Title

Community Networks at the Edge of Ancient Andean States: a view from the Tiwanaku frontier, Locumba, Peru (ca. AD 500-1100)

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Community Networks at the Edge of Ancient Andean States: a view from the Tiwanaku frontier, Locumba, Peru (ca. AD 500-1100)

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy

in

Anthropology

by

Matthew J. Sitek

Committee in charge:

Professor Paul Goldstein, Chair
Professor Guillermo Algaze
Professor Geoffrey Braswell
Professor Christine Hunefeldt
Professor Elizabeth Newsom
Professor Bruce Owen

2022

The Dissertation of Matthew J. Sitek is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

University of California San Diego

2022

DEDICATION

For my family,

But particularly for four generations of women who have always (and continue to) inspire me to stay the course and get it done.

my grandmother Harriet,
my mother Karla,
my wife Kat,
and my daughter Harriet

EPIGRAPH

History never repeats itself,
But the kaleidoscopic combinations
Of the pictured present
Often seem to be constructed out of the
Broken fragments of antique legends.

The Gilded Age: A Tale of To-Day (1874)

Mark Twain

There is no great and small
To the Soul that maketh all:
And where it cometh, all things are
And it cometh everywhere.

History (1841)

Ralph Waldo Emerson

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ACKNOWLEDGMENTS

It is difficult to know where to begin an acknowledgments section for a project that has taken over a decade to complete. It feels like a lifetime ago, that I had the good fortunate to make a trip to the middle Locumba Valley to visit the site of Cerro San Antonio for the first time. So much has happened since, that I know I will make the misstep of forgetting some very critical people and their contributions to this dissertation, but I want to do my best to acknowledge as many as I can here.

First, I want to thank those directly connected to this thesis document and the final product, my doctoral committee. First and foremost, here, Paul Goldstein, the chair of my committee and my academic adviser throughout graduate school, has been most intensively involved in this thesis. Paul introduced me to the world of southern Peruvian archaeology, and through his mentorship I have built this thesis around my work there. As the lead director of the Proyecto Arqueologío Locumba (PAL), all work presented here was completed under his direction and I truly couldn't have completed this project without him.

My other committee members have also provided me with a significant amount of guidance throughout my thesis development as well as my graduate career more broadly. Guillermo Algaze has always been generous with his time, willing to read important drafts, including any number of grant proposals for funding this work. His seminars were always some of the most thought provoking and his macroscale perspectives on the ancient world had a huge impact on my own ideas developed here. Geoff Braswell has always been willing to provide honest feedback, and his comments on my work have always compelled me to improve. In addition, having been a TA for several of Geoff's undergraduate courses his enthusiasm and well-crafted lectures certainly inspired my own approach to teaching archaeology. Christine Hunefeldt was one of my strongest advocates in graduate school and her seminars on the Inca and broader Andean history always provided a breath of fresh air to old narratives. Elizabeth

Newsome also always provided thought provoking seminars and allowed me to pursue creative avenues of my research and really delve into new interesting aspects of the art of the ancient Americas. Finally, Bruce Owen has provided some of the most detailed comments on this document, which were more-than-appreciated, and his extensive knowledge of the southern Andes and particularly the Valles Occidentales has been a major asset to the development of this thesis.

I'd like to thank the University of California, San Diego (UCSD) and particularly the Department of Anthropology for my graduate school experience. While full of ups and downs, I have truly valued the opportunity to pursue my graduate degrees and develop my pedagogical skills. In addition to those professors on my committee, a number of other faculty in my home department at UCSD provided interesting seminars and very useful guidance throughout my graduate career, particularly: Jonathan Friedman, Shirly Strum, Rupert Stasch, Margarete Schoeninger, Nancy Postero, and Tom Levy. In addition, so many of my fellow grad students at UCSD, both within Anthropology and other departments, gave me such critical support over the years. This could range from professional interactions in seminars to letting off steam at the Lewis Street house, but all of it made the difference through the dregs of grad school. Again, I am sure to miss a few, but some of the closest UCSD grad support came from Andrew Somerville, Ben Ellerby, Corina Most, Ben Van Overmeire, Kari Hansen, Doruk Beyter, Amrita Kurian, Shane McClain, Keven Henner, Michael Berman, Misha Miller-Session, Sowbi Balaswaminathan, Kyle Knabb, Nancy Peniche May, Jimmy Daniels, and Matt Howland.

I need to give extra thanks to my fellow lab mates in the UCSD South American Archaeology Lab – again, directed by Paul Goldstein. This is where I spent most of my time on campus, and my colleagues and friends in the lab made some of the biggest impacts on my graduate school career and especially my development as an Andeanist. My lab mates here include Sarah Baitzel, Alicia Boswell, Beth Plunger, Giacomo Gaggio, Ariana Garvin, Brandon Gay, Andrew deLeon, Juliana Santillian-Goode, and Ulli Green. I owe so much, in particular to

the mentorship and friendships of Sarah and Alicia, who always looked out for me.

Finally, my last years on-campus at UCSD were spent honing my teaching skills as an instructor in the Muir College Writing Program (MCWP). I felt my pedagogical approach made more progress in my three years here than any time before or since and I am truly obliged to the director Carrie Watsal and the rest of the MCWP team for how they run their program.

Reaching even further back on my academic path, I wouldn't be where I am today without having come through one of the strongest archaeological undergraduate programs out there. The Department of Archaeology & Anthropology at the University of Wisconsin, La Crosse (UWL) is where I took my deep dive into the world of archaeology and I couldn't think of a better place to have done it. Not only the student-focused department but the Mississippi Valley Archaeology Center provided such a strong and immersive experience in both academic and applied sides of the field. Within the department I took many foundational courses from Joe Tiffany, James Theler, Dave Anderson, and Susana Lloyd. Particularly important faculty influences at UWL were Tim McAndrews and Christine Hippert. Both Tim and Christine imparted their passions of Andean culture, past and present, to me, and their joint field school in Cochabamaba, Bolivia was my first experience traveling to the Andes and one that changed my life. Tim was also pivotal in helping me navigate applications and find the right graduate program to take the next step in academia.

As noted above, one of the resources that sets the UWL archaeology program apart is the Mississippi Valley Archaeology Center (MVAC). At MVAC I was introduced to the field of cultural resource management and had endless opportunities to work directly with archaeological materials from around the Upper Midwest. Kathy Stevenson, Connie Arzigian and the rest of the MVAC staff were always patient and willing to answer questions and issue corrections to an over-eager undergraduate. I feel my time volunteering at and later being employed with MVAC is when I actually became an archaeologist and for that I will be forever grateful.

Finally, my first steps into higher-ed were actually completed at Winona State University (WSU). Here I have to highlight the superb program that was the Northern Great Plains Experience (NGP), led by professors Rob Brault and James Reidy. This program took us out across the Great Plains and introduced us to the culture and history of the Lakota and Northern Cheyenne. This trip was another profound life experience and ultimately one that would prime my life of anthropology. In addition, one individual at WSU, who in some ways impacted my academic path into archaeology more than anyone else, was Cathie Logan. After a one-credit obligatory orientation course during freshman year, Cathie really took interest in my academic future and not only first showed me the brochure to the UWL Archaeology Program, but ultimately advocated for my transfer from WSU to UWL – this small act of kindness on her part would change my life.

One of the most significant long-term changes that rippled from my discovery that archaeology was a pursuable career, was spending a significant portion of every year in the Central Andes. While first spending time in Bolivia, particularly around Cochabamba and La Paz, I would ultimately find myself in the far south of Peru. I really can't say how grateful I am for my time in the southern Peruvian valleys of the Osmore and Locumba drainages. I consider the cities and towns of the far south, particularly Moquegua, Arequipa, Villa Locumba, and Tacna, to be some of my favorite places and I am so grateful for the never-ending hospitality of so many people I have met there.

My first days in Peru were spent in Moquegua and after that I made sure as many of my days as possible would be spent there. I consider Moquegua a home-away-from-home and so many of my fondest memories of the past ten years can be found there. Professionally, like most archaeologists who have passed through Moquegua in the last 35 years, I am forever grateful to the Museo Contisuyu and every single staff member there (past and present), particularly Paty Palacios, Yamilex Tejada, Antonio Oquiche, Julio Pinto Vera, Rocío del Carmen Tejada, Marco Quea, Raúl Linares, Raúl Menaut Huacan, and Luciano Santos

Gutierrez. Here at the museo, out in the field, and elsewhere in Moquegua I also had the good fortune of many great conversations over pisco and good music with many archaeologists from around the world. In particular, Sarah Baitzel, Allisen Dahlstedt, Nikki Sharratt, Rosalia Choque Gonsalez, Matthew Biwer, Sofia Chacaltana, Giacomo Gaggio, Macelo Maaldonada, Raquel Monscoso, and Sara Beker were re-occurring characters in my Moquegua archaeological experience and it wouldn't have been the same without them. Huge thanks specifically to Allison Davis, who really showed me the ropes of living in Andes during my early days in Peru. Finally, I received some of my strongest professional support from the four archaeologists who really form the core of the archaeological community in Moquegua: Mike Mosley, Donna Nash, Susan deFrance, and Ryan Williams. All four have supported me since my first days on the Moquegua scene and have provided useful and often essential advice and encouragement ever since. Mike, Susan, Donna, and Ryan – thank you!

Other friends from around Moquegua, who were always willing to help include Betty and Roberto de Olazabel, German Zapata, Yeremy Maquera Fernandez, Andy Badoino, and all the gentleman down at the Club Moquegua. However, here more than anyone I need to thank my closest friend in Peru and one of the most interesting and generous people I have ever met, Andrew Mitchell. Andrew's home at Estación el Conde in the Moquegua Valley was truly my home-away-from-home for many field seasons. Andrew is without-a-doubt one of the most giving people I know and was always willing to open his doors to me and my family. Here at Conde, the late, great Ina and neighbors Vidal and Candelaria were always patient with the North Americans that would enter their lives for a handful of months each year. Andrew's family David, Marie, Sara, and Patrick were also frequently willing to help me and my wife while in Lima and I owe them a huge thanks as well!

I had the pleasure of working in various capacities for several field schools based in Peru. In 2011 and 2012 I worked for Proyecto Omo and Paul Goldstein's return to excavating the Omo Temple in Moquegua. I met so many superb Peruvian field excavators during this time, including Gumercindo, Flora, Elia, Eva, Nico, Rosalia, Cesar, Justina, and Dina. In regards to field schools, I also want to thank Abby Levine for letting me tag-along on her Institute for Field Research field school in Taraco. While just one season, it was great to put in some time in the highlands generally and the northern Titicaca Basin specifically.

Moving on to those that directly assisted with the project detailed in this dissertation. As noted above, all work completed for this thesis was conducted under the broader Proyecto Arqueologío Locumba (PAL), which is directed by Paul Goldstein and Antonio Oquique Hernani. I am extremely grateful to both of them for guidance through the process of developing and writing propuestas and informes and getting the big picture logistical issues under control. I owe more thanks than I could possibly put into words here to Sarah Baitzel and Arturo Rivera Infante. They helped in multitudes of small ways and a fair share of big ways, but they were always willing and almost always able to help – I couldn't have done this without them! In terms of logistical assistance, I would like to thank the knowledgeable staff and professional archaeologists, based at the Ministerio de Cultura office in Tacna, particularly Rosana Revilla for helping me navigate the official business.

Here is a good place to acknowledge the various sources that very generously provided funding for my work at Cerro San Antonio and this dissertation. My largest source of funding came from the National Science Foundation in the form of a doctoral dissertation improvement grant, but I also received very generous grants from the American Philosophical Society and the San Diego chapter of the Explorers Club. In addition, I received great support from various organizations within my home university, UCSD. These included small, but critical, grants from the Office of the Dean of Social Science, the Center for Iberian and Latin American Studies, the International Center, and of course, my home department, the Department of Anthropology.

In terms of the field work itself, I want to thank those who took the time to help make initial site visits to Cerro San Antonio when this project was still just a dream. Paul Goldstein Herber Cahuana, Alex Sicos, Sarah Baitzel, Gacomo Gaggio, David Neiss, and Kat Huggins all helped me find my way. Early advice and info about local archaeology in Locumba and Tacna came from Colleen Zori, Carlos Vela, Adan Umire, and Jesus Gordillo. I want to highlight the work input made on-site by both the 2015 and 2016 UCSD Archaeological Field schools as well as supervisors for those field schools, such as Giacomo Gaggio, Jordan Dalton, and Brandon Gay. At various times, critical pieces of field equipment were generously loaned to me, particularly from Donna Nash and Paul Goldstein.

I must thank the municipality of Villa Locumba for their hospitality during my many months of field work in their little community. The municipal hotel was often host to our field schools and other local institutions like the Pequinita Market and the restaurant Rosarios, kept me fed and well-supplied. A number of people in Locumba would provide above-and-beyond support for my work and would ultimately become close friends, I owe a special debt of gratitude to Pastora Nieto, Percy Medina, Angelica Condori Calla, and Bartoleme Apaza. However, I owe the biggest thanks to Jhon Ortega as well as his family, for not only hosting my wife and I during the final big push of field work, but for being a close friend with a huge heart – thank you Jhon!

During writing the last few years I have had the good fortune of finding my way into academic teaching as well as back into the world of cultural resource management. I want to thank Deb Gold and the Department of Anthropology at St. Cloud State University for having kept me employed and my pedagogy honed the past few years. More recently, I have been employed at Bolton & Menk Inc., and am incredibly grateful to Jammi Ladwig and the rest of the cultural resources team for getting me back into the field in the Midwest.

Finally, I want to thank those who have supported me long before my days in archaeology and continue to be the foundation of everything in my life, my family. I am lucky enough to have been raised in a close-knit family with many aunts, uncles, and cousins who are too numerous to list here, but each played their part. However, I do want to highlight all four of my grandparents: Mike and Mary, Harriet, and Gordon – each of whom influenced me in their own way. I am again so lucky to have three siblings, Alex, Ellie, and Ben, who are my closest friends. I am so proud of who they have become and hope they know that even though I'm the oldest, I often find myself looking up to them. Finally, my parents, Jerry and Karla, to whom I owe more than I could ever possibly say. They have always been supportive and have always encouraged me to chase my wildest dreams, while also managing to keep my feet on the ground.

The final person to acknowledge, is also the person who played the single most profound role in this project and certainly my life the past ten years, my wife, Kat. Kat has been with me nearly every step of the way, from initial site visits in 2014 to my final days of field work in 2019. In fact, Kat was my primary co-excavator during 2018-19 excavations and my only assistance in the major material analysis that followed. She has been my travel companion and professional collaborator, my best friend and my muse. I owe Kat so much for her support along this process, I don't quite know where to start and certainly don't know where it ends. Now as we set out in parenthood together, I look back and can hardly believe where we have been and can only imagine just where we might go. Thank you, my love!

VITA

Education

2022 **Ph.D.** – *Anthropology* – Department of Anthropology, University of California San Diego (UCSD).

2013 **M.A.** – *Anthropology* – Department of Anthropology, University of California San Diego.

2010 **B.S.** (with honors) – *Archaeological Studies*, minor *Anthropology* – Department of Archaeology & Anthropology, University of Wisconsin, La Crosse (UWL).

Other Professional Affiliations

Register of Professional Archaeologists (RPA #: 4699)

Member of the Society for American Archaeology (Member Since: 2010)

Employment

2021-present **Cultural Resources Technician** – Bolton & Menk, Inc. – Burnsville, MN

2019-2021 **Adjunct Faculty**- Department of Anthropology – St. Cloud State University (SCSU)

2015-2019 **Field Director and Project Coordinator** - Proyecto Arqueológico Locumba (PAL). Locumba, Peru.

2015-17 **Instructor** – Muir College Writing Program – University of California San Diego

2015-16 **Program Coordinator** and **Lead Supervisor** – UCSD Undergraduate Archaeological Field School, Peru – Locumba, Peru. Directed by Dr. Paul Goldstein (UCSD).

2013 **Field Supervisor** – Institute for Field Research (IFR) Field School Program – Taraco, Peru. Directed by Dr. Abigail Levine (UCLA).

2012 **Program Coordinator** and **Supervisor** – UCSD Undergraduate Archaeological Field School, Peru – Moquegua, Peru. Directed by Dr. Paul Goldstein (UCSD).

2011-15 **Teaching Assistant** – Department of Anthropology – University of California, San Diego.

2011-15 **Research Assistant** – South American Archaeology Lab, Department of Anthropology – University of California, San Diego.

2011 **Field Supervisor** – UCSD Undergraduate Archaeological Field School, Peru – Moquegua, Peru. Directed by Dr. Paul Goldstein (UCSD).

2010-11	**Cultural Resource Technician** and **Public Field School Supervisor** - Mississippi Valley Archaeology Center (MVAC) – La Crosse, WI.

Honors and Awards

2020	Adjunct Faculty Improvement Grant (SCSU)
2020	Anthropology Dissertation Fellowship, Department of Anthropology (UCSD)
2019	George Haydu Prize for the Anthropological Study of the Interaction of Culture, Behavior and Human Values (UCSD): Essay Title: *Community Ecology: a deep-time perspective on the emergence of middle-range sociality*
2018-19	National Science Foundation (NSF) – Doctoral Dissertation Improvement Grant (Award #1841909)
2018	Lewis and Clark Field Scholar – American Philosophical Society
2018	Exploration and Field Research Grant - Explorers Club (San Diego chapter)
2017-18	F.G. Bailey Fellowship (Dept. of Anthropology, UCSD)
2017	Friends of the International Center Scholarship (UCSD)
2016	Dean of Social Sciences Travel Grant (UCSD)
2015	Tinker Dissertation Grant - Center for Iberian and Latin American Studies (UCSD).
2014	Dean of Social Sciences Travel Grant (UCSD).
2013	Center for Iberian and Latin American Studies (CILAS) – Travel Grant (UCSD).
2012-13	Mel E. Spiro Anthropology Fellowship, Department of Anthropology (UCSD).
2012	Dean of Social Sciences Travel Grant (UCSD).
2010	Department of Archaeology & Anthropology Honors. (UWL).
2009	Undergraduate International Research Grant (UWL).

Publications and Presentations

<u>*Journal Articles*</u>

2022	**Tiwanaku Sealings and Signet Rings: authority transmission in the ancient Andes.** Paul Goldstein, Kathrine Davis, Sarah Baitzel, & Matthew Sitek. *Latin American Antiquity* (completing final revisions).
2018	**Plazas and Processional Paths in Tiwanaku Temples: convergence, divergence, and encounter at Omo M10**. Paul Goldstein & Matthew Sitek. *Latin American Antiquity* (29)3:455-474.

2010 **Household Archaeology at the site of Pirque Alto: Cochabamba, Bolivia**. Matthew Sitek. *Journal of Undergraduate Research* Volume XIII: University of Wisconsin-La Crosse.

Book Chapters

(in-press) **Un Enfoque Holístico del Entorno Construido: un ejemplo de la arquitectura provincial Tiwanaku en Moquegua, Perú**. Matthew Sitek & Paul Goldstein. Arqueológica del Sur: Museo Contisuyu después de 25 años, Moquegua, Peru.

Conference Presentations

2022 **Moquegua, a Tiwanaku Hub: better understanding Tiwanaku's multimodal community network in the Valles Occidentales**. 87th Annual Meeting of the Society for American Archaeology, Chicago, IL.

2021 **Investigación Reciente en el Sitio del Cerro San Antonio (L1) en el Valle Medio de Locumba, Tacna, Perú.** La región olvidada de la arqueología peruana: 10 años de investigación en Tacna (virtual roundtable). Instituto Francés de Estudios Andinos.

2021 **Communities in the Campo: household excavations at a Tiwanaku frontier settlement in the middle Locumba Valley, Peru (ca. AD 500-1100)**. 86th Annual Meeting of the Society for American Archaeology, San Francisco, CA.

2020 **Comunidades en el Campo: excavaciones domésticas en un asentamiento fronterizo de Tiwanaku en el valle medio de Locumba, Perú (ca. 500-1100 dC).** Primer Seminario de Arqueología Transnacional entre Perú, Bolivia y Chile, Tacna, Peru.

2019 **Un Enfoque Holístico del Entorno Construido: un ejemplo de la arquitectura provincial Tiwanaku en Moquegua, Perú**. Matthew Sitek & Paul Goldstein. Seminario Arqueológica del Sur 2019: Museo Contisuyu, Moquegua, Peru.

2018 **Finding the Middle Ground: community networks and their role in archaeological interpretation**. Matthew Sitek. UCLA Cotsen Institute of Archaeology 7th Biennial Graduate Conference.

2017 **Tiwanaku colonization and the greater reach: preliminary results of the Locumba Archaeological Survey.** Paul Goldstein & Matthew Sitek. 82nd Annual Meeting of the Society for American Archaeology, Vancouver, BC, Canada.

2015 **Second-Hand Spaces: abandonment and reoccupation during the final stages of a Tiwanaku provincial temple (Omo M10A).** Matthew Sitek, Sarah Baitzel, Kathleen Huggins, and Paul Goldstein. 80th Annual Meeting of the Society for American Archaeology, San Francisco, CA.

2014 **Liminal Plazas, and processional paths in Tiwanaku temples: Divergence, convergence and the rule of three at Omo M10.** Paul Goldstein and Matthew Sitek. 79th annual meeting of the Society for American Archaeology, Austin, TX.

2010 **Ethnographic Analogy: A Study of Household Life in Highland Bolivia, Past and Present**. Matthew Sitek. Latin American Modernities: A Workshop on Collaboration, Research and Service, Viterbo University, WI.

Conference Posters

2016 **Preliminary Research into the Presence of Tiwanaku at the Site of Cerro San Antonio in the Middle Locumba Valley, Peru.** Matthew Sitek & Paul Goldstein**.** 81st Annual Meeting of the Society for American Archaeology, Orlando, FL.

2015 **From Trash Pile to Temple Wall: the distribution of Formative Period sherds in adobes at the Omo M10A Tiwanaku temple.** Kathleen Huggins, Matthew Sitek, and Paul Goldstein. 80th annual meeting of the Society for American Archaeology, San Francisco, CA.

2015 **Preliminary Research at the Site of Cerro San Antonio in the middle Locumba Valley, Peru**. Matthew Sitek and Paul Goldstein. 55th annual meeting of the Institute of Andean Studies, Berkeley, CA.

2014 **Building on Ancient Ground: excavations at a Formative Period sunken court complex in the northern Titicaca Basin**. Matthew Sitek and Abigail Levine. 79th annual meeting of the Society for American Archaeology, Austin, TX.

2014 ***Taypi*, Why the Middle Matters: duality and mediating space in provincial Tiwanaku architecture**. Matthew Sitek and Paul Goldstein. 54th annual meeting of the Institute of Andean Studies, Berkeley, CA.

2013 **The Middle Court - liminal space in provincial Tiwanaku monumental architecture.** Matthew Sitek and Paul Goldstein. 78th annual meeting of the Society for American Archaeology, Honolulu, HI.

2010 **Household Archaeology at the Site of Pirque Alto, Bolivia**. Research in the Rotunda – University of Wisconsin Celebration of Undergraduate Research. Madison, WI.

Reports

2021 **Phase I Archaeological Survey for County Road 1 Improvements, Norway Lake and Arctander Townships, Kandiyohi County, Minnesota** (submitted to the Minnesota State Archaeologist). Jammi Ladwig, Danielle Kiesow, & Matthew Sitek.

2021 **Phase I Archaeological Survey for County Road 119 Improvements, Whitefiel and Fahlun Townships, Kandiyohi County Minnesota** (submitted to the Minnesota State Archaeologist). Jammi Ladwig, Danielle Kiesow, & Matthew Sitek.

2019 **Reconocimiento Sistimatico del Valle Central de Locumba: patrones de asentamiento y migración en los Andes Antiguos, etapa 3 (2018-19)** (submitted to the Peruvian Ministerio de Cultura). Paul Goldstein & Antonio Oquiche.

2016 **Reconocimiento Sistimatico del Valle Central de Locumba: patrones de asentamiento y migración en los Andes Antiguos, etapa 2 (2016)** (submitted to the Peruvian Ministerio de Cultura). Paul Goldstein & Antonio Oquiche.

2010 **Phase I Archaeological Survey for Timber Parcels Proposed for Harvest in the DuBay Flowage (FERC License No. 1953), Portage and Marathon Counties, Wisconsin** (submitted to the Wisconsin State Archaeologist). Constance Arzigian, Michael Straskowski, & Matthew Sitek.

Theses

2022 **Community Networks at the Edge of Ancient Andean States: a view from the Tiwanaku frontier, Locumba, Peru (ca. AD 500-1100).** Doctoral Thesis (Ph.D.) – UC San Diego

2013 **Taypi, a View from the Middle (Court): analysis of liminal space in provincial Tiwanaku monumental architecture (Omo M10A)**. Matthew Sitek. Master's Thesis (M.A.) – Department of Anthropology, UC San Diego.

2010 **Household Archaeology at the site of Pirque Alto: Cochabamba, Bolivia**. Matthew Sitek. Honors Thesis (B.S.) – Department of Archaeology & Anthropology, UW La Crosse.

Invited Guest Lectures

2019 ***A New Archaeological Tool Kit: GIS, UAVs ("drones"), and Photogrammetry in the Field****.* For UWL Archaeology Club talk series – UW La Crosse.

2016 ***Understanding Inca Statecraft****.* For HILA 123 – the Incas and their Ancestors, Prof. Christine Hunefeldt. Department of History – UC San Diego.

2015 ***A Brief History of Archaeological Thought****,* ***Archaeological Field Methods*** *(2 lecture series)*. For ANTH 3 – World Prehistory, Prof. Thomas Levy. Department of Anthropology – UC San Diego.

2014 ***World Systems Theory and Empires – the Inca (Peru) and Qin (China) Compared***. For POLI 123 – Politics of Empire, Prof. John Lejeune. Department of Political Science – UC San Diego.

2014 ***Development of Complexity in the Oaxaca Valley (Mexico)***. For ANTH 53 – the Aztecs and their Ancestors, Prof. Geoffrey Braswell. Department of Anthropology – UC San Diego.

2013 ***The Archaeology of Andean South America*** *(3 lecture series)*. For HILA 123 – the Incas and their Ancestors, Prof. Christine Hunefeldt. Department of History – UC San Diego.

2011 ***An Introduction to Archaeology***. For ANTH 1 – Introduction to Culture, Prof. Jana Fortier. Department of Anthropology – UC San Diego.

ABSTRACT OF THE DISSERTATION

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Community Networks at the Edge of Ancient Andean States: a view from the Tiwanaku frontier, Locumba, Peru (ca. AD 500-1100)

by

Matthew J. Sitek

Doctor of Philosophy in Anthropology

University of California San Diego, 2022

Professor Paul S. Goldstein, Chair

This dissertation develops a *community ecology* framework, which utilizes methods developed through network-analysis and the broader study of complex adaptive systems. Unlike most models of state growth that have tended to support either top-down, macroscale explanations, or bottom-up or more microscale-focused perspectives to connect between state

and individual, my approach privileges the mesoscale, considering the community as the pivotal middle ground. I focus on Tiwanaku, one of the first state-level societies to expand in the Middle Horizon of the Central Andes, (ca. AD 600-1100), using results from several seasons of archaeological research at the Tiwanaku occupation of the Cerro San Antonio (L1) site, in the middle Locumba Valley on the far south coast of Peru. This work included survey and mapping, systematic surface collection, and extensive household archaeology excavations and material analysis. Using the community ecology framework, I synthesize these data to reconstruct the culture history of the site, understand the daily lives of Cerro San Antonio's Tiwanaku residents, and delineate the role this node played in Tiwanaku's dynamic multimodal community network on its western frontier. In doing so I shed light on the nature of Tiwanaku statecraft and contribute to the anthropological understanding of how individuals, communities, and institutions operated within nascent states of the past.

INTRODUCTION

One of the key issues facing the world today is how to balance the political, economic, and social tensions that arise as individuals, communities, and institutions become integrated into increasingly complicated interaction networks in which commodities, information, and of course people flow between borders. While the contemporary scale of these phenomena is unprecedented, the roots of the processes driving what is collectively known today as globalization and the emergence of the Anthropocene, reach deep into prehistory. First-generation states of the ancient world were, by definition, the first sociopolitical organizations to formally integrate culturally diverse and economically differentiated regions into interconnected networks that must be conceptualized as globalized systems. During the Middle Horizon (ca. AD 600-1100) Tiwanaku was the first state-level polity to emerge in the South-Central Andes and is a crucial case study for understanding the processes that lead to these prehistoric periods of increased exchange and interconnectivity. This dissertation investigates the development of early globalized networks in the Tiwanaku realm from the perspective of colonial encounters. Differently put, I am exploring how individuals living on the frontier of the Tiwanaku state negotiated their potentially varying roles in local, regional, and supraregional multi-modal community networks. In turn, this will inform our understanding of how long-term local and transregional interactions evolved in the Andean region and inform broader anthropological questions which seek to understand the ever-emerging globalized systems of the present.

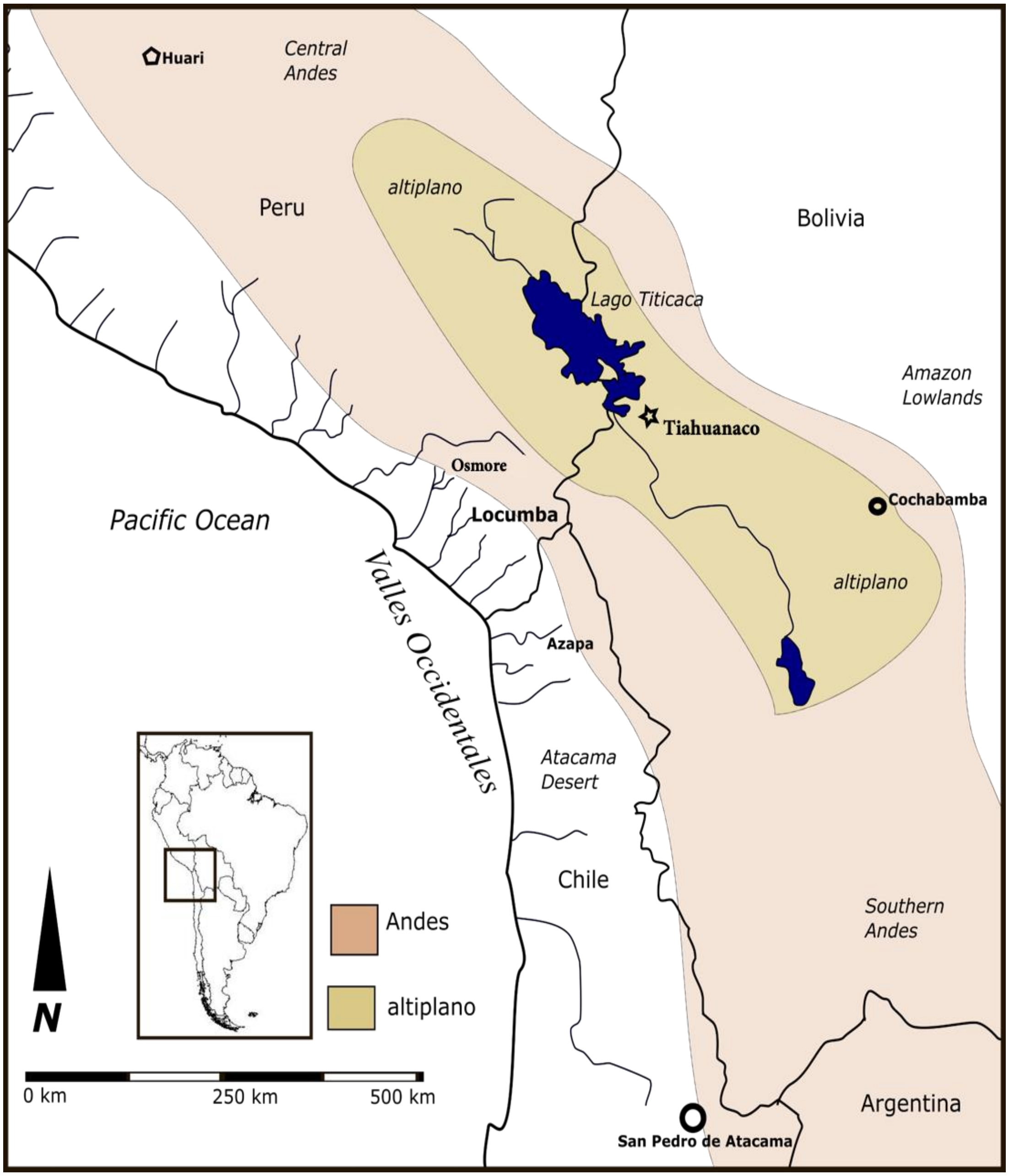


Figure 1. Map of the South-Central Andes: Schematic map of the south-central Andes with important Tiwanaku sites indicated.

Throughout the Middle Horizon, but particularly from ca. A.D.800 to A.D. 1100, the nascent state of Tiwanaku influenced much of the South-Central Andes (Figure 1). The coastal river valleys of southern Peru and northern Chile formed the western frontier and one of the focal points of Tiwanaku influence. Previous research has shown that Tiwanaku's colonial footprint in this region was not uniform, and the different forms that highland influence took in the Osmore (southern Peru) and Azapa (northern Chile) drainages demonstrate the crucial role that scale, timing, and distance may have had for understanding the choices and constraints faced by populations at the Tiwanaku frontier. In this sense, the research presented here is particularly important as it centers on the site of Cerro San Antonio (L1), located in the Locumba Valley which is geographically situated between the more well-studied regions of northern Chile and southern Peru. My dissertation research at the site between 2012-2019 shows that the Middle Horizon occupation of the site comprises three residential sectors and associated cemeteries with Tiwanaku material assemblages, covering over 25 hectares (Figure 2).

Ancient states were by definition expansive and inherently transregional, globally-oriented institutions. It is crucial to determine how these early polities were able to expand and to what degree this expansion involved strategies of direct control or more hegemonic forms of integration. Frontier-based perspectives on this issue are particularly important. Frontiers are places of sociopolitical contact, where cultural differences are formalized through alterity and where new cultural forms emerge through hybridity and other processes of ethnogenesis. These frameworks, which emphasize the potential for intensified cultural and socio-political change at the intersection of multiple cultures, highlight the need for more nuanced, localized understandings of how complex societies operate from the bottom-up. As one of the primary settings for the foundational practices of daily life, the material remains of households and other domestic contexts are sensitive indicators of community affiliation and outside influences, and act as particularly potent material remains for engaging with the past. Through methods developed primarily under the heading of household archeology, I utilize these domestic remains at the site of Cerro San Antonio as my primary form of evidence for investigating this well-preserved frontier site.

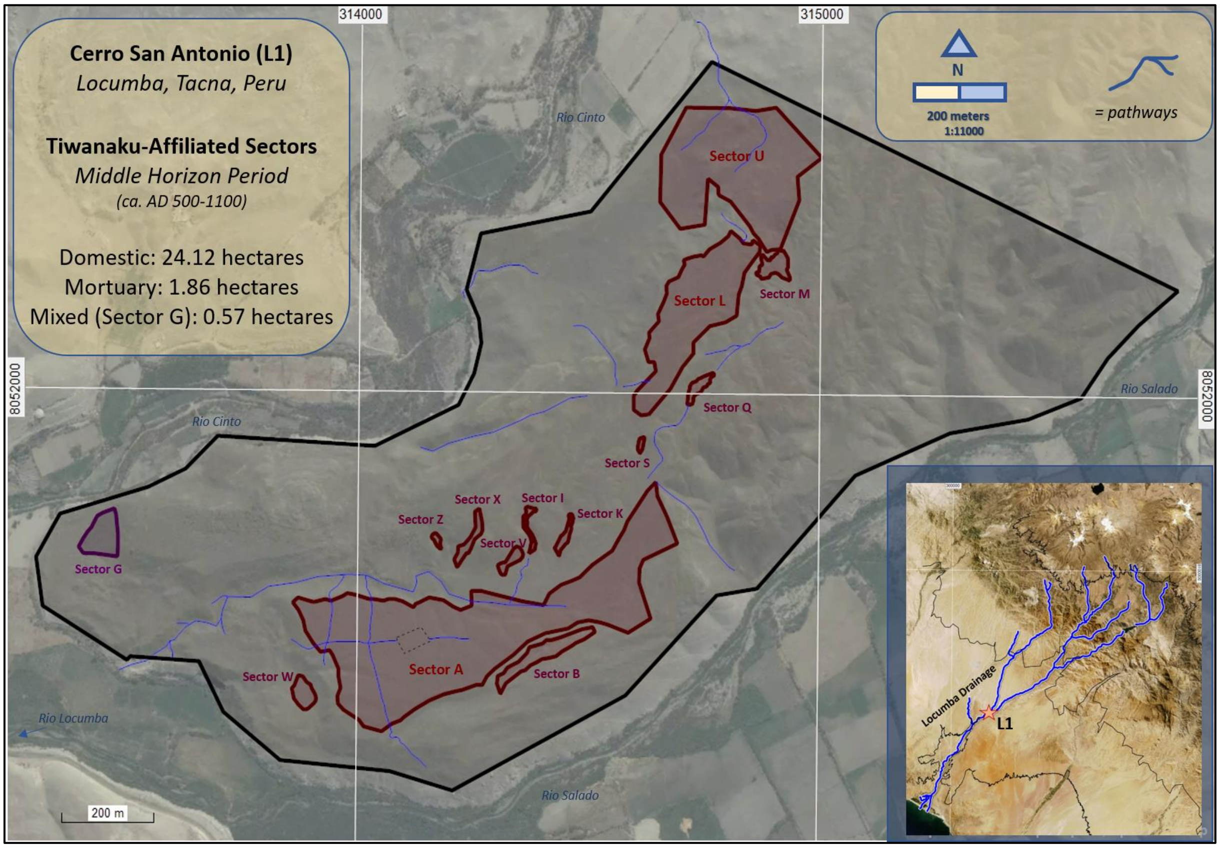


Figure 2. The archaeological site complex of Cerro San Antonio (L1) in the middle Locumba Valley in southern Peru with Tiwanaku-affiliated sectors displayed. (insert) Cerro San Antonio's general location in the broader Locumba drainage.

While I approach the issue of Tiwanaku statecraft using this fundamentally bottom-up approach, complex adaptive systems, as exemplified by macro-level institutions like the state, must also be understood from top-down perspectives. Indeed, in the final analysis the transregional processes associated with state expansion must be understood as the emergent result of local interactions between individuals (bottom-up), but these interactions are always constrained by global conditions of the broader networks in which they take place (top-down). Informed by complexity science and drawing heavily on multiple schools of network analysis I synthesize data collected through archaeological survey, excavation, material analysis, remote sensing, geographic information systems, and ethnographic research to explore how daily life, community dynamics, and broader processes of state expansion unfolded at Cerro San Antonio at micro-, meso-, and macro-scales.

In order to grapple with the complexity inherent in this approach I have developed a robust middle-range framework which I use to bridge the gap between the micro and macro. I use the term community ecology to define this framework as I feel that communities are the natural emergent result of human social engagement and as such are the true intermediary between the local world of individual experience and the global realm of institutions. I ground this community ecology framework to the socio-geographical context of the Andes through the indigenous Andean concept of ayllu - a term with substantial intersections to my definition of community. Therefore, it is my community ecology framework viewed through the lens of ayllu that forms the central theoretical thrust and informed my research questions and the hypotheses I composed to test those questions.

Research Questions and Hypotheses

My project harnesses the fine resolution gained from detailed household context investigations while maintaining a globally-oriented focus, by investigating to role of Cerro San Antonio in the broader Tiwanaku network as a multiscalar issue.

At the *microscale*: What types of activities defined the everyday lives of individuals living at Cerro San Antonio during the Middle Horizon? How were specific spaces within and between domestic structures used and is any specialization present? What connections can be made between materials recovered in these hyper-local contexts and the broader Tiwanaku realm?

At the *mesoscale*: How did households at the frontier site of Cerro San Antonio in Locumba coalesce into residential communities? Were there substantial differences within and between sectors? Was there specialization present at the settlement level? Finally, how were these settlements then articulated into the Tiwanaku state?

At the *macroscale*: Does this settlement represent a diasporic colony with separate community ties than those that have been traced to the Osmore drainage or is Cerro San Antonio an outgrowth of the successful Osmore provincial center? Alternately, is the Locumba settlement more like those observed in northern Chile, with indigenous populations that restructured themselves due to contacts and trade with Tiwanaku? What can the role of the Locumba node tell us about the topology of broader Tiwanaku network? Do the settlements in Locumba confirm strategies of a centrifugal political force compelling highland communities to establish new enclaves or that of a centripetal force, drawing distant communities in via exchange of goods and ideas?

I spend Chapter 1 and Chapter 2 of this dissertation contextualizing and further advancing these questions. Similarly, at the end of Chapter 4 (see *4.3*) I present a detailed account of my primary hypotheses, their archaeological correlates, and anthropological implications, but I also wanted to present them here at the fore to help guide this discussion from the onset.

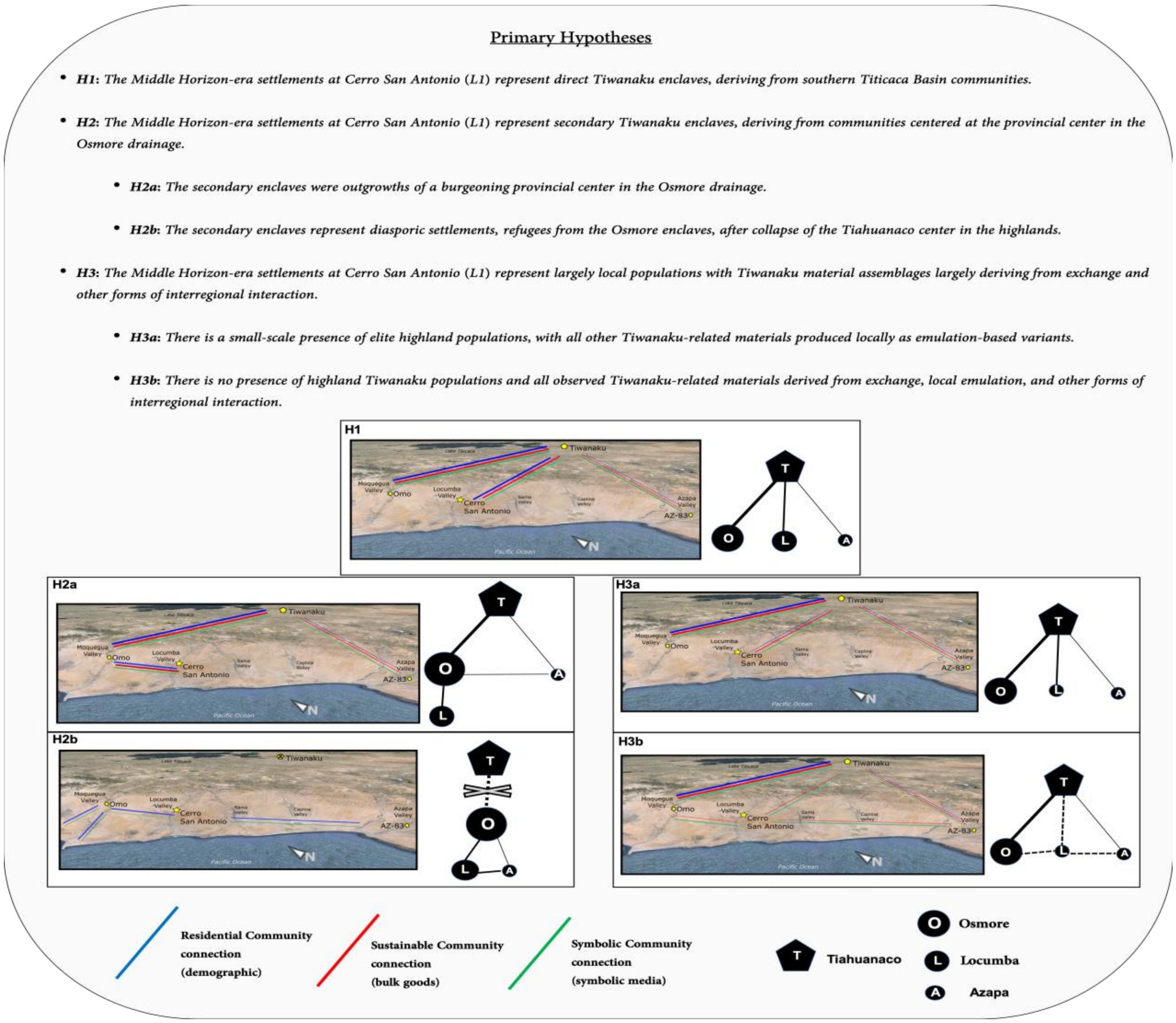


Figure 3. Graphic display of the primary hypotheses tested in this study. (above) Summary of my three primary hypotheses and their variants: Hypothesis 1 (H1), Hypothesis 2 (H2) and its two variants (H2a and H2b), and Hypothesis 3 (H3) and its two variants (H3a and H3b). (below) Network and map-based visualizations of the three hypotheses.

Again, these hypotheses will be further contextualized and explained in later chapters (see 4.3). Of course, the results to this hypothesis testing and my interpretations of those results are also presented, in detail, in later chapters and summarized in the formal Conclusion.

Document Organization

Finally, I want to end this introduction with a brief outline of the organization of this thesis. This will only highlight the most essential aspects of each major section and subsequent chapters.

Section 1 contains the chapters that discuss the broader research context in which this study is situated. This includes extensive literature review, synthesis, and the introduction of some of my own formulations for understanding human sociality and the archaeological record. Section 1 also provides detailed descriptions of the materials and methods employed in this study.

Chapter 1 provides the primary theoretical context for my approach to understanding human sociality and the archaeological record. This discussion begins necessarily by introducing the field of complexity science and the study of complex adaptive systems, before moving on to how I situate the anthropological study of the human condition into this complexity-informed perspective. Here I focus on middle-range sociality and propose a framework based around an ecology of communities. I then turn to how this community ecology approach can be used to help interrogate long-standing archaeological inquires. Here my main focus is on exploring the phenomena of increasing sociopolitical complexity in human societies worldwide and specifically the evolution of the state.

Chapter 2 situates the theoretical issues discussed in Chapter 1 in the socio-geographical context of the Andes. This extensive chapter covers a number of important topics. First, I review some features of the Andean natural environment and geography, critical for understanding sociocultural development in the region. In order to provide a longue durée perspective for my specific study in Locumba I also provide a brief history of the development of sociocultural complexity in the Andes from peopling to present day. Next, I discuss the indigenous Andean concept of *ayllu* and its intersections with my community ecology approach. Finally, I end this chapter by reviewing the archaeological understanding of Tiwanaku, the sociopolitical phenomenon that is the focus of this study.

Chapter 3 introduces the setting and materials used for this study, namely the middle

Locumba Valley on the far south coast of Peru and specifically the archaeological site complex of Cerro San Antonio (L1). Here I provide a basic description of the broader Locumba drainage, its natural environment and its place in the broader South-Central Andes. I highlight the drainage's known prehistory, history, and modern demographics. I then turn to describing the site of Cerro San Antonio itself. Chapter 3 contains a relatively detailed characterization of the site and its internal divisions or sectors. Here there is a sector-by-sector walk-through of the site and a discussion of other important features.

Chapter 4 is the central methods chapter of this thesis. Here I present all methods used in data collection, secondary analysis, as well as the middle-range methods used in my final interpretations. I outline the procedures I employed during field work at the site of Cerro San Antonio as well as the techniques I used in analyzing the artifacts and other data collected during this field work. I give detailed explanations for the secondary data processing techniques I have selected for mapping and statistical analysis. Chapter 4 also contains a detailed overview of the network-based approach I have adopted for connecting archaeological data to the complexity-based perspective I discuss in Chapter 1. I highlight the multiscalar approach to organizing my final interpretive analysis - showing how my data collected in Locumba is most effective when viewed as informing analyses at micro-, meso-, and macro-scales. Finally, I return to my primary hypotheses (introduced above) and review how my methods will work to engage the research questions these hypotheses generate.

Section 2 contains all data and results from my work at Cerro San Antonio and all subsequent analysis. This section is only meant to present the basic results with more advanced synthesis and interpretation reserved for Section 3.

Chapter 5 presents the results from initial and on-going reconnaissance field work at Cerro San Antonio. I use the term reconnaissance here to categorize a number of relatively non-intrusive data collection methods, most of which focused on generating spatial data regarding the site for the development of maps to guide future field work.

Chapter 6 targets the results generated from systematic surface collection at L1. This systematic form of collection-based survey targeted the primary Tiwanaku-affiliated domestic sectors. Here I largely present the data as heat-maps, an effective way of displaying material density and spatial distributions.

Chapter 7 offers the results from the most extensive form of field-based data collection, excavations. These excavations again targeted the three Tiwanaku-affiliated domestic sectors - Sectors A, L, and U. Excavations took place in two major phases: in 2016 when initial test excavations were completed and in 2019 when large-scale excavations were undertaken. Here I present data from each of the ten excavated contexts separately with only initial comparisons noted. Again, the more synthetic, comparative analysis is reserved for Section 3.

Chapter 8 presents the results from the variety of post-field lab-based analyses conducted on materials recovered from archaeological field work. Each of the 16 major material types used in this study received different forms of analysis, many of which vary quite considerably. Here, I again present the raw data and initial comparisons, with each material type discussed in its own subsection.

Section 3 contains the more advanced and multivariate forms of analysis as well as my broader anthropological interpretation of the resultant data. These chapters are organized around the multiscalar approach I define in Chapter 4 - synthesizing the data presented throughout Section 2 into scales of analysis at the micro-, meso-, and macro-scale. Ultimately, the goal of Section 3 is to illustrate the impact of this dissertation by showing the contribution a better understanding of the Locumba node plays in understanding the broader story of Tiwanaku and the emergence of the state in the ancient Andes.

Chapter 9 takes a microscale perspective and works to define what daily life was like for the occupants of Cerro San Antonio during the Middle Horizon. Focusing largely on data collected during excavations I use this chapter to define specific activity areas within individual structures to highlight the types of activities that individuals in Locumba undertook. This microscale, house-centric view gives an intimate look into how Tiwanaku these Middle Horizon residents really were.

Chapter 10 takes an intermediary or mesoscale approach to the Locumba data set. Here is where I do the majority of comparing and contrasting different individual domestic spaces explored through excavations as well as the sector-wide data sets collected from surface collection and other survey work. I utilize a variety of network-informed approaches to highlight the clear continuities but significant differences that defined the lifestyles of the various occupants of Cerro San Antonio during the Middle Horizon.

Chapter 11 zooms-out to the macroscale and works to situate Cerro San Antonio and the middle Locumba drainage into the broader context of the South-Central Andes. Here, I largely treat Cerro San Antonio as a single node and use it to help investigate the topology of the broader Tiwanaku network. However, I also zoom-in and make connections between specific contexts and even specific finds at L1 and explain how they can inform the broader Tiwanaku narrative.

One of the true fulcrums of human history is the development and proliferation of the state. As such, understanding how such enterprises arose has been the one of the primary aims of anthropological archaeology. My project builds on this broad and diverse body of research. In an academic environment where heterarchy is increasingly evoked, my community ecology approach moves beyond acknowledging this diversity and can explain differences within a given society as historically situated practices and strategies for processing information in a myriad of individual interactions. By engaging with global questions through investigations into local processes, community ecology can build upon prior research from both top-down and bottom-up approaches to understanding expansive polities and colonial encounters in the ancient world. I work to translate these discordant case studies into a common framework, while maintaining a focus on the elements that make case studies unique.

In addition to making studies of ancient social networks comparable across geographic space, this approach also allows for these archaic case studies to inform the study of contemporary social networks. Today the relatively rigid nation-state is ubiquitous, and the formal, directed movements of populations and institutions of the past has largely given way to more informal processes of economic institutional expansion and sociopolitical community diffusion across borders - transnationalism has come to define the fundamentally cosmopolitan, global political economy. While the contemporary scale of these processes is unprecedented, I suggest the origins of these processes have roots which reach deep into prehistory, when the earliest state sponsored populations were moving across the landscape. Through engaging Tiwanaku community networks with a multiscalar approach, this dissertation contributes to a better understanding of nascent states, migration, social interaction at the mesoscale, and sheds light on the origins of the globalized processes that define the world today.

SECTION 1 - RESEARCH CONTEXT

In Section 1 I provide a thorough description of the context for the research completed in this dissertation. Generally speaking I start as broadly as possible and work towards more specific contextual aspects of this research through four chapters.

Chapter 1 provides a description of the theoretical context for this project. This includes a basic theoretical framing for my analysis and delineates the various schools of social scientific and broader philosophical thought employed in my interpretations. Ultimately my goal in Chapter 1 is to put forward my community ecology approach which draws on complexity science, ecology, and various models developed in understanding the evolution of social complexity via anthropological archeology.

Chapter 2 works to contextualize my theoretical discussion in the social and historical context of the Andes. In order to do this, I provide a basic overview of the Andean environment and culture-history. I also provide a detailed discussion of the indigenous Quechua/Aymara concept of *ayllu*, which represents an essential analog for my community ecology approach. Here I also synthesize the known research regarding the development, expansion, and collapse of the Tiwanaku polity during the Middle Horizon Period (ca. AD 500-1100).

Chapter 3 presents the case study for this dissertation - the multi-component archaeological site of Cerro San Antonio (L1) in the middle Locumba drainage in southern Peru. This includes a general introduction to the geology, environment, and culture-history of the broader Locumba drainage. I provide a detailed description of the archaeological site complex of Cerro San Antonio (L1), including each of the site’s component sectors.

Chapter 4 outlines the various methods I employ in this dissertation. This includes tracing the data collection techniques I relied on in my archaeological field work and later laboratory material analysis. In addition, I review the various methods I have used to synthesize in order to test my hypotheses. This includes a broader discussion of the network approaches that inform almost all advanced methodological approaches I use in my broader interpretations.

Finally, I diagram my hypotheses and their archaeological correlates and interpretations.

Chapter 1 - Theoretical Context

In this chapter I detail the broader theoretical foundation for this study. This discussion will orbit around two primary concepts: *community* and *the state*. In addition to outlining how these concepts have been defined in the broader social scientific literature I will explore how these forms of sociopolitical organization both emerged from the human condition and came to define it. However, first I make a case for why the evolution of human sociality must be viewed through the lens of *complexity* to fully understand how and why immensely complicated complex institutions, such as the state, may have developed in the remote past.

1.1 Situating Human Sociality: how to understand complexity

While *Homo sapiens* are not unique in their capacity for highly social behavior (Wilson 2012), it is only our species which has utilized this capacity to fill (or at the very least fundamentally affect) every niche on the planet and even beyond. This is in no small part because of our species' immense cognitive prowess which seems to have been fully activated sometime in the Upper Paleolithic, at least 45,000 years ago (Gamble 2007). Our cognitive abilities were of course facilitated by the unprecedented relative size of our brains and the complicated organization therein. When all things are considered, the functioning human brain is arguably the most complex bounded biological system that we yet know of in the universe (Baianu and Poli 2010; Deacon 2011). It is for this reason that any investigation into the development of human social processes will be greatly aided by incorporating a formal complexity perspective. Here I define complex adaptive systems, the focus of attention in complexity studies, and argue that frameworks for understanding these systems can be effectively synthesized into archaeological frameworks for understanding past social processes.

Complex Adaptive Systems

While the term complexity is often used in common parlance it is actually the focus of one of the most important burgeoning interdisciplinary scientific fields[1] (Boulton, et al. 2015; Miller 2016; Mitchell 2009). The focus of complexity studies are *complex systems*, which include any system based on non-linear interactions and emergent properties; summarized well by the often-evoked, simplified definition, *a system whose whole is more than the sum of its parts*. Complex systems come in two major varieties, complex physical systems (CPS) and complex adaptive systems (CAS). *Complex physical systems* are governed entirely by fixed physical laws, whereas *complex adaptive systems*, while constrained by the same fixed physical laws, are largely composed of interacting agents which can adapt to their surroundings in a variety of ways (Holland 2006:13-23). While most of their foundational defining features are the same, complex adaptive systems will be the focus here.

Like many projects framed by ecology or systems perspectives, those studying complex adaptive systems have been forced to abandon the reductionism inherent in many other positivist projects (P. W. Anderson 1972; Crumley 2007; Gentili 2018; Miller 2016). Instead, complexity studies focus on the interactions between agents and the phenomena which emerge from those interactions. A major aspect of the complexity perspective is noting the often-paradoxical relationship that forms as the emergent global phenomena generated from the local interactions between agents come to constrain and even transform the local agents, while at the same time remaining dependent on those same local interactions (Deacon and Cashman 2012; S. Johnson 2002). A familiar example here is the global financial market - a global phenomenon (literally in this case) that is generated by the multitudes of actions and reactions of billions of individual buyers, sellers, renters, and lenders; however, the possible actions of these individual

[1] The epicenter for this field is the Santa Fe Institute which since the 1980s has focused on bringing together scholars from all fields interested in understanding complex systems. Much of how I frame complexity here is influenced by their collective work (https://www.santafe.edu/).

agents are greatly constrained if not explicitly directed by at least some aspect of the global financial marketplace. In this case specific locations, notably the New York Stock Exchange, revolve around live status readouts regarding the global financial market that is both generated by and directly effects how those same individual traders invest in individual companies around the world. It is for this reason that understanding CAS, like the global financial marketplace, always eschew simple top-down or bottom-up approaches (Miller 2016).

While examples of complex adaptive systems range greatly, there are a number of characteristics that are common to most which I have split into two broad (though not mutually exclusive) categories. The first is *CAS Dynamics* or how these systems operate through their interacting agents. The second are common characteristics of *CAS Organization* or structure. I have outlined prevalent characteristics in both groups in Table 1.

Table 1. List of frequent characteristics of CAS. This list is not meant to be exhaustive, and these features are not necessarily present in all CAS. This list is synthesized from a number of other, similar lists (Miller 2016; Mitchell 2009; Weiss and Buchanan 2009; Weiss, et al. 2011:7). I use these terms both in quantitative methods and qualitative descriptions throughout this thesis.

	Characteristic	*Simple Description*
Dynamics	Emergence	The aggregate of interactions within a CAS generate properties that cannot be attained by the simple summation of those interactions.
	Feedback	In bounded systems composed of interacting agents, every action of an agent has some type of impact on the system. These impacts often cause chain-reactions among other agents which can, depending on the nature of the system, either bring about system stability or instability.
	Self-organized criticality	Thresholds at which relatively stable systems reach a certain breaking point, which once crossed, leads to cascades of reactions within the system and rapid change.
	Inheritance with Memory	Interacting agents within a CAS are often able to pass along basic information to other agents, including temporally, from one generation to the next - often through arbitrary coding.
	Randomness and Contingency	Much of what agents within a system encounter is probabilistic and without set direction – agents tend to respond to these current conditions and are inherently limited by their current characteristics.
	Competition and Cooperation	Interactions between agents within a CAS can often be characterized as competition, that is competing directly or indirectly for the same resources as other agents; or as cooperation where agents work together, either directly or indirectly to accomplish a common goal.
	Decentralized decision making	Production of organized patterns and behaviors at the system level, based entirely on undirected, localized interactions between individual agents within the system.
Organization	Hierarchy and heterarchy	CAS are inherently hierarchical, with the interaction of lower-order agents leading to higher-order processes. However, many networks of lower-order agents are heterarchically organized.
	Modular organization and sequestration	Agents and other components within CAS are at least partially isolated from one another – this often allows for variation and even specialization.
	Networks	Actions of agents are fundamentally interdependent on other agents within the system; connected by linkages which form relational ties and allow for the transfer of information and resources.
	Nested systems	CAS relate with other CAS in a number of ways, but are often found nested within each other - frequently the agents that compose a CAS are themselves bounded CAS.
	Scaling laws	Fundamental constraints lead to patterns in the way components of a given CAS operate at various scales of both operation and analysis.

Formal complexity studies have utilized and developed a suite of mathematical models and computational approaches to quantify and categorize these various features of CAS. Understanding chaos dynamics, the study of thermodynamics, and information theory have all played a central role in the development of complexity studies (Gell-Mann 1995; Mitchell 2009; Shannon and Weaver 1949). Some of the most robust models for understanding these systems can be found in network approaches (Boccaletti, et al. 2006; D. J. Watts 2004). Network approaches and their influence on the methodology of this study are discussed in Chapter 4 (4*.2*). However, it is important to highlight from the start that all network approaches emphasize the interconnected nature of complex systems. It is through these interconnected networks that feedback occurs leading to the suite of other complex systems dynamics such as essential thresholds of self-organized criticality and decentralized decision making (Jervis 1998). Ultimately, network approaches help quantify, map, and further visualize these complex interactions.

However, while network and other quantitative approaches help delineate these complex systems, they also frequently reveal just how complicated these systems are. In fact, a philosophical and indeed methodological distinction has often been made between complex systems and complicated systems (Andersson, et al. 2014; Strum and Latour 1987). As defined above, complex systems are defined by non-linear and emergent properties whereas *complicated systems* are generally simply composed of a large number of components (Holland 2006:3-5). A separate but related arena of study, often filed under the heading of *general systems theory*, has long been working to delineate these complicated systems through a variety of reductive techniques (Boulding 1956; Skyttner 2005; Von Bertalanffy 1972). Of course, these are not mutually exclusive classifications, many of the most intensively studied CAS are defined by both complex and complicated characteristics. These systems, often composed of multiple interacting complex systems, are referred to as supercomplex, ultracomplex, or even “wicked systems” (Andersson, et al. 2014; Baianu and Poli 2010; Orange

2019).

Any environmental niche on planet Earth (let alone the global biosphere taken as a whole) is a good example of a supercomplex system, with countless networks of biological agents conducting nearly endless combinations of interactions at any scale of analysis. This example also brings to the fore another confounding dimension in understanding these systems - time (Olivier 2011). Understanding complex, and particularly, supercomplex systems always involves understanding how these systems *evolve*, that is change over time. Of course, in his monumental synthesis, in which he provided the fundamental mechanisms involved in the evolution of life on earth, Charles Darwin himself acknowledged, “The mind cannot possibly grasp the full meaning of the term of a hundred million years; it cannot pass up and perceive the full effects of many slight variations, accumulated during an almost infinite number of generations.” (Darwin 1859:426). For this reason, even with this arsenal of important reoccurring features and a robust toolkit of approaches to study them, complex adaptive systems often (and supercomplex systems always) extend beyond the comfortable reach of formal quantitative models.

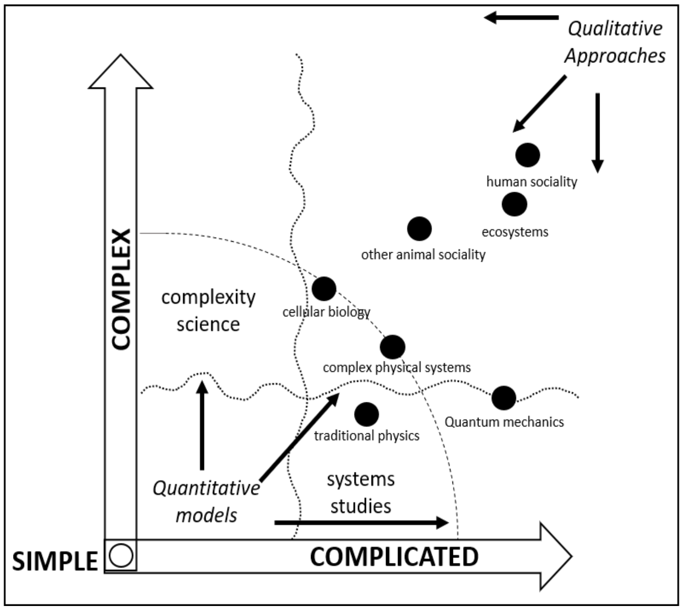


Figure 4. Graphic illustrating the relationship between complexity and complicatedness and the purview of complexity science and systems studies (Andersson, et al. 2014:149). Also illustrated are the angles from which quantitative and more qualitative approaches approach these issues. Finally, also plotted are different major types of systems and areas of study and where they fall in terms of complexity and complicatedness.

As Figure 4 illustrates, as complex systems become more complicated, they fall further and further outside the ability to model through traditional mathematics and even advanced computing. As will be discussed below (*1.2*), this is particularly true of human sociality, which due to a number of factors, including our ability for symbolic thought and communication, proves to be the most wicked of all CAS yet encountered. Providing a coherent explanation for these supercomplex systems always incorporates some level of qualitative approach, often rooted in developing what is best described as a narrative (Andersson, et al. 2014; Teixeira de Melo 2020). This is of course where grounded epistemology of the scientific method meets the abstracted ontological realm of philosophy and even religion. Volumes have been filled discussing the nature of this overlap, where scientifically observed data merge into philosophic musings (Thomas 1978; Whitehead 1947), and understanding the social implications of this conversion is one of the primary arenas of science studies (Hess 1997; Jasanoff, et al. 2001) and the postmodern project more broadly (Foucault 1982; Ricoeur 1980). However, while there will always be corrosive strands of power in synthesizing narratives and bias is impossible to completely eradicate, it is my position here that developing a robust middle-range framework based around the proper analytical subunits can help avoid the increasingly fruitless hermeneutic doldrums that define the majority of postmodern perspectives that have come to dominate the study human sociality[2].

1.2 Building It Up & Breaking It Down: finding the proper subunits

This subsection outlines my approach to understanding human sociality through the lens of complexity. This is based on a fundamentally multiscalar approach which identifies social subunits at three scales of analysis - micro (individuals), meso (communities), and macro (institutions). In this analysis, each higher order unit is an emergent property of interacting units at the level below (i.e. communities emerge from interactions between individuals, institutions emerge from interacting communities). I focus particularly on developing the mesoscale, what I define as the realm of middle-range sociality. Specifically, I describe my model of *community ecology*, that is a framework which works to identify and analyze the consequences of multi-modal community interaction.

Scales of Analysis: individuals, communities, institutions

While most are not explicitly rooted in formal complexity science there has been an

[2] I include in this most applications of intersectionality and related Critical frameworks. Like many forms of multivariate sociological analysis, intersectionality focuses on areas where certain demographic affiliations overlap, and the challenges faced (or not) by those groups (e.g., Crenshaw 1990; Walby et al 2012). However, by relying on concepts like mutual constitution and failing to fully incorporate emergence (i.e., the non-linear nature of complex systems) these studies don't actually offer "an explicit theoretical framework for exploring the relationship between individual lived experience, multiscalar identities, and broader systems of inequality" (Knudson et al 2020:186), but instead represents a relatively rigid rubric that seeks to sort the quality of individual lived experience (or even the legitimacy of human suffering) based on static and essentialized identity categories and politically-oriented terms like privilege and oppression.

ongoing trend in anthropology to incorporate more multiscalar modes of analysis (Mueller 2016; Romano, et al. 2020; Weiss, et al. 2011; Williamson 2015; Xiang 2013). Archeology is no different, with a number of recent studies explicitly utilizing some form of a multiscalar framework in their analysis of the archaeological record (Bevan and Conolly 2006; Birch 2014; Chamblee and Williams 2015; Covey 2015; Knappett 2011; Mills, et al. 2015; Peelo 2011; Torres-Rouff and Knudson 2017). However, it is also important to be explicit about not just the scales involved in a multi-scalar approach, but which dimensions of the human social experience these scales measure (i.e. the subunit(s) of the study). For my multiscalar model, I rely on three arbitrary but essential scales, being macro, meso, and micro, as well as three significant and wide-ranging dimensions, being the spatial, temporal, and social dimensions of human experience (Table 2).

Table 2. Chart of scales used in my multiscalar approaches, and the different dimensions of human sociality which they generally correlate with, as well as how these scales manifest in archaeological interpretations of past societies.

	Spatial	**Temporal**	**Social**	**Archaeological Theory**
Macro	Regions	Longue durée (evolutionary)	Global - Institutions	Social Theory regarding the sociocultural dynamics of past societies
Meso	Localities (sites)	Diachronic (historical)	Communities	Middle Range?
Micro	Specific Contexts (activity areas)	Lived-experience (moment-to-moment)	Local - Individuals	Archaeological record

In this approach, the boundaries between micro, meso, and macro scales shouldn't necessarily be seen as arbitrary but in reality, they also are not truly discrete[3]. These scales are

[3] For instance, there is increasing evidence for the legitimacy of considering the biological individual organism as an emergent but objectively bounded unit able to process information (Krakauer et al 2014).

hierarchically related, but with the social dimension in particular, are more appropriately visualized as a nested set of systems, the higher-order scales emerging from the interactions of the lower-order scales. Likewise, the dimensions of analysis are also not mutually exclusive, but intimately entangled with one another in a variety of ways. This is especially true in human social groups, which by definition include the tremendous variety of positions and experiences of each individual. Again, while I tap into each of these dimensions and scales of analysis throughout this dissertation, here my discussion will center of the mesoscale dimension of human sociality. The next sections interrogate how this mesoscale concept of community has been used in anthropological interpretation as well as put forth my new model for understanding this important concept.

Community

The concept of community has been central to interpretation in anthropology and the social sciences since the formation of these disciplines (Hillery 1959, 1982), however despite this long-standing ubiquity, or perhaps because of it, the term community suffers from multiple definitions and contradictory uses (A. P. Cohen 1985; Creed 2006; Rapport 1996). Indeed, despite its apparent role as a primary social category or unit, very little consensus exists on what exactly constitutes a community, and the term is often used superficially to refer to any number of group types. I hope to show that there is good reason for both this complex understanding of community and the longevity of its use in social theory. Borrowing methods and models developed in complexity and ecology studies, I will demonstrate that the plasticity of the concept of community is what makes it the ideal term for middle-range frameworks and, crucially, that this adaptability is essential for delineating the often-paradoxical relationship between “the local” and “the global,” as frequently encountered in any study of human values and sociality.

Communities Under Review

In the last 20 years there have been a number of excellent studies that grapple with the concept of community and how it can/should be used in archaeological and broader anthropological interpretation. Some of the central studies utilized here include Canuto and Yaeger's now foundational edited volume on the archeology of communities in the New World (Canuto and Yaeger 2000), Creed's more critique-oriented 2006 edited volume (Creed 2006), MacSweeny's review of community concepts in her study of communities in Western Anatolia (Mac Sweeney 2011), and Harris' review of community studies in archeology (Harris 2014). Each of these reviews delineate several trends, as well as strengths and weaknesses of community studies in archeology and the social sciences within their own frameworks, past and present. However, several points of agreement are worth noting here, namely:

1) Each of these reviews point out what they see as the perpetuation of the original use of the term community in the social sciences. That is, defining community as the unit of social organization under traditional societies, or the natural product of co-residence or continuous face-to-face interactions (Murdock 1949; Redfield 1956). They argue that this structural-functionalist framing of community is still the default in the use of this term. This definition is also tied up in what many of these authors see as a romanticizing of the term; for instance, juxtaposing this idea of community as the intimate and natural mechanism for social cohesion against the new forms of social organization, especially of the maturing industrial revolution at the turn of the 20th century. Many foundational social science scholars (Durkheim 2014 [1893]; Simmel 1964; Tönnies 1887) saw the loss of these traditional community forms as a serious (and possibly fatal) issue for Western society. In addition to each of these reviewers denying such a "natural"

aspect of community formation, they all point to the fact that romanticizing the term leads to perceptions of communities as homogeneous organizations characterized as free of social tensions and power dynamics.

2) Even with the historical-developmental school of community studies in mid-20th century (Wolf 1957), which shifted communities from isolated social units, to units articulated within broader economic and historical systems, it wasn't until the 1980s that "community" received a serious revamp in anthropological theory, under the growing influence of practice theory (Bourdieu 1977; Giddens 1984). A. P. Cohen explicitly injected the idea of identity into community studies with his influential suggestion of a symbolic basis for community formation (A. P. Cohen 1985), and B. Anderson's work introduced the concept of the imagined community (B. Anderson 1983) as an almost purely cognitive construct. Both studies rejected the idea that communities were the natural social unit, one which developed out of residential proximity. Furthermore, these studies sought to redefine communities as socially constructed groups that were largely defined by both collective identity as well as those definition-establishing social fields which shaped the categories of "us" and "them" and form the basis of ethnicity (e.g. Barth 1998).

3) Finally, although these reviews indicate that in the last 30 years the theorizing of community has not moved substantially past this shift in defining community as identity group, several trends and advances are noted:

    a. A focus on communities being the result of local agency and practice (i.e., J. R. Allison 2008; Bhattacharyya 1995; Canuto and Yaeger 2000; T. Moore 2007; Pauketat 2008).

    b. A continuation of the idea of the imagined community or the idea that communities extend far beyond that of face-to-face interactions (i.e., Isbell 2000; Knapp 2003; Mac Sweeney 2011; Varien and Potter 2008).

c. A new shift in attention to affective or emotional aspects of community formation, maintenance, and transformation (Harris 2014; Tarlow 2012; Whittle 2003).

d. An understanding that communities operate at multiple and varied scales that can be overlapping or nested and often involve heterarchical and relational modes of power (i.e., DeMarrais and Earle 2017; Knappett 2013; Robb 2007; M. Watts 2007).

e. And, an incorporation of non-human actors (plants/animals, objects, etc.) into an understanding of community networks (i.e., Gell 1998; Law 2009; Van Oyen 2015).

So where does this leave us – how have these new theoretical advancements changed the definition of community? Below are four definitions of community from the previously mentioned reviews:

1) Yaeger and Canuto define community as, "an emergent social institution that generates and is generated by supra-household interactions that are structured and synchronized by a set of places within a particular span of time" (Canuto and Yaeger 2000:5).

2) Creed defines community as a socially and politically charged "notion" that often incorporate "1) a group of people, 2) a quality of relationship, and 3) a place/location." (Creed 2006:2).

3) MacSweeny defines community as, "an identity bearing social group… [who share a] conscious sense of collective belonging" (Mac Sweeney 2011:32)

4) Harris defines community as a, "particular set of assemblages that operate at a range of specific scales and always involve human beings." (With assemblages defined as the emergent consequences of affective relationships between actors,

being humans and non-humans.) (Harris 2014:91).

Clearly, each of these definitions touch upon important aspects of communities, and overlapping use of the above-mentioned dimensions (spatial, temporal, and social) are immediately apparent. From here I synthesize these definitions in a new conception of community, one which now incorporates both these multi-dimensional aspects as well as a multiscalar approach.

Re-situating Community

At the most basic level, I define community as *a group of individuals who rely on one another in the production and reproduction of a way of life, and in turn share some repertoire of behaviors and beliefs*, and as such, *communities are the natural, emergent, socio-organizational result of individuals coping with the complexity presented by a variety of shared local problems*. Again, while this is not radically different than the previously cited definitions of community, I will build on this below and begin to embed it within a new ecological framework.

As my first point of elaboration, I must highlight one major point of departure in my definition from those cited above: I suggest a return to the concept of community to its "natural" state (so-to-speak). By situating community within a deep time and explicitly evolutionary context, these social configurations can be seen as the fundamental *natural consequence of human social engagement*. In defining this deep time perspective of community I follow a number of studies, but particularly Foley and Gamble's 2009 publication on the major transitions in the evolution of human sociality (Foley and Gamble 2009). I suggest that one of the fundamental aspects of early hominin social traits was the tendency to live in multi-male, multi-female groups, as it is with almost all extant populations of primates, including, humans. Foley and Gamble refer to these groups as "communities" (2009:3268) and convincingly argue that they represent the basal hominin social group. Extending from this, Foley and Gamble suggest that it is likely that ancient hominin communities operated most commonly through male residence and female transfer and, based mostly on chimpanzee communities, the authors argue that there would have been a fair amount of intra-group conflict – often resulting in violence (Chapais 2011; De Waal 2007; Van Schaik 1996). Effectively this is the setup for the entire human social project, and it centers on communities.

Importantly, the size and dynamics of these early hominin communities would be greatly influenced through continuous *fission and fusion practices* (2009:3268). Fissioning would occur both on a daily level, involving small groups splitting off for foraging, grooming, and other activities, as well as on a more permanent level (i.e., fission events due to an intergroup conflict). Fusion would occur daily in the evening, primarily for protection during sleep, as well as on more intermittent occurrences as fissioned factions joined to form new community configurations. Like many species of primates these groups would be highly flexible with the ability to fluctuate in concert with various ecological conditions (Amici, et al. 2008; Aureli, et al. 2008; Sussman and Garber 2007). Fission-fusion sociality is another truly basal trait in human social organization and underscores why a robust theory of communities is so important. Coping with both daily and more permanent forms of fission and fusion events catalyzed an evolutionary ratchet effect in the hominin genera *Homo*, eventually leading to the cognitive prowess and hyper-sociality in *Homo sapiens* (Aureli, et al. 2008; Foley and Gamble 2009; Grove, et al. 2012). While even a brief review of this evolutionary process is a daunting topic in of itself, the table below (Table 3) outlines five of the major transitions in the evolution of human sociality based on community organization and fission-fusion dynamics.

Table 3. Chart of the five major transitions in the evolution of sociality in hominin species (after Foley and Gamble 2009:3276).

Transition (years before present)	Hominin Species	Major Adaptation (biological-behavioral)	Change in Community-Based Sociality
1 6 - 4 million	*Australopithecus sp.*	Bipedalism, extended territorial ranges	Development of fission-fusion sociality and the initial residential-sustainable community networks
2 2.6 - 1.6 million	Early *Homo sp.*	Early tool-use, meat eating	Prolonged female-male bonding and more investment in residential-sustainable community boundaries.
3 800 - 700 thousand	*H. heidelbergensis*	Controlled use of fire, cooking	Nested community structures form and the initial local symbolic communities structures emerge (kinship-family)
4 400 - 300 thousand	*H. neanderthalensis,* Early *Homo sapiens*	Extremely large relative brain size, hunting	Exploded fission-fusion - regional sustainable community networks form as locally-oriented symbolic communities begin connecting.
5 200 - 10 thousand	*Homo sapiens*	Domestication of plants and animals	*Release from Proximity* Globally-oriented symbolic communities proliferate as many face-to-face constraints were largely lifted

Each of these major transitional moments obviously represent major shifts in our remote past, however the monumental moment for *Homo sapiens* came with our "release from proximity" (Gamble 1998), when our propensity for fission-fusion sociality would propel the species across the planet. Humans did this through the externalization of action and complex information into language and material culture. As Gamble explains:

> The release from proximity, which finds its spatial expression in an unbounded social landscape, produced the externalization of memory which transferred the properties of people to objects. Once instituted, the components of the personal network were transformed by the symbolic resources. This was the route by which social relations were stretched. It is externalization of creative rhythms that marks out social evolution in the Paleolithic (1998:443).

At long last, the requirement for face-to-face interactions, a condition which had shackled human sociality since our nascent hominid traits that emerged millions of years earlier, was cracked. *Homo sapiens* had developed a suite of bio-cognitive behaviors which allowed for the dissemination of knowledge more efficiently over space and through time, overcoming the ephemerality of individual experience. This was the emergence of culture. In essence, the release from proximity opened the temporal dimension to the meso- and macro-scale, giving human communities access to their histories and allowed for the identification of meso- and macro-historical trends. At the heart of this development, communities were the primary venue in which these behaviors evolved, and from the point of release from proximity, communities themselves continued to diversify as human societies mined their newfound pasts to plan for better futures.

Modes of Community

To contend with the inherent complexity within these diverse and ubiquitous human community configurations I rely on three different modes of community: residential communities, sustainable communities, and symbolic communities. While I expand below, these are modes by which a community manifests based in a) spatial fixity, b) subsidence and exchange, and c) negotiations of meaning or value. I have largely adapted the basic terminology of this framework of communities from Carr and colleagues and their work on the Hopewell culture of North America (Carr 2008; Carr and Case 2005; Ruby, et al. 2005).

Table 4. Modes of Community as discussed below in the text – including common examples of sociocultural expressions of these modes of community and examples of possible archaeological correlates at three different scales (micro-meso-macro). Note these examples (and references) are by no means exhaustive.

		Micro-scale		Meso-scale		Macro-scale	
		Sociocultural exp.	*Archaeological correlate exp.*	*Sociocultural exp.*	*Archaeological correlate exp.*	*Sociocultural exp.*	*Archaeological correlate exp.*
Residential		-House-dwelling	-closely articulated material scatters (activity areas) (Kent 1990)	-Neighborhood -Barrio	-plaza groups (Goldstein and Sitek 2018) -bounded compounds (Smith et. al 2010)	-village -city -region	-bounded settlements -settlement clusters (Bandy 2004)
Sustainable		-Household division of labor	-task-differentiation in activity areas (i.e. gendered spaces) (Conkey and Spector 1984)	-Village resource/labor pooling -local markets or specialization	- Centralized community storage features (Earle 2010) - Household craft specialization (Costin 1991)	-Regional exchange network -World-system	-long-distance material (exotic) (Blanton and Feinman 1984; Renfrew 1977)
Symbolic	*Locally-oriented*	-Communities of practice	-local-specific technological choices in production (i.e. ceramic paste recipes) (Roddick 2009)	-Gender/age-based social groups	-gender specific spaces (i.e. men's houses) (Bowser and Patton 2004)	-Ethnicity	-shared lifeways (dress, cooking practices/cuisine) (Jones 1997, Reycraft 2005)
	Globally-oriented	-household ritual	-domestic figurines/icons (Brown et. al 2002)	-Village sodalities/cult groups	-public spaces (plazas, buildings) (Moore 1996)	-Religion -Regional polities	-regional iconographic suites -administrative architecture and other infrastructure (Schreiber 2001)

Importantly this multi-modal concept of community helps get around relatively sticky anthropological concepts like identity. The hyper-simplified schematic illustration in Figure 5 is meant to demonstrate just how complex any given individual's community affiliation network can be. Embracing the paradoxical nature of complex systems, we can see that as much as communities are the emergent result of the interaction between individuals, it also becomes clear that an individual's "identity" is actually the emergent result of their community affiliations.

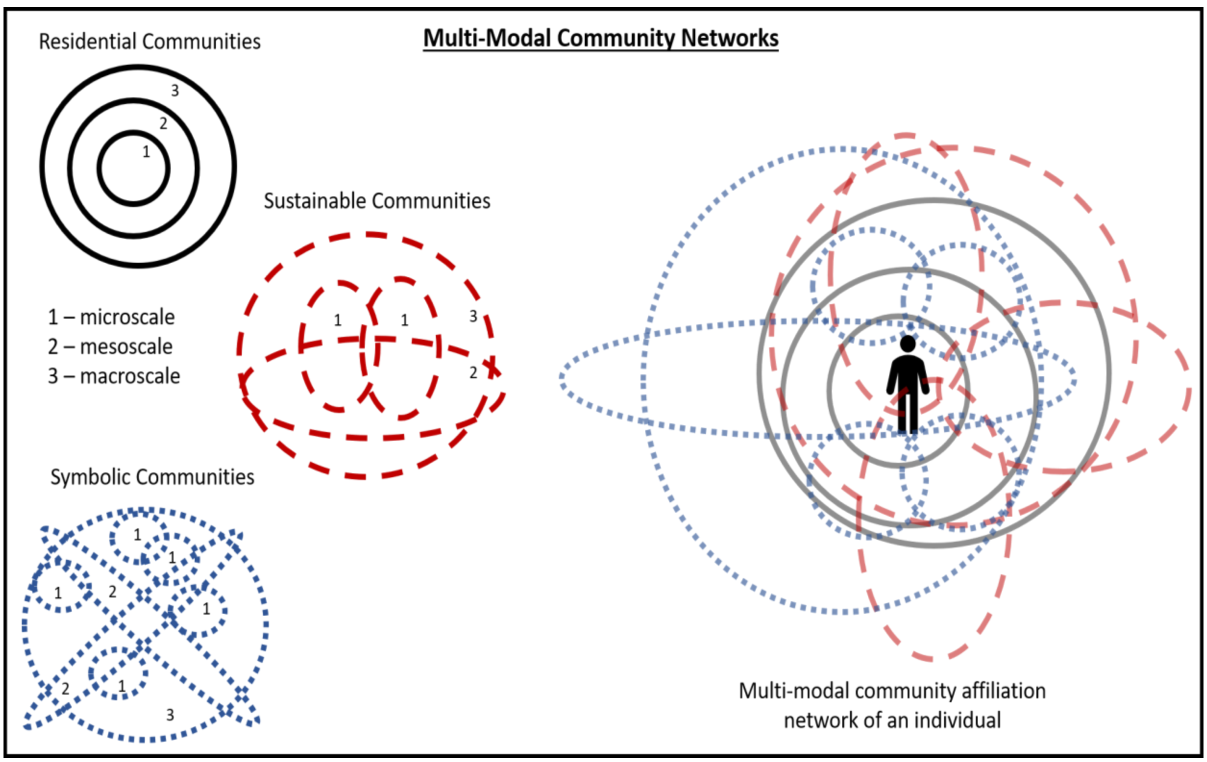


Figure 5. Simplified schematics illustrating the nested nature of each mode of community. The hyper-simplified schematic on the right illustrates just how complicated a given individual's multi-modal community affiliation network can be.

As will be demonstrated throughout this dissertation, in this way the community ecology model described here helps dismantle any type of "black box" mode of analysis (Clarke 1972) at every scale of analysis - from the microscale of individuals to the macroscale of institutions.

Residential Communities. These communities are simply defined by close if not co-residence (Carr 2008:44). As such, these modes tend to overlap with the more commonly used definitions of community. Rereading the definitions suggested in the review articles outlined above, it is clear that place is central to all conceptions of community, and it is for this reason that residential communities tend to anchor the other modes of community. Residential modes of community have been present since the initial hominin communities and can even be said to exist in most social animal species, though they are particularly important to human development as definitions of space relate to territoriality, resource availability, and areas for diachronic reunion.

For instance, central place foraging and the development of home-bases has often been proposed as a key element in the social evolution of hominins (Kroll and Isaac 1984), and while this has not gone without criticisms (Potts, 1984), this model still has a significant explanatory value in exploring the evolution of hominin sociality and cognitive capabilities. Many animals build forms of proto-housing based on a variety of criterion: sustenance, safety, environmental comfort (sleep), social connection/separation, sanitation, or some combination (James III 2010); nest building is one of the most ubiquitous habitual behaviors (McGrew and Feistner 1992), and great apes build up to 13,000 nests in their lifetime (Fruth and Hohmann 1996). However, as pointed out by J. Moore in his analysis of human categories of “home”, while many species build shelters, including our closest genetic relatives, only humans build homes (J. D. Moore 2012). Stated otherwise, “functionally the nests of apes have taken on aspects of home but only for one night” (Groves and Pi 1985:44). So, what led to the complexity of human residential communities?

Central to human home-base models is the process of childrearing. Gamble introduces the concept of childscape, “where our identity is created, and its metaphorical basis established through references to emotional, material and symbolic resources” (Gamble 2007:229), and convincingly argues that anthropology, and specifically archeology, is critical to developing methods and theoretical models to better understand this aspect of hominin life history. Utilizing results from studies undertaken with human infants (Kuhlmeier, et al. 2004), Coward and Gamble suggest that material, not linguistic categories are first understood by developing infants and children. Emotions frame these early experiences but they are embodied in the environment in which these relations are based (Coward and Gamble 2008:1971). In this model the material world in which an infant develops is crucial. Whether a natural rock shelter used for a season by Upper Paleolithic hunters, or a permanent adobe structure constructed by a family in the Neolithic, the built environment played a crucial role in facilitating the long post-utero gestation required for human development. In this way “home-bases became an ecological breakthrough by relaxing some ecological constraints and selective pressures for hominid populations” (Rolland 2004:270). Therefore, beginning with the initial home-base formations in the remote past and continuing to today residential modes of communities have played a basal role in community formations.

However, far from being the simple location of residence, residential communities can become quite complicated as individuals tend to affiliate with and be affiliated with multiple and often nested sets of this mode of place-based community (Table 4). For instance, a person living in the past may first and foremost identify with those immediate kin who share their main domestic dwelling, however this single domestic residence is almost certainly articulated with a house cluster or neighborhood, which is then certainly part of a larger village, hamlet, or even city (Bevan and Conolly 2006; Binford 1980; Flannery 1976; Garcia and Vale 2017). Some of the clearest examples of nested residential communities are found in the earliest cities. One of the most distinct cases is Teotihuacan, the urban capital of the ancient Mesoamerican polity of the same name, which for the better part of a millennium was the largest settlement in the Americas (Cowgill 1997). At its peak, around A.D. 400 the city was composed of some 2000 apartment compounds, spread out over twenty square kilometers which could have housed up to 200,000 people (Millon 1973). The primary residential community unit at Teotihuacan came in the form of walled residential compounds. These larger compounds were then internally divided into apartment compounds centered on small patios - likely housing semi-autonomous, multi-family groups (Manzanilla 2004; M. E. Smith, et al. 2019). The larger residential compounds were also clustered into broader groups, forming what has been referred to as neighborhoods or barrios (M. E. Smith and Novic 2010; Widmer and Storey 2012). Therefore, an individual living in the city of Teotihuacan was likely associated with a nested set of at least four distinct residential communities (apartment < walled compound < barrio < city), each with literal walls demarcating the community boundaries. These built environment-based expressions of residential communities are well trodden territory for archaeologists (Bowen and Gleeson 2018; Carballo 2011; Drennan and Peterson 2008; Flannery 1976; Gerritsen 2006; Kolb and Snead 1997; Mac Sweeney 2011; Pacifico and Truex 2019). When sites are particularly well-preserved, archaeologists have been advancing methods to detect, image, excavate, reconstruct, and otherwise map past residential communities of all scales. Additionally, social geographers, civil engineers, and anthropologists interested in community layout also widely recognize the importance of residential modes of community.

Sustainable Communities. Sustainable Communities also fall within familiar archaeological (and broader social scientific) territory, as they may be broadly defined by exchange networks, both local and (sub)regional, through which material or demographic resources are regularly exchanged (Carr 2008:76; Ruby, et al. 2005). These communities form to offset and buffer against local demographic variations and subsistence productivity (Earle 2010; Plog and Braun 1984). Like residential communities, sustainable communities can be said to exist in most social animal species, and certainly existed in our remote hominin past, largely as hyperlocal foraging groups and broader demographic exchanges of mates. However, with our release from proximity human sustainable communities have developed into a diverse and complex field of exchanges. Of course, today any individual person's range of affiliated sustainable communities may span the globe ten-times over, with many interactions taking place digitally (and anonymously). In prehistory most of these exchanges took place between people in local contexts, but of course that is not to say that all parties involved were always present. While prehistoric examples of sustainable communities were still dense networks, they can be a bit simpler to delineate than those of today.

Sustainable communities have been investigated in a myriad of ways. Sustainable communities were the primary focus of much of the anthropology which centered on culture areas and culture-history in the first half of the 20th century (Kroeber 1939; Trigger 1989:211-313). In fact most studies whose central study is political economy, trade, or demography are primarily focused on measuring and tracing the dynamics of sustainable communities (R. M. Adams 1974; Caldwell 1962; Hassan 1981; Oka and Kusimba 2008; Polanyi 1944; Sahlins 1972), and thus these studies can range from any number of scales (Table 4).

At the micro-level, both in time and space, individuals of the past would have participated in basic shared daily tasks, with some sort of division of labor, as evidenced in the archaeological record by spatially discrete activity areas in domestic tasks (Hendon 1996; Kent 1984). These hyperlocal sustainable communities scale up, correlating with residential communities, as can be seen in shared neighborhood or village storage systems and household-based specialization (Blitz 1993; Costin 2001), and could even span entire regions resulting in regional trade networks and marriage alliances (Esterhuysen 2008; Knudson, et al. 2014). The dominant mechanisms of exchange in these regional sustainable communities are often used to define ancient economies, which may range from reciprocal or redistributive economies to tributary systems and various forms of market exchange (Braswell 2010; Dillian and White 2010; Earle 2010; Hirth 1996; Schortman and Urban 1992). The direction and velocity of materials and people moving through networks of sustainable communities can also help define broader economic systems, such as the distributed networks found in more egalitarian systems or the more centralized networks under dendritic or world-systems (Algaze 2005; Blanton, et al. 1992; Chase-Dunn and Hall 1991; Kajsa Ekholm and Friedman 1982b;

Hall, et al. 2011; Peter Peregrine 2000; Wallerstein 1993). In addition to being grounded by residential communities, sustainable communities, at all scales, require some amount of shared understanding by the individuals involved.

Symbolic Communities. Symbolic communities represent the most fluid and diverse mode of community. Broadly speaking symbolic communities are the social venues for the articulation of meaning. Generated from repeated interaction and a need for shared understanding, these communities produce, transform, and breakdown hierarchies of value, hence articulating systems of knowledge that define what things are and more importantly how to competently act. These communities may be explicitly self-identifying, however, many symbolic community types are pervasive, both generating and resulting from widespread similarities in daily domestic practices (*habitus*) and define cross-cutting sociocultural categories, such as age, gender, and ethnicity. These are the social arenas in which consensus is reached and coalitions are forged (DeMarrais 2016). Participation and practice in symbolic communities can differ internally. These variants are referred to as *local symbolic communities* (Ruby, et al. 2005:76). In fact, all symbolic communities begin locally and only after some duration become globally oriented enough and spatially dispersed to allow for local variants to form (Table 4). Again, these symbolic modes of community have deep evolutionary origins, and relatively complex social competency is passed along in many of our fellow social primates (Richerson and Boyd 2008; Strum and Latour 1987), however it was with our monumental release from proximity that these modes of community took center stage in our sociality and set humans apart.

As noted earlier, one of the primary ways in which *Homo sapiens* were able to achieve this release from proximity was our ability to externalize memory and knowledge into material culture. This is the primary thesis of M. Tomasello, who argues that material culture allowed for, “some cultural traditions [to] accumulate the modifications made by different individuals over time so they become more complex, and a wider range of adaptive functions is encompassed –

what may be called cumulative cultural evolution or the ‘ratchet effect’” (Tomasello 2009:37). He focuses a significant amount on the act of learning and teaching. For Tomasello:

> The argument is that cumulative cultural evolution depends on two processes, innovation and imitation (possibly supplemented by instruction), that must take place in a dialectical process over time such that one step in the process enables the next (2009:39).

In this way traditions or, using Gamble’s terms, rhythms can be passed faithfully from one generation to the next. However, these traditions do acquire modification as they travel over space and through time – resulting in an amplified product with a cultural “history” of its own (Tomasello 2009; Weiss, et al. 2011). Facilitating these learning arrangements were likely the first function of local symbolic communities.

As stated in the quote above, cumulative culture hinges on sociogenesis, or the ability to invent and imitate - essentially creative behavior as well as goal-oriented focus. For Tomasello there are two main types of this sociogenesis. The first involves an individual which using his/her given cultural resources must adapt to a novel situation or environment – a form of virtual collaboration. The second involves cooperation between individuals, or actual collaboration, where the two individuals develop a novel solution for a novel problem (Tomasello 2009:41-42). Through both types of collaboration novel new tools were invented to deal with novel new problems or conversely novel new ways were developed to use old tools. Once the creative and concentrated focus of *Homo sapiens* was applied to material culture it began to diversify and complexify exponentially (Coward and Gamble 2008; Knappett 2020). Soon tools were developed with the purpose of being used to make other tools, and entire sustainable communities, complete with their own inventory of material goods, developed around these material-based symbolic communities.

Of course, a mastery over material culture was only one part of this story and it rapidly became densely entangled with a series of other mechanisms that facilitated our release from proximity. One of the primary other mechanisms was language. Like material culture, verbal and other embodied forms of communication greatly facilitated not just actual collaboration between individuals in a novel situation, but the preservation and proliferation of knowledge. This communication likely began with simple forms of imitation and play, as it still does in human infants (Boyd and Richerson 2005; Piaget 1951) as well as can be observed in many social animals (Lewis 2000). However, coupled with the material culture ratchet-effect, *Homo sapiens* developed more episodic forms of memory allowing for more abstracted practices of ritual and other forms of drama (Peterson 1999:69-71). The power of ritual was not in its ability to unify the consciousness of all individuals involved, where there were (and are) always certain levels of ambiguity, dissonance, and resistance (Bell 1992; DeMarrais 2016), but in its ability to anchor the collective identity of the symbolic community in collective action and performance (e.g., DeMarrais 2014; Durkheim 1959 ; Inomata and Coben 2006; Swenson 2015; Tambiah 1985; Turner 1969). Ritual in humans can be said to have crossed a threshold when the highly structured nature of these practices came to signal, “not just cultural conventions but conventionality itself” (Parmentier 1994:133).

These early forms of ritual channeled the affective energy that likely governed early symbolic communities (James 1904; Whitehead 1926), and eventually gave way to narratives which spanned generations. At the onset, these narratives likely described individuals in residential communities who were successful at building, maintaining, and transforming sustainable communities (Bloch 2008; Boyd and Richerson 2005; Langley 2013; Peterson 1999; Sugiyama 2001). However, stories were codified in language, material, and even cognitive structures (Descola 2013; Lévi-Strauss 1978), and those which were brought to life in shared ritual came to transform symbolic communities from repertoires of shared behaviors to constellations of shared beliefs.

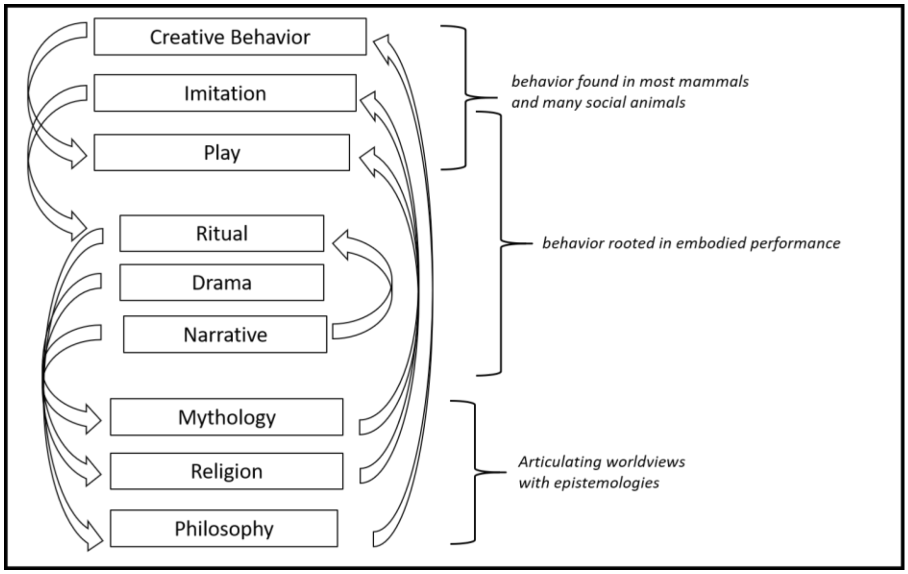


Figure 6. Schematic of levels of abstraction (Peterson 1999:73), which illustrates interacting behaviors through which symbolic communities operate.

Utilizing ethnographic data from various groups, Australian Aboriginal dreamtime stories in particular (Ingold 2002), Coward and Gamble (2008:1973-1974) provide an interesting hypothesis as to how "imaginative geographies," developed through relational maps and narrative (including song), may have been used in child rearing and early forms of acculturation. Accordingly, they suggest that these imaginative geographies allowed for the rapid dispersal of human communities between 100,000 and 15,000 years ago:

> These narratives contribute to the transmission of these skills by associating the landscape, its paths, tracks, denizens and the temporality and skills that structure it with known mythical persons, such that knowledge of it becomes personal, a question of relationships between individuals (Coward and Gamble 2008:1973).

With access to narrative, and eventually more symbolically loaded mythic archetypes, these kinds of symbolic communities became the powerful social configurations which acted as both centripetal and centrifugal forces; essentially fission-fusion engines, propelling humans across the planet (Turnbull 2007).

Importantly, as symbolic communities became increasingly adroit at abstraction (Figure

6) and globally-oriented, they maintained practices that engaged lower levels of abstraction as well. For instance imitation of adaptive behavior is central to communities of practice (Lave and Wenger 1998), in which situated learning gave way to very specific modes of production and other embodied forms of knowledge[4] (Creese 2016; Dorland and Ionico 2020; Roddick and Stahl 2016). Even as the level of abstraction took on religious forms, involving dense networks of articulated hierarchies of value, ritual and dramatic performance maintained their importance in sustaining all scales of symbolic communities (Lévi-Strauss 1988). In this sense this formulation avoids the pitfall of assuming symbolic modes of community are purely cognitive constructs, as they are often portrayed in studies utilizing imagined community and other concepts often associated with the ontological-turn in the social sciences.

Community Ecology: the complex dynamics of middle-range sociality

As with the more recent complexity studies mentioned above, ecological-oriented studies have been very successful at avoiding the reductionist tendencies while maintaining the scientific rigor of their more positivist-oriented counterparts (Bateson 1972; Crumley 2007; Gibson 1979; Guattari 2000; Hutchins 2010; Ingold 2012; McGraw and Krátký 2017; Sahlins 1963a; Steward 1968; Szabó 2015). While ecological approaches vary widely, they regularly share two important characteristics: 1) They insert the phenomena they are studying into a broader network of other related phenomena, especially the natural environment. 2) They are inherently relational, seeing phenomena not as static structures or systems, but constellations of people, places, and practices, transitioning through time. Here I layout the case for an ecological framework for the middle range, by further delineating the complex social dynamics that underwrite the modes of community described above.

Communities on the Ground. An ecological approach to communities situates these

[4] Because of this new bioarcheological methods are being developed to test for these modes of community in skeletal and other bodily markers (Becker et al 2017).

emergent social configurations within the natural world. It is the position taken here that all modes of community are only truly realized in practice, and while it's not a strictly determinant relationship, the natural environment acts as a primary constraint on the possibilities for successful communities (Trigger 1991). This includes even the most abstracted, cognitively-based forms of symbolic community, as many lines of evidence suggest that cognition is not simply, "an abstract symbolizing process but fundamentally structured by the inescapable fact that the biological processes constituting 'mind' are part of a body which is constantly interacting with the world" (Coward and Gamble 2008:1970; Deacon 2011). As has already been noted, in this view, even "imagined communities" must be, at some level, grounded.

It should be noted that as defined here, multi-modal communities are a uniquely human socio-organizational response to the material world, and I disagree with many forms of actor-network theory that claim non-human elements have equivalent agentive power as their human counterparts (Latour 2005). However, that does not preclude non-human actors and other elements from playing active roles in all modes of community. With our release from proximity and externalization of memory, material actors, from tools and architecture to entire landscapes have become deeply entangled with the generation, maintenance, and transformation of communities (Table 4). Not only is the human mind embodied in a biological body, but the mind, "routinely spills out into the environment, enlisting all manner of extrasomatic objects and artifacts in the conduct of its operations" (Ingold 2012:438). But even more durable materials, imbued with clear symbolic value, must be activated by an embodied human mind, and carries no active agency of its own.

Of course, other biological organisms can be far more dynamic in their agentive power and has already been noted, many social species can be said to form both residential and sustainable modes of community. Some primate groups may even have what is appropriately termed proto-symbolic communities (Whiten 2000). However, whether the difference is in kind or simply in degree both at the individual and community level even our closest extant primate relatives cannot begin to grapple with the supercomplex community systems and institutions that emerge from and underwrite human sociality (Povinelli and Ballew 2012).

Interacting Modes of Community. An ecological approach is also essential because, while distinct modes, residential, sustainable, and symbolic modes of community are not mutually exclusive categories and are never found in isolation; rather they are continuously interacting, overlapping, supporting, and transforming each other. At the most basic level, sustainable communities demand some shared understanding of the value of what is being produced, consumed, or exchanged, which in turn necessitates knowledge drawn from multiple symbolic communities, with both modes of community being grounded in residential communities. Using these interacting modes of community as analytic subunits can help delineate complex and often overly abstracted social phenomena. For instance understanding the political economy, or how the sociopolitical structures effect how wealth is allocated in a given economic system, is a major field of inquiry in anthropological archeology (D'Altroy and Earle 1985; Earle 1997; Hirth 1996; Humphrey and Hugh-Jones 1992; Polanyi 1944; Santley and Alexander 1992; Stanish 2014), and has often suffered from getting bogged down in dichotomous top-down or bottom-up models. Armed with the idea of emergence the community ecology model can incorporate both perspectives, seeing the political economy as fundamentally an emergent property of symbolic communities forming within as well as encompassing sustainable communities. While not radically different from many of the cited political economy examples the multimodal community model provide a useful grounding.

Importantly, it is at the intersection of these communities where higher-order institutions emerge (Jost 2005). Here, following S. Abrutyn, I define *institutions* most broadly as emergent macro-level sociocultural spheres (Abrutyn 2013:11). Institutions have their own set of ecological dynamics far too extensive to define here (Abrutyn 2013:68-97; Hughes 1936). However, a few important examples are worth highlighting here. Some institutions are relatively ephemeral and only occur in specific instances - these include all manner of reoccurring events and instances (Handelman 1998). However, some institutional modes are far more durable and ubiquitous. Like communities, these durable forms of emergent institutions can manifest in different modes and at different scales. A well-studied macro-institutional manifestation is the state, which is discussed in detail below (1.3).

The most ubiquitous micro-institutional manifestation is the household. Generally considered to be a behavioral group, representing the smallest scale economic system, households may also be conceptualized as the smallest scale institutions to emerge from community interaction. Based in place and almost always around some form of domestic architecture, households are fundamental representations of residential communities and, as the basic locus for most material and biological forms of production, consumption, and reproduction (Netting, et al. 1984; Wilk and Rathje 1982), households are also sustainable communities. Finally, household are both held together and internally divided by the symbolic community affiliations being practiced by their members. The interaction of these symbolic community affiliations are frequently some of the most implicit, internalized and intimate, symbols in an individual's life; however, they can also be explicit, manifesting in practice as various forms of cooperation, competition, and even resistance. The durable and ubiquitous institutional manifestation of households offer the ultimate micro-scale perspective of the development of social complexity (P. M. Allison 1999; Nash 2009; Steadman 2016). Further, as political forms of hegemony begin through those localized dynamics inherent in factional competition between local symbolic communities (Blanton and Fargher 2012; Brumfiel 1994; Carballo, et al. 2014; Clark and Blake 1994; Dietler 2001; Stanish 2017), "ultimately, in all societies, the domestic economy of households is the source of the resources directed towards political ends" (D'Altroy and Hastorf 2001:16). In essence, the household is both the result and locus of accumulative political actions at different scales. This is of course roughly in line with standard formulations of what households are (as cited above), however in some ways it also runs counter to these prior explanations. Here, households represent microscale institutions that emerge as communities interact, and not the other way around[5].

Community Topography. Finally, an ecological framing is necessary to highlight the topography of community networks in both time and space. Almost all communities have some sort of core or an area of influence and control. Residential communities are directly tied to specific places, while sustainable communities may spread over and even connect entire regions, center on locations of resources, both material and demographic. Even symbolic communities which may not be as tightly restricted to time/place as the other community modes, still tend to form and manifest around residential communities.

Even relatively stable community configurations will ultimately transition through cycles of periodic centralization and dispersion. For much of human history, most community configurations would expand and contract, centralize and decentralize with the seasons. Some of the clearest examples are highly-mobile hunter-gatherers. As with our early hominid ancestors, band-level hunter-gatherers rely heavily on fission-fusion social dynamics. These community types would often be organized as small, widely dispersed residential communities which doubled as fully self-sufficient sustainable communities. However, during seasons of plenty these groups would fuse with other micro-residential communities (Marcus and Flannery 1996; Theler and Boszhardt 2005). Often meeting in the same place, year after year, normally dispersed local symbolic communities would engage one another to exchange all modes of symbolic capital (Henry and Barrier 2016). It is through the repeated seasonal cycles like these, built around central places (Stanish 2017:168-171), that we can understand how incredible monumental centers, like Göbekli Tepe, could have manifested thousands of years before the first permanent settled villages and agriculture (Dietrich, et al. 2012). Some of these centralization cycles were based more on punctuated needs, such as defense or periods of

[5] A recently published study provides a good example - they use the term institution to refer (roughly) to my category of local symbolic community (Holland-Lulewicz et al 2020), which I believe results in misunderstanding the order and scale in which these aspects of human sociality emerge.

environmental stress, while others took hundreds of years to cycle through (Frank and Gills 1996; Friedman 1979; Kondratiev 1925; Marcus 1998; Willey 1991). E. R. Leach's modeling of the concepts gumsa-gumlao in highland Burma as an oscillatory model in which the normally anarchistic network of Kachin villages would band together as a cohesive political entity (Leach 1954) is a particular rich example of this type of punctuated community topographic cycling.

Remembering the aforementioned importance of political action within even the smallest scale community unit, the household, these periodic amplifications of larger community units highlights how dynamics such as power work under this framework. The multiple modes of community offer a more diverse and realistic way to see the flow of power in ancient societies, as there are multiple avenues for aggrandizing individuals or entrepreneurial local symbolic communities to seek influence. Here, we can eschew our reliance more essentialist models that see power only as a quest for dominance over others and continue to develop more relational models for power in the past (Crumley, et al. 1995; J. D. Moore 2004; Schortman and Urban 2012). For instance, I argue that there is good evidence that the earliest modes of power were decided along lines of competence within symbolic communities, whereby symbolic rather than purely economic modes of capital are more valued.

This perspective helps illustrate how some of the earliest state-level societies likely formed around ritual modes of production (Spielmann 2002), with capital largely drawn from symbolic modes of community. All ancient incipient states were segmentary in nature, and at least some of the earliest states likely operated as, what Geertz termed theater states, in which, "the state, even in its final gasp, was a device for the enactment of mass ritual. Power served pomp, not pomp power" (Geertz 1980:13), with only subsequent generations of states and empires being driven by more materialist or economic modes of production and central control (Fargher, et al. 2011; Goldstein 2015; Southall 2000; Stanish 2017). This community-based, bottom-up perspective also clarifies processes of hypercoherence and eventual collapse (Flannery 1972; Tainter 1990, 2006; Yoffee 2019) in these complex institutions as well as patterns of balkanization and resilience (Faulseit 2012; Folke 2006; Perego, et al. 2019) in symbolic communities in the aftermath of collapse, when more centralized forms of institutional constraints are released.

In the next subsection I discuss in detail how my framework of community ecology can specifically help delineate many facets of the rise and fall of archaic states.

1.3 The Birth, Life, & Death of Archaic States

One of the primary goals of this dissertation is to contribute to one of anthropology's most persistent inquiries - that is understanding the development and proliferation of what is most frequently called *the state* (Gailey 1985; Lull and Micó 2011). The bounded nation-state has formed the basis for global geopolitics for the entirety of the modern era. While of course this was not always the case, neither is the institution of the state a purely modern invention. Today's hyper-complicated nation-states are only the most recent manifestations of a millennia-old emergent macroscale institution. In this section I work to synthesize my community ecology framework with the robust body of anthropological and related research that has worked to understand this important institution. Specifically, I trace the trajectory of archaic states from their initial emergence through their eventual collapse using my complexity-inspired framework described above (1.2). However, first I contextualize this discussion by highlighting how the concept or category of *the state* has developed throughout the history of modern archaeological thought.

The Evolution of the State in Archeology: of stages & systems

Almost all modern archaeological approaches to understanding the state can be tied to what is most appropriately termed an evolutionary perspective. This term, evolution, is always entangled with its best-known manifestation - biological or Darwinian evolution. There is of course good reason for this, Darwin's magnum opus, *On the Origin of Species*, reoriented the zeitgeist of the Western world, and has developed into one of the most rigorously investigated realms in the history of science. However, in the broadest sense evolution simply refers to change over time within a bounded system. By definition, all complex adaptive systems change or evolve over time through the adaptive behavior of their constituent components. It is important to remember that Darwinian evolution is a specific suite of mechanisms to explain change within biology at the macroscale (Weiss and Buchanan 2009; Weiss, et al. 2011), and while human sociality is fundamentally constrained by that biological system, it is governed by its own complex dynamics and can't simply be explained away using these biological mechanisms. Here I provide a brief outline of some of the most influential models for defining and understanding the state in the archaeological record using this evolutionary perspective.

While the state has been a topic of socioeconomic studies since the Enlightenment (Engels 1891; Hobbes [1651]1970; Locke [1689]1947; Maine 1861; Weber [1904]2002), its origins as the center of modern anthropological debate can be traced to the influential publication, *Evolution and Culture* in 1960 (Sahlins and Service 1960). In this ambitious book, M. Sahlins and E. Service attempted to rectify issues arising from conflicting paradigms of the day - rooted in L. White's energetics-based model of cultural evolution (White 1943) and J. Steward's multilinear cultural ecology models (Steward 1953, 1968, 1972). The authors did a remarkable job synthesizing these models, situating each as differing modes of related evolutionary processes (a point which will be raised later). However, what has proved to be the most impactive aspect of their work was the formulation of four stages of cultural progress. Based on the criteria of degree of social segmentation and intensity of integration these general evolutionary stages range from simple *bands*, to segmented *tribes* and hierarchical *chiefdoms*, ultimately culminating with highly developed *states* (Sahlins and Service 1960:36-37). Whether building upon or dissenting from this formulation of cultural progress, these stages have served as the groundwork for all later archaeological discourse of social complexity and will act as the foundation from which this discussion will build.

For Sahlins and Service the state represented the highest level in a series of stages through which any given society could advance. Broad structural progress of this kind characterized *general evolution* – a measure of a society's overall adaptability to its environment (Sahlins and Service 1960:23-38). Understanding sociocultural progress in these generally Darwinian evolutionary terms of was not new to anthropology – models of this kind had been central to anthropology since its inception as a discipline. However, the poor-handling of value-laden stages like savagery, barbarism, and civilization employed in the unilenear evolutionary models of early anthropologists (Morgan 1877; H. Spencer 1860, 1892; Tylor 1870) often gave way to concepts of cultural superiority with obvious political implications. These complications led to widespread abandonment of progress-based models for cultural change in the early years of the twentieth century. This new holistic anthropology, rooted in *historical particularism*, had little need for comparative categories like the state, as all cultural progress was framed as being relative (Boas 1896; Kroeber 1935).

Eventually comparative directionality would return as the focus to understanding cultural change with the work of V. G. Childe. Working mainly in the Near East, Childe sought to explain the vast transformations he saw in the way in which political economies manifested throughout the archaeological record. In a series of seminal publications Childe defined two profound periods of transformation or what he would term revolutions (Childe 1944, 1950, 1951, 1957). The first revolution was a shift from food gatherers to food producers, what he termed the *Neolithic Revolution*, and the second was a shift from village farming societies to what he termed, civilizations – the *Urban Revolution* (Childe 1950). In addition to outlining several of the mechanisms which may have led to these cultural revolutions, Childe's work reinserted the idea that cultural change was directional and would eventually reach thresholds in terms of social complexity (Childe 1951; Flannery 1994; Trigger 1980). Childe saw these thresholds as rooted in the political economy and therefore tied to a society's technological capacity and readily expressed in material culture and settlement planning - which made archeology ideally suited for identifying and isolating these processes in the deep past.

The work of Childe led directly to the evolutionary emphasis within which Sahlins and Service's evolutionary framework was developed (Fried 1960; Sahlins 1960; Sahlins and Service 1960; Steward 1953, 1968, 1972; White 1943; Wittfogel 1955). Childe's focus on evolutionary processes would also influence the *New Archeology* of the 1960s and 1970s (Binford 1962; Clarke 1968). With a new positivist emphasis archaeologists worked to systematize the evolutionary processes which led to transformations in social complexity (Binford 1965; Flannery 1973). These early *Processual Archeology* projects employed new technological advancements in the natural sciences to begin systematically documenting the evolving relationship with the natural environment as societies began to grow in size and complexity (Watson, et al. 1971). These studies focused on looking for *prime mover* explanations to Childe's revolutions, focusing on major phenomena like population pressure, trade, and warfare (R. M. Adams 1974; Braidwood 1960; M. N. Cohen 1975; MacNeish, et al. 1972; Price and Sanders 1968). It was during this time that the evolution of the state took center stage in archaeological studies (Carneiro 1970, 1973, 1988; Flannery 1972; Flannery and Marcus 1976; Friedman 1979; Wright 1984; Wright and Johnson 1975).

K. V. Flannery has completed some of the most comprehensive studies using evolutionary frameworks to delineate the relationship between sociocultural processes and the archaeological record (Flannery 1972, 1976, 1995, 1998, 1999, 2002; Flannery and Marcus 2012). Flannery built directly on the work of Sahlins and Service and identified two scales of evolutionary change – what he termed cultural evolution and social evolution. *Cultural evolution*, correlated to what Sahlins and Service called specific evolution, and involved a society's historically situated adaptations to a given environment. *Social evolution* aligns with Sahlins' and Service's general evolution and refers to the structural and systematic reorganization of a society leading to a greater stage of complexity (Flannery 1995:3-4; Marcus

2008). Focusing on the level of systematic segregation and centralization of sociopolitical institutions and economic inequalities Flannery also developed a system of stages by which different societies' level of complexity could be compared.

Flannery's stage-based model contains many of the same stages as Sahlins' and Service's model – including bands, chiefdoms, and states. However, Flannery included additional stages of *autonomous villages* and *ranked societies* as additional intermediaries between bands and chiefdoms, as well as the additional stage of *empire* beyond the state. It is important to note for Flannery these stages are meant to "provide us with shorthand references to common types" at the broader scale of social evolution (Flannery 1995:22), and not exact molds to which every society must conform. Also, while certainly not alone (Doran 1970; G. A. Johnson 1980; Salmon 1978), Flannery was an early advocate for the use of systems-based frameworks for modeling culture change and particularly for simulating the rise of the state (Flannery 1968, 1972). While not built specifically on complexity studies, Flannery's systems-based models rely on feedback dynamics and are particularly compatible with the the multi-model community ecology model I use for explaining the rise of the state below.

Riding the general postmodern movement in the social sciences, the 1980s and 1990s saw an increase in particularistic frameworks for understanding the archaeological record (Hodder 1985, 1991; Shanks and Tilley 1982). These new interpretive approaches brought a much-needed humanistic perspective to the understanding of past social dynamics, including a new focus on new concepts like gender, class, and other major identity formations (Brumfiel 1992; Conkey and Spector 1984; McGuire 1992). Interestingly, these studies often framed themselves as in opposition to some of the macroscale perspectives of Flannery and many others, when in reality they were complimentary (Hegmon 2003) - generally just focused on delineating patterns in social behavior at the micro and meso scales instead of the macro.

However, even during this time a number of studies maintained a focus on macroscale comparative categories, like the state (Algaze 1993; Carneiro 1993; Chase-Dunn and Hall 1991;

Crumley 1995; Earle 1993; Feinman and Marcus 1998; Haas 1982; Peter Peregrine 1990; C. S. Spencer 1990). While there is still a contingent of archaeological theory that is critical of almost any use of directional or evolutionary categories (Pauketat 2001, 2007), there is also a large component of comparative-focused research (M. E. Smith and Peregrine 2012). Many of these studies have continued to advance the use of evolutionary frameworks, at both the general-social and specific-cultural levels (Bondarenko, et al. 2002; Claessen 2000; Marcus 2008; Prentiss 2019; Richerson and Boyd 2008; C. S. Spencer 1997; C. S. Spencer and Redmond 2001; Stanish 2017). Some more recent studies have even explicitly brought in concepts and methods from complexity theory (Bentley and Maschner 2003, 2008; Chapman 2003; Kohler 2012). While still using the state as a comparative category, based on a directional understanding of evolutionary change, these more recent studies do more to incorporate micro- and meso-scale behaviors and activities in their models for understanding the state (R. M. Adams 2001; Blanton and Fargher 2007; Fukuyama 2011; Goldstein 2015; Goldstone and Haldon 2009; Murphy 2016; Routledge 2013; Scott 2017; M. E. Smith and Schreiber 2005; Southall 2000; C. S. Spencer 2010; Yoffee 2005).

While I discuss the nuances, exceptions, and contradictions to these definitional elements below, here I define the state as emergent macroscale socio-spatial institutions that always involve some combination of:

1. Structural socioeconomic inequalities in regard to access to different sectors of the broader sustainable community network (i.e., the formation of true class-based symbolic communities).
2. Hierarchical or dendritic settlement patterns in regional residential community networks - including the development of urban centers.
3. Logistical ability to assert authority - often involving monopoly over violence and other punitive practices through militarized local symbolic communities.
4. Institutionalized sustainable and symbolic community specialization - including craft

production and religious-bureaucratic information processing.

Below I draw on this complicated history of understanding the state as a critical comparative concept in archaeological theory. I use my community ecology framework as a middle range theory to articulate these aforementioned models and illustrate how and why these complex institutions emerged repeatedly in many parts of the ancient world.

<u>Before the State: egalitarianism, ranked societies, and network formation</u>

States were not the first institutions to incorporate socioeconomic inequality and political modes of authority. These attributes had been present in human communities and institutions for millennia before the first states emerged. In fact, it is important to remember that the egalitarian nature ethnographically observed and archaeologically inferred in many band-level hunter-gatherer groups was actually an evolved trait (Ames 2010; Boehm 2009; Kurzban, et al. 2015; Trivers 1971). For instance, while there is variation and overall, cooperative behaviors outrank antagonistic ones, the social hierarchies of our closest extant primate relatives are far from egalitarian and it is unlikely that those of our hominin ancestors, even the earliest *Homo sapiens* were either (De Waal 2007; Dunbar, et al. 2014; Sussman and Garber 2007).

As has already been noted, developing, maintaining, and transforming hierarchies of value is essentially the base-level purpose of symbolic communities, and even in egalitarian societies of the deep past, certain individuals would have been better suited to carry out these activities. Age and experience were always major factors in this, and whether based in physical coordination, endurance, or cognitive aptitude, natural abilities also played a role in early community leadership, even in egalitarian societies (Davis and Moore 1945; Peterson 1999). In fact, some have argued that egalitarian societies are actually just structured around what are best considered reverse dominance hierarchies or competitive altruism (Boehm, et al. 1993; Bowles and Gintis 2013). Even if this is not quite the case, it is clear that broader sustainable communities organized in an egalitarian mode require constant intervention from local symbolic communities in order to ensure that prestige, defined along any grounds, is not hoarded and free-loaders aren't allowed to drain the broader sustainable community resources without contributing (Ames 2010; Blanton and Fargher 2007; Boyd, et al. 2003; Stanish 2017; Wiessner, et al. 2002).

In these pre-state egalitarian societies *reciprocity* defined the vast majority of sustainable community material exchanges as well as the exchange of value in symbolic communities. While much of reciprocal exchange, especially of material goods can be immediate and ephemeral, our break from proximity facilitated deferred forms of reciprocity as well. One of the defining features of humans was our ability to articulate local symbolic communities across entire regions by exchanging symbolically loaded objects (Gamble 1998). This was first formally identified in the famous ethnographic example of the Kula Ring exchange, documented by B. Malinowski (Malinowski 1922) and later expanded on by M. Mauss in *The Gift* (Mauss 1954). This cultural phenomena was interpreted as an exemplary example of *deferred reciprocity* as the obligatory relationships produced by the exchange of high-valued, sacred objects, helped maintain long distance connections in the Melanesian islands in the South Pacific. In other words, the exchange of items valued only in symbolic communities helped maintain essential connections in broader sustainable community networks. It has been argued that it is in this type of deferred reciprocity that the seeds for inequality lie as all forms of this delayed payback develop a hierarchical scenario of *debt* (Graeber 2011). However, in spite of this, relatively durable forms of reciprocity-based egalitarianism appear to have been an enduring political-economic mode for much of human prehistory.

Breaking Chayanov's Rule

One of the ways in which the enduring cycle of reciprocity-driven egalitarianism was broken was by certain individuals and communities tapping into the inherent unused labor potential of households and other microscale socio-spatial institutions. This was first observed by M. Sahlins in his seminal publication, *Stone Age Economics* in which he defined and dissected the idea of the *domestic mode of production* (Sahlins 1972). In community ecology terms the domestic mode of production looks at the ability of individual residential communities to produce for local and broader sustainable communities. Relying heavily on quantifiable data collected by Soviet social scientist A. V. Chayanov (Chayanov 1966), Sahlins made the assertion that small-scale sustainable communities where relatively unarticulated residential communities comprise the primary production units, will always possess a significant amount of untapped labor potential (Sahlins 1972:86-92). Said another way, the relatively independent or locally-oriented, residence-based sustainable community production units will consistently under-produce unless otherwise motivated.

Based on this trend of underproduction, which Sahlin's called *Chayanov's Rule*, he argued that these residential community-based sustainable communities were actually ripe for manipulation by enterprising individuals. However, even with this productive potential he noted, "[t]he great challenge lies in the intensification of labor: getting more people to work or people to work more" (Sahlins 1972:82). Some have argued that the first option, getting more people to work, was likely the route pursued most successfully as the second option, getting people to work more, "requires the leadership to intervene directly in the daily work schedules of individual households and villages" (C. S. Spencer 1998:6).

However, C. Stanish has provided an elegant third option for how to break Chayanov's rule, that is "getting…people to work differently in a more efficient labor organization" (Stanish 2003:25). In the community ecology model this mean reorienting local symbolic communities to intervene in the scheduling of sustainable community activities. One of the most well documented examples of relatively minor reallocation of labor receiving major productive returns is through labor specialization. Economic division of labor, or what could be called inter-sustainable community specialization, has of course been a well-studied economic principle since the work of Adam Smith (A. Smith 1776). Importantly, even in this early work Smith noted the emergent nature of specialization, what he called the productive powers of labor, whereby coordinated specialization within a sustainable community produced emergent results, that is they produced more than the sum of the individuals' labor had they remained independent (A. Smith 1776:5). The power of a specialized division of labor was also emphasized in the foundational social scientific work of E. Durkheim as he argued that increasing specialization in division of labor led to increased modes of organic solidarity, which lessened the influence of mechanical forms of solidarity (Durkheim 2014 [1893]). Again, in community ecology terms under Durkheim's model, as sustainable communities become more specialized the importance of symbolic communities was diminished, at least in terms of their explicit role in social solidarity.

The Role of Individuals

From the complexity perspective it is perfectly reasonable to see socioeconomic inequality resulting from the increase in specialization as a slow grinding process that eventually led to positions of prestige developing. This is essentially the position of early evolutionary models of social stratification which argued that certain tasks and specifically tasks of increased specialization would naturally carry prestige based on the scarcity of individuals with the natural aptitude to perform the task and/or the costly and extensive training need to gain the skills to complete a task (Davis and Moore 1945:247; Fried 1960:109-111; Friedman and Rowlands 1977). Under the community ecology model this would translate to local symbolic communities forming around an increasing number of specific sustainable community roles. The formation of these new local symbolic communities would result in increasing venues in which individuals can compete for prestige. As these local symbolic communities continue to proliferate, interact, and even compete for resources they develop new emergent realms of *institutional autonomy*, which amongst other things, increase the types of goals individuals believe are worth pursuing

(Abrutyn 2013:23).

However, while much of the road to institutionalized inequality and the rise of the state may have been gradual, evidence suggests that there were clearly periods of punctuated change (C. S. Spencer 1990), and while it is difficult to trace the actions of individuals in the archaeological record the historical and ethnographic records are bursting with examples of individual agency having broad societal effects (Flannery 1999; Flannery and Marcus 2012). As has already been noted, most models of how to overcome Chayanov's Rule pivot on the actions of motivated individuals intervening in sustainable community organization. In their study of how ranked societies first developed in ancient Mesoamerica, Clark and Blake outline six procesually-linked conditions which lead these enterprising individuals into increasingly generalized roles of leadership:

> 1) Egalitarian social systems contain the seeds of permanent social inequality in their structure of age, kin, gender, and aptitude distinctions.
> 2) The development of permanent social inequality is an unanticipated consequence of individuals pursuing self-interests and personal aggrandizement.
> 3) Temporary positions of prestige become hereditary and legitimate positions of authority under limited social and natural environmental conditions.
> 4) These changes result from the purposive actions of individuals pursuing individual strategies and agendas within the structural constraints of their cultural system.
> 5) The engine of change is competition for prestige – constituted as public recognition of states, rights, and responsibilities – among a network of aggrandizers.
> 6) Effective competition within one's community requires that aggrandizers traffic outside their respective communities and establish enduring ties with individuals elsewhere (Clark and Blake 1994:28-29).

Clark and Blake nicely delineate something already discussed above, that is how relatively locally-oriented symbolic communities become more globally-oriented by articulating into relational networks, led by competing aggrandizers. Here symbolic communities are analogous to *factions*, which are defined as "structurally and functionally similar groups which, by virtue of their similarity, compete for resources and positions of power or prestige" (Brumfiel 1994:4). While it is clear that these factions would often be in direct competition over material resources (Brumfiel 1989, 1992; Brumfiel and Fox 2003), there is also growing evidence that the earliest factional competition was likely grounded in the competitive generosity that defied the preceding egalitarian systems (Blanton 2016; Blanton and Fargher 2007; Carballo, et al. 2014; DeMarrais and Earle 2017; Stanish 2017). Again, it is here in the realm of competing and cooperating symbolic communities in which the agency of individuals can result in major institutional change or in scalar terms where the actions of individuals in the moment-to-moment of the microscale can determine the course of mesoscale historical trends and even conceivably have an impact at the level of general evolution at the macroscale.

Pathways to Power

There is little doubt that coercion, in the form of physical force or violence, played a role in the strategies of some of the earliest aggrandizers, especially as they competed for followers (Carneiro 1992). However, more persuasive strategies, in which those giving up some labor-based autonomy received something in return, likely created the more lasting forms social inequality which would eventually lead to the emergence of the state (Stanish 2003:25-26). While any successful aggrandizer likely employed varied approaches for cultivating followers and climbing the hierarchy of any given symbolic community network, there are clear patterns that can be identified in the types of strategies used repeatedly in the past. To structure this discussion I rely on the *dual-processual theory* which separates these strategies into two broad, but useful categories: exclusionary and corporate (Blanton, et al. 1996), although of course there are other ways in which these strategies can be grouped (Peter Peregrine 2012). As always, while these strategies represent useful comparative types, they were likely never found completely separate from one another.

Exclusionary Strategies. *Exclusionary strategies* include any strategy in which aggrandizers attempt to monopolize sources of power (Blanton, et al. 1996:2), and while this always involves some form of abstracted value, it frequently revolves around controlling material resources. In other words, exclusionary strategies represent aggrandizers using their influence over symbolic communities to directly intervene in sustainable communities. These exclusionary strategies rely on there being "bottlenecks in resource flows" which provide nascent symbolic community aggrandizers "opportunities to mobilize surplus and the investments of the resources into alternative sources of power" (Earle 2011:242). While these strategies can scale-up to complex bureaucratic states, at smaller scales these strategies result in patron-client-style relationships between aggrandizers and their constituents. At the very least, all exclusionary strategies are also roughly built around redistributive dynamics, by which some individuals (or communities) acquire more control over who gets what and when (Earle 1977; Polanyi 1944).

One of the principal resource flow bottlenecks available to early aggrandizers are points at which local sustainable communities connect to neighboring sustainable communities. These critical points of connection are where exotic goods can be acquired and their distribution controlled, conversely they are also areas where the value of local goods can become more highly valued in trade (Friedman and Rowlands 1977; Helms 1992). By luck or strategic selection some symbolic communities were anchored by residential communities that were located along critical "natural corridors of trade and communication" (Hirth 1978:43). It was in these *gateway communities* (or *transit communities*) that early aggrandizers probably had the easiest time inserting themselves in these early prestige-good exchange systems (Bandy 2004b; Hirth 1978; Northrup 1978). Long before the distinct core-periphery asymmetrical exchange networks of early polities, there were likely similar unequal flows of easily transportable, but highly valued prestige goods (Chase-Dunn and Hall 1998; Kajsa Ekholm and Friedman 1982b; Frankenstein and Rowlands 1978; Peter Peregrine 2000; Schneider 1977). The transferable wealth generated from these *prestige-good* exchanges could allow aggrandizers to break Chaynov's Rule by simply paying to mobilize labor through gift giving and other redistributive measures.

Another way in which aggrandizers could insert themselves directly into critical points of sustainable communities was through marriage and other form of kinship manipulation, or what has been called *patrimonial rhetoric* (Blanton, et al. 1996; Weber [1922]1978). One of the most critical aspects of sustainable communities was not just offsetting material needs but demographic ones as well (Ensor 2013; Rapp 1977). Meeting, acquiring, and exchanging viable marriage partners were likely some of the first sustainable community activities to become deeply entangled with the first emergent symbolic communities. These early symbolic communities around this aspect of sustainable communities defines broader kinship systems, which always incorporate some way to grapple with descent and lineage. Explicit lineages allowed aggrandizers clear avenues to connect themselves with important ancestors and other forms of relations (Arnold and Hastorf 2016; Rakita 2009). By inserting themselves, and likely their symbolic-residential community in-group, into critical points in broader sustainable community demographic networks, aggrandizers could "dampen the free migration of faction members between competing network strategists in what otherwise would be a more openly fluid, competitive social landscape" (Blanton, et al. 1996:5). By inserting themselves directly in the sustainable communities which controlled not just the flow but reproduction of people, aggrandizers could again break Chayanov's Rule by getting (or creating) more people to work.

A final exclusionary strategy in which individual aggrandizers and their constituent local symbolic communities could insert themselves directly into sustainable communities was through competitive generosity, most frequently through hosting feasting events. The importance of *feasting* as an essential and ubiquitous practice in the development of social inequality has been increasingly emphasized by archaeological studies (Bray 2003; Dietler 2001; Dietler and Hayden 2001, 2010; Hastorf 2016:194-203; Hayden and Villeneuve 2011; Stanish 2003:26-28; VanDerwarker 1999). Feasting represents explicit examples of conspicuous consumption and can include any matter of food or drink (Dietler and Hayden 2001). While feasting and other competitive generosity can certainly be examples of corporate strategies, enacted to specifically to deter exclusionary strategies (see below), here I use the concept of growth spiral to illustrate how feasting led to direct aggrandizer interventions in sustainable communities and therefore represent exclusionary strategies.

The term *growth spiral* refers to the process by which one type of wealth is converted into another, in turn resulting in increasing size and complexity of a group. In their extensive anthropological work on feasting dynamics M. Dietler and B. Hayden provide a lucid example that illustrates how competitive feasting can actually engage strategies rooted in control over prestige-good and kinship exchanges as well. In the Samia society in eastern Africa, enterprising aggrandizers would invest large amounts of wealth in orchestrating work-party feasts, in which they would invite neighboring residential communities (Dietler 1990:367). The hosting aggrandizer would provide copious amounts of food, drink, and an overall festive atmosphere. During this time guests would also be working, in the Samia case, extracting small amounts of ore from local sources. After the feast, the aggrandizer would work within his local symbolic-residential community to convert the ore into highly valued iron agricultural implements. Aggrandizers would invest this new prestige-good wealth in acquiring more marriage partners, thus also intervening in demographic sustainable communities. Increased marriage partners inherently also meant more children, and more children meant increasingly more members of the labor pool the aggrandizer could rely on (Dietler and Hayden 2001:249-256). In complexity terms these growth spirals represent feedback loops by which the aggrandizing host increasingly receives more wealth while his constituent guests increase their negative or owed wealth. As noted above, while exclusionary strategies could induce these growth spirals many of the mechanisms underlying more lasting examples of feedback were catalyzed by more corporate-based strategies.

Corporate Strategies. Another suite of strategies employed by would-be aggrandizers are more relational in terms of the modes of power they tap into. These *corporate strategies* develop directly out of the pro-egalitarian modes of community interaction discussed above and in many cases can be interpreted as directly opposed to exclusionary strategies (Blanton, et al. 1996:2). It is for this reason that these strategies have seen a recent refocus in the field of collective action theory (DeMarrais and Earle 2017). Here under the community ecology framework, I consider these strategies through which the actions of aggrandizing individuals result in their local symbolic community becoming the center of new, emergent sustainable communities. However, despite these strategies being less focused on direct control over material resources, they still utilize exclusionary strategies in regard to their control of knowledge and other important abstract elements of value in the venue of local symbolic communities. It is for this reason that these corporate strategies have been said to be based on *knowledge-based political economies* (Blanton, et al. 1996:3).

As has been noted, any given sustainable community network is governed by the rules and norms defined by local symbolic communities. Conversely many local symbolic communities developed specifically to generate, maintain, and disseminate critical information regarding sustainable communities. As with material flows through sustainable communities, the flow of information through symbolic communities has natural points of concentration as well as critical junctures where local networks connect to outside networks. Whether by natural development or strategic choice, specific local symbolic communities develop around these critical junctures in information flows (Artemova 2000). But again, as has already been emphasized, symbolic communities, while based around abstraction and cognitive categories, were always realized in practice. While information and knowledge were and still are transferred through language and symbolic media, one of the primary ways in which this knowledge was articulated, formalized, and enacted was through ritual and other forms of performance (Inomata and Coben 2006; Stanish 2017).

Authority in symbolic communities can and certainly did fall into manipulative strategies, whereby aggrandizers set out to capitalize on symbolic community knowledge flows. However, it is more likely that most early leaders in local symbolic communities are better seen under a *cohesive-devotional* rubric, whereby ritual leaders are true believers so to speak and working as system-serving agents (Flannery 1972; Rick 2004:77-78). As with roles in sustainable communities, individuals would be naturally suited, or temperamentally inclined to specialize in ritual knowledge and action. In addition, many leadership positions actually carry a high risk, especially those having to do with regulating or otherwise scheduling sustainable community activities, and it is not unlikely that many of these early leadership positions were obligations as opposed to major advantages. As will be discussed below in direct reference to the earliest state formation, as ritual performance become more important or elaborate it actually "demands work" in the form of costumes, food, drink, and other necessary elements (Spielmann 2002:197). It is in this way that local symbolic communities actually can become the center of their own emergent sustainable communities (Stanish 2017:80-90).

Of course, these corporate strategies of ritual specialists also included explicit individual aggrandizing behavior. For instance, in her excellent ethnography detailing the power of ritual specialists (*shamans*) in Indonesia, J. Atkinson notes how:

> The immediate neighbors of a prominent shaman stand to benefit most from his skills. Their advantage is not only logistical but also political. Established shamans use their reputations to attract people to their settlement, for only those who live nearby have primary claim on a shaman's services…A powerful shaman can serve as an enticement and a justification for residence choice (Atkinson 1992:271).

This example makes clear that established leaders in important symbolic communities can have effects on not just sustainable communities but residential community configurations as well. In this way it is helpful to see these leaders as essential elements in defining *places* in which local symbolic communities choose to pool their collective symbolic capital. Importantly, the residential community to which these successful symbolic community aggrandizers could become important central places in of themselves (Stanish 2017:168-171).

Creating Unequal Community Networks

While the way in which power is distributed across various communities often differed greatly between exclusionary and corporate strategies, both would eventually lead to the formation of increasingly unequal flows of materials and knowledge. Most of these exchanges resulted in sustainable communities that would operate primarily through redistribution or at the very least asymmetrical reciprocity. Under exclusionary strategies aggrandizers would gradually come to control more aspects of the flow of materials and people through sustainable communities. Eventually these aggrandizers may even possess the ability to demand tribute in the form of materials or labor. Likewise, under corporate strategies aggrandizers come to influence an increasing number of aspects of society through their control of knowledge. As entire multi-modal community networks began to pivot more on the leadership of individuals, certain levels of inequality shifted from ephemeral positions enacted in specific times and at specific places, to more accepted hierarchical organization both within and between communities - this effectively represents the emergence of *elites*. Particularly successful aggrandizers were able to pass prestige to those in their local symbolic and residential communities and eventually to their children. Community systems based around these successful aggrandizers with some ability of hereditary wealth transfer are often called big men societies or *chiefdoms* (Earle 1997; Kirch 1989; Sahlins 1963b), and while they may be able to carry out macroscale spatial behavior they generally lacked lasting temporal power.

<u>Becoming the State: prime movers, institutional leadership, and network consolidation</u>

Above I explained how the actions and interactions of individuals at the microscale lead to emergent inequality at the level of community at the mesoscale. Here I explain how community action and interaction at the mesoscale leads to emergent institutions at the macroscale, and specifically the state. K. V. Flannery has again provided one of the most eloquent models for simulating the rise of the state in these terms (Flannery 1972). Below I outline how Flannery's evolutionary simulation is still very pertinent to understanding state emergence and couples well with my community ecology model, but first I highlight some of the underlying socio-environmental mechanisms that likely acted as the catalyst for these major changes in social organization.

Socio-environmental Stresses & Prime Movers

For Flannery and many others broad or lasting transformations in any level of sociocultural organization, particularly those that led to the emergence of new complex institutions like the state, were always caused by significant socio-environmental stresses. Some of these stresses were likely sustained (e.g., and extended drought) or they could be relatively acute (e.g. a devastating flood), but all demanded human action for survival. It is important to view these stresses as not truly deterministic but rather as constraints, primarily to sustainable communities (Trigger 1991). The archaeological record has shown that there are clear patterns in the way societies respond to these stresses - Flannery calls these *prime movers* (Flannery 1972:405-408; Haas 1982; Wright 1986).

I've already discussed a few common prime movers, including extended trade networks, marriage alliances, and developing specifically-tuned symbolic communities for managing sustainable community activities, and while these were still certainly central to the rise of general inequality, here I note a few more prime movers that become particularly pertinent in the development of state-level stratification. Each of the three prime movers described below assume some permanent level of inequality already exists, even if only in certain sectors of society. Also, all three assume that residential communities had shifted to permanent modes (villages) and sustainable communities were beginning to circulate primarily on domesticates. While it is beyond the scope of this dissertation to comprehensively break down this pivotal transformation, as the prime movers below make clear, the transition to permanent village life caused permanent shifts to how communities operated at every level (Bandy and Fox 2010; Marcus and Flannery 1996:70-75).

Irrigation. While forms of social inequality may have existed in all human societies, even in small hunter-gatherer bands, nowhere in the ancient world did the state emerge before the widespread adoption of agriculture. Whether its acceptance was gradual or punctuated, farming completely transformed the way sustainable communities operated. While sources of water were obviously always important to human societies, agriculture demanded humans learn to manage and transport water through irrigation techniques. It was for this reason that in one of the first comprehensive models for the rise of the state, K. Wittfogel focused exclusively on large-scale irrigation (Wittfogel 1955). Effectively, Wittfogel argued that the complex nature of water management would necessitate the formation of powerful and likely permanent managerial positions in the symbolic communities developed to plan, construct, and manage irrigation projects (Wittfogel 1955:166). Some ethnographic and archaeological examples have criticized this theory, showing examples whereby relatively heterachically organized symbolic communities manage complex irrigation systems (W. Adams, et al. 1997; Leach 1959). Others have even argued specifically the opposite, claiming complex institutions like the state must exist before complex irrigation projects could be orchestrated (R. M. Adams 1966; Carneiro 1993). As always, it certainly differs case by case, but it is clear that as sustainable communities relied increasingly on domesticates the development of new specialized symbolic communities were needed, providing more venues for potential aggrandizers to compete (Billman 2002; Davies 2009; Lees 1994).

Population Pressure. Another major transition that went hand-in-hand with sustainable communities shift to agriculture was residential communities shift to permanent settlements. While in some areas permanent residential community settlements certainly predated the adoption of agriculture, once agriculture became the primary means of production in sustainable communities permanent residential settlement became necessary. These initial permanent settlements completely restructured how the various modes of community could interact, resulting in the emergence of two important institutions - the household and the village. These represent the first two emergent institutions that were fundamentally anchored to a specific location on the landscape. Again, while population growth may have predated and even caused sedentism (Boserup 1965), these new geographically stagnant residential community modes and agriculturally-oriented sustainable communities always facilitated and even provided incentives for increased populations (Carneiro 1970; Drennan and Peterson 2008; Sanders, et al. 1988; Wilk and Netting 1984).

However, the new geographically-anchored residential community structure retarded one of the primary mechanisms that symbolic communities had developed for dealing with intra-community conflict, that could lead to fissioning. Mobile modes of residential community facilitated fissioning - when individuals or entire local symbolic communities were in conflict they could simply split off and either join another group or start their own (G. A. Johnson 1982; Rappaport 1968). Permanent modes of residential community and the agricultural sustainable communities that supported them required significantly more labor to establish. The combination of permanent settlements, growing populations, and less ability to fission led to an increase in scalar stress and necessitated a need for new symbolic communities to diffuse these intra-community issues (Bandy 2004a; Bandy and Fox 2010; G. A. Johnson 1982). However, even when it was possible for fissioning to occur, geographic circumscription and the carrying capacity of the local ecosystem would also restrict how often these new residential communities could fission (as it always had) (Carneiro 1988; Kirch 1988; Norton 2007).

Warfare. A final prime mover surrounds intra-community conflict and violence. This suite of direct violent or conflict-based behaviors is often grouped together as warfare, but these also include all manner of raiding, slave capture, and territorial invasion. Violent confrontations between individuals within communities as well as between communities has likely always been part of community formation and transformation (Knauft, et al. 1991). Even egalitarian hunter-gatherer and other small-scale societies are known to engage in relatively extensive and complex violence-based practices (Allen and Jones 2016; Macfarlan, et al. 2014). However, again with the widespread adoption of sedentary residential community configurations, raiding and destruction of sustainable community resources became more prevalent. The most ardent supporter of the warfare prime mover hypothesis is R. Carneiro (Carneiro 1970, 1978, 1988, 1992, 1994, 2012). While Carneiro has been adamant that warfare was always involved in state formation, he also acknowledges that it was always combined with other socio-environmental stresses as well. Specifically, Carneiro's frameworks suggest that as population pressure increased, the scalar stresses described above propelled an increase in intra-community conflict. This was especially true in regions that were particularly circumscribed by environmental factors - such as occupying a fertile river valley in an otherwise arid desert (Carneiro 2012). For Carneiro it was leadership in militarized symbolic communities that led to eventual institutional leadership and the state.

Simulating Institutional Emergence

Any one or combination of these prime movers could engage the series of evolutionary mechanisms described below that increase social complexity and result in the state. For Flannery, the complexity of a given society is measured by two primary characteristics – segregation and centralization. *Segregation* refers to the degree of internal differentiation and specialization of social subsystems, whereas *centralization* indicates the degree of interconnection between these subsystems (Flannery 1972:408). Subsystems generally fall into two categories: *lower-order subsystems,* which have a specific purpose within the political economy and are generally inflexible whereas *higher-order controls* are generally more socio-political in nature, flexible and "set reference values of the output of lower-order subsystems" (Flannery 1972:423). In community ecology terms lower-order subsystems generally associate with sustainable communities whereas high-order subsystems correlate with modes of symbolic community.

This macroscale process of centralization and segregation are generally initiated by the aforementioned prime movers. However, while the socio-environmental stresses catalyze this process it is through the emergent social mechanisms of promotion and linearization that new institutions actually emerge. *Promotion* effectively occurs when symbolic communities or microscale institutions increase their importance within the system. Often this means a specific symbolic community becomes more general in its purpose. This can also occur when a segment of a symbolic community transforms into an institution in its own right, increasing segregation. The mechanism *linearization* occurs when lower-order subsystems, generally symbolic communities regulating specific tasks within sustainable community activities, consistently fail and are bypassed by higher-order symbolic community manifestations (Flannery 1972:413).

The basic simulation proceeds beginning from a relatively small-scale society, where there are mostly very specific-purpose symbolic communities managing different aspects of the broader sustainable community. As linearization occurs in response to some socio-environmental stress(es), buffers are weakened between symbolic community components, leading to simplification within the broader multi-modal community network. To maintain this general-purpose simplification more management is needed, often leading to the emergence of higher-order symbolic communities. As new socio-environmental stresses are encountered these increasingly general-purpose symbolic communities can fissure through promotion, leading to greater segregation. Coordination between these new symbolic communities necessitates new or more effective information processing symbolic community formulations. These new communities are inherently more specific in function and therefore efficient, but as they develop, these communities also tend to become more general purpose and self-serving which causes more stress on the system. This creates a feedback loop as new institutions emerge to cope with this stress. When centralization and segregation have crossed a certain threshold within an articulated network "the state can be said to exist" (Flannery 1972:423).

Peer-Polity Interaction

While Flannery's model provides a useful sequence through which high-order institutions emerge from lower order community interaction within a specific network or society, it is important to remember that no multi-modal community network is ever found in isolation. This is a factor emphasized in C. Renfrew's peer-polity interaction model (Renfrew 1996; Renfrew and Cherry 1986). This model is useful here as it traces broad connections between community networks and their emergent institutions at the macroscale. This model added nuance to long-standing models of diffusion by acknowledging that across the ancient world it appears "when a significant organizational change, and in particular an increase in complexity, is recognized within one polity, it is generally the case that some of the other polities in the region will undergo the same transformation at about the same time" (Renfrew 1996:7). As has already been noted, it is often at the linkage between two largely independent community networks that aggrandizers find the most success as these linkages are where new information and materials can be exchanged.

In many instances this peer-polity interaction resulted in increased complexity through direct competition as described by Carneiro (Carneiro 1993). However, Renfrew notes that through a process he calls symbolic entrainment, there is a "tendency for a developed symbolic system to be adopted when it comes into contact with a less-developed one with which it does not strikingly conflict" (Renfrew 1996:8). In other words, more highly developed symbolic communities tend to subsume less developed ones, especially if they provide novel solutions for common issues. Some recent studies have even suggested that this form of peer-polity interaction, even in highly competitive manifestations, resulted in early urban-style settlements before centralized states emerged, as the primary residential communities of the competing networks converged geographically (Jennings, et al. 2016:476-478).

Consolidating Community Networks

While these meso- and macro-scale evolutionary mechanisms sound abstract they fit nicely with the more micro- to meso-scale aggrandizing strategies described above. As has already been noted, these aggrandizing behaviors are the very prime movers that kick off this feedback loop of linearization and promotion. Importantly, as symbolic communities become more general purpose in function, they provided new avenues of power for aggrandizers to pursue, and if a system was able to sustain certain levels of centralization these avenues could lead to almost any node in the community network. These new emerging leadership roles did not just carry prestige for the individual aggrandizer but came to be essential for the functioning of society - this led to these symbolic community aggrandizing roles becoming *institutionalized leadership positions* that needed to be filled, even if an individual aggrandizer was lost (Vaughn, et al. 2010). These new emerging general-purpose symbolic communities exceeded the abilities of single aggrandizers which would lead to them delegating to their closest symbolic-sustainable community in-group, often their direct kin. It was in this way that these institutional leadership roles led to hereditary inequality and eventually the society wide stratification that define the earliest states. Importantly, as the formation of this hereditary stratification across multiple modes of community is definitional to the formation of the state, this means that, more often than not, “state formation is a multi-generational process” (Jennings, et al. 2016:485)

<u>Being the State: systems of control, integration, & network globalization</u>

The question of the threshold of the state is not an easy one to answer. State-level societies have now existed for some time – no one would suggest that the modern geopolitical states of the 21st century are the same of those arising in ancient world. Most models of social complexity, especially those in the neoevolutionary or systems projects, have defined at least two types of states. Sahlins and Service (1960) distinguished between archaic states and the modern nation-state; likewise, Flannery (1995) has separated archaic states or kingdoms from more expansive empires. As is always the case with evolutionary models, there is a temporal assumption here, that is earlier states are expected to be less complex than ones that emerge later. Building on this, here I target what some of the dynamics of pristine or first-generation states may have been. I then describe how the fundamentally stratified flows that are definitional to states are best seen as a variety of core-periphery relations.

First-Generation States

With all the previously described general principles and limitations in mind; how would we expect the very first states to have operated? The higher-order controls of symbolic communities developed to cope with increasingly segmented and specialized multi-modal community networks often must center exclusively on information processing - effectively specializing in “reflexive communication” (Blanton 1998:162-163). As will be noted below, while control of material resources and their sustainable community features were always part of early statecraft, it was the information processing ability of their symbolic communities that separate them from more ephemeral chiefdoms and other manifestations of ranked societies (Wright 1977). In many ways this stands in stark opposition to many Marxist or materialist perspectives, which more often than not, relegate symbolic community behavior to mere epiphenomena, used to mask purely sustainable community aspirations to dominance and total control (Althusser 2006; Gramsci 2011). However, in addition to not always representing dedicated systems of oppression, as has already been mentioned, the corporate strategies of aggrandizers were often geared more towards regulating knowledge-based wealth in symbolic communities than controlling material wealth of sustainable communities, and it was likely these strategies that led to the earliest forms of centralization and segmentation that define the multi-modal community networks from which the initial pristine or first-generation states emerged.

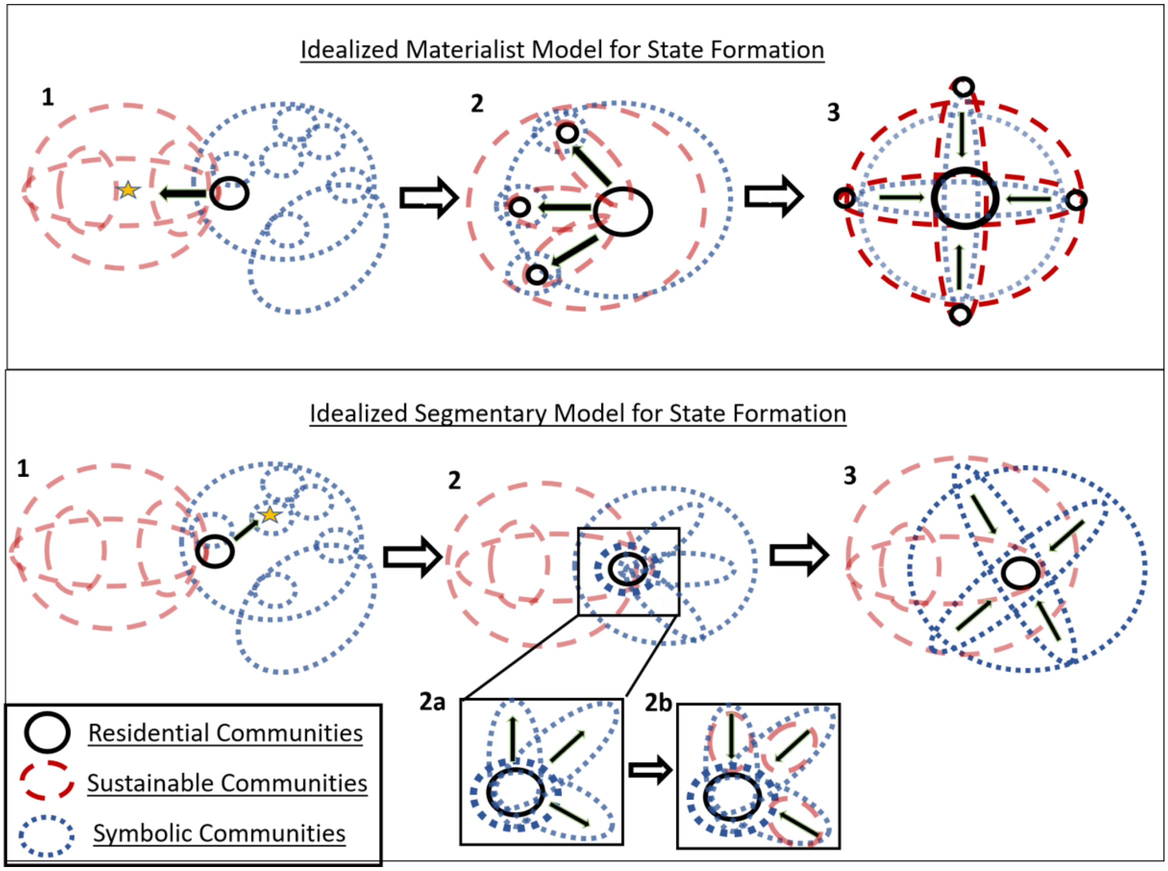


Figure 7. Hypersimplified schematics of different models of state formation described in the text, represented using the modes of community (as represented in Figure 5).

It is likely that the earliest forms of symbolic community centralization to reach the level of the state, that would have been tolerated by relatively egalitarian-oriented populations would have been for scheduling lower-order activities needed for sustainable community exchanges. It has already been described how ritual and other knowledge-specialists could become powerful aggrandizers, capable of transforming and even generating new residential and sustainable communities. As these symbolic communities became more globally-oriented and came to control more aspects of society it is likely that the new burgeoning sustainable communities that funded the performances central to *long ritual cycles* defined the first multi-modal community networks centralized and segmented enough to be considered a state. A. Southall and others have argued that this *ritual mode of production* was likely at the foundation of first-generation or what he called *segmentary states* (Goldstein 2015; Southall 1956, 1988, 1991, 2000; Spielmann 2002; Stanish 2017). As such, the sociopolitical and economic reach of these polities was likely quite limited and its control heterogeneous in which “political sovereignty was confined to the central, core domain.” Under this segmentary state model, power was rooted in its “ritual suzerainty” which “extends widely toward a flexible, changing periphery” (Southall 2000:239).

C. Geertz made some of the first explicit insights into the type of state-level polity in which power was held and expressed more via ritual suzerainty than in political sovereignty. Using the historic and ethnographic observations from the Balinese state, Geertz outlined his model of the *theater state*, in which:

> Court ceremonialism was the driving force of court politics; and mass ritual was not a device to shore up the state, but rather the state, even in its final gasp, was a device for the enactment of mass ritual. Power served pomp, not pomp power (1980:13).

However, while political heterogeneity and ritual pomp may have defined the higher-order controls of the earliest states, at their foundation these processes were also involved in managing and indeed controlling lower-order subsystems of production, consumption, and interregional exchange that define sustainable communities. This aspect of control always incorporated territorial control and even expansion (C. S. Spencer 2010). Defining the limits and overall topology of all forms of community network flows, symbolic and material, is essential to understanding these earliest states.

Core-Periphery Systems

Interregional interaction has been part of human sociality at every stage of complexity. Interaction spheres and long-distance trade networks, even ones composed of only loosely integrated symbolic and sustainable communities, always had centers of gravity - natural aspects of the socio-environmental landscape that led to certain unequal flows of goods and ideas (Caldwell 1962; Hirth 1978; Schortman and Urban 1992). However, as discussed above, the formation of increasingly higher-order forms of stratification in multi-modal community networks fundamentally changed the topologies of this interaction. One of the most useful formulations for conceiving of these unequal flows, especially with the emergence of complex institutions like the state, are core-periphery models. These models are particularly useful at tracing these macro-level flows of the state, effectively looking for patterns in a regional-level division of labor (Hall 2000:4; Santley and Alexander 1992; Wallerstein 1993:294).

I. Wallerstein's *world-systems theory* (Wallerstein 1974) has provided the foundation for the broader core-periphery framework discussed here. Under world-systems theory there are three primary geo-social components to a macroscale regional division of labor: cores, peripheries, and semi-peripheries. *Cores* are the dominating and driving force in the world-systems model. They are at the peak of social complexity (for the system), having highly centralized political organization. Cores control, both directly (e.g., military force - colonization) and indirectly (e.g., hegemonic control), all forms of long-distance trade to-and-from peripheral regions, and accumulate all surpluses (Wallerstein 1974). Technological development is also concentrated in the core regions of the system, with highly diversified production economies and highly specialized labor institutions (Hall 2000:5).

At the other end of the spectrum, *peripheries* are seen in Wallerstein's model as producers for the core region. These peripheral zones see very little profit and certainly no concentration of surplus or general wealth (Wallerstein 1974:302). Specialized production in peripheral areas is rare, focusing instead on the production of bulk goods (e.g. agricultural products) and the collection of other raw materials (e.g. mining). These raw goods are then imported into the cores, as either tribute or forced extraction, with finished or manufactured goods often exported back to the periphery for additional profits to the core (Wallerstein 1974:102-103). Finally, *semi-peripheral* areas, as the term indicates, represent regions that were in-between cores and peripheral areas; acting as buffer zones, economically and geographically, between the core and peripheral areas. The role of these intermediary zones can be dynamic and relative as "[semi-peripheries] act as peripheral zones for core countries and in part they act as a core country for some peripheral areas" (Wallerstein 1979:97), and as such these regions are generally more evenly balanced in terms of the concentration of profits, technological advancements, and diversity of production.

Wallerstein originally formulated world-systems theory to explain the meteoric rise and spread of capitalism. Originating in what he called "the long sixteenth century" (ca. AD 1450-1640), Wallerstein detailed the emergence of this new economic system at the hands of a few western European nations that formed the core. The rise of a merchant class in need of bulk goods, raw materials, labor, and external markets, in turn, led to the colonization and peripheralization of much of the world (Wallerstein 1979, 2011). Wallerstein's model was primarily economic, focusing on the reproduction of this exploitative core-periphery mode of production at the macroscale. In addition, for Wallerstein, a true world-systems manifestation necessitated the modern technological capabilities to transport bulk goods from distant peripheries, disqualifying most prehistoric sociopolitical formations. However, in spite of this many scholars immediately saw the usefulness in this model for explaining how economies as well as broader complex social systems, like archaic states, operated in the deep past (Chase-Dunn and Hall 1993; Chirot and Hall 1982; Kajsa Ekholm and Friedman 1982b; Frank and Gills 1996; Frankenstein and Rowlands 1978; Friedman and Rowlands 1977).

In order to broaden the applicability of this model other case studies, the primary alteration to world-systems theory was that this core-periphery relationship in regional networks expanded far beyond purely economic modes of production, and instead applied to any modes of accumulation, exchange, and even broader modes of social reproduction (Chase-Dunn and Hall 1991; Kajsa Ekholm and Friedman 1982b; Frankenstein and Rowlands 1978; Friedman 1979; Friedman and Rowlands 1977; Peter Peregrine 2000; Schneider 1977). C. Chase-Dunn and T. Hall offer four broad modes of exchange which defined premodern world-systems; 1) trade in bulk goods; 2) political and military exchanges; 3) luxury, preciosity, or prestige-good exchanges; 4) and information exchanges (Chase-Dunn and Hall 1997). With each mode of exchange the scale and strength of its boundary can be expected to outreach the preceding boundary. However, they also see world-system boundaries as extremely dynamic and "pulsating" geographically over time (Hall 2000:11). Many of the dynamics of these processes, including the role of prestige goods and information were described above. In addition, by the time a society approached the complexity of state, there was always an element of bulk-good control, in addition to the other modes of exchange.

More important for understanding archaic states is examining the ways in which cores relate to peripheries. Under the original world-systems formulation cores dominated their peripheries in almost every respect, but certainly economically (Frank 1966; Wallerstein 1974). Here peripheries were completely reliant on cores for all economic activity. However, many studies have shown that, particularly in nascent states, the logistic inability of cores to directly control many aspects of peripheries made these areas "zones of cultural interfaces in which cross-cutting and overlapping social units can be defined and recombined" (Lightfoot and Martinez 1995:472; G. Stein 1999). In fact, because of their contact with a developed core, many peripheral populations could actually find advantages and sometimes transform quite rapidly (Algaze 2005; Chase-Dunn and Grell-Brisk 2016; Donnan and Wilson 1994; Kasja Ekholm and Friedman 1985; Feuer 2016; Green and Costion 2017; Kohl 1987; Parker 2006; Upham 1992).

As has already been noted, the boundaries of different spheres of exchange or control likely shifted over time, even during the life of an archaic state. In times of centralization and core strength, "dominant core strategies" were predominant, and typical hierarchical, core-periphery systems would develop - however, in periods of decentralization, "boundary strategies would prevail" (Blanton, et al. 1992:422-423; Kristiansen 1994; Marcus 1998). The logistical limitations of first-generation states have already been discussed, however below I use this general core-periphery framework to describe patterns in how each of modes of community may have manifested under the unequal flows that defined the macroscale institutions of archaic states.

Archaic State Residential Communities

One of the classic hallmarks of archaic states are the development of stratified residential community settlement patterns. This stratification generally expresses in both population size and complexity of institutions present in settlements (Wright and Johnson 1975). The ideal state-level settlement pattern is often depicted as a fixed solar system composed of a four-tier hierarchy - a large primate center in the middle of a core area of influence, orbited by progressively smaller and less complex settlements, from secondary centers, to large villages, and finally hamlets (Billman 2001; Marcus 2008:259; Plog 1976). Of course, as discussed above, this was not a uniform spread; constraints, from environmental to preexisting sociocultural systems, provided advantages and disadvantages to state expansion and control (Crumley 1979; S. C. Smith and Janusek 2014; G. Stein 1999). However, at the macroscale all first-generation states were certainly based in primary residential communities from which the central symbolic communities expanded their influence and control.

Urban Cores. The development of the first urban centers or cities has been central to understanding the state. This has been true since V. G. Childe first coined the Urban Revolution to mark the general emergence of complex societies (Childe 1950). While it may be true that population agglomerations large enough to be considered urban centers likely predated, and even may have operated on sociopolitical processes that depressed state-level centralization in some areas (Jennings, et al. 2016), it is clear that the earliest states were centered on large urban centers (Cowgill 2004:526). Like a household or a village, a city represents a specific socio-spatial institution under the community ecology framework - that is they represent more than large, complex residential communities and instead are specific locations in which specific sustainable and symbolic communities are anchored in residential communities (Cowgill 2004;

Glaeser 2011; Jacobs 1961; Storey 2006). A useful distinction has recently been made between urban types: economic cities - centered on sustainable community behavior and political cities - centered on symbolic community aggrandizing behavior. This recent survey by Smith and Lobo argued that most emergent urban centers likely centered on the intentional actions of aggrandizers and their constituent symbolic communities whereas most modern cities fall more into the economic city category (M. E. Smith and Lobo 2019). However, in another recent study G. Algaze emphasizes that the brutal living conditions of all premodern cities would have essentially demanded consistent influx of immigrant populations to sustain themselves, necessitating an economic drive (Algaze, et al. 2018; see also Nichols 2006).

While households likely remained important socio-spatial institutions at the microscale within macroscale socio-spatial institutions like the first cities (e.g., Marcus 2009; Ur 2014), new intermediary forms of residentially-oriented community formations began to emerge as well. In several recent studies the term *neighborhood* has become particularly emphasized to describe these new urban residential community manifestations (see Arnauld, et al. 2012; Hutson 2016; Pacifico and Truex 2019; Stone 1987). While house clusters and other forms of intermediary residential communities had certainly been present in village formations (Bandy and Fox 2010), neighborhoods represent a new emergent form in the hyperdense population centers of emerging cities. While these new socio-spatial institutions manifested differently in different urban settings, they appear to be a relatively ubiquitous feature of urban settlements from their first formation (Storey 2006). Sometimes literally walled off, but always physically demarcated in the built environment these spaces were used to house and more importantly socially integrate local symbolic community affiliation in an otherwise globally-oriented symbolic community settlement (Hutson 2016; Pacifico 2019; any chapter in Manzanilla and Chapdelaine 2009). Finally, sometimes neighborhoods are also seen as nested in larger intercity intermediary forms like precincts, barrios, or districts (M. E. Smith and Novic 2010).

Colonized Peripheries. Another way in which the first states fundamentally altered residential community formations was through the formalization of various colonization practices (G. Stein 2005:12-13). As always, there is great variability in these residential community manifestations, but G. Stein offers a comprehensive conceptualization that grapples with this diversity, defining a colony as:

> An implanted settlement established by one society in either uninhabited territory or the territory of another society. The implanted settlement is established for long-term residence by all or part of the homeland…and is both spatially and socially distinguishable from the communities of indigenous polity or peoples among whom it is established (G. Stein 2002:30).

Stein goes on to explain how these new forms of implanted residential communities were motivated by various sustainable and symbolic community manifestations (G. Stein 2005:11). Along these lines he argues that functionally a colony can be:

1) a center of higher-order symbolic communities centered on administrative or military goals - *direct colony*
2) a center of higher-order symbolic communities centered on religion - *mission colony*
3) a new residential community for refugees - *diasporic colony*
4) a new residential community for settlers due to demographic pressures - *settler colony*
5) a new residential community for forcibly resettled populations - *displaced colony*

Obviously, these different roles of colonies are not mutually exclusive and the function of any given colony likely shifted over time. However, the main point here is that these new implanted residential communities are another ubiquitous feature of even the earliest states. That said, while they may have been ubiquitous, the limited logistical ability of archaic states would have affected just how far direct colonial methods could be applied (G. Stein 1999:62). Instead, various versions of settler colonies and even diasporic colonies likely defined the earliest colonial manifestations. These settler-diaspora colonies maintained their symbolic community practices but often only had tenuous direct contact with the homeland (G. Stein 2005:47). However, they manifested, these colonies were by definition located at the extents of state control and characterized important regions called frontiers or borderlands.

As has already been noted these frontiers or borderlands represent dynamic areas of culture contact (Barth 1998; Feuer 2016; Green and Costion 2017; Lightfoot and Martinez 1995; Parker 2006; G. Stein 2005). Sometimes this dynamic landscape appears to have resulted in the fusing of various symbolic community practices and beliefs through various forms of emulation and other forms of symbolic entrapment, resulting in hybridity and even ethnogenesis (Card 2013; Van Dommelen 1997; Weik 2014). However, sometimes it was in these areas of cultural contact where symbolic community affiliations were accentuated and even aggressively projected (R. Cohen 1997, 2008).

Archaic State Sustainable Communities

The rise of the first archaic states, including the emergence of the first urban centers necessitated intensification of sustainable community activity in every dimension. I have already discussed at length a number of ways in which aggrandizers and increasingly entire higher-order symbolic communities would intervene, both directly and indirectly, in sustainable community organization. This includes everything from managing irrigation projects and other infrastructural projects to increase agricultural productivity to co-opting long distance trade relationships. While centralization was of course a part of this shift under archaic states, segregation may have been even more powerful as is evidenced by increased specialization in all aspects of sustainable community roles.

Craft Production. Nowhere in the sustainable community networks of archaic states is specialization more evident than in craft production. The production of crafts, from tools to clothing and from pots to figurines, is a fundamental part of the human condition and talented specialists likely existed at any level of social complexity. However, it was under states that entire symbolic communities developed to maintain the skill-base necessary to complete increasingly specialized sustainable community tasks involved in this craft production (Costin 1996; Patterson 2005; Schortman and Urban 2004; G. S. Stein and Blackman 1993). Again, while they may have existed prior, it was under the state that full retainer workshops, or entire communities who worked full-time to complete crafts commissioned by higher-order elites, were first developed (Costin 1991:9). This type of specialized craft production can be indicated in a number of ways but often includes standardization and increasing levels of precision expressed in the final products (Costin 1991, 2001). Importantly, G. Algaze has recently used the concept import substitutions, by which aggrandizer-funded workshops would mass produce formally high-valued imports, to explain how this early specialization would have been one of the primary catalysts for driving the often paradoxical cycles of urban growth (Algaze, et al. 2018).

Archaic State Symbolic Communities

The centralization and segregation of increasing social complexity under archaic states certainly had repercussions in sustainable and residential modes but they primary took place in symbolic community manifestations (Conrad and Demarest 1984; Knapp 1988). As has already been noted, if nothing else, a state truly specialized in reflexive modes of communication (Blanton 1998). Much of this communication involved decision making, which under archaic states meant the need for symbolic communities that were: “both externally specialized with regard to the local processes [they] regulate, and internally specialized in that the central process[es] are divisible into separate activities which can be performed at different places at different times” (Wright 1977:383). The highest-order symbolic communities were occupied by true elites who, like leaders of modern nation-states, ultimately acted as the delegater-in-chief, relying on leaders of their constituent symbolic communities to regulate lower-order sustainable communities (Huber and Shipan 2006). Purely bureaucratic symbolic communities became important for maintaining records for sustainable community tributes and other purposes of production and exchange. Militarized symbolic communities became important for enforcing laws in residential communities as well as securing resources for burgeoning sustainable communities (Carneiro 1992; Schreiber 1987; Valdés Guía 2019). However, arguably more important for many archaic states were specialists who worked to regulate the articulating systems of value which allowed for complex institutions like the state to be be sustained (Conrad and Demarest 1984).

Priests. As has already been noted, first-generation states in particular likely hinged on the ability of local symbolic community leaders to generate, maintain, and transform knowledge and other systems of belief (Southall 2000). While this role may have fallen to individual aggrandizers in pre-state formations, as centralization and segmentation both allowed for specialization as well as broadening authoritative power, entire communities were needed to carry out these central integrating activities. The class of specialists geared towards managing higher-order forms of symbolic wealth are best defined as *priests* (VanPool 2009; Winkelman 1992). As these symbolic communities were promoted and became more general purpose they also became more self-serving, in that a great amount of resources, material and symbolic, were needed to sustain them (Flannery 1972:413). Temples and other higher-order symbolic community infrastructure often formed essential and central portions of urban settlement built environments as well of the broader sustainable community (Kajsa Ekholm and Friedman 1982a; Stanish 2017). Again, these symbolic community manifestations often were ables to spread much further and integrate much deeper than other forms of state influence.

Globalizing Community Networks

The debate of whether states represent qualitatively new institutions or simply ones defined by quantitative difference is still alive and well, there is no question that they are defined by a marked increase in centralization and segregation. As a macroscale emergent institution, the state would manifest in specific ways in specific times and places, but was always more than the sum of the multi-modal community networks whose interaction generated them. Even first-generation, largely segmentary states, acted as centers of gravity in expanding networks of control and influence. This new regional-level network centralization is best seen as a form of globalization. Following studies of the modern planetary globalization process that defines the Anthropocene (Chase-Dunn 1999; Friedman 1995; Tomlinson 1999; Trouillot, et al. 2001), an increasing number of studies project this idea into prehistory to describe periods of intense centralization and integration in past networks (Kajsa Ekholm and Friedman 2008; Jennings 2010, 2016; Knappett 2016; LaBianca and Scham 2006). While globalized networks are defined by increased connectivity between all modes of community they are particularly emphasized in increasingly interconnected symbolic community belief systems. These symbolic homologies, in broad swaths of a network, can actually generate phenomenological effects that act to compress space-time - essentially making formally disparate locations feel more alike (Jennings 2016:13-20). However, globalized networks can also have the opposite effect, actually instigating the re-embedding of local symbolic communities as forms of general symbolic community conservatism and even active resistance (Scott 1990; Yoffee 2016). Far from monolithic, the community ecology framework coupled with Flannery's systems-based state simulation helps illustrate how not just centralization, but institutional segregation defined archaic states.

Breaking the State: resiliency, collapse, and network balkanization

Of course, states were not static entities but rather precarious emergent institutions reliant on multitudes of multi-modal community network interactions. Like all complex adaptive systems, states relied on constant feedback between interlocking subsystems both composed of and controlled by increasingly centralized and segregated symbolic communities (R. M. Adams 2001). In his simulation for the rise of the state Flannery also explains how the processes of promotion and linearization that lead to centralization, segregation and the emergence of the state, are also subject to fatal internal pathologies that induce eventual collapse (Flannery 1972). Promotion of symbolic communities can easily fall victim to *usurpation* in which they turn aggressively self-serving, draining capital from the system instead of generating it. Likewise, by their basal nature, processes of linearization increasingly cause higher-order symbolic communities to circumvent and often break-down intervening, better established buffer systems.

Both of these issues can lead to *hypercoherence* in which critical symbolic communities or internal institutions take on too many roles. When these hubs within the network falter or fail it can lead to cascades of other failures - the entire system becomes a house of cards (Flannery 1972:420; Yoffee 2019). Effectively if these critical higher-order symbolic communities fail they lead to thresholds of self-organized criticality in which rapid feedback leads to the collapse of the entire system (Tainter 1990; Yoffee and Cowgill 1991). As with understanding their emergence, most frameworks for understanding the dynamics of complex societal collapse begin with socio-environmental stresses. These may be gradual or prolonged (extended drought) or punctuated (e.g. major flood), and of course include all manner of human induced ecological issues (e.g. environmental degradation due to over exploitation or warfare) (Diamond 2010; Tainter 1990, 2006).

A growing number of studies using panarchy theory have provided one of the more robust frameworks for understanding how complex emergent institutions like the state can be both fragile and prone to collapse as well as resilient, capable of maintaining coherent cultural projects for centuries (Folke 2006; Gotts 2007; Holling and Gunderson 2002; Kinzig, et al. 2006; Redman 2005). The panarchy framework is geared towards understanding the adaptability or resilience of a given system (in this case the state) to the socio-environment in which it is situated - particularly the ability of the system to "absorb" socio-environmental stresses without fundamental reorganization (Holling and Gunderson 2002:28). Under this model the adaptive cycle is made of four primary stages: exploitation, conservation, release, and reorganization. The *exploitation* and conservation phases are about a system seeking out/developing surrounding resources to exploit and consolidating/developing resources for accumulating surplus. The *release* stage roughly aligns with aspects of hypercoherence when the system reaches fragility thresholds and eventually can collapse. A final stage of *reorganization* occurs when the system is reconstituted - sometimes in the image of the predecessor system and sometimes something new (Holling and Gunderson 2002:33-35).

Importantly the panarchy framework is a multiscalar model that sees various, interlocking adaptive cycles occurring simultaneously (Holling and Gunderson 2002). These systemic cycles are nested within each other and depending on their scale, move through the adaptive cycle at different rates. For example, macroscale institutions and higher-order symbolic and sustainable communities tend to move through the cycle relatively slowly with substantial changes accruing over generations. Conversely, microscale institutions and local symbolic communities may move through the process relatively rapidly, with periods of creative destruction occurring many times during the life of an individual. The interlocking nature of these different cycles are ripe for feedback and periods of self-organized criticality. For instance, *memory* generated from the conservative macroscale societal systems can actually generate stability for lower-order systems, even during times of change. However, the faster cycling lower-order systems can actually accumulate to generate *revolt* and rapid periods of change in even conservative higher-order systems (Redman 2005:73-74).

Balkanizing Community Networks

Many archaic states appear to have lasted for generations and even centuries, however many also appear to have suffered relatively rapid collapse - it is clear that both elements of resilience and fragility defined these early macroscale institutions. However, even the most resilient archaic states would eventually collapse leading to major decentralization and balkanization in multi-modal community networks. The collapse of macroscale institutions almost always meant significant reorganization in all modes of community. Residential communities that defined urban cores often dissipated entirely (Tainter 2006). Colony populations were often cut-off from their homelands and left living in diaspora - interestingly these can represent some of the last vestiges of former state symbolic community manifestations (R. Cohen 1997; Owen 2005). However, it is important to see the collapse of a complex adaptive system, like the state, less as a collapsing building, reduced to rubble, and more of a series of interlocking solar systems release from their orbit around a black hole. Said another way the collapse of an archaic state, while often rapid and even occurring through violent revolt, did not result in the subsequent system(s) starting from scratch. In fact, periods of collapse often lead to periods of intense regeneration and even increased complexity (Faulseit 2016; McAnany and Yoffee 2009; Schwartz and Nichols 2010).

In fact, it is only after a state has developed and collapsed that macroscale institutions like empires can form. Here I define empires as aggressively territorially expansive states, that have often conquered or otherwise incorporated neighboring states (Doyle 1986; Sinopoli 1994; M. E. Smith and Schreiber 2005). The reason empires were often able to form quickly was by reconstituting community networks originally forged by proceeding states (Chase-Dunn and Grell-Brisk 2016; Chase-Dunn and Hall 1997; Hall, et al. 2011:251). These geopolotical landscapes of competing or peer-polity states in which empires could form only appear to have occurred after the rise and collapse of a number of first-generation archaic states.

1.4 Chapter Summary

Chapter 1 has detailed the theoretical perspectives and frameworks on which this dissertation attempts to build-on and work within.

1.1: I make the argument that to properly understand any aspect of human sociality a formal complexity approach is necessary. Here I introduce complex adaptive systems and the reoccurring features that define them.

1.2: Here I explain how any complexity perspective necessitates a multiscalar and multidimensional approach. Most importantly, in this subsection I introduce my community ecology approach as an essential middle-range framework for bridging the gap between the local and the global.

1.3: In this final subsection I work to synthesize the community ecology framework with the wide body of research that has worked to understand the birth, life, and death of archaic states.

Next: Chapter 2 contextualizes this largely theoretical discussion in the context of Andean South America and specifically the Tiwanaku case study in the south-central Andes.

Chapter 2 - Socio-Geographical Context

In this chapter I contextualize the theoretical discussion outlined in Chapter 1 within the socio-geographical context of the Andes. To do this I provide a basic introduction to Andean South America by surveying the history and prehistory of this diverse region as well as reviewing some of the ways in which this history has been understood. This includes highlighting the role archeology and ethnography have played in this process as well as the study of the Inca and other contact period groups from Colonial-era documents. I hone-in specifically on the indigenous concept of *ayllu* as an essential feature of Andean social life. I draw extensive connections between the present and historic use of the concept of *ayllu* in many parts of the Central Andes with the multi-modal community networks I defined in Chapter 1. Finally, this section ends with a detailed account of the Middle Horizon Period (ca. AD 500-1100) in the south-central Andes. This discussion centers on situating Tiwanaku as an archaic state and reviewing current archaeological understanding of how this polity formed, expanded, and eventually collapsed.

2.1 A (Very) Brief History of Understanding Social Life in the Andes: a macroscale view

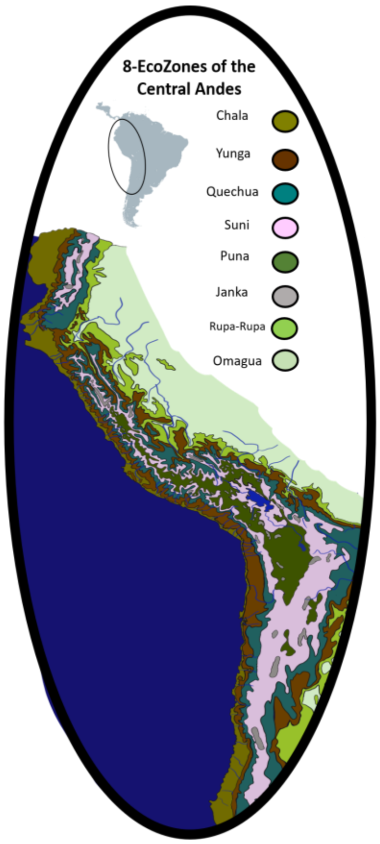
The western coastline of South America is marked by hyperarid coastal dessert punctuated by modest river valleys; narrow oases watered by alpine runoff. Then rise the rugged Andes, whose snow-capped, often volcanically active peaks reach heights of 4000 meters above sea level. On the eastern slopes the range gives way to cloud forests and eventually the tropical lowland expanse of the Amazon Basin. In much of western South America, just a single week of walking could bring one from the Pacific, across the expanse of the Andes, and into the humid jungles of the Amazon. This land of compressed ecological extremes was the locus for one of the truly independent developmental trajectories of human societies in the deep past. As with the Near East, North Africa, East Asia, and Mesoamerica, investigating the processes involved in the development of social complexity has been one of the central themes driving Andean archaeological research since its beginnings (Bennett 1946; Lumbreras 1981; Moseley 1992a; Stanish 2001a; Willey 1953). Likewise, archaeological research conducted in the Andes has been central to advancements in theoretical and empirical understandings of social complexity more broadly (Carneiro 1988; Spencer 2010; Steward 1972; Tantaleán 2016).

In this subsection I review how the study of the Andean past has developed since the turbulent sixteenth century when the Andes and the rest of the Americas were brought into contact with the Old World societies of Africa, Asia, and Europe. This discussion centers largely on the development of archeology and ethnohistory in the twentieth century and how these burgeoning disciplines were applied in Peru, Bolivia, and to a lesser extent Chile, and other neighboring nations. I then provide a schematic overview of the processual culture-history these studies have produced, highlighting significant trends in regional sociopolitical development and horizon-based system that has long defined our understanding of Andean prehistory. However, first I supply some additional geographical context by presenting information about the defining environmental and geological features of the Andes.

<u>The Andes: an environmental overview</u>

The Andean Cordillera represents the longest continuous mountain range in the world - spanning the entire north-south length of the South American continent or approximately 7000 kilometers. The range is the result of subduction tectonic activity as the Nazca Plate underlying the eastern Pacific Ocean slides beneath the South American continental plate. The Andes touch portions of seven modern nations - from Columbia in the equatorial north of the continent to the Patagonia region of Chile and Argentina in the south. However, here my discussion targets the Central Andes portion of the range which primarily falls within Peru and Bolivia and is bound by southern Ecuador in the north and northern Chile and northwestern Argentina in the south. The Andes represent one of the prominent regions in the Pacific Ring of Fire, and as such is subject to frequent and often intense earthquakes and contains numerous active volcanoes (Barazangi and Isacks 1976; De Silva 1989). The particularly volcanically dense southern Andes contain the highest elevation volcanic peaks in the world (Cembrano and Lara 2009).

Like most alpine-based environments, differences between specific ecozones in the Andes are largely oriented vertically, based on elevation. This is made particularly extreme in the Andes as the range is located often just twenty kilometers from the Pacific Ocean. This ecological complexity is again compounded as the chain interacts with warm, moist air from the southern Atlantic in the east and the cool, dry air which wells up from the cold, deep waters of the Humboldt current along the Pacific coastline (Garreaud 2009). The result of this is an extreme rain shadow effect, whereby moisture is trapped east of the Andes, resulting in the well-watered Amazon Basin and more importantly for this study, it creates a hyper-arid strip of coastal desert, trapped between the Pacific and the Andes (Houston and Hartley 2003). In a now classic study, J. P. Vidal used indigenous Quechua terms to label eight primary environmental zones that define the Central Andean portion of the chain (Vidal 1987). These zones begin along the western coast and move eastward across the cordillera and end with the Amazon basin in the east, with boundaries between zones defined by vegetation, topography, precipitation, and of course, elevation (Figure 8).



ECOZONE	Elevation m.a.s.l.	average temperature range (degrees centigrade)	defining features	commonly cited natural resources	commonly cited domesticates
Chala	0 -500	8 - 33	coastal lomas and hyperarid desert broken by intermitent river valleys - extreme seasonal fog	fish, marine birds and mammels, guano fertalizer	fruits, peppers, maize, beans, squash
Yunga-W	500-2300	15 - 40	hyperarid, rocky hillsides dissected by deeply incised valleys	crayfish, algarobba and molle fruit, cactus	maize, beans, squash, peppers
Quechua	2300-3500	11 - 16	relatively smooth fluvial steppes adjacent to intermontain valleys. Generally below frequent frost line	wild camelids and deer, various wild plants	maize, beans, tubers (potatoes, oca), chenopods (quinoa), llamas, alpacas
Suni	3500-4000	7 - 10	high-relief topography, marked by narrow steep quebradas, frequent frosts	wild camelids and deer, wild tubers	llamas, alpacas, limited maize, temperate tubers
Puna	4000-4800	0 - 7	low-relief grassland plains, frequent frosts	wild camelids and deer, vicuña, wild tubers and chenopods, lacurine resources	tubers (potatoes, oca), chenopods (quinoa), llamas, alpacas
Janca	4800+	0	high-mountain peaks - above the vegetation line, permanent frosts	X	X
Yunga-E	2300-1000	11 - 35	forested slopes, steep topography, and narrow quebradas	various wild plants and animals	maize, squash, beans, coca
Rupa Rupa	1000-400	22 - 25	semi-topical, cloud forest	timber, fruits, various wild plants, animals	maize, squash, fruits, beans, peppers
Omagua	400-50	23-30	Well-watered swamps, humid tropical rainforest	timber, hallucinagenic plants, fruits, gold, feathers, monkeys	maize, fruits

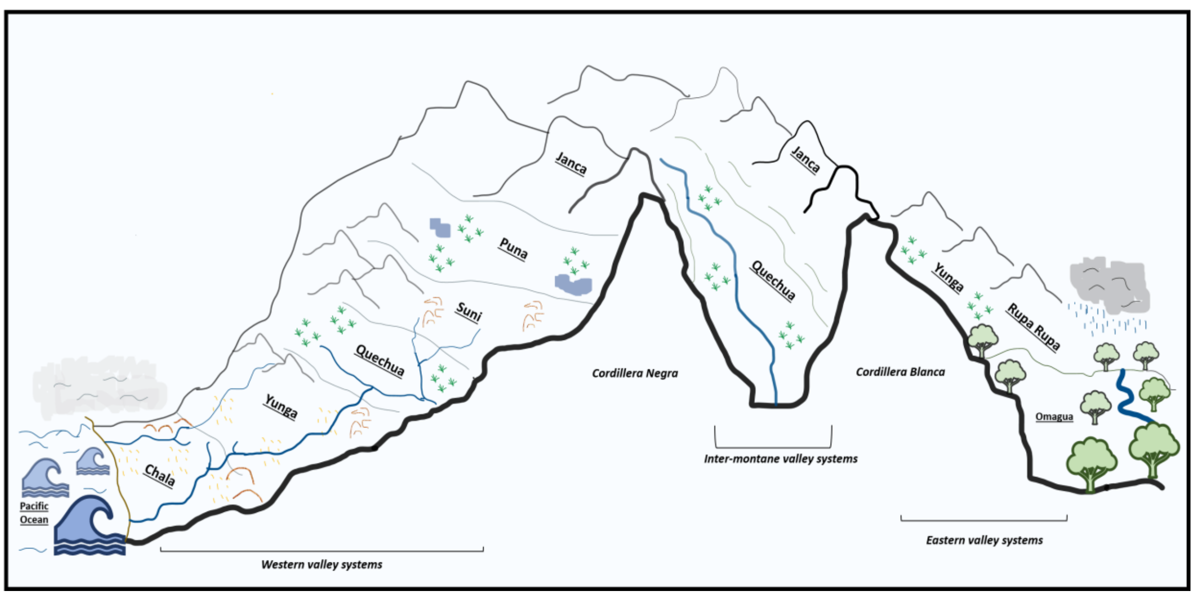


Figure 8. The eight primary ecozones of the Central Andes according to J. P. Vidal's model (Vidal 1987:24). Includes: map depicting the distribution of environmental zones across the Central Andes (top-left), chart providing basic information[6] regarding each ecozone (elevations, average temperature range, and basic descriptions of the topography and wildlife) (top-right), and an idealized cross-section of the environmental zone distribution (bottom).

[6] Most of this information was drawn from Vidal (Vidal 1987) but I also supplemented with information from other sources as well (particularly, Thomas and Winterhalder 1976; Troll 1968).

While there have been modern updates and new micro-climates defined (Hazzi, et al. 2018), Vidal's general zones are still particularly useful as they are based explicitly on generalized indigenous conceptions[7] and use of the Andean landscape. As will be discussed in every subsection below, grappling with these often very condensed vertically-oriented environmental zones is a central theme to traditional Andean social life and the anthropological understanding of it (Murra 1985; Pease 1985; Platt 1986). I refer to these zones (Figure 8) throughout my discussion of general Andean culture-history below and provide much greater detail to how these zones are specifically distributed in the south-central Andes subregion (see *2.3*).

While these general environmental zones likely defined the broader Andean environment for a significant portion of human occupation, there have been some significant changes over the millennia worth noting. The truly ancient glaciers of the Central Andean highlands and long-standing alpine lakes, particularly the massive Lake Titicaca, have provided ideal conditions for long-term paleoclimatic sampling, which have provided exceptional climactic clarity for the Andes (Abbott, et al. 1997; Abbott, et al. 2003; Grosjean, et al. 2001; Seltzer, et al. 2000; Thompson, et al. 2000). As with the rest of the Americas, Andean South America was first definitively colonized sometime during the Pleistocene, at least 13,000 years before present (Dillehay 2008). Here, at the tail end of the last Ice Age, much of the highland zones were glaciated, though the coastal zones likely would have been well-watered and suitable for habitation. However, this period was likely marked by drastic and lasting climactic change as glaciers receded and ocean levels rose (J. A. Smith, et al. 2005). As coastal zones shrunk, new habitats opened up in the former permafrost-locked and glaciated highland zones (Hansen, et

[7] However, it is important to note that some groups use some of these terms in a relative sense. For instance, a single intermontane valley may be said to contain *suni* (valley bottom), *puna* (mid valley slopes), *janca* (valley ridgetops), while technically the entire valley would fall within Vidal's *quecha* zone according to elevation (see Mayer 2007:244-245).

al. 2003). By the mid-Holocene, between 9000 and 3000 years ago, climactic conditions were actually warmer than present in much of the Central Andes (Geyh, et al. 1999), with environmental and overall precipitation levels reaching those roughly of modern conditions at the terminal mid-Holocene some 2000 years before present (Sandweiss and Richardson 2008:98). Of course, these climactic conditions varied greatly over time and in specific places - again, this will be explored specifically in relation to the south-central Andean subregion below (see *2.3*).

El Niño Southern Oscillation (ENSO)

A significant global climactic effect which greatly affects the general Central Andean ecozone trends listed in the table included in Figure 8, is the El Niño Southern Oscillation (ENSO). While the ENSO plays out globally, it has particularly focused effects in the Andes. During ENSO events a shift in the Pacific Ocean trade winds brings warmer waters to the normally cool eastern Pacific (Enfield 1989). This suppresses the Humboldt current and brings nutrient poor coastal waters and rains to the normally hyperarid coastal *chala* and *yungas* along the western Andean slopes. Conversely, drier winds from the north bring more arid conditions for typically well-watered portions of the Andean *quechua*, *suni*, and *puna* highland zones. ENSO events appear to consistently occur in cycles of two to seven years and last for periods of up to several months (Enfield 1989). These events bring damaging flooding along the coast and drought conditions in the higher elevation zones, which have and continue to cause serious complications to human activities (Dillehay and Kolata 2004; Moseley 1999).

Despite their relatively regular occurrence, ENSO can still be very unpredictable as they come in up to four major varieties of greater and lesser intensity (Sandweiss, et al. 2020). While they vary locally there appear to have been Andean-wide ENSO-triggered occurrences of catastrophic flooding along the coast and prolonged drought in the highland zones which have affected the overall trajectory of Andean civilization (Dillehay and Kolata 2004). These intense

ENSO events occur sporadically but roughly occur every 50, 100, and 500 years (Keefer and Moseley 2004; Magilligan and Goldstein 2001; Moy, et al. 2002). The 500-year events represent truly environment-transforming climactic patterns and have likely only occurred a handful of times since the onset of ENSO events in the mid-Holocene about 5000 years ago (Sandweiss, et al. 2020; Sandweiss and Richardson 2008:100; Sandweiss, et al. 1996; L. Wells, et al. 1997). However, whether once-in-a-generation or a standard ENSO, flooding events could have relatively profound changes in the resources available to early agriculturally-based communities in the coastal quebradas of the western Andes (Goldstein and Magilligan 2011; Manners, et al. 2007; Sandweiss and Quilter 2008; Van Buren 2001; L. E. Wells 1990). Likewise, even modest drought events could cause significant problems to nascent agricultural and pastoral communities in the highlands (Binford, et al. 1997; Moseley 1999; Ortloff and Kolata 1993; Rodbell, et al. 1999; Shimada, et al. 1991; P. R. Williams 2002).

A History of Archaeological Thought in the Andes

Before delving into how social life unfolded in the Andes, it is important to highlight how this social life has been studied and articulated into a historical narrative. In the Andes, like any given *Homo sapiens*-occupied locale on the planet, all human societies have been focused on delineating certain aspects of their past. As will be noted later (see *2.2*), many Andean cultures have had particularly central symbolic communities based around grappling with the past through ancestor worship and other mortuary-based activities (e.g., Gose 2008; Hastorf 2003; Isbell 1992; Lau 2008). In both formal and informal ways, Andean societies have reused or reoccupied buildings or landscapes which had been central to previous cultures - this was actually an important feature of Inca imperial strategy (Yaeger and López Bejarano 2004). Furthermore, after Spanish conquest many early chronicles made astute observations regarding pre-Inca ruins and settlements (Cieza de Leon 1976[1553]). However, here my focus will be on how modern anthropological, and specifically archaeological paradigms formed beginning at the eve of the twentieth century (Trigger 1989). As noted above, my discussion targets how these disciplines developed in and were applied to studies in Peru and to a lesser extent Bolivia, Chile, and the other surrounding modern Andean nations.

In the Central Andes the first formal manifestations of the Western antiquarianism that would form the initial impetus for archeology can be credited to the Peruvian M. E. Rivero (Tantaleán 2016:24-28). Just over two decades after Peruvian independence was declared from Spain, Rivero formed what would come to be Peru's first national history museum as well as publishing the first formal publication centered on Andean antiquities - *Antigüedades Peruanas* (Rivero 1851). Shortly after this, prominent foreign travelers also began to publish on findings in Peru, including the detailed sketches of E.G. Squire from the United States (Squier 1877) and even initial excavations by German (Stübel and Uhle 1892) and French teams (Wiener 1880). While some of these later studies were remarkably systematic for their time, they were still geared more towards collecting interesting curiosities, than delineating any form of articulated history. More than this, the War of the Pacific would bring the majority of the Central Andean nations into direct conflict for much of the late nineteenth and early twentieth century and cause serious disruptions in any sort of social scientific study. That said, this antiquarianism-oriented period would culminate in the sensational successes of American explorer H. Bingham in his National Geographic-funded discovery of Machu Picchu (Bingham 1930) and the ultimately tragic exploits of British Col. P. H. Fawcett in his search for lost cities in the Bolivian Amazon (Fawcett 1910).

The modern archaeological framework for understanding Central Andean prehistory can clearly be traced to German archaeologist M. Uhle (Linares Málaga 1964; Menzel 1977; Rowe 1954; Tantaleán 2016:43). In addition to providing the first comprehensive chronology for the region, Uhle would also petition for and coordinate some of the first formal federal protections of cultural patrimony in Peru, Bolivia, and Chile. Uhle used seriated materials from surface collections and excavations at dozens of important sites in Peru, Bolivia, Argentina, and Chile to define pan-Andean horizon styles. Using the Inca as a base-line Uhle was the first to assert there had been previous horizons of stylistic unification in the Andes (Uhle 1902). Again, while there have been significant revisions to these stylistic horizons, they were often quite accurate and provided the first evolutionary framework for understand cultural development in the Andes. Uhle would also come to run the prehistory department in Peru's initial Museo de Historia Nacional, founded Chile's Museo de Etnología y Antropología, and petitioned for formal protection of Bolivia's important site of Tiahuanaco (Martínez 1998; Tantaleán 2016:39-43). It should be noted that while Uhle certainly represents the foundational figure during this period, other rigorous archaeological work was also being conducted by others in the region, particularly A. Bandaleir's detailed archaeological and ethnographic work, funded by the American Museum of Natural History in highland Bolivia (Bandelier 1905, 1910).

However, in the growing nationalism that defined the early twentieth century, Peru found its own founding father of archeology in J. C. Tello (Astuhuamán Gonzáles and Daggett 2006; Burger 2009). Like Uhle, Tello would work at many important Andean archaeological sites and was instrumental in establishing infrastructure for cultural patrimony protections in Peru (Tantaleán 2016:54-55). Within the diffusionist framework that defined early twentieth century anthropology (i.e., Boaz 1924; Kroeber 1940), Tello sought to identify Peru's mother culture - a deep cultural root through which all Peruvian culture could be grounded (Tello 1929, 1930). He found this mother-culture at the important Andean center of Chavín de Huántar, the epicenter of a clear progenitor style to Uhle's Tiahuanaco and Inca horizons (Tello 1943). Similarly, across the border in Bolivia, Austrian born-turned-Bolivian national, Arthur Posnansky would find a similar mother culture at Tiahuanaco. While earlier researchers, like Uhle and Bandelier had identified Tiwanaku as pre-Inca, Posnansky went further, arguing Tiwanaku was actually the center of the earliest civilization in the world - destroyed by a pre-Biblical world-wide flood (Posnansky 1945). Back in Peru, the nationalistic approach of Tello was further amplified by the *indigenismo* movement which, inspired by new Marxist-oriented histories (Basadre 1937; Basadre and Puccinelli 1931; Mariátegui 1934), sought to establish firm foundations for indigenous-led social movements (Tantaleán 2016:56-57). This was exemplified in the work of L. Valcárcel, who conducted some of the first systematic work in the Peruvian *altiplano,* identifying important links between the highlands and coast and insisting that "one had to explain Peruvian society from within" (Tantaleán 2016:68; Valcárcel 1945, 1949).

As World War II forced the world into the modern era, Central Andean archeology was also largely transformed during the early mid-twentieth century. It was during this period that foreign researchers, largely based in the United States, would again come to greatly impact archeology's trajectory in western South America. The first post-war project, largely funded by the U.S. government's Bureau of American Ethnology and directed by a leading voice in the emerging post-Boasian neoevolutionary school of anthropology, J. Steward, was *The Handbook of South American Indians*. This multi-volume encyclopedic report compiled all known information regarding the current and prehistoric peoples of South America - including some of the first systematic ethnographic and linguistic work in remote areas of the Andes and the Amazon (Steward 1940). An important member of Steward's team and later a leading researcher for the American Museum of Natural History, was W. C. Bennett, whose work would come to redefine much of the primary Central Andean cultural sequence (Bennett 1943; Bennett and Steward 1946). Like Uhle and Tello before him, Bennett would work at many crucial archaeological sites across Peru and Bolivia, as the first to employ largely modern archaeological methods and techniques (Bennett 1946, 1948, 1950).

Both contemporaries and immediate successors of Bennett would largely follow his lead into the culture-history school of anthropology which focused on delineating increasingly fine-tuned cultural sequences (Bennett and Bird 1964; Kroeber 1926; Murdock 1951). One of the earliest concerted archaeological efforts in this regard was the Virú Valley Project, directed by G. Willey based at Harvard University. The Virú Valley project was the first to carry out a comprehensive settlement pattern study in the Andes, using detailed stylistic seriation to detail the entire cultural sequence of the valley (Strong and Evans 1952; Willey 1945, 1953). This type of work was bolstered by the extensive collections and sequencing of Peruvian archaeologist R. Larco Hoyle on Peru's north coast (Larco Hoyle 1948), which represented some of the first systematic work on the Moche and Chimu cultures.

This period of Central Andean archeology would climax with the work of J. H. Rowe (and his University of California-Berkeley students) in his coordination of the Ocucaje master sequence based on systematic collections in the Ica Valley (Hammel 1969; Menzel 1964a; Patterson and Lanning 1964; Rowe 1945, 1962). This period of the late 1950s and into the 1960s would be relatively tumultuous for the Central Andes politically speaking, with military coups and sweeping peasant land reforms occurring in Peru and Bolivia. This was of course in-line with the broader global geopolitical environment, in which the Cold War had entered its initial peak period. This tense political milieu would shape the way in which the Andean societies were interpreted, particularly in regard to the Inca. For obvious reasons the Inca had been the focus of historical studies since initial antiquarianism pursuits (Prescott 1847), but Rowe and his students actually conducted some of the first formal excavations in Cuzco and other important Inca sites, developing an initial chronology for Inca imperial emergence (Menzel 1959; Rowe 1944, 1946, 1956, 1967). However, it was also during this period that the use of ethnohistorical methods would become crucial in delineating the Andean past.

While many of the chronicles of early Spanish conquistadors and officials as well as other historical documents had already been translated and utilized by researchers, it was under the work of J. V. Murra that this ethnohistoric approach took center stage. Murra, well-steeped in the politics of the day having served the communist forces in the Spanish civil war, brought a new perspective to published histories, and more importantly unpublished colonial era legal documents, arguing among other things that the Inca represented a unique case of an expansive state governed by non-market exchange forces (Murra 1956, 1962, 1968, 1980).

However, far from being an arbitrary application of popular socialist perspectives of the day, Murra used the newly emerging substantivast school of economics to argue for a case of Andean exceptionalism, that would come to be known as *lo Andino* (Tantaleán 2016:99-102). *Lo Andino* was effectively a new expression of historical particularism, and while not without its complications (Gade 1999:31-41; Jamieson 2005), would come to influence much of the study of social life in the Andes throughout the 1960s and 1970s. Again, this was particularly evident in the work of ethnohistorians and anthropologists who utilized to relied on primary historical documents to highlight the particular ways in which Inca statecraft represented a uniquely Andean way of social organization (Murra 1985; Pease 1965; María de Diez Canseco Rostworowski 1953; Salomon 1978; Zuidema 1964, 1977).

The 1970s and 1980s would see a major increase in the sheer number of archaeological and ethnographic projects in the Central Andes. Materialist focus would continue to dominate many aspects of Peruvian-led archaeological projects (Choy Ma ; Lumbreras 1974; Mujica, et al. 1983). Likewise, ethnographic projects in the Andes at this time also took largely materialist or ecology perspectives in their study of Andean peasant communities (Long and Roberts 1978; Mayer 1974; Thomas 1976). Major multi-year, multi-component research projects, largely in the spirit of the Virú Valley project would proliferate during this time. These new projects would aggressively employ the new processual focus of archeology in North America, relying on a suite of new scientific techniques for sampling archaeological sites and the broader environment (Flannery 1973; Watson, et al. 1971). These projects, including the Chan Chan-Moche Valley Project on the Peruvian north coast (Moseley and Day 1982; Ravines 1980), the Upper Mantaro Valley Project (Earle, et al. 1980; Horton 1984; Morris and Thompson 1970) and Ayacucho Basin Project (MacNeish 1981) in the central Peruvian highlands, the Programa Contisuyu on the far south coast of Peru (Watanabe, et al. 1990), and the Wila Jawira project in highland Bolivia (Kolata 1996a; Ponce Sanginés 1976) would come to bring dozens of new researchers, largely from the United States and western Europe to the Central Andes, and greatly impact the intellectual landscape of the region.

In the last thirty years, archaeological research in the Central Andes has increased exponentially. In Peru, competing university programs, largely based at Pontifcia Universidad Católica del Perú and Universidad Nacional Mayor de San Marcos, have generated their own internal debates and methodological approaches to studying cultural patrimony since the 1980s (Higueras-Hare 2008; Tantaleán 2016:126-135). Similarly, foreign researchers have continued to lead extensive projects throughout the region, bringing the ever-changing repertoire of interpretive approaches and technological techniques to studying the Andean past. These emerging perspectives and modern data sets are far too varied and extensive to comprehensively review here; however, I do incorporate them into my general outline of Andean culture-history below.

An Andean Culture-History: from peopling to present

While never complete and constantly updated, the archaeological and broader anthropological research described above has produced a relatively detailed sequence for how Andean social life has developed over the past 15,000 years. This history is of course far too extensive and unnecessary to comprehensively review here, however a basic orientation to how complex society has developed, from start to finish, is necessary to provide context for understanding Tiwanaku and the Middle Horizon. As has already been alluded to above, developing culture-history frameworks, even ones based on varying processual criterion, have limitations. Horizon-based schema have become particularly entrenched in understanding Andean prehistory (Lorandi 1986; Willey 1945), and while their diffusion-centric beginnings have been largely dismantled, they still have limited how conceptions like time and progress have been applied in understanding the Andean past (Swenson and Roddick 2018). I generally use contemporaneity, or general temporal periods, for guiding this discussion, but obviously also use additional criteria including developmental stages (Rowe 1962). This of course guarantees underplaying significant differences in local cultural manifestations and even in broad local developmental sequences (Carmichael 2019; Moseley 2013; Roddick 2018). However, this is meant to be a fundamentally macroscale perspective, only targeting the broad trends in the social through the l*ongue durée*. I then pivot to a more meso- and even micro-scale view of Andean social life in subsequent subsections (see *2.2* and *2.3*). However, with these limitations in mind here I present a basic overview of Andean culture-history, beginning with the first peopling of the region at least 13,000 years ago and ending with a discussion of the region as it stands today (J. D. Moore 2014; Moseley 1992a; Quilter 2013; Silverman and Isbell 2008).

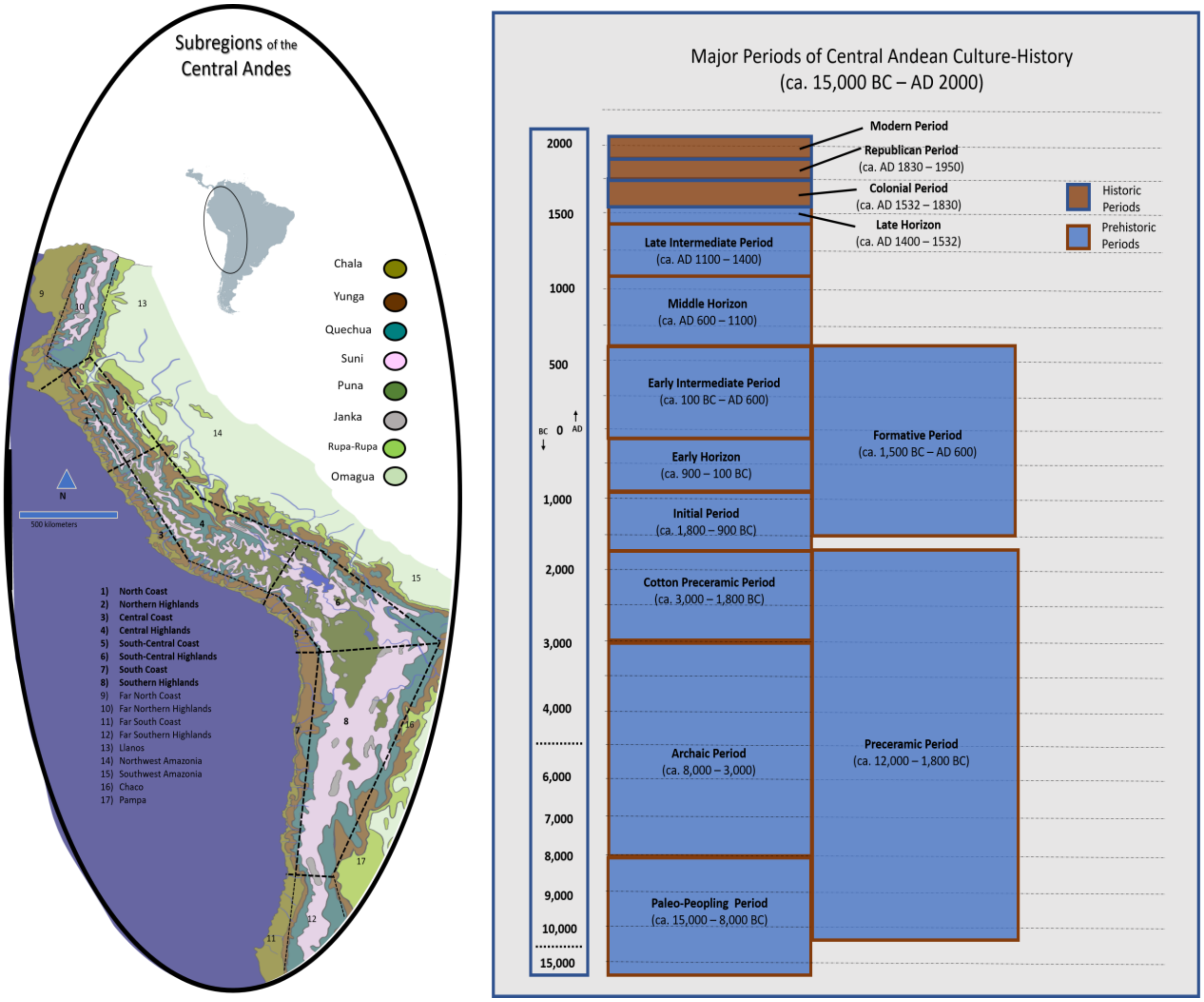


Figure 9. Map depicting major Central Andean subregions as referred to in the text and schematic of major periods/stages of Central Andean culture-history as discussed in the text.

For reference I have included a map which illustrates the primary subregions I refer to throughout this discussion[8]. As has already been noted, I focus on what can generally be referred to as the Central Andes. This geographic region encompasses the modern nations of Peru, Bolivia, and Chile, but also includes portions of Ecuador and Argentina. However, to minimize the bias of using modern borders I tend to use more general geographic subregion designations in the discussion below. The Central Andes are composed of eight primary

[8] While these divisions are my own - they match most closely with those outlined by C. Stanish (see Stanish 2001).

subregions - the northern highlands, the north coast, the central highlands, the central coast, the south-central highlands, the south-central coast, the southern highlands, and the south coast. As will be noted, cultural developments in the Central Andes also depended on interactions with additional subregions also depicted in the map (Figure 9). Again, I provide a more detailed look at the development of social life in the south-central highlands and south-central coast later in this chapter (see *2.3*).

First Peoples & Archaic Communities

Debates and controversy have always surrounded the exact timing of the first human migrations into the Americas (D. G. Anderson and Gillam 2000; Fiedel 2000), and the initial peopling of the South American continent is no exception (Borrero 2016; T. F. Lynch 1990). However, an increasing amount of archaeological data and new genetic mapping methods have provided increasing resolution on exactly how the first humans spread throughout South America and specifically the routes these early migrations took through the Andes (Dillehay 2008; Lavallée 2000; Sutter 2020). While some researchers persist in claiming sites dating to before 20,000 years before present in northern Brazil (Boëda, et al. 2014), the most widely agreed upon figure is that South America had been colonized certainly by ca. 13,000-11,500 BC and possibly by as early as ca. 16,500-12,500 BC (Dillehay, et al. 2015; Sutter 2020:39). These first colonizing populations likely moved relatively rapidly down the from the isthmus of Panama along the Pacific coast. Some subpopulations of these initial migrations likely did move inland via river valleys, but the highlands were colonized up to 1000 years after the coast (José M. Capriles, et al. 2016; Rademaker, et al. 2016). These groups were composed of highly mobile residential communities with sustainable communities geared exclusively for hunting and gathering wild game and flora. However, these strategies did range - from generalized foraging in the interior to more specialized maritime foraging strategies employed on the coast (deFrance, et al. 2009; Dillehay 2008:35-40; Sandweiss 2008).

By approximately 10,000 years before present the Central Andes, from the coasts to the highlands, were occupied by humans - this marks the onset of the Archaic Period (ca. 8000-3000 BC) (Aldenderfer 1989). While most expressions of residential communities were still highly mobile and fluid, sustainable community strategies had become far more specialized in exploiting micro-niches found in each ecological zone (Aldenderfer 2008). This was particularly true of the highland subregions, where the harsh conditions of the *suni* and *puna* environments necessitated careful resource scheduling (Aldenderfer 1998, 2006; Camacho and Marcos 2019; José M Capriles and Albarracin-Jordan 2013; Rick 1980). However, groups living along the coast in the *chala* zone, able to rely on the extremely bio-diverse littoral were quickly beginning to develop more sedentary configurations of residential communities (deFrance, et al. 2009; Lavallée, et al. 2011).

Some of these semi-sedentary groups would show some of the first clear expressions of significant investments into symbolic community affiliations. One of the most iconic examples of this symbolic community development were in the elaborate mortuary practices of the Chinchorro. The Chinchorro complex refers to the first semi-sedentary group to occupy much of the *chala* region in the south coast subregion, which included the earliest examples of artificial mummification in the world (Arriaza, et al. 2008; Standen 1997). However, until the Late Archaic, even with the rising complexity on the coast, the broader sustainable community networks of highland and coastal groups appear to have remained largely independent (Aldenderfer 1989:152).

Initial Complexity & the Maritime Hypothesis

Sometime after ca. 3000 BC, the trend of residential communities becoming increasingly sedentary and more complex in terms of symbolic community manifestations would accelerate exponentially - this defines what is generally referred to as the Late Preceramic Period (ca. 3000-1800 BC). Along the north coast subregion of the Central Andes, communities began erecting substantial non-domestic structures. Especially in an area referred to as Norte Chico, centered on the Supe Valley, a number of sites would come to feature truly monumental architecture in the form of massive mounds and large platforms. Originally believed to be centered at only a few sites like Aspero and Caral in Norte Chico (Engel 1957; Feldman 1980; Moseley and Willey 1973; Shady Solis 2006) and El Paraiso a little further south (Quilter 1985), this monument construction now appears to have taken place a at least 30 locations in the region (Haas and Creamer 2006). Interestingly, these monumental structures required significant organization and yet the cultures who constructed them had not yet invented or adopted technologies like ceramics and early evidence showed a general lack of domesticates (Bird 1948). This observation led M. Mosley to purpose the *Maritime Hypothesis*, which suggested that the abundant resources provided by the fisheries along the Pacific coast released ecological constraints for these coastal sustainable communities which allowed for their modes of symbolic communities to flourish (Moseley 1974, 1992b). While domesticated cultigens, particularly cotton for fishing nets, were essential and indeed substantial portions of sustainable communities at this time (Beresford-Jones, et al. 2018; Dillehay, et al. 2007; T. Pozorski and Pozorski 1990), the rich maritime subsistence base clearly facilitated these impressive, early symbolic community expressions in the built environment.

Formative Foundations: farming, herding, & village life

While the sustainable communities that underwrote the monumental constructions of the coastal Preceramic Period may have been largely based on wild marine resources, by ca. 1000 BC domesticated plants and animals would come to command the diets of most Central Andean communities (Pearsall 2008). As has already been noted, even in the early centers of Norte Chico, non-dietary domesticated plants, like cotton and bottle gourds, were essential for the fishing practices that drove their sustainable communities. However, even here dietary domesticates like peanut, manioc, squash, and quinoa were present in small amounts

(Dillehay, et al. 2007), and by the end of this period the range of domesticated crops was quite rich, with at least fifteen species present (Dillehay 2011; Pearsall 2008:113). Many native Andean domesticates, like sweet potato, jack bean, squash, and cotton were likely domesticated on the western and eastern slopes of the northern highlands and further east in the *amazonia* subregion (Piperno and Pearsall 1998). On the other hand, starchy tubers, like potatoes and oca, as well as pseudocereals, like quinoa, were domesticated south in the central and south-central highland subregions (Bruno 2014; Spooner, et al. 2005). Finally, maize, the most important non-Andean dietary domesticate likely arrived in Columbia from southern Mexico by ca. 6000 BC and had reached the Central Andes by at least ca. 4500 BC (Freitas, et al. 2003; Pagán-Jiménez, et al. 2015; Pearsall 2008:133). Importantly, the stimulant coca which was likely domesticated around ca. 2000 BC in coastal Ecuador, would become (and remains) central in many Central Andean symbolic community practices (Plowman 1984). Again, while their spread was uneven, crops like maize, potatoes, legumes, peppers, and squash would come to define not just the foundation for sustainable communities but increasingly hold sway over the expression of residential and symbolic community arrangements throughout the Andes (Hastorf 1999).

In a similar time frame, domesticated animals would also come to fundamentally transform many aspects of Central Andean community expressions (José M Capriles and Tripcevich 2016; Stahl 2008; Wheeler 2012). Sustainable communities operating in the Andean highlands, particularly in the central and south-central subregions, had generally relied equally on wild deer as much as they did on wild camelids (guanaco and vicuña) (Lavallée 1988). This changed beginning after ca. 4000 BC as several sites in the central, south-central, and southern highlands subregions show increasing reliance on camelids, including evidence for husbandry in the form of sharp increases in fetal camelid bones in archaeological assemblages (Wheeler 1995:279-281; Hugo D. Yacobaccio and Vilá 2016). However, exactly when and where the domesticated camelids, llamas and alpacas, formally emerged as new species from their wild counterparts continues to be a matter of debate (Bonavia 1999; Rick 1980) - especially given the similarities in morphology between wild and domesticated species as well as their ability to interbreed[9] (Wheeler 1995:282). However, like domesticated plants, there is good evidence that pastoralism, based around herding domesticated llamas (likely alpacas as well), had come to define the orientation of many sustainable communities throughout the Central Andes by at least ca. 1000 BC (Browman 1989; K. M. Moore 2016; Hugo D Yacobaccio 2004). An additional important animal to be domesticated in the Andes was the *cuy* or guinea pig. While also difficult to distinguish from its wild relatives[10], the guinea pig is believed to have been domesticated sometime before ca. 3000 BC and widespread by at least ca. 1000 BC (Stahl 2008:123-126).

As has already been noted, as agricultural and pastoral lifeways came to define the sustainable communities of Central Andean societies residential and symbolic modes of community were also drastically transformed. Agricultural infrastructure such as irrigation canals, hillside terraces, and raised fields as well as storage facilities necessitated increased sedentism and the formation and widespread adoption of the mesoscale institution of the village. In addition, while they had been in-use in places like the *yungas* of Ecuador and in parts of *amazonia* for centuries (Roosevelt 1999; Zeidler 2008), with the widespread adoption of agriculture, ceramics and related high-temperature technologies finally became widespread in both highland and coastal subregions (Burger 1995:58-60). These new sustainable community agricultural infrastructure and related technologies also necessitated increasingly focused symbolic community intervention to organize and maintain them (Hastorf 1999; Pearsall 2008). As will be discussed below, the complex push and pull dynamics of new institutional emergence

[9] Recent genetic testing has seemed to clear up some of the relation between llamas, alpacas, and wild camelids - this recent work seems to confirm long-held assumptions that llamas descend from wild guanaco whereas alpaca were domesticated from wild vicuña (Kadwell et al 2001).

[10] Again, recent genetic testing has helped delineate some of these issues inherent in morphological studies - broadly speaking these suggest *cuy* were domesticated at least twice - once in Peru and once in Columbia (Lord et al 2020).

coupled with new subsistence strategies, population growth, and individual aggrandizing practices (as defined in Chapter 1) began to play-out throughout the Central Andes.

While not driving quite the same sedentary residential community manifestations, pastoralism would also greatly effect broader community organization (José M Capriles 2011; Nielsen 2016). While domesticated camelids certainly provided a significant source of dietary protein, their most important resource for Central Andean communities was wool. Wool and the woven textiles produced from processed wool would become some of the most highly valued goods for symbolic communities throughout the Central Andes, which necessitated extensive sustainable communities for support (Dransart 2003; Murra 1962). In addition, camelids, particularly llamas, were also used as draft animals. While not particularly effective (when compared to Old World quadrupeds) and rarely used in agriculture (plowing, etc.), they still came to transform broader sustainable community exchange networks with the development of caravan routes that connected much of the central, south-central and southern Andean subregions (Browman 1974; Nielsen 2000). Importantly these caravans would provide the logistical edge needed for the vertical complementarity that would come to define broader Andean community networks in later periods (Browman 1984; T. F. Lynch 1983).

Interregional Interaction & Globally-Oriented Symbolic Communities

By ca. 1800 BC most sustainable communities operating throughout the highlands and coastal subregions of the Central Andes had transitioned to domesticates. While certain manifestations of sedentism had emerged in the coastal Preceramic centuries earlier, now most residential communities had transitioned to fully sedentary configurations - the basis for the new institution of the village. New craft technologies of ceramics and woven wool and cotton textiles would both bolster sustainable communities and create new venues that required and allowed for symbolic community embellishment (Burger 1995:57-127; S. Pozorski and Pozorski 2008:614). Finally, increasing use of llamas as pack-animals allowed for much greater extension in how much and how far goods could be transported (Browman 1975). All these new sociocultural features primed multi-modal community networks for both the exclusionary and corporate strategies of aggrandizers (see *1.3*) and the development of truly regional forms of interaction. This developmental stage is generally referred to as the Initial Period (ca. 1800-900 BC) in the northern and central coastal and highland subregions and the Formative Period (ca. 2800 - AD 400) in the south-central and southern highland and coastal subregions.

Along the north and central coast subregions, where manifestations of symbolic community interactions had already resulted in the often-monumental public architecture constructions during the Preceramic Period, settlements would reach new levels of scale in terms of both population size and complexity. Now with fully developed, agriculturally-oriented sustainable communities, supplemented with the continuous source of marine resources from the Pacific, these already large coastal centers would erupt into the first true urbanized settlements in the Andes (Makowski 2008; T. Pozorski and Pozorski 2018). Multiple sites in the Casma Valley in particular, like Pampa de las Llanas-Moxeke and Sechín Alto likely held populations in the thousands (S. Pozorski and Pozorski 2002, 2008). While this coastal complexity still appears to have largely orbited around the corporate strategies of symbolic communities (Burger 1995:75), evidence such as the clear depictions of violence and subjugation at sites like Cerro Sechín, make it clear that more exclusionary strategies were also being deployed (S. Pozorski 1987).

Importantly, regional symbolic communities become evident in this period, most clearly expressed in the spread of the U-shaped and sunken, circular court architectural traditions (Moseley 1992a:136-142; Von Hagen and Morris 1998). Beginning on the coast, the spread of these architectural traditions suggests that symbolic communities were becoming more adept at transferring complex forms of information across space (Stanish and Haley 2004). This tradition would spread from the coast and into the central highlands, where already well-established symbolic community manifestations, like the Kotosh Tradition would incorporate these new coastal constructions into their built environment repertoire (Burger 1995:104-127).

This period of growing symbolic community complexity would culminate in the rise of Chavín de Huántar and the spread of the first globally-oriented symbolic community motifs that would come to influence most of the Central Andes, and define what is known as the Early Horizon (ca. 900-200 BC) (Burger 1995; Kembel and Rick 2004; Tello 1943). Located in the *quechua* zone of the central highlands subregion, Chavín de Huántar would eventually grow to a size of approximately fifty hectares and house up to 3000 occupants (Burger 2008:683). However, more impressive was its ceremonial core which covered almost ten hectares and was centered on a series of intricate temple and sunken court complexes (Lumbreras 1989).

Symbolic communities at Chavín would first utilize the U-shaped platforms and circular sunken court architectural styles that derived from the coast, but quickly would develop their own built environment style, including the use of labyrinth-like passages within mounds and elaborate stone carvings (Kembel and Rick 2004; Rick 2004). Importantly, with the full use of the highly visual mediums of ceramic, textiles, and low-relief stonework, symbolic communities at Chavín developed a new aesthetic mode of symbolic community expression, based on a suite of largely exotic and otherworldly motifs (Cordy-Collins 1977; Miller and Burger 1995; Rowe 1964). Importantly, ceramics and especially textiles represent particularly mobile modes of symbolic communication, which allowed for many of Chavín's motifs to be adopted by symbolic communities throughout the Central Andes (Burger 1995:195-203).

Peer-Polity Interaction & the Emergence of States

There is still a significant amount of debate regarding when the first states emerged in the Central Andes (Stanish 2001a). Some place the crossing of this institutional threshold as early as the Late Preceramic (Haas and Creamer 2006; Shady Solis 2006), others the Initial Period (T. Pozorski and Pozorski 2018), and as criteria are often changing, it is unlikely that a definitive consensus will ever be reached (see *1.3*). However, beginning after ca. AD 200 with the development of the Moche, there can be little doubt that by almost any criteria state-level institutional complexity had formally emerged in the Central Andes (Stanish 2001a). The Moche were actually a series of peer-polities, which clustered into three primary groups centered in the Moche, Jequetepeque, and Lambayeque Valley systems in the north coast subregion (Bawden 1995; Castillo Butters and Castillo 2008; Chapdelaine 2011; Larco Hoyle 1948). Through a variable combination of strategies, from managing extensive sustainable community endeavors like agricultural irrigation projects (Billman 2002) to providing significant investments into crafts like ceramics and metallurgy (Bernier 2010; Bourget and Jones 2009; Shimada and Wagner 2001), Moche aggrandizers quickly developed relatively large constituent of symbolic community followers.

In a similar fashion as earlier Chavín, Moche symbolic communities would utilize multiple extant stylistic trends to innovate their own emergent artistic styles (Donnan 2004; Quilter 1997; Trever 2016). While extreme exclusionary strategies, including organized raiding and warfare, had likely been utilized on the north coast for millennia, Moche aggrandizers would employ slave capture as well as human sacrifice as primary avenues to expand their control over sustainable communities and consolidate their power within their local symbolic communities (Billman 1997; Quilter 2002; Sutter, et al. 2005; Swenson 2003). At their height, the competing Moche peer-polities would develop complex settlement patterns (Billman 2002; Chapdelaine 2002), centered on monumental architectural precincts, like the truly massive adobe pyramids of the Huaca de la Sol and Huaca de la Luna in the Moche Valley (Hastings and Moseley 1975; Uceda, et al. 1998). Finally, these polities were unambiguously stratified with clear expressions of elite rulers, evidenced by some of the most elaborate royal burials of the ancient Americas, such as the famous Lord of Sípan burials in the Jequetepeque Valley (Alva 2001).

Further south in the south-central highlands and central coast subregions new levels of community network complexity was also emerging at the same time as Moche in the north. In the central coast subregion, the Lima culture developed in the *chala* region of the Rímac and

Lurín valleys, most notably constructing impressive adobe brick platform mound architectural complexes (Mauricio 2018). The most substantial complex, at Pachacamac, would become a primary epicenter for symbolic community activities for over a thousand years, as the site would be co-opted by later Wari and Inca expansive states (Eeckhout 2013; Uhle 1903). Further south still in the *chala* zone of the Ica and Nazca drainages in the south-central coast subregion, competing aggrandizers that would form the basis of the Nazca culture (Proulx 2008) would develop some of the most enigmatic symbolic community manifestations of the ancient world - the Nazca Lines (Reinhard 1985; Silverman and Browne 1991). These often-massive geoglyphs are the result of processional paths, among other large-scale symbolic community practices that anchored burgeoning sustainable communities based on increasingly complex agricultural infrastructure and elaborate craft production (Aveni 1986; Seglins, et al. 2017; Vaughn 2004).

To the east in the south-central highlands, surrounding the massive alpine lake, Lake Titicaca, increasing cultural complexity was accelerating even more quickly than on the coast. Here significant symbolic community imprints in the built environment had already initiated at centers like Chiripa in the southern Titicaca Basin as early as ca. 1500 BC (Hastorf 2008). However, by ca. AD 200 the center of Pukara had emerged as the leading center in an increasingly crowded region of competing aggrandizers and their constituent communities (Klarich and Bustinza 2012; Stanish 2003:137-145). How this process played out during the Late Formative Period in the Titicaca Basin is discussed in much greater detail below (see *2.3*).

The peer-polity interaction that defined the Moche and other previous societies drew on interregional ties and involved some expansive strategies - even some examples of true colonization (Hubert 2015; Wilson 1983). However, most direct interventions made by aggrandizers and their factions in these nascent complex community networks were relatively localized - focused on drawing (or forcing) sustainable and symbolic community resources inward as opposed to expanding their residential community networks out-wards. After ca. AD 500 this would shift as true expansive statecraft would directly effect huge swaths of the broader

Central Andean system - this marks the onset of the Middle Horizon (ca. AD 500-1100) (W. H. Isbell 2008; Stübel and Uhle 1892). Again, this period is the focus of this dissertation and will be discussed in detail below (see *2.3*), but a few points are necessary to highlight here.

The Middle Horizon is centered on the emergence, expansion, and collapse of two state-level polities - the Wari in the central highland subregion and the Tiwanaku in the south-central highland subregion. Both polities would emerge from long-standing localized peer-polity interactions in their own subregion, and come to influence not just their respective subregion, but most surrounding subregions as well. In addition to each synthesizing their own local styles, as true peer-polities, Wari and Tiwanaku would come to share remarkably similar set of iconographic styles and other visual media in grounding and expanding their symbolic community networks (Conklin 2013; W. H. Isbell, et al. 2018). While following similar overall trajectories, each polity developed within different local community interaction circumstances and utilized very different strategies in expanding their influence (Goldstein 2013; P. R. Williams 2005).

Centered in the Ayachuco area of the central highlands subregion, the Wari would develop relatively rapidly from fierce competitions between local aggrandizers (W. H. Isbell 1997b; W. H. Isbell and Cook 2002). These early community interactions appear to have relied heavily on raiding and other, often violent, direct intervention strategies (Tung 2007), suggesting the emerging Wari aggrandizers relied significantly on exclusionary strategies throughout the Middle Horizon (Tung 2012, 2014). Wari would directly establish distant residential community colonies, complete with examples of the type of administrative architecture used in exclusionary strategies and direct sustainable community interventions (W. H. Isbell and McEwan 1991; Nash and Williams 2004; Schreiber 1992, 2001). These Wari colonies can be found in a number of locations throughout the north, central, and northern south-central highland subregions as well as the north, central, and south-central coastal subregions (Bélisle 2015; Jennings 2010; McEwan 2009; Schreiber 2004; Topic and Topic 1983; P. R. Williams, et al. 2005).

Conversely, Tiwanaku would emerge as the result of local peer-polity interactions that had been cycling through periods of complexity within the Titicaca Basin for millennia (Bandy 2013; Stanish 2003). As noted above, just prior to the Middle Horizon, the polity centered at Pukara in the northern Titicaca Basin held sway over the broader south-central highlands. However, by the Middle Horizon the central site of Tiwanaku in the southern Titicaca Basin would house tens of thousands - the center of a truly massive interregional network of increasingly hierarchically-ordered sustainable and symbolic communities (Browman 1984; Janusek 2006, 2008; Kolata 1993a; Stanish 2013). Tiwanaku would also establish limited strategic colonies to more directly control distant sustainable community resources (K. Anderson 2013; Goldstein 2005, 2015). While there are still only limited examples of direct or sustained conflict or cooperation between these two polities (P. R. Williams, et al. 2001), their interaction is again clear in their shared suite symbolic media, which developed a true pan-Andean “international” or global symbolic community network (W. H. Isbell 2008; W. H. Isbell, et al. 2018).

Initial Collapse & Regional Development

The influence of the burgeoning states of Wari and Tiwanaku, while by no means uniform or complete, would come to fundamentally transform the Central Andes, both during their growth and ultimate collapse. The increasingly globalized networks of these highland-based polities lasted an incredible length of time, however community organization issues, likely arising from hypercoherence were leading to sociopolitical stresses in both states (Finucane, et al. 2007; Janusek 2004a). These organizational issues would eventually collapse as these weakened institutional and higher-order community networks encountered a particularly prolonged ENSO-driven drought beginning just after ca. AD 1000 (Ortloff and Kolata 1993). As underlying symbolic community superstructure deteriorated, formally articulated networks of sustainable communities began to drift apart and directly compete (R Alan Covey 2008b; Zovar

2007). This spurred increased use of exclusionary strategies and particularly raiding a warfare (E. N. Arkush 2012; E. N. Arkush and Tung 2013). This is particularly evident in shifting settlement patterns of residential communities. In subregions like the south-central highlands, the former core of the Tiwanaku state, defensive hillforts become common residential community manifestations (E. N. Arkush 2008, 2011).

While localized regional development and warfare defined much of the former highlands cores or Wari and Tiwanaku, some subregions would see a coalescing of communities into new complex networks at this time (Dulanto 2008). For instance some subregions on the south coast (Conlee 2004; Nigra, et al. 2014) as well as portions of the northern highlands (Church and Von Hagen 2008; Guengerich 2017; Toohey 2011) would see levels of complexity not yet achieved for those subregions. However, it was again on the north coast that the greatest level of sociopolitical complexity could be found (Vogel 2018). Here centered at the urban site of Chan Chan, in the former core of the southern Moche, the Chimù would emerge as a new state-level polity (J. D. Moore and Mackey 2008; Moseley and Day 1982; Silverman 1991). As with their antecedents, Chimù aggrandizers would invest huge amounts of resources into agriculture-based sustainable community systems as well as advancing craft-based sustainable communities, developing advanced artisan-based symbolic community networks (Mackey and Klymyshyn 1981; Topic and Moseley 1983; Tschauner 2006). The Chimù would also develop extensive built environment facilities from which they would focus their control over sustainable community resource flows (J. D. Moore 1992; Pillsbury and Leonard 2004; Topic 2003), as well as territorial strategies through residential community expansion (Boswell 2016; Cutright 2009; Keatinge 1975; Vogel 2012).

Tawantinsuyu & Andean Empire

In the *quechua* zone of the southern portion of the central highlands subregion, centered in the Cuzco intermontane valley system, a new polity would emerge that would define the final period of Andean prehistory. The Inka would transform from a relatively modest locally-oriented, if not dense network of community-level aggrandizers into the first and only true empire to develop in the Andes (R Alan Covey 2008a). The Inka would call their empire Tawantinsuyu or the "the four parts together" - referring to their quadripartite organization structure for dividing their ever-growing provincial network (Yupanqui 2005[1570]). By the time the infamous Spanish ships carrying Pizarro and his men arrived on Andean shores in AD 1532, Tawantinsuyu covered over one-million square kilometers and likely maintained at least ten million subjects[11] (D'Altroy 2014). In their century of imperial growth and consolidation, like many true empires (Alcock 2001), the Inka applied every aggrandizing strategy discussed above (see *1.3*), and were particularly adept at tailoring their strategies to local community network configurations (D'Altroy 2005). While full of their own built-in biases and limitations (Burns 2010; Julien 2000), chronicles and other written documents created during the initial years of Spanish invasion have provided researchers with exponentially more primary information regarding the nature of Inka statecraft than those that preceded it (Betanzos 1987[1551]; Cabello Balboa 1945[1586]; Cieza de Leon 1976[1553]; Cobo 1979[1653]; Garcilaso de la Vega 2009[1609]; Guamán Poma de Ayala 1980[1562]; Sarmiento de Gamboa 1988[1579]). Needless to say a comprehensive overview of the Inka is impossible to provide here (R Alan Covey 2008a; Pease 1994; Maria de Diez Canseco Rostworowski 1999; Rowe 1946). In addition, below I discuss what we know about aspects of Inka social life in more meso- and micro-scale perspectives (see *2.2*). However, as the Inca represent the apogee of the development of Andean social complexity, a few important points must be reviewed here.

Sometime after ca. AD1200 the Inka would emerge as a state-level society and the primate polity within their network of locally competing aggrandizers and their constituent

[11] These population figures are estimates and populations in Andean South America (as with the rest of the Americas) may actually have been much lower by AD 1532 due to widespread European disease (e.g. Mann 2005).

communities (R Alan Covey 2018). The leaders of the early Inka state employed a complex set of aggressive exclusionary strategies, using raiding and forced marriage alliances to directly intervene in neighboring sustainable communities and expand and consolidate their control over local symbolic community networks (Bauer and Covey 2002; McEwan 2010). Inka imperial propaganda and Spanish ignorance has made determining the exact chronology of Inka imperial expansion a particularly difficult task (Bauer and Smit 2015; Ogburn 2012; Rowe 1945). However, it is clear that through concerted expansion efforts from ca. AD 1400-1525 the Inka state would manage to conquer or incorporate the entirety of the Central Andean region. Again, while archaeologists are still working to confirm the stories collected in the sixteenth century it appears likely that the majority of Inka imperial expansion and the development of fundamental strategies they employed for incorporating their ever-growing subject population did occur rapidly[12] , under the reign of Pachakuti Inka Yupanki and his son Thupa Inca Yupanki in the later half of the 16th century AD (ca. AD 1438-1493) (R Alan Covey 2018; D'Altroy 2002).

Important in explaining how this unprecedented expansion could occur in the course of a single generation is the geographic location of the Inka core in Cuzco, which is situated at the margin of the central and south-central highland subregions or the former core areas of influence for the prior Wari and Tiwanaku states. In fact, the broader Cuzco region had been directly colonized by Wari residential communities (R. Alan Covey, et al. 2013; McEwan 1996, 2009) and maintained long-standing sustainable and symbolic community connections with the broader Titicaca Basin and even Tiwanaku itself (Bauer 1999; Pärssinen and Siiriäinen 1997). Whether they were aware of it or not, the Inka were able to capitalize on their position between these formally globalized regional-scale community networks to rapidly expand from Cuzco into the central and south-central highland subregions (D'Altroy 2002:66). In world-systems theory

[12] In fact, newly collected/re-calibrated 14C dates show evidence that Inca forces has invaded areas as far north as the northern highlands and as far south as the southern highlands by as early as ca. AD 1450 (see Ogburn 2012).

terms the Inka are a classic case of a marcher state - a polity which erupts from the periphery and rapidly engulfs formerly articulated systems (Chase-Dunn and Grell-Brisk 2016:213-215).

Again, while the exact timing of Inka imperial expansion is still to be determined, it is clear that by the time Wayna Qhapaq, the final uncontested ruler of the Inka, took the throne in AD 1493 the Inka had a significant foothold in every subregion of the Central Andes. To accomplish this the Inka relied heavily on domination by force via extensive military campaigns, often using siege warfare tactics to cut-off core residential communities from their extended sustainable community networks (E. N. Arkush and Tung 2013:337-340; D'Altroy 2014:321-350). As will be noted below, a key Inka strategy was to invest significant sustainable community resources in military infrastructure, particularly constructing storehouses and roadways for provisioning large-scale forces (D'Altroy 2018; Hyslop 1990; Murra 1980). In extreme cases, to intervene in particularly rebellious or well-organized community networks, the Inka would actually relocate entire residential communities to new, often distant locations in a colonization practice known as *mitmaqkuna* (Cieza de Leon 1976[1553]:56-57; D'Altroy 2005; Espinoza Soriano 1969, 1993; Rowe 1982) - true cases of forced displacement colonies.

However, as ethnohistorian F. Pease aptly noted, despite their expansive territorial empire the primary success of the Inka was not found in their “domination over lands and men in general, but rather over organized systems of resource production” (Pease 1972:42). To accomplish sustained control over systems of production the Inka utilized a diverse suite of strategies to re-orient all modes of community to ultimately serve Cuzco by striking at the core of local institutions but often leaving many other aspects of their local community structures intact (Rowe 1982). One of the primary ways Inka would co-opt sustainable communities was through a rotating corveé-type labor tax, called *mit'a*, in which all male heads-of-household were required to participate in state-run projects, from military campaigns to road construction (D'Altroy 2002; Murra 1980). Importantly, the Inka scheduled their labor extraction in-sync with down periods in agricultural and pastoral seasonality - simply adding service to the state as a position in the annual cycle of sustainable communities (Julien 1988; Murra 1965).

The Inka would also re-orient local symbolic communities by identifying their central elements - this could be a place, an item, or even a person - and then incorporate them directly into the broader Inka symbolic community (Conrad and Demarest 1984; Silverblatt 1987). One of the clearest examples of this is the *Ceque System*, an elaborate symbolic community network in which the Inka articulated hundreds of locations, sacred to local symbolic communities throughout the provinces (Bauer 1998; Cobo 1979[1653]:14-61; Zuidema 1964). This system was conceived of as lines radiating from the central Qoricancha temple in Cuzco across the landscape literally tethering the core of local symbolic communities to Cuzco (Bauer 2016). This system preserved lower-order, locally-oriented symbolic communities while linking them to a globally-oriented one in which the Inka reigned supreme (Conrad and Demarest 1984:166-167; Silverblatt 1988). This strategic hijacking of institutional cores could take many additional forms but ultimately the Inka's success was in developing a series of entangled globally-oriented multi-modal community networks into which almost any local community manifestation could be integrated without being destroyed.

By ca. AD 1500, in its final decades Tawantinsuyu was one of the most institutionally complex state-level societies on the planet - a true expansive empire (D'Altroy 2014). While the Inka were well-practiced in bringing to bear all the violent methods of warfare and other extreme exclusionary tactics, their primary potency as an imperial force would be in their suite of network-based strategies used to bring all multi-modal community networks into the orbit of Cuzco. The entire Tawantinsuyu imperial project was undergirded by a substantial infrastructure in terms of social organization and the built environment (D'Altroy 2014; Hyslop 1984; Julien 1988; Urton 1998). Over 40,000 kilometers of roads, hundreds of waystations, and thousands of storehouses connected at least fifty-one Inka enclaves (D'Altroy 2018; Hyslop 1984, 1990; T. Y. LeVine 1992). The nature and function of these enclave nodes depended on their placement in the broader provincial network (Alconini 2008; Garrido 2016; Jenkins 2001; Malpass and

Alconini 2010; Niles 2004; Stanish 2001b), with some representing hubs for sustainable community activities, such as provisioning military campaigns and providing room and board for mit'a laborers when on the job, and even state-sponsored craft workshops (Costin 1996; D'Altroy 2005; Morris 1982; Zori, et al. 2017). Others would act as symbolic community hubs; regional stand-ins for the true network-wide core in Cuzco (Coben 2006; Morris and Thompson 1970). This globally-oriented but locally-based distributed mode of production allowed for the Inka to mobilize large amounts of resources in terms of both manpower and materials to almost any portion of the empire and facilitate what some have called a true top-down command economy (D'Altroy and Earle 1985; Jenkins 2001; D. E. La Lone 1982; M. B. La Lone and La Lone 1987).

Spanish Colonization & the Great Restructuring

Years before a Spaniard ever set foot in the Central Andes, Old World diseases had begun to ravage South American populations (Roberts 1989), wreaking havoc on community networks at every scale. By the time Wayna Qhapaq, the sitting Inka emperor died from smallpox in AD 1428 Cuzco's center of gravity had already weakened as the emperor began establishing a new imperial center in northern highlands to deal with the growing tensions (Bray 2015-339; Cieza de Leon 1976[1553]:263). Civil war gripped Tawantinsuyu from Wayna Qhapaq's death until the exact week Spanish forces formally entered the Central Andes (Rowe 2006). This monumental coincidence of timing, along with other historical circumstances (Diamond 1999) would allow the small group of Spanish to commandeer what remained of the empire and eventually come to embed themselves throughout the Central Andes.

Of course this process was not simple, it would take four years for the Spanish to gain control of Cuzco, and Spanish infighting would quickly lead to the assassination of Pizzaro and many of the other early conquistador leaders (MacCormack 1985a; MacQuarrie 2008). In addition, the remnants of the Inka ruling class would establish a rebel-state centered in the *rupa*

rupa subregion east of Cuzco (Bauer, et al. 2015). During this time Spanish forces would apply aggressive exclusionary strategies, working to reformat sustainable communities with themselves at the center (Ramírez 1986). This involved the use of slave-labor in the new residential community-based *encomienda* system as well as industrial style mining operations (Mayer 2007:94-99; Wiedner 1960; Yeager 1995). After three decades of disease, civil war, and foreign invasion the multi-modal community network configuration of Tawantinsuyu would largely disintegrate (R Alan Covey 2020; Wachtel 1977).

In spite of the collapse of Tawantinsuyu and the exponential increase in Spanish and other foreign presence, it wasn't until AD 1572 that the nature of Central Andean community networks would be fundamentally transformed (Mumford 2012). It was in this year that Tupac Amaru, the final leader of the Inka guerrilla state was captured and executed in Cuzco and the newly appointed viceroy of Peru, Francisco de Toledo would initiate his Reducción General de Indios (Julien 2007; Markham 2010). Toledo's Reducción campaign set out explicitly to restructure every mode of Central Andean community structure. Scattered residential communities were relocated to new, centralized locations (Gose 2003; Wernke 2012). These new settlements were built along a classic Spanish-plan, around central plaza-church complexes, geared towards both literally and symbolically re-orienting local symbolic communities around newly imposed Christianity (Fraser 1990; MacCormack 1985b; Redden 2015). These new centralized communities were also used to tax, mobilize, and otherwise control the actions of sustainable communities. While the initial Spanish conquests may have caused disarray in the community networks of the Central Andes, the Toledan reforms would come to introduce a new, and fundamentally different order (Klein 1993; Scott 2006; VanValkenburgh 2017; Wernke 2007).

From Independence to Modernity: the development of contemporary Andean nations

While there would be substantial indigenous-led rebellions (Campbell 1976), Central

Andean communities would continue to suffer under Spanish colonial rule for over two centuries as the Viceroyalty of Peru. However, as Napoleon took control of western Europe, including deposing the Spanish monarch, Andean South America would break free from colonial orbit. Two major military movements began under different circumstances, but would prove extremely effective, as José de San Martín of Argentina began moving his forces north up the Pacific coast from Chile and Simón Bolívar moved his forces south down the coast from Venezuela. Meeting in Peru these two forces would join other movements in liberating the Central Andes from Spanish rule - forming Chile (AD 1810), Peru (AD 1821), Ecuador (AD 1822), and finally Bolivia (AD 1825) (J. Lynch 1973).

From this period of independence onward each Andean nation followed its own messy trajectory into nationhood in what is generally called the Republican Period (Hunefeldt 2001). These paths have been intertwined, most notably in the War of the Pacific, in which Bolivia and Peru battled Chile, primarily over territorial disputes along the south-central coast subregion (Farcau 2000). The twentieth century would bring major economic interventions to the Central Andes by burgeoning international powers, particularly the United States, as Andean nations grappled for a place in the new fully industrialized global landscape (Galeano 1997). Modernity has fundamentally transformed, altered, and otherwise changed the nature of multi-modal community networks in the Central Andes. Like all contemporary people, individuals in Andean society associate with multitudes of different community modes. However, in-spite of being part of the globalized present there are still dense threads of continuity that can be traced into the past and help us understand how multi-modal community networks may have been configured in the deep past.

2.2 Communities in the Central Andes: understanding *ayllu*

In this subsection I work to further situate my framework for modeling multi-modal community networks within the unique setting of the Central Andes. Here, while still highlighting macroscale trends, I focus my discussion on the mesoscale dynamics of community life in the region as it has been delineated through ethnographic observation and ethnohistoric analysis. Specifically, I build this discussion around the indigenous Andean concept of *ayllu*. As will be explained, the concept of ayllu is as complicated as it is complex both in its implementation in Andean life and the anthropological understanding of it. However, in the broadest sense, I argue the Quechua and Aymara use of *ayllu* is roughly equivalent to the definition of community I utilize in this study (see 1.2).

I approach this topic cautiously, with the express understanding that Central Andean communities are diverse and dynamic and conceptions of *ayllu* emerge differently across space as they certainly have through time. I hope to show how approaching *ayllu* with my community ecology perspective helps to side-step some of the pitfalls that have been identified under the *lo Andino* critique, namely that: 1) ethnographic analogy in studies of Andean prehistory have led to a view of an unchanging and monolithic indigenous social substructure and 2) privileged focus on the unique characteristics of Andean society and broader ecology has limited comparative studies (Beaule 2016; Cahill 1990; Deere 1990; Kojan and Angelo 2005; Salman and Zoomers 2003; Sillar and Joffré 2016; Van Buren 1996)[13]. By identifying *ayllu* as various interacting expressions of residential, sustainable, and symbolic modes of community I am able to facilitate many of the often-contradictory applications of this term in both time and space as well as opening up this fundamentally Andean expression of the social for cross-cultural study. As Basso noted in his study of Apache place-making in the American southwest, true anthropological understanding of phenomena “can be grasped only in relation to the ideas and practices with which it was accomplished,” and while I will never be able to directly observe the

[13] Some have gone further to argue that ethnographers biased by the *lo Andino* perspective were blinded to the growing terrorist movement Sendero Luminoso, that first percolated up in the well-studied central highlands subregion in the 1980s (Starn et al 1994).

complicated lives of individuals as they unfolded living in Locumba during the Middle Horizon, I think these densely documented indigenous Andean conceptions of community are a clear place to start (D. Y. Arnold 1997). As such, I rely heavily on this subsection later in my synthesis and discussion (see Chapter 11).

Ayllu in Andean Studies

In the broader academic realm of Andean Studies there are few indigenous terms that have been utilized as much or as long as *ayllu* (Basadre 1937; Saavedra 1903). It has been used as a fill-in for almost every trending anthropological term from corporate group to subaltern (Weismantel 2006). Like most prevalent and amorphous terms in many ways the majority of definitions are correct, or at least not entirely wrong. In rather predictable academic fashion, the dynamic nature of the term *ayllu* has led to more disagreements regarding its application than agreements. Here, before systematically dissecting *ayllu* using the multi-modal community ecology framework laid-out in Chapter 1, I want to review[14] some of the general ways in which this term has been observed and inferred in the ethnographic present and past.

The term *ayllu* was in widespread use throughout the Central Andes, specifically the central and south-central highland subregions, at the time of Spanish arrival in AD 1532. As will be noted below, the Inka and many of their constituent bureaucratically-oriented symbolic communities utilized *ayllu* as a demarcation for taxation and other demographic recording purposes, likely greatly impacting its use and distribution. Indeed, in spite of its ubiquitous use in Aymara dialects, increasingly detailed historical linguistics has shown *ayllu* to be one of the 566

[14] As always, I am interested here on identifying useful patterns in the “wheat” as opposed to stewing in the particulars of the “chaff.”

lexical items to come definitively from the ancestral language of Quechua[15] (Emlen 2017:345). In one of the earliest Colonial attempts to systematically document the Quechua language Dominican Friar Domingo de Santos Tomas would identify *ayllu* as a term simply denoting "lineage, generation, or family" (Santo Tomás [1560]1947:107v), a definition echoed by other early linguistic documentation efforts (Ricardo [1586]1951). Importantly, as has been noted by others (Rasnake 1986:49-50; Spalding 1984:29; Urton 1985:278-279), the more extensive, early 17th century dictionary of D. González Holguin (González Holguin [1608]1989:56) provides additional uses for the term and suggests a far more pervasive reach for the concept of *ayllu*.

[15] Quechua and Aymara are the two most widespread indigenous languages spoken in the Andes - each have approximately 7 million speakers and multiple dialects. In spite of their diversity there is significant overlap in their lexicons - including the term ayllu. The relationship between Quechua and Aymara is still a debated topic with some arguing they share a single root language. However most convincingly argue that while these languages have a complicated and archaic history of interaction, they appear to derive from two separate languages that converged and not vice-versa: proto-Aymara and proto-Quechua (Adelaar 2012; Emlen 2017).

Table 5. Chart listing the Quechua terms and phrases that include the term ayllu or its related root aylluy[16] in González Holguin's 17th century Quechua dictionary (González Holguin [1608]1989). Table includes Quechua and Spanish quoted directly from source, English translations (my own), and finally the page number from source. Terms listed above the double line are those that most clearly relate to human kinship/social organization whereas the terms below the line refer more generally to relatedness and other similarities.

Quechua	*Spanish*	*English*	*Page #*
Ayllu	Parcialidad genealogia linage, o parentesco, o casta	Partial genealogy lineage, or kinship, or caste	56
Ayllu maciy	Mi pariente de mi linage, o de mi nacion	My relative of my lineage, or my nation	56
Ayllopura	Los de vn linaje, o parientes	Those of one lineage, or relatives	56
Ayllu̲chani.	Diuidir gente por sus parcialidades, y ordenar vn exercito, o poner en sus lugares differentes	Divide people by their biases, and order an army, or put in their different places	56
Aylluchacuni	Hazerse de vn linaje.	Becoming a lineage	56
Aylluyruna, o ayllumaciy	De mi nacion, o liuaje, o pariente.	Of my nation, or language, or relative	56
Aylluymaçi, o llacta maciy runa	Hombre de mi patria, o conterraneo	Man of my country, or earthly	56
Ayllumaçiy tucuc	El que se haze, o finje de mi linaje.	The one that is made, or pretends to be of my lineage.	56
Ayllonnac mana aylloyoc	El que no tiene parientes	He who has no relatives	56
aylluymi	es mi pariente de mi linage	He is my relative of my lineage	101
Aylluy huauque	Dize el varon a los de su patria, o linaje	The man says to those of his country, or lineage	140
Kapac ayllu	De la cassa, o familia real, o noble	Of the house, or royal family, or noble	109
Yahuarinnak ayllucuna	La padrastria y affinidad, o affines.	Stepfather and affinity, or related.	235
Ayllu suti.	Apellido de linage	Lineage surname	262
Ayllu macipura	Parientes a fines	Relatives at the end	262
Caylla ayllu	Parientes cercanos	Close relatives	262
Ayllu (2)	El genero, o especie en las cosas.	The genera, or species of things.	56
Huc ayllu hacha	Los arboles de vna especie	The trees of a kind	56
Huc huc ayllum camatahua chaqui yoccuna	Los animales son de diferentes especies, y generos	Animals are of different species, and genera	56
Angel cunam yzcum chacuchacu ayllo	Los angeles son de nueve choros distinctos	The angeles are nine distinctive classes	56
Ayllontin	Todos los ayllos, o linajes	All ayllus, or lineages	56
Ayllo pura, o aillo ayllucama huñunacuni.	Iuntarse los de vn linaje, o cosas de vn genero.	Join those of a lineage, or things of of genera	56
Ayllo çapatiay, o ayllo cama	Sentaos cada ayllo por si.	Sit down each ayllu for yourself.	57
Patachani runacta aylluncama	Distinguir y apartar por si los de cada ayllo o parcialidad	Distinguish and separate if they are of separate ayllu or partiality	190

[16] Importantly, some modern Quechua dictionaries define *aylluy* as "to assemble, gather, collect" or "to warm, cover with a blanket"

As illustrated in Table 5, *ayllu* does not appear to have simply been a bureaucratic category of the recently implemented Inca census, but rather it had extensive reach into the Quechua lexicon surrounding kinship, lineage, and other forms of social organization. Importantly, it appears that at least in some contexts *ayllu* actually represented a general category of relatedness or even an acknowledgment of similarity (i.e. "*Huc ayllu hacha*" - "The trees of a kind"). This point becomes particularly pertinent below when I discuss aspects of the symbolic community dimension of *ayllu*. However, even just focusing on the most commonly used social dimension of the use of *ayllu* still reveals a fair amount of variability.

Andean Subregion	# of studies
general comment	8
north-central highlands	1
central highlands	11
south-central highlands	8
north coast	1

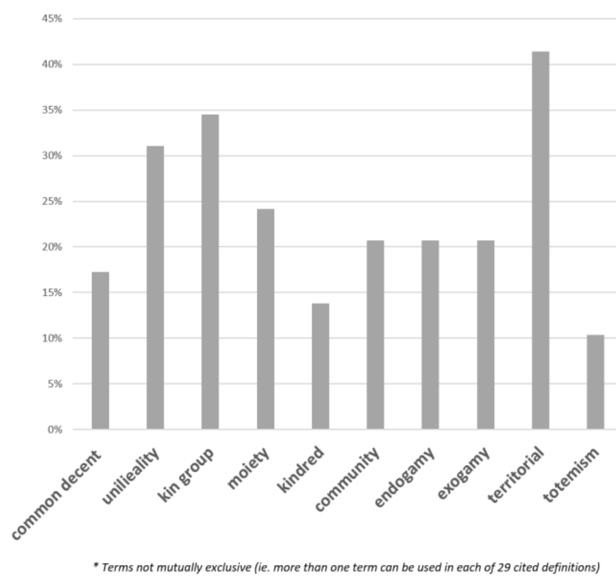


Figure 10. Visualization of Godoy's survey of ayllu definitions in 29 colonial-era and 20th century ethnographic accounts - (left) Central Andean subregions in which accounts were made and (right) frequencies of ten terms used most commonly in ayllu definitions (Godoy 1986:726-728).

As illustrated in Figure 10, reviewing many of the mid-20th century ethnographic-based definitions (as well as a few Colonial-era sources[17]), R. Godoy targeted ten terms that were

[17] Nineteen (19) of Godoy's 29 examples are from ethnographic-oriented studies from the 20th century (Godoy 1986).

used most frequently used to characterize *ayllu* (Godoy 1986). Seven of these terms refer to classic anthropological aspects of kinship, including descent and marriage restrictions. Three terms diverge from this trend - community, totemism, and the most commonly used trait of all, territorial (used in 41% of definitions). The criteria of community would appear to broaden *ayllu* beyond kinship to refer to a general social group and totemism and territorial suggest defining criteria based on some form of shared belief and co-residence. While all ten terms are clearly central, these last three begin to expose how even in the realm of the social, *ayllu* went beyond the standard arena of kinship. As will be raised again below, while birth-rights and lineages were certainly part of the inner workings of these groups, *ayllu* membership was ultimately about the willingness and ability to take on the responsibilities involved in the complex suite of practices that were needed in their maintenance and reproduction (Rasnake 1986:60-63; Spalding 1984:28-30, 52).

Ayllu Organization

Since the 1970s rigorous ethnographic observation and systematic ethnohistoric review of colonial-era documents has provided a much more comprehensive picture of what ayllus are and how they have been expressed in different places throughout the Central Andes (the following are some of the most influencial for my own work here: Abercrombie 1998; Allen 1986b; D. Y. Arnold and Hastorf 2016; Bastien 1985; Bode 1989; Bolin 1999; Brush 1977; Choque and Mamani 2001; Ferreira 2012; Godoy 1985; Harris 1978; B. J. Isbell 1978; Izko 1986; Mayer 2007; Meyerson 1990; Murra 1985; Platt 1982a; Rasnake 1986; Rivera Cusicanqui 1991; Salomon and Urioste 1991; H. O. Skar 1982; Spalding 1984; Urton 1985; Yampara Huarachi 2001). While I provide my own working definition below, I will start from a formulation presented by K. Lane in which he argues an ayllu, “comprises a social, economic, and political unit united and re-affirmed through seasonally organized rituals and responsibilities” (Lane 2007:78). I think this broad definition does an effective job conveying the scope of the concept, however below I hope to show how the term can be more systematically delineated. Before delving into the specifics of how ayllu maps onto residential, sustainable, and symbolic modes of community, there are two primary organizational aspects of ayllu that permeate most dimensions of the concept: recursive-hierarchy and dualism.

An essential characteristic of ayllu is that it actually refers to organization at multiple scales - from relatively small, localized groups to (sub)regional-level social arrangements. These different scaled groups are best visualized as a nested-structure with multiple smaller groups forming the larger groups (Izko 1992-80; Platt 1986:81; Rasnake 1986:53-60; H. O. Skar 1982; Spalding 1984:51-52). Therefore any individual living within an ayllu organization belongs to multiple scalar-ayllu formations, and as will be explained, even multiple ayllus at the same scale - forming an often complicated network of ayllu affiliations that could be “activated” strategically (Rasnake 1986:53; Urton 1985:253). Each level group generally has some kind of leadership, and while these positions vary greatly, they form relatively clear recursive, hierarchical chain-of-command for directing various aspects of ayllu decision making (Abercrombie 1998:370-371; Spalding 1984:53). This makes the broader ayllu social structure effectively a classic segmentary social structure (Lane 2007:79-83; Sahlins 1961). While the terms utilized to describe these positions and scale of ayllu can differ from place to place, some key trends are worth highlighting here before heading into more specific aspects below.

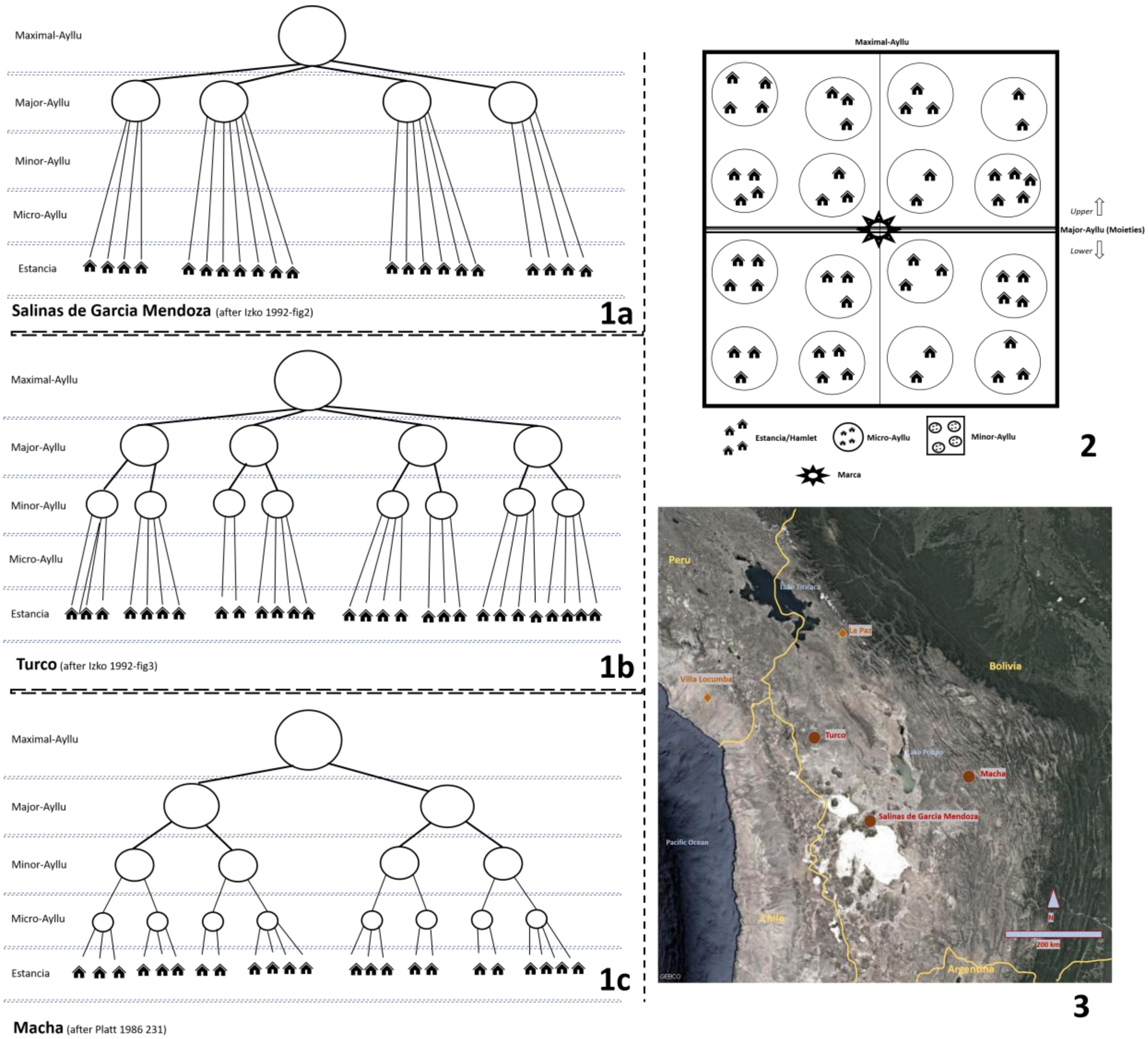


Figure 11. Schematic visualizations of ayllu organization.

The smallest scale ayllu, generally referred to as a *minor-ayllu*, is a social unit which most closely aligns with many of the colonial-era definitions noted above, as they are based on some form of consanguineal-based kinship with explicit ancestral connections. These ayllus are composed of multiple family units which formed residence-based hamlets, frequently called *estancias* or *cabildos*. Today these small *estancias* are often represented by nominal hyperlocal leaders, often referred to as *alcalde*[18]. In particularly complex ayllu formations, *estancias* might first form into smaller *micro* or *minimal-ayllus* as intermediaries before coalescing into true minor-ayllus (Platt 1986:230-231). Minor-ayllus are headed by individual leaders, called *jilaqata* (aymara) or *jilanqu* (quechua), who meet as councils to settle inter-ayllu disputes and make other important decisions (Spalding 1984:32-40).

Minor-ayllus can then align into larger coalitions, called *major-ayllus*. As will be noted below, the major-ayllu groups are those most frequently dually ordered through *moieties*. Finally, the two major-ayllu moieties, under certain circumstances and when faced with certain choices, can conglomerate into a *macro-* or *maximal-ayllu*. These major- and maximal-ayllus are headed by leaders generally called *mallku* (aymara), *kuraka* (quechua) and increasingly Spanish-based *segunda mayor* (Klein 1993:59-61). While still subject to the approval of their constituency these upper-level ayllu leadership positions are often drawn from a select number of elite micro-ayllu groups, and at times in the past were clearly hereditary positions, making them particularly attractive positions for would-be aggrandizing individuals (Abercrombie 1998:162; Mayer 2007:266-270; Platt 1986; Spalding 1984:33). Importantly, smaller-scale ayllu leadership like that of *jilaqata*/*jilanqu* and *alcalde* tend to be elected or even obligatory positions that, along with other lesser-managerial positions would rotate on a set basis, forming a cargo-based system (Fernández 2018).

Another, ubiquitous structural element of overall ayllu organization is *duality*. In spite of not being an indigenous term, the concept of duality has been central in anthropology projects of all types in the Andes (Anders 1986; Astvaldsson 2000; Beaule 2016:605-607; Duviols 1973; Gelles 1995:715-718; J. D. Moore 1995; Paerregaard 1992; Palomino 1971; Turner 1993; Webb 2012). While duality and other forms of complementarity pervade many aspects of Andean

[18] Depending on their specific role and the nature of the ayllu, many of these ayllu leadership positions are increasingly referred to as *alcalde*, *cobrador*, and other Spanish-based terms (e.g., Abercrombie 1998; Godoy 1985).

social life, duality expresses in ayllu organization most explicitly in the widespread use of moiety divisions (Urton 1993; Zuidema 1989). As noted above, the moiety division is most frequently recognized at the level of major-ayllu, but percolates down through the rest of the scales of ayllu as well. Moiety divisions can mark some of the most distinctive differences within broader ayllu networks and often frame certain relations both between and within ayllus at various scales (Flores 1984; Paerregaard 1992), even dictating what determines exogamous versus endogamous marriage (B. J. Isbell 1978:132-134; Platt 1986; Rasnake 1986:63-64; Urton 1993). Significantly, these major moieties were always considered complementary, but generally not equal. Most moiety names denoted one as "upper" and one as "lower." These terms came along with all manner of connotations that played out not just abstractly in symbolic community understanding but would actually determine role and access to sustainable community resources as well as built environment manifestations in residential communities (Bauer 1987; Bouysse-Cassagne 1986; Gelles 1995; J. D. Moore 1995; Pärssinen 1992:351-362).

Below I outline how these organizational principles of recursive-hierarchy and dualism frame ayllu manifestations in multi-modal community networks. While residential, sustainable, and symbolic modes of ayllu formation are discussed separately below, it is critical to remember that these modes of community were never expressed independently, but in practice were not just co-occurring, but co-dependent - truly entangled phenomena.

Ayllus as Residential Communities

One of the clearest ways in which any community manifests is through settlement patterns and other expressions of the built environment that mostly closely connected to residential modes of community. As noted in Figure 10 territory was and is the most used criteria in defining ayllu, and for this reason the settlement patterns of ayllus have been one of their most heavily discussed aspects. Importantly, ayllus at every scale have been found to hold particularly dispersed settlement patterns, which far from random, represent a strategic exploitation of particularly condensed vertically-oriented environmental zones of the Central Andes (Mayer 2007; Murra 1975; Platt 1986; Spalding 1984:16-23). The practice of vertically oriented ecological exploitation through direct residential occupation, formed the basis for J. Murra's hugely influential, largely economically-oriented vertical complementarity or vertical archipelago model for understanding the Inca political economy (Murra 1956, 1975, 1985). While the movement of materials may be the purview of sustainable community networks, their accumulation on the landscape result from where people live, making them pertinent to residential communities as well.

At the smallest and most localized level, ayllus are composed of individual households which consist of closely related, extended families (Spalding 1984:24-26). Small plots of land, for field or pasture, are directly exploited by this family as a core corporate group (Klein 1993:60-61). While modern residency patterns are extremely diverse, most historically observed ayllu family formations seem to have followed patrilocal residence, whereby newly married couples would often occupy the house of the husband's father before fissioning off to establish their own dwelling (Abercrombie 1998:340-344; Platt 1986:79; Urton 1985:253; Van Vleet 2002:90). These family-based residential communities would be based around house-structures (dwellings), corrals, storage facilities, and generally some kind of communal exterior patio. Depending on the broader residential context some of these domestic architectural suites would be walled forming discrete compounds, others would remain open and more spatially dispersed (Figure 12) (Abercrombie 1998:332-335; Allen 1986b:41; Barada 2017:56-57; Tomasi and Rivet 2011).

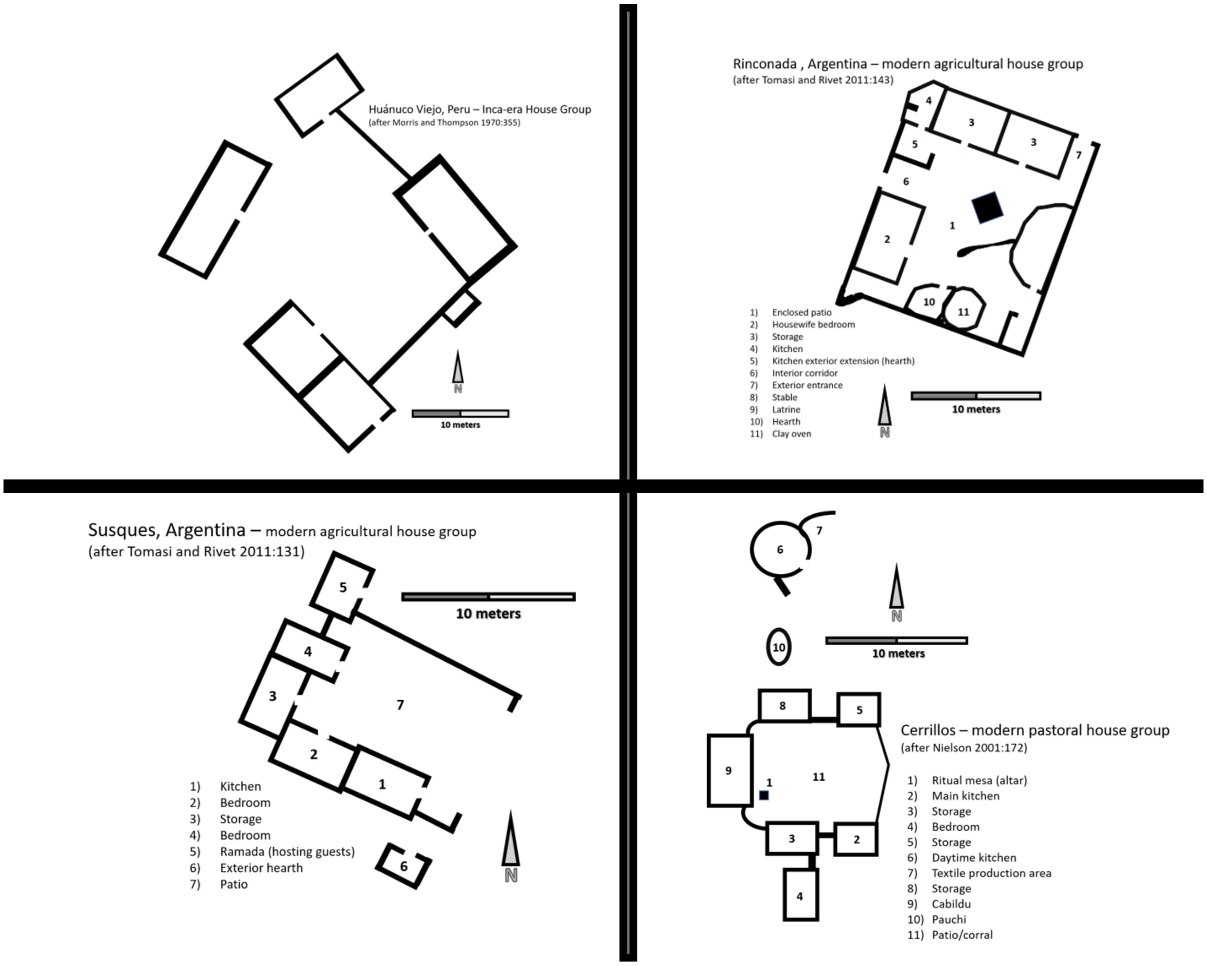


Figure 12. Examples of traditional domestic structure configurations in the contemporary south-central highlands subregion as well as from Inca-era contexts in the central highland subregion.

Under the community ecology framework, it is critical to remember that households, in this case these individual domestic compounds and their constituent family members, represent concrete institutions, or manifestations of community interaction, in this case between different minor and major ayllus. So as much as these domestic units form the basal social components of the broader ayllu network, they must also be understood as emergent products of the interaction amongst those same *ayllus*. This is made clear in the centrality of individual house-making ceremonies in grounding broader ayllu symbolic communities throughout the Central Andes (D. Y. Arnold 1991). Both establishing new houses as well as completing necessary maintenance tasks, like re-thatching roofs, are deeply embedded in sustaining ayllus at the local and even more global scales (Abercrombie 1998:332-334; Gose 1991; Platt 1986:82-83; Sillar 2000:50-58; 2013; Spalding 1984:60). This is exemplified in C. Allen's intensive investigations into Andean place-making, as she argues,

> An ayllu is created when *runa* [indigenous community members] build a house or houses on a named place. The ayllu does not consist simply of the group of co-residence individuals, nor of the named place itself: it exists only when these entities - people, houses, the place - are brought into relation with each other" (Allen 1986a:41).

Here we see the built manifestations, in this case the house, as primary pivot-points for broader ayllu practices - a point elaborated-on below.

Some contexts required these domestic compounds to be isolated, however most are found in clusters, equivalent to a hamlet often referred to with the Spanish term *estancias*. Generally the layout of *estancias* lack central planning and represent localized growth and domestic fissioning from single households (Platt 1982b:43-47). Even today many of these hamlets can still lack substantial central infrastructure with some still only accessible by foot paths (Abercrombie 1998:54-55; Barada 2017). These informal hamlets and their constituent households form the basis for a micro- or minor-ayllus - the smallest scale of formal ayllu. As noted above, at most scales of ayllu, kinship is more about how an individual acts within the context of ayllu responsibilities than strictly who their ancestors are, but at the level of minor-ayllu biologically-oriented kinship is central. Even at the scale of minor-ayllu lineage the residential community settlement patterns could be quite dispersed, with constituent estancias occupying pockets of land across huge swaths of territory, often in multiple ecological zones (Platt 1982b:30-35; Spalding 1984:37-39). Again, the motivation for this form of dispersed residential pattern is believed to be primarily the result of a vertical complementarity strategy used by Andean communities for exploiting the highly diverse Andean ecozones (Murra 1985). Importantly, these micro-ayllu *estancia* residential installments are not always permanently occupied and may represent seasonal residential bases for micro-ayllu members during specific sustainable community-oriented tasks (Abercrombie 1998:73-74).

In similar cyclical process micro-ayllus can also conglomerate in more nucleated villages residential settings[19]. These minor-ayllu settlements are generally oriented around public plaza spaces which are orbited by residential compounds utilized by specific *estancia*-based households when the village is occupied. Often these centralized villages are almost completely vacant[20], but spring to life during specific expressions of minor-ayllu sustainable and symbolic community practices (Abercrombie 1998). Some of these villages would also act as central places for broader major-ayllu and even maximal-ayllu configurations. Often the arena of major-ayllu conflict and cooperation, these settlements called *marka*, while also often largely vacant could pulse in population, reaching ephemeral, but urban-sized aggregates (Alarcon 2001:452-453; Choque and Mamani 2001). Ultimately, despite the seasonal nature of many ayllu residential situations as well as the ephemeral nature of major-ayllu aggregations, over time *markas* could result in substantial built environment manifestations in the broader sociopolitical landscape.

Ayllus as Sustainable Communities

One of the principle features of ayllu sustainable communities has already been mentioned - that is their tendency to use direct exploitation methods to take advantage of the diverse, often vertically-stacked, ecozones that define the Central Andes (Brush and Guillet 1985; Fonseca 1973; Paerregaard 1992). As discussed above, this frequently would manifest in minimal-ayllu's establishing residences in multiple locations, occupied permanently, or more

[19] During the Toldedo *reducciones* in AD 1572, villages were forced to resettle into largely nucleated villages - some newly establish, others built on previously existing minor or even major ayllu residential centers. This process certainly has affected the residential patters of ayllu formations, but most evidence suggests some substantial continuity as well (see Rasnake 1988; Wernke 2007, 2012).

[20] For instance, in his ethnographic work with the ayllu-community of K'ulta in western Bolivia in 1979, T. Abercrombie observed that of the 13 domestic units in his hamlet only 6 were occupied at any one time and the neighboring minor-ayllu village, with upwards of 120 domestic structures was almost entirely vacant except for punctuated events (see Abercrombie 1998).

often seasonally by closely affiliated kin (Murra 1972; Pease 1985). In the broadest terms these *verticality* strategies were constrained by the natural environmental and climactic factors - some plants are extremely sensitive to temperatures and some resources are only found in specific locations (Brush 1977). Some of these vertical archipelago networks can be quite general, only targeting broad climactic regions, such a lower-elevation settlements in the *yungas* regions in order to grow maize, fruits, coca, and other temperate crops and pasturelands for camelid herds and agricultural fields for tubers and high-elevation pseducereals. However, most were far more complex, actually targeting more specific micro-ecozones within the broader zones (Göbel 1998; Harris 1985; Platt 1986:79-80; H. O. Skar 1982; Spalding 1984:30).

The work of E. Mayer has been essential at highlighting that *zonal complementarity* is not a passive process of simple occupation on the part of the ayllu, but active procedures of generating and gaining access to production zones (Mayer 1985, 2007). For Mayer these *production zones* are, “a communally managed set of productive resources in which crops are grown in distinctive ways” and include infrastructural features (such as walls separating and pathways connecting various estancia-held plots), specifically tuned systems for rationing resources (specifically, water-irrigation and pasture access), and a leadership apparatus as essential elements (Mayer 2007:245). Under the community ecology rubric this makes production zones mesoscale institutions - the materialized emergent result of focused multi-modal community interaction. Importantly, these production zones, while certainly constrained by the climactic factors and available resources, would eclipse these limitations of the natural environment and become formalized landscapes both fine-tuned for sustainable community needs as well as saturated with meaning for symbolic communities (Platt 1986:79). Production zones are fundamentally built on practices of cooperation, through construction and maintenance of shared irrigation canals and herding trails, as well as shared major- or maximal-ayllu affiliation. However, as representatives of their respective minor-ayllus the relationship between production zone estancias can be fraught with tension, frequently revolving around land disputes, that can percolate up resulting in conflict and even fissioning at major- or maximal-ayllu level (Abercrombie 1998:97-98, 288-289; Platt 1982b:47).

Some ayllus employ more permanent *estancia* residential patterns in specific production zones, developing agriculturally-oriented specializations within their broader sustainable community networks (Mayer 2007:249-251). However, the most intensively studied sustainable community specialization regarding base-level subsistence in ayllu configurations, pastoralism, were actually more transient in their residential patterns, leading to differing dynamics within ayllu sustainable community networks (Browman 1974; José M Capriles and Tripcevich 2016; Grant and Lane 2018; Kuznar 1995; Nielsen 2000). Pastoral specialists managing large herds of llamas and alpaca, raised as much for their wool as their meat, would largely be based in the high-elevation *puna* pasture lands, but would migrate seasonably to bring their herds down to the lower elevation *quechua*, *yunga*, and even *chala* zones[21] to take advantage of the seasonal *lomas* bloom (Browman 1974, 1989). While some herding specialists are and would have been part of formal ayllu sustainable community networks, modern accounts show that sometimes these groups struggle to gain formal membership to more agriculturally-oriented, land-owning ayllu groups; instead forming alliances with individual micro-ayllus or even individual households (Kuznar 1995:49; Mayer 2007:263-264). Annual grazing circuits of pastoralists inherently connect various environmental regions, naturally disrupting self-contained ayllu sustainable community networks (Flannery, et al. 1989; Kuznar 2016). This interzonal articulation is capitalized on by pastoralists who have developed substantial caravan routes to gain access to resources they require but also transporting a variety of good between locations as well (Browman 1974; Nielsen 2000).

Ayllu sustainable community networks are not simply focused on base-level subsidence, but crafts and other made-goods as well. Often ceramics, textiles, baskets, and other essential

[21] Permanent pastoral residence in these lower-elevation zones has become more common in many areas as camelids have been replaced by goats, sheep, and cattle since the Colonial-era (Kuznar 1991).

quotidian goods would be made at the level of household, on an as-needed basis and dictated by other seasonal sustainable community needs (Bolin 1999:119-120). However, both presently and in the past specific estancias and even minor-ayllus are known to specialize in specific crafts (Rasnake 1986:60). While some craft-based ayllu specialization today is clearly tied to the well-established modern tourist trade, many of these goods still circulate widely in more traditional ayllu-oriented sustainable communities as they certainly did in the past. Ceramic specialization has been particularly well-studied in the Central Andes, and illustrates how even relatively microscale specialized institutions, like potters' workshops, necessitate extensive sustainable community networks (D. E. Arnold 1998; Bell 2017; Ramón 2014; Ramón and Bell 2013; Sillar 2000). Transporting these specific goods, manufactured in specific locations would also drive llama caravans and other supra-ayllu sustainable community connections (Bell 2017:25-42).

An incredibly important underlying mechanism in ayllu sustainable community networks, at any scale, is the dynamic of *reciprocity* (Alberti, et al. 1974; Guillet 1980; Wachtel 1981). Another well-trodden concept in the anthropological literature, in the broadest terms reciprocity represents some form of direct exchange of goods and services (Mauss 1954; Polanyi 1944). However, far from simple, reciprocity can manifest in all manner of ways, ranging from informal, largely symmetrical exchanges, to more rapacious exchange relationships leading to institutional inequalities. Again, the work of E. Mayer has developed some of the most rigorous attempts to categorize the variability in Andean modes of reciprocal exchange (Mayer 1974; 2007:105-142; Salomon 1985). Mayer identifies three primary expressions of reciprocity that permeate sustainable community networks, each with a more informal embodiment used for household and minor-ayllu exchanges and a more formal, impersonal mode used for major- and maximal-ayllu exchanges, and of those outside the broader ayllu network. The three primary modes of reciprocity include: *voluntad* exchanges which are fundamentally dictated by the relationship between those making the exchange, *waje-waje* or *ayni* in which the terms of exchange can be spontaneous and flexible, and *minka* which refer to set exchange relationships, generally manifest as requests (or demands) for labor in exchange for a set amount of goods in return (Mayer 2007:110-111). Exactly which modes of these reciprocal exchanged could range dramatically, some being evoked seasonally for specific sustainable and symbolic community tasks, forming periods defined by personal and relatively low-stakes exchanges and others in which more hierarchical relationships could be enacted and directed towards larger-scale community projects (Gose 1991; Schaedel 1988; S. L. Skar 1995). As will be emphasized below, this complex reliance on reciprocity goes far beyond economic exchanges of materials and labor in sustainable communities but dictates the dynamics of symbolic communities as well.

<u>Ayllus as Symbolic Communities</u>

I have already referenced or alluded to some of the ways in which symbolic communities underlie or are entangled within residential and sustainable community networks. Here I want to touch on some of the ways in which symbolic communities have manifested as more formal religious and political institutions and highlight roles that individual leaders have played in this process at multiple scales of ayllu.

Before delving into specific instances of ayllu-based symbolic community manifestations, it is necessary to elucidate some of the underlying trends that have been noted for Central Andean ontologies. In one of the most recent anthropological attempts at a grand structural synthesis, P. Descola hashed out a new framework through which the cognitive structures of most ontological systems could be categorized (Descola 2013). Using the central highland subregion as his primary example, he classifies Central Andean societies as rooted in analogism, the most complex of his four fundamental types (Descola 2013:201-230). In Descola's framework *analogism* has two fundamental implications about the way in which many

Central Andean people understand the world around them. The first is that different types of things (humans, animals, landscape features, etc.) are fundamentally dissimilar in physicality (Descola 2013:233). This results in cognitive schema and corresponding symbolic community practices that emphasize analogy and correspondence, resulting in a dense lattice of relations based on dualistic complementarity between opposites, often nested in multiscalar hierarchies (Urton 1985). This fundamental role of dualism in ayllu organization has already been noted and will be elaborated on below.

The second critical feature of cognitive structures based on analogism is that different types of things are also dissimilar in interiority (Descola 2013:233). This means all types of things (humans, animals, landscape features, etc.) also have fundamentally different essence and even intentionality. Framed in the community ecology model this means that under the general Central Andean ontological framework, non-human beings are not necessarily part of human symbolic communities[22], but rather have symbolic communities of their own. These non-human symbolic communities have logics and languages of their own as well, as F. Salomon eloquently relayed regarding the contemporary symbolic communities he observed in the central highlands: “they feel they inhabit a universe full of incompletely understood relationships, some of them dangerous” (Salomon 2018:57). Summed up even more succinctly by C. Allen, Central Andean symbolic communities operate in a landscape in which “the whole world is watching” (Allen 2015).

However, adding even more complexity is the fact that many underlying Andean cosmologies maintain a tripartite dimensional structure, generally composed of upper-celestial and lower-underworld dimensions, separated by the intermediary dimension in which humans operate (Kolata 1996b; Platt 1986:242; Qespi 1994). While many non-human beings, like those of mountain peaks, may have physical representations in our dimension, their symbolic

[22] In Descola’s framework this differs from animism and totemism, in which differing being can share interiority and therefore co-exist in human symbolic communities.

communities largely reside in the other dimensions. These non-human symbolic communities are seen as holding important influence over resources needed for human sustainable community survival, necessitating humans learn to communicate and perform the appropriate actions to gain access to these foreign realms (Allen 1986b; Bolin 1999; De la Cadena 2015; Mannheim and Salas Carreño 2015). In general, one of the primary methods in which humans can penetrate the symbolic communities of these important other beings in analogism-based mentalities is through acts of sacrifice (Descola 2013:212) - a trend that certainly holds true for ayllu symbolic communities.

At the most localized-level ayllu symbolic communities manifest as intimate kinship relations and the negotiation of roles based on age, gender, and general capability (Abercrombie 1998:340-344; Bolin 1999:120-123; Van Vleet 2002, 2009). As in most societies, one of the focal points for these localized symbolic communities is marriage or the union between man and woman (*chachawarmi*). Not only does this practice bring about new potential ayllu sustainable community connections, but it represented a fundamental manifestation of complementarity or productive emergence from bringing together opposites (D. Y. Arnold and Yapita 2006:126-131; Platt 1986; Van Vleet 2009:129-160). Households and estancias would generally orbit the eldest married couple, who would often serve as the defunct leaders of household institutions. In fact, age acted as a primary constraint on the roles in which individuals could play and the agency they could enact in ayllu practices at these localized scales (Guamán Poma de Ayala 1980[1562]; Urton 1985:265). Gender also plays a formidable role at this local level, often dictating the types of sustainable community tasks individuals are expected to carry-out. However, far from simple manifestations of standardized age and gender roles, ayllu symbolic communities at this hyperlocal scale could also serve as venue's for aggrandizement. For instance, C. Allen and others have noted how through drawing on a suite of iconic globally-oriented symbolic community elements, talented storytellers represent essential and well-respected actors, both in connecting local families to their more expansive connections as well as anchoring and reproducing symbolic community behavior at the local level (Abercrombie 1998:113; Allen 1993, 2011).

Symbolic community leadership positions at the level of hamlet and minor-ayllu rotate and are technically voluntary. In reality they are often expected of certain individuals and effectively mandatory for maintaining standing in the ayllu - roles holding great prestige but also representing heavy burdens (Allen 1986b:92-96; Urton 1985:265). These positions can represent roles geared for coordination of specific sustainable community tasks, such as managing irrigation cleaning or the planting communal minor-ayllu fields (B. J. Isbell 1978:138-151). However, as noted above, these small-scale networks collate on individual leadership roles, often titled alcalde or *jilaqata*/*jilanqu* (Abercrombie 1998:86-90). These positions represent obligatory representative roles in which male minor-ayllu members would settle - disputes within their own minor ayllu and stand for their minor-ayllu in larger-scale ayllu matters (Klein 1993:61-62). One of the most important aspects of this role would be allocating and assigning land to estancias and coordinating meticulous record-keeping the various reciprocal transactions that underwrote all ayllu exchange. Generally, only men of a certain age and means are allowed to maintain these roles as they required substantial sustainable community investment (Urton 1985:265). Local leaders are often charged with not just coordinating but largely sponsoring seasonal and annual ritual celebrations (Abercrombie 1998:370-374). However, these roles can also come with express access to particular minor-ayllu sustainable community resources, such as lands and labor, both allowing for but also obligating current leaders to focus on their higher-order symbolic community responsibilities (Platt 1986; Spalding 1984:32).

These more politically-oriented ayllu symbolic community formations would scale-up to the level of major- and maximal-ayllu. Leaders of major-ayllus or moieties, called *mallku* or *kurakas*, would serve similar roles as those at lower levels acting as dispute mediators within the major ayllus and the primary representative of their constituent major-ayllu (Abercrombie

1998:86-90). Unlike the hamlet or village-based residential community formations of households and minor-ayllus, *kuraka* leaders are expected to host major festivities at more established *marka* settlements as well as coordinate more substantial community projects. It is at these maximal-ayllu gatherings in which major-ayllus and moieties would come together for both integrating festivities and but also violent confrontation. This is epitomized in the ritualized *tinku* battles in which individual representatives from disputing major- and minor- ayllus fight, often quite viciously in hand-to-hand combat (Alarcón 2004; Juan San 2002). Other, ritual-based processions and even settlement within *markas* will be patterned along dualistic moiety divisions as well as more atomized into minor ayllu groups. Despite this maintenance and even emphasis of boundaries between subdivisions of the maximal ayllu, these settings also provided mediating space where broader ayllu affiliations and roles could be negotiated and transformed (Aedo 2018). This is exemplified in the language used to refer to broader ayllu affiliations, in which close kinship terminology is evoked, even when addressing high-level *kuraka* leaders, bounding ayllu relations at all scales in the familiar framework of family.

However, far from representing a level playing field, the broader topology to the maximal-ayllu symbolic community network was always hierarchical, even broad dualistic level of moiety divisions. As has already been noted, whether in Quechua or Aymara speaking ayllus the nomenclature used to refer to moiety divisions are almost always some distinction between "upper" and "lower." These upper and lower terms had complex connotations that touch on any number of complementary, but fundamentally unequal dualisms in ayllu symbolic and even sustainable communities (Bouysse-Cassagne 1978; Duviols 1973; Webb 2012).

Importantly, one kuraka is generally selected, whether by vote or by a set cargo-rotation to act as lead and the true head of specific maximal-ayllu affairs. Like lower-level leadership positions this lead kuraka acted as an essential gatekeeper and repository for the economic and symbolic capital of their constituent communities (Abercrombie 1998; Spalding 1984:39-41). As has already been noted, while many more recent Central Andean ayllu's select kurakas through more democratic means, there are numerous documented examples, particularly in ethnohistorical cases, in which the position of kuraka, and even lesser-ayllu roles were hereditary (Abercrombie 1998:117-120). In these scenarios major and maximal-ayllu kuraka leadership was selected from only a few competing micro-ayllu networks (Spalding 1984:32-33).

These positions of power and leadership were further emphasized through common iconic materializations. Staffs (*vara*) are common accessories indicating the roles of ayllu leadership at various scales (D. Y. Arnold and Hastorf 2016:121-123; Rasnake 1988). These staffs can be both passed between elected leaders or other times are inherited when leadership positions are hereditary (Rasnake 1988:216). Likewise disembodied human heads also represent particularly potent symbols of symbolic community power. D. Arnold and C. Hastorf have detailed how actual curated skulls, of both ancestors and enemies, served as particularly powerful elements in symbolic communities at every scale - used to signal the authority of *mallku* in maximal-ayllu proceedings and ordering hyperlocal household ritual (D. Y. Arnold and Hastorf 2016:107-121). In fact, the curated bodies of revered individuals would be curated as mummies, used as essential grounding points, particularly for minor-ayllu lineage formations (W. H. Isbell 1997a; Spalding 1984:61-70).

However, ayllu symbolic communities also had to manage relationships with the symbolic community networks of a diverse array of non-human beings. As noted above, the primary manner of communication between these distinct social realms was through sacrifice. Sacrifice was central in ayllu symbolic community ritual at every scale (Abercrombie 1998:375-382; Bolin 1999:53-57). Llama fetuses, coca leaves and guinea pigs were and are deposited below entry ways and in specific corners were frequent components of establishing new domestic structures (Platt 1986:82-83). Most dwellings contained small altars (*misas*), loci for sprinkling libations (*ch'alla*) or placing coca leaves, as deposits leveraging success in future sustainable community activities (Abercrombie 1998:333). Similarly, plazas on which hamlets and minor-ayllu villages were centered would also contain altars to which sacrifices could be made (Abercrombie 1998:334). Sacrifice could be made in terms of time, as it is through pilgrimage, another common rite across Central Andean ayllu formations (Abercrombie 1998; Bauer and Stanish 2001; Radcliffe 2009; Sallnow 1981; H. O. Skar 1985). Ayllu symbolic communities can be distilled in certain individuals, who like the more politically oriented *kuraka* and *mallku*, would act as essential ayllu leaders (Abercrombie 1998:113; B. J. Isbell 1978:201-202). These ritual specialists, most commonly called *yatiri*[23], represent those best suited and practiced at tapping into the foreign symbolic communities of the non-human beings. The most powerful of these actors are represented on the landscape as mountain peaks, fresh-water springs, and glaciers (Alderman 2015; B. J. Isbell 1978:151-157). Similar landscape features as well as human constructed elements can also represent *wa'kas*, another complex indigenous term that generally refers to specific loci of ruptures between different symbolic communities (Bray 2009, 2015). Using particularly ordered verbal recipes, often combined with a suite of material sacrifices, the *yatiri* attempt to engage these often unstable non-human symbolic communities (Abercrombie 1998:346-351; Mannheim and Salas Carreño 2015:60-63{Salomon, 2018 #2852).

Ayllus: now & then

The discussion above only represents a superficial overview of how ayllu is and has been used in the Central Andes. This incomplete inventory largely draws on ethnographic examples from ayllu groups from across the Central Andes observed over the past fifty years, and of course, none of the ayllu configurations and other characteristics described above can be found in any one place or time. Like most forms of Central Andean social order, ayllu organization was radically altered when it collided with the Old World, through Spanish

[23] There are numerous accounts of *yatiri* assuming these specialized roles after surviving being hit by lightning or even hail stones (Bolin 1999; Kolata 1996b).

invasions - first violently commandeered by the early-Colonial hacienda system and later systematically besieged during the sweeping Toledan reforms (Klein 1993). Specific national policies and other recent histories have led to different ways in which Central Andean communities and their various ayllu schema were allowed to advance into the modern era (Godoy 1986:723; Izko 1986; Larson 2004). For instance, the Peruvian c*omunidad indigena* land reform movements in the early twentieth century made individual land ownership the norm, undermining many ayllu sustainable community functions. In Bolivia, ayllus were able to maintain many of their high-order regulatory functions, allowing for ayllu to remain “a more inclusive principle of social order” (Rasnake 1986:12). Importantly, ayllu continues to develop as a living social concept in the Central Andes, even forming the basis for substantial indigenous social movements.

However, the main focus of this dissertation is to delineate multi-modal community networks in the deep Central Andean past, so the question remains - how long can ayllu be said to have defined social life in the Central Andes? As stated from the onset, it is well documented that by AD 1532 ayllu was an established, Quechua-based term that was used to describe any manner of relatedness between similar beings. It was used most extensively as an organizational principle to describe a recursive-hierarchy of human social arrangements, from microscale household institutions to regional-level federations. The Inka used ayllu in this way both for their own internal social organization as well as for demographic and tribute-based purposes (Julien 1988; Rowe 1946, 1982; Zuidema 1964, 1989). The Inka imperial co-option of existing ayllu networks and their implementation of ayllus when they did not exist certainly affected their distribution and the way in which they operated. Like the Spanish, the Inca colonial process would often transplant particularly troublesome groups and were known to install strict hierarchical leadership, in order to motivate would-be aggrandizers to facilitate Inka rule (D’Altroy 2005; María de Diez Canseco Rostworowski 2005).

Yet both Inka and early Spanish accounts suggest that truly inclusive use of ayllu, like those described above, were already pervasive in Aymara-speaking groups in the south-central and southern highland subregions when incorporated into Tawantinsuyu, suggesting a more archaic adoption of the term (Bouysse-Cassagne 1986, 1987; Julien and Collier 1982). Focusing exclusively on the propensity for certain minor-ayllu symbolic communities to curate mummies of important lineage members, W. Isbell traces ayllu further back, arguing that some form of above-group mortuary complex is a fundamental feature of ayllu (W. H. Isbell 1997a:139). Using this as his index-artifact Isbell suggests that ayllu surfaced as a pervasive organizational concept in the north coast subregion during the development of the Moche, as a bottom-up response to the emergent top-down hierarchies imposed by nascent states (W. H. Isbell 1997a:212-213). He even goes on to argue that the spread of institution of ayllu may have led to the collapse of the later Middle Horizon states of Wari and Tiwanaku (W. H. Isbell 1997a). However, others have conversely argued that ayllu is actually an essential term for understanding these same Middle Horizon polities formation and spread (e.g. Albarracín-Jordán 1996, 1999; Blom 2005; Goldstein 2000b, 2005, 2009, 2015; Janusek 2004c:27-53; 2008:35-65; 2013; Janusek and Blom 2006; Kolata 2003a:456-457; McAndrews, et al. 1997). In my final synthesizing interpretation of the Tiwanaku phenomenon and specifically the Locumba case study (see Conclusion), I use this momentum and employ this dynamic indigenous concept to help situate my community ecology approach into the unique setting of the Andes.

2.3 Tiwanaku: culture-history & archaeological interpretation

In this subsection I discuss specific aspects of the Tiwanaku polity, the diverse range of multi-modal community networks from which it emerged and eventually came to transform, as well as the broader Middle Horizon Period (ca. AD 500-1100)[24] it has come to represent. Here I

[24] Of course, Tiwanaku was not the only nascent state on the rise during this period, and I make sure to note how and when Wari would intersect with the Tiwanaku story as it progressed and influenced community networks from its core in the central highland subregion to the north.

bring in macro-, meso-, and micro-scale perspectives, synthesized from the substantial (and growing) bodies of evidence collected by archaeological investigations that have explored Tiwanaku's sociocultural imprint in the South-Central Andes and beyond. My goal is to provide a clear sketch of Tiwanaku's trajectory as an emergent macroscale institution, most appropriately termed a state. While I draw on archaeological evidence from any and all contexts available (settlement patterns, mortuary contexts, material analyses, etc.), I focus most on hyper-local, microscale household contexts and other features that comprise the domestic sphere. Using the community ecology scheme as a middle-range framework I hope to delineate some of the principal processes that led to the dynamic and lasting cultural florescence we now call Tiwanaku. As always, this is not meant to be a complete review of Tiwanaku, but rather provide a foundational context and base-line comparison for the present study (see Janusek 2004c, 2008; Kolata 1993a). Ultimately, I hope to illustrate how a better understanding of the everyday lives of those living in the middle Locumba Valley during this time, can assist in strengthening our grasp on this important period in Andean prehistory. First, I highlight some of the ways archaeologists and other outsiders have understood the site of Tiahuanaco and provide a bit more detail regarding the broader environmental particulars of the South-Central Andean context.

Understanding the Trajectory of Tiwanaku

Like most prehistoric societies, polities, civilizations, and widespread cultural fluorescence, the closer we look at Tiwanaku the more difficult it becomes to define simply. The epicenter of the Tiwanaku phenomenon was the site of the same name[25], located in the southern Titicaca Basin, just 20 kilometers from the lake's edge. Particularly because the impressive ruins of its ceremonial core stand in stark contrast to the windswept plains surrounding them, the site of Tiahuanaco has always represented an alluring symbol of the past to those who visit from afar (Janusek 2008:3-17; Kolata and Ponce Sanginés 2003). This has included the Inka from the neighboring central highlands, who over four hundred years after their abandonment would famously co-opt the ruins of Tiahuanaco (Yaeger and López Bejarano 2004), incorporating them into one of the more prominent versions of their primary creation myth (Cobo 1979[1653]:141). Just over a decade into Spanish colonial rule, the ethnographically-oriented soldier, Pedro de Cieza de Leon would be the first non-indigenous person to transmit their first-impressions of site. Like most, Cieza de Leon admired what little of the site remained, assured that the monoliths and other stonework were "beautifully carved, so much so that they seem the work of great artists or masters" (Cieza de Leon 1976[1553]:283). Importantly, when Cieza de Leon inquired if the Inca were responsible for the site, local informants laughed, suggesting while they weren't sure who constructed them, they had been there since long before the Inka invaded the southern Titicaca Basin (Cieza de Leon 1976[1553]:458).

Beginning in the late 19th century, modern era documentation at and about Tiahuanaco followed the general trends outlined above (see 2.1), as archeology began to formalize as a discipline out of more colonial-driven antiquarianism. Due to its impressive stonework as well as its location just 55 kilometers from Bolivia's modern capital city of La Paz, Tiahuanaco would be visited by many of the first established foreign and indigenous archaeologists and historians in

[25] In this thesis I primarily use the spelling ***Tiwanaku***. For example, I use Tiwanaku to refer to the archaeological material culture, the polity, and the broader cultural phenomenon that Tiwanaku represents. However, I use the spelling ***Tiahuanaco*** to describe the archaeological site and the former settlement it represents. The modern town that sits directly adjacent (and overlying) the site is spelled Tiahuanaco and some have argued the latter spelling is more appropriate for the prehistoric polity as well (Nair and Protzen 2013), but for consistency with most other recent sources I use the former spelling here in most instances.

the region. The site was documented by well-known trips made (separately) by American E. G. Squier and German naturalist A. Von Humbolt during the mid-19th century (Squier 1877; von Humboldt 1878). However, most early visits by foreigners would still garner relatively outlandish and often racist interpretations of the ruins[26] (particularly regarding the indigenous Aymara and how they could not have played a role in its creation) (Castelnau 1851; Mitre and Miranda 1879).

Looting and stone-borrowing would continue to chip-away at the preserved sections of the site, with a major blow occurring in the early years of the 20th century as a new rail line to La Paz was built directly through the site. Workers systematically mined ashlars for railway buildings and even destroyed larger stone elements to create gravel fill. Worse yet, this destruction led a well-meaning French scientific team, led by G. Crequi-Montfort to intervene with a major conservation and excavation project at the site (Créqui-Montfort 1904), that would ultimately do more damage than it prevented. Finally, research at Tiwanaku in the first decades of the 20th century would be dominated by the eclectic Austrian-born naval officer, Arthur Poznansky. Having become enamored with the ruins at Tiahuanaco, while visiting La Paz on business, Posnansky would devote most of his life to documenting the site - promoting his vision of Tiwanaku as the progenitor of a global-scale civilization in the deep past. While, like many of his contemporaries, Posnansky would hold racist views of indigenous populations ultimately relegating his broader interpretations of Tiwanaku to be irrelevant, he did produce four substantial volumes (Posnansky 1945), recording significant details about the aspects of the site and materials recovered there that have since been lost due to modern development and looting (Marsh 2019).

The 20th century would also bring more scientifically-informed and anthropologically-oriented archaeological studies to Tiwanaku and its area of influence. This would include M.

[26] Regrettably these types of interpretations have continued today and have even gained some pop culture notoriety (e.g., Hancock 1996; von Daniken 1968).

Uhle who would first come to the site in the final years of the 19th century. Building on his museum-based seriation work (Stübel and Uhle 1892), Uhle would conduct test excavations at Tiahuanaco and throughout the southern Titicaca Basin, to develop the first culture-history for the south-central Andes. This seriation-based chronology building would be elaborated on by other influential researchers, W. C. Bennett, A. Kidder II, and S. Rydén, all of which excavated mostly small test units to hash out basic chronological sequences using ceramic styles as their basis. While all of these early archaeological endeavors conducted systematic work, they would all falsely conclude that Tiahuanaco was some form of vacant ceremonial center - a pilgrimage site for a polity seated somewhere more environmentally hospitable (Bennett 1948; Bennett and Bird 1964:138; Bennett and Lazarte 1956; Kidder 1956; Rydén 1947:158-160; Uhle 1902).

One exception to this interpretive trend was A. Bandeleir, who having traveled extensively throughout the southern Titicaca Basin, would correctly surmise that Tiahuanaco was likely also a large population center, only obscured now because of the ephemeral nature of house construction materials (e.g. unfired adobe and grass thatch) (Bandelier 1905, 1910). The culture-history models of Uhle and Bennett would be very influential in Rowe's master sequence, which used Tiahuanaco Style for its pan-Andean Middle Horizon marker (Rowe 1945). By the mid-twentieth century it was determined that Tiahuanaco Style actually represented material correlates for two peer-polities - Wari in the central highlands and Tiwanaku in the south-central highlands (Lumbreras 1974; Menzel 1964b; Wallace 1957).

The site of Tiahuanaco would take on the role of national icon through the efforts of C. Ponce Sanginés. Ponce would harness the agitated nationalistic enthusiasm that swelled during and after the Agrarian Reform movements that swept much of the Central Andes at this time to create a new Bolivian archeology (Ponce Sanginés 1978). This movement was integral in modernizing archaeological techniques at the site as well as developing and maintaining protections for the site, but it also hampered almost any form of international research collaboration. However, beginning in the 1980s Ponce would begin facilitating more cooperative research situations, teaming up with A. Kolata in the formation of Project Wila Jawira. Continuing into the 1990s Project Wila Jawira would coordinate extensive multidisciplinary studies that completed excavations, settlement pattern studies, and a suite of more environmental-based research to develop an impressive dataset from which to study Tiwanaku and the broader Middle Horizon (Kolata 1996a, 2003b). Importantly, this was the first project to detect and study the extensive domestic contexts at the site (Bermann 1996; Janusek 1994, 2003a). Through this work both Ponce and Kolata would support interpretations of Tiwanaku as a true centralized state - a political force capable of raising significant military forces and controlling a well-integrated agricultural hinterland. Both researchers also saw the capital of Tiahuanaco as a true *axis mundus* - the cosmological center for a vast religious order (Kolata 1993a, 2004; Kolata and Ponce Sanginés 1992; Ponce Sanginés 1969b, 1976).

In the last 25 years studies investigating Tiwanaku have multiplied exponentially (Janusek 2004c, 2008; Vranich and Stanish 2013; Young-Sánchez 2004, 2009). These have included important work at the center of Tiahuanaco and associated Pumapunku complex, often working to delineate some of the more destructive excavations noted above as well as non-invasive remote sensing work (Koons 2013; Vella, et al. 2019; Vranich 2006). This has also included more studies of peripheral areas of the site - particularly domestic contexts (Janusek 2009; Marsh 2012a, Rivera 2003). The broader Titicaca Basin has been host to numerous surveys and excavation projects, which have both supported and challenged ideas put forward by Ponce and Kolata (Aldenderfer, et al. 2005; W. H. Isbell and Burkholder 2002; La Favre 2016; A. R. Levine and Vranich 2013; Stanish 2003; Vranich, et al. 2012). More environmental and agroecology projects within the immediate Tiwanaku hinterland, have also injected nuance and uncertainties to more centralized conceptions of the political dimension of Tiwanaku (Erickson 1992; Janusek and Kolata 2004; Kolata and Ortloff 1989; Stanish 2002). However, more recent research has also illustrated just how widespread Tiwanaku’s influence was throughout the South-Central Andes (Browman 1997; Goldstein 2007). Yet again, Tiwanaku’s overall imprint in these distant regions shows great variability in different places and at different times (e.g., K. Anderson 2013; Berenguer and Dauelsberg 1989; Goldstein 2015; Goldstein and Owen 2001). Furthermore, the site of Tiahuanaco has not lost its potency as an icon of cultural patrimony. It continues to act as a grounding place for the state[27] as well as for Aymara-speaking communities of southern Titicaca Basin (Sammells 2012, 2013). Since AD 2000 Tiahuanaco has been recognized as a UNESCO World Heritage site and preservation and documentation of the site has increased (Margottini 2013; Yates 2011).

Below I work to synthesize these new and varying accounts of Tiwanaku into one coherent narrative. As always, this is a practice in futility as the reality of Tiwanaku, even in the macroscale, was never just one thing, but rather a hyper-complex sociocultural phenomenon which emerged from the interactions within and between the multitudes of multi-modal community networks that defined the south-central Andes. However, in order to accommodate as much of the variability of Tiwanaku as possible, I split my discussion into four, sequential macroscale temporal categories[28], covering: 1) a brief review of the extensive, proceeding Formative Period (ca. 1500 BC - AD 500), 2) the Early Middle Horizon when Tiwanaku emerged as a polity (ca. AD 500 - 750), 3) the Late Middle Horizon as Tiwanaku transformed into a true state (ca. AD 750 - 1000), and 4) the Terminal Middle Horizon and the beginning of the Late Intermediate Period marked by the passing of the Tiwanaku phenomenon (ca. AD 1000-1200).

In addition, I also split my discussion of each macroscale temporal period into three macroscale spatial segments. In general, these spatial distinctions tease out patterns as they played out in 1) Tiwanaku's core area of influence in the Titicaca Basin of the south-central

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[27] The most notable event in recent history was the choice of Evo Morales, the first indigenous president elected in Bolivia, to hold his 2006 inauguration at the site (Howard 2010; Postero 2010).

[28] While this discussion largely traces trends in the macroscale, to provide clearer connections to the more relatable level of ego-based lived experience, I follow the lead of colleges (see Marsh et al 2019), and often translate these macroscale time periods into generation lengths of 30 years (Fenner 2005).

highlands, 2) the western valleys of the south-central coast, and 3) multiple locations in the northern and eastern margins of the southern highlands.

The South-Central Andes

While its impact would be felt throughout the Central Andes, Tiwanaku's primary area of influence was centered squarely in the south-central highlands subregion with eventual extensive spread into the south-central coast and southern highlands subregions as well. Taken together these three subregions are generally referred to as the South-Central Andes (Figure 13). The general ecozones that comprise these subregions align with those described above (Figure 8) but do have important unique distributions worth stressing here.

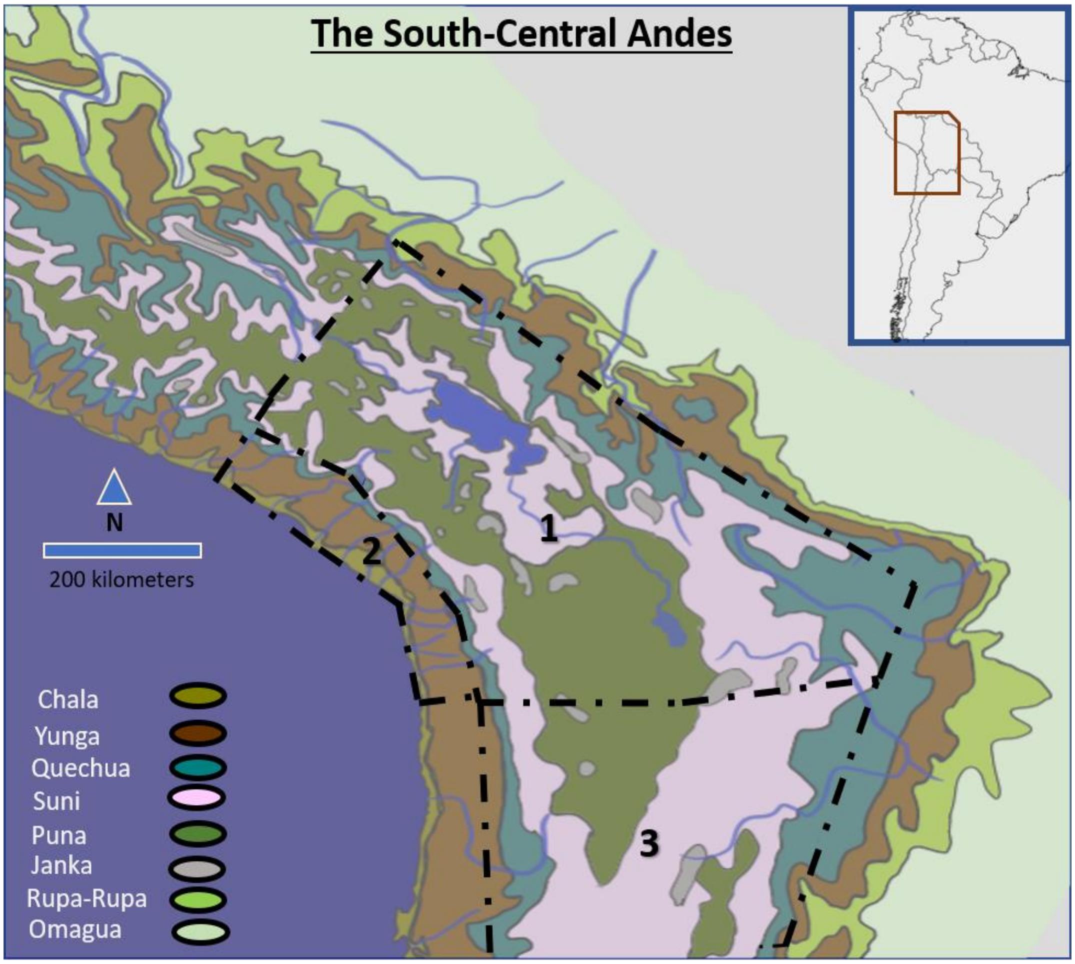

Figure 13. Map of the South-Central Andes, with inserts of important subregions discussed in the text - 1) the south-central highlands, 2) the south-central coast, and 3) the southern highlands.

South-Central Highlands

The south-central highland subregion represents the widest section of the broader Andean cordillera - reaching a maximum width of approximately 450 km (from western to eastern *yunga* regions). This subregion also contains the most area covered in the *puna* ecozone type, which encompasses the majority of the south-central highlands and extends well into the southern highlands subregion. This expansive highland plain is known as *the altiplano* and is generally separated into the northern *altiplano* (portion in south-central highlands) and the southern *altiplano* (portion in the southern highlands subregion). The *altiplano* is a broad windswept grassland, with only occasional significant topographic disruptions. The general ground cover is tough bunch grass and other hardy scrub brush. However, streams, lakes, and highland wetlands (*bofedales*) are well distributed and facilitate well-watered niches, in an otherwise marginal environment. These freshwater locales represent resource-dense areas where freshwater fish, waterfowl, and aquatic plants and algae can be found seasonably (Yaranga 2020). While there are frequent frosts (especially in the months May - August) and low average temperatures, a whole suite of highland domesticated tubers and pseudocerials can be grown seasonally here. The altiplano also represents ideal seasonal pasture lands for native domesticated camelids, llama and alpaca, where massive herds were supported in the past. Likewise, the *puna* represents a natural habitat for wild camelids (vicuña and guanaco) as well as deer and small mammals, particularly rodents.

The northern altiplano is centered on the massive highland lake, Lake Titicaca (Figure 14) - the highest elevation navigable lake on the planet (average elevation: 3800 m.a.s.l.). Lake Titicaca covers approximately 8400 km^2 at current water levels - though, as will be noted below, it has been documented to fluctuate significantly with climactic shifts. The lake is technically composed of two sublakes, connected by a narrow channel (the Straights of Tiquina) when water levels are at their maximum. The northwest lake, Lake Chucuito, covers 7000 km^2 and makes up most of the lakes total area. This deep, cold lake is dotted with islands of various size, the largest being the Island of the Sun and associated Island of the Moon, just off the Copacabana Peninsula in the southeast. The southeastern portion of the lake, often called Lake Wiñaymarka, covers approximately 1300 km^2 and is documented to have dried up almost entirely in periods of aridity. Importantly, while technically a freshwater lake, Lake Titicaca is highly saline and is not considered potable for humans and can cause serious complications for crops of all types. Even so, the lake is a significant source of freshwater fish, waterfowl, amphibians, and aquatic plants, like reeds and other sedges.

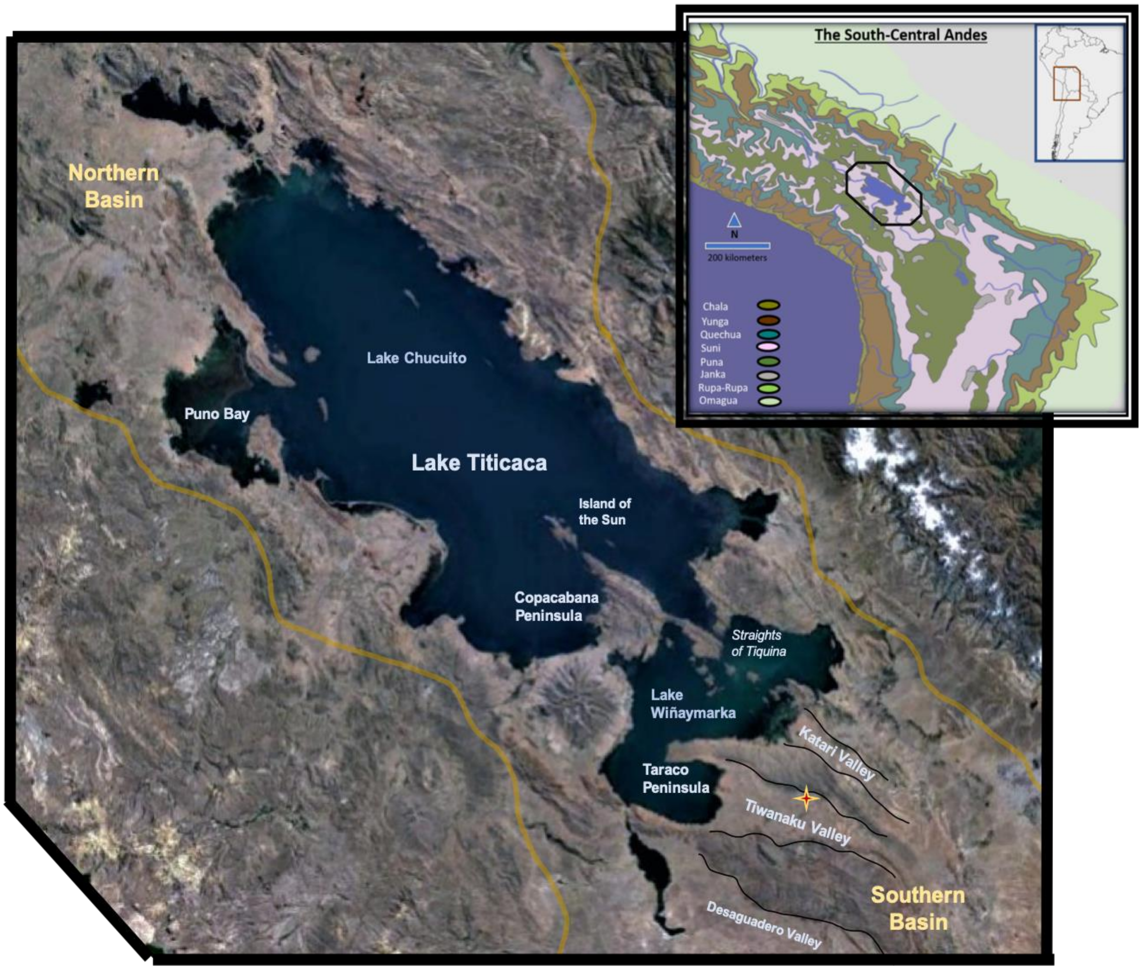

Figure 14. Satellite-based imagery (GoogleEarth) map of Lake Titicaca and the surrounding Titicaca Basin.

The lake sits in a broader basin that covers the majority of the northern altiplano (approximately 57,000 km^2) and the broader south-central highland subregion. Significantly, much of the Titicaca Basin falls into the lower elevation *suni* ecozone - allowing for a variety of wild and domesticated species[29] to be successfully exploited in the basin, not available in the surrounding *puna*[30]. The northern Titicaca Basin is dissected by several small rivers[31] which

[29] Importantly this can include certain varieties of maize and legumes.

[30] This is particularly true within a few kilometers of the lake where average temperatures can be multiple degrees (c) higher than the surrounding area.

[31] Some of the most significant being the Azangaro and Ramis Rivers.

release into the north edge of the lake. The basin extends north, ending along with the *altiplano* in the steeper and narrower central highlands subregion. The southern Titicaca Basin extends over 100 kilometers beyond the lake, following the Desaguadero River valley south, eventually ending as the river continues, emptying in the large alpine lake, Lake Poopó, 300 km to the southeast. The eastern extent of the Titicaca Basin is marked by a relatively steep descent through the *yungas* into the more subtropical and tropical ecozones of the *rupa rupa* and *omagua*. The southernmost extent of the south-central highlands is bordered by the particularly extensive and temperate Cochabamba-Mizque intermontane river systems.

South-Central Coast

The western margin of the south-central highlands region is marked by more gradual descent through the *quechua* and *yunga* foothills eventually ending in the hyperarid coastal *chala*, along the Pacific Coast. This region (from the lower elevations of the *quechua* to the coast[32]) demarcated the south-central coast subregion, represents the northern extent of the Atacama Desert[33], and is marked by true hyperaridity[34]. While the *chala* zone here has direct access to the immensely rich fisheries and other marine resources offered by the Pacific Ocean, the rest of the landscape can be relatively barren, except for annual blooms along coastal dunes, facilitated by dense coastal fogs. These seasonal *lomas* draw wild camelids, deer, and other animals to these coastal areas.

[32] I use the measurable reach of the coastal fogs (*grau*) to demarcate between the highlands and coastal subregions.

[33] Technically, the Atacama Desert is a political demarcation and end with the Chilean border.

[34] Less than 2mm of measurable precipitation annually.

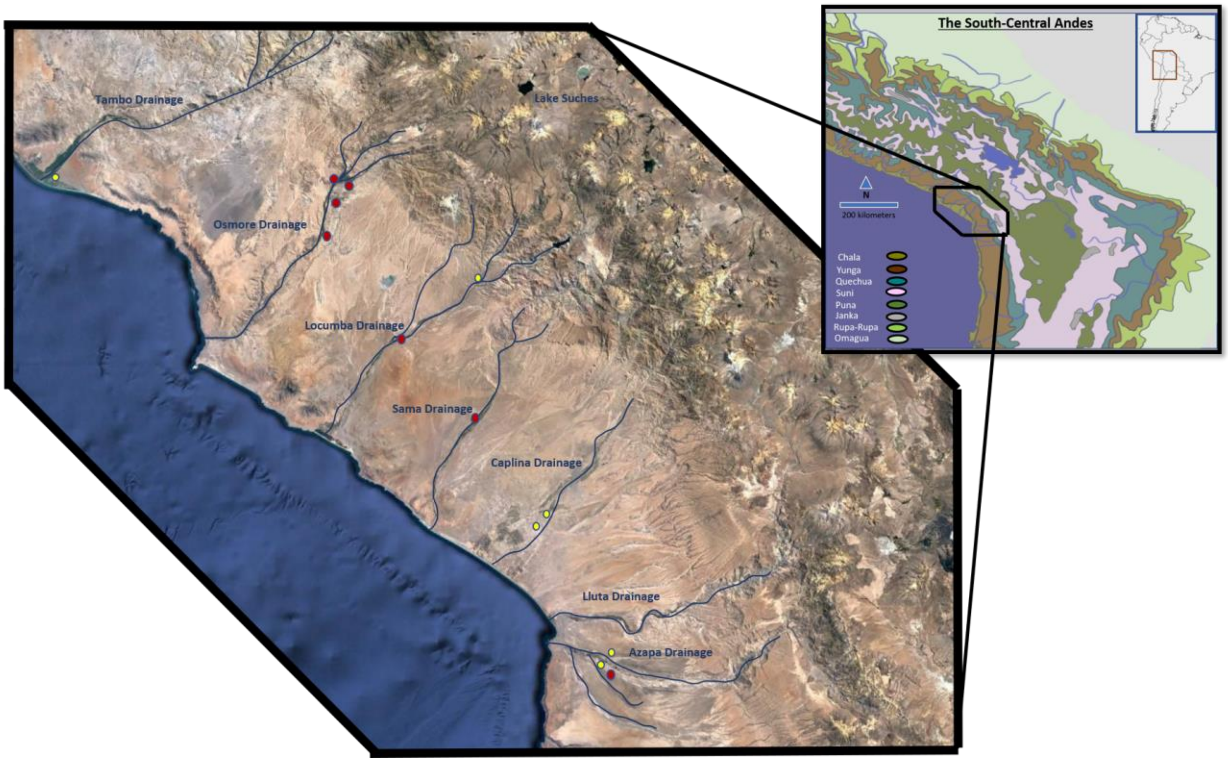

Figure 15. Map of the south-central coast subregion with the drainage systems that comprise the Valles Occidentales labelled (note: dots indicate some major Tiwanaku-affiliated sites).

The only permanent disruption to the hyperarid coast are relatively modest river valleys that act as drainage for snow-melt and alpine springs at the higher elevations. These drainage systems generally begin as steep, rocky canyons in the *suni* and upper *quechua*, before giving way to wider, more even valleys in the *yungas*, before passing through the *chala* and emptying into the Pacific (Figure 15). The south-central coast is defined by seven such drainages: the Tambo, Osmore, Locumba, Sama, and Caplina in southern Peru and the Lluta, and Azapa in northern Chile. These valleys and their associated drainages represent effective oases in the otherwise hyperarid desert, drawing seasonal wild camelids and deer in the upper elevations as well as migrating birds like duck and ibis. The rivers themselves, while often quite shallow, could support small freshwater fish, crustaceans (crayfish), as well as large stands of reeds and other freshwater grasses. These valleys could also host small stands of molle, algarroba, and other small hardy trees. Most domesticated crops (apart from some cold-weather tubers and pseudocereals) thrive in these valleys, provided they can be watered. This subregion is the true focus of this dissertation and is discussed, in detail, as it pertains to the Locumba drainage below (see 3.1).

Southern Highlands

Back in the highlands - as the *altiplano* continues south beyond Lake Poopó, it enters the southern highlands subregion. Much of the northern portion of the southern highlands is like the southern south-central highlands - defined largely by highland *puna* grassland. However, continuing south this region is marked by much steeper topography as well as much more extensive volcanic and geothermal activity. This harsh region is rich in mineral and metal deposits as well as encompassing extensive highland salt flats, like the Salar de Uyuni. Despite the aridity, intermontane river valley systems in places like San Pedro de Atacama, represented desert oases, the only biodiverse or resource-rich areas to be found before the southern highlands break to the well-watered eastern *yunga* foothills and *pampa* grasslands in the southeast (Pfeiffer, et al. 2018; Santoro, et al. 2017).

The Formative Period (ca. 1500 BC - AD 500): the emergence of hierarchical institutions in the South-Central Highlands

The 2000 years of the Formative Period would bring massive changes to sustainable communities in the widespread adoption of domesticated plants and animals and the suite of technologies that their maintenance required (Hastorf 1999). Likewise, residential modes of community would also fundamentally shift to sedentary manifestations and institutions like the village would emerge (Bandy 2004a). While this extensive and varied period is not the focus of this study, outlining some of the critical transformations in multi-modal community network configurations during the Formative is necessary for understanding the later Tiwanaku phenomenon. Here I highlight how these fundamental shifts in residential and sustainable community manifestations would allow for the first regional-level symbolic community networks as well as truly hierarchical institutions to form in the Titicaca Basin and eventually the rest of the south-central Andes. The Formative Period[35] in the south-central Andes is generally separated into three subdivisions: the Early (Upper) Formative (ca. 1500-800 BC), the Middle Formative (ca. 800-250 BC), and the Late (Lower) Formative (ca. 250 BC - AD 500), which I use to frame my discussion below.

The Early Formative (EF) (ca. 1500-800 BC) is defined by the relatively sweeping shift from mobile modes of residential community formations to more settled forms[36] as well as the pivot of sustainable communities to a central reliance on domesticates and the emergence of agriculturally- and pastorally-oriented configurations. (Bruno 2014; Hastorf 2008:548; BrieAnna S Langlie, et al. 2011; Marsh 2015). Villages would emerge as a ubiquitous mesoscale institution, founded on new dynamics involved in sedentary modes of residential communities and the novel forms of cooperation needed in sustainable communities to maintain domesticated fields and herds (Bandy 2004a, 2006; Hastorf 1999). These EF sustainable community networks appear to have remained relatively localized and autonomous, however evidence for limited long-distance exchange in the form of relatively isolated exotic goods (obsidian, marine shell, sodalite beads), suggest some far reaching network connections (Bandy 2005:95; Browman 1981; Stanish 2003:106-108). Important technologies like ceramics also became central to sustainable community activities as well as a new media for symbolic community expression (Stanish 2003:102-104). Significantly, while sedentism did prevail during this period, evidence suggests that permanent fissioning still played an essential role in

[35] The Formative Period (ca. 1500 BC - AD 500) encompasses the later portion of the Initial Period, the Early Horizon, and the Early Intermediate Period as used in much of the Central Andes.

[36] Recent research in the Titicaca Basin has started to illuminate this previously poorly understood transition - these studies have confirmed the high mobility of Late Archaic residential communities, but also suggest frequent re-occupation and evidence for surprisingly long-distance sustainable community connections (see Craig 2011; Haas, R. and Llave 2015).

residential community and broader village institutional dynamics. M. Bandy has used systematic settlement data from the Taraco Peninsula in the southern Titicaca Basin to illustrate how, on multiple occasions, the largest villages of the EF would fission, developing two (or more) new settlements after each event (Bandy 2004a:328-330); developing a complicated and quickly compacting network of village-based community networks (Bandy 2001:103-111).

The Middle Formative (MF) (ca. 800-250 BC) is marked by a cessation of this broader village-based fissioning that defined the EF, and the emergence of the first truly globally-oriented symbolic community networks in the region (Bandy 2004a:330-331). Often framed as the first religion in the Titicaca Basin, the Yaya-Mama tradition represents the emergence of a suite of practices and material manifestations that could be drawn on by local symbolic communities in order to integrate the growing residential community populations resulting from the shifting sustainable community configurations adopted in the EF (Chávez 2004). These elements included the construction of the first public architecture – most notably rectangular and trapezoidal sunken courts built into natural hillsides and artificial mounds accompanied by low-relief stelae and other stone sculpture (Chávez and Chávez 1975; Cohen 2010). The Yaya-Mama tradition also carried with it a suite of ritual paraphernalia, including finely decorated ceramics and musical instruments (most notably ceramic trumpets). Most of the new ceramic styles were finely decorated serving bowls used for the consumption of liquids, which coupled with paleobotanic evidence, suggests the MF is when the production of alcohol was introduced to the region (Goldstein 2003; Logan, et al. 2012; Whitehead 2006). All of these material signals of the Yaya-Mama global symbolic community have been interpreted as facilitating ritual practices that harnessed novel forms of spectacle to smooth-out issues of scalar stress and anchor symbolic communities in place through substantial investments in the built environment (Hastorf 2003; Roddick and Hastorf 2010).

The MF sustainable community networks would both extend and consolidate at this time, as suggested by growing importance of long-distance trade, craft production, and the centralization of wealth. While present in the EF, long-distance trade would increase dramatically in the MF, including the spread raw materials used for more utilitarian goods (Bandy 2004b:95-96; Burger, et al. 2000). Importantly, during the latter half of the Middle Formative water levels in Lake Titicaca were extremely low, which fundamentally altered transportation routes throughout the basin. In a definitional case of gateway (or transit) communities, it has been argued that this shift in transportation routes gave some residential communities a privileged position in these new configurations, and allowed for wealth to begin concentrating within specific communities (Bandy 2004b; La Favre 2016:204). This resulted in the formation of settlement clusters within residential community networks, whereby small residential sites would be established outside larger central residential communities. Several residential communities, like Chiripa on the Taraco Peninsula (Hastorf 2003; Hastorf, et al. 1999) and Qaluyu in the northern Titicaca Basin (Plourde and Stanish 2006; Stanish 2003:112-115) would emerge as hubs in these expanding multi-modal community networks. These increasingly interconnected, regional networks provided numerous avenues for aggrandizing individuals to apply both corporate strategies, as indicated by the relatively integrating quality of most elements involved with the Yaya-Mama tradition, as well as exclusionary strategies through the control of emerging sectors of sustainable communities surrounding trade and crafting (Hastorf 2008:549-553; Stanish 2003:109-136).

By the Late Formative (ca. 250 BC - AD 500)[37] the initial settlement clusters that had formed in the MF began transforming into more hierarchical and autonomous residential community networks, with primary sites acting as true centers of gravity for growing orbits of smaller secondary and tertiary sites (Stanish 2003:137-142). New higher-order symbolic communities were necessary as these central residential communities began playing a more

[37] In most recent chronologies of the southern Titicaca Basin the broader Late Formative Period is divided into four sub-periods: The Initial Late Formative (ca. 250 BC - AD 150), Late Formative 1 (ca. AD 120-240), Late Formative 2 (ca. AD 240-420), and the Terminal Late Formative (ca. AD 420-590) (see Marsh et al 2019).

focused role in large scale sustainable and symbolic community networks. This process of promotion resulted in increasingly generalized leadership roles as higher-order symbolic communities came to intervene in more aspects of sustainable communities (Roddick and Hastorf 2010). Symbolic community expressions in media like ceramics and textiles would begin to diverge into increasingly distinct styles (Bennett 1948; Steadman 1995), suggesting more balkanized organization in the broader symbolic community network (Stanish 2003:140-142). This was also reflected in built environment projects that, while retaining elements like public sunken courts and plazas, would also add more exclusive elements, suggesting more centralized control in symbolic communities that regulated the rituals that were centered there.

Importantly, while some exclusionary strategies involving violence may have been present in the proceeding EF and MF, it is in the LF that clear signs of raiding and warfare are evident in increased intentional residential community razing and even symbolic community expressions emphasizing violence and domination (Stanish and Levine 2011). This period of initial factional competition in the early LF would culminate at the center of Pukara, where after a sustained campaign of raiding against its nearest competitors would come to control much of the northern Titicaca Basin (A. Levine 2012; A. Levine, et al. 2013). The site of Pukara would boast impressive public architecture including multiple sunken courts, substantial stone-lined terracing, and it would project a suite of novel iconographies elements, spread through ceramic, textile, and stone sculpture - reaching areas as distant as the south-central coast subregion (Haeberli 2001; Klarich 2005; Klarich and Bustinza 2012; Stanish 2003:144-146). Likely due to issues of hypercoherence as aggrandizers took direct control of too many sustainable and symbolic community networks, by ca. AD 200 Pukara would wane as a primary center as the core of the broader Titicaca Basin multi-modal community network would shift to the southern basin (Hastorf 2008; Stanish 2003:158-159).

This collapse of Pukara in the north occurred as major transformations were also occurring within the southern basin as centers on the Taraco Peninsula, like Chiripa and Kala

Uyuni, which had served as regional population centers for generations, began to empty, shifting to the settlements in the valleys south of the lake (Bandy 2001:162-198; Bandy and Hastorf 2007; Janusek 2004d). This major migration of residential communities seems to coincide with a shift in sustainable community practices in the widespread adoption of raised field agriculture. Likely catalyzed by the dramatic shifts in lake levels since the MF, raised field agriculture used built-up tracks of well-drained mounds, separated by dug-out canals to harness the fluctuations in lake levels as well as mitigate other environmental issues, like unpredictable frosts (Erickson 1985, 1992; Erickson and Chandler 1989). Centers in the the wide, marshy valleys south of the lake, like Khonko Wankani, Lukurmata, and Tiahuanaco, were much better positioned to develop and coordinate wide tracks of this new agricultural infrastructure and facilitate many of the former Taraco Peninsula populations (Bandy 2005; Bermann 1996:103-130; Janusek 2004d, 2015; Janusek and Kolata 2004; Marsh 2012b; Stanish 1994).

Newly refined dating and ceramic stylistic sequences have illuminated how symbolic communities grappled with these major shifts in residential and sustainable community modes, as the formally widespread LF Kalasasaya styles give way to the more locally-specific Qeya styles that define the Terminal LF (ca. AD 420-570) (Marsh, et al. 2019:812-813). These more variable Qeya styles used novel and more symbolically-dense imagery and motifs, implying symbolic communities that were vying for the attention of communities on the move (Marsh, et al. 2019; Roddick 2009). Ultimately, it would be the symbolic communities at Tiahuanaco that could provide the most effective, or at least most attractive, strategies for integrating the increasingly dense community networks in the southern Titicaca Basin (Janusek 2004d).

Formative Changes Elsewhere in the South-Central Andes

The extensive Formative Period would also see major changes to community networks elsewhere in the South-Central Andes. In the macroscale, many of the basal shifts in residential and sustainable communities would mirror those already noted for the Titicaca Basin, including the widespread emergence of sedentary village institutions and the adoption of domesticates. For instance, just southeast of the Titicaca Basin in the expansive and temperate intermontane Cochabamba-Mizque Valley systems, agriculture would spread quickly, and while regional symbolic communities would form coherent regional styles, such as Quillacollo and Tupuraya. However, very little centralization appears to have occurred until the terminal LF as connections with the Titicaca Basin polities began to increase (Brockington and Rocha 1989; Gablemann 2012; Pereira, et al. 2001). In the southern *altiplano* in the broader Lake Poopó Basin sedentary village institutions would also come to frame community life. However, the local Huancarane communities here would orient themselves around pastoralism than some of the more agriculturally-oriented Formative Period sustainable communities elsewhere (José M Capriles 2016; McAndrews 2005). Further south still, in the relatively isolated highland intermontane oases in San Pedro de Atacama, residential communities appear to have adapted only semi-sedentary lifeways until late in the Formative, and focused significant sustainable community investments in establishing long distance camelid caravan networks (Agüero and Uribe 2011).

Similar Formative Period transformations were also occurring in the lower elevation zones of the broader South-Central Andes. In the river valleys of the south-central coast subregion, most domesticated crops could be grown year-round, and this agricultural productivity would support a dense network of small, village-based community networks spread relatively evenly through valley bottoms. Variations did occur, with residential communities in the *chala* closer to the coast maintaining sustainable community practices largely oriented on marine resources (deFrance, et al. 2009; Owen 2009), and communities located higher in the *yunga* and *quechua* zones of the valleys would rely more on pastoral sustainable community formations (Vining 2016). In these western valleys most Formative symbolic communities did not invest significant amount in public architecture, however burial mounds (*tumulos*) were ubiquitous features, suggesting changing symbolic community investment in shared lineages

(Romero, et al. 2004). Again, while not as severe as the highland transformation, social inequalities did develop in these valleys - frequently evidenced by unequal distribution of exotic trade goods (Goldstein 2000a). While forming similar overall community network formations, each of the south-central coastal valleys would develop its own broader community networks - the best defined Formative manifestations being the Huaracane in the middle Osmore drainage (Costion 2009, 2013; Goldstein 2005:122-134), the Algodonal in the coastal Osmore drainage (Owen 1993, 2009), and the Alto Ramirez tradition in the middle Azapa drainage (Iván Muñoz Ovalle 1987, 2004; Iván Muñoz Ovalle 1983).

<u>The Early Middle Horizon (ca. AD 500-750): the formation of Tiwanaku as a centripetal center</u>

In the competitive milieu that defined the Terminal Late Formative (ca. AD 420-570), Tiahuanaco would be established as the primary center in the broader Titicaca Basin. As has already been noted, the Late Formative was a time of great change throughout the basin, as Pukara would falter in the north and shifting environmental conditions and sustainable community transformations led to major residential community migrations in the southern basin (Janusek 2004d). In just ten generations the Tiwanaku Valley would go from being relatively unpopulated[38] to hosting the highest population density in the South-Central Andes. Far from incidental, the major growth of residential communities and re-orientation of sustainable communities in the broader Titicaca Basin were clearly driven by symbolic community enterprises centered at the site of Tiahuanaco. Here, I review how these initial symbolic community formations resulted from and came to transform the broader multi-modal community networks in the southern Titicaca Basin and beyond. This period has traditionally been called Tiwanaku IV or Tiwanaku 1, but here I use Early Middle Horizon (ca. AD 500-750) to refer to this

[38] Originally, systematic survey in the Tiwanaku Valley suggested several residential community settlement clusters within the valley at the onset of the LF (e.g., Albarracín-Jordán 1996; McAndrews et al 1997; Bandy 2013).

initial period of growth at Tiahuanaco.

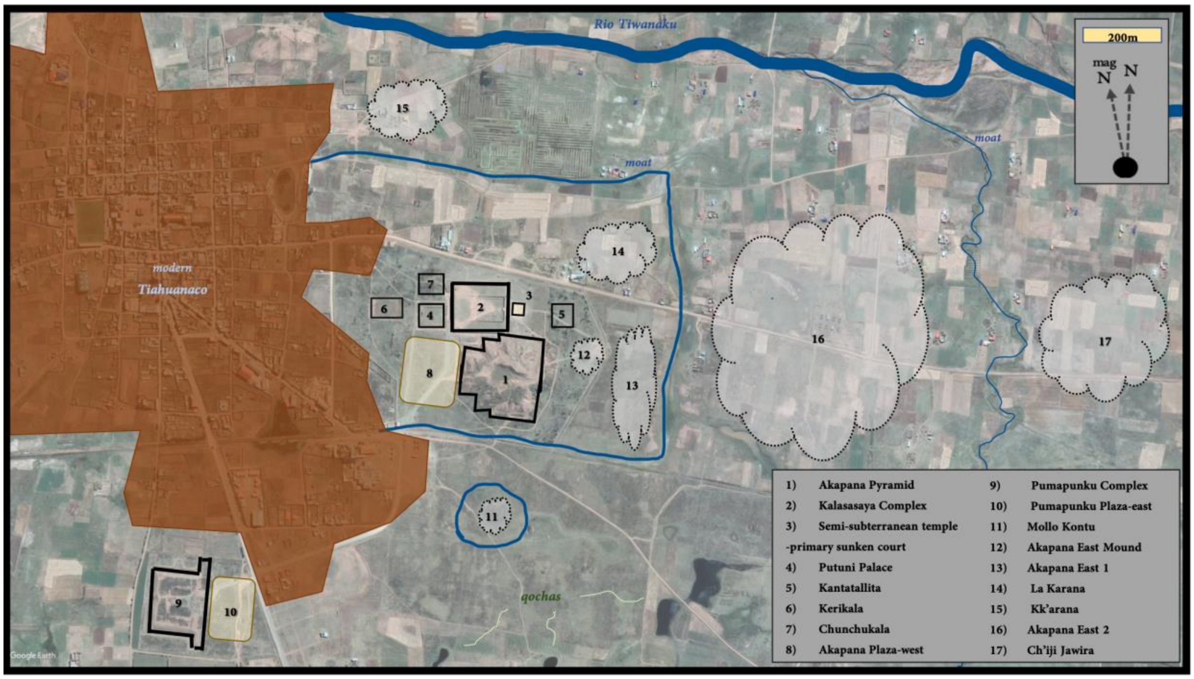

Figure 16. Map of site of Tiahuanaco.

The site of Tiahuanaco (Figure 16) was likely established sometime in the early Late Formative (sometime after ca. AD 100), including the first iteration of the site's primary sunken court (Ponce Sanginés 1969a). At this point Tiahuanaco was like many of the other centers in the southern basin and was substantially smaller than multiple sites on the Taraco Peninsula and even Khonko Wankani in the neighboring Desaguadero drainage to the south (Bandy and Hastorf 2007; Janusek 2015; Janusek, Vranich, et al. 2013). As the Late Formative progressed Tiwanaku would grow in population, which largely concentrated in residential sectors in the Kk'araña and Akapana East 1 sectors (Marsh 2012a, 2012b). This was also a period of symbolic community elaboration at the site as some of the earliest residential sectors were leveled and the construction of Kalasasaya platform complex was initiated. The Kalasasaya platform complex coupled with the older sunken court would form the beginnings of the site's impressive ceremonial core precinct (Kolata 2003c). As noted above, in the final two centuries of the LF Tiahuanaco would grow drastically, from a large 20 hectare village to a booming 100 hectare settlement (Mathews 1992; McAndrews, et al. 1997). However, even this substantial growth would be dwarfed by the dramatic changes at the site in the Early Middle Horizon. For perspective, by the end of the Early Middle Horizon, ca. AD 700, just four generations after populations began to shift to Tiahuanaco, the site sprawled over some 6.5 kilometers of area - a true urbanized settlement.

Now residential communities occupied several large sectors in and around the ceremonial core precinct of the site (Janusek 2004b:193-195). Most of these residential sectors would expand eastward, overlaying but largely abandoning Late Formative domestic structures in Akapana East 1 and forming new discrete sectors - Akapana East 1M and Akapana East 2. Further east still, the sector of Ch'iji Jawira would form one of the more peripheral residential community contexts at the site (Rivera Casanovas 2003). In the north, early established residential sectors like Kk'araña would be largely abandoned (Marsh 2012b), and new sectors like La Karaña and Muru Ut Pata would be established (Janusek 2004b; 2013:202). Similarly, to the south of the ceremonial core sectors like the Mollo Kontu became well-established (Couture 2003), closely associated with a system of *qochas* or artificial wetlands (Verzijl and Quispe 2013), used for some irrigation but often for watering herds of camelids (Janusek 2008:183-184). Finally, within the ceremonial core itself more elaborate residential spaces were founded in the Putuni and Kerikala sectors (Couture and Sampeck 2003) - these would be closely associated with the broader Kalasasaya complex. The monumental precinct would receive other major changes - early in this period existing public architecture, like the sunken court and Kalasasaya platform would be modified and the major monumental complexes of the Akapana Pyramid in the ceremonial core and the more peripheral Pumapunku complex would be initiated (Vranich 1999, 2006). The substantial increase in residential community space as well as the boom in monumental constructions clearly shows quantitative growth in the Tiahuanaco settlement, but this still begs the question - what qualitative factors drew populations to Tiahuanaco and led to this unprecedented growth?

One factor that certainly played a critical role in Tiwanaku's rise has already been mentioned - the adoption and expansion of raised-field agriculture in sustainable community formations. Raised-fields have long been recognized to have played a primary role in the Tiwanaku political economy - approximately 1200 square kilometers of relic raised-field systems have been identified in the Titicaca Basin, and most appear to have been in use during the broader Middle Horizon (Kolata and Ortloff 1996:112). Early studies of these field systems stressed their important ability to mitigate drought, flooding, and frost, and suggested that they represented an attractive, hyper-productive agricultural technology either harnessed or imposed by emerging elites centered at Tiahuanaco (Erickson 1985, 1992, 2006; Janusek and Kolata 2004; Kolata 1986, 1991; Kolata and Ortloff 1989). However, more recently M. Bandy has convincingly argued that in reality the raised-field systems produce lower yields than more traditional rain-fed agricultural methods that had already and continued to be used in the basin (Bandy 2005). This was particularly true when labor investments for construction and maintenance was considered. However, the climate-mitigating qualities of raised-fields did allow one major advantage - they could be planted earlier and harvested later than other farming methods available in the *altiplano*. Bandy argues that it was this factor that allowed enterprising aggrandizers at Tiahuanaco to develop staggered sustainable community production schedules, in which surpluses could be generated with minimal impact on pre-existing sustainable community activities (Bandy 2005; 2013:141-143).

The surplus yields generated through staggered sustainable community practices allowed the aggrandizers at Tiahuanaco to capitalize on already well-established strategies of conspicuous consumption. Feasts, involving the large amounts of food and alcoholic beverages, had been a central symbolic community practice throughout the Titicaca Basin since the Middle Formative. However, in the Late Formative a clear shift occurred in how these events were carried-out, as large communal serving vessels gave way to more individualized serving bowls. This has been interpreted as a general transformation in how commensality was configured, from relatively equitable exchange events among the broader symbolic community to events which were hierarchical or at the very least based on exchanges in which the quantity and quality of what was being exchanged was fundamentally unequal (Bandy 2013:136-140; Goldstein 2003). At Tiahuanaco this mode of feasting would reach new levels of scale and significance as indicated by the ubiquitous presence of dense middens with feasting debris throughout the site. Symbolic communities at Tiahuanaco would quickly develop new ceramic forms to reinforce their hospitality-based influence, epitomized in the rapid spread of new decorated serving vessels, the *kero* and *tazón*. These red-slipped, well-fired vessels, along with textiles, would become powerful portable media to project the suite of motifs that would come to signify the influence of Tiwanaku's core symbolic communities throughout the region (Augustine 2019; Janusek 2002, 2003b, 2005a; Villanueva Criales 2015).

The feedback loop driven by this seasonal cycle of raised-field surplus production reciprocated by aggrandizer-sponsored feasting events, resulted in an aggressive growth spiral which appears to have thrust Tiwanaku symbolic communities into generalized roles as sustainable community managers at the macroscale (Browman 2004; Janusek 2006; Kolata 2003a; Seddon 2013). This is best understood as a point of self-organized criticality, a threshold of promotion and linearization that led to the accelerated emergence of higher-order symbolic communities as well as institutions - all tethered to Tiwanaku. For instance, the modifications in the Kalasasaya complex appear to have developed an accurate solar observatory - used to gauge critical seasonal junctures (Benitez 2009; Janusek 2008:114-116; 2012:123-125). However, while Tiwanaku was certainly growing in size and complexity, this force was largely centripetal in nature, drawing the orbit of multi-modal community networks inward.

Here I feel it is useful to employ E. Mayer's concept of production zone (Mayer 1985) to frame Tiwanaku's position in the region. As Tiwanaku's influence spread, the seasonal festivities hosted by symbolic communities at the site became essential for broader social reproduction in the south-central highlands (Browman 1978, 1981). Local symbolic communities from throughout the southern basin and beyond, would likely send representatives to set-up seasonal residential community locations to the site in order to engage in these increasingly important activities. Said another way, Tiahuanaco itself, from the raised fields and monumental architecture to the power of the elite symbolic communities that were centered there, became a production zone that needed to be actively maintained.

Early Middle Horizon Microscale Institutions: households in the core

Households had first emerged along with the mesoscale village as the primary institutions framing domestic life for sedentary populations beginning in the Early Formative, and this would continue to be the case at Tiahuanaco as the Middle Horizon unfolded. The primary built environment manifestation of these microscale institutions at Tiahuanaco were open-air, walled compounds, containing any number of internal structures and other domestic features and facilities. These bounded compounds shared a number essential features, but also “represented the most salient unit of social differentiation” within the broader urban settlement (Janusek 2002:43).

Compounds excavated in the Akapana East 1M, Akapana East 2, Ch’iji Jawira, La Karaña, and Mollo Kontu have all had similar built environment configurations (Escalante 2003; Janusek 1994; 2004b:193; Rivera Casanovas 1994; Vallières 2012:155-160). This included a thick outer compound wall, which was almost always oriented approximately 8 degrees east of north. These walls would most frequently be constructed using a course of roughly cut ashlars or cobbles with an adobe brick superstructure. Interior to compounds would be at least one multi-room, roofed structure, often used for sleeping, as well as a number of other constructions including rectangular or circular storage bins (Janusek 2004b:193-195; 2005b). The materials used in these interior structures could vary, from the use of finely cut ashlars and field stone for wall foundations to locally collected sod and informal adobes bricks for superstructure[39]. Almost all interior spaces in these compounds had prepared clay floors with any roofing constructed of thatching, likely made from local bunch grass. All compounds also had an open patio space where a variety of domestic activities appear to have taken place. Other ubiquitous features would include subsurface storage and refuse pits - these could be formally lined with stones or plaster, but were most frequently informal and filled with refuse and large amounts of ash (Janusek 2005b:150). Most compounds have had identifiable kitchen spaces, centered on one or more hearths, that served as primary food preparation areas. As noted above, formally occupied sectors like Akapana East 1 and Kk'araña would be largely abandoned and covered in sheet middens and dotted with informal refuse pits, suggesting they were used largely for refuse disposal by the more recent occupants (Escalante 2003; Janusek 2003a, 2009; Marsh 2012a:364-430).

Many of the base-level manifestations of community interaction within these microscale institutions would be relatively similar. Some of these similarities were the ubiquitous features common of most ancient households - all Early Middle Horizon domestic compounds appear to be locations where people slept, cooked, ate, and disposed of refuse. However some practices, like the uniform orientation of compound walls, also show clear signs of more specific shared symbolic community engagement. This is also indicated by the ubiquitous presence of Tiwanaku ceramic serving wares. While these decorated redware vessels would not share the conformity of the Late Middle Horizon iconographic suite, the vast majority of serving vessels at this time adopted the Tiwanaku kero and tazón forms and draw on the same body of iconographic elements (Alconini 1995; Augustine 2019; Janusek 2002). All compounds show at least some use of these vessels, normally in the open patios, which suggest engagement in some form of household-level consumption and libation practices (Janusek 2005b). A final

[39] Some walls were even simple *tapia* style - constructed using layered layers of mud, often with no foundations (Janusek 2005b; Rivera Casanovas 2003).

overlapping feature common to most investigated compounds is the presence of interred offerings which could range from camelid fetuses and guinea pigs to human remains. Most examples of human remains are intentional interments, buried under floors or specific architectural features, but are only partial individuals, suggesting household-based symbolic community ritual as opposed to standard practices for disposing of the dead (Blom and Janusek 2004:132-133).

Despite these base-level similarities in function and broader symbolic community engagement, the differing distribution and density of most material types recovered from these domestic compounds[40] suggest that these emergent households at Tiahuanaco also differed quite acutely from one another (Janusek 1999, 2005b). Diet and other culinary practices appear to have been very compound-specific with different quantities of highland and lowland crops, protein sources, and cooking techniques suggesting different sustainable community access and symbolic community preference (Berryman 2010; Vallières 2012; Webster and Janusek 2003; Wright, et al. 2003). Some compounds and even groups of compounds appear to have specialized in specific facets of the broader sustainable community network as well. For instance, at the sector of Mollo Kontu the high prevalence of camelid remains as well as its close proximity to the maintained *qochas* suggests strong ties to pastoralism (Couture 2003; Vallières 2012, 2016). This trend of broad conformity in globally-oriented symbolic community practices but maintenance of more household-specific community affiliations is most pronounced in the peripheral Ch'iji Jawira sector (Rivera Casanovas 2003). Here evidence suggests that while they shared the same general orientation as elsewhere at the site compounds were generally of a lower quality, with stone foundations almost completely absent from most walls and structures (Rivera Casanovas 1994:130-139). Interestingly, a high density

[40] I discuss these excavated assemblages (as well as others mentioned in this chapter) in more detail in conjunction with my own analysis in Section 3, particularly Chapter 11.

of ceramic production tools and refuse, as well as evidence from locally interred human remains suggest that multiple compounds in Ch'iji Jawira specialized in the production of utilitarian ceramic vessels (Becker 2016; Janusek 1999:113-115; Rivera Casanovas 2003).

A final distinction to be noted here is the existence of inequalities between different sectors at the site that permeated down to the microscale of households. By the end of the Early Middle Horizon a large canal or moat had been established that separated the ceremonial core precinct and inner-domestic sectors from more peripheral domestic sectors[41] (Kolata 1993a; Kolata and Ponce Sanginés 1992). Some general differences between the inner vs outer sectors that have already been mentioned. For example the quality of domestic structure construction was generally lower in Akapana East 2 and Ch'iji Jawira when compared to compound architecture in Akapana East 1M (Janusek 2005b:164-165). However, these were only slight differences when compared to the households which occupied the true core ceremonial precinct. The principle example[42] here is the Putuni architectural complex that was established early in this period (Couture 2004; Couture and Sampeck 2003). This complex housed multiple domestic compounds that used finely cut ashlars for much of the construction, adorned with painted-plastered adobe walls. A system of subsurface drainage canals illustrate that this was a pre-planned complex, initially established with a significant amount of community investment. A large specialized kitchen space suggests more substantial expressions of feasting and libation ceremonies than in other residential contexts (Couture and Sampeck 2003:234). Finally, contained within the Putuni complex adjacent to the domestic compound was a mortuary architectural component. This included several accessible stone-line cists that

[41] In fact, recent remote sensing-based work east of the Akapana Pyramid has revealed a more elaborate built environment than previously understood - it now appears that underlying Akapana East M1 and Akapana E1 are substantial platforms that were likely constructed to further augment the scale of the Akapana itself (Vella et al 2019).

[42] It is likely that the adjacent Kherikala architectural complex was also occupied at this time by similar high-status household manifestations as those described for the Putuni (Couture and Sampeck 2003).

appear to have be the focus of repeated offerings and other symbolic community practices (Couture and Sampeck 2003:238-243). Overall these were clearly households that were central to the burgeoning Tiwanaku phenomena, likely occupied by principle aggrandizers and their constituent core communities that occupied increasingly generalized leadership positions across increasingly centralized community networks throughout the region (Kolata 2003a).

The Early Middle Horizon Abroad: Tiwanaku's influence in the South-Central Andes

Tiwanaku’s meteoric growth was both caused by and led to extensive migrations within the southern Titicaca Basin. A few other neighboring sites, particularly Lukurmata in the Katari Valley less than 20 km to the northwest, would also grow substantially (Kolata 1996a). Importantly, while certainly entangled within Tiwanaku’s growing web of influence, in this early period, Lukurmata and other nearby sites like Iwawi, show evidence that they maintained their own local symbolic communities that only selectively drew on elements being projected from Tiahuanaco (Bermann 1996, 1997; Burkholder 2001; W. H. Isbell and Burkholder 2002). Similarly, throughout the Early Middle Horizon Tiwanaku seems to have only been able to strategically tap into certain sustainable community networks in the important Desaguadero drainage - one of the most critical transportation corridors in and around the southern Titicaca Basin (S. C. Smith and Janusek 2014). Other modest but centralized community networks that had been established in the Late Formative in the western and northern Titicaca Basin also appear to have largely maintained their autonomy with only specific sustainable and symbolic community networks being drawn into Tiwanaku increasing centripetal force (Schultze 2008; Seddon 2005; Stanish 2003:180-189; Stanish, et al. 2005).

In spite of its lack of direct control within its broader hinterland, by the end of its initial phase of growth, Tiwanaku’s influence could be detected throughout the South-Central Andes. Like the Tiwanaku imprint in the Titicaca Basin, this influence abroad would not be in the form of complete local transformation, but rather a strategic co-option of pre-existing community networks. One of the principal ways in which Tiwanaku likely first injected itself into these distant community networks was through llama caravan trade (Browman 1978, 1981, 1984). Since at least the Middle Formative, entire sustainable community networks had developed around long-distance exchange, largely carried out by itinerant traders who traveled seasonally in llama caravans. This was particularly true in the expansive altiplano which greatly hindered highland based communities ability to directly access the resources of other altitude-based ecozones through residential community colonization (Berenguer 2004; Nielsen 2000). This reliance of trade via llama caravans has been referred to as the *altiplano mode of production*, in which bulk-good crops (like maize or tubers) were transported along with finished products (like textiles or ceramics) as well as exotic items (like feathers or marine shell) (Browman 1981:414-415).

As Tiahuanaco developed into an essential production zone for both sustainable and symbolic community networks, it likely became a necessary stop for a number of caravan routes - particularly those that connected to the southern altiplano and the broader southern highlands subregion (Beaule 2016:610; Berenguer 2004; Browman 1997). This is supported by evidence for early, but limited connections in the temperate Cochabamba Valley, where the local Illataco Phase is defined by the influx of imported Tiwanaku decorated ceramics (K. Anderson 2009; 2013:92-95). Further south still in the intermontane desert oases system of San Pedro de Atacama local aggrandizers began including Tiwanaku-style textiles as well as drug paraphernalia in their grave goods at a similar time, in what has been defined as the Quitor Phase (Oakland 1992; Salazar, et al. 2014; Stovel 2001; Torres-Rouff 2008; Torres and Conklin 1995). Both examples illustrate a situation of strong connections but weak control - whereby the increasing value of the Tiwanaku symbolic community became useful inroads into profitable sustainable community networks.

Tiwanaku influence would differ in the western Pacific valleys of the south-central coast subregion. Here, highland communities with definitive ties to Tiwanaku would not just infiltrate local sustainable and symbolic community networks but would establish their own network of residential communities (Goldstein 2015). This was first acutely expressed in the middle Moquegua Valley of the Osmore drainage (Goldstein 1989b, 2005, 2013; Goldstein and Owen 2001). Arriving sometime soon after ca. AD 600 these initial residential outposts were clearly associated with llama caravan routes - set-back from the agriculturally productive valley floor near well-used pathways and often marked with hillside geoglyphs[43] (Goldstein 2005:150-160). These early sites were well-established village formations with dense middens suggesting long-term use. Sites were planned with a clearly demarcated nested set of residential communities - with domestic structures clustered around open plaza spaces which were then clustered into villages (Goldstein 1993a, 2005).

However, almost all domestic structures were relatively ephemeral; constructed of loosely spaced framing posts, which likely held vegetable-fiber mats or skins resulting in tent-like constructions (Goldstein 2005:195-197). This combination of long-term use of relatively ephemeral construction types suggests repeated seasonal-use. This form of settlement was also coupled with its own distinct material suite, known collectively as the Omo-style, which included the use of distinctive polished blackware ceramics, a relatively rare ware type in other Tiwanaku contexts, as well as a relatively fine-line mode of iconography in its decorated redwares (Goldstein 1985, 2005; 2009:282-286). Importantly, these initial Omo settlements would settle areas that were uninhabited by the indigenous Huaracane populations and likely only recently viable due to recent ENSO flooding events that shifted spring locations in the valley (Goldstein and Magilligan 2011; Magilligan and Goldstein 2001). The initial Omo villages established in middle Moquegua Valley represent the first substantial accumulation of the convergence of fully Tiwanaku residential, sustainable, and symbolic community networks

[43] While difficult to date, these hillside geoglyphs in Moquegua are almost always associated with Middle Horizon contexts. The most frequent images depicted are camelids however there are also plants, keros, and anthropomorphic images displayed as well.

outside the Titicaca Basin and a key precedent for Tiwanaku's transformation from a centripetal center to a centrifugal polity.

The Late Middle Horizon (ca. 750-1000): the transformation to Tiwanaku as centrifugal polity

The Late Middle Horizon or Tiwanaku V Period represents the height of centralization and influence for the polity - a period where Tiwanaku was definitively an archaic state (Stanish 2013). While much of the growth of Tiwanaku as a population center would be completed before the end of the Early Middle Horizon, this later period would be no less transformative. The site itself would see major remodeling events that would completely re-configure the city and the way it was experienced, from macroscale monuments to microscale domestic compounds. Importantly, Tiwanaku's influence abroad would increase in breadth and depth as community strategies and activities in the core required more input from external networks (Janusek 2008:243-249; Kolata 1993b). Ultimately, this period would be Tiwanaku's climax, when its long-standing position as a regional focal point for multi-modal community networks became crystallized, but also cracked.

It is quite likely that monumental construction and remodeling was a constant activity at Tiahuanaco, however by ca. AD 800 all major constructions were in use (Kolata 2003c; Vranich 2006). The Pumapunku complex to the southwest of the primary site likely acted as a gateway to the city - an impressive series of plazas and platforms which visitors would pass through before continuing to the monumental core (Vranich 1999). In the core itself, the completed Akapana pyramid would represent the most subordinating structure, standing over seventeen meters in height (Janusek 2008:113-118). At this time a large plaza was established at the pyramids western base where hundreds could stand and wait to ascend or watch those who did (Augustine 2019:73-75; Koons 2013). The Akapana itself was elaborated with structures occupying the summit along with multiple sunken courts and evidence for activities along a number of its terraces (Alconini 1995; Manzanilla 1992; Vranich 2001). To the east of the Akapana, the Kantatayita precinct likely supplemented the complex of ritual activities that were continuing to be undertaken in the adjacent primary sunken court and Kalasasaya platform complex (Escalante 1994; Janusek 2008:125-126). Whether these monumental buildings were used as part of a single, complex procession by visiting pilgrims or acted as anchoring points for specific symbolic communities at specific times, by the Late Middle Horizon the core precinct was an impressive suite of monumental constructions (W. H. Isbell and Vranich 2004; Kolata and Ponce Sanginés 1992).

Stone working was an essential feature of Tiahuanaco's built environment (Nair and Protzen 2013). This was not a new phenomenon as stone sculpture had played a central role in symbolic communities in the Titicaca Basin since the Middle Formative (Janusek 2004d). Monoliths, were fundamental in anchoring the built environments utilized in the rituals of the Yaya-Mama tradition. The Late Formative center Pukara would also rely heavily on low-relief stonework as a primary medium to display their distilled symbolic community messages. Tiwanaku would continue this momentum from its founding and by the Late Middle Horizon would be composed of an impressive array of monumental stone works. All monumental constructions were encased in finely cut ashlars, often punctuated with massive stone columns. Platforms and other structures featured elaborate gateways which were used to emphasize the thresholds of monumental spaces - accentuating the transition from profane to increasing sacred spaces. Stone sculptures, and specifically monoliths depicting human-like figures, were central elements to most built spaces[44] (Janusek 2008:128-130). These human monoliths, like the stone tenoned effigy heads that adorned the walls of the primary sunken court (Janusek 2008:110-111), likely represented important ancestral figures. While the stonework clearly

[44] Recent studies of Tiwanaku-era monoliths show that they likely served an expanded role across the broader ritual landscape - acting as permanent symbolic community member presence at important resource locations like springs (Janusek and Bowen 2018).

illustrates a huge investment into symbolic community activities, the crafting necessary for such work also implies the existence of well-established and likely full-time sustainable community specialists (Janusek, Williams, et al. 2013). Some of the largest blocks at the site have been sourced to quarries over 50 kilometers away, requiring boats to cross Lake Wiñaymarka (W. H. Isbell and Burkholder 2002; Janusek et al. 2013), again highlighting the huge investments being made in facilitating the symbolic community activities in Tiwanaku's core.

One of the primary processes driving early symbolic community promotion and linearization at Tiwanaku was their successful ability to synthesize pre-existing ritualized exchange and symbolic media into new novel practices and representations (Janusek 2006, 2013; Seddon 2013). As noted above, one of the principle foci of this burgeoning symbolic community energy was in scheduling a broadening network of sustainable communities (Kolata 2004; Kolata and Ponce Sanginés 1992). By the onset of the Late Middle Horizon, Tiahuanaco had served as the principal center of gravity for any number of crucial sustainable community networks for several generations - scheduling agriculture, pastoral, lascurine, and any number of crafting industries (Janusek 1999, 2013; Kolata 2003a). The leadership of the most important symbolic communities had transformed from powerful yet punctuated leaders of seasonally driven community agglomerations to permanent elites at the center of increasingly hierarchical and segregated institutions.

This transformation was particularly conspicuous in the re-modeling of monumental structures in the core. While Tiwanaku ritual architecture had always utilized gateways and platforms to emphasize transition through different spaces, these features reached an apex during this later period. Most new structures and additions to old buildings, appear to emphasize exclusivity - closed off locations where important rites could be conducted and staging for more public performances could take place privately. This increasing centralization is also reflected in the overall topology of how the site of Tiwanaku was configured. Again, while the monumental precinct had always formed the center of the settlement, residential sectors would now form a clear “concentric gradient of social status that diminished with distance from the core” (Janusek 2008:156). This expression of social status differences in residence was not simply based on relative location but would manifest in the microscale as households were reconfigured during the Late Middle Horizon.

Late Middle Horizon Microscale Institutions: from households to neighborhoods

Some of the clearest examples of the changing nature of Tiwanaku social stratification is found in the microscale domestic contexts within the ceremonial core. While certain residential communities had always occupied this central location, during the Late Middle Horizon these privileged compounds would be remodeled into true monumental palaces (Kolata 2003c). Again, the best understood of these palaces is the Putuni (Couture 2004; Couture and Sampeck 2003). Here, the long-occupied Early Horizon compounds would be formally razed and a large platform containing a restricted courtyard would form the primary new structure with the residences moved to attached architectural suites. The new courtyard complex would cover over 3500 square meters and feature a number of niches, that evidence suggests were likely gilded and contained the mummified remains of significant figures from symbolic community lineages (Couture and Sampeck 2003). The residences themselves would now be constructed almost entirely of finely cut ashlars which were plastered and painted with bright pigments (Couture and Sampeck 2003). The broader Putuni Palace, along with the associated Kerikala complex served as the residences for the principle elite of Tiwanaku, likely with deep ties to the founding lineages of the now, regional-level polity (Bandy 2013; Janusek 2008:157).

However, these elite palaces weren’t the only manifestations of microscale household institutions in the core ceremonial precinct. Atop the Akapana a number of relatively small, but well-constructed roofed-structures were established (Manzanilla 1992:55-70). The overall content and distribution of associated materials suggest that these structures served, at least in part, as residences (Janusek 2004c:207-208). This has led some to suggest these structures may have acted as the base of operations of priests, who now literally occupied the peak of an elaborate hierarchy of symbolic community specialists and resided over the myriad of ritual practices that underwrote the broader Tiwanaku phenomena (Alconini 1995; Janusek 2006).

Mesoscale patterns in residence outside the ceremonial precinct would also shift again. Formally abandoned residential sectors, like Akapana East 1, would be re-occupied and previously expanding sectors, like Ch'iji Jawira, would ultimately contract, with large portions used for disposing of domestic refuse. In most sectors the walled, open-air compound would remain the foundational microscale expression of households, though they too would see some major changes (Janusek 2003a). Excavations in two of the compounds to re-occupy Akapana East 1 illustrate a shift in how compounds were internally organized and collectively associated. Instead of representing manifestations of largely self-contained household institutions, compounds now appear to have been linked into more elaborate neighborhood configurations.

Specifically, one partially excavated compound, while still possessing many standard domestic features, also contained a well-constructed sunken court associated with high proportions of sumptuary goods, particularly serving vessels (Janusek 2004b:199-200). Directly to the south, a separate compound was oriented around an outdoor kitchen complex that included at least twelve hearths and a well. Internal structures in this compound were crudely-made sod and informal wall foundations, unlike those constructed with cobble foundations and formal adobes in the compound to the north. This pattern seems to suggest that some of the ways in which the built environment was manifested in the ceremonial precinct was being reproduced at smaller scale in the residential sectors (Janusek 2004b:200; 2008:156). In particular, higher status individuals and their associated households began occupying the loci of important symbolic community ritual. In this case, microscale domestic compound sunken court complexes. In other words, the urban renewal during the Late Middle Horizon would shift the true microscale institutional expression from the domestic compound of households to more extensive neighborhoods.

The Late Middle Horizon Abroad: Tiwanaku's expansive strategies

The city of Tiwanaku had served as the primate center in the broader Titicaca Basin since the onset of the Early Middle Horizon - easily the largest population center in the region. Yet, with few exceptions, its growth and direct influence remained largely centered at the site itself. Its main strategies of influence relied on drawing community networks in, as opposed to extending their networks out-wards. This would change in the Late Middle Horizon as the urban center required greater and greater input from outside networks, resulting in more direct strategies of influence and control. Many sites in the southern basin[45] that had largely maintained their own symbolic community autonomy during the Early Middle Horizon, like Iwawi, appear to have been fully embedded in Tiwanaku networks at this time (Burkholder 1998; W. H. Isbell and Burkholder 2002). Much of the southern Titicaca Basin (Figure 17), particularly the lower and middle Tiwanaku, Katari, and Desaguadero Valleys would have formed Tiwanaku's primary hinterland - a dense landscape of raised fields, *qochas*, and increasing overall populations (Janusek and Kolata 2004; Kolata and Ortloff 1996; McAndrews, et al. 1997). Significantly, this hinterland would continue into the lake as Tiwanaku established a number of settlements on major islands, like the Island of the Sun and Island of the Moon as well as smaller islands, like Pariti (Korpisaari and Pärssinen 2011; Stanish and Bauer 2004). While much of the hinterland was geared towards sustainable community needs and projects, offerings found underwater in the Khona Reef illustrate how the entire landscape, including the lake itself, was integrated into Tiwanaku broader multi-modal community network (Delaere, et al. 2019).

[45] The largest neighboring site, Lukurmata would reach its peak in terms of size and impact at the end of the Early Middle Horizon but would remain firmly linked to close-by Tiwanaku (Bermann 1996, 1997).

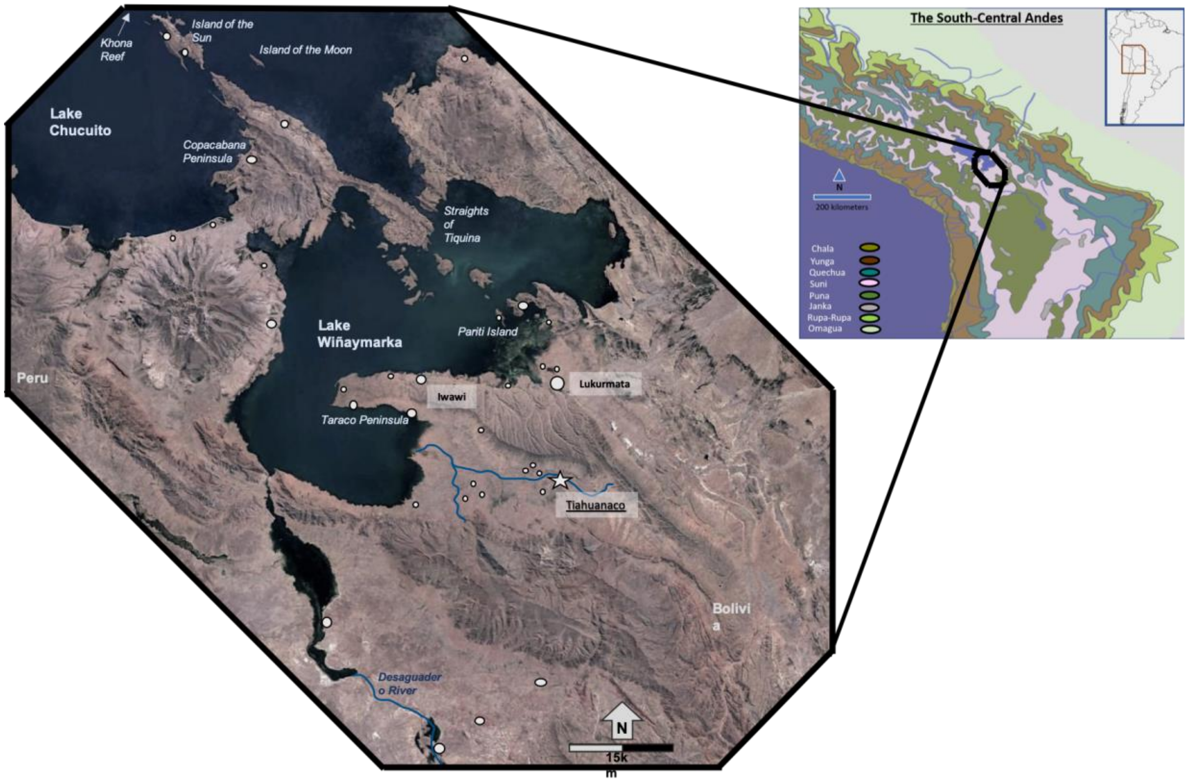

Figure 17. Map of the southern Titicaca Basin with major Tiwanaku sites discussed in the text.

Similarly, while Tiwanaku had greatly influenced the broader Titicaca Basin for generations, by the Late Middle Horizon their strategies of influence seem to have shifted to strategies of control (Janusek 2008:217-220; Stanish 2003:180-189). This does not mean that Tiwanaku acquired a complete monopoly of force or a true totality of control in the basin, but rather that they found ways to tap directly into community networks. Extensive archaeological survey throughout the western and northern Titicaca Basin have delineated settlement patterns that indicate several centers had formed throughout this portion of the basin around the same time as Tiwanaku, in wake of Pukara's collapse during the Late Formative Period (Plourde and Stanish 2006; Schultze 2008; Stanish and Bauer 2004; Stanish, et al. 2005). As Tiwanaku experienced a meteoric rise during the Early Middle Horizon, most of these sites would continue operating as the centers in their own community networks, participating in Tiwanaku's web of influence but also maintaining their own symbolic community practices and stylistic expressions.

Yet, by ca. AD 800 Tiwanaku had established over 100 sites in the western and northern basin. These could range drastically, some representing small Tiwanaku villages, often associated with raised field systems and other lake resources (Stanish 2003:180-189). However, Tiwanaku would also establish more substantial settlements which included clear signs of their most iconic symbolic community expressions, most frequently represented in the built environment as sunken courts and in the material record as significant amounts of Tiwanaku redware serving vessels (Stanish, et al. 2005:106-108). Importantly, some of the most elaborate Tiwanaku settlements were built adjacent to already established centers, which continued to exist, suggesting continued negotiation as opposed to true domination. Finally, while far less-intensively studied archaeologically, the eastern Titicaca Basin has also revealed evidence for a mixed Tiwanaku footprint. Most evidence of direct occupation comes from along the lake shore region, but Tiwanaku goods have been found eastward into the *rupa rupa* and even *omagua* ecozones along the steep slopes down to the Amazon Basin (Becker and Alconini 2015; José M Capriles 2002).

As Tiwanaku developed the broader Titicaca Basin into an extended hinterland, its primary centrifugal force would be directed southward across the southern altiplano. Tiwanaku's furthest, substantial reach[46] would remain the highland desert oases system of San Pedro de Atacama. While Tiwanaku sustainable communities had connected with this region since early in the Early Middle Horizon, during this time (the local Coyo Phase) community leaders in San Pedro appear to have relied significantly on Tiwanaku symbolic community media in their aggrandizing strategies. However, there is still little evidence that Tiwanaku ever established residential community outposts here, with most connections remaining centered on the long-distance llama caravan exchange networks which articulated much of the southern highlands.

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[46] There is good evidence that sustainable and symbolic communities as far as northwest Argentina were also influenced by the expanding Tiwanaku state.

The symbolic community practices requiring hallucinogenic plant consumption appear to have been particularly potent in this region as snuff tablets and other paraphernalia have been found with some frequency in San Pedro de Atacama[47]. A particularly well-preserved bundle, clearly belonging to a ritual specialist was recently found in southwestern Bolivia, illustrating that this was a practice that extended beyond the desert oases (Albarracin-Jordan, et al. 2014). It appears likely that Tiwanaku also directly influenced symbolic community networks in this region through symbolic community specialists in the form of traveling shaman and other ritual practitioners.

Closer to the Tiwanaku homeland in the temperate intermontane valleys of the eastern cordillera, the broader Cochabamba region would also shift in their relationship to the highland polity (K. Anderson 2013; Rivera Casanovas 2016). Locally, the Piñami Phase aligns with the Late Middle Horizon and is marked by the ascendance of a single Tiwanaku-influenced style that comes to be represented in most symbolic community manifestations. Importantly, the multi-modal community networks centered in the Cochabamba and neighboring Mizque valley systems would develop their own local interpretation of Tiwanaku symbolic media - particularly evident in distinct form variations in important serving vessels[48]. However, far from simple sustainable community exchange relationships, the Late Middle Horizon in this area is defined by an overall shift to more deep-set Tiwanaku lifeways. Settlement patterns in the region at this time confirm that Tiwanaku did not substantially re-organize the broader residential community configuration, but they did directly enter into it (Higueras-Hare 1996, 2012; Rivera Casanovas 2016). This can be observed in the establishment of fundamentally Tiwanaku institutions in

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[47] Interestingly, these materials are only been recovered in a few contexts in other areas of Tiwanaku influence, including the capital itself. However, snuff tablets and other iconographic references to hallucinogenic plant consumption is depicted prominently is Tiwanaku monoliths and other symbolic media.

[48] This primary local style is known as CVCT (Central Valley Cochabamaba Tiwanaku) and its most common (and iconic) example is the challendor-style kero - a variation of kero with an extremely restricted, funnel-like base (see Anderson 2013).

microscale household and mesoscale village contexts. Microscale institutions are most clearly seen in true Tiwanaku domestic architecture. One investigated site, Pirque Alto, shows clear evidence of a Tiwanaku-style domestic compound (Figure 18), that was occupied by a household whose activities are defined mostly by diagnostically Tiwanaku materials (Green 2009; McAndrews 2007; Rivera Casanovas 2016:209-212; Sitek 2010). Similar to the strategy employed in the western Titicaca Basin, here in Cochabamba Tiwanaku residential communities were often founded alongside previously established settlements.

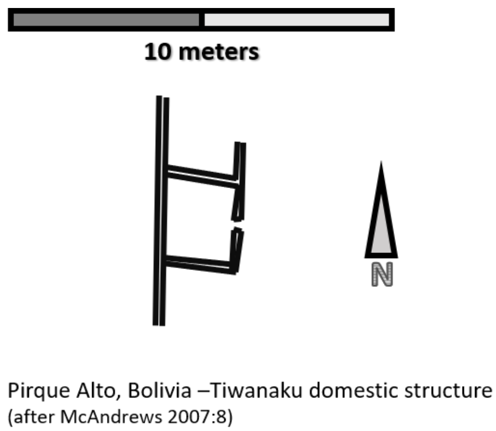

Figure 18. Schematic plan view of domestic compound partially excavated at Pirque Alto outside of Cochabamba, Bolvia (McAndrews 2007; Sitek 2010).

Tiwanaku's footprint outside the Titicaca Basin would be greatest in the south-central coast subregion - focused most acutely in the coastal valleys or *valles occidentales* (Chacama 2004; Goldstein 2005, 2009). As with the Early Middle Horizon, the Osmore drainage and specifically the middle Moquegua Valley would be the focal point of this influence. However, during the Late Middle Horizon, Tiwanaku influence would distribute throughout the surrounding drainages as well. Some Tiwanaku interaction in this area remained strictly relegated to sustainable community activities (Vining and Williams 2020). A likely example here is the Chivay obsidian source in the upper reaches of the Camana-Majes drainage. Obsidian from this source was well-represented at Tiwanaku (and elsewhere), but the source location itself shows no evidence for direct Tiwanaku control, suggesting a simple sustainable community connection (Tripcevich 2010; Vining and Williams 2020).

However, most of the other drainages, including Tambo, Osmore, Locumba, Sama, Caplina, and Azapa, all show evidence for more substantial Tiwanaku community investment (Baitzel and Rivera Infante 2019; Browman 1997; Goldstein 2007, 2015; Szykulski, et al. 2014). Late Middle Horizon contexts from many of these valleys show clear evidence for sustainable and symbolic community connections with the highland state. Like San Pedro de Atacama, some of the clearest examples of this increased influence can be found in burials in the form of Tiwanaku ceramic and textile grave goods. Some drainages, like the Tambo and Caplina, have still only revealed diagnostically Tiwanaku materials in these types of mortuary contexts (Gordillo Begazo 1993; Szykulski, et al. 2014:75-80; Szykulski, et al. 2016:75-83). Other drainages, like Locumba (see Chapter 3), Sama, and Azapa show evidence for more embedded forms of community engagement, including the establishment of villages and other sustainable community infrastructure (Baitzel and Rivera Infante 2019; Goldstein 1995). Most coastal valley settlements, outside the Osmore drainage, appear to have been established late in the Late Middle Horizon and don't appear to have greatly impacted pre-existing community formations. Importantly, it has even been suggested that what formal residential community outposts may have been settled in drainages like Locumba, Sama, and Azapa, may have been derived from the burgeoning Moquegua enclaves in the Osmore drainage (Uribe Rodríguez and Agüero Piwonka 2004).

The Osmore Enclaves. As has already been noted, the broader Osmore drainage, and specifically the middle Osmore or Moquegua Valley would represent a Tiwanaku presence of a completely different sort than the rest of the south-central coast subregion. Here, the already significant Omo-style settlements in the valley would be joined by a new and significantly larger wave of migrants, defined as following the Chen Chen-style. These new Chen Chen populations would establish new villages, also organized around clear nested residential community formations, with unrestricted plazas centering clusters of domestic compounds. Importantly, almost all major Chen Chen settlements would be established in close proximity[49] to the previously established Omo settlements. Most Chen Chen-style domestic structures were constructed using a wattle-and-daub construction technique, known locally as *quincha*. Quincha-style walls were generally constructed using evenly cut lengths of river-cane, planted into shallow trenches and bolstered by more substantial posts, set at particular intervals[50] (Goldstein 1989a:180; 2005:212-214). Floors in most structures were compacted clay and mud in relatively thin layers. Walls would frame rooms of various sizes that tended to form relatively rectangular structures, as opposed the more rectilinear configurations of Omo-style dwellings. However, while Chen Chen structures were not structurally uniform, most appear to have employed a similar orientation (Figure 19), suggesting at least some broader settlement planning (Goldstein 1993a). Dense refuse concentrations suggest an intensive and likely permanent, and unlike their Omo counterparts these residential patterns suggest year-round occupation in the Chen Chen villages.

[49] Chen Chen settlements tended to be closer to the valley edge and were almost always established to the southwest of Omo sites.

[50] Some Chen Chen-style domestic structures used posts set in the center of structures to support roofing (Goldstein 2005).

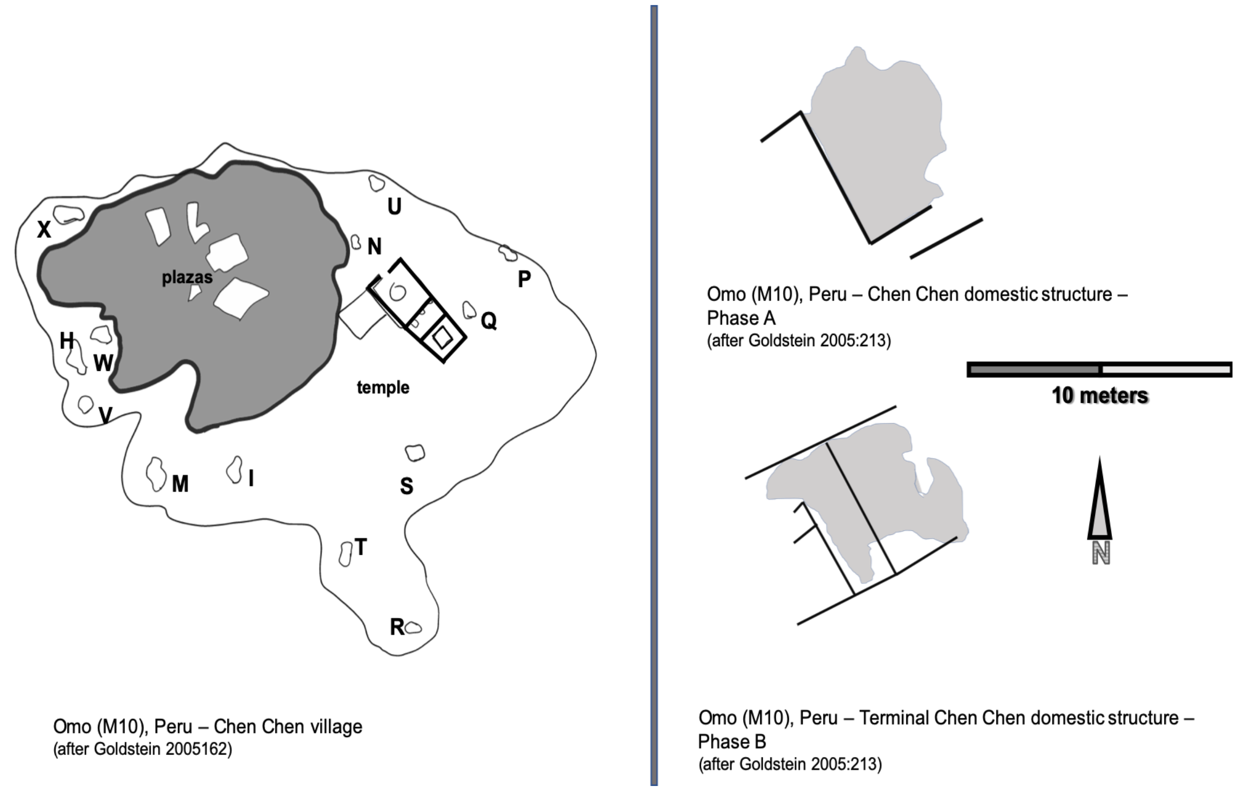

Figure 19. (left) Schematic map of Tiwanaku Chen Chen village Omo M10 in middle Osmore drainage - including primary domestic sector (shaded) and domestic plazas, the Omo Temple, and the 14 associated cemetery sectors (Goldstein 2005:162). (right) Simplified schematics of Chen Chen-style domestic structures excavated at M10 (Goldstein 2005:213).

In addition to these differences in residential community configurations the Chen Chen colonists also appear to have had a completely different focus in sustainable community activities. As opposed to the pastoral or caravan focus of the Omo colonists, Chen Chen villages appear to have been particularly geared towards large-scale agricultural endeavors. This is indicated by a significant amount of sustainable community infrastructure, including extensive valley-bottom canal systems, centralized village storage-pit facilities[51], and high frequencies of stone foot-plow blades and a variety of ground stone tools for processing grains (Goldstein 2005:212-225). Similar to patterns occurring in the rest of the Tiwanaku sphere, the

[51] Chen Chen storage pits were stone-lined and often plastered with mud. While some storage pits are found associated with individual domestic structures, often they were clustered together in-between structures. Evidence suggest these storage-pit clusters were even roofed.

local Chen Chen symbolic communities would be defined by more generic, often geometric Tiwanaku iconography in all media, but particularly ceramics (Goldstein 1985, 2000b, 2009). Finally, more recent biological studies indicate that while Omo and Chen Chen groups were not completely endogamous, these major community differences did define reproductive relationships and the micro-institutional manifestations of family and broader macro-institutional logic behind kinship (Johnson 2020). Taken together, 1) the planned and permanent nature of residential communities, 2) the sustainable community focus on lowland agriculture, and 3) the more generic symbolic community media all suggest that the Chen Chen colonists represent a more deliberate extension of Tiwanaku that differed in almost every dimension from their Omo counterparts.

Another significant feature of the Tiwanaku occupation of the middle Osmore drainage was the establishment of the Omo Temple. Built adjacent to the largest Chen Chen-style village (site M10), the Omo Temple is the only Tiwanaku monumental architecture constructed outside the Titicaca Basin. While smaller than the Akapana or Kalasasaya the Omo Temple possessed many of the definitive features of Tiwanaku ritual architecture, including spaces to facilitate both public and private symbolic community gatherings and ritual (Goldstein 2005:269-305). Extensive excavations of the structure indicate that the overall layout and specifically the access patterns were designed to emphasize the movement from public to increasingly exclusive spaces, with architectural features that emphasized the transition between these major dimensions of space (Goldstein 1993b; Goldstein and Palacios 2015). Importantly, the temple was used by both Omo and Chen Chen colonists and represents a critical place where these two distinct groups would come to both accentuate their complementary differences as well as reaffirm their mutual highland affiliations (Goldstein and Sitek 2018; Sitek 2013).

Wari: peer-polity interaction during the Middle Horizon

Tiwanaku was not the only polity to develop and expand during the Middle Horizon.

Centered approximately 700 kilometers to the northwest in the central highlands subregion, the development and expansion of the Wari[52] polity would also come to define the Middle Horizon. Similar to Tiwanaku, the Wari had origins in the Middle Formative (or Early Horizon), when populations began coalescing into more permanent forms of residential communities as sustainable communities were re-purposed to focus on agriculture and pastoralism. Later, during the Early Intermediate Period, these formative village societies in the broader Huamanga and Huanta intermontane drainage systems would begin to cohere into more centralized settlements, the principle being West Huarpa in the Ayacucho Valley. This burgeoning village would eventually transform into the urban settlement of Huari and serve as the epicenter of the expansive Wari state (W. H. Isbell and Schreiber 1978; Schreiber 1992). While Wari is not the focus here, its development and expansion clearly impacted the trajectory of Tiwanaku, so a few points are worth highlighting.

During the Early Middle Horizon[53] the site of Huari would emerge from what was West Huarpa, as the settlement grew rapidly in population and overall size (W. H. Isbell 1997b; Lumbreras 1981). Aggrandizer focus on the centralization in symbolic community formations is indicated by the investment in new ritual architecture, including sunken courts and walled plazas (Bragayrac 1991; Brewster-Wray 1990). Like Tiwanaku, it appears initial growth at Huari occurred as various community networks were drawn inward, with growth occurring without centralized planning. Early aggrandizers at Huari were able to tap into well-established community networks further south in the central highlands as well as on the central coast and northern south coast subregions (Knobloch 2005).

However, during the Late Middle Horizon[54] the nature of Wari's influence would shift,

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[52] Here I use: *Wari* - to refer to the polity and broader cultural phenomenon and *Huari* - to refer to the central settlement, city, and archaeological site in the Ayacucho Valley.

[53] This overlaps with Epoch 1 - Phase A and B in the classic Wari culture-history sequence (Menzel 1964b).

[54] This overlaps with Epoch 2 in the classic Wari culture-history sequence.

signaled most clearly in the core as the settlement of Huari would dramatically transform into a true planned city (W. H. Isbell 1986). At this time the urban center was reconfigured and the more open symbolic community built environment elements were replaced with a more rigid town plan, rooted most extensively in exclusivity (W. H. Isbell 1997b; W. H. Isbell and Vranich 2004; Nash and Williams 2004). This is most evident in the orthogonal cellular architecture that came to define a significant amount of Wari settlements and particularly domestic architecture. Most residential community expressions within the city of Huari during the Late Middle Horizon appear to have been cramped, apartment-style domestic structures, often multiple stories in height (W. H. Isbell 1997b; Nash 2016). New forms of architecture also began to punctuate the broader symbolic community built environment (Ochatoma and Cabrera 2000). This included the D-shaped temple structures that were specifically designed as the arenas for exclusive rituals and possibly even human sacrifice. Elaborate mortuary components, in the form of underground mausoleums and tomb complexes suggest that some of the most potent symbolic community elements remained rooted in lineages and other symbolic communities that dealt with kinship as institutions within Wari continued centralizing (W. H. Isbell 2004; Tung and Cook 2006). Eventually sprawling over 3-4 kilometers in area the city of Huari was a true urban center, and like Tiwanaku, would require ever increasing input from outside community networks (Schreiber 1992).

From relatively early in their development, the aggrandizing individuals and their constituent communities centered at Huari would rely on aggressive exclusionary strategies in their expansive reach (Schreiber 1992, 2001; Tung 2012, 2014). These strategies appear to have included raiding and other practices of direct conflict with neighboring groups (Tung 2007, 2008; Tung and Knudson 2010), but would also rely on more hegemonic and bureaucratic forms of control as well (Jennings 2006, 2010; P. R. Williams, et al. 2005). Unlike Tiwanaku, which outside of the Moquegua enclaves would only establish limited village-level institutions, Wari would invest far more sustainable community resources into developing planned settlements outside their core hinterland (W. H. Isbell and McEwan 1991). By the Late Middle Horizon the Wari had established several substantial colonial enclaves, articulated by an established road system (Glowacki and Malpass 2003; Schreiber 1992). These sites could be found as far north as the north-central highlands and as far south as the south-central coast (Figure 9) (Edwards 2010; McEwan 2009; Schreiber 2004; Topic and Topic 1983; P. R. Williams 2001). While these colonial enclaves would vary considerably, centers like Pikillacta in the in the southern central highlands, displayed impressive examples of settlement planning in extensive constructions based around the orthogonal cellular architectural suite developed in the Wari core (W. H. Isbell and McEwan 1991; McEwan 1990; Nash 2016). Importantly, while sites like Pikillacta show clear evidence for the ability of the Wari to channel substantial resources and logistically coordinate these efforts across vast areas (McEwan 1990; Schreiber 2001), settlement research done around these impressive centers illustrate only minor reconfigurations in pre-existing community networks (Bélisle 2015). As with the Tiwanaku, Wari were able to tap directly into distant networks, but appear to have operated within some of the more established local community configurations.

Despite being centered at urban centers hundreds of kilometers apart, Tiwanaku and Wari were more than just contemporaneous state-level societies - they were true peer-polities[55] (Janusek 2008:280-288). It is important to remember that this peer-polity interaction does not mean that these two societies relied on close or consistent connections at the micro- or meso-scales, but rather that the macroscale institutions and particularly symbolic media used in maintaining and expressing these institutions would converge to form a pan-regional, globally-oriented symbolic community. For the case of Wari and Tiwanaku their main symbolic engagement was a suite of iconographic elements that represented some of the most stable

[55] It should be noted that in addition to Tiwanaku, Wari would also interact with the remnants of the largely collapsed Moche polities in the north coast subregion as well as the newly emerging center of Pachacamac in the central coast subregion (Castillo Butters et al 2012; Eechhout 2013; Kaulicke 2000).

expressions of the symbolic communities that formed the core of the higher-order state-level institutions (Cook 2004). This globally-oriented suite of Middle Horizon visual media has been referred to as the Southern Andean Iconographic Series (SAIS) (W. H. Isbell 2008:734-738; W. H. Isbell, et al. 2018), and was found most commonly on portable media like ceramics and textiles, but was expressed in low-relief stone carving and architectural elements as well (Conklin 2013; P. R. Williams, et al. 2019). While most Wari-Tiwanaku interaction appear to have been relegated to the macroscale sphere, there were particular points in which these polities would directly interact.

Evidence for direct interaction between the two major Middle Horizon polities is restricted to the south-central coast subregion, almost exclusively in the Osmore drainage. As has been discussed, the middle Moquegua Valley in the Osmore drainage represents the most concentrated Tiwanaku presence outside of the Titicaca Basin, but it was also here that they would most intensively interact with Wari. In the upper valley of the Osmore drainage the Wari would establish their southernmost colonial outpost. The Wari presence in the Osmore drainage included a number of village-level sites which included residential community manifestations but also substantial sustainable community infrastructure, namely agricultural terracing and canal systems. However, the most impressive Wari settlement complex here would be the mesa-top citadel site of Cerro Baùl and the adjacent Cerro Mejia (P. R. Williams 2001, 2005; P. R. Williams, et al. 2001). Cerro Baùl possessed clear signs of Wari symbolic community architecture, including a D-shaped temple, a number of platform-based precincts, and a specialized brewery for making molle-based chicha (Moseley, et al. 2005; Nash 2002; Nash and Williams 2004).

The exact nature of interaction between the neighboring Tiwanaku settlements in the middle Moquegua Valley and the Wari colonists in the upper valley has been debated (Goldstein 2013; P. R. Williams 2013). There are clear signs for sustainable community interaction in the form of isolated Tiwanaku goods in Wari sites and vice-a-versa (Goldstein

2013; Owen and Goldstein 2001). There is also some evidence for limited intermarriage and even a rustic-version of the Omo Temple built along the slopes of Cerro Baùl (P. R. Williams 2005). Yet given the proximity of these two major colonial outposts in the Moquegua Valley for at least twelve generations, the lack of substantial integration within residential and symbolic community modes suggests that they retained their separate respective highland identities[56] for the majority of their co-occupation of this south -central coastal context. Ultimately, Wari would follow Tiwanaku's downward trajectory into collapse in a period that is increasingly referred to as the Terminal Middle Horizon.

The Terminal Middle Horizon into the Late Intermediate Period (ca. AD 1000-1400): collapse & the impact of the post-Tiwanaku diaspora

Beginning just after the end of the first millennium of the Common Era (ca. AD 1000), after at least fourteen generations as the most influential center in the south-central highlands, Tiwanaku would falter and eventually fail. Collapse would not occur all at once, as certain institutions and higher-order symbolic communities appear to have failed before others (Janusek 2004a). Major residential sectors were abandoned beginning at the end of the Late Middle Horizon, suggesting the centripetal pull of the center had already began to wane (Janusek 2009). At about the same time, most stonework production and architectural remodeling would cease, suggesting the disbandment of some of the most specialized sustainable communities at the city (Nair and Protzen 2013; Vranich 1999).

Evidence for more acute examples of institutional failure in the center is found in the clear deliberate destruction of the Putuni Palace, suggesting a true revolt against central elites (Couture 2004; Couture and Sampeck 2003). Likewise, Important monoliths and other

[56] Importantly, there is able evidence that unlike the Tiwanaku, the Wari in the Osmore drainage did substantially interact with the pre-existing Huaracane communities (Costion 2013; Green 2015; Green and Goldstein 2010).

architectural elements also show evidence for intentional desecration (Janusek 2004a; 2008:294-295; Protzen and Nair 2012). While the significance of built spaces like the Akapana would show resilience, the symbolic communities maintaining them would also slowly diminish and disperse (Alconini 1995; Vranich 2001). Settlement pattern shifts clearly show that populations began to fill the broader Tiwanaku Valley as well as neighboring valleys as Tiahuanaco began to empty (Albarracín-Jordán 1996; La Favre 2016; Mathews 1997; McAndrews, et al. 1997). By ca. AD 1000 it is likely that Tiahuanaco was only 3% its peek size (Janusek 2008:294).

The causes of Tiwanaku collapse are likely as varied and complex as the processes through which the polity first developed (Erickson 1999; Janusek 2004a; P. R. Williams 2002). However, there are some clear root causes for the inevitable collapse of some of Tiwanaku's most resilient institutions. The most critical factor is that a long-term drought, beginning just before ca. AD 1000, likely wreaked havoc on the broader Tiwanaku political economy (Binford, et al. 1997; Janusek and Kolata 2004; Kolata and Ortloff 1996). In particular, the raised field systems that had represented some of the most uniquely Tiwanaku and essential sustainable community formations throughout the Middle Horizon suffered greatly at this time (Stanish 1994). Even with the substantial ritual mode of production that had come to drive Tiwanaku's broader political economy could not make up for losing the vital subsistence base provided by the raised field systems throughout the Tiwanaku hinterland (Erickson 1999; Janusek and Kolata 2004; Kolata 2004; Kolata, et al. 2000). In a classic case of hypercoherence, as lower-order subsistence community networks began to falter, the hyper-centralized, higher-order symbolic community networks that had developed in the Late Middle Horizon could no longer fund the massive seasonal events that had defined the city for centuries (Janusek and Kolata 2004). This would effectively deactivate both the push and pull factors that had globalized the South-Central Andes, causing a general balkanization of the community networks of the region[57].

In the wake of Tiwanaku's collapse the broader Titicaca Basin would once again fraction into a number of largely independent, but closely linked polities. However, unlike the Formative Period that preceded the Middle Horizon, the multimodal community formations of the Late Intermediate Period would retain some of the hierarchical expressions that had developed through Tiwanaku statecraft (Janusek 2004a:194-199). Certain community leadership roles still offered aggrandizers and their constituent communities tenuous avenues to circumscribed positions of power. While there is still evidence for some feasting, the Tiwanaku focus on ceramic serving vessels as primary symbolic media was largely abandoned (Janusek 2008:292-296). The widespread adoption of above-ground burial towers, called *chullpas*, suggest that the dead would remain essential members of community life, particularly in anchoring symbolic communities to the landscape (Stanish 2012).

The newly distributed nature of residential communities following the abandonment of Tiahuanaco would completely destabilize the symbolic communities that had formally regulated who and how many aggrandizers could seek power and led to an increasingly volatile political landscape (Janusek 2004a). Violence, in the form of raiding and warfare would become consistent strategies in inter-community competition and conflict (E. N. Arkush 2008). The institution of the village would transform, moving from lakeside and valley bottom settlements to hill and ridge-top fortresses - known locally as *pukaras* (E. Arkush and Ikehara 2019; E. N. Arkush 2011; Mullins 2016). In spite of the centralized leadership required for concerted warfare and raiding, some essential sustainable community endeavors appear to have remained quite decentralized, illustrating the limited reach of many positions of power (BrieAnna S. Langlie 2018). Yet, by the time the Inka began pressuring the community networks of the south-central highlands from their center in Cuzco in the late fourteenth century, the Titicaca Basin polities

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[57] Similar patterns would take place in the central highlands subregion as Wari collapsed at approximately the same time.

had formed into relatively cohesive networks capable of banding together for defense as well as maintaining sustainable community connections in some of the relatively distant locations engaged by earlier Tiwanaku (E. N. Arkush 2011; Bouysse-Cassagne 1987; Murra 1968; Pärssinen 2015; Stanish 2003:204-235).

Tiwanaku Collapse Abroad: communities in diaspora

With the collapse of Tiwanaku, the process of balkanization in multi-modal community networks would take hold throughout the South-Central Andes (R Alan Covey 2008b). Llama caravans would continue to articulate much of the southern highlands (Berenguer 2004; Nielsen, et al. 2019), however the shift of residential communities and broader village institutions to hilltop *pukaras* signals that defense had also become a primary concern here as well (Álvarez Larrain and Greco 2018). Yet, there was great variability in exactly how these *pukaras* would manifest in the southern highlands, suggesting different roles in sustainable community networks that remained relatively diverse. Importantly, evidence suggests that after the fall of Tiwanaku, raiding and warfare became such essential aspects to the broader sustainable community networks that they were likely seasonal practices - anticipated events in the broader political economy (Nielsen 2018). Closer to the Tiwanaku core, the eastern Cochabamba Valleys would also see a general shift in settlement patterns, including targeting defensive locations for new village locations. However, here there would be more symbolic community continuity as the Central Valley Cochabamaba Tiwanaku (CVCT) style would continue to define non-domestic ceramic wares (K. Anderson 2009:188-190; Céspedes Paz 2000). While certain traces of Tiwanaku influence would continue to be found and certain long-distance network connections remained in the southern highlands, it wasn't until the Inca imperial system was enforced in the 15th century that this region would be widely articulated again (Pärssinen 2015).

Tiwanaku's collapse would be most intensely expressed abroad in the Osmore enclaves

(Owen and Goldstein 2001). Significantly, the Omo Temple, the most substantial expression of Tiwanaku monumentality outside the Titicaca Basin, would be at least partially destroyed. Some of the most exclusive areas of the temple appear to have been ransacked and the vast majority of the walls were toppled (Goldstein 2005). Chen Chen-style villages were also intentionally razed. This destruction involved a concerted effort of tearing down quincha walls, digging shallow pits, and piling up domestic debris into substantial mounds (Goldstein 2005:225-226). Interestingly, none of the typical indicators of outside violence, like widespread burning or the presence of high frequencies of weaponry, have been recovered at these destroyed Chen Chen villages. This would suggest that this systematic destruction came from the residential communities themselves, which along with the temple's desecration, appear to suggest a complete rejection of the institutional manifestations associated most closely with Tiwanaku proper. However, it is important to note that while the temple and major Chen Chen villages were largely abandoned there was a small contingent of residential communities that remained, including some who re-occupied the last standing architectural elements of the Omo Temple complex. These remaining communities would retain many elements of the Tiwanaku lifeways that defined the Late Middle Horizon (Goldstein 2005:214-216; Owen 2005). This Terminal Middle Horizon continuity illustrates that collapse, even in relatively sweeping manifestations, like in the Moquegua enclaves is almost never complete.

As centralized residential communities established in the Osmore began to lose their sustainable and symbolic community tethering to the highlands, they would diffuse throughout the south-central coast subregion (Owen 1993). In Moquegua, these Tiwanaku communities living in diaspora are called Tumilaca. Tumilaca multi-modal community networks would retain a significant amount of the attributes that defined earlier Chen Chen communities, but reject a number of the symbolic elements most closely associated with the state (Goldstein 2005:227-228; Sharratt 2011, 2016; Sharratt, et al. 2009; Sharratt, et al. 2015). Importantly, newly refined dating sequences indicate that the earliest Tumilaca villages were likely established in the Late

Middle Horizon, suggesting they represented early fissioning events in which Chen Chen colonists sought independence from the highland polity. That said, most Tumilaca-style settlements and material culture appear to derive from post-ca. AD 1000 and state collapse (Sharratt 2016; Sharratt, et al. 2009; Sharratt, et al. 2015).

In the middle valley village contexts, Tumilaca households would continue using quincha-style architecture; though they would use a free-standing wall technique that relied less on substantial posts for architectural support (Goldstein 2005:229-232). Microscale institutional household contexts would be different in Tumilaca villages established in former-Wari upper valley contexts in the Osmore drainage. Here domestic architecture would rely heavily on field stone for most super-structure elements (Bawden 1993; Sharratt 2019). Both middle and upper valley village contexts would also be defined by similar features such as above-ground, rectangular storage bins and new emphasis on site defensibility (Goldstein 2005:228-229; Sharratt 2019). The refugees of the abandoned Tiwanaku enclaves in Moquegua would disperse to the coast and further south as well. Contemporaneously with the abandonment of the primary colony settlements in the middle valley, small Tumilaca-style settlements would be established along the *chala* zone of the Osmore drainage (Owen 1993, 2005).

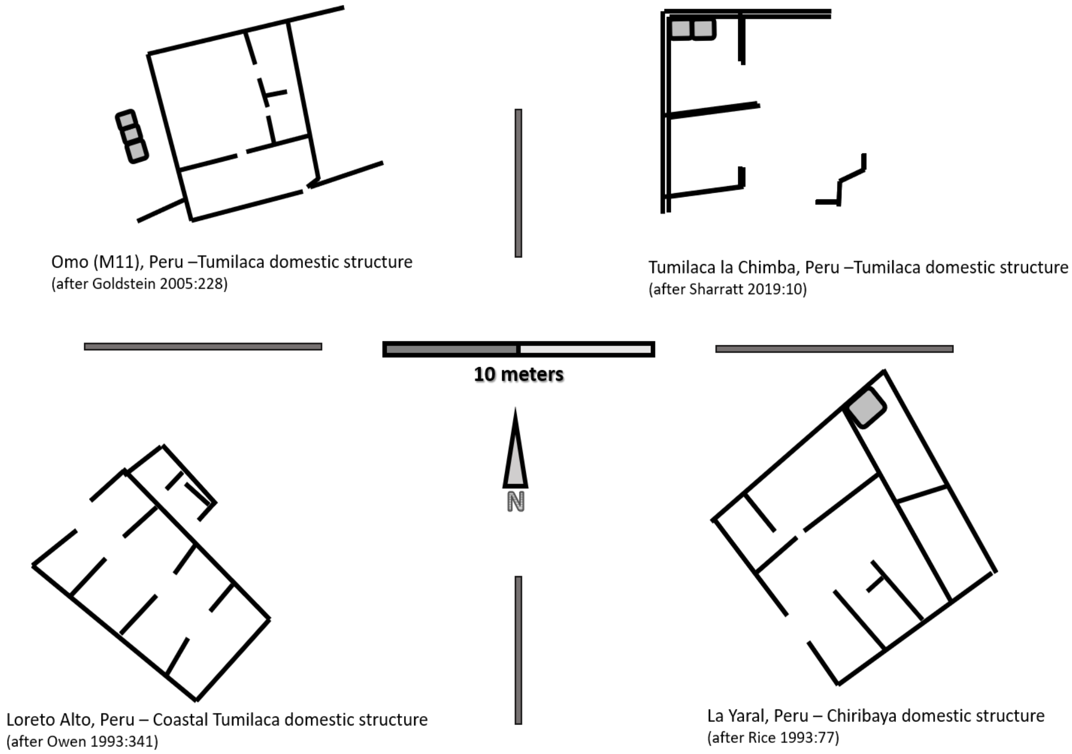

Figure 20. Schematics of domestic structures dating to Tiwanaku-affiliated terminal Middle Horizon and early LIP contexts in: (top-left) upper Osmore drainage, middle Osmore drainage, and (lower-left) lower Osmore drainage contexts as well as a Chiribaya affiliated domestic structure from the middle Osmore.

Further south in the Azapa Valley where Tiwanaku had only established minor residential community settlements (Goldstein 1995), a different post-collapse pattern would emerge. Here a local emulative ceramic style, known as Cabuza, had been developing for generations (Iván Muñoz Ovalle 2019). Cabuza ceramics were crude versions of Tiwanaku serving vessel forms as well as simplified versions of their more geometric motifs (Dauelsberg 1972; Uribe Rodríguez 1999). Sorting out the chronology for when the local San Lorenzo culture began developing this clearly emulative style of Cabuza, when the Tiwanaku residential communities in Azapa were occupied, and when later truly Late Intermediate Period styles first emerged has been difficult (Berenguer 1998; Cassman 1998; Focacci 1983). Nonetheless, recently headway has been made and it appears that Cabuza pottery began being produced by local communities in limited contexts sometime in the Late Middle Horizon, likely when any truly

Tiwanaku residential communities in the valley were also occupied (Korpisaari, et al. 2014; Iván Muñoz Ovalle 2019). However, it wasn't until the collapse of Tiwanaku and the spread of the Tiwanaku diaspora that Cabuza would spread. After ca. AD 1100 Cabuza would spread north and be adopted selectively by communities throughout the Caplina, Sama, Locumba, and coastal Osmore drainages (Baitzel and Rivera Infante 2019; Owen 1993, 2005; Vela Velarde 2014), many of them likely decedents of the original Tiwanaku colonies in Moquegua (Sutter 2006; Sutter and Sharratt 2008). Lasting until after ca. AD 1200 Tumilaca and eventually Cabuza would represent the final manifestations of this truly Tiwanaku symbolic media (Sharratt 2019).

As the Terminal Middle Horizon eroded into the Late Intermediate Period, the last vestiges of Tiwanaku in the Tumilaca and Cabuza styles would fade, and a number of new community formations would emerge to take their place. Developing during Late Middle Horizon in out of the Maytas tradition in the Azapa drainage, the Chiribaya would quickly spread up the *chala* ecozone and become the dominant cultural manifestation throughout the south-central coast subregion; spreading as Tiwanaku influence waned[58] (Dauelsberg 1972; Jessup 1991; Kołomański 2016; María Cecilia Lozada and Buikstra 2002). Many basic microscale institutional manifestations of the Chiribaya would be similar to those of the Tumilaca and other Terminal Middle Horizon communities, including quincha-style domestic structures[59] and a sustainable community base relying on mixed agricultural and pastoral lifeways (Knudson, et al. 2007; Maria Cecilia Lozada, et al. 2009; Owen 1993:96-98; Reycraft 2005; Zaro and Umire Alvarez 2005). At the same time Chiribaya communities were moving to higher elevations from the coast,

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[58] Significantly, a well-established network of Chiribaya communities occupied the lower Osmore drainage and appear to have affiliated with later Tumilaca-affiliated groups (Owen 1993, Owen 2005).

[59] While they used similar technology, it should be noted that Tumilaca-Cabuza and Chiribaya domestic structures were generally quite different. One consistent difference was that typical Chiribaya domestic structures were bound by a thick compound wall (all made of quincha), whereas Tumilaca-Cabuza houses were typically free-standing *quincha* with no compound wall (Owen 1993).

Estuquiña communities would begin moving into lower elevations from the highland drainages. Estuquiña communities would establish defensive villages in many of the same locations formally occupied by Tumilaca communities (Bawden 1993; Sharratt 2019:6-8), employing similar strategies to those observed at the same time in the south-central and southern highland subregions (Conrad 1993; Stanish 1991).

Chiribaya and Estuquiña communities would come into contact, though maintain distinct settlement patterns in the middle Moquegua valley of the Osmore drainage. Finally, from the Azapa drainage further south additional newly developed community styles would begin influencing populations throughout the south-central coast. The San Miguel and later Pocoma-Gentilar styles would be the most pervasive and represent a complete separation from the stylistic elements that had long defined Tiwanaku communities (Uribe Rodríguez 1999; V. I. Williams, et al. 2016). As with the Tiwanaku heartland in the south-central highlands, this region would not see globalized community network formations until it was integrated into Tawantinsuyu, under the Inka sometime in the late 14th century.

2.4 Chapter Summary

In this chapter I situated the theoretical frameworks discussed in Chapter 1 within the social and historical context of the Andes.

2.1: In this subsection I provide a basic *longue durée,* or macroscale, overview of the development of social life in western South America. This includes a basic introduction to the complicated geology and broader natural environment of the Andes, a brief sketch of how archeology and the study of the past has advanced in Peru and Bolivia, and finally a review of some of the broad trends in the development of complex society, from peopling to present, in the Andes.

2.2: Here I describe the indigenous Andean term ayllu through a review of ethnohistoric and ethnographic research. I argue that the way in which Quechua and Aymara speakers did and do use the term ayllu overlaps nicely with my definition of community and is an essential term for framing any study of Andean communities in the deep past.

2.3: Finally, I provide a relatively detailed summary of the social development that occurred during the Middle Horizon Period (ca. AD 600-1100) in the South-Central Andes. Specifically, I discuss the development, spread, and eventual collapse of the Tiwanaku state and the socio-cultural phenomena that surrounded it.

Next: In Chapter 3 I introduce the Locumba drainage. I provide a basic overview of the natural environment, social history, and previous archaeological work in the drainage. Finally, I introduce the true case study for this dissertation the archaeological site complex of Cerro San Antonio (L1) in the middle Locumba Valley.

Chapter 3 - Materials

This chapter lays out the primary materials used in this study - namely the archaeological remains at the site of Cerro San Antonio (L1). However, I begin by introducing the broader setting for my study, the Locumba drainage on the far south coast of modern Peru. While I have already outlined the broader prehistory of the south-central Andes and have highlighted some of the archaeological research and anthropological interpretations that underpin our understanding of that prehistory (see Chapter 2), here I detail more specific research conducted in and around the Locumba drainage which directly set the stage for my dissertation research. This includes introducing the broader project under which my doctoral dissertation research has taken place, Proyecto Arqueológo Locumba (PAL) and its main objectives in surveying the Middle Valley zone of the Locumba drainage. While I delve into more detail below in the results (Section 2) here I provide a basic orientation of Cerro San Antonio (L1) and the archaeological sectors that are delineated there.

3.1 Setting the Stage: the Locumba Drainage & the Cerro San Antonio case study

This subsection sets the stage for the primary research project reported on here by providing a basic description of the setting of the study. While I have already described the broader environmental composition of the south-central Andes, here I highlight the specific geological and hydrological characteristics that define the Locumba drainage. This initial section also provides an overview of the current state of the valley in terms of modern demographics and industry. I also review the limited, but important, formal archaeological research that preceded my dissertation research in the valley. I end this subsection with a detailed description of the site of Cerro San Antonio (L1), including a sector-by-sector tour of the archaeological sectors defined there and the other cultural resources at the site.

The Locumba Drainage

As with each of the coastal river valleys that define Peru's Pacific coastline, the broader Locumba drainage acts to channel the snow melt, spring water, and rains that flow from the high *puna* grassland and snowcapped peaks of the western Andean cordillera. The Locumba drainage transports this essential fresh water across a narrow stretch of hyperarid desert, before emptying into the Pacific Ocean. In pre-modern times the Locumba drainage covered an area of approximately 5,742 square kilometers and likely discharged well-over 50,000 cubic meters of water in any given year (Cotrina Chávez, et al. 2009; Vargas Edwin, et al. 2018). Here, I provide a brief orientation of the Locumba drainage and its underlying geology.

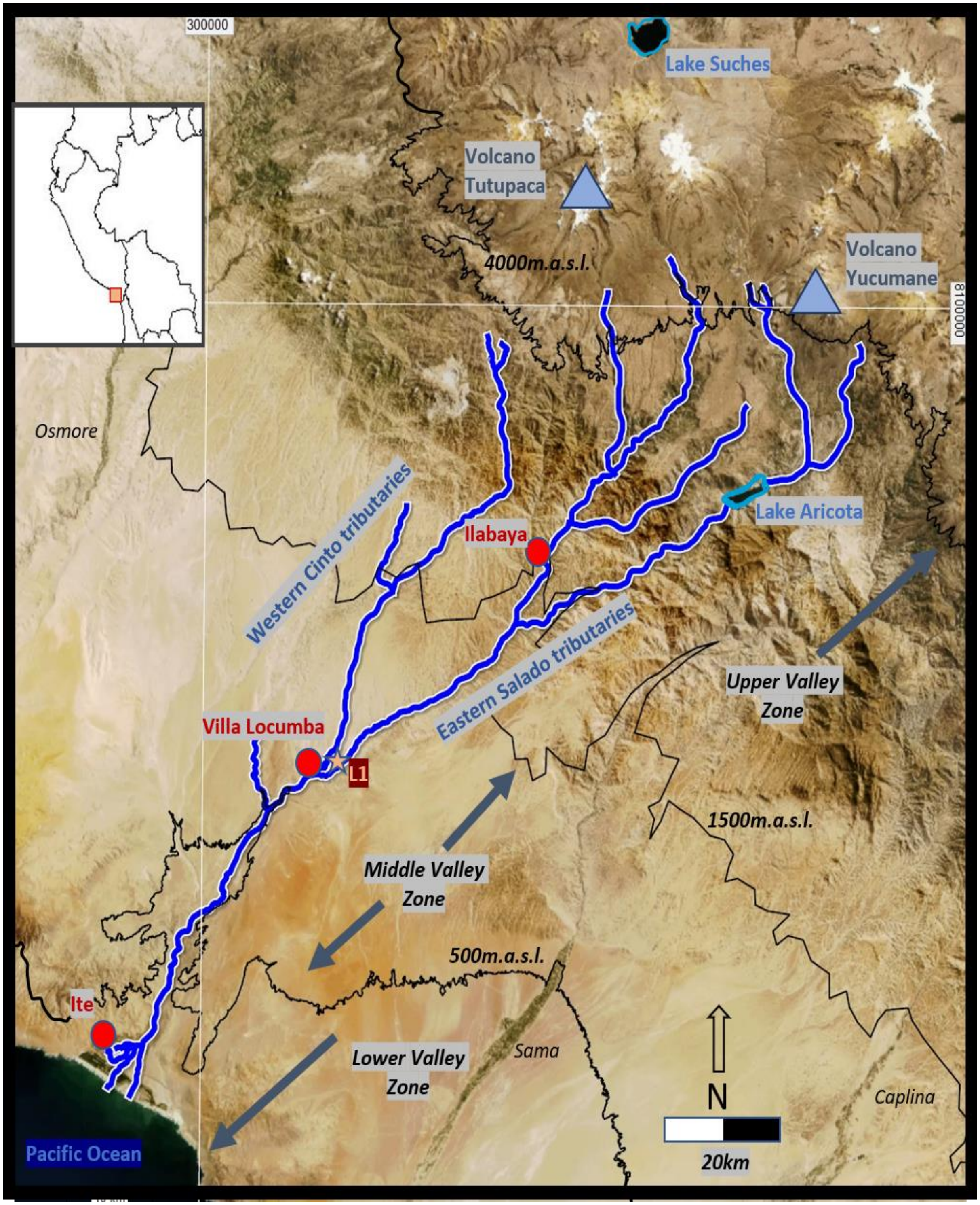

Figure 21. Map of the Locumba drainage of the far south coast of Peru (see insert). This map displays major geographical features, including all major tributaries, lakes, and volcanic peaks mentioned in the text. Also indicated are the major elevation-based environmental zones, including important topographic markers (500, 1500, and 4000 meters above sea level).

While the Locumba drainage ends its journey to the Pacific as a single-channel river, it bifurcates several times as it descends approximately 5000 meters in elevation, along its 170-kilometer path from its highland sources. These various bifurcations can be viewed as two primary tributaries - the western Cinto tributary and the eastern Salado tributary. The eastern Locumba headwaters begin around 5000 meters above sea-level as the first tributaries drop down from the volcanic peak of Yucumane, which also feeds the neighboring Sama Valley to the southeast (ONERN 1976). From here the eastern headwaters pool in the natural alpine lake, Lake Aricota[60]. Below the lake, natural springs bolster the flow of water and at the former site of the modern town of Mirave[61] these waters are joined by another prominent tributary. This other tributary flows by the modern town of Ilabaya to the north and is fed directly from snow melt from the slopes of the Tutupaca volcano. After Mirave, the primary Salado tributary of the Locumba drainage is said to begin.

Similarly, the western headwaters of the Locumba drainage ultimately begin around 5000 meters above sea-level, fed from the same snow melt, natural springs, and the large alpine lake, Lake Suches, which feed the headwaters of the broader Osmore (Moquegua) drainage to the west (ONERN 1976; Pagador Moya, et al. 2010; Vargas Edwin, et al. 2018). However, unlike the eastern Locumba headwaters which still flow along their natural route, the western headwaters just below Qubrada Honda, have been dry for over fifty years. Beginning in 1959, the then U.S.-owned Southern Copper Corporation completely dammed the western Locumba headwaters in the establishment of the large, open-pit copper mine, Toquepala. Since then only subterranean water flows through the broader Cinto tributary system (Ferrer Rivera 2020). However, by all accounts pre-1959 the western Cinto tributary flowed year-round, similar

[60] A hydroelectric plant was constructed at the town of Curibaya in 1967, which moderates all water flowing in/out of the lake - it likely lowered the overall volumetric discharge of the Locumba drainage by up nearly 20,000m3 (Vargas et al. 2018).

[61] In 2019 after a devastating flash flood destroyed much of the town of Mirave, the regional authorities decided to relocate the entire town.

to the eastern Salado tributary. The Cinto and Salado tributaries join at approximately 570 meters above sea-level, directly between the modern town of Villa Locumba and the site of Cerro San Antonio (L1). From here the Locumba River flows as a single channel for over 35 kilometers, before emptying into the Pacific at the modern town of Ite (Figure 21).

Like much of the south-central Andean coastline, the underling geology through which the Locumba drainage cuts, is quite varied[62]. However, the general make-up of the middle-elevation zones of the valley can be defined by upper Tertiary-era uplifted and often faulted fluvial deposits (Tejada Bedoya 2007). Strata of clays and sandstone conglomerates can be seen in most cut-banks and cliff-sides. There are also large quantities of various pyroclastic materials, especially tuffs and flows of andesite and granite, resulting from the significant volcanic history of the region. Deposits of copper alloys, gypsum, and various sulfides have been identified throughout the drainage. Naturally occurring arsenic is found in dangerous levels in the eastern tributary system of the drainage[63] (de Esparza 2009; Morales Cabrera, et al. 2018). There are also large deposits of rock salt in the flat *pampas* surrounding the valley. While the alluvial plains in valley-bottoms are often defined by rich, if not shallow organic soils, much of the natural sediment of the drainage is defined by fine silts and other eolian deposits as well as heavier sands, gravels, and cobbles transported by past flooding events (ONERN 1976; D. S. Rice 1989).

The broader Locumba drainage can be split into three primary zones, based largely on elevation: the Upper Valley (1500+ m.a.s.l.), the Middle Valley (500-1500 m.a.s.l.), and the Lower Valley (0-500 m.a.s.l.) (Figure 21). The steep and narrow canyon-systems of the Upper

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[62] These deposits include igneous, sedimentary, and metamorphic-heavy rock deposits with strata laid down from the Pre-Cambrian all the way through the mid-Quaternary (ONERN 1976; Tejada Bedoya 2007).

[63] Found at levels upwards of 500 ppb As, this arsenic in the waters of the eastern tributary likely originates from natural deposits along the slopes of the Yucame volcano (de Esparza 2009).
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Valley tributaries give way to more gradual and far-wider valley walls in the Middle Valley tributaries. Finally, a single river, the Lower Valley alluvial basin expands to its widest point[64] before narrowing slightly again and releasing into a relatively constrained delta-piedmont and into the Pacific. All zones are considered arid, but coastal fog hydrates the *lomas* in the Lower Valley and rains bring seasonal water[65] to the Upper Valley zone (D. S. Rice 1989). However, while the Middle Valley zone receives some moisture from coastal fog between May and September[66], there is little-to-no measurable precipitation in any given year. At around 18.7 degrees centigrade (ONERN 1976), the mean temperature[67] for the Lower and Middle Valley zones situate them in roughly the subtropical desert ecosystem typical of the western *yungas*.

Before the widespread implementation of agriculture in prehistory, the river valley in these zones likely sustained limited riverine vegetation, including various species of cane, cactus, and a limited number of molle and willow trees. The much cooler Upper Valley zone climbs from a lower montane desert ecosystem in the lower elevations and climax in the high *puna* tundra in the upper elevations. River fauna would include a variety of small fish and crayfish in the lower zones, and all zones would have been seasonally home to migrating ibis and other birds. While wild camelids and deer were likely found in the Upper Valley zones for much of the year, they too would likely migrate to lower elevations during the seasonal bloom of the coastal *lomas*. Finally, from fish to marine mammals and birds as well as a variety of mollusks and marine flora, the Lower Valley littoral served as the most biodiverse area of the

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[64] The widest point in the broader drainage is in the upper portions of the Lower Valley (just north of the modern Panamericana highway), at approximately 0.92km in width.

[65] These rains tend to be concentrated between the months of January and April (ONERN 1976).

[66] Based on readings from Ite on the coast (~30 m.a.s.l.) and Ilabaya at the lower Upper Valley zone (1500 m.a.s.l.) the Middle Valley zone likely accumulates between 16-18mm of moisture a year from these coastal fogs (ONERN 1976).

[67] Seasonal high temperatures tend to average around 21 degrees centigrade, between January and March. Seasonal lows tend to average around 14 degrees centigrade, between June and August (ONERN 1976).

broader drainage (Cotrina Chávez, et al. 2009; ONERN 1976).

As has already been noted, paleoclimatic data for the south-central Andes have grown substantially in recent years. This new data frequently confirms the overall trends that have been observed in the foundational data from the Quelccaya glacier ice cores (Thompson, et al. 2000) and the various sediment cores from Lake Titicaca (Abbott, et al. 1997; Abbott, et al. 2003). However, newer studies (e.g., Vining, et al. 2018) have also shown how there was actually a great amount of variability throughout the microclimates that define the broader Andean ecozone. While no studies have been conducted directly in Locumba, it is likely that the climatic history of the drainage follows the continuing trend of general warming and drying that began in the early Holocene (ca. 10,000 years before present). While the overall trend of climactic conditions may have been towards aridity, the Locumba drainage has also been subject to continuous, if not irregular, flooding due to the El Niño Southern Oscillation (ENSO). These major climactic events cause a general aridity in the normally seasonably wet highlands and bring precipitation to the usually hyperarid coasts. These events are felt particularly acutely in the narrow tributaries where flash flooding can occur after minimal rainfall (see Magilligan and Goldstein 2001; Satterlee, et al. 2000). As will be highlighted below, these ENSO events have shaped not just the geological formation of the Locumba drainage but have fundamentally constrained how human history has unfolded in this specific place.

Local Histories & Modern Demographics

Human history in the broader Locumba drainage likely began as the first people moved south along the Pacific coast as well as inland, skirting along the permanent snow-covered zone at 3500 meters above sea level, during the waning centuries of the last glacial maximum, around 12,000 years ago. These small hunter-gatherer groups would have specialized in hunting both big and small game found inland as well as exploiting the wide variety of marine resources offered by the Pacific. By the onset of the Archaic Period (after ca. 10,000 years before present) local populations would have begun developing strategies for exploiting specific microclimates throughout the drainage (Aldenderfer 1989, 1991). By as early as 5000 years before present, Locumba populations likely began exploiting domesticated plants as well as adopting new pastoral modes of life with domesticated camelids. During the Formative Period (ca. 3000 BC - AD 500), as domestics took hold of local economies and settled village life became the norm, populations in Locumba appear to have followed similar sociocultural trends to what has been observed in the neighboring Osmore drainage, including the construction of communal burial mounds (*tumulos*). At this time populations along the coast would have continued to exploit marine resources, including the exploitation of massive quantities of bird guano, which was used for agricultural fertilizer. As agricultural and pastoral systems began to intensify, population clusters began to form throughout the drainage, and likewise political economies likely shifted to more hierarchical forms of organization (see Goldstein 2000a, 2003). Like the other far south coastal valleys, Locumba was likely incorporated into regional llama-caravan trading routes and other forms of socioeconomic vertical complementarity (Browman 1984).

Sometime after AD 600, during the Middle Horizon, the Locumba drainage saw its first major influx from highland people (Goldstein 2000b, 2009). Like the neighboring Tiwanaku settlements in the Osmore drainage, the initial impetus for highland migration to the drainage is likely to have been, in part, an ENSO flooding event that changed critical hydrological resources in the Middle Valley zone (Goldstein and Magilligan 2011; Manners, et al. 2007). As Tiwanaku's sociopolitical influences dissipated and the region entered the Late Intermediate Period (ca. AD 1200), the Locumba drainage again experienced a migratory influx from populations that likely originated on the coast (Chiribaya/Maytas) as well as further south in what is now northern Chile (San Miguel, Gentilar) (Dauelsberg 1972; Lozada and Buikstra 2002; Owen 2005; Sutter 2006).

Again, major ENSO events[68] likely shaped the timing of the movement of these new populations.

Finally, sometime after AD 1450 the valley was brought into the fold of the expanding Inca Empire. Under the Inca, the Locumba drainage was firmly in the *Contisuyu* province, that included the rest of the neighboring drainage systems (Tambo, Osmore, Sama, Caplina, Lluta, Azapa) (Rowe 1946). Further Inca provincial divisions, called *warangas*[69], placed the Locumba drainage in the *Tarata* province, along with the Sama drainage (P. M. Rice 2014:82-84). While the Inca established a large hilltop settlement at the site of Moqi in the Upper Valley tributaries and Colonial documents show good evidence for economic incorporation of communities along the Lower Valley coast, there is little evidence for major Inca occupation in the Middle Valley zone (Covey 2000; Gordillo Begazo 2013). However, it has been shown that the Qhapaq Ñan (Inca Road system) did pass through the Middle Valley (Díaz Rodríguez 2005) and it is quite possible that the primary Inca settlement is under the modern town, Villa Locumba.

With Spanish contact, subsequent invasion, and the fall of the Inca Empire, the Locumba drainage went through severe culturally transformational periods as former sociopolitical systems were both inadvertently altered and intentionally destroyed, and new domesticates and the brutal hacienda system came to redefine the broader economy. As with the rest of *Tawantinsuyu*, local populations were likely restructured as colonial rule shifted from Inca to Spanish control. The first European observations of the Locumba drainage during the Colonial era were made by a Spanish friar, Antonio Vázquez de Espinoza as he traveled along the Peruvian coast in 1618. He passed south from Moquegua, and noted while measurably smaller, the Middle Valley zone of Locumba still produced fruitful yields of wheat, corn, and pimentos (Vázquez de Espinosa 1968[1620]:513-514). He also noted the seasonal rounds still observed

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[68] One event in particular - the Miraflores event in AD 1300 - fundamentally altered many valleys in coastal Peru (Van Buren 2001).

[69] In Inca administrative rule, the ideal *waranga* represented 1000 male taxable subjects (Julien 1988).

by herders, moving between the Upper Valley tributaries and the blooming *lomas* of the coast that came with the seasonal fogs. Vázquez was amazed by the bountiful harvest from the coast, particularly in February and March, when major anchovy runs would attract massive quantities of seabirds, whales, and other fish, resulting in staggering amounts of exportable food. He even noted the ubiquitous nature of edible salt rock deposits (Vázquez de Espinosa 1968[1620]:519-420).

Vázquez's observations also give us some insights into how the region was articulated politically and economically. While he does not name them, he clearly references both Villa Locumba at the confluence of the Cinto and Salado tributaries in the Middle Valley as well as the town of Ilabaya in the Upper Valley zone - he appeared impressed that both towns held regular mass on feast days (Vázquez de Espinosa 1968[1620]:513-514). He later notes, that Locumba and neighboring Sama, were politically administered by a single deputy, assigned by the regional Corregidor of Arica to the south (Vázquez de Espinosa 1968[1620]:615). However, he notes elsewhere that Locumba, along with Sama and Tacna, were part of the Diocese of Arequipa to the north (Vázquez de Espinosa 1968[1620]:517). A number of times Vázquez highlights the continuous exchange caravans that moved guano and fish from the coast and fruits and other crop yields from the valleys up into the sierras. He comments on how a new burgeoning silver mine, San Felipe de Austria along the Potosi King's Road, was completely supplied by products from these lower valleys - noting specifically *uchu* peppers from Locumba (Vázquez de Espinosa 1968[1620]:619).

Importantly, even 400 years ago, Vázquez noted how most of the Locumba Valley lacked the fruitful vineyards and bodegas that neighboring valleys possessed, due to the likelihood that the waters passed over "alum or sulfur deposits" (Vázquez de Espinosa 1968[1620]:514). However, he did note a single vineyard, owned by a Capt. Garcia de Castro, which was able to produce large amounts of wine as well as other fruits due to being located on a natural spring (Vázquez de Espinosa 1968[1620]:514). To date I have not been able to locate

Capt. Garcia de Castro in land records, so it is difficult to know if this vineyard was located on a spring in the Salado valley or if it was located in the Cinto tributary. The Cinto tributary did not suffer from the same high arsenic levels that the Salado tributary, and as is evident by the remains numerous Colonial-era bodegas, many still with large *tinaja* wine jugs in situ, grapes can be fruitfully grown there. In fact, later during the Republican Period (after AD 1871), an English merchant named Mariano Adrian Ward, established a productive vineyard in middle Cinto tributary. He created a profitable export business to Europe, that lasted through the War of the Pacific (1879-1884), but eventually failed during the subsequent Chilean occupation (Ferrer Rivera 2020). Today, the well-preserved ruins of the bodega represent an important local landmark.

Today, the broader Locumba drainage is almost entirely included in the province of Jorge Basadre, which is part of the Peruvian department of Tacna (along with the Sama and Caplina drainages). The province of Jorge Basadre is divided into three districts, that roughly align with the elevation-based valley zones outlined above. The town of Ite acts as the center for the coast and Lower Valley zone and Ilabaya is the district center for the Upper Valley zone. The town of Villa Locumba is both the center for the Middle Valley district as well as the locale for the broader Jorge Basadre provincial municipal government. The province of Jorge Basadre is home to just under 10,000 people[70], and while there has been increase in the population densities (i.e. number of people residing in the primary population centers), there has been a decline in overall population in the past twenty years (INEI 2008). While the official language spoken today is of course Spanish, over 17% of residents claimed Aymara as their first language in the last census (INEI 2008). Independent agriculture makes up an estimated 42%

[70] If the province of Candarave, which includes some portions of the Upper Valley tributaries, is included this population number raises to 17,422 people (Vargas et al 2018:666).

of the municipality's industry, with an estimated 7554 hectares under cultivation[71] (Vargas Edwin, et al. 2018:665). As has already been noted, the types of crops grown in the eastern Salado tributaries are limited, due to the mineral content of the water. Therefore, crops in the Salado tend to focus on specific varieties of maize, wheat, as well as alfalfa for grazing cattle, horses, and goats. However, the Cinto tributary, known locally for having sweet water (*agua dulce*[72]), can sustain a much wider variety of other crops. Here, all variety of fruiting trees (avocado, *chirimoya*, peach), grapes, melons, and a variety of other crops are grown successfully. However, because the headwaters of the Cinto had been dammed by the Toquepala mine since the 1950s, the fruitful tributary had been largely abandoned by agricultural industry for over forty years (Ferrer Rivera 2020).

That said, in the last twenty years the municipality and local farmers have worked to reopen and install new pumps for groundwater wells and have reestablished a flourishing agricultural trade. The Locumba Valley has become particularly known for its onions, maize, the spices of oregano and paprika, as well as for various fruits. Even vineyards have returned to the Cinto tributary in recent years, and as with the majority of the bodegas of southern Peru, they have focused their production on distilled piscos, instead of traditional wines. The valley is also home to Fort Locumba, one of Peru's southernmost military instillations, as well as one of the largest police academies in southern Peru.

The town of Villa Locumba and the broader drainage are best known today for hosting one of the largest Catholic-based pilgrimage celebrations in all of southern Peru. The Señor de Locumba festival centers on a Catholic idol - a large painted, wooden crucifix, complete with a

[71] It is estimated that up to 70% of this may only be growing alfalfa and/or used for animal grazing at any one time (Vargas et al. 2018).

[72] Throughout the *chala* and *yungas* region of the coastal Central Andes, river valleys are known as having either sweet water or salt water - each having their own qualities for agriculture and other activities (Alvarez 2014).

crucified Christ, that is believed to hold particularly potent connections to God and specifically possess healing powers for the sick and injured. For the week leading up to the principal festival day on September 14th[73], tens-of-thousands descend on the small town. These pilgrims participate in walking the stations of the cross into town, numerous catholic masses, and public confessions. Like many Catholic celebrations in the Andes, there is a strong component of residual (and newly formed) indigenous spiritual practice. *Yatiri* and other indigenous healers host a variety of activities on the large hill behind the central church. Regional religious and community dance troupes also come to participate from all over the south-central Andes. For approximately four continuous days (day and night) these dance troupes, accompanied by a local band, march a procession through the central church (where the idol is kept), through the central plaza, and loop around the outside of town.

In addition to the impressive scale of the modern celebration, by all accounts this is also one of the longest-lasting Catholic ceremonies of this type in the southern Andes. The first indirect reference to the Señor de Locumba idol was made in Colonial inventories of the local church in 1655 and 1729, but seems to be confirmed in an account of a local hacienda owner in 1749 (Guadalupe Inga and Tapia Condori 2018:32-39). While there are references to the idol throughout accounts made in the late 18th and early 19th centuries, after the War of the Pacific there are clearer accounts of the growing festival being found in local and regional newspapers. The modern church and the current mode of the festival appear to have taken hold in the 1950s and 1960s (Guadalupe Inga and Tapia Condori 2018:39-69), with attendance growing steadily ever since.

Previous & Ongoing Work

Previous archaeological work in the Locumba drainage had been relatively minimal,

[73] The festival has a minor component that occurs in May.

particularly in the Middle Valley. However, some important work has been completed, laying the foundations for this project. While I have alluded to some of the findings of these studies above, here I specifically highlight this work and what they have found. While some of the earliest scientific archaeological expeditions to pass through this region (Ishida 1960; Trimborn 1975) made stops and even undertook excavations in the neighboring Osmore, Azapa, and even Sama drainages, most do not include more than a single line about Locumba. One exception is G. Vescelius, who traveled the region in the late 1950s. While largely unpublished, his notes indicate the presence of what he believed to be a large Inca site (or sites) at the conjunction of the Cinto and Salado, he denoted as Locumba I and Locumba II (Covey 2000:125). While he could be referring to a site since destroyed by the expansion of the modern town, it is likely Vescelius was referring to Cerro San Antonio (L1). While our more recent work at L1 has only revealed a minor Inca-period component, the significant Late Intermediate Period domestic sector (most accessible from the modern town of Villa Locumba), could easily be mistaken for a Late Horizon era settlement.

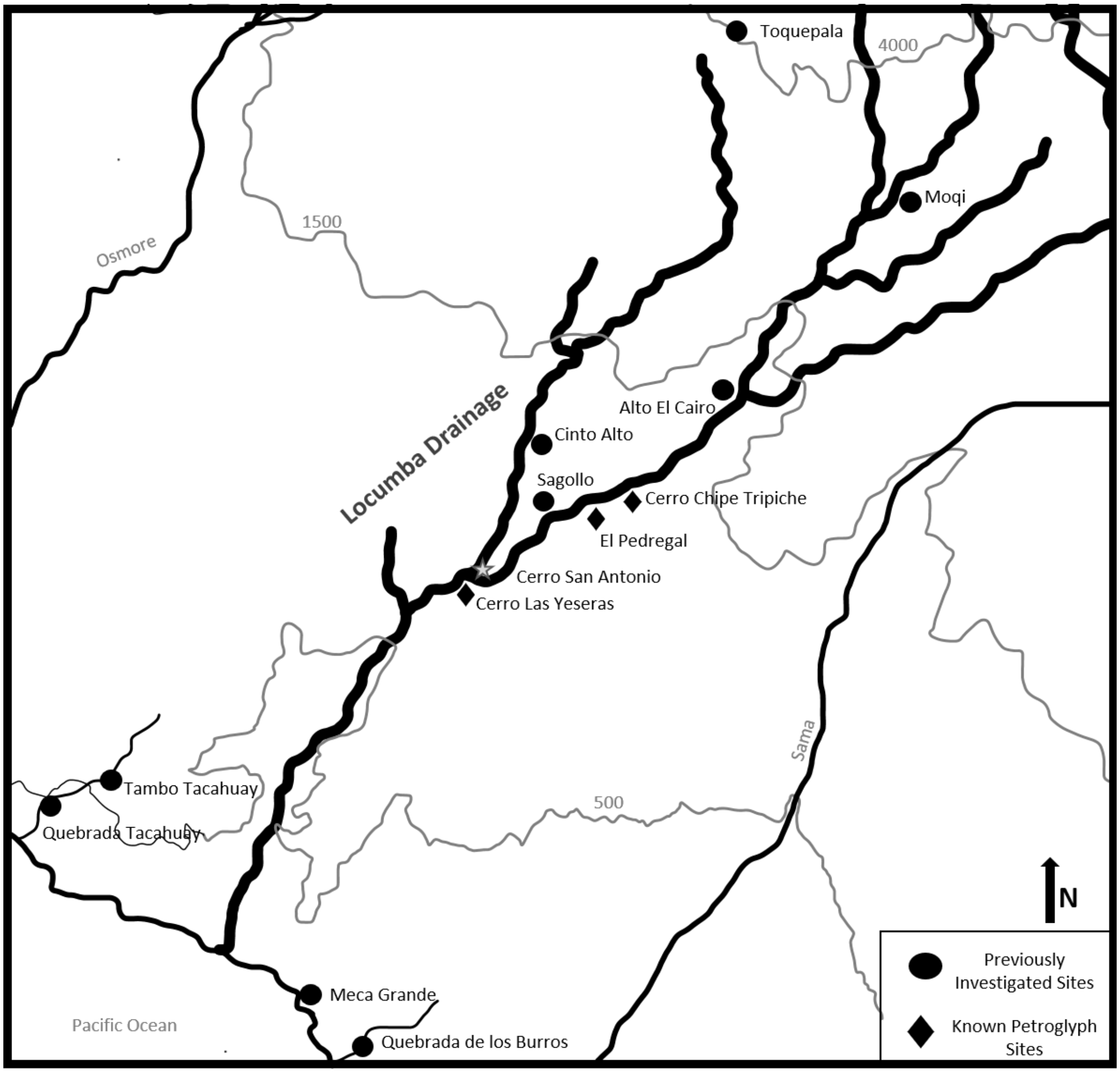

Figure 22. Map displaying the some of the most intensively investigated archaeological sites in the broader Locumba drainage.

As archaeological research in the western coastal valleys intensified in the 1990s and early 2000s, numerous studies targeted the littoral region of Locumba and neighboring drainages. These studies included a systematic survey, led by A. Covey and A. Umire (Covey 2000), that targeted prominent coastal quebradas, between the mouths of the Locumba and Osmore drainages. Interestingly, this survey revealed very early as well as rather late prehistoric deposits. One location, Quebrada Tacahuay revealed significant evidence for what were likely some of the earliest Paleoindian hunters to enter the region as well as a small, but well-established Inca outpost, called Tambo Tacahuay. While the survey also revealed a number of occupations dating to the Late Intermediate Period (mostly San Miguel and Gentilar), there were only limited finds associated with Tiwanaku or the Middle Horizon (Covey 2000:131). Excavation projects directed by S. deFrance and A. Umire, again near Quebrada Tacahuay, completed deep, stratigraphic excavations which revealed the remains of early Archaic Period seasonal settlements (deFrance, et al. 2001). These remains show clear evidence of heavy marine resource exploitation in the form of dense middens of shell and fish bone. These excavations also revealed a number of significant ENSO flooding events that appear to have completely covered some of the earliest occupations (deFrance, et al. 2009; deFrance, et al. 2001). Slightly earlier excavations in the nearby Quebrada de los Burros also revealed Archaic Period domestic remains with clear evidence of marine resource-centered life-ways (Lavallée, et al. 2011).

Modern archaeological investigations have also been conducted in the Upper Valley zone - again largely targeting both very early and relatively late Prehispanic cultural contexts. In some of the highest tributaries of the drainage, rock shelters and cave painting sites, most dating to the Archaic Period, have been documented and even excavated. Some of the earliest and most striking cave art in the southern Andes are found at the Toquepala cave site in the western tributaries, shared with the headwaters of the Osmore drainage (Aldenderfer 1989). A number of general surveys have been carried out in the Upper Valley tributaries as both academic research and contract archeology projects hired by private or state industry (Cardona Rosas 1997; Herrera Corrales 2007; Oquiche Hernani 2014). The upper tributaries have also been partially surveyed by the official Qhapaq Ñan Project[74], which documented a number of Inca-related sites (Díaz Rodríguez 2005). One of the most intensively studied sites in the entire drainage is the Inca site of Moqi. Mapping and excavations, directed by C. Zori and J. Gordillo,

[74] The Qhapaq Ñan Project, coordinated by the Peruvian Ministerio de Cultura, works to delineate, restore, and protect surviving segments of the Inca Road system and their associated sites.

illustrated that this high-altitude site was an important regional node in the broader Inca road system (Gordillo Begazo 2012, 2013).

Until very recently, work in the Middle Valley zone of the drainage had been much more limited. While there were a number of earlier studies and regional histories (mostly centered around Tacna) that reference and even offer useful descriptions of a few of the more prominent archaeological sites in the mid-valley zone (Ayca Gallegos 2006, 2010; Vela Velarde 2014), no real systematic work had been conducted. However, useful for my study, Cerro San Antonio is almost always one of the few sites mentioned in these reports, and while often brief these descriptions offer a nice diachronic view of the state of L1 over time. One exception was S. Palumbo, who while doing survey work in the Upper Valley zone, completed some preliminary GIS-based viewshed analysis of ability to see prominent snow-covered peaks from a few select locations at L1 (Palumbo 2004:41-43). There have also been a number of more recent contract and salvage projects that have been carried out in the Middle Valley as new roads are paved and municipal facilities are constructed. One of the most prominent of these salvage projects was to rescue several Tiwanaku-era burials from the site of Sagollo in the Saldo tributary just a few kilometers north of L1.

Additional focus has been paid to one of the most regionally well-known archaeological features of the middle Locumba Valley, numerous sites with petroglyphs. In Locumba, petroglyphs are frequently found on medium-sized boulders at prominent points along the valley's edge and include images of anthropomorphic beings, animals, and geometric shapes. While these archaeological features had been a point of local pride for some time, it wasn't until 2013 that A. Umire documented each known petroglyph site in the Middle Valley; which included some of the first truly systematic work conducted at Cerro San Antonio (Umire Alvarez 2014).

The last five years have seen a general increase in the amount of systematic work completed in the valley as well as community interest in protecting the archaeological resources of the drainage. A local museum has been established in Locumba, and while it largely focuses on more recent history and ethnographic accounts, it brings attention to the depth of local history. Also, as will be detailed below, significant looting events (especially at the site of Cerro San Antonio) have focused regional concern on the state of cultural patrimony in the area. Due in part to these recent looting problems, the Tacna departmental office of the Ministerio de Cultura registered the first sites in Middle Valley zone in 2013. Cerro San Antonio was one of these registered sites, and since then (in 2016) the Ministerio de Cultura has placed perimeter markers and large display signs formally signaling the protected sites boundaries. Since 2015, the primary work in the Middle Valley has been completed as part of the broader Proyecto Arqueologío Locumba.

Proyecto Arqueologío Locumba (PAL)

Established in 2015, by directors Dr. Paul Goldstein (University of California, San Diego) and Lic. Antonio Oquiche (Identidad Cultural Inc.) the Proyecto Arqueologío Locumba (PAL) is a multiyear archaeological survey of the Middle Valley zone of the Locumba drainage (between 500-1000 m.a.s.l.). The overarching goal of the project is to systematically survey habitable land along the central tributaries of the Middle Valley and document all premodern occupation. The majority of field work in the PAL survey has involved reconnaissance through systematic pedestrian survey, and mapping and collection at multiple sites in the Locumba drainage. The PAL project with the UCSD Archaeological Field School also conducted the general reconnaissance of Cerro San Antonio in 2015, and surface collection units and test household excavations in Sector A in 2016 that are reported here. To date the survey has completely covered the Middle Valley portion of the Cinto tributary and have nearly completed documenting the Salado tributary as well. While these initial project findings are still in the process of being published, I can report that the survey has revealed occupations from the Formative through Inca times, with numerous sites dating to the Late Intermediate Period. All work conducted at

Cerro San Antonio (L1) and reported on here has been part of the broader PAL survey. As is detailed below (see 3.2), my dissertation work at L1 was a central aspect of activities completed under the PAL survey.

3.2 Cerro San Antonio (L1)

Here I provide a basic description of the site of Cerro San Antonio (L1) and each of the 28 archaeological sectors that define the broader archaeological complex contained within the site. Later (see Chapter 4), I provide details into the methods and techniques I used to delineate these sectors and in Section 2 I provide deeper insights into nuances in their cultural affiliation and even basic purpose (see Chapter 5). While the focus of this dissertation are the Tiwanaku-affiliated domestic sectors, understanding the site as a whole is essential, so here I review all sectors from all time periods.

The primary western and eastern tributaries of the broader Locumba drainage meet at approximately 570 meters above sea level (m.a.s.l.). Here, just 35 kilometers from the coast, the Cinto and Salado rivers converge to form the single-channel Locumba River. Just 300 meters east of this confluence, Cerro San Antonio (L1) occupies the articulated series of blufftops and dissected plateaus that rise sharply from the broad alluvial plain. The site's extents reach to the edge of the valley floor in both the Cinto and Salado and generally widen as the tributaries diverge. This position, occupying the entire interfluve[75] between the tributaries, gives almost every sector at the site reasonably easy access to both valleys. The brief plateaus step up in elevation, from 570-655 m.a.s.l., as the site parallels the tracks of the tributaries - oriented roughly west-east initially but after approximately one kilometer shifting to a general SW-NE orientation.

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[75] This is the formal term denoting the land area between two converging river tributaries - sometimes also called a *doab*.

Quebradas separate most of the planar landforms with a series of particularly pronounced quebradas acting as the primary access points in and through the site. All landforms incorporated in the site's area are subject to extreme wind- and solar radiation-based erosion and general weathering. Bedrock and clay deposits are visible in most exposed blufftops and plateaus with heavier sandy sediments collecting in wind-protected areas and quebradas. Water-worn cobbles and gravel litter the surface (as well as subsurface) - these include mostly igneous and non-foliated metamorphic stone types. No part of the site contains any extant vegetation which was almost certainly the case in all periods of prehistoric occupation. In total L1 covers an area of 166.49 hectares (1,664,975.768 square meters) with a perimeter of 6261.416 meters.

Archaeological Sectors

While it is designated as a single site, L1 or Cerro San Antonio, is actually an archaeological complex. It comprises 28 distinct archaeological sectors which occupy mutually exclusive areas. While there are some archaeological features that fall outside these sectors, all primary domestic or mortuary-style sectors received their own perimeter and sector designation.

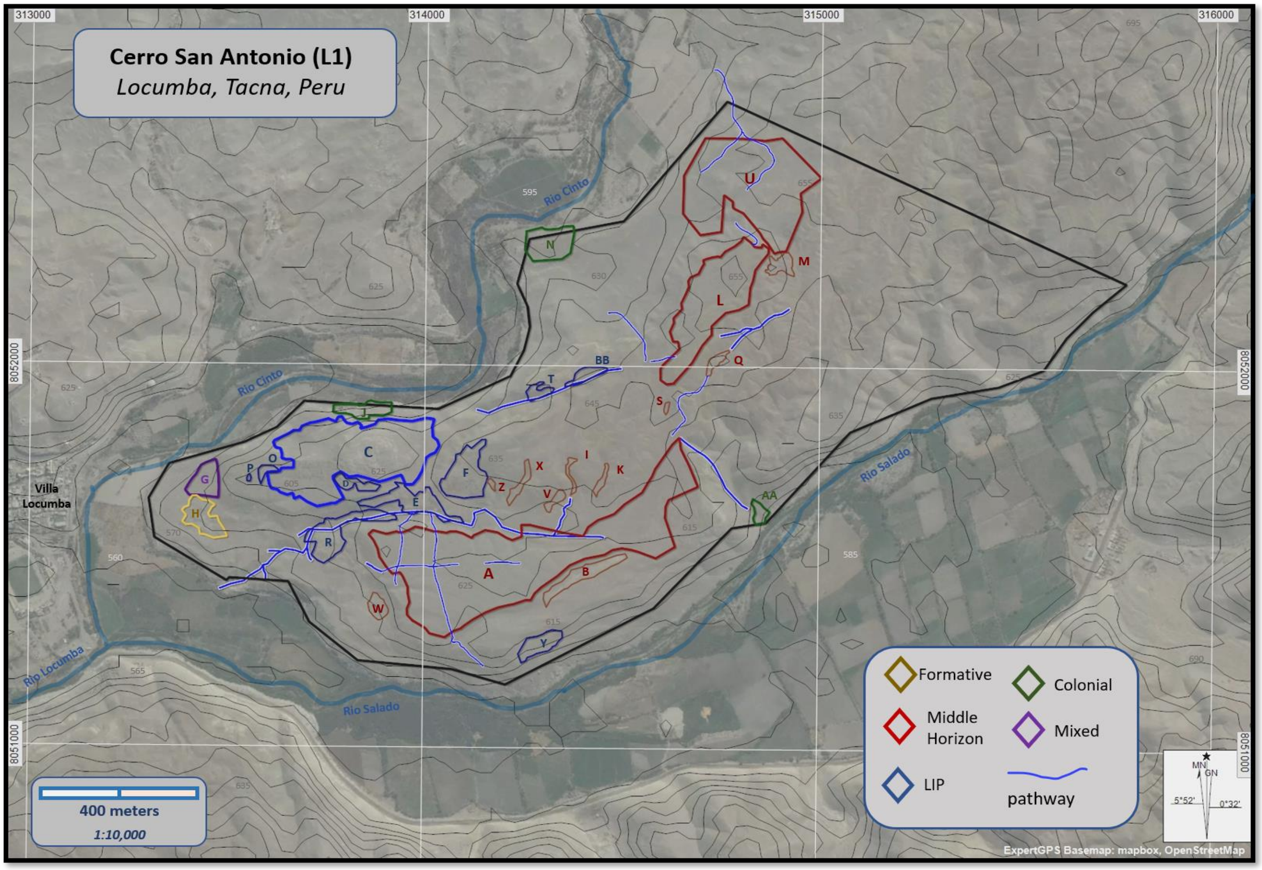

Figure 23. Map of Cerro San Antonio (L1) displaying all 28 archaeological sectors dating to all pre-modern culture-history periods. Also depicted are some of the major pre-modern pathways that connected the pre-modern occupations.

As will be described more below, most of the deposits at L1 follow what we refer to as "horizontal stratigraphy." This means while individual sectors may have depth and even multiple cultural strata, the majority of occupations appeared to have largely targeted previously uninhabited or unused sections of the site, resulting in relatively simple depositional itineraries.

Table 6. List of archaeological sectors at Cerro San Antonio (L1). Here primary, secondary, tertiary refer to the temporal sequence, not the intensity of occupation.

SECTOR	AREA (hectares)	PERIMETER (meters)	PRIMARY FUNCTION	PRIMARY CULTURAL AFFILIATION	SECONDARY FUNCTION	SECONDARY CULTURAL AFFILIATION	TERTIARY FUNCTION	TERTIARY CULTURAL AFFILIATION
A	13.23	2370.08	DOMESTIC	MH - TIWANAKU				
B	0.62	539.17	MORTUARY	MH - TIWANAKU				
C	6.44	1401.34	MORTUARY	LIP - CHIRIBAYA	DOMESTIC/MORTUARY	LIP - SAN MIGUEL	DOMESTIC	LIP - GENTILAR
D	0.27	301.13	MORTUARY	LIP - CHIRIBAYA	DOMESTIC	LIP - GENTILAR		
E	0.93	726.71	MORTUARY	LIP - CHIRIBAYA				
F	1.13	495.46	MORTUARY	LIP - SAN MIGUEL	MORTUARY	LIP - GENTILAR		
G	0.57	308.92	MORTUARY	MH - TIWANAKU	DOMESTIC	LIP - SAN MIGUEL	DOMESTIC	LH - INCA
H	0.68	400.92	MORTUARY	FORMATIVE				
I	0.09	247.34	MORTUARY	MH - TIWANAKU				
J	0.47	359.93	DOMESTIC	COLONIAL				
K	0.11	202.67	MORTUARY	MH - TIWANAKU				
L	4.02	1087.44	DOMESTIC	MH - TIWANAKU				
M	0.27	282.85	MORTUARY	MH - TIWANAKU				
N	0.93	379.27	DOMESTIC	COLONIAL	DOMESTIC	HISTORIC		
O	0.11	166.79	MORTUARY	LIP - SAN MIGUEL	DOMESTIC	LIP - GENTILAR		
P	0.01	48.9	MORTUARY	LIP - ESTUQUINA				
Q	0.14	200.84	MORTUARY	MH - TIWANAKU				
R	1.08	674.55	MORTUARY	LIP - SAN MIGUEL				
S	0.03	79.07	MORTUARY	MH - TIWANAKU				
T	0.18	234.02	MORTUARY	LIP - GENTILAR				
U	6.87	1235.7	DOMESTIC	MH - TIWANAKU				
V	0.13	175.65	MORTUARY	MH - TIWANAKU				
W	0.24	189.38	MORTUARY	MH - TIWANAKU				
X	0.19	293.1	MORTUARY	MH - TIWANAKU				
Y	0.47	311.34	MORTUARY	LIP - CHIRIBAYA				
Z	0.04	85.32	MORTUARY	MH - TIWANAKU				
AA	0.17	180.81	DOMESTIC	HISTORICAL				
BB	0.25	257.84	MORTUARY	LIP - GENTILAR				

Below I provide a brief description of each sector as well as associated archaeological features which fall outside the formal sector perimeters.

Sector A

Covering over thirteen hectares, Sector A is the largest sector at L1. It occupies an expansive plateau at the far south end of the site, bordering the Cinto Valley. The north extent of the sector is largely defined by the large *quebrada* that acts as the primary western access to the entire site as well as dividing the large planar surface that Sector A occupies from the large planar surface and associated blufftop that is occupied by Sector C. A narrow *quebrada* also borders the southwest side of the sector, separating Sector A, from the steep slope leading down to the valley floor - this quebrada is occupied by the Sector B cemetery. Sector A can be accessed from a number of locations, but there are clear natural pathways up the steep slopes leading from primary site access points to the west and south - these appear to have been used in prehistory as well. A cleared pathway also emerges for the central *quebrada's* eastern end and into the eastern portion of Sector A. In addition to these access points several footpaths also cross through the center of the sector.

Like the rest of the site, there is no natural relief from the sun or wind - both of which can be quite severe, especially around midday. This consistent wind has resulted in minimal sediment accumulation, leaving the natural geological surface littered with small boulders, small to medium cobbles, and gravel. On clear days, the snowcapped volcanic peak of Tutupaca in the northeast can be seen most positions in the east half of the sector and the very tip of the peak of Yacamane can even be seen at a few points in the east of the sector as well.

Culturally, Sector A is defined as a Tiwanaku domestic sector. The sector's surface cultural deposits are extensive and often quite dense but also very deflated due to the wind/solar exposure. Domestic occupation is indicated by the presences of small clearings and low rockpiles which were created as the prehistoric occupants cleared away the naturally occurring stone to make way for domestic structures and other activity areas. These low rockpiles also served as domestic middens, and while cultural materials are not restricted to these piles, they are found in much higher densities. To complicate matters, instead of simply representing primary deposits, at least some of these rockpile-midden deposits appear to have been disturbed upon large-scale site abandonment. As will be discussed later, similar Tiwanaku abandonment patterns have been observed in the neighboring Osmore drainage (Goldstein 2005:225-226). These deposits range in density. The western side of the sector is very dense with many areas containing up to 30 sherds per square meter. These deposits taper off as the eastern portion of Sector A becomes much sparser, eventually resulting in very low densities of material (less than one sherd per square meter)[76]. Despite the extensive domestic refuse only a few small segments of *quincha*-style cane wall foundation and two associated posts were located on the surface.

While much of the sector is covered by relatively undifferentiated rockpile-middens and small, poorly defined clearings, there are a few orienting features in Sector A. The most identifiable feature is a large plaza space located in approximately the center of the dense surface scatter that covers the western portion of the sector. The plaza is quadrangular, measuring approximately 25 x 35 meters, and is oriented roughly along a NW-SE axis. While there are no surviving superstructural elements to this plaza, the rectilinear clearing is quite stark compared to the dense deposits surrounding it and the exposed pavement is far more compact than any surrounding surface area. In addition, looters have revealed that in the direct center of the plaza was a subsurface offering of at least one adult camelid[77] - now strewn about

[76] As is noted later - this lower density is likely due, at least in part, to modern/recent historic activities.

[77] A few decorated Tiwanaku redware sherds found in the backdirt of the looters pit suggest some additional ceramic offerings. The deflated nature of the looting backdirt pile suggests the looting may have taken place in Colonial times or perhaps earlier.

the surface.

Approximately 75 meters to the southeast of the central plaza is an additional plaza-style clearing. This secondary plaza is irregularly shaped and only approximate 15 meters across. This small plaza is associated with a slight rise that appears to be artificial, made by simple mounding of locally gathered sediment. Finally, approximately 130 meters, due south from the central plaza is the foundation of a small square structure (approximately 1.95 x 1.95 meters). While this structure was also looted in the distant past, we excavated this structure in our 2016 test excavations (Special Structure L1A-1), and is discussed in greater detail in Section 2.

As one of the primary Tiwanaku domestic sectors, Sector A was subject to intensive investigation for this study, including: systematic surface collection and extensive excavations.

Sector B

Sector B is a relatively narrow mortuary sector which stretches almost 400 meters across a relatively wide and shallow, sandy-bottomed quebrada. The quebrada runs roughly NE-SW and represent a natural southeast border of Sector A. Sector B is a Middle Horizon-era mortuary sector and as it was badly looted, both prehistory as well as recently, many of the subsurface tombs that make-up this cemetery are now exposed. Over forty (40) tombs have been exposed through looting with an estimated 50 left undisturbed[78]. The tombs here range in form - while a few may have originally possessed modest, cobble-stone collars all are subsurface cist-style tombs. Approximately two-thirds of the looted tombs appear to have been stone-lined with the remaining being constructed as simple cists. While unfortunately they are often destroyed by looters, most interments seemed to be a seated-flexed position, with bodies wrapped in various textiles and bound with vegetable-fiber cord. Some offerings, mostly

[78] This estimate as well as all following undisturbed tomb counts are made using low-altitude UAV photos and ground-truthed when possible.

ceramics, were left or accidentally destroyed by looters - these include both redware style serving vessels as well as more standard plainware *ollas*[79]. All diagnostic materials recovered in Sector B (including ceramic sherds, textile fragments, wooden spoon fragments) fall within the Tiwanaku functional-stylistic canon.

Sector C

Sector C is the most culturally and stratigraphically complicated sector at Cerro San Antonio, with archaeological remains pertaining primarily to the Late Intermediate Period. Covering 6.44 hectares the sector is situated on a relatively expansive plateau that covers the northwest section of the site, outlooking the Cinto tributary. Moving eastward, the plateau ends with a punctuated blufftop peak before dropping down into a wide, sandy saddle, which leads up to another blufftop (occupied by Sector F). The large plateau surface of Sector C is covered by a particularly dense amount of medium to large cobbles as well as gravel, and while the position of this rocky ground cover has been greatly altered by cultural activity (see below) the overall density is likely to be natural. This 2-hectare planar surface is bordered to the south by the central quebrada - this also separates Sector C from Sector A. To the north the sector is demarcated by steep cliffs down to the Cinto valley floor which give way to a more gradual sandy slope to the east.

The blufftop rises about fifteen meters above the natural plateau surface, with easy access found on the west and south sides. Some of the most pronounced clay deposits at L1 can be found eroding out of the southwest slopes of the Sector C bluff. The top of the bluff is also relatively flat and allows for excellent views, both up the Cinto tributary and down the central Locumba valley as well as of the snowcapped volcanic peaks Tutupaca and Yucamane. Protected from wind between the two blufftop peaks, the saddle that represents the easternmost

[79] One (1) narrow-necked olla abandoned by looters was found to contain the remains of at least four (4) large frogs.

area within Sector C, contains a few small boulders, but is generally significantly sandier than the rest of the sector.

Sector C is one of the few sectors at Cerro San Antonio that shows evidence of true stratigraphic cultural deposits. This sector is also one of only two sectors at the site which shows evidence for both substantial domestic and mortuary components. As the sector does not appear to include Tiwanaku remains, I have not conducted excavations for the current project, and have only sampled the surface materials at Sector C. However, one small silver lining from the recent destructive looting events, many of which have been conducted in Sector C, is they have revealed a glimpse into the stratigraphic sequence that defines this sector. Here, I describe the cultural sequence from the suspected earliest occupation to the most recent.

The earliest use of this sector appears to have been as a cemetery with clear affiliations to the Chiribaya-Maytas material tradition. These early Late Intermediate Period cemetery components seem to be found in clusters around the western, northern, and eastern slopes as well as on top of the Sector C bluff. There are likely at least 100 tombs associated with this cemetery component.

Most of these tombs are circular cist-style tombs, with the majority being lined with cobbles. These cists were roofed with cut sections of timbers[80], most approximately 1.5 meters, laid in a single direction across the mouth of the tomb. While most of the visible tombs with associated Chiribaya-Maytas material are circular, at least three (3) of the tombs were rectangular - the cobble masonry in these rectangular tombs appear to have been much more carefully carried out. While most of these tombs are found at a standard depth (the mouth or collar of the tomb located just below or at ground surface), some of the tombs, especially those found on the top of the bluff and down the western slope are buried at incredible depths - some

[80] In-field observations suggest these likely derive mostly from molle and algarroba trees.

over three meters below the ground surface[81]. Most bodies appear to have been interred as seated-flexed burials. Items broken or abandoned by looters reveal a wide variety of ceramic offerings, some representing examples of fine Chiribaya-Maytas decorated serving vessels, but most representing a variety of plainware narrow-necked *ollas* as well as bowls. Most of the ceramics appear to have been filled with substantial amounts of molle pepper berries. Other intraceramic offerings appear to have been complete maize cobs (with kernels) and small hollowed-gourd vessels. Other diagnostic grave offerings[82] recovered included decorated Chiribaya textiles (including multiple *chuspa* coca bags) and other personal implements such as combs and wooden spoons. Like other documented Chiribaya-Maytas mortuary settings (see Atwood 2007; Focacci 1990; Owen 1993; Wylde 2017), there were also a significant amount of animal offerings recovered here. Importantly, at least four dog burials have been exposed by looters as well as a number of caches of camelid feet[83]. This cemetery in Sector C is closely associated with additional Chiribaya-Maytas cemeteries in the nearby Sector D, Sector E, and Sector O.

The second phase of use in Sector C was also mortuary, this time by populations associated with the San Miguel material tradition. The burial contexts associated with San Miguel offerings appear to be far more limited than the Chiribaya-Maytas cemetery. Like the earlier burials, the San Miguel tombs are also spread across the slopes and top of the Sector C

[81] While some of the overlaying sediment may have accumulated, it is likely that these tombs were dug over 2.5 meters below the ground surface.

[82] One of the largest looters caches, recovered by local Locumba authorities in 2016, were likely removed from this cemetery in Sector C. While an inventory of these items can be found in Appendix XX, these items included: musical instruments (panpipes, drums), precious metal adornments (gold bracelet and diadem), and a variety of other unique items.

[83] These camelid feet offerings could include anywhere from two to seven individual articulated feet (generally include the carpals/tarsals, phalanges, and hoof). Sometimes these appear to have been in the tombs with individuals but at least few cases appear to have their own small cists constructed adjacent to tombs.

blufftop. All San Miguel tombs are constructed as subsurface, circular cists. The vast majority appear to be at least partially lined with overlapping courses of cobbles. Also, like the Chiribaya-style tombs, most of these San Miguel burials are roofed with one course of timbers. Based on what is exposed, there are likely between twenty-five (25) and fifty (50) San Miguel-associated[84] tombs in Sector C. This middle Late Intermediate Period cemetery is likely directly associated with additional San Miguel cemeteries in Sector F and Sector R.

Overlying both the Chiribaya-Maytas and San Miguel mortuary components was the third and final component, a substantial domestic occupation with most identifiable decorated ceramics associated with the Gentilar material tradition. While the earlier mortuary components were restricted to the blufftop, the late LIP domestic component covers the entire 6.44-hectare extent of Sector C. There are three primary areas to this domestic component. Extremely dense material remains can be observed throughout the western plateau portion of the sector. Here, the final occupants constructed a series of domestic platforms by piling the locally available cobbles. They appear to have used a cribbing-style of construction method - creating raised bins with cobbles and filing those in with sediment and gravel. These rectangular field stone platforms gradually step up in elevation as they approach the steep drop-off down to the Cinto valley floor - forming a broad stepped set of nested platforms. The lowest platform is approximately 0.5 meters above the natural plateau surface with the highest surfaces approximately two meters above the natural ground surface. Interestingly, these platforms appear to have been destroyed upon abandonment - it is difficult to determine the nature of this destruction. While these platforms are in poor condition a few segments of *quincha*-style cane wall foundations as well as a single post.

Moving eastward across the sector, the domestic scatter continues and encompasses

[84] While San Miguel material culture can be difficult to distinguish from later Gentilar styles, we identified San Miguel based on their exclusive and frequent use of black-on-cream decorated ceramics (Uribe Rodríguez 1999).

the Sector C blufftop - these are the deposits that directly overlie the earlier cemetery components. Covering the top of the blufftop and along the more gradual, sandy northwestern slope leading to the valley bottom are relatively dense domestic material scatters. There are a number of small portions of quincha-style cane wall foundations throughout this area of the sector, and at the northeast edge of blufftop is the well-preserved and complete foundation of a rectangular quincha-style domestic structure. Along the steeper bluff slopes to the north, west, and south are covered in extremely deep midden deposits. In addition, along the southern slope, projecting both southwest and southeast are two artificial walls. These appear to have been created by piling field stone - domestic-refuse deposits on the wall have since bolstered its size. These may have originally acted to restrict access to the blufftop peak occupations. All diagnostic materials appear to fall well-within the Gentilar stylistic canon[85] (Uribe Rodríguez 1999:213-218).

The final area of the Gentilar occupation in Sector C is located in the sandy saddle, located between the Sector C blufftop and Sector F blufftop. While Gentilar domestic deposits continue, the primary feature in this area is a formal plaza space. Oriented roughly along a direct N-S axis the rectangular plaza is framed by a single course of medium-sized cobbles, with an additional row of cobbles down the center of the plaza. Before construction, the plaza space was clearly prepared by building up low areas and leveling the entire area by compacting the sediment. Additional cobbles along the eastern side of the plaza suggest associated built spaces may have existed adjacent to the open plaza space. This is an interesting feature as the overall dual-nature of this plaza construction is similar to those observed in Inca architectural styles (Hyslop 1990:234-243). While no diagnostically Inca materials were recovered here, this could suggest an Inca-affiliated component here.

[85] It is of course possible that the earlier LIP cemetery components (Chiribaya, San Miguel) had associated domestic components, that were covered by the later Gentilar occupation.

Sector D

Sector D is a small mortuary sector situated directly adjacent to the southeast border of Sector C. Perched between Sector C and the central quebrada edge, Sector D only contains approximately 25 tombs. Interestingly, while these tombs are all associated with the earlier LIP Chiribaya-Maytas tradition, the Sector D cemetery did not get covered by the dense Gentilar domestic refuse like the Chiribaya-era cemetery components underlying Sector C. All exposed tombs in this sector are circular, cist tombs. All Sector D tombs also used the cobble lining and were topped with a row of timbers. Most materials associated with these burials fall into the Chiribaya tradition, although the decorated serving ware offering, associated with some of the nearby Sector C Chiribaya burials were absent here. Interestingly, two different boot-pot[86] ceramic vessels have been found associated with Sector D - these pots are most frequently associated with the Estuquiña material tradition, found most commonly in the Upper Valley of the Osmore drainage (Stanish 1991).

Sector E

This mortuary sector occupies a low ridge that begins along the southern slopes of the Sector F blufftop and eventually juts out to the west, into the central quebrada. Covering just under one hectare, Sector E is large for a mortuary sector, but still dense with tombs (approximately 50 tombs). Here all tombs appear to be circular cists and while some are stone-lined, the majority are simple cists[87]. While only some of the exposed tombs had recoverable materials, all diagnostic materials suggest Sector D was exclusively a Chiribaya-Maytas period cemetery. Like the Chiribaya-era cemeteries in Sector C, there were also animal-related

[86] These are believed to be used for roasting maize and other grains.

[87] Along this ridge, sediment is particularly thin, resulting in many of these tombs being partially carved into the soft sandstone bedrock.

offerings in Sector E, including at least two dogs and one offering of camelid feet.

Sector F

Covering 1.13 hectares Sector F is the largest mortuary sector associated with the Late Intermediate Period. This sector occupies the blufftop just east of Sector C, with tombs located on all sides of the blufftop, but particularly concentrated on the west and north facing upper slopes. Like the other cemeteries which have been heavily disturbed by modern looting, many of the exposed tombs do not have any diagnostic material associated. However, most diagnostic ceramics suggest this was primarily a San Miguel era settlement with a possible later (and much more minor) Gentilar component. This cemetery likely contains at least 75 individual tombs. All tombs in Sector F appear to be circular cists with the vast majority lined with cobbles. Interestingly, while most of the tombs were roofed with a row of but timbers, a few of the tombs in Sector F appear to have been capped with unshaped sections of local limestone. Evidence shows some engagement with this sector during Colonial times; in addition to looting there was at least a single offering of a silver coin next to some burnt candle wax.

Sector G

Sector G is a complicated, multicomponent sector located at the westernmost end of Cerro San Antonio. While Sector G (along with Sector H) occupies the lowest elevation portion of the broader site it still has an excellent viewpoint southwest down the central Locumba valley. The sector is complicated as it shows evidence for definite domestic and probably mortuary use, and diagnostic ceramics have been found which represent almost every pre-historic material tradition. Low altitude photos and a single disturbed context suggest that much of the sector is covered with circular subsurface features. Ground-truthing these types features at L1 has almost always revealed cist-style tombs. However, while the single disturbed example at Sector G does appear to be a stone-lined cist it appears to have been used a storage or refuse pit in prehistory. Only excavation will reveal if this is an anomaly or if this is indeed a relatively expansive storage location. The cultural affiliation of the Sector G is also difficult to determine. Overall, surface scatter is relatively light, but most ceramics observed and collected are diagnostically Tiwanaku plainware. However, we have also noted Formative Period sand-tempered ceramics, LIP-era San Miguel decorated cream-on-black sherds, as well as some of the only diagnostic Inca sherds recovered at L1. As noted above, it is likely subsurface sampling is necessary to delineate the cultural sequence at this sector. One final feature of note in Sector G is a rectangular plaza space in the southern portion of the sector. This plaza is 20 x 40 meters and roughly oriented on a NW-SE axis.

Sector H

Sector H represents the earliest prehistoric use of L1, and the only sector to be affiliated exclusively with the Formative Period. In an area of 6.7 hectares there are eight artificial, earthen mounds. These mounds, known as *tumulos*, are well-known features that were used by Formative Period populations as burial mounds. While these mounds are well-documented in a number of locations from the neighboring Osmore drainage to the north (Goldstein 2000a; 2005:125-127) and Azapa to the south (Muñoz Ovalle 1987, 2004). However, only a limited number of these *tumulos* have been systematically excavated; making it very difficult to estimate the how many burials or other offerings these mounds contain. Each mound is irregularly-shaped and they vary greatly in size. The northernmost *tumulo* is the largest (1823m^2) and also isolated from the rest. Interestingly, there are three think posts clustered in a triangular orientation[88] in the southeast corner of this larger mound. The other seven mounds also vary in shape and size (range from 71 to 580m^2) but are all clustered together. Some of these smaller mounds may have originally held a more regular, conical shape, but millennia of

[88] It is unclear if these represent a structure that the mound was constructed around or posts for a structure built on top of the mound.

deflation have made them slump. While these *tumulos* are affiliated with the Formative Period there were no diagnostic materials recovered on the surface. Finally, sharing the lowest elevation plateau at the far western extent of the site with Sector G, these burial mounds in Sector H look southwest and have a view kilometers down the central Locumba valley.

Sector I

Sector I is one of three narrow *quebrada*-cemeteries found directly adjacent to the north side of Sector A. Likely containing twenty-five (25) tombs, Sector I covers only 0.09 hectares. Like the other *quebrada*-cemeteries this narrow gully is relatively sheltered from the elements as it cuts into a steep slope. At least eight (8) of these tombs have been looted; however, these disturbance events appear to have taken place in antiquity. All tombs appear to be stone-lined, circular cists. Unlike other cemeteries all of these tombs appear to have also had above-surface stone collars. All materials, including a near complete *kero*, are diagnostically Tiwanaku. Interestingly, this sector lies at the end of one of the bifurcations of the prehistoric pathway that leads directly through the primary *quebrada*.

Sector J

Sector J is the primary Colonial-era sector at Cerro San Antonio. Directly abutting the Cinto valley bottom, on the northern margin of the site, Sector J is composed of the ruins of a Colonial-era bodega and associated features and scatter. The primary bodega structure is built with adobe bricks, and while the roofing and much of the superstructure is collapsed or absent a significant portion of the lower walls and foundations remain. The bodega is composed of four primary rooms: the main *tinaja* storage area, the *lagares* (crushing tanks), and two additional rooms[89]. The primary storage room still has seven medium-sized Colonial wine *tinajas* largely in situ as well as remarkably well-preserved sections of the plumbing which would transport wine from the *lagares* to the storage *tinajas*. Overall this bodega is a relatively simple version of a integrated-linear plan; a layout seen utilized in Colonial wine haciendas in the neighboring Osmore (Rice 1996:191-192). Unfortunately, none of the *in situ tinajas*[90] found at L1 have been inscribed with a date. However, being used as a property marker in a nearby field is a *tinaja* with the date 1699, and while not definitively from the Sector J, this does suggest this bodega was in operation before 1700.

The primary bodega structure is surrounded by typical Spanish Colonial-era domestic refuse: various stoneware and porcelain ceramics, glass bottle fragments and beads, metal horseshoes and binding for barrels, peach pits and cow bones. Directly associated with the bodega to the northeast is what appear to be a filled-in well; although this could be the base for a circular kiln or a mount for a *falca*. Finally, built directly onto the rugged bedrock that rises quite sharply to the southeast of the bodega are the adobe brick foundations of an additional rectangular structure. Based on extensively studied bodegas in Moquegua, this structure likely swerved as a temporary residence for bodega owners when visiting their fields or it could have served as a country chapel.

Sector K

Sector K is another narrow quebrada-based mortuary sector, directly associated with the Sector A Middle Horizon domestic sector. This sector occupies the quebrada directly east of Sector I. Ancient looting events have exposed 10 tombs, with a likely 15 total tombs in the entire

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[89] One small room, directly adjoining the tinaja storage room and the *lagares* was small and likely used as a work/staging area. The other room is larger, including a large doorway to the exterior and may not have been roofed - this suggests this room may have been a loading area where horses and mules would be kept and loaded with products.

[90] It should be noted, detailed observations of the tinajas have been limited as a current, neighboring farm owner keeps several beehives in amongst the Colonial era vessels.

sector. All exposed tombs are circular cist-style tombs. While all have at least one course of stones as collar, it is unclear if they are stone-lined. All collected materials are diagnostically Tiwanaku.

Sector L

Covering just over four hectares, Sector L occupies the northernmost plateau at Cerro San Antonio. The planar surface of the Sector L plateau is oriented roughly NE-SW and is tapers off onto a narrower ridge at the southern end. Unlike other blufftop plateaus at L1, Sector L is dissected by a network of shallow quebradas. These quebradas provide shelter from the afternoon winds that sweep through the valley. While Sector L can be access from pathways that wind down to both the Cinto and Salado valley bottoms, it is the most defensible domestic sector at the site simply based on its location. Sector L also has the clearest sightlines to the volcanic peaks Tutupaca and Yucamane to the north. While there are still significant amounts of medium-small cobbles and gravel, overall, the natural geologic ground cover on Sector L is less dense than other sectors. Large natural clay deposits define the southwestern cliffsides along the sector's southwestern perimeter.

Sector L is a Middle Horizon-era domestic sector. Like Sector A, Sector L is defined largely by rockpile-midden deposits interspersed by irregular, generally small, clearings. However, the different orientation and narrow quebrada system that define the Sector L surface have provided far more protection from wind deflation. This wind protection has allowed for the preservation of dozens of segments of quincha-style cane wall foundations and architectural posts, giving us a far more detailed view of the plan of this domestic sector. This excellent material preservation carries over to other cultural materials. Materials are found in high densities across the sector, with higher densities found in the rock-pile middens. An additional dense midden is located along the steep northwestern slope of the sector. All collected materials fall within the general Tiwanaku stylistic canon. Interestingly, there does not seem to be the abandonment pitting, as observed in Sector A.

As one of the primary Tiwanaku domestic sectors, Sector L was subject to intensive investigation for this study, including: systematic surface collection and extensive excavations.

Sector M

Sector M is located along the northeastern facing slope, just below the Sector L and above the Sector U domestic sectors. This is another Tiwanaku-affiliated cemetery and contains approximately 70 tombs. All tombs appear to be circular cists with at least one to two courses of cobbles as simple collars. Sector M is one of the few Middle Horizon-era cemeteries with a view of the snowcapped peaks of the Upper Valley. This sector has clear evidence for looting, likely in antiquity, but little evidence for modern disturbance.

Sector N

Sector N is located on a ridge along the northwest edge of L1, overlooking the Cinto valley bottom. The sector is centered on a Colonial or possibly early Historic-era structure and its associated scatter. The structure was made of adobe bricks and while the roof is now absent, some rubble suggests it may have had a *mojineta*-style roof, a specific to this region. It is possible that this structure is directly associated with the bodega in Sector J, though it seems this structure was occupied for some time after the bodega. Modern agriculturalists have built structures along the same ridge as Sector N, so their domestic refuse has mixed with the historic scatter, making it difficult to delineate systematically.

Sector O

Sector O is a mortuary sector found at the western extent of the Sector C plateau. This cemetery was exposed only recently by modern looting events, which exposed ten (10) tombs.

Some of this sector is likely covered by domestic refuse from Sector C. All tombs appear to be stone-lined, circular cists with no above-ground collars. Most materials recovered here appear to be affiliated with Chiribaya-Maytas material styles, though no decorated ceramics have been recovered.

Sector P

The smallest sector by area, Sector P is composed of the remains of four (4) *chulpa* burial towers at the westernmost edge of the Sector C plateau. All appear to have been relatively small, with base diameters of approximately 1 to 1.25 meters. These structures were largely composed of adobe but appear to have a single course of fieldstone as their foundation. All four structures are in poor condition, largely consisting of their foundations and a course of largely melted adobes. These types of burial towers are mostly closely associated with the Estuquiña, late Late Intermediate Period culture (Stanish 2012). Only a handful of ceramic sherds were found associated with the *chulpas*, and while none are diagnostic, all fall within general LIP plainware traditions. Importantly, the location of these structures gives them a ten-kilometer vista south, down the central valley.

Sector Q

Sector Q is another small, quebrada-bottom mortuary sector. Located just below the southeastern edge of domestic Sector L, Sector Q likely holds thirty (30) individual tombs. All tombs appear to be circular cists with cobbles used to form above-ground collars. Almost all materials are diagnostically Tiwanaku. However, we also collected multiple Colonial-era olive jar fragments, suggesting Colonial-era looting.

Sector R

Sector R is a Late Intermediate Period cemetery located at the western end of L1. This sector occupies a brief planar just below the northwestern perimeter of Sector A and continues down eastward through the central quebrada bottom and slopes. There are an estimated forty (40) burials included in this perimeter. Tombs here are circular cists, often using large boulders as above-ground collars as well as further subsurface lining. While this sector has seen some recent looting, most disturbance appears to have occurred in prehistory. All diagnostic materials observed in Sector R are associated with the San Miguel material tradition.

Sector S

Sector S is a particularly small sector (totaling 0.03 hectares), located between Sector A and Sector L. This is a sector unique in that it is centered on a single (1) ambiguous feature, and a few collected ceramic sherds. The feature appears to be a roughly circular subsurface feature - it is assumed to be a tomb but only excavation will confirm this. The ceramic sherds collected are examples of particularly well-crafted Tiwanaku decorated redware.

Sector T

Sector T is a small mortuary sector located on a high ridge overlooking the Cinto Valley in the central portion of the site. In total there are likely fifteen (15) tombs in the Sector T cemetery. This sector is also located directly adjacent to one of the primary quebrada pathways that allows for site access from the north side. All tombs here appear to be circular cists with larger cobbles used as collar stones. All materials affiliated with Sector T appear to date to the late Late Intermediate Period and the Gentilar material tradition.

Sector U

The northernmost sector at Cerro San Antonio, Sector U covers a number of sandy slopes and hilltops overlooking the Cinto tributary. The sector begins just below the north perimeter of Sector L and expands north and eastward, covering 6.87 hectares. Due to the sector's overall orientation and location at a hook in the Cinto tributary, Sector U has been protected from the wind, which has resulted in more accumulation of sand and silt. There are a number of clusters of medium to small-sized boulders in the north and east areas of the sector.

Sector U is defined as a Tiwanaku-affiliated domestic sector. Compared to all other domestic sectors at the site, Sector U's surface scatter is quite sparse. However, even with low densities materials can be found throughout the sector. Apart from a single location, there are not the rockpile-midden deposits that define the Tiwanaku domestic sectors elsewhere.

As one of the primary Tiwanaku domestic sectors, Sector U was subject to intensive investigation for this study, including: systematic surface collection and limited excavations.

Sector V

Sector V is a small mortuary sector, located just north of Sector A and directly outside the Sector I quebrada cemetery. This cemetery appears to be composed of twelve (12) tombs. These tombs all appear to be circular cist-style tombs with the majority having some form of stone collar. While there are very few materials found directly associate with these tombs, diagnostic sherds suggest a Tiwanaku affiliation.

Sector W

Sector W is a Tiwanaku affiliated mortuary sector located on a planar surface just below the steep western slope of Sector A. Hard hit by recent looting events, there are currently forty-six (46) tombs exposed in Sector W, with a likely 100 left undisturbed. With just under 150 documented tombs, Sector W is the largest Tiwanaku-affiliated cemetery so far identified at L1. All tombs exposed here appear to be circular cist-style tombs - most have a single-course cobble collar. Interestingly, in addition to the standard circular collar, some of the tombs are further framed by a rectangular course of cobbles. Many examples of exposed human remains suggest most burials were interred in a seated-flexed position. Bodies were wrapped in a variety of textile garments and bound with vegetable-fiber cords. There appear to have been a variety of grave goods, including decorated redware ceramics, foodstuff (particularly maize), and wooden spoons.

Sector X

Sector X is a narrow quebrada mortuary sector. Like the neighboring Sector I and Sector K, Sector X is directly north of Sector A and the central quebrada pathway. There are likely less than ten (10) tombs located in this sector. All tombs are circular cists and use small boulders for above-surface collars. Only a few diagnostic materials have been found here and all are affiliated with Tiwanaku and the Middle Horizon.

Sector Y

Sector Y is the southernmost sector at Cerro San Antonio. The sector occupies a very brief planar surface that juts out halfway down the steep rocky slop which leads from the Sector A plateau to the Salado valley bottom below. There are likely a total of twenty-five (25) circular cist tombs in Sector Y and while very few materials have been found, diagnostic ceramics suggest a Chiribaya-Maytas affiliation.

Sector Z

Sector Z is a small mortuary sector located at the base of the southern slope leading down from the Sector F blufftop. Sector Z only contains four (4) circular cist-style tombs, making this one of the smallest Tiwanaku-affiliated mortuary sectors. This Tiwanaku affiliation was determined by a single Tiwanaku tazón sherd.

Sector AA

Sector AA is a small early-Historic Period material scatter. This scatter is located at the southern margin of the site at the base of a clear pathway and one of the few access points to the Salado valley bottom. The Sector AA scatter includes fragments of glass bottles, stoneware and porcelain ceramic sherds, as well as peach pits and goat bones.

Sector BB

Sector BB is a Gentilar-affiliated mortuary sector along a ridge line overlooking the Cinto tributary and just east of Sector T. Tombs at Sector BB are constructed as circular cists, using small boulders and large cobbles for above-surface collars. It appears that Sector BB holds fifteen (15) individual tombs.

<u>Other Archaeological Features</u>

While the vast majority of archaeological features fall within the officially delineated sector perimeters, there are a few reoccurring features that do not. While the features described below are important archaeological resources, their continuous or scattered nature made them difficult to include in sector boundaries, so they were cataloged in other ways.

Valley Access & Pathways

One critical set of features are the various natural access points and associated pathways which connect the above-mentioned sectors to the valley below as well as to each other. As has been noted, the vast majority of Cerro San Antonio's over six-kilometer perimeter is composed of sandstone cliffs and steep rocky slopes. Access to the site directly from the river must be made from one of seven primary access points which lead out to the valley bottoms.

Three of these access points can be found along the southern and southeastern site boundary, leading to the Salado, and three can be found on the north and northwest site boundary leading to the Cinto. The fifth and likely one of the primary access points to the site during most prehistoric periods can be found at the western end of L1, roughly leading directly to the confluence of the two tributaries and the central Locumba Valley. This access point leads directly to and from the central site quebrada.

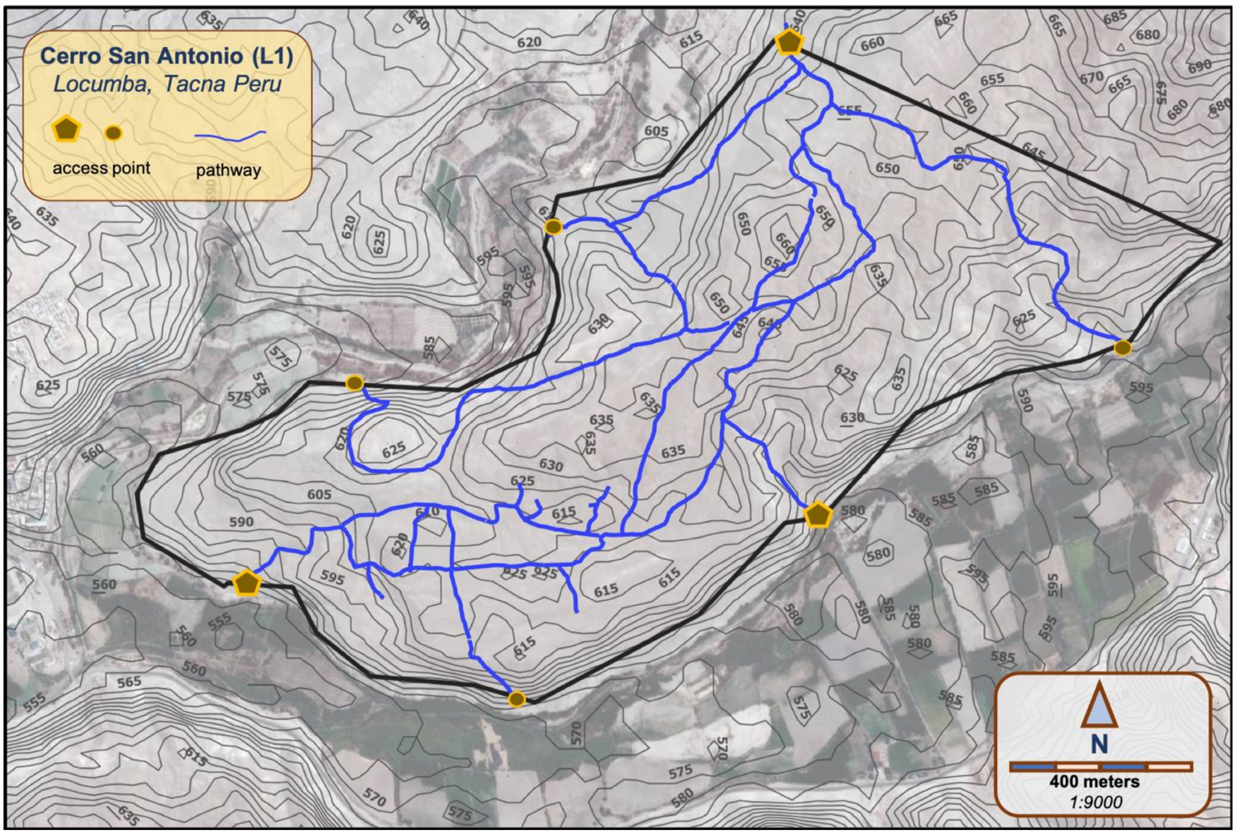

Figure 24. Map of Cerro San Antonio depicting all documented premodern pathways and primary points of access between the valley bottom and the occupied areas of the site.

The central site quebrada acts as one of the primary (and only) transportation corridors through the site. This deep, wide quebrada separates the large plateaus of Sector A (to the south) and Sector C (to the north) and smaller but clearly demarcated pathways lead directly up to these domestic sectors as well as some of the associated petroglyph locations. While the central quebrada contains some tombs and associated human remains from cemeteries in Sector R in the west and Sector E further east, for the most part it is relatively clear of cultural debris. Some of the petroglyph boulders (see below) are also concentrated near the western mouth of the quebrada. The central pathway follows the quebrada bottom for almost a kilometer before it opens into the eastern portion of the Sector A plateau. Here the pathway continues east, clearly demarcated by the clearing of all large stones. Finally, this path bifurcates, one path leading northwest and ending in the Sector I[91] quebrada cemetery, the other continues east eventually tapering off in the easternmost portion of Sector A.

There are also several demarcated footpaths along the eastern site of the Sector L plateau. One network of pathways connects Sector L, the Sector U and the Sector Q quebrada cemetery, before eventually leading to the Salado access point near Sector AA. Interestingly, these paths show signs of several much smaller paths running parallel with the main path - this pattern has observed being left by herders as the flock follows/is led by the herder. There are additional ways to access the broader landform, occupied from L1, especially from the north. Just beyond the northern boundary of the site is an old Colonial road which connect to the modern road about five kilometers up the Cinto tributary.

Petroglyphs

One of the best documented archaeological features at Cerro San Antonio (L1), before the start of this work, were its petroglyph-covered boulders (Umire Alvarez 2014). At least 109 individual boulders, containing thousands of individual pecked images and design elements can be found throughout the site. While there is some variability in the mode of these petroglyphs, the majority were made by pecking away the patina of small, medium, and large boulders - likely using a variety of different locally available hammer stones. Most igneous and metamorphic

[91] I first identified the Sector I cemetery by simply following this clearly demarcated path to the mouth of this otherwise tucked-away quebrada.

based boulders at the site have a relatively dark patina (of varying colors of grays, browns, pinks, and greens) and there did not seem to be a preference in which were selected for petroglyphs. Clearly important in boulder selection was location. There are five primary petroglyph clusters with a number of scattered isolated petroglyph boulders as well. The vast majority of the petroglyph boulders are found in three clusters at the western end of the site. There are 89 boulders in the L1 Western Cluster found at the westernmost margin of Cerro San Antonio. One of the densest clusters of boulders (30 petroglyph boulders) as well as the boulders most densely illustrated with petroglyphs are found in the L1 Salado West Cluster. The L1 Central Quebrada Cluster (41 petroglyph boulders) is found throughout the western portion of the central quebrada - found densest just 100 meters into the quebrada and along the slopes amongst the tombs in the Sector R cemetery. Finally, there are two additional, small petroglyph clusters, L1 Salado Central Cluster and L1 Salado North Cluster, at the Salado valley bottom access points in the northeast portion of the site.

As has already been noted, the 109 petroglyph boulders across the site hold thousands of individual images. A comprehensive description, let alone any form of analysis, is beyond the scope of this thesis. However, a breakdown of boulders and their design elements as well as a number of example images are found in Appendix XX. However, here it can be noted that the images and motifs can be broken down into four standard rock art categories: geometric, zoomorphic, phytomorphic, and anthropomorphic. Geometric images range from nested boxes and circles, square and rectilinear designs, and a variety of straight and wavy linear motifs. The vast majority of zoomorphic images seem to depict camelids, dogs, foxes, and deer; however birds and fish are also depicted. Most animals present were likely local species, with the exception of a clear depiction of a monkey, which could only be found on the eastern slopes of the Andes and the Amazon Basin. The most common phytomorphic motifs seem to be some kind of cactus or other plant, but these are often quite abstract. Finally, anthropomorphic images range from depicting humans doing standard activities - often relating to animals (herding llama, hunting deer). Anthropomorphic images also appear to depict superhuman beings or at the very least humans in headdresses or other regalia. Some boulders only contain a single image, while others are extremely dense with imagery, to the point of being near illegible with overlapping images. Likewise, sometimes just a single side of a boulder was used as a panel, while other time almost every available surface was used for imagery.

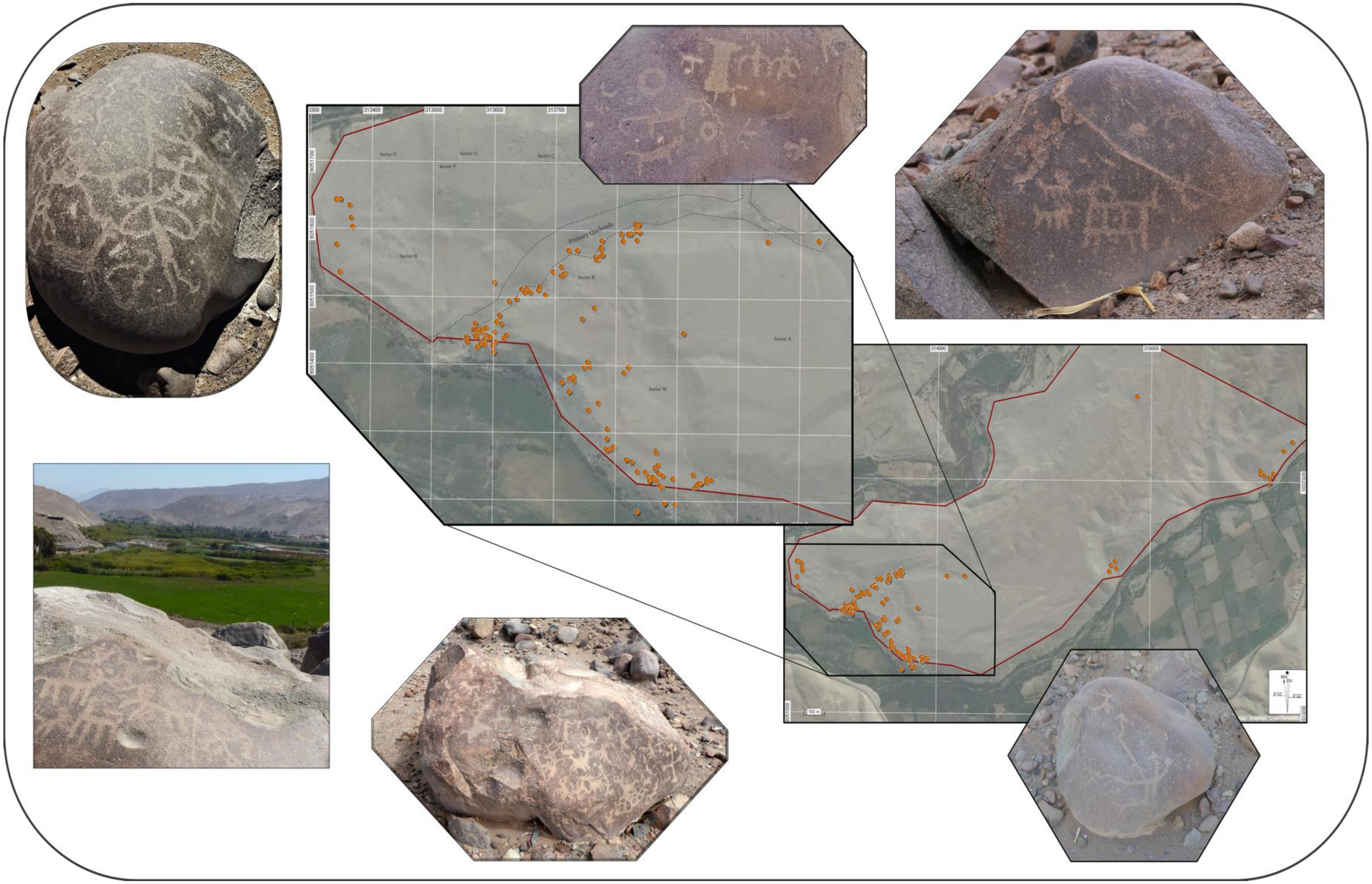

Figure 25. Map (and insert) indicating locations of all documented boulders with petroglyphs or other decorative alterations, with sample photos of petroglyphs.

Unless clear diagnostic motifs are employed petroglyphs and other rock art are notoriously difficult to date and affiliate with specific cultural traditions. Based on regional studies, the vast majority of motifs present on the Cerro San Antonio petroglyph boulders could be affiliated with Archaic through Late Horizon periods. However, new finds under the PAL survey in 2019, suggest some many motifs and styles of petroglyphs at L1 may be affiliated with Tiwanaku occupations.

Other Features

There are a few other unique cultural features at Cerro San Antonio. Of particular note are two related features at the far western extent of the site. This includes an adobe wall with cobble foundations situated approximately 15 meters on the slope above the valley bottom. Directly below this wall, cut into the slop about five meters above the valley floor is an old canal. Given the elevation and slope of this canal it was almost certainly fed by the Cinto tributary and has likely been out of use since the late 1950's. These features both likely date to the Colonial-era and are associated with the bodega in Sector J.

Disturbances

Situated directly across the Cinto-Salado confluence and within sight of the modern town of Villa Locumba, Cerro San Antonio (L1) has long been subject to disturbances, mostly caused by human activity. Here I briefly highlight some of the more disruptive practices that have taken place at the site and how they have impacted the archaeological record there.

Development

Most evidence at L1 suggests that, from at least the Formative Period almost every new group to occupy the Middle Valley of the Locumba drainage has had some impact on the site.

The prehistoric sectors dating to the first agriculturalists in the Formative, Middle Horizon, various times in the Late Intermediate Period, and again with the Spanish in Colonial times, attest to the importance of this location. While these occupations did tend to avoid one another (i.e., most sectors were only occupied once), later occupations likely borrowed usable stone for architecture and other useful items that could be salvaged from abandoned occupations. This is to say; the development of these prehistoric and historic settlements were the first disturbances at the site, and they certainly effected the archaeological deposits.

However, more modern developments (post ca. AD 1900) have also left a serious mark on the site. Immediately observable in aerial photos are a number of car tracks. Other than to service a set of power lines that cut across the far west margin of the site, there is little reason to drive across most to the site, and most of these disturbances appear to be punctuated events (i.e., not re-used roadways). However, the nature of the local sediment and erosion processes means once the fragile surface patina is broken, any disturbance becomes extremely noticeable[92]. In the northwest section of L1 there are also several small piles of garbage left by local farm owners over recent decades (1950s-present). This modern debris is particularly dense at the northwest Cinto access point where modern farm workers have set up residence, just adjacent to Sector N. There are also a few places where individuals have used locally available cobbles to write messages on hillsides - these generally are only a minor disturbance.

In this hyperarid region of Peru, it is common to attempt to claim land or at the very least demarcate property boundaries using the widely available cobbles and field stones, sometimes stacked into kurins, placed in a single line. There are a number of places, where over the years, individuals, and likely even official municipal projects, have demarcated various sections of the site, especially in the southeastern portion. For the most part these stone lines are not terribly

[92] For this reason, in important, relatively undisturbed sectors (such as Sector L) we tried to minimize our own foot traffic and always attempted to establish walking paths in quebrada bottoms where they would cause the least disturbance.

intrusive, and often draw their stones from quebradas outside the demarcated cultural sectors.

However, related to one of these sections of demarcated space, that falls within the eastern extent of Sector A, I observed an interesting phenomenon. I found four separate piles, each composed of hundreds of Tiwanaku plainware ceramic sherds, tucked away behind some boulders in nearby *quebradas*. The ceramic piles are almost certainly not the work of looters and no archaeological account mention anything about making collections like this. The most probable current explanation is that whenever the stone demarcations were made[93], the ceramics that fell within were collected so no complications could be raised due to it being an archaeological site. More formal, often painted stone markers as well as rebar and wooden posts can be observed at a few locations along the site's valley-side margins - these have been used for a variety of municipal road and survey projects.

Looting

Disturbances caused by modern and historic development pale in comparison to the destruction caused by modern and historic looting at the site. These looting events, while particularly intense in the recent decade, have likely occurred at the site for millennia. Every mortuary sector, from every cultural period, has been subject to looting. Extremely deflated and weathered backdirt piles in some cemetery sectors suggest pre-Spanish looting - this is particularly true in the Formative (Sector H) and Middle Horizon-era cemeteries (especially Sector B, Sector I, and Sector M). Later looting events can be tied to Spanish Colonial-era populations as indicated by the presence of Colonial-era goods in the Tiwanaku cemetery in Sector Q and the San Miguel blufftop cemetery in Sector F.

However, modern looting, taking place in the last ten years have been particularly

[93] In our low-altitude drone photos I noticed a large marker, written in stones on a hill directly adjacent to this specific demarcated area – while almost illegible, it likely says "PTAR a Ilo, Ano 1955" - PTRA seems to refer to a water resource project (Plantas se Aguas Residuales) based out of the neighboring port city of Ilo back in the mid-1950s.

destructive to mortuary deposits at L1. Between 2014 and 2017 a team of looters exposed, sacked, and largely destroyed at least 200 individual tombs, primarily across seven sectors. The hardest hit contexts, included Sector D, Sector E, and Sector P in 2014, Sector B, Sector C, Sector F, and Sector W in 2016, and Sector C again in 2017. Most of the hardest hit cemeteries were affiliated with the Middle Horizon and Late Intermediate Period.

In addition to destroying irreparable archaeological contexts and stealing and often breaking important artifacts, the looting of mortuary contexts is particularly disturbing as the perpetrators disrespectfully destroy human remains. At the peak of looting in 2015 human remains were strewn about, covering around one hectare of the surface in total. In 2016 PAL and this project worked with the Tacna regional office of the Ministerio de Cultura to document what was salvageable and rebury many of the human remains out of respect. There have also been more aggressive deterring measures taken in recent years. In 2014 two looters were cited for illegally being on the site[94] and in 2016 there was a municipal organized arrest, in which two looters were caught with over 200 individual artifacts[95] they were preparing for sale. This last arrest event was made quite public and has in some sense put Cerro San Antonio in the spotlight for new regulations in protecting cultural patrimony in Peru. As of 2019, L1 received special protection status from the Ministerio de Cultura which diverts resources for developing site protection.

Bioturbation

While there is truly no vegetation to speak of anywhere on the site, there are a number of animal-based disturbances that have affected some archaeological deposits. Some of the

[94] This only occurred because on our two-day site visit in 2014 we witnessed looters on site, in the act, and were able to provide the authorities photos.

[95] These items are kept in the regional museum, Las Peañas in Tacna Peru - some documentation can be found in Appendix XX.

more minor disturbances come from birds - vulture guano covers a number of the petroglyph boulders and burrowing owls have been observed in some of the quebrada tombs and Colonial adobe structures. Invasive Argentine hares are found throughout the site. They use both tombs and rockpile-midden deposits for temporary burrows at night. In particular, their burrows in the rockpile-midden deposits can create confusing patterns, that might otherwise be interpreted as cultural. In a few select locations there has been evidence for rodents (likely field mice) using organic materials midden deposits for nests. Finally, in many locations there are, sometimes quite dense, deposits of land snails (or at least their shells). Importantly, these dense snail shell deposits are always associated with domestic midden deposits. However, as will be discussed in the excavations results in Section 2, these are not ubiquitous among midden deposits.

3.3 Chapter Summary

In Chapter 3 I reviewed the basic materials used in this study. This refers primarily to the archaeological site of Cerro San Antonio (L1) and the archaeological data collected there.

3.1: Here I provided geological, ecological, and historical context for the broader setting of my study - the Locumba drainage in the southern Peruvian department of Tacna.

3.2: This subsection is a detailed overview of the principal locus of my study, the multi-component archaeological site of Cerro San Antonio. This includes a sector-by-sector description of the individual archaeological components delineated at the site.

Next: Chapter 4 defines the various methods and other techniques I utilized for my study at Cerro San Antonio. This includes an extended explanation of my approach to data collection, archaeological analysis, and ultimately anthropological synthesis.

Chapter 4: Methods

In this chapter I outline the methods I have utilized to carry out my dissertation research in both the field and laboratory, including a brief timetable of my entire dissertation process. I walk-through each of the primary categories of archaeological field strategies I undertook in my work at Cerro San Antonio: Reconnaissance, Systematic Surface Collection, and Excavation. Here, I also detail the laboratory-based techniques I selected for cataloging and analyzing the materials collected during field work. The findings and results of these methods are provided in Section 2 (Chapters 5-8).

This chapter also introduces the basic analytic and interpretive structures I use to synthesize my data into a broader anthropological discussion. Here, I build on the discussion of Chapter 1, and explain how I frame this study, and specifically the network-based approaches I employ to bridge the data collected on-the-ground to the broader meaning and implications of those findings. I outline my multiscalar framework and explain how the methods described above can inform analysis of multi-modal community networks at three separate scales: microscale, mesoscale, and macroscale. The final product of this analysis is the subject of Section 3 (Chapters 9-11).

Finally, this chapter further outlines the three primary hypotheses (and their variants) I developed to guide my research at Cerro San Antonio (L1). Establishing effective methods for engaging these hypotheses shaped my broader strategies throughout the dissertation research process. While first presented in the Introduction, my discussion here outlines my three primary hypotheses as well as their likely archaeological correlates and how the methods described here worked to collect that data. I also highlight some of the implications of each hypothesis to the broader Tiwanaku story, were it supported by the data collected. I weigh the validity of these hypotheses throughout my discussion in Section 3.

4.1 Data Collection: field & laboratory methods & procedures

In this section I describe the methods and procedures employed during data collection, both in the field and in post-field laboratory analysis. This field work and material analysis took place across three primary field seasons but supplemental work was completed during four additional seasons (Table 7).

Table 7. Major phases of field and laboratory work discussed in the text.

Season	Work Completed	Peruvian Ministerio de Cultura Permits
2012, 2013, 2014	Initial site visits, reconnaissance, and logistical setup	-
2015	Systematic pedestrian survey and sector mapping	#00359-2015/DGPA/VMPCIC/MC
2016	Systematic surface collection, test excavations	#0319-2016/DGPA/VMPCIC/MC
2017	Laboratory material analysis	#076-2016-GM-A/MPJB
2018-19	Large-scale excavations, laboratory material analysis	#0388-2018/DGPA/VMPCIC/MC & #0199-2019/DGPA/VMPCIC/MC

<u>2012-2014</u>

I made my first visit to the middle Locumba Valley and the site of Cerro San Antonio (L1) in April of 2012.[96] This initial site visit allowed me to locate the site in relation to the modern town of Villa Locumba and begin noting the cultural affiliation of diagnostic materials found on the surface. However, this was just a day trip and time at the site was limited.

[96] This visit was made on May 6, 2012 with Dr. Paul Goldstein and two Peruvian archaeologists Alexander Sicos and Herber Cahuana.

I returned to the site the following year in August of 2013.[97] While still just a day trip, we were able to explore the site more extensively - including locating one of the primary Tiwanaku-affiliated domestic sectors (Sector A).

In 2014 I made my final initial site visits and was able to initiate logistical connections in Locumba and the department capital of Tacna. During these visits we contacted municipal officials in Locumba as well as notifying officials in the local office of the Ministerio de Cultura in Tacna of our plans for a formal project.[98] I made a separate two-day visit to the site of Cerro San Antonio where I was able to conduct further reconnaissance and prepare for formal survey.[99]

2015

2015 represents the first formal season of field work conducted at Cerro San Antonio, as a component of the broader Proyecto Arqueologío Locumba (PAL).[100] Field work at L1 was conducted over approximately seven weeks in August-September of 2015. During the 2015 season our crew consisted of myself, two other graduate student supervisors, twelve UC San Diego undergraduate field school students, and the two project directors. The primary objectives of PAL in the 2015 season focused on systematic pedestrian survey of the Cinto branch of the Locumba drainage. During this initial season we did not collect, instead photographing and drawing artifacts in the field and on locating and delineating boundaries for new sites and

[97] This visit was made on August 2, 2013, with Dr. Sarah Baitzel, Giacomo Gaggio, and David Neiss.

[98] This visit was made on August 6, 2014, with Dr. Paul Goldstein and Lic. Antonio Oquiche. This visit would form as the foundation for the development of Proyecto Arqueologíco Locumba (PAL).

[99] This visit was made between August 21-22, 2014, with Kathleen Huggins.

[100] This work was conducted within the PAL project under permit #00359-2015/DGPA/VMPCIC/MC issued by the Peruvian Ministerio de Cultura to Dr. P. Goldstein and Lic. A. Oquiche.

sectors. This no-collection policy included the 2015 work at Cerro San Antonio, so no collections of any kind were made in 2015. With the full seventeen-person crew we worked for over two weeks at Cerro San Antonio, conducting systematic pedestrian survey and working to delineate individual sectors within the expansive site - documenting surface materials, but leaving artifacts *in situ*. I was able to invest an additional five weeks of work at L1, further fine-tuning sector boundaries and mapping major surface features.

2016

In 2016 we returned for the second season under PAL in the middle Locumba Valley for a more extensive field work, lasting for approximately 8 weeks, from late July-September of 2016.[101] This work was conducted with myself, three other graduate student supervisors, ten UC San Diego undergraduate field school students, and the two project directors. Broader PAL objectives for this season included completing the systematic pedestrian survey of the Cinto branch and initiating systematic survey of the Salado branch of the middle Locumba Valley. This season we had arranged for appropriate storage facilities locally in Villa Locumba, so we initiated systematic surface collection-based field strategies. Work at Cerro San Antonio included the continued delineation and mapping of sectors within the site and initiating systematic surface collection units in the Tiwanaku domestic sectors (primarily Sector A and Sector U). We were also able to initiate excavation at L1 during the 2016 season with five test excavations in Sector A at Cerro San Antonio. Finally, we were able to initiate material analysis, completing initial cataloging of all materials collected during the 2016 season.

[101] This work was conducted under custodia permit #0319-2016/DGPA/VMPCIC/MC issued by the Peruvian Ministerio de Cultura to Dr. P. Goldstein and Lic. A. Oquiche.

2017

2017 was a lab-based season for Proyecto Arqueologío Locumba and for my work specifically at L1. I was able to complete secondary analysis of materials collected during the 2016 season,[102] including selecting and preparing a batch of materials for exportation to and analysis in the United States.

2018-2019

The final season of PAL consisted largely of work conducted at Cerro San Antonio was completed over three separate segments: from July-October of 2018, January-May of 2019, and July-August of 2019. As with the prior field seasons this work was conducted as part of the broader PAL survey project.[103] Most work over this extended field season was conducted with a smaller crew (often just myself and a single volunteer), focused exclusively on my research at Cerro San Antonio. During the first segment of the field season in 2018 we completed the systematic surface collection units in the Tiwanaku domestic sectors at L1 and prepared the locations of excavation units. During the second segment of field work in the first half of 2019 we completed extensive household excavations at select locations at Cerro San Antonio as well as completing most analysis of materials collected. In the third segment during the 2018-19 field season in the summer of 2019, we excavated a final unit at L1, and I completed analysis of all materials collected and participated in the Locumba valley survey.

In the section that follows I divide my discussion of methods and materials employed during the work outlined above into four primary subsections: Reconnaissance & Aerial Photography, Survey & Systematic Surface Collection, Excavations, and Material Analysis. The

[102] This lab work was possible under custody of materials via permit #076-2016-GM-A/MPJB.

[103] This work was conducted under permit #0388-2018/DGPA/VMPCIC/MC and extension permit #0199-2019/DGPA/VMPCIC/MC issued by the Peruvian Ministerio de Cultura to Dr. P. Goldstein and Lic. A. Oquiche.

results from this work can be found in Section 2 (Chapters 4-7).

Reconnaissance

Here I describe methods and strategies employed for initial surface-based work at Cerro San Antonio (L1). All of these methods are relatively non-destructive surveying techniques and did not involve the systematic collection of any archaeological materials.

Aerial Imagery

As noted already in this chapter (3.1), while some previous archaeological investigations had touched on Cerro San Antonio, little systematic work had been done at the site or throughout the broader middle Locumba Valley. Therefore, one of the first tasks, even before initiating fieldwork, was assembling images and generating maps that could assist in guiding initial fieldwork. As with most modern archaeological projects, we first went to the open source platform of GoogleEarth. Generated using frequently updated satellite and ground-based imagery, GoogleEarth has become a powerful tool for archaeological projects. Not only is it a free platform with relatively high-resolution imagery, but it also includes basic measurement tools as well as the ability to view imagery taken at different times. Areas with little to no vegetative or other type of ground cover are particularly ideal for using this type of imagery as low-profile and even subsurface features can be quite visible (often more-so than what can be seen when on the ground).

In addition to the satellite imagery, I was also able to acquire high-altitude aerial photos from the Peruvian Servicio Aerofotografico Nacional (SAN), which catalogs and sells declassified aerial photos from the Peruvian Airforce. While this area appears to have less areal coverage than other localities in Peru, there was a single photo,[104] from a military flyover in

[104] SAN Photo: 455-97A

1997, that showed L1 is some detail. For more detailed topographic data I also relied on the 1:100,000 scale topographic maps produced by the U.S. Defense Mapping Agency[105] as well as ASTER digital elevation maps provided by NASA.[106] These maps help translate the detailed imagery found on GoogleEarth into more quantifiable spatial-based data. The maps generated from the synthesis of these various data were essential for every step of the project, but of particular use in expediting initial survey by assisting in identifying important areas to target in initial reconnaissance.

Another way in which aerial imagery played an important role in this project was through my use of an unmanned-aerial vehicle (UAV), more commonly referred to as a drone, for low-altitude photography. UAVs have become relatively affordable and relatively compact, making them extremely useful tools for archaeological field work (Fernández-Hernandez, et al. 2015). We used a Mavic Pro[107], which was relatively light and compact yet had good stabilizing capabilities and most importantly came equipped with a 35mm camera (equivalent). For this project, I used the drone for two primary tasks: 1) broader site/sector mapping (discussed here) and 2) overhead photos for excavations (discussed below). In addition to providing essential visual documentation these low-altitude site and sector photos were used for developing three-dimensional models of important surface features as well as the site as a whole.

Photogrammetry and structure-for-motion digital programs have quickly become important elements of any archaeologist's tool kit. These programs have the ability to stitch

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[105] Cerro San Antonio (L1) falls onto three separate maps: 2735-Locumba(36-U), 2736-Moquegua(35-U), and 2836-Tarata(35-V). High resolution scans of all topographic maps from this series (J632) in Peru are generously hosted on the University of Texas Libraries website (http://legacy.lib.utexas.edu/maps/topo/peru/).

[106] The ASTER (Advanced Spaceborn Thermal Emission and Reflection Radiometer) files are elevation models developed by NASA and their collaborators through satellite imagery based on global thermal readings. These are also available online for free (https://asterweb.jpl.nasa.gov/gdem.asp).

[107] In our 2018 pilot research with the drone I used a Mavic Pro owned by Dr. Paul Goldstein and the PAL project. In my 2019 excavations and mapping I used my own personal Mavic Pro.

together mosaics of sequential photographs and generate three-dimensional point clouds, which can then be meshed and textured, generating relatively accurate three-dimension models of outdoor contexts. These models can provide essential context information post-fieldwork and are excellent for later presentation purposes. An important feature of the Mavic Pro camera is that each photo is geotagged with a reference point, which allow these models to be georeferenced and utilized for more advanced mapping purposes.[108] For additional spatial accuracy I relied on permanent reference points we placed strategically throughout the site as well as the southwest corner nails and datums of excavation units. Each of these points had been shot in using a differential GPS (process described below) and were therefore accurate up to 1-3 centimeters. By capturing these reference points in our flyovers, we were able to increase the accuracy of our georeferencing.[109]

To generate the high-definition models and imagery discussed above, a significant and relatively consistent overlap was needed between each overhead photo.[110] To achieve this we had to develop a strategy that would allow for automated, systematic flyovers. After some trial-and-error, our final solution involved incorporating three separate programs: the DJI Fly application, Litchi Mission Hub, and ArduPilot Mission Planner.[111] Briefly, we would use ArduPilot to map out our given survey area and generate a basic flight plan, then we would use the DJI Fly app to sync and calibrate the compass of the drone itself, and finally use the Mission

[108] For instance, these models can be reformatted into two-dimensional TIFF images, which can be used for incredibly high-definition aerial images of important sectors in maps.

[109] In order to see these reference points (often rebar or even nails) we used small plastic cones (used in children's sports) - these are flat, come in a variety of colors, and are exactly 20cm in circumference. In addition, we used brightly-colored flagging tape to mark the location of wall foundations and other features.

[110] Based on the work of others and my own trial-and-error a 40-60% overlap between photos seems to be ideal.

[111] This combination of programs was first suggested to me by Dr. Bruce Owen.

Planner flight plan loaded through Litchi Mission Hub to actually complete the photo survey in the field.[112]

Pedestrian Reconnaissance

Much of the initial as well as ongoing work at Cerro San Antonio involved simple on-the-ground observation, which I refer to here as pedestrian reconnaissance. While some of this reconnaissance work was done in a systematic fashion, I separate it from the systematic surface collection (discussed below) as it did not involve the systematic collection of any materials. Pedestrian survey could involve simple informal walks across the site looking for important surface features, material scatters, or disturbances (i.e., looting) but did also involve more systematic coverage and even limited opportunistic material collection. The results of this work are presented in Chapter 5.

Informal pedestrian reconnaissance involved initial site visits in 2012-2014 as well as almost anytime team members crossed through the site during more intensive fieldwork (2015, 2016, 2018-19). Initially we used this informal technique to find the major sector boundaries - literally observing where material scatters began and ended on the surface. During our 2015 season we engaged in a more systematic survey technique at Cerro San Antonio. Following standard PAL survey practice, we would use teams of 5-10 people and pace-off in even intervals (depending on terrain, 10-20 meters apart), and then use basic compass headings to systematically walk transects over the site. The main goal of this systematic pedestrian survey was to define pre-modern occupations through locating and mapping material scatters on the surface[113]. When pre-modern materials or features were identified the team would then pace off

[112] We used an iPad with data-capabilities in the field - this allowed us to load multiple models in Litchi (which needs an internet connection) as well as edit flight plans if necessary.

[113] We would estimate the density of surface materials (ceramics in particular) and features, but any non-culturally sterile surface was delineated as a sector.

from the find to determine if it was isolated or part of a more substantial material scatter. If found to be an articulated scatter, a perimeter would be defined and delimited using a handheld GPS (see below). Through this method we were able to complete 100% coverage of the site and delineate a detailed site map of sectors.

In addition, more specialized and focused systematic survey methods sought to define spatial distribution patterns of specific material types in specific loci. While a number of such studies were initiated, the only one that was completed and is reported on here is a systematic survey of the distribution of ground-stone lithic materials in Sector L. To conduct this survey an area was demarcated with pin-flags and systematically walked by a single crew member. This crew member identified every ground-stone lithic tool within the area, recording its location with a handheld GPS, photographing it, and finally recording several attributes, including its type within our developing typology. The typology and this survey are discussed in greater detail below (see Chapter 5 and Chapter 8).

While materials were not systematically collected in this mode of work, on occasion we would locate an important, diagnostic, or delicate item on the surface and collect it for preservation and future analysis. These materials, called "Spot Finds,"[114] can be important for recording and preserving important artifacts that fall outside systematic surface collection or excavation units. However, to preserve *in situ* contexts for future research we would collect these spot finds sparingly, often deciding to photograph items in the field instead of collecting. Spot finds were recorded, photographed, or drawn in situ during the initial visits and 2015 PAL season, and collected in the 2016 and 2018-19 seasons.

All pedestrian reconnaissance work was guided using handheld GPS devices[115]. The handheld GPS units have up to three-meter accuracy and are sufficient for initial reconnaissance purposes. Waypoints were recorded to mark sector boundaries (see below),

[114] When referring to these items in Spanish, we use the term "Especiales" or "Specials."
[115] We used Garmin etrex x20 and Garmin etrex x30 for all survey work.

important features, and the location of spot finds. In addition, photos were also taken of all important contexts and finds for additional documentation.

Mapping

A third major mode of non-intrusive reconnaissance field work was mapping. Of course, mapping was important at almost every stage of field work and analysis, and it is discussed as it pertains to those specific tasks in each individual subsection. However, here I highlight some of the more important general procedures we followed in collecting spatial data and programs used in generating maps.

A variety of techniques and instruments were utilized for field mapping. Our most basic and ubiquitous instrument was a standard magnetic compass. Compasses were used for basic orientation during survey and mapping as well as for laying out initial units. We utilized handheld GPS units for most reconnaissance-based work - especially delineating the sector boundaries. Once an initial material scatter or feature was identified during reconnaissance a GPS waypoint was marked and a pin-flag was placed. Then, the survey crew would gather at that point and pace off (often in cardinal directions, but this depended on the terrain), placing another pin-flag once they covered approximately twenty meters without identifying any additional material or features. Once the basic extents of the sector were confidently identified, one team member would walk between the flags, marking GPS waypoints in 5–20-meter intervals. We also used handheld GPS units to map most perimeters of major surface features such as plazas, mounds, and looted tombs. However, in a few instances we used more detailed surface mapping instruments. In 2016 we used a traditional plane table mapping method, using an alidade, to map a few of the most badly looted cemetery sectors as well as a total station in 2018 for some mapping of the Tiwanaku domestic sectors.[116] A final survey/mapping instrument we used was a

[116] Both the alidade-plane table setup and Topcon GTS 102N Total Station were loaned by Dr. Paul Goldstein.

differential GPS[117] - far more powerful than handheld GPS units, this instrument can provide accurate readings down to 1-3cm. The differential GPS was used during the initial portion of the 2018-19 season to shoot-in precise coordinates for: 1) previously excavated 2016 test excavation units (SW corner nail) and 2016 datums, 2) 2019 excavation units (initial SW corner nails) and their datums, and 3) permanent reference points in each major area of the site.

All of the mapping data collected for this project uses the Universal Transverse Mercator (UTM) system for assigning geographic map coordinates. In the zone-based system that defines UTM, Cerro San Antonio (L1) and the wider middle Locumba Valley fall into Zone: 19K (south). The UTM system relies on the 1984 World Geodetic System for all navigation standards (WGS 84) and uses a *northing* for its latitudinal (y) coordinate and an *easting* for its longitudinal (x) coordinate. In this text and throughout the figures the UTM northing and easting coordinates are often indicated simply by a *N* and *E*, followed by their respective coordinates. Different measuring and survey instruments produce different levels of accuracy in terms of these coordinates - for instance our handheld GPS units had an accuracy down to +/-3 meters whereas the differential GPS we used can get down to 1–3-centimeter accuracy. In the text and figures I always report the complete coordinate reading, whether it includes one decimal place or three. All coordinate and other measurements reported are metric. One final important mapping note, at this southern latitude the declination can be quite extreme[118] and while most of our digital instruments were calibrated for this, we did have to make sure to set declinations on all standard compasses.

I also utilized a suite of digital mapping, or geographic information systems (GIS), programs for this project. As has already been noted, for initial pre-field mapping and planning we utilized open-source GoogleEarth as well as digital versions of the USDMA topographic

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[117] This Trimble DGPS unit was generously loaned for use by Dr. Donna Nash.

[118] For our locality the average declination between 2015-2019 was 5.74° west of True North.

maps. However, once we were working with data collected in the field, we needed more advanced programs to manage and analyze the data. To manage waypoint data collected by handheld GPS units I mainly used ExpertGPS. While not open-source, this program is an extremely useful tool for organizing and displaying spatial data collected from handheld GPSs as well as converting waypoint data into a variety of other formats. For more advanced spatial analysis and mapping I have utilized Esri's ArcGIS, but eventually shifted to using QGIS - an open-source geographic-information-system platform that can complete the same functions as more expensive platforms. Using a combination of ExpertGPS and QGIS I have generated most of the final maps displayed in this thesis - including most of the kernel-density and heat maps presented in Section 2. Finally, to meet Peruvian Ministerio de Cultura requirement, all major maps have also been converted to AutoCAD.

One of the most important initial mapping tasks, especially pertaining to the systematic survey work at the site (described below), was implementing a site grid. Starting at the even UTM coordinate that fell closest to the southwestern-most corner of Cerro San Antonio's perimeter (N8051150 E313300), I developed a site grid composed of 50x50m units. Due to the irregular nature of the Cerro San Antonio (L1), some of the units in the broader grid fall outside the site perimeter and therefore were obviously not counted towards site units. Each unit was given an alpha-numeric unit name -beginning with 1A and ending with 31NN.

Systematic Surface Collection

One of the important intermediary modes of field work, between the non-intrusive reconnaissance and destructive techniques of excavation, is systematic survey, involving the collection of materials. This work was based exclusively off the site grid and was defined exclusively by surface collection units.

Surface Collection Units

We utilized the broader site grid (described above) to implement a systematic sampling strategy for our surface collection units. For this strategy, in every 50x50 meter (2500m²) unit of our general site grid we would collect the southwestern-most 10x10 meter (100m²) unit. This results in a 4% overall coverage of the sectors sampled.[119] As time did not permit me to cover the entire site, I mostly targeted sectors deemed in reconnaissance to be affiliated with Middle Horizon period domestic occupations (Sector A, Sector L, Sector U).

My procedure for surface collection units would be to select site grid units that were to be sampled for that day and upload their southwest corner coordinates into handheld GPS units. We would then use the waypoint-finder function to locate the units in the field. The 10x10 meter units would be measured using 50-meter tape measures and standard compasses. Pin-flags would be placed in the corners and strings (or the 50m tapes) would be used to demarcate the unit boundaries. Then a team of 2-10 individuals would systematically walk the unit collecting all materials believed to be cultural in nature.[120] Materials were collected and sorted in the southwest corner of the unit. Even with the excellent organic material preservation of the area, the vast majority of surface materials encountered and collected were inorganic durable material types (ceramics, lithics, some bone). However, even so, due to the high quantities of materials (in some units) and the overall number of surface collection units we completed, we only collected diagnostic artifacts.[121] For ceramics this meant only collecting rims, bases, handles, and decorated sherds. Also, if we encountered multiple or extra-large lithic artifacts

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[119] This may seem rather small but the sectors targeted had very dense material deposits, in some cases a single unit resulted in thousands of individual artifacts. Also, this 4% coverage is comparable to other similar surface collections in the region (Goldstein 1989).

[120] This precise strategy would depend on the number of crew members, time of day (shadow), and the nature of the terrain/deposits.

[121] This limited collection strategy is also meant to lessen the burden of storage on local Peruvian infrastructure.

(namely large ground stone tools, like *manos*) we would only collect an example specimen. However, even if not collected, all materials from collection units (including non-diagnostic ceramics) were analyzed and counted, weighed, and photographed, before being left in the field. 10x10m units that fell onto a steep slope or something of that nature were written off and marked as “not-collected.”

Excavations

Excavations at Cerro San Antonio were conducted during two separate field seasons: 2016 and 2018-19 (Table 7). These excavations targeted sectors deemed to be both predominately domestic in function and Tiwanaku in cultural affiliation through initial reconnaissance and confirmed through systematic survey and surface collection. All excavations were conducted after the sector being sampled was fully mapped and systematic surface collection units were completed.

2016 Test Excavations

In 2016 we excavated five 2x2m² test units in Sector A at Cerro San Antonio (L1A) for a total of 20 square meters excavated. These excavations were used to determine the depth and complexity of deposits in Tiwanaku domestic occupations at Cerro San Antonio and help gauge the extent of our future excavations at the site. The locations of these five units were selected based on results from the systematic pedestrian survey and surface collection of the sector. Each unit was excavated by a separate team, composed of one supervisor and approximately three undergraduate students.

While locations for each unit had been preselected, units were located and placed using handheld GPS units. Once we had reached the approximate location of our preselected units, we would place a 10cm nail (blue-flagging). We would then take between 5-10 additional handheld GPS waypoints on the nail - using the average of these waypoints as the official UTM for the southwest corner of the unit. As with our surface collection units, the southwest corner acted as the primary point of reference for all units as well as excavation areas and subareas (when possible).[122] Additional flagged nails (orange-flagging) were placed at the final three two-meter intervals, using standard three-person measuring tape-compass triangulation methods.

Excavations followed standard archaeological procedures. Each 2x2m unit was excavated in one-meter quadrants until surface features indicated natural or cultural area divisions. Excavation levels were dictated by changes in sediment consistency and color as well as by materials and features encountered.[123] While level depths could vary, most levels did not exceed 5cm and many were as shallow as 1cm deep. Standard Marshalltown trowels (pointing, 5 x 2.5" blade) and broad, fine-bristle brushes were used for most sediment removal. The fine-grained nature of most sediments encountered mandated that sediments were swept directly into dustpans and removed immediately, otherwise the sediments often scattered and smeared, masking important features. Any materials or architectural features which appeared to be close to locations of original deposits were left in situ until they could be photographed and mapped. All features were first bisected (when possible), so internal feature profiles could be documented. Excavations were considered complete when culturally sterile deposits were reached.[124]

Excavated sediment would be piled into buckets, with each bucket filled to a marked fill-line, ensuring each bucket held approximately the same volume - 10 liters. All removed

[122] Unlike our systematic surface collection units, the location of our excavation units did not (and were not intended to) align with even intervals in the broader UTM-based site grid.

[123] Standard geological terms were used for sediment descriptions with Munsell color charts being used to determine color of sediments and other deposits.

[124] In most units a $1m^2$ sounding unit was excavated down between 25-75cm in order to confirm no deeper deposits were present.

sediments were sifted through 1/4” wood-framed screens, with contexts deemed to be near occupational floors (”*superpiso*”) and features sifted through fine-screen mesh (~ 1mm screen). All materials collected were put into bags for post-field sorting. Materials mapped as in situ spot finds were bagged separately.

Once an entire unit reached the base of an excavated level, the unit would be photographed and mapped. Local datums were used for elevations.[125] For subarea mapping nomenclature we used lower-case lettering for initial quadrants (e.g., *quad. c*), upper-case lettering for formal subareas (e.g., *Area B*), and features received sequential numbers for each unit (e.g. *Rasgo 2*). Once completed profiles were mapped for all unit profiles. Every excavated context received an individual field form which documented all pertinent context info (See Appendix XX). Photos were also taken of every context, including overhead photos at the base of every major excavation level.

2018-19 Household Excavations

The scope of excavations during the 2018-19 season were far greater than the test excavations of 2016 and therefore our approach was also quite different. However, for continuity we attempted to follow similar procedures to those outlined above, when possible. In total, five excavation blocks were completed in the 2018-19 season - two in Sector A (L1A), two in Sector L (L1L), and one in Sector U (L1U), totaling 176 square meters of excavated area. Almost all 2018-19 excavations were completed by myself and a single trained volunteer.

My overarching strategy for these excavations conform to what has become an archetypal set of archaeological techniques and perspectives, known collectively as *household archeology* (Parker and Foster 2012). As detailed above (see 1.2), my theoretical formulation of

[125] We used 1/2” iron rebar, set ~30cm into the ground for three of our datums (Datums: L1A-1, L1A-2, L1A-4), and marked points on large boulders for the other two (L1A-3, L1A-5). UTM and elevations were first ascertained by the handheld GPS triangulation method described above and were later shot in using a differential GPS.

the social unit of household differs slightly from many of the traditional definitions that have guided the household archeology approach. However, the fundamental field sampling strategies, first outlined in household archeology studies, were central to my approach in the 2018-19 excavations.

In addition to turning the gaze of archeology away from the sacred precincts of exclusive temples and breathtaking offerings of elite burials and towards the domestic contexts that defined everyday life for past populations, this change in perspective came with a set of approaches for how to best delineate these domestic contexts; namely exposing complete domestic structures along with their associated features through wide-area excavations. The goal of these wide-area excavations is to expose spatially associated clusters of materials which through various analytic techniques (described below in 3.3), can be hypothesized to represent possible domestic *activity areas* (Kent 1990).

To expose complete activity areas, the final area of excavations in the 2018-19 season were determined by the nature of deposits and associated features we encountered and as such were often not regular in dimensions. Therefore, I often refer to these individual excavation locations as *excavation blocks* here in the text, but they still often appear as *excavation units* in figures, tables and supplemental materials. Excavation blocks were initiated as 4x4m units, composed of four 2x2m quadrants (labeled a-d). These 2x2m quadrants served as the initial excavation subareas unless visible architectural features on the surface dictated otherwise. The initial 4x4m units would be expanded in 2x2m unit expansion units; again, depending on what was encountered. The location of the initial 4x4m units were determined by varying criteria - depending on the sector being sampled. Most units were selected to further expose architectural elements already visible on the surface. These were often segments of wall foundations and the base of posts. However, locations for units in Sector A also worked to expand a few of the more promising test excavations opened in 2016. Once selected the unit locations were marked by a flagged nail (orange-flagging) - this nail served as the southwest corner of the initial 4x4m unit (quad. a). These excavation block southwest corner nails were shot-in using a differential GPS unit which provided UTM information with sub-meter accuracy. Additional flagged nails (orange-flagging) were placed at all two-meter intervals in the initial 4x4m units and in the corners of all 2x2m expansion units, using standard three-person measuring tape-compass triangulation methods. Additional unit nails (yellow-flagging) were placed a one-meter intervals once the first occupational levels (*superpiso*) were encountered.

As with the 2016 test excavations, all 2018-19 excavations followed standard archaeological procedures. Each 4x4m unit was excavated in two-meter quadrants until surface features indicated less arbitrary unit subarea divisions.[126] Initial 2x2m units (and when possible subsequent expansion 2x2m units) were first excavated in an alternating checkerboard pattern in order to preserve profiles for inspection. Excavation levels were dictated by changes in sediment consistency and color as well as by materials and features encountered. While level depths could vary, most levels did not exceed 5cm and many were as shallow as 1cm deep. Standard Marshalltown trowels (pointing, 5 x 2.5" blade) and broad, fine-bristle brushes were used for most sediment removal. The fine-grained nature of most sediments encountered mandated that sediments were swept directly into dustpans and removed immediately, otherwise the sediments often scattered and smeared, masking important features. Any materials or architectural features which appeared to be close to locations of original deposits were left in situ until they could be photographed and mapped. All features were first bisected (when possible), so internal feature profiles could be documented.

Excavated sediment from all 2018-19 contexts would be piled into buckets, with each bucket filled to a marked fill-line, ensuring each bucket held approximately the same volume - 5 liters. All excavated contexts were sifted through fine-screen mesh (~ 1mm screen). All materials collected were put into bags for post-field sorting. Materials mapped as in situ spot

[126] *Level 1* in every 2x2m unit was treated as a surface collection unit (*superficie*) - after being photographed and mapped, all materials visible on the surface were collected.

finds were bagged separately. However, because these excavations were completed by a team of just me and a single volunteer we were able to control the rate of work-flow and achieve far more detailed contextual control in 2018-19. For levels deemed to be on or near occupational surfaces architectural areas were further subdivided, often based on cardinal directions (i.e., Area A - South, Area E - Southeast), in addition to the use of arbitrary 1x1 meter superpiso subunits for extra contextual control. In fact, areas deemed particularly well preserved, the location of every bucket removed on sketch maps; in some instances, providing the location of material concentrations down to $10cm^2$[127]. All context information collected in the field was recorded directly on field forms as well as in personal notebooks.

Detailed plan maps would be drawn once each area and subarea reached the base of an excavation level. Elevations were measured from local datums,[128] which were also shot-in using a differential GPS. We used the same nomenclature as 2016 for naming/mapping areas and subareas - with initial 2x2m quadrants labeled with lower-case lettering (e.g., *quad. c*). All 2x2m units used to expand excavation blocks were considered amplifications of the four quadrant units of the initial 4x4m unit and were labeled as such (e.g., *quad. d AMP SW2*). Upper-case lettering was used for formal architectural areas once encountered (e.g., *Area F*). If rooms or other architectural areas were expanded on the expansion would be labeled using cardinal directions (e.g., *Area B EXT W*) and if the final area proved to be larger than approximately 2x2 meters then they were permanently divided into subareas, also labeled using cardinal directs (e.g., *Area D-SW* or *Area A-S*). All features received sequential numbers for each unit (e.g., *Rasgo 2*). Once completed profiles were mapped for all unit profiles. Every excavated context received an individual field form which documented all pertinent context info

[127] Materials were sorted and recorded in the field as separate bucket lots, but were ultimately cataloged together by area/subarea.

[128] We used 1/2” iron rebar for all new datums set and used for the 2018-19 excavation blocks (Datums: L1A-6, L1A-7, L1L-1, L1L-2, L1L-3, L1L-4, L1U-1).

(See Appendix 3).

In addition to hand drawn maps and profiles, every context was documented extensively through photography. Aerial overhead photos were taken at the base of every major excavation level using the DJI Mavic Pro drone described above. These aerial photos would include a series of shots of the entire unit block (often between 20-30 meters above ground surface) from 90° as well as a series of lower altitude (often between 2-10 meters above ground surface) 90° detail shots. Also using the drone, we would take a series of angled (~45°) aerial unit photos in-the-round which would document profiles and the other three-dimensional aspects of the context. We would also document all contexts, both completed and in-process, using traditional handheld cameras.[129] In addition to providing essential visual documentation of our excavated contexts we also used these photos for three-dimensional modeling.

Locus Number

Every individual context, no matter the way it was encountered or investigated, was given a locus number. This includes major sectors as wells as individual spot finds. This unique number is used to index each individual context in our relation database as additional analysis.

<u>Material Analysis</u>

All materials collected during field work underwent some form of analysis. The extent and form this analysis took depended on the material category that was being analyzed. Here, I outline the strategies and techniques I employed in analyzing these materials. Almost all of this analysis is considered preliminary as there is still a significant amount of data each of these material types can produce given more time and more analysis. Some materials, like ceramics, underwent multiple stages of analysis and documentation, and others, like camelid coprolites,

[129] Our standard field camera was a Panasonic Lumix DC-FZ80

were only subject to basic counts and weights. I provide basic descriptions of these analyses below, but to avoid redundancies, I supply more methodological detail in conjunction with the results (see Chapter 7). However, whatever the material type, initial analysis always involved cleaning the artifacts and preparing them for long-term storage - these procedures are also described as they pertain to each material category below. The results from all material analyses described below can be found in Section 2 (Chapter 7).

Initial Sorting & Specimen Numbers

No matter the collection style (spot find, systematic surface collection, or excavation[130]) all materials were sorted into the same major material types, largely dependent on the majority composition of the object. While these material types are described in some detail below as well as in Section 2, it is important to note that we utilized 16 material types in our initial sorting. These 16 material types, can be usefully divided into four broad material classes, as illustrated below.

[130] As described above, all the materials collected via excavation methods were collected from sifted sediment - these screen sizes ranged from ¼ inch to 1 millimeter, depending on the year and context - therefore all materials discussed here are considered macro-materials.

Table 8. The 16 material types into which all materials collected in the field were sorted. These types are organized into four broad material classes: Artifacts, Ecofacts, Samples, and Human Remains.

ARTIFACTS		ECOFACTS		SAMPLES		HUMAN REMAINS	
CERAMIC	Any material made from fired-ceramic technology - ceramic vessels	**FAUNA - HARD**	Any remains deriving from animals (vertebrates and invertebrates), composed of largely durable and even inorganic materials (bone, shell)	**ARCHITECTURE**	Sample collected composed of architecture materials (adobe brick fragments)	**HUMAN REMAINS**	Any remains deriving from humans (bone, hair)
LITHIC - FLAKED	Any stone object made through percussive-reductive technology	**FAUNA - SOFT**	Any remains deriving from animals, composed of largely soft organic material (coprolites, fur, skin)	**MINERAL**	Sample of an inorganic mineral (or other substance)		
LITHIC - GROUND	Any stone object made through grinding-reductive technology	**BOTANICS**	Any remains belonging to any plant species.	**SOIL SAMPLE**	Unsifted sample of sediment collected from excavated contexts for micro- and other future analysis		
TEXTILE	Fabrics and any other objects derived from natural fibers (wool, cotton)			**C14**	Sample collected specifically for carbon-dating purposes		
BASKETRY	Any object made from vegetable-fiber materials						
METAL	Objects made from any form of metal						
BEADS	Perforated materials used for adornment and other decorative purposes – made from a variety of materials (stone, shell, bone)						
ARTIFACTS	Includes any finished tools or multi-material, composite object.						

The *Artifact* material class contains material types that represent clear human-made or manipulated materials. The *Ecofact* material class represents any material types deriving from plants or animals (both human-influenced and naturally occurring). The *Samples* material class represent subsamples of more substantial deposits encountered in the field - these are often collected for future analysis. Finally, *Human Remains*, or any remains deriving from the human body, represents its own material class.

The cataloging system for recording these material types was based on a *Specimen Number*. For every specific context we documented, all encountered materials would be grouped into one of the material types and then assigned a specimen number.[131] Therefore, sometimes a specimen number only represents a single ceramic sherd and other times it represents a bag of over 1000 sherds. The specimen log is a sequential list onto which all material types were recorded - no matter the collection method (spot finds, surface collection, excavation)[132]. A specimen number from Cerro San Antonio is always prefaced by the site number, L1 (i.e., L1=3124). Every specimen logged would receive a tag, including the specimen number and essential context information.

Ceramics

The material type Ceramic received some of the most intensive post-field analysis. This took the form of a multi-stage sorting and documentation process. While several complete ceramic vessels were recovered in almost every mode of field work, most Ceramic specimens are sherds (fragments of ceramic vessels). I have relied on multiple texts and studies to form my

[131] Note: each material type (i.e., Ceramic, Textile, Botanic, etc.) would receive a specimen number not the broader material classes.

[132] We did decide to begin the different collection methods at different stages of the list. Spot find specimens begin at L1=1, systematic surface collection specimens begin at L1=2000, and excavation specimens begin at L1=3000. While these will eventually merge, it was an easy way to avoid confusion while conducting different tasks in the field.

general ceramic documentation and analysis strategies (Rice 1996a, 1996b; Sinopoli 1991).

However, before conducting any analysis, ceramic sherds had to be thoroughly soaked, washed, and dried. The high salinity of local sediments required that sherds soaked for up to 48 hours to leech out these minerals. The sherds would soak in plastic basins, with the water changed once every 24 hours, and scrubbed with toothbrushes to clean away all non-ceramic materials. Then sherds would be dried in the sun in shallow plastic baskets.[133]

The first stage of analysis for all Ceramic specimens was to sort by *cultural-temporal affiliation*. Of course, sometimes isolated sherds or non-diagnostic body sherds were not possible to assign confidently to a cultural-temporal affiliation. However, prehistoric ceramic styles were distinct enough in this region, that the majority of ceramic sherds received a broad cultural-temporal affiliation. Also, because the present study targeted sectors believed to have had Tiwanaku domestic affiliations, the majority of the ceramics discussed here fall within the broader Middle Horizon period ceramic stylistic suite.

The second stage of analysis, the *ware analysis*, was only conducted on ceramics deemed to be affiliated with Tiwanaku contexts. In this case a ware refers to a constellation of features, largely centered on the technological approach used to create the vessel and the overall appearance of the final product (e.g., overall composition, firing technique, and finishing style), that can allow ceramics to by sorted into broad categories. For the case of Tiwanaku, there are three broad ware types, into which almost all ceramic vessels can be sorted: Plainware, Redware, and Blackware[134].

The third stage of analysis for all Ceramic specimens was to sort sherds into groups of *diagnostic vs. non-diagnostic*. Diagnostic sherds refer to any sherd including elements that can

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[133] I used a color-coded system - matching colors of soaking-basins, drying-baskets, and plastic clips used to attach specimen tags - to avoid any confusion, when washing high volumes of sherds.

[134] These ware types are almost always referred to by their Spanish equivalent: *Llana*, *Rojo*, *Negro*.

identify a vessel's primary form (primarily rims, bases, and handles) as well as any sherd that includes decoration (paint, modeling). Non-diagnostic sherds are almost entirely composed of body sherds from plainware vessels. As noted above, during excavation both diagnostic and non-diagnostic sherds were collected, but only diagnostic sherds were collected in surface collection contexts.

The fourth stage of ceramic analysis was only completed for ceramics collected via excavation.[135] During this stage of analysis a variety of attributes of each diagnostic sherd was documented, including maximum/minimum dimensions, weight, modifications, and decoration motifs. A standard vessel diameter chart was used to measure rim/base dimensions of sherds. For Plainware rim sherds I took an additional metric of rim type (described in Chapter *8.1*). For decorated sherds, the motifs and paints used would be described, recoded, and coded. Even non-diagnostic sherds were weighed, with ranges for thickness and other dimensions recorded. The other primary goal of diagnostic analysis was to determine the form of the vessel each sherd belonged to. As with cultural-temporal affiliation, here I relied on information compiled from other studies in the region to determine the most likely forms and motifs represented by sherds (Alconini 1995; Augustine 2019; Goldstein 1985; Janusek 2003; Owen 1993; Rivera Casanovas 2003; Uribe Rodríguez 1999).

A fifth and preliminary stage of analysis was a more detailed, *visual paste analysis*[136]. Time did not permit a comprehensive, sherd-by-sherd paste analysis, so we selectively sub-sampled all excavated and surface collected sherds to report the major paste types reported here. These types are considered preliminary and working to both confirm and clarify these is one of the next major steps in this project.

[135] I had hoped to complete diagnostic analysis for ceramic specimens collected during systematic surface collection but did not have time to complete and included here.

[136] We used both handheld magnifiers and a digital microscope for this analysis.

While all diagnostic sherds were documented through photography, a subset of important sherds went through the additional process of illustration. These often included decorated Redware sherds that include complete or previously unknown motifs and decoration styles. These sherds would be drawn in profile and in plan view and later digitally traced and shaded.

As noted above, while the vast majority of ceramic specimens collected for this project were sherds, we did encounter and collect a number of complete or near-complete vessels.[137] These were treated much as any diagnostic sherds - they were photographed and when pertinent roll-out tracings were made of motifs.

All Ceramic specimens were bagged and tagged and stored in boxes for future analysis and long-term storage.

Lithics

As a general term lithics refer to any object, made from stone, modified by humans. Like ceramics, lithics, are some of the most ubiquitous material types in the archaeological record, and as such, there are many texts to choose from for lithic analysis. I have drawn on a number of these, especially lithic-based studies conducted in the Andes. Here, lithics actually constitute two separate material types: Lithic-Flaked and Lithic-Ground.

Lithic-Flaked. Flake-stone materials are any stone object made by percussive or impact-based methods or technology. Most prehistoric populations used a combination of percussion-flaking (i.e., using a hammer stone to knap flakes from a core) as well as pressure-flaking (i.e., using bone or antler to chip off small flakes by applying direct and sustained pressure). As such, after cleaning these artifacts, the first step of analysis was to group them into three primary categories based on this production: tools, debitage, and hammer stones.

[137] I was able to photograph and document a number of vessels captured from looters in 2015 as well as a few vessels held and displayed by the local Villa Locumba municipality.

Tools were any flaked-stone object (or fragment) that represents a final product or a tool in the state of manufacture. Tools would be grouped by tool type (e.g., projectile point, hoe, scraper etc.) - each would be photographed, measured, and weighed. Debitage represents any byproduct of lithic tool manufacture that was not later reused for any purpose. Debitage was split into two general categories - flakes and cores. These would be counted, based on raw material type and photographed. Hammer stones were simply weighed and measured.

While a few of the more delicate projectile points we recovered were given an extra layer of plastic wrapping all Lithic-Flaked specimens were bagged, tagged, and stored in boxes for future analysis and long-term storage.

Lithic-Ground. Ground-stone materials are any stone object made by a grinding-reductive method or technology. These ground-stone objects can be tools that are produced through grinding and then used for another purpose (e.g., ax, *bola*-stone). However, many ground-stone tools are tools made through grinding that are then in turn used for grinding-related purposes (e.g., *manos* and *metates*) - most of the specimens documented here fall into this latter category. This method of stone tool manufacture does not generally create the debitage that flaked-stone technology does, so for the most part Lithic-Ground materials were generally completed tools that were simply cleaned, photographed, and weighed. One exception was the tool-type, *mano* - because these were so common and variable, we utilized some comparative studies to develop a typology for our collections at L1. It is also important to note, due to their size and weight, several Lithic-Ground specimens were documented but ultimately left in the field.

All Lithic-Ground specimens were bagged, tagged, and stored in boxes for future analysis and long-term storage.

Textiles

The Textile specimen material type includes any form of fabric (woven or otherwise) composed of natural fibers (wool or cotton) as well as loose threads, twisted cords, and un-spun fibers. In many parts of the world, including in much of the Andes, the remains of textiles from archaeological contexts are exceedingly rare. While we often only recover small fragments, our relatively robust Textile specimen collection, make this one of the more important material types reported on here. Of course, as the basis for much of clothing and many other useful implements, textiles have long been one of the most important material technologies for humans. However, in many parts of the ancient Andes clothing, textiles and the art of weaving took on particularly potent cultural significance. As with the other material types noted here, the social significance of textiles is discussed in greater detail elsewhere in this thesis, however because of this central importance in Andean society, there are a wide-array of texts to draw on in shaping our textile analysis (Arnold and Espejo 2015; Cason and Cahlander 1976; Oakland 1992; Plunger 2009).

The initial sorting involved in textile analysis was to separate the articulated fragments of fabric from the other textile-related materials. Fragments of textiles would be carefully cleaned using air bulbs and fine-bristled brushes. Textile fragments would be sorted into rough categories of *course* and *fine* - referring to the overall style of weave and the weight of the threads used. Analysis would begin by attempting to locate diagnostic indicators on the fragment (border/selvage, decoration, etc.) to help identify what the fabric may have been used for (clothing, bag, etc.). We would document basic attributes of the fabric - material used/color of threads in both the weft and the warp, any design/motif present, and the weight. We also collected more textile-specific attributes, including thread counts and basic spin/ply observations. All textiles/fabric fragments were photographed, wrapped in acid-free paper, bagged, tagged, and stored in boxes for future analysis and long-term storage. A few of the more complete or delicate textile fragment specimens were given an additional layer of wrapping and given their own small boxes for protection.

Other Textile specimens were sorted based on overall function and raw material. Most of these materials were byproducts of textile manufacture, repair, or simply parts of formally woven fabrics. The most common materials in this category were twisted cords (2-5-ply), individual thread fragments, and raw wool and cotton fibers (in various states of spinning). Basic attributes of each would be recorded, including count, weight, color, and raw material. These items would be photographed, bagged, tagged, and stored in boxes for future analysis and long-term storage.

Basketry

Here the material type of Basketry refers to any objects made from vegetable fiber - this of course includes baskets (woven, vegetable-fiber containers) but also included several different types of twisted vegetable-fiber cord and rope. These materials were treated similar to textiles. They were carefully dry-cleaned used brushes and air-bulbs. The specimens would be divided into basketry fragments and cord/rope. Basket fragments would receive similar attribute analysis as the textile fabric fragments - including color, raw materials, and construction method. We used a few different sources to assist with the proper terminology for basket weaving in the Andes and throughout the ancient world. All Basketry specimens were photographed. For vegetable-fiber cord and rope we would record the weight as well as the ply. Most Basketry specimens were wrapped in acid-free paper, bagged, tagged, and stored in boxes for future analysis and long-term storage.

Metal

Metal specimens include any object made of metal. This included both finished objects, debitage, and other fragments. All metal items were cleaned by dry-brushing, counted, weighed, and raw material determined. We used a variety of local metallurgical studies to determine the form and function of any metal objects. All metal items were photographed. All metal items were wrapped in acid-free paper, bagged, tagged, and stored in boxes for future analysis and long-term storage.

Beads

The Bead material type includes all perforated objects meant for adornment or decoration. If needed, beads would be cleaned by dry-brushing. While there were exceptions, most beads recovered at Cerro San Antonio were quite small; the majority falling into the general seed bead size-range. However, all beads were still measured and weighed. In addition, the color and raw material were determined. All Bead specimens were wrapped in acid-free paper, bagged, tagged, and stored in boxes for future analysis and long-term storage.

Artifacts

The Artifact specimen type includes the widest array of objects and materials. For the most part, the Artifact material type designated objects made from a variety of materials that were unique, completed tools (e.g., a wooden spoon, a cactus-spine needle, or a fragment of a leather sandal). Artifact specimens were also sometimes multi-material composite objects (a ceramic spindle whirl with wool thread still attached or feather adornments with leather bindings). Because each of these objects were unique the method of cleaning, cataloging, analysis, and storage was different for each and is discussed more with the results (Chapter 7). However, all Artifact specimens were weighed with major attributes documented. All Artifacts were photographed and wrapped in acid-free paper, bagged, tagged, and stored in boxes for future analysis and long-term storage.

Fauna

Here, the Fauna material category refers to an recovered materials that represent byproducts of animals - both vertebrates (e.g. mammals, birds, fish) and invertebrates (e.g.

mollusks, crustaceans). Zooarchaeology, or the study of animal remains from the archaeological record (Reitz, et al. 1999), is a robust specialization and I only scratched the surface in terms of the analysis we were able to complete on our faunal materials. I drew on both general texts as well as more regionally specific studies in developing my strategy outlined here. The broader category of Fauna was separated into two material types: Fauna-Hard and Fauna-Soft (described below)[138].

Fauna-Hard. Materials which fall into this material type are animal remains composed of durable organic and some inorganic (mineral agglomerations) materials. The first step of post-field analysis for Fauna materials was to sort the remains by overall material type - the most common at L1 were animal bone, marine shell, crustacean exoskeleton, terrestrial land-snail shell, and coral. When possible, I would further sort these groups into more specific taxonomic groups (i.e., *order*, if not *genus* and *species*). Again, while time and resources did not permit me to conduct more advanced zooarchaeological analysis (MNI calculation, bone measurements, age, sex etc.), I was able to record basic counts and weights for all individual types, effectively calculating accurate NISP. Finally, for certain specific types, for example camelid bone, I completed additional sorting and recorded additional metrics (see 8.7). Only a limited number of unique or complete Fauna-Hard specimens were photographed, but all were bagged, tagged, and stored in boxes for future analysis and long-term storage.

Fauna-Soft. This material type is composed of animal remains or byproducts composed of largely softer organic materials. These organic materials could include animal remains (fur, skin, feathers), but also included organic animal byproducts - namely dried animal dung.[139] For the most part analysis of Fauna-Soft materials only involved the recording of counts, weights,

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[138] It should be noted that in a number of places (particularly the master Specimen List and field forms), Fauna-Hard materials are often simply referred to as Fauna and Fauna-Soft materials are referenced as Organics.

[139] These are not technically coprolites as they are simply preserved from dehydration as opposed to being fossilized.

and other basic attributes when pertinent (color, etc.). These materials were simply bagged, tagged, and stored in boxes for future analysis and long-term storage.

Botanics

Materials falling into the Botanic material type were simply any and all plant remains (including any carbonized remains and charcoal). Paleoethnobotany is another robust specialization within archaeological studies and I drew on a number of general texts as well as more Andean-specific texts for my overall methodological strategy. Due of the excellent preservation conditions in Locumba, uncarbonized Botanic materials were ubiquitous and often quite dense, providing an extensive botanic collection. Like all materials the Botanic specimens were largely considered macrobotanical remains. However, during our 2018-19 field work we utilized a fine-screen (1mm mesh) to sift all excavated contexts and systematically sorted the heavy fraction - this method revealed seeds often only recovered through microanalysis (e.g. *quinoa* seeds), which are also included in the general Botanics category. While some larger Botanic specimens (like maize cobs) were cleaned by dry brushing, due to their delicate nature, most Botanic specimens were lightly cleaned with an airbulb.

Analysis of Botanic specimens would begin with sorting the remains into as specific of groups as possible - sometimes these would be general (e.g., wood) others were groups were specific to the species (e.g. *Zea mays*). For plant identification, especially of domesticates, I utilized a locally compiled comparative collection[140] as well as several reference texts. After sorting each group would be counted, weighed, and any other pertinent attributes documented. Unique, complete, or unidentifiable fragments were photographed for future reference. All Botanic specimens were bagged, tagged, and stored in boxes for future analysis and long-term storage.

[140] This comparative collection was compiled by Giacomo Gaggio and was used with his permission.

Soil Samples & Microanalysis

Soil Samples refers to samples of unsifted sediment from important excavated contexts and represents the most common form of material subsampling employed on this project. For every individual floor context, feature, or other important context excavated we removed an unsifted sample of sediment for micro and other future analyses. During excavation we would use a standard plastic measuring cup to remove the sample - emptying directly into the material bag. While there are a few exceptions, the standard soil sample size was 1 liter for our 2016 test excavations and 0.5 liter for our 2018-19 excavations.

The primary form of secondary analysis conducted on these samples was standard micro-sorting, via a digital microscope. While the primary focus of this microanalysis was microbotanical remains, all non-naturally occurring sediments were sorted, counted and weighed[141]. Due to the hyperaridity of the region and the general lack of organic-based soils at Cerro San Antonio, general flotation or wet-screening was not necessary to process our samples[142]. Instead, the soil sample would be sifted through series of geological screens (2mm, 1mm, 0.5mm, and 0.2mm) - each size-grade being bagged separately. Each size-grade would then be sorted with all remains separated individually. Most important microbotanic and microfaunal finds were counted and weighed and eventually stored in glass vials for future analysis and long-term-storage.

Other Samples

While soil samples were our primary form of subsampling material analysis a few other,

[141] All microbotanical analysis was conducted by Ariana Garvin and while some of the more significant findings are reported here, more detailed results can be found in her MA Thesis (Garvin 2021).

[142] While studies have compared and debated the effectiveness dry vs. wet methods of processing soil samples (Chiou et al. 2013), we found that the risk of damaging microbotanical specimens from wet-screening is not worth the risk.

much more limited sampling material types do exist. These often involved sampling locally occurring minerals or extremely dense or large cultural deposits or elements that could not feasibly be collected. These are described below.

Architecture. These specimens were defined as permanent or large architectural elements that could not be collected or had to remain in situ. In the case of my investigations at L1, the only material to be classified in this material type were fragments of sun-dried adobe bricks. While we could not recover any complete bricks, we collected samples for future compositional analysis. All Architecture sample specimens were bagged, tagged, and stored in boxes for future analysis and long-term storage.

Mineral. The sample material type of Mineral included largely naturally occurring minerals and other geological deposits. These could be concentrations or deposits (e.g., calcium-carbonate deposit, volcanic ash lens) or simply a reoccurring element from the broader excavated matrix that we wanted for future reference. The nature of the deposit and the specific material would determine exactly how much of the specimen was collected and how it was cleaned and analyzed. However, all Mineral specimens were bagged, tagged, and stored in boxes for future analysis and long-term storage.

C14. C14 samples refer to specimens, of a variety of carbon-based organic material, collected specifically for future export to the United States for radiocarbon dating analysis. Most specimens that have been selected for radiocarbon dating were selected from other material specimen types (e.g., Botanics). However, a few specimens, encountered in the field were deemed ideal for this form of analysis and were specimened as C14. These samples were carefully removed from their in-situ context and immediately either deposited in a sealable whirl-pack bag or wrapped in tinfoil and bagged.

Human Remains

Any remains deriving directly from the human body constituted their own material type, Human Remains. While most work at Cerro San Antonio targeted non-mortuary contexts we did work to document and sometimes sample Human Remains from looted cemetery contexts. With the exception of a few Human Remains specimens recovered from excavated contexts, the vast majority were collected as spot finds and therefore did not need to be sorted. Most Human Remains specimens were human bone. These were carefully dry brushed for cleaning. Age and sex of the represented individual were determined when possible and all Human Remains were photographed. The primary purpose for collecting human bone was for eventual export to the United States for various stable-isotope analyses.

4.2 Analysis & Interpretation: middle-range frameworks

Here I discuss the data processing, analysis, and interpretive strategies into which I synthesize the data collected through the methods described above. These are effectively the middle-range methods I utilize to connect the data collected in the field and lab to the theoretical models I described in Chapter 1. Here I explain how my ecological approach to communities can be operationalized into a set of strategies for engaging the archaeological record at multiple scales. Each scale relies on network approaches, which range from the use for formal network approaches (FNA) derived from mathematics to more humanistic network approaches (HNA) which applying a network perspective to help visualize anthropological interpretation.

Approaching Complexity with Networks

From the broader environment in which they are living to the social hierarchy they are resisting or the thoughts they are thinking, complexity and complex adaptive systems permeate every aspect of the human experience. As outlined in Chapter 1, while the mode in which complex systems manifest are extremely varied, they tend to share a number of properties at both the operational level (dynamics) and at the organizational level (see Table 1). One of the most critical characteristics of complex systems, that effects both the dynamics and organization, is that the agents or components of the system are interconnected - their actions have some impact to other agents as well as to the emergent properties of the system as a whole. While the processes of *feedback* and *self-organized criticality* explain some of the dynamics by which this interconnectivity plays out, it is through *networks* that complex systems organization is best visualized and understood (Mitchell 2009:227-273).

In the simplest sense, a network is defined as a set of items with connections or ties (Newman 2018; Watts 2004). What these items are and how these connections are defined can vary wildly. However, standard networks are always composed of two primary elements - nodes and links. *Nodes*, often called vertices, represent the agents or components of a system. *Links*, also called edges, represent the connections between the nodes. While links can represent almost any type of connection, they tend to fall into four primary categories - interactions, relations, flows, and node similarities (Borgatti, et al. 2009). Links can also be categorized based on their temporal nature. *State-types* represent sustained (not necessarily permanent) connections and *event-type* network connections represent discrete interactions, whether reoccurring, sequential, or merely ephemeral (Borgatti and Halgin 2011:1170). As will be elaborated on below, utilizing networks have numerous methodological advantages, that are thoroughly reviewed in several works (Brughmans 2010, 2013; Knappett 2011; Peeples 2019), but there are four points that are particularly relevant to archaeological data: 1) Networks are relational by nature - they help avoid simplified, reductionist strategies, 2) Networks are also spatial in nature - they assist in identifying the topology of systems, 3) Networks are effective at articulating various scales of phenomena and analysis, 4) Networks can incorporate both physical things and abstract ideas, as well as people and objects (Knappett 2011:57-58).

The use of networks in social scientific research has an extensive past with a number of starts and re-imaginings (Newman, et al. 2006). Even within archeology network approaches have a relatively extensive and varied past, and while I cannot provide an exhaustive review of the history of network approaches here (see Brughmans 2010, 2013; Collar, et al. 2015; Knappett 2011; Peeples 2019), a few anchoring contextual points should be made about some of the leading methodological frameworks built around networks. There are a number of ways in which network approaches can be lumped or split, however following others (see Braswell 2019; Van Oyen 2015), I find it most useful to separate network approaches into two broad camps: Formal Network Approaches and Humanistic Network Approaches. Rooted in graph theory and computational mathematics, Formal Network Approaches offer robust methods for quantifying what are often thought to be fundamentally qualitative phenomena. Conversely, Humanistic Network Approaches tend to utilize network visualization to illustrate the qualitative messiness of what are often assumed to be straight-forward quantifiable phenomena. For this current study I attempt to draw on methods developed in both camps and highlight some of their more foundational threads.

Formal Network Approaches

Formal Network Approaches (*FNA*) are extremely varied and can be traced back into the history of mathematics as an offshoot of graph theory (Barnes and Harary 1983). However, FNA became particularly useful for the social sciences with the development of *Social Network Analysis* (*SNA*). Emerging from the development of the *sociograph* (Moreno 1937), SNA would eventually provide the basis for some of the most powerful quantitative and computational approaches to social analysis (Freeman 2000; Wasserman and Faust 1994). Nodes in SNA network studies can be individuals, communities, or institutions, but always represent fundamentally human social units.

Critical for my network approach is that SNA (and many other FNA) utilize community as a fundamental concept (Coscia, et al. 2011; Leicht and Newman 2008; Mucha, et al. 2009). In these models community is defined by *clustering* or modularity, that is nodes who share closer links with each other (within the community) than they do with others (outside the community)

(Coscia, et al. 2011:512). There are numerous ways that this community-based network clustering can be defined (Newman 2006), but some of the most common include: 1) density-based definitions = node in the community share more links, 2) node similarity-based definitions = nodes share common attributes, 3) action-based definitions = nodes perform similar actions within the network, 4) influence propagation-based definitions = nodes act in similar way based on actions of a lead node (Coscia, et al. 2011:514-515). Understanding the dynamics of how both individual nodes interact within communities as well has how community clusters interact, is one of the most important areas of study for SNA and essential for understanding how broader social-based complex systems evolve and persist through time.

One of the first and still most significant SNA models, termed *the strength of weak ties* (Granovetter 1977), provided foundational discoveries regarding both inter- and intra-community dynamics (see Figure 26). The first premise is that intra-community structure is defined by node similarity and the likelihood that if one node (A) shares very strong ties with a second node (B), and that node (B) shares strong ties with an additional node (C), then node A and node C are likely to share at least a weak tie. A second premise further emphasizes the importance of weak ties by arguing that the important binding ties between community clusters are likely defined by weak ties (Granovetter 1983:200-203). These inter-community connections represent essential sources of novel information (or whatever the links represent in the network) and often the origin of major network transformations.

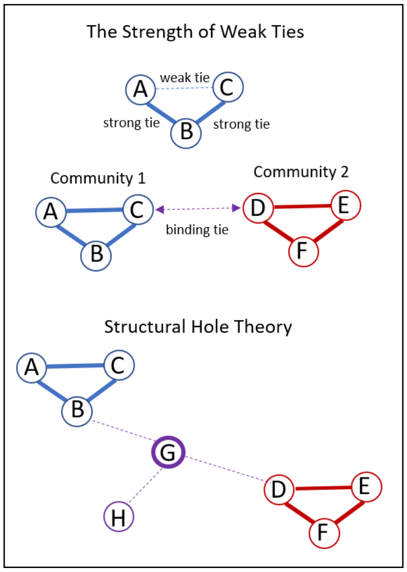


Figure 26. Visualization of the strength of weak ties and structural hole theory in social networks.

Taken together these premises suggest that communities with an abundance of strong ties tend to have strong local cohesion but weak global cohesion whereas communities defined by more weak ties will have much stronger global cohesion (Granovetter 1983). This results in a somewhat counterintuitive notion when it comes to social contexts - communities defined by weak ties often have more social capital to act within the broader network as well as more resilience to collapse. Building directly on this idea was *structural hole theory* (Burt 1992, 2000), which also emphasized how nodes with weak links to multiple communities can be much more central to the overall functioning of a network, even when compared to nodes with many strong intra-community links.

Again, much of SNA has worked to quantify the centrality of a given node or even of entire network structures. These range from *degree centrality* which simply quantifies the number of links to a given node, *closeness centrality* which averages the shortest path lengths from one node to all others, to *betweenness centrality* which determines the integration of a given node by quantifying the number of times a node acts as a bridge between other nodes in the system (Freeman 1978). More complex analyses are employed to also determine a nodes *eigenvector centrality* which gauges a given nodes influence over other nodes (Bonacich 2007). Any given network can possess nodes of each type of centrality, sometimes nodes are truly central, dominating all centrality metrics, however some network structures allow for different nodes to occupy the different modes of centrality (Figure 27).

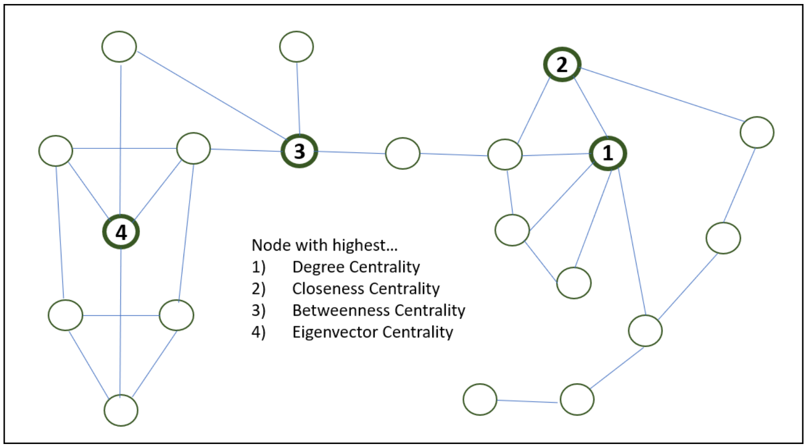


Figure 27. Example of a single network in which each of the primary modes of node centrality is exhibited by a different node.

SNA models have also helped illustrate the sometimes-unbelievable interconnection within social networks. Made famous by the catchy phrase *six degrees of separation* (Watts 2004), SNA models help to show how almost any two people on the planet can be said to connect through their social networks in six degrees or less. This network assumption was fleshed out in the important finding of *small-world networks* (Watts and Strogatz 1998) which effectively showed how community clustering naturally occurs in complex social networks. Small-world networks possess traits of both ordered (non-random) as well as random networks, proving these were not mutually exclusive classifications. However, as found in the real world these small-world networks are far from balanced. In the real world these social networks tend to have *scale-free* qualities (Barabási and Albert 1999), which lead to high degrees of disparity in degree distribution and often result in hubs[143]. *Hubs* have high degrees of centrality and as described above can become critical to the functioning (or failure) of a given network.

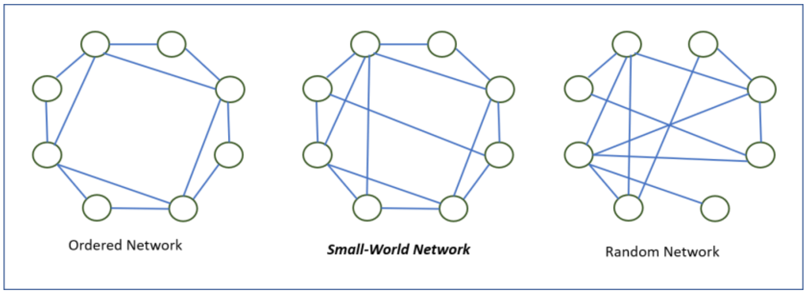


Figure 28. Schematic representation of different types of network configurations.

It should be noted that as SNA was taking hold in sociology during the latter half of the twentieth century, a parallel focus on quantitative approaches as well as the nascent strength of computational power was taking place under the heading of systems theory, which had major components throughout the social sciences. As has already been noted (see 1.1), archeology and other studies of history were no exception (Clarke 1968; Doran 1970; Flannery 1973) and much of the language that I used in my discussion of the evolution of *the state* in Chapter 1 (see 1.3) derives from these systems approaches (Flannery 1972). While this systems theory in archeology drew more on energy flows developed in biological and ecological studies much of the methodology, they used was the same; including the use of the essential node-link format. Again, the ultimate goal of both systems and network approaches was to render the complexity inherent in the social, simple - or at the very least quantifiable.

[143] This network approach was able to help explain what had been known as the Pareto Curve or the Matthew Principle in social economics (e.g., Backhause 1980): summed by the oversimplified, “the rich tend to get richer and the poor poorer.” When applied to networks and complex systems more broadly this phenomenon came to be known as *preferential attachment* (e.g., Vázquez 2003).

Humanistic Network Approaches

Unlike FNA, Humanistic Network Approaches (HNA) have utilized networks to emphasize the messy complexity inherent in relationships or phenomena often thought to be simple or independent. Many of these HNA are more appropriately defined as new philosophical framings to social scientific questions, although some do not always shy away from more quantifiable methodology (Hodder and Mol 2016). Nevertheless, even some of the more abstract HNA provide useful new ways of thinking about what can define a node, the nature of the relationships that link nodes, and especially how to conceive of the network as a whole.

As FNA tends to be centered on Social Network Analysis, the HNA are anchored by the approach developed as Actor-Network Theory (ANT). Again, like SNA, ANT has a variety of starts but its primary thread developed as a form of material semiotics in historical sociology and science studies (Callon 1999; Latour 2005; Law 2009). One of the most important contributions of ANT is lifting the restrictions on what can define a node. Instead of representing exclusively humans (whether individuals, communities, or institutions), ANT nodal definitions can include material objects (artifacts, architecture, landscape elements) as well as all manner of affective or abstract elements (ideas, emotions, concepts). While conceiving of objects in place of formally human behaviors is not all that radical for archaeologists (Reid, et al. 1975; Schiffer 2016), true ANT models hold adamantly to the “generalized principle of symmetry” which insists that not only can materials and abstract ideas act as nodes in these models but they hold equal capability for transformative agency within the network as their human actor counterparts[144] (Latour 1994). While the idea of material agency, whether considered a form of secondary agency or true generalized symmetry is often debated (Dornan 2002; Gell 1998), providing a network approach in which non-human elements play an active role has been important for archaeological network studies (Donnellan 2020; Knappett 2011; Schortman and Urban 2012).

[144] For this reason, Latour and others use the term *actant* to encompass all node types, avoiding what they feel is the restrictive anthrocentric term, *actor* (Latour 2005).

A similar emphasis on the central role of non-human elements can be found in archaeologist I. Hodder's *entanglement theory* (Hodder 2012). In entanglement theory Hodder specifically targets the interdependence of humans and things (or even things and things). This theory uses network visualizations, what Hodder has termed *tanglegrams*, to illustrate the complex web of engagements humans become committed to in their reliance on things. These tanglegrams are representations of what Hodder argues are matrices of human-thing relationships (H-T and T-H) as well as human-human (H-H) and even thing-thing engagements (TT) (Hodder and Mol 2016:2). Additional HNA archaeological approaches take this further (back into the realm of ANT) by including all manner of gestures and abstractions such as signs and symbols, especially those which drive affective action. These approaches prefer to use the term assemblage instead of network, but use similar framing to take more dynamic, relational approaches in their spatial analysis of the archaeological record (Harris 2014; Jervis 2018).

The most poetic HNA-related approach rooted in archeology and a deep time perspective is T. Ingold's concept of *meshwork* (Ingold 2007). However, unlike other HNA Ingold actually rejects the node-link framework altogether, and drawing particularly on the phenomenology of Merleau-Ponty (Merleau-Ponty 1968), instead envisions meshworks as a messy web of lines without end, through which "materials flow and bodies move" (Ingold 2012:435). Again, the importance of these HNA is they bring complexity back to the fore and constantly interrogate the emergent paradoxical nature of complex adaptive systems - the local generate the global, but the global fundamentally constrain the local.

A Multiscalar Network Approach

All data used in this thesis comes from the archaeological record, meaning none of my initial nodes and links directly represent communities, institutions, or even individual human actors, but rather materials and fixed locations. At every scale of analysis, the known points that my interpretations are anchored to are these non-human elements. As has already been noted above, each of these data types, materials and investigated contexts, received their own unique sequential number. Each encountered context within the bounds of L1 received a unique *locus number*. This included all surface contexts (ranging from an entire twelve-hectare sector to a single fixed point representing a collected spot find) and excavated contexts (ranging from an entire excavation block to a small post mold feature). Clearly some of these contexts indexed with locus numbers are contained within other indexed contexts, often resulting in a nested set of locus numbers. In addition, each material type collected in a single context (see above for more detail) received a unique *specimen number.* Specimen numbers are always tied to a locus number (often a nested set of locus numbers). These two associated lists of indexed numbers form the basis for the relational database[145] from which all other methods described below draw their data. It should be noted from the onset that relational databases use a fundamentally network-based format to relate data, emphasizing why embracing a network approach can be so prudent.

[145] For this project I utilized the Microsoft Office suite for most data entry and validation. Initial data entry generally done in standard Excel datasheets, but were also input in digital forms generated in Access. Microsoft Access was used as the base relational database where datasheets were combined and queries could be run.

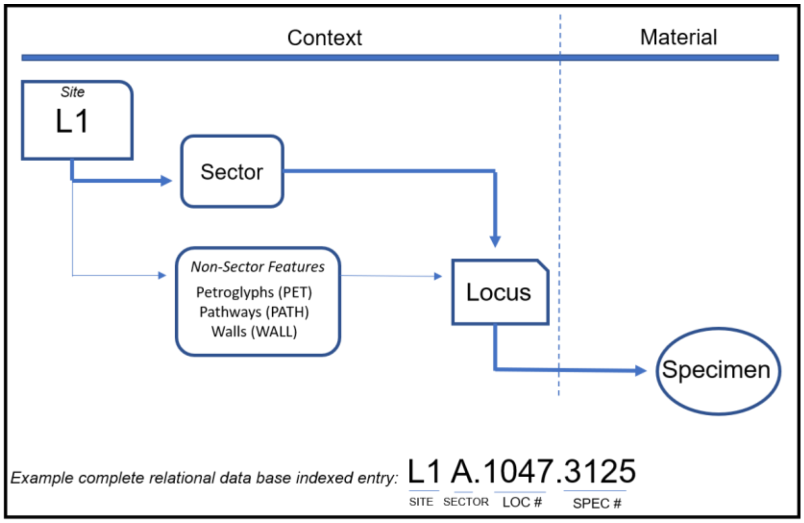


Figure 29. The fundamental relationships between context and material data types - based on indexed Locus and Specimen numbers in a relational database.

While there are some who find the FNA and HNA approaches to be incommensurable (Latour 2005:21-26), a growing number of archaeologists have been quite successful at synthesizing some of the more effective aspects of each approach into their study of the past (Braswell 2019; Hodder and Mol 2016; Knappett 2011). Here I follow their lead, drawing on both FNA and HNA methods in developing my own multiscalar network approach. Specifically, I show how integrating this multiscalar network approach with the community ecology framework I outline in Chapter 1, can help to effectively detect and reconstruct the sociocultural dynamics that defined the everyday lives of prehistoric populations from the fundamentally non-human elements that define the archaeological record. Specifically, I tailor this method to analyze the Middle Horizon domestic contexts at Cerro San Antonio (L1) at three different scales - micro, meso, and macro.

Microscale: defining activity assemblages

My primary goal at the microscale is to use the spatial distribution and density of material finds to help identify specific locations in which specific tasks occurred in and around domestic structures. While I do draw on data collected at all stages of field work for my microscale analysis, the majority is derived from excavated contexts as they provide the most contextual control. As I have noted elsewhere, defining activity areas in domestic settings is the focus of one of archeology's more advanced methodological domains, household archeology (Carballo 2011; Douglass and Gonlin 2012; Nash 2009; Steadman 2016). Since its initial development the goal of household archeology has been to gather and advance methods and techniques for more accurately defining the tasks, activities, and other material-behavioral connections that defined the everyday lives of past populations (Ashmore and Wilk 1988; Blanton 1994; Flannery 1976; Hirth 1993; Wilk and Rathje 1982). At this scale of analysis, I am hyper-focused on the local - any global implications of these local activities are considered at other scales of analysis. At the level of microanalysis each excavated context represents its own isolated domain - all comparisons are localized to what was exposed in that unit. The strategies for excavations are described above (see 3.2) and the contexts themselves are described in Chapter 7, however it should be noted here that in total nine separate contexts were excavated providing nine separate sample sets for microscale analysis.

Before attempting to infer specific local activity areas my goal was to both quantify and visualize the spatial distributions and densities of each material type[146] within each sampled space. Of course, weights and counts of all material types were collected as part of initial cataloging, so quantifying totals, frequencies, and even weighted densities for all defined areas in each unit was relatively straightforward and often very informative. However, in addition to basic distribution tables and charts I also generated heat and kernel density-style maps to help visualize these material distributions. For this process, excavation level and feature base plan-view maps were scanned and digitally traced[147]. These base maps would be brought into the open source geographic information platform QGIS where it would be georectified using

[146] Here material type includes broad material type categories (i.e. Plainware ceramics) or more specific subcategories of materials (i.e. Plainware ollas w/ rim type-3).

[147] I use the open-source platform Inkscape (operated by Google) for most map digital tracing.

waypoints collected with the differential GPS. In QGIS polygon shapefiles were generated for each archaeological area, subarea, and feature defined in the field. As noted in above (see 3.2), local preservation conditions and our excavation strategy allowed for subarea lots to be defined down to 10cm² for important floor contexts. This detailed contextual control, coupled with the visualization of the mapping techniques allowed for the detection of “hot spots” (e.g. areas of very high relative density) as well as “cold spots” (e.g. areas of low relative density) even within subroom areas. When overlaid, these material density heat maps allow for the visualization of material co-occurrence.

Another way in which I visualize excavated domestic area material inventories is by employing a relatively simple FNA model, called a bipartite or affiliation network (Knappett 2011:46-48, 53-57). This type of network analysis draws connections or affiliations between one class of node, by showing their shared connections with a second class of node (Figure 30). At the microscale of analysis my goal is to draw affiliations between different architecturally defined rooms or other spaces by showing their shared connections to various material types.

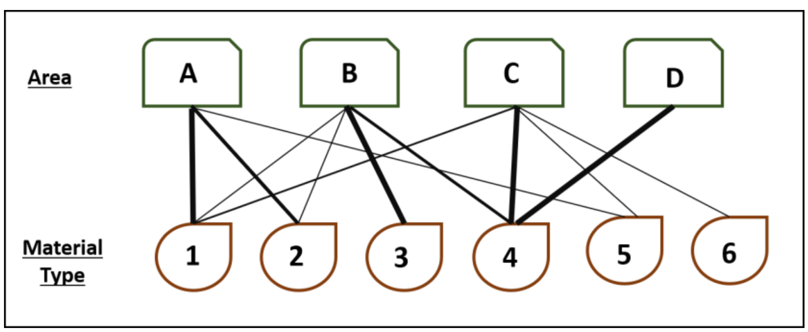


Figure 30. Example bipartite network drawing affiliations between hypothetical Areas (top) by showing shared connections with material types (below) - strength of relationship between areas and materials further emphasized by the weight of the links (thin = weak connection, thick = strong connection).

Both the density heat maps and the bipartite network allow for more accurate and detailed visualization of the co-occurrence of materials that defined each individual excavated area as well as to compare material assemblages between areas. This provides excellent footing for the next step in analysis at the microscale which is extrapolating behaviors and activities that may have led to those material deposits. Here I take essentially a behaviorist view, using classic *chaînes opératoires* (also called behavioral chains) models to look for functional connections between materials and define activity areas (Kent 1990; Lemonnier 1976; Schiffer 2016). However, far from viewing these material associations as static representations of past activity, I take an active assemblage approach which acknowledges the dynamic interactions between human behavior and the materials that come to define the archaeological record (Harris 2014; Jervis 2018; Marsh 2016). Some compound activity areas have well-defined material co-occurrence assemblages in designated spaces. For instance, kitchens, have strong co-occurrence of edible plant and animal-based (often with signs of preparation of cooking), cooking ceramics and other utensils (stone blades), high densities of charcoal or ash, as well as fixed features like a hearth. Of course many spaces were the locale for a variety of overlapping activities, many while not functionally related, nonetheless had great effect on how the other played out (Hodder 2012; Schiffer 1975). This step of course necessitates drawing heavily on the ethnographic record as well as cross-cultural archaeological comparisons (see Chapter 2). I use these previous studies from the Andes and elsewhere around the world to frame the spatio-density patterns observed in excavated contexts at L1.

When possible, I apply an additional network-based mode to look at the connections between spaces at the microscale. This built environment-focused approach is one of the primary methods developed in spatial syntax, which like SNA has developed robust methods for translating the built environment into quantifiable node-link networks (Hillier 2010; Hillier and Hanson 1984). Most spatial syntax techniques rely on network centrality metrics (Bafna 2003). This method is extremely effective when detailed architectural plans, especially regarding access patterns, are available. Only two of my nine excavated contexts have architectural plans detailed enough for these spatial syntax methods, so their discussion here is limited.

The final step is contextualizing this hyper-local view at the microscale of analysis within my ecology of communities. It is important to remember in this framework, households are viewed as the smallest, cross-cultural socio-spatial institution, which is actually a higher-order social process than communities. In this view the social group of *household*, anchored in co-residence, are the emergent result of residential, sustainable, and symbolic community interaction. Of course activities that took place at Cerro San Antonio during the Middle Horizon were defined specifically by that time and place; however I do attempt to categorize these activities based on ubiquitous modes of activities recognized in cross-cultural household studies, namely: production, distribution, transmission, and reproduction (Nash 2009; Wilk and Rathje 1982). However, many of these activity areas, especially as they pertain to broader community practices, are incomplete as they are fundamentally tied to activities that occurred elsewhere. Similarly, many patterns at this microscale only come into focus when they can be compared - drawing connections between these excavated rooted data sets is one of the primary goals of the second level of analysis - the mesoscale.

Mesoscale: tracing inter/intra-community patterns

The primary goal of analysis at the mesoscale is to compare and contrast material assemblages of specific loci throughout Cerro San Antonio in order to trace both inter- and intra-community patterns. All analysis at the mesoscale is restricted to contexts at L1, discussion of broader connections is reserved for the macroscale of analysis. Like the microscale, this level of analysis also utilizes data from excavated contexts but draws heavily on other data collected through surface collection methods as well. While I do bring these two data sets together, in order to keep the datasets comparable, I largely treat the excavation and surface collection data as separate.

Before jumping into the realm of the social, my first step in mesoscale analysis is to draw connections between my excavated contexts. To better visualize connections between unit inventories I employ the bipartite network analysis as described above in the microanalysis. However, for the mesoscale, instead of within-unit architectural areas, each affiliation node being compared is defined by an entire excavated context. Again, this method helps visualize the data that can also be quantified in frequency and relative density tables. While this allows for useful comparisons between excavated contexts and provides a nice snap-shot into differences between domestic sectors, a more detailed view of excavation context material assemblage differences can be detected through a statistical technique that has been adapted specifically for archaeological seriation, called the Brainerd-Robinson Coefficient of Similarity (Brainerd 1951; Cowgill 1990; Robinson 1951) or simply the B-R Coefficient.

The B-R Coefficient is a similarity coefficient that helps gauge the similarity between two archaeological assemblages by providing a metric that “compares the similarity in the proportion of values of attributes” (Athenstädt, et al. 2018:64). For this study I use the B-R Coefficient to compare the relative proportion of major material types in assemblages from select major excavated contexts (e.g., entire test units or excavations blocks). This generates a pair-wise matrix of similarity coefficients that range between 0-200, with 200 being a perfect similarity. Following several recent SNA-influenced archaeological approaches (Giomi and Peeples 2019; Golitko, et al. 2012; Mills, et al. 2015; Peeples and Roberts Jr 2013), I then translate the B-R Coefficients matrix into a simple network format using network visualization software[148].

While not providing as much depth as excavated contexts, the data derived from surface collections provide more spatial breadth. Using the same process described for the intra-unit microscale analysis, I generated density-based heat maps for each of three Middle Horizon domestic sectors. While this surface collection material data is largely restricted to ceramics and lithics, these relative density maps still offer insights into the broad patters that occurred across these sectors. As noted above, while the ephemeral building materials and abandonment

[148] I have been using Peeples' R-Script to compute my BR-Matrices (Peeples 2011) and UCINET 6 for Windows (Borgatti et al. 2002) to generate my initial network visualizations.

destruction processes in the Middle Horizon domestic sectors at L1 did not allow me to generate a detailed, structure-by-structure town plan, some surviving architectural features as well as my excavations allowed me to estimate the type of residential communities the patterns observed in these maps may have been grounded in.

A final stage of analysis at the mesoscale is comparing the sectors as a whole. Here, I again repeat my bipartite affiliation network technique for the three Middle Horizon domestic sectors for a final visualization of material assemblages at the largest possible node size at this intra-site level of analysis. I also conduct a basic spatial syntax analysis of the sectors, exploring how their geographic location, in relation to contemporary cemeteries, and valley bottom access can also reveal important factors that constrained cultural action at the site.

Finally, I work to synthesize these excavation comparisons, sector-wide material surface distributions, and broader spatial analysis to discuss patterns that may reveal important loci of action for residential, sustainable, and symbolic communities. As with the microscale, I also specifically look to categorize these mesoscale activities in terms of the ubiquitous behavioral categories of production, distribution, transmission, and reproduction. With the broader sector-wide views I can more completely trace behavioral chains and other, more extensive activities. For example, at the mesoscale I work to detect manifestations of residential communities at multiple scales - specifically I work to situate my excavated contexts in their broader residential community context (house cluster, neighborhood, etc.). I identify locations in which critical tasks were completed for broader sustainable communities. I use public architecture (i.e., plazas) and evidence for large-scale community action (i.e., feasting), how local symbolic communities at Cerro San Antonio may have engaged more globally-oriented symbolic community action.

Macroscale: identifying broader connections

My primary goal at the macroscale is to identify relations that connect Cerro San Antonio to the broader Tiwanaku sphere. This level of analysis draws on data collected at all stages of field work and draws on the well-developed archaeological topics of interregional interaction, frontier-borderland studies, and collapse (Chase-Dunn and Hall 1991; Feuer 2016; Stein 1999; Tainter 1990) to discuss Cerro San Antonio's position and role in the Tiwanaku network. What I identify here as macroscale is also what most archaeological applications of FNA have focused on (Braswell 2019; Knappett 2013, 2016; Mills, et al. 2013; Mills, et al. 2015; Schortman and Urban 2012).

Some of my analysis at this level is very top-down - taking a full interregional perspective on the broader Tiwanaku area of influence. At this level L1 becomes a single node with links drawn to other documented Tiwanaku-affiliated sites throughout the south-central Andes. Here I present a variety of different network models using site size, proximity, and a variety of other linkages based on site material assemblages to explore the topology of Tiwanaku influence. Timing is also of critical importance to defining the position of the L1 node - here I bring in five radiocarbon dates to provide a preliminary idea of the dating of Middle Horizon deposits at L1. I use network centrality measures to help quantify each of these linkages. I connect this systems perspective to other useful framings in the FNA corpus, from the strength of weak ties to small-world networks. I contextualize these true macroscale network perspectives in the broader systems theory perspectives that have that have developed robust methods for modeling the life and death of the emergent institution of the state (Algaze 1993; Flannery 1972; Haas 1982; Yoffee 2005). Specifically, I discuss how these models should be seen a prehistoric modes of network globalization (see 1.3).

However, the macroscale of analysis also connects back the the hyper-local contexts exposed in excavations. At this local contextual level I attempt to trace global connections by identifying practices that may connect to those observed at other Tiwanaku-affiliated sites. Drawing on more localized studies of frontiers and borderlands I look for practices that may be conserved from former homelands as well as for examples of new emergent cultural practices or ethnogenesis that often occurs in these dynamic regions (Green and Costion ; Lightfoot and

Martinez 1995; Parker 2006; Stein 2002). I also highlight non-local or exotic goods which also suggest long-distance linkages. This level of material inventory analysis again allows for the observation of similarities as well as major differences in the practices that defined each of these excavated areas.

4.3 Hypotheses: archaeological correlates and implications

In this final subsection of Chapter 3, I outline the three primary hypotheses (and their variants) that the methods, techniques, and broader approaches I have outlined above seek to test. These hypotheses are framed in the macroscale, that is they use Cerro San Antonio as the primary node of interest. These hypotheses are also framed in terms of the known culture-history surrounding Tiwanaku and the broader south-central Andes detailed in Chapter 2 (see 2.3), specifically as it has been defined in the western valleys. Figure 31 displays simplified versions of these hypotheses in two different forms of network visualizations.

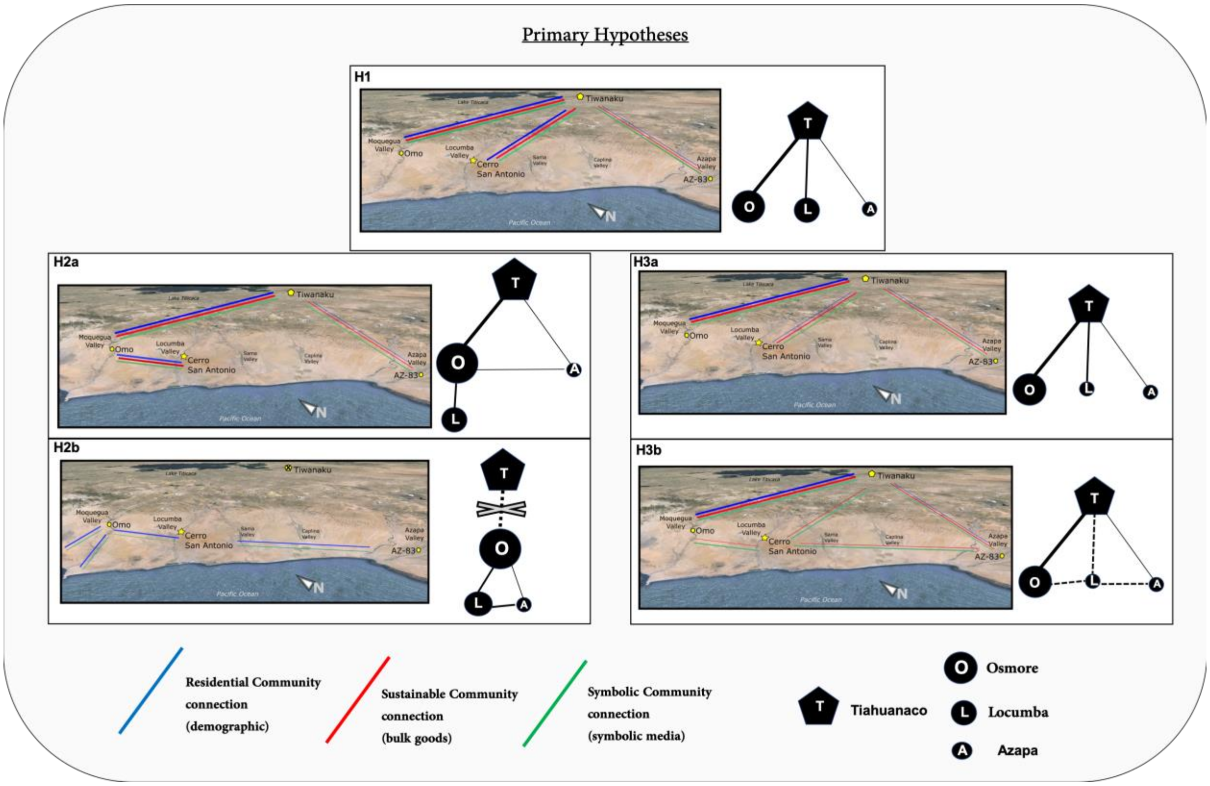


Figure 31. Simplified network visualizations of the three primary hypotheses that lead guide this study: H1 (*top*), H2a and H2b (*left*), and H3a and H3b (*right*).

However, for each hypothesis I also outline some of the most significant correlates and implications and explain how these macroscale hypotheses connect to the data collected at L1 and must be inferred from all three scales of analysis. While they do reference all scales of analysis, these correlates and implications are presented in broad strokes. It is important to note that these hypotheses are not considered mutually exclusive. For instance, the relationship between populations in Locumba and the nascent Tiwanaku polity may have changed, even dramatically, throughout the six-hundred-year span of the Middle Horizon. It is also considered that different sectors or even different excavated residential units may have adhered to one of these hypothesized relationships. The nuances and validity of all aspects of these hypotheses is weighed in the discussion in Section 3.

Hypothesis 1 - Primary Tiwanaku Enclave

H1: The Middle Horizon-era settlements at Cerro San Antonio (L1) represent direct Tiwanaku enclaves, deriving from southern Titicaca Basin communities.

Archaeological Correlates: Evidence supporting H1 would show clear and sustained connections with those observed in the highland Tiwanaku core. At the *microscale* individual excavation unit assemblages should be dominated, if not completely composed of Tiwanaku style materials used in Tiwanaku-style activities. This should be particularly true of consumption practices by of course applies to production, transmission, and reproduction-based activities as well. These patterns should scale up to the *mesoscale* where broader residential sustainable, and symbolic community patterns should have clear correlates in those observed at Tiwanaku as well as in known highland migrant populations in the middle Osmore. At the *macroscale* Middle Horizon populations at Cerro San Antonio should show evidence for strong direct connections to highland Tiwanaku core - this should be evident in examples direct exchange. The timing of the L1 Middle Horizon deposits should align with the hight of Tiwanaku influence in the highlands and elsewhere. If similar to those in the Osmore drainage, for H1 domestic occupations in Locumba should be quite dense, likely representing multi-generational, sustained settlements.

Implications: With a multi-component enclave in Locumba, largely independent of the major enclave in the middle Osmore, emphasis would shift to the settler diaspora model as less of an exception and more of a possible strategy of Tiwanaku statecraft. This would suggest a more centralized but less integrated frontier network during the Middle Horizon, and support interpretations that suggest that the burgeoning Tiwanaku political economy acted as a centripetal force - projecting highland communities into more productive agricultural regions like the Locumba drainage.

Hypothesis 2 - Secondary Tiwanaku Enclave

H2: The Middle Horizon-era settlements at Cerro San Antonio (L1) represent secondary Tiwanaku enclaves, deriving from communities centered at the provincial center in the middle Osmore drainage.

There are two variants to to this hypothesis (H2a and H2b). Both clearly center on the Osmore drainage as a primary intermediary between the communities at Cerro San Antonio and Tiahuanaco in the highlands. The primary difference in the variants of Hypothesis 2 are based on the timing of the L1 Middle Horizon settlements.

H2a: The secondary enclaves were outgrowths of a burgeoning provincial center in the middle Osmore drainage.

Archaeological Correlates: Evidence supporting H2a will strong and sustained between the domestic contexts at L1 and the large Tiwanaku enclaves in the Osmore drainage. While there may be some evidence for connections with the highland all Tiwanaku variants should fall within those seen as defining the Omo and Chen Chen traditions in the middle Osmore. At the *microscale* individual excavation unit assemblages should be dominated, if not completely composed of Tiwanaku-style materials used in Tiwanaku-style activities. This should be particularly true of consumption practices by of course applies to production, transmission, and reproduction-based activities as well. These patterns should scale up to the *mesoscale* where broader residential sustainable, and symbolic community patterns should have clear correlates in those observed at Tiwanaku-affiliated sites in the Osmore drainage. Again, at the *macroscale* Middle Horizon populations at Cerro San Antonio should show evidence for strong direct connections to the Osmore drainage. The timing of the L1 Middle Horizon deposits should align with the height of Tiwanaku influence in the highlands and the Osmore drainage. In H2a while the L1 occupations should be contemporary with those in the middle Osmore they should be shorter-lived (smaller/less-dense middens) as they definitionally would have been established after the Osmore settlements.

Implications: Identifying L1 as an offshoot of the Osmore enclaves would elevate the larger neighboring enclaves to that of a true secondary provincial center. While this might suggest a more hierarchical network arrangement for the Tiwanaku frontier, it also suggests a more decentralized network structure with the middle Osmore colonies acting as an intermediary between Tiahuanaco and the western valleys. This would situate Cerro San Antonio as a tertiary node in the Tiwanaku frontier network.

H2b: The secondary enclaves represent diasporic settlements, refugees from Moquegua, after collapse of the Tiwanaku center in the highlands.

Archaeological Correlates: Evidence supporting H2b with also show a strong connection to Tiwanaku-affiliated material traditions developed in the middle Osmore. These may also be similar to the Omo and Chen Chen Moquegua traditions but may also align more closely to those observed in the later Tiwanaku-affiliated material tradition known as Tumilaca. Very similar to that of H2a, evidence for H2b at the *microscale* individual excavation unit assemblages should be dominated, if not completely composed of Tiwanaku-style materials used in Tiwanaku-style activities. This should be particularly true of consumption practices by of course applies to production, transmission, and reproduction-based activities as well. These patterns should again scale up to the *mesoscale* where broader residential sustainable, and symbolic community patterns should have clear correlates in those observed at Tiwanaku-affiliated sites in the Osmore. Again, at the *macroscale* Middle Horizon populations at Cerro San Antonio should show evidence for strong direct connections to the Osmore drainage. However, the timing of the L1 Middle Horizon deposits should fall after the collapse of the Tiwanaku polity in the highlands and associated collapse-related events in middle Osmore and instead align with Tumilaca occupations in the upper and lower drainage.

Implications: Identifying L1 Tiwanaku-affiliated populations in Locumba as terminal or even post-Middle Horizon refugees would align with patterns observed elsewhere in Pacific coastal valleys after Tiwanaku collapse. Locating an additional post-collapse Tiwanaku settlement complex in Locumba would obviously negate state-contemporary colonization and instead confirm the presence to a loosely articulated, but distributed regional network comprised of a far-flung post-Tiwanaku diaspora.

Hypothesis 3 - Exchange & Emulation

H3: The Middle Horizon-era settlements at Cerro San Antoni (L1) represent largely local populations with Tiwanaku material assemblages largely deriving from exchange and other forms of interregional interaction.

There are also two variants to the final hypothesis (H3a and H3b). Both of these variants are based on the idea that Tiwanaku residential communities were minimal or absent at L1 and instead all Tiwanaku materials derive from the indirect interaction between sustainable and symbolic modes of communities. It should be noted that while these hypotheses were seriously tested, they are also viewed as effective null hypotheses. Initial visits to Cerro San Antoni showed extensive evidence for direct Tiwanaku highland occupation. However, far from irrelevant these hypotheses proved important in defining the broader Middle Horizon story at L1.

H3a: There is a small-scale presence of elite highland populations, with all other Tiwanaku-related materials produced locally as emulation-based variants.

Archaeological Correlates: In this scenario evidence should show a small, but clearly defined residential communities of highland Tiwanaku populations. However, these residential communities would be either nested within or closely associated with locally derived communities. At the *microscale* when Tiwanaku-based lifeways are present they should be restricted to these specific Tiwanaku-affiliated residential communities. At the *mesoscale*, there may also be examples of new Tiwanaku-related or hybrid styles developing as local symbolic communities begin emulating those centered at Tiwanaku. These hybrid styles are most likely restricted to more globally-oriented symbolic community practices and materials, but may encompass other community domains as well. For H3a L1 deposits should date to a period contemporary with the height of Tiwanaku influence during the Middle Horizon.

Implications: If the Tiwanaku affiliated components at L1 prove to hold this elite status this would suggest a more direct and centralized form of Tiwanaku statecraft. This approach would involve conform to many traditional models in which centralized states occupy their peripheral territories to extract a variety of resources.

H3b: There is no presence of highland Tiwanaku populations and all observed Tiwanaku-derived materials derived from exchange, local emulation, and other forms of interregional interaction.

Archaeological Correlates: This would entail there being no clear evidence at any scale for Tiwanaku residential community development at Cerro San Antonio. This would be all activities, again at every scale of analysis, would suggest local, non-Tiwanaku community practice. Any Tiwanaku-related materials would derive from trade or perhaps locally produced hybrids. For H3b the timing of L1 Middle Horizon occupations would likely align with the height of Tiwanaku influence in the South-Central Andes.

Implications: The absence of Tiwanaku residents would imply that local populations were acquiring Tiwanaku goods through exchange. The nature of these sustainable community-based arrangements could vary from the directed patron-clientage relationships as suggested for the northern Atacama valleys or more indirect forms of locally controlled exchange as suggested for the San Pedro de Atacama Desert oasis region further south. Either way, this would suggest that apart from the enclaves in the middle Osmore, the western valleys formed a relatively distributed frontier network, with an influx of Tiwanaku goods moving through largely preexisting sustainable-symbolic community interaction routes.

4.4 Chapter Summary

Chapter 4 presented a description of the suite of methods and techniques I have employed for carrying it out this dissertation.

4.1: I outline my data collection methods. This includes my strategies employed in the field, including reconnaissance, systematic surface collection, and excavation. I also describe my material analysis and other laboratory-based data collection methods.

4.2: I provide a description of my analytical strategies which provide the middle-range methods for connecting the archaeological record to important anthropological questions. Here I explain how my strategies are largely rooted in a variety of school of network-based analysis and visualizations.

4.3: Finally, I layout my three primary hypotheses (and their variants) which have framed this study.

Next: Section 2 presents the data collected from the methods and techniques described in 4.1.

SECTION 2 - DATA & RESULTS

Section 2 is a presentation of the results compiled from data collected during archaeological field work and subsequent material analysis completed for my doctoral research. The methods and techniques employed to collect this data are described in detail in Section 1 - Chapter 4. All of these data were collected from contexts at the archaeological site complex of Cerro San Antonio (L1) in the middle Locumba drainage on the far south coast of Peru. As described in Chapter 3, the site contains over two dozen discrete archaeological sectors, affiliated with a number of different culture-history periods. Here I focus almost exclusively on the contexts deemed to be affiliated with the Middle Horizon Period (ca. AD 500 - 1100) and Tiwanaku, though raw data from sectors deriving from other periods are reported on when pertinent as well as in the appendices. While I do synthesize different data sets here, most articulating analysis and all interpretive discussion is presented in Section 3.

Chapter 5 presents the results gained through reconnaissance data collection in the field. This category of data collection includes a number of different methods and tasks, but all are relatively non-destructive field techniques used for generating maps and other forms of spatial-based data analysis.

Chapter 6 covers data collected through systematic surface collection field methods. This chapter presents the raw results of systematic surface collection as well as a variety of ways to visualize this data through material density heat-maps.

Chapter 7 presents the results from excavation within the three Tiwanaku-affiliated domestic sectors (Sectors A, L, and U). Here these results are presented unit-by-unit and cover detailed architectural and broader spatial data regarding these well-preserved domestic contexts.

Chapter 8 lays out all data derived from post-field material analysis. Depending on the material type or and modes of analysis employed these results vary quite drastically in both depth and breadth.

Chapter 5 - Reconnaissance

In this brief chapter I present the results generated from initial and ongoing reconnaissance at Cerro San Antonio (L1). This work included both remote, photo-based mapping as well as initial on-site, pedestrian-based survey (see 4.2 for a description of these methods). Essentially, results included here all revolve around the non-intrusive data collection used for generating maps which define a number of dimensions of the site, particularly regarding the spatial nature of its cultural occupations. A number of these maps were already presented in Chapter 3 with the introduction of L1, but here I provide more depth. I separate these results into four primary subsections: Initial Reconnaissance, Systematic Pedestrian Survey, Spot Find Collections, and (on-site) Low-Altitude Photography.

5.1 Initial Reconnaissance

This subsection relays the results of the initial reconnaissance that took place at Cerro San Antonio. The two main tasks undertaken in this category of data collection were: 1) collating existing remote imagery and previous studies for mapping and 2) initial visits to the site, in which logistical access to the site was assessed, and previously noted sectors of the site were confirmed on the ground. As noted in Chapter 3 (see 3.1), due to its close proximity to the modern town and its extensive archaeological remains, a number of researchers had visited Cerro San Antonio in the past. However, prior to 2012-2015, there were only a few preliminary maps and sketches that provided any indication to internal site sectors or even the boundaries of the broader site (Ayca Gallegos 2010:107; Palumbo 2004:98). Therefore, the most essential product of this stage of work was developing a usable site map, which would provide the basis for all future work.

The first map I was able to generate, before even visiting the site, was a simple topographic map, which I generated using ASTER DEM satellite imagery from NASA (see 4.1).

By overlaying this with the relatively high-resolution, open-access satellite imagery from GoogleEarth I was able to generate useful maps to guide the initial reconnaissance work.

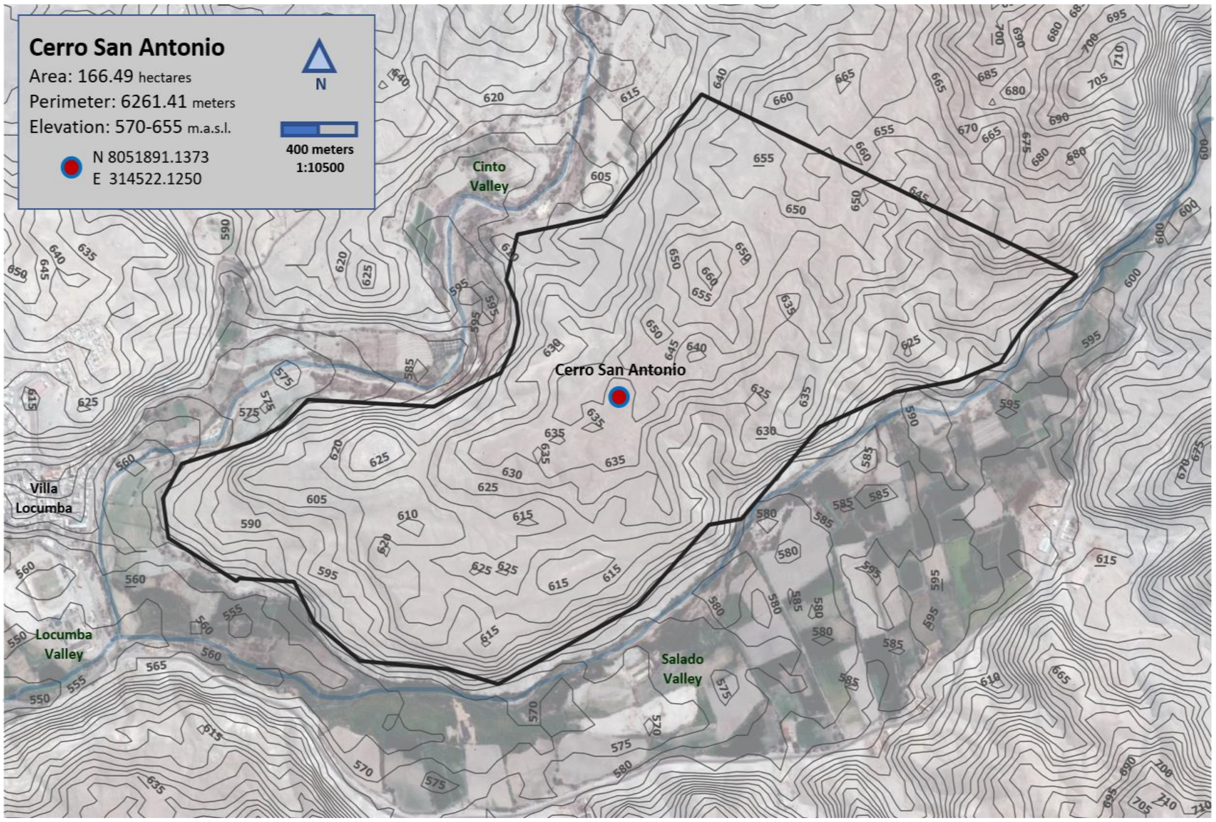
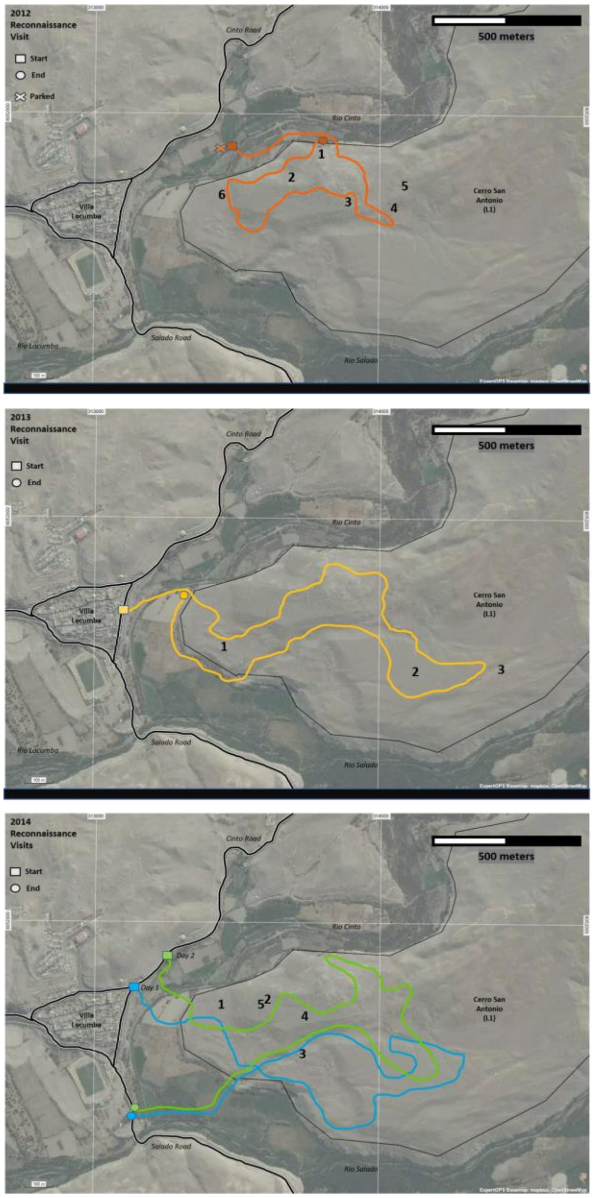


Figure 32. Topographic contour map (5 meter spacing) generated using ASTER DEM imagery from NASA, background imagery from GoogleEarth. *Note*: my original map did not include the formal L1 site boundary.

As with most previous archaeological studies that visited Cerro San Antonio, my initial reconnaissance visits targeted the western end of the site. These earliest visits largely confirmed what the previous visitors had observed - a large Late Intermediate Period domestic occupation with associated mortuary components in the north portion of the site, a large Tiwanaku-associated domestic component with at least one mortuary component in the south, and Formative Period burial mounds (t*umulos*) on the western end of the site, closest to the modern town. These initial visits were completed without the use of handheld GPS and all documentation was done with photography and note-taking. I used the topographic maps and downloaded GoogleEarth imagery for general orientation and base-maps to sketch in findings (see Figure 33).



2012

- Brief day visit to determine the logistics of the site
- Identified:
  - The colonial bodega (Sector J) (**1**)
  - The primary LIP domestic sector (Sector C) (**2**)
  - A number of the LIP mortuary sectors (Sector D, E, F, P) (**3**, **4**, **5**, **6**)
- Modern looting minimal

2013

- Follow-up brief day visit
- Walked from town and entered the northwestern corner of the site
- Identified:
  - Formative tumulos (Sector H) (**1**)
  - (Re-walked) LIP sectors from 2012 (Sectors (C, D, E, F, P)
  - Tiwanaku domestic sector (Sector A) (**2**)
  - Tiwanaku mortuary sectors (Sector B) (**3**)
- Modern looting minimal

2014

- Two day full-day visits
- Walked from town and entered the northwestern corner of the site (both days)
- Identified:
  - Mixed sector – domestic/mortuary (Sector G) (**1**)
  - (Re-walked) LIP sectors from 2012 (Sectors C, D, E, F, P)
  - (Re-walked) Tiwanaku sectors from 2013 (Sectors A, B)
  - Additional LIP mortuary sectors (O, R) (**2**, **3**)
  - Southern petroglyph fields
- Extensive modern looting (documented active looters on-site) (looting site #1 (**4**), looting site #2 (**5**))

Figure 33. Maps displaying the initial reconnaissance trips I undertook at Cerro San Antonio (L1) between 2012-2014. The numbers on each map correspond with the findings summary to the right.

Significantly, between my 2013 and 2014 visits the site of Cerro San Antonio was formally registered as an archaeological site with the Tacna office of the Ministerio de Cultura by archaeologist Adan Umire and Rosanna Revilla (Revilla 2013). This site declaration involved the definition of a formal site boundary, which first illustrated the immense size of the site complex. While my 2014 visits would still target the western portion of the site, this new delineation map provided a formal site boundary (including UTM-based coordinates). Notwithstanding the site registration, however, in 2014, we witnessed and documented looters actively looting on-site and provided photographic evidence to the local authorities and the local Ministerio de Cultura.

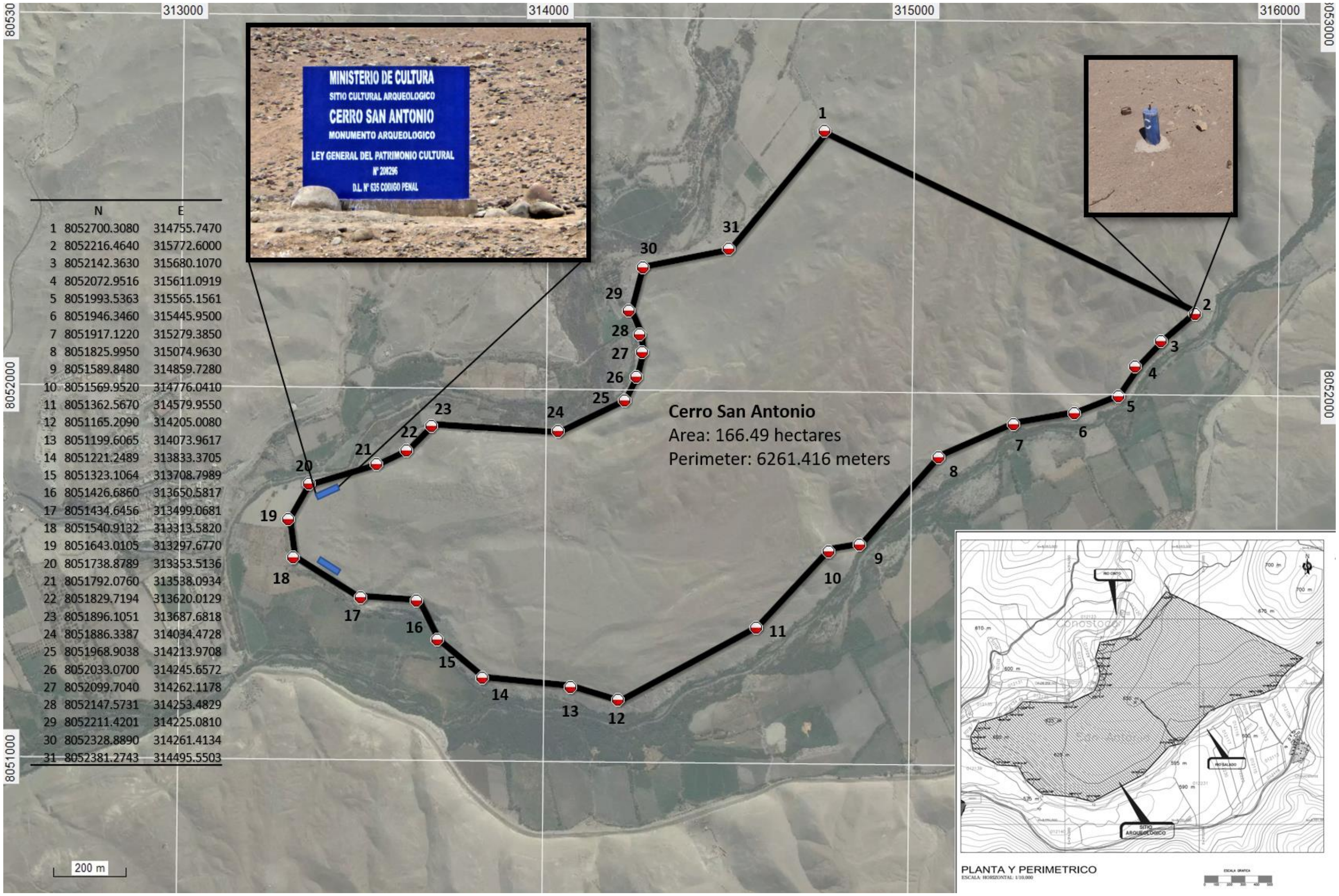


Figure 34. Official site boundary of Cerro San Antonio as delineated by the Peruvian Ministerio de Cultura - Tacna Office.

In a sense, informal reconnaissance would continue every time work was conducted at the site. New features and materials were observed all the time and often simply recorded in field notes. However, as work advanced we would also use handheld GPS units to record the location of important features and other spatial aspects of the site. In total over 2000 individual waypoints were collected to this end. This informal reconnaissance would continue to inform more formal, advanced forms of data collection and therefore results from this work is included where pertinent elsewhere.

5.2 Systematic Pedestrian Survey

The formal site boundary facilitated more systematic forms of pedestrian survey. Using handheld GPS and more substantial survey crews, this systematic pedestrian survey resulted in identifying important geological topography of the site and delineating all inter-site sectors. True transect-based pedestrian survey was undertaken in 2015 by the UCSD archaeological field school, where 25 major, full-crew transects were completed. The transects targeted the eastern portion of the site where reconnaissance had yet to explore and would ultimately result in 100% coverage of the 166.49 hectares of the site.

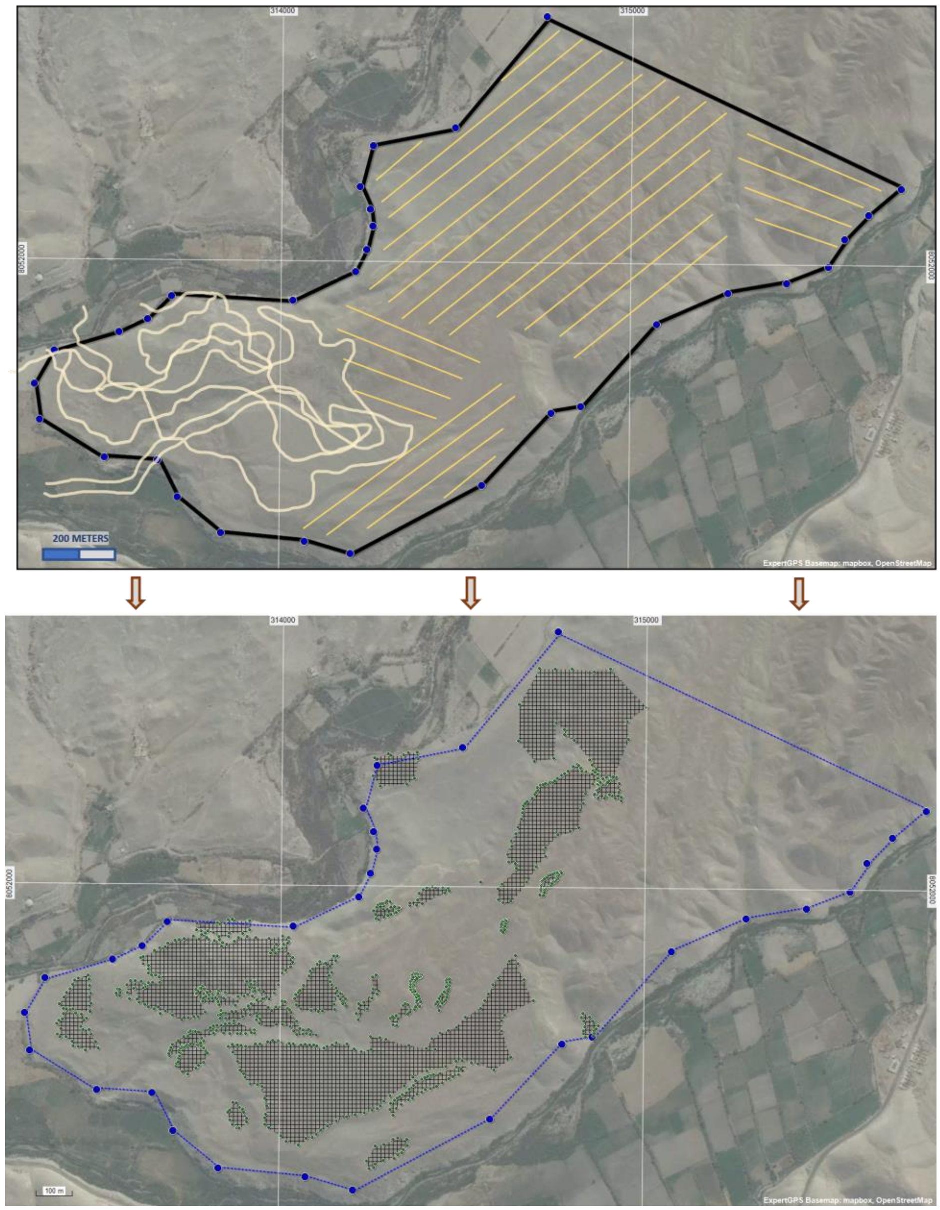
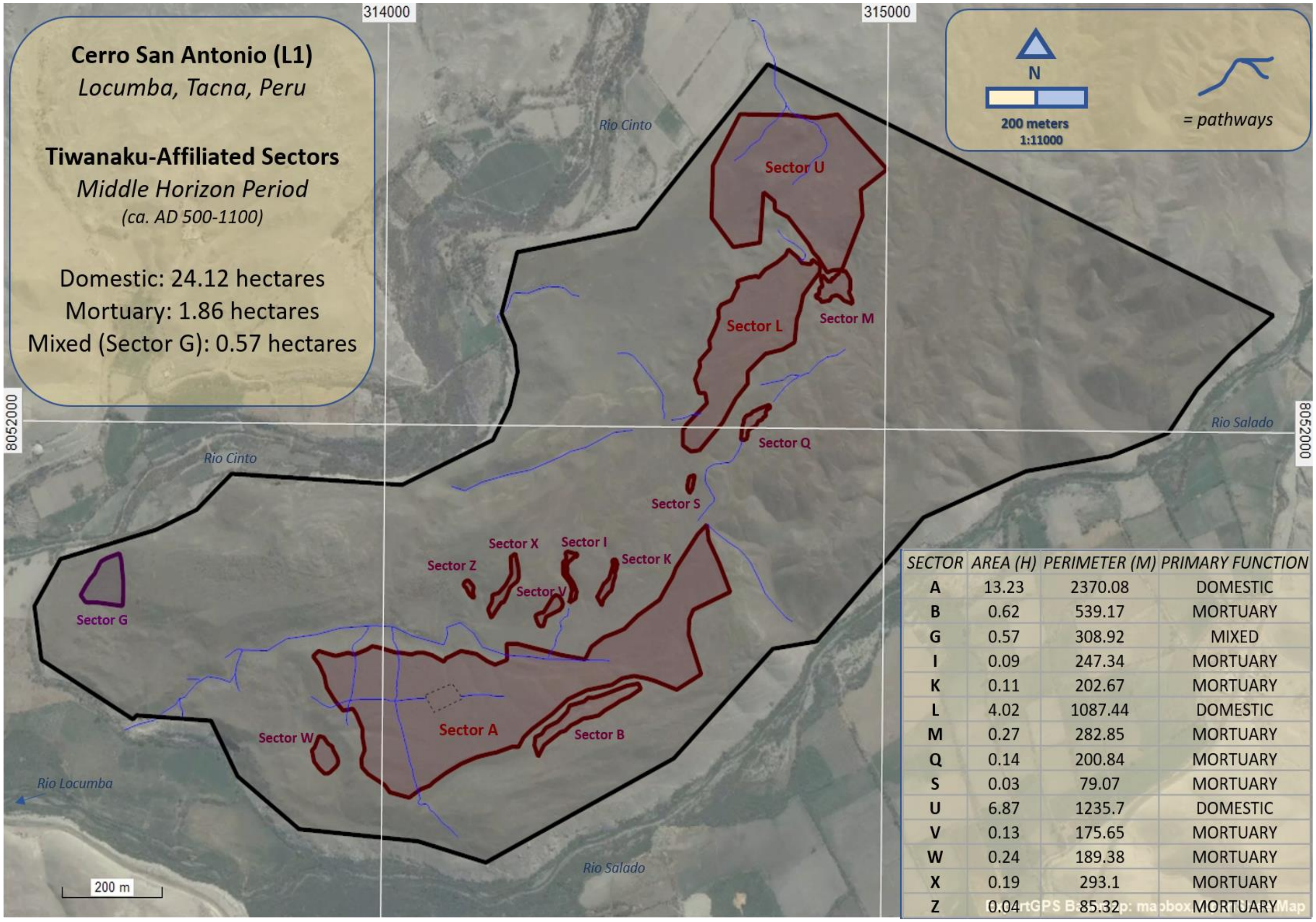


Figure 35. (top) Map depicting all major pedestrian survey work - initial reconnaissance routes (pale yellow) and systematic pedestrian survey transects. (bottom) Map displaying all sectors delineated from informal reconnaissance and systematic pedestrian survey - shaded areas represent areas with pre-modern cultural material and perimeter waypoints (GPS) are marked in green.

Again, much of the data collected at this stage of research, especially in regards to to major sector attributes were presented in Chapter 3 with the initial sector descriptions (see 3.1). However, in addition to major characteristics like perimeter length, total area, and cultural affiliation, additional sector attributes were recorded. Here, I note the additional information regarding the Middle Horizon-affiliated sectors (with other sector information reported on in the appendices - see Appendix 5).



SECTOR	AREA (H)	PERIMETER (M)	PRIMARY FUNCTION
A	13.23	2370.08	DOMESTIC
B	0.62	539.17	MORTUARY
G	0.57	308.92	MIXED
I	0.09	247.34	MORTUARY
K	0.11	202.67	MORTUARY
L	4.02	1087.44	DOMESTIC
M	0.27	282.85	MORTUARY
Q	0.14	200.84	MORTUARY
S	0.03	79.07	MORTUARY
U	6.87	1235.7	DOMESTIC
V	0.13	175.65	MORTUARY
W	0.24	189.38	MORTUARY
X	0.19	293.1	MORTUARY
Z	0.04	85.32	MORTUARY

Figure 36. Map of Cerro San Antonio (L1) depicting all Tiwanaku-affiliated sectors as well as pre-modern access routes and pathways.

The initial pedestrian survey documented fourteen sectors with cultural affiliations to Tiwanaku and the broader Middle Horizon Period. This included three domestic sectors (Sectors A, L, U), ten mortuary sectors (Sectors B, I, K, M, Q, S, V, W, X, Z), and a final sector with mixed functions (and likely cultural affiliations) (Sector G[149]). In total these sectors cover 26.55 hectares, with over 90% (24.12 hectares) of that area deriving from the three domestic sectors. The systematic pedestrian survey also revealed a number of pre-modern pathways that allowed access between the sectors and to the site in general. In total over three kilometers of pre-modern pathways have been identified within the site boundaries of L1. Almost every pre-modern pathway has some direct connection to one of the primary Tiwanaku domestic sectors (Figure 36). Significantly, based on the site's internal topography and overall proximity, the Tiwanaku-affiliated sectors fall into two separate groups: the South Group and the North Group.

The South Group is centered on the largest domestic sector on-site (Sector A) and also contains seven of the ten mortuary sectors (Sectors B, I, K, V, W, X, Z), covering a total of 14.65 hectares. The vast majority of this area is from Sector A, which covers over 13 hectares of area. While subject to high winds and extreme sun exposure the expansive plateau that Sector A encompasses is the only contiguous landform on site on which a settlement population could have comfortably housed hundreds of individuals. Most of the cemeteries are relatively small and are tucked into narrow quebradas to the north and south of Sector A. The South Group straddles the primary quebrada pathway and had efficient access to three valley bottom access points, leading to the Salado Valley as well as the central Locumba Valley. Recent looting and more historic disturbances have damaged most sectors in this group.

The North Group is composed of the two domestic sectors, Sector L and Sector U as well as the three remaining mortuary sectors (Sectors M, Q, S) and covers 11.33 hectares.

[149] As noted in the Chapter 3 initial sector descriptions (see 3.1), Sector G is quite complicated and diagnostic ceramics and other materials from every cultural period have been recovered here. For this reason, Sector G is often excluded from this study, until future investigations provide more clarity on these observations.

Almost 11 hectares of this area is from Sector L (4.02 hectares) and Sector U (6.87 hectares). Sector L occupies a flat blufftop which overlooks Sector U which covers the sandy slopes below. Sector L is the best-preserved domestic sector on-site and contains numerous examples of preserved architectural foundations and dense material scatters. Conversely Sector U is the sparsest of the Middle Horizon domestic sectors with almost no preserved features or other substantial remnants of occupation. These two sectors could conceivably be considered a single continuous domestic sector, but the difference in topography and material density was justification to separate them into separate sectors. Associated most directly with Sector L are three mortuary sectors, which like the South Group, are mostly found tucked away in narrow quebradas. The North Group has direct access to three of the site's valley bottom access points, the two most closely accessible points lead to the Cinto Valley.

Ground-Stone Pilot Survey

An important pilot study targeting ground-stone lithics was completed within Sector L and initiated in Sector A - the two most prominent Tiwanaku-affiliated domestic sectors. While far more limited and focused than the work described above, this ground-stone study was non-intrusive and did not involve material collection so also falls under the heading of systematic pedestrian survey. Conducted during the 2018-19 season, this survey was meant to supplement a typology for ground-stone tools developed from excavated samples recovered at L1. The typology itself is discussed in greater detail in later chapters (see 8.2), but it included (eleven 11) ground-stone tool types. Most of which fall into the broad categories of mano or metate - the primary tools used for grinding, crushing, and other domestic tasks[150].

Here I will only report the findings of the completed ground-stone pilot survey within

[150] As discussed more in Section 3 most of these tasks revolve around foo preparation, but can also include a variety of other tasks.

Sector L. The Sector L ground-stone survey area encompassed 5230m^2 along the western edge of the sector. This area was selected for a number of reasons. One of the primary reasons was that this area contained the highest density of exposed domestic wall foundations. While limited and very fragmentary these architectural segments provided considerable contextual data regarding the location of domestic structures and even internal architectural patterns of individual structures. Additionally, as can be noted in Figure 37, the pilot study area for the ground-stone study intentionally encompassed L1L-2019-Unit 3. This allowed me to incorporate the ground-stone and architecture exposed and collected in the unit with the surrounding area.

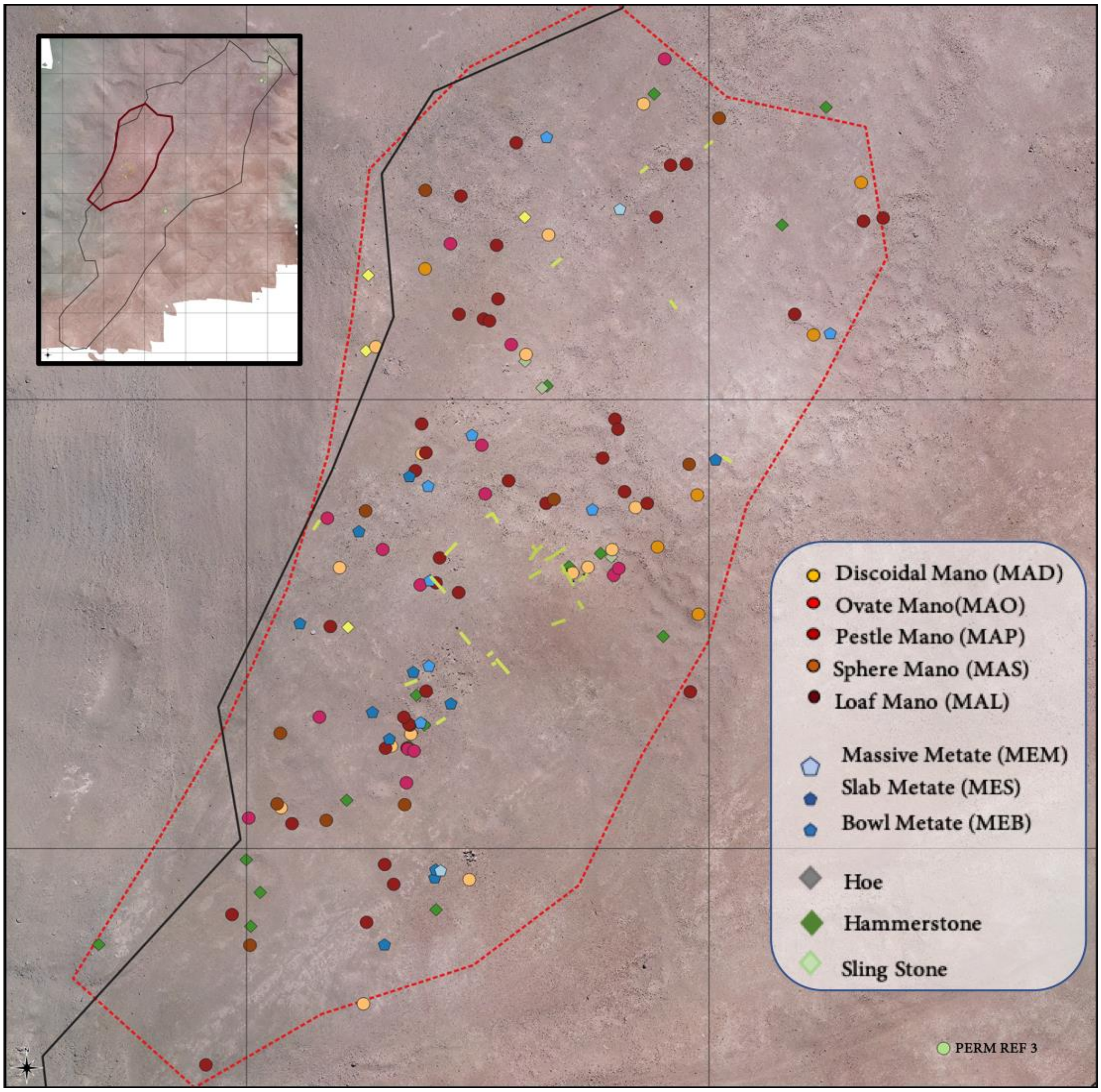


Figure 37. Map projecting the plotted finds in the ground-stone pilot study. Also depicted are segments of quincha wall foundation segments.

The ground-stone survey identified 123 ground-stone specimens (including fragments) and with an additional 13 ground-stone specimens identified and collected from excavation block L1L-2019-3, there were 136 specimens to work with for this pilot study. Again, the typology into which we organized these finds will be described in greater detail below, but I provide a brief sketch of the typology and initial results here.

We identified four primary categories into which all ground-stone specimens could be organized, based primarily on function: manos, metates, hammerstones, and other. *Manos* are largely hand-sized cobbles used primarily for grinding a variety of materials on top of another ground-stone implement (metate). *Metates* tend to be significantly larger than manos and are generally used as the foundation or anvil, on which various materials are ground or pounded with manos. *Hammerstones* are technically a percussive-based lithic technology but many we identified also appear to have be partially ground and as they are also not technically made via flaking, I include them here. Finally, the limited category of *Other* contains all miscellaneous ground-stone specimens that don't fall in the other categories. Most major categories of ground-stone contained multiple subtypes, largely based on form. Again, more depth is provided regarding these subtypes and other ground-stone attributes in later chapters (see 8.2), but a few important trends are worth noting here.

5.3 Spot Find Collections

The only semi-intrusive tasks included in the reconnaissance category of work were surface spot finds. As described in Chapter 4 (see 4.2), this non-systematic material collection strategy was employed to retain important materials encountered on the surface that we did not wish to leave in the field. These were often diagnostic artifacts, essential for defining the cultural-temporal affiliation of sectors as well as materials we feared were at risk due to preservation or theft if left in the field. Here I present the basic results of spot finds recovered from in or around the Tiwanaku-affiliated sectors at L1. I include a brief summary of the composition of these findings and their general distribution here, but provide a more detailed description of the materials collected in the material analysis chapter (see Chapter 8).

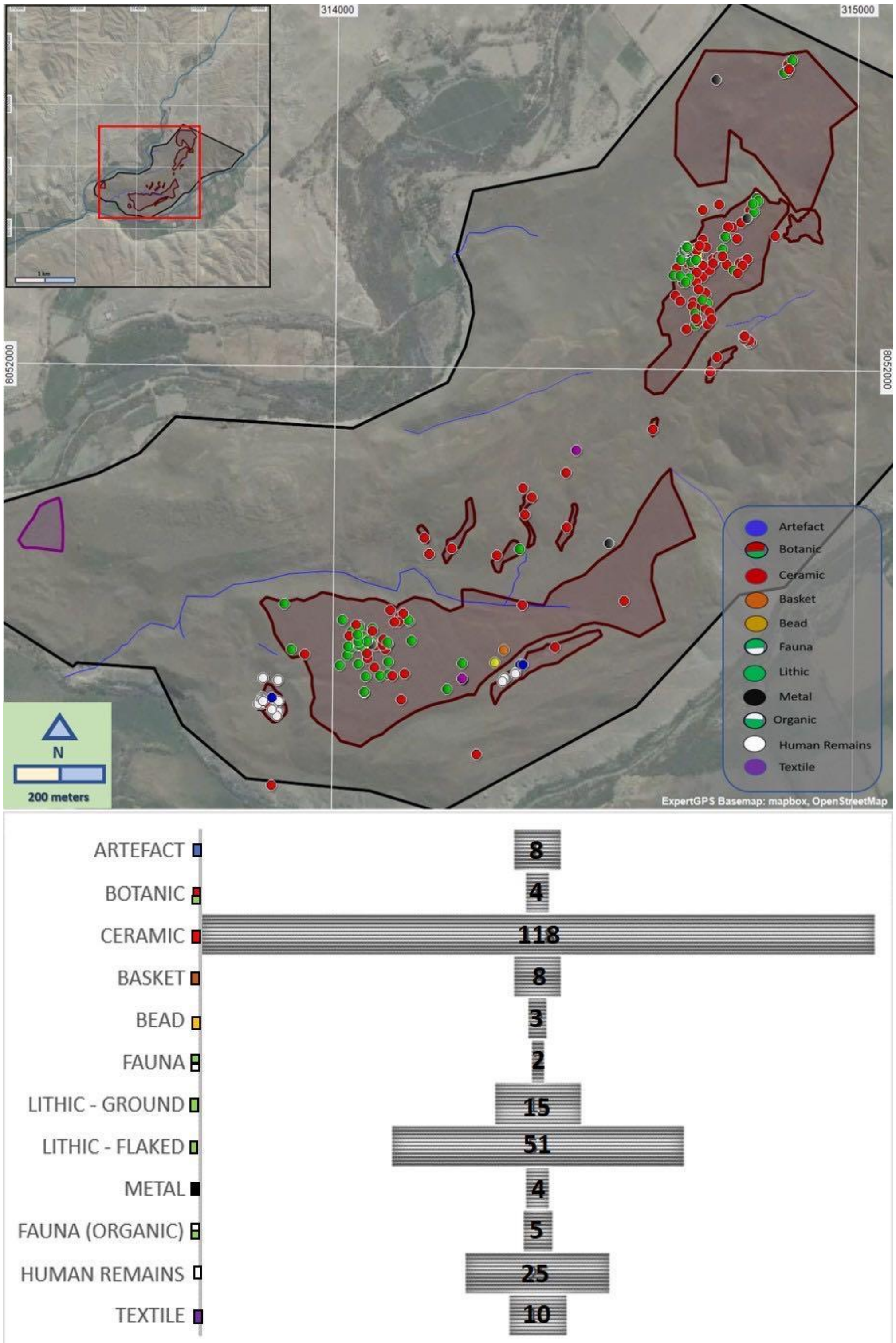


Figure 38. (*top*) Map displaying the distribution of all Spot Finds associated with the Tiwanaku-affiliated sectors. (*bottom*) Chart illustrating the number of Spot Finds associated with each major material type (Total: n=253).

In total, 253 individual surface spot finds were collected from in and around the thirteen sectors with primary Tiwanaku affiliations (Sector G is excluded here). These spot finds would fall into almost all of the material categories described in Chapter 4, including: Ceramics, Basketry, Beads, Flaked and Ground Lithics, Textiles, and Metals as well as Fauna and Organics, Botanics, and Human Remains. Ceramic and Flaked Lithic materials made up almost 67% of all spot finds (46.6% and 20.1%, respectively). Diagnostic ceramics, and particularly decorated redware sherds, were the most common specific material type, often targeted for their clear presentation of iconographic elements and value in comparative studies. Since Spot Finds collections were opportunistic and not systematic there is no point in analyzing their distribution, but below I provide maps of both the North and South Group to give a clearer idea as to how these collected materials were these materials were collected. It should be noted that we collected at least one diagnostic spot find (almost always ceramic sherds) from every Tiwanaku-affiliated sector in order to confirm their affiliation.

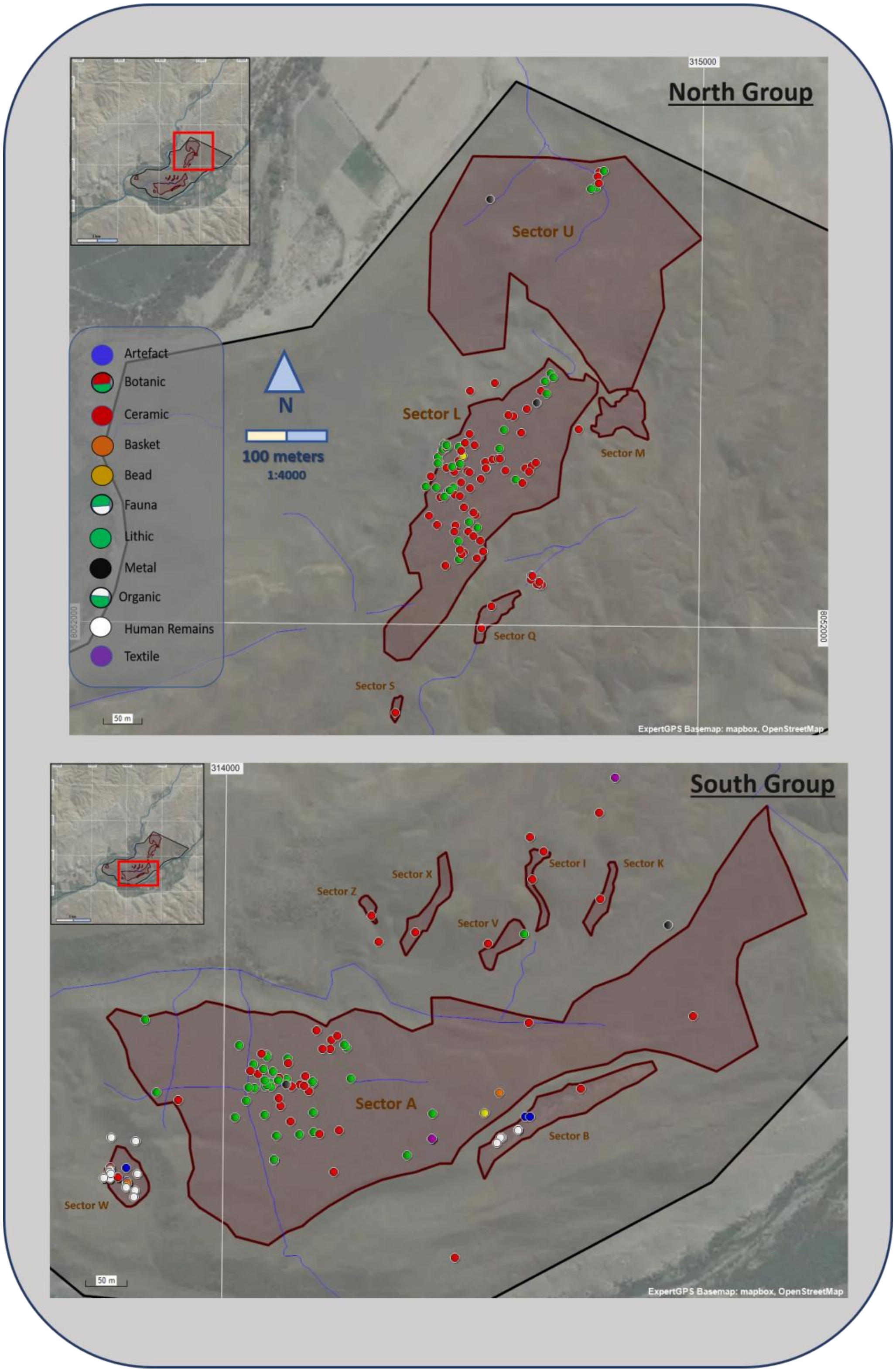


Figure 39. Maps plotting the Spot Finds from the North Group (top) and South Group (bottom Tiwanaku-affiliated sectors at Cerro San Antonio.

As can be noted in Figure 39 the vast majority of Spot Finds were collected from Sector A and Sector L. This was for two reasons: 1) these two sectors were defined by extremely dense surface scatters and 2) we spent significantly more time in these sectors than others at L1. Again, while these finds cannot necessarily be used for any systematic spatial analysis they can be essential for assisting in defining broader issues regarding affiliation. I discuss this use of these materials in later sections.

5.4 Low-Altitude Photography

The final form of data collection included in the non-intrusive reconnaissance category is low-altitude photography through the use of an unmanned-aerial vehicle (UAV), commonly referred to as a drone. While the UAV was utilized for a number of other specific tasks, such as excavation photos, it was most extensively used in general reconnaissance and site mapping. As with the other tasks reported on in this chapter, many of the maps and models generated from the low-altitude photos and other UAV data are just the first step in more advanced forms of analysis which are reported on in later chapters. Therefore, here I only present some of the more general results from this work.

The primary use of general low-altitude photos was for generating high-definition orthomosaic photos as well as three-dimensional models of sectors and even of the entire site. These photo-based maps can be annotated and used to supplement standard two-dimensional maps in various spatial and other context-based analysis. As described in Chapter 4, these maps and other models are generated using a method called photogrammetry, which digitally stitches together overlapping photos, in this case taken using the UAV. While all photos taken with the Mavic Pro drone we utilized were geotagged, we still relied on our on-site permanent reference points to more accurately georeference these generated models and images. As noted in Chapter 4, these permanent reference points were cemented rebar, strategically established around the site, and shot-in with a differential GPS.

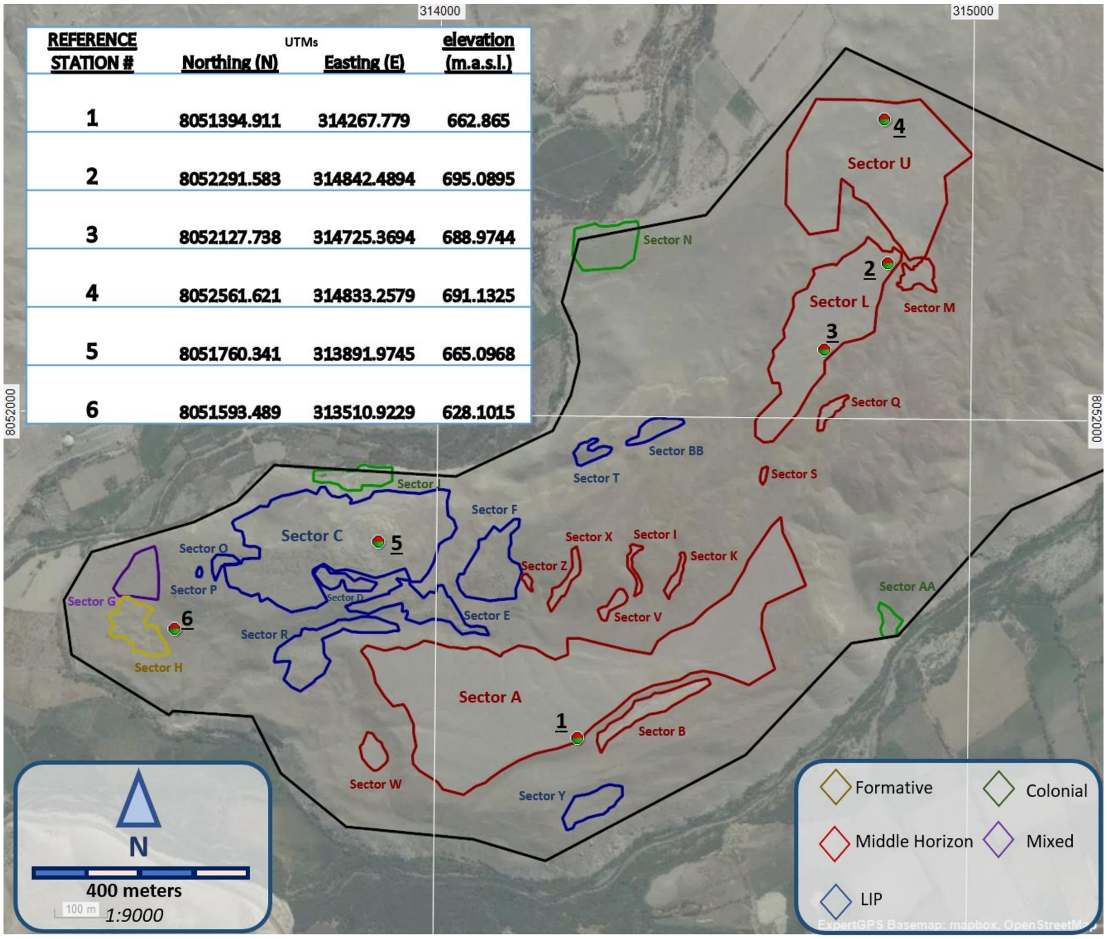


Figure 40. Map showing the six permanent reference points established at Cerro San Antonio.

For the general mapping photos, we would fly both standardized transects as well as more free-form flyovers. Each flight would fly at a consistent elevation, but these elevations would vary between flights - ranging from 20 to 90 meters above the ground surface.

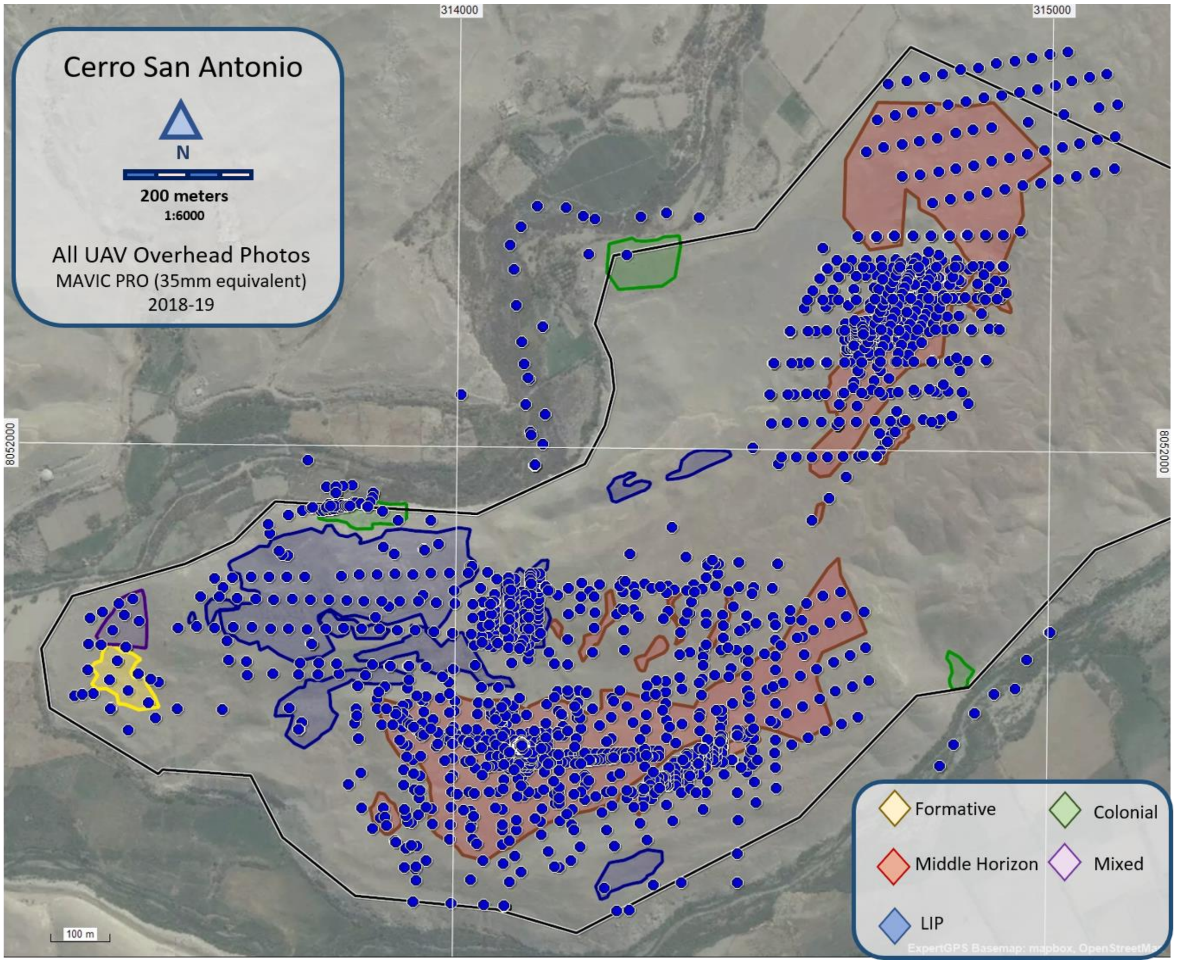


Figure 41. Map which displays all 1,970-individual low-altitude photos taken with the UAV with the purpose of general mapping during the 2018-19 season.

In total 1,970 individual photos were taken with the UAV for the purpose of general site mapping and modeling (Figure 41). While coverage of the site writ-large was not 100% complete, all delineated sectors were documented and approximately 70% of the broader site's surface was captured in these photos. Consistent with the focus of this dissertation, coverage favored the Tiwanaku-affiliated domestic sectors, particularly Sector A and Sector L where we spent the vast majority of on-site time in 2018 and 2019. To this end, over 50% (1,008) of the individual photos targeted the Middle Horizon era sectors (Figure 42).

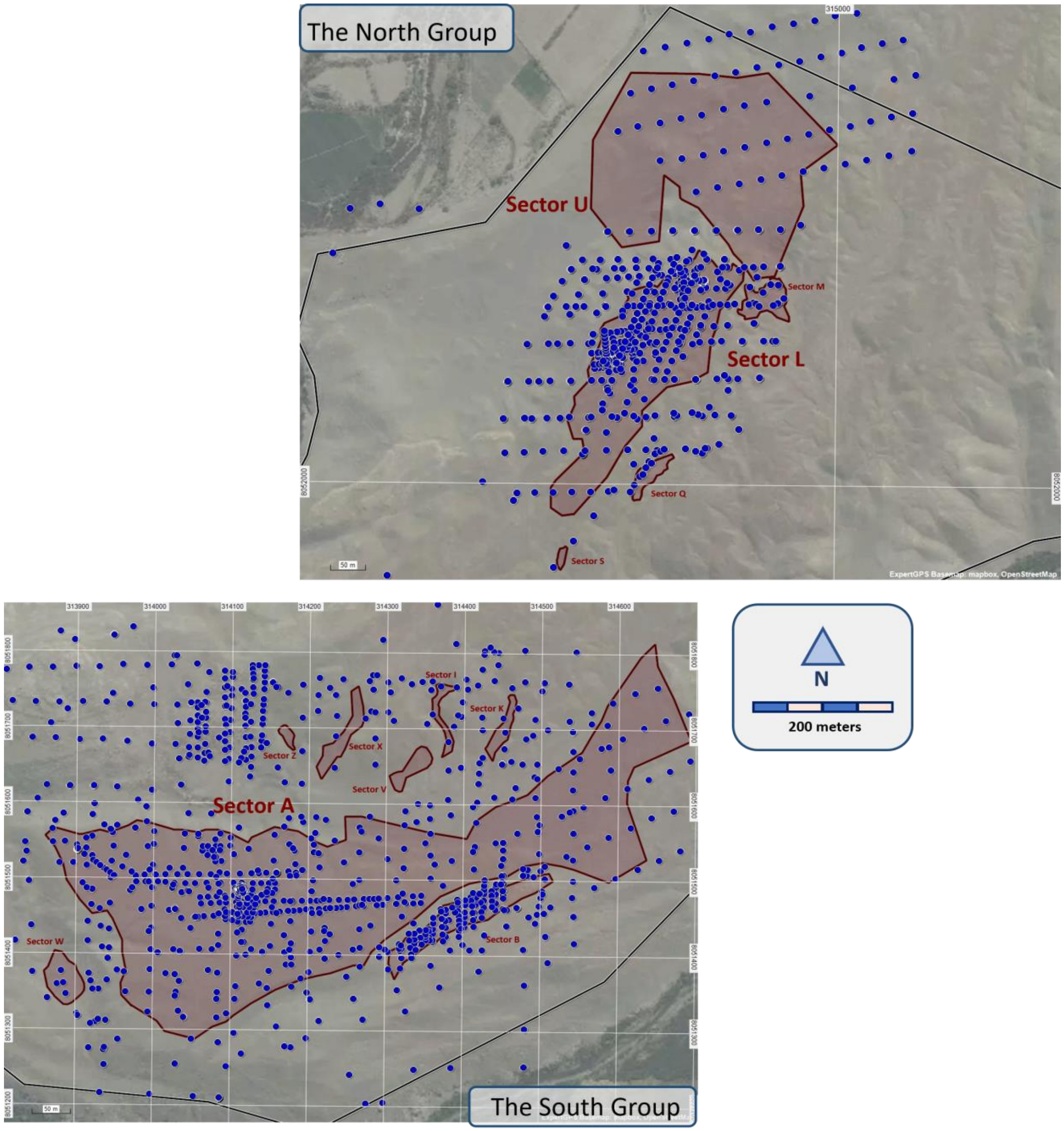


Figure 42. Maps of the North and South Groups of Tiwanaku-affiliated sites at L1 - blue dots indicate individual overhead UAV photos (taken at various elevations: 20-90 m.a.g.s.).

The thorough coverage of Sector A and Sector L allowed for full coverage at multiple elevations. Each of these sectors would receive systematic, full-coverage fly-overs at elevations 40, 60, and 90 meters above ground surface in addition to multitudes of more limited and often simply advantageous[151] overhead flyovers. For Sector A and Sector L flyovers on many different days also meant getting photos with different lighting/shadow conditions, which assisted in later modeling using the images.

The most detailed structure-for-motion models and orthophotos were generated for Sector A and Sector L - the two best-preserved Middle Horizon domestic sectors. Again, these models are primarily used to support more advanced analysis that is presented in later chapters, but Figure 43 and Figure 44 show the primary orthophotos generated for Sector A and Sector L respectively as well as some of the features visible in these types of high-definition, low-altitude aerial photo-based models.

[151] A good example here is that most every day we would bring the UAV to the field to conduct completed/in-process overhead photos of excavation blocks. Once the drone was calibrated and, in the air, we would always take additional overhead shots of neighboring sectors and other areas of the site.

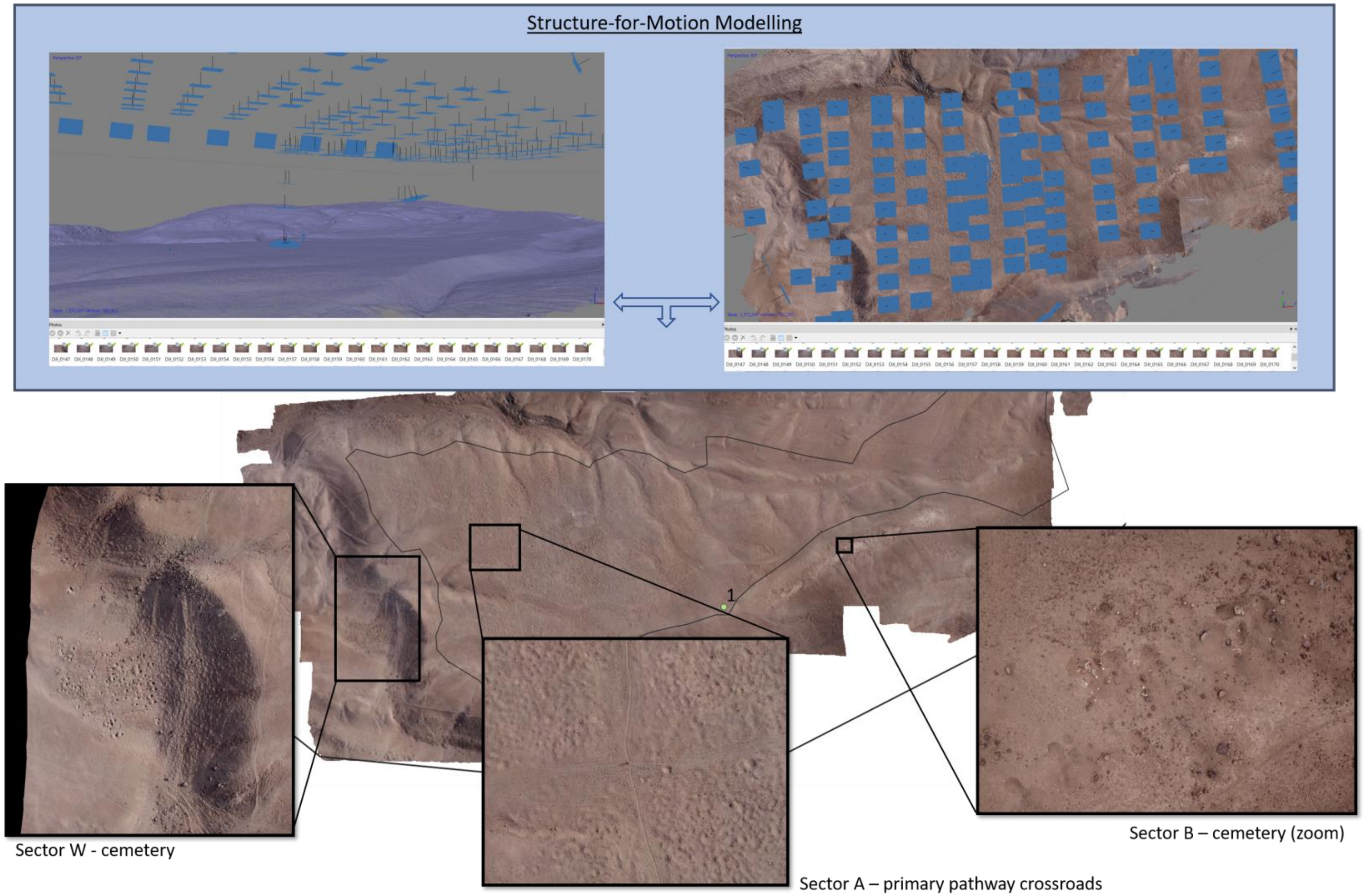


Figure 43. Orthophoto mosaic of Sector A with inserts of associated mortuary sectors (Sector W and Sector B) as well as some major features visible in this high-definition modeling. Also included (*top*) are some examples of the structure-for-motion, photogrammetry process of generating these models from low-altitude photos taken with a UAV.

The model of Sector A presented in Figure 43 illustrates a number of results that can be extracted from this low-altitude photography and subsequent processing. The top of the figure provides some images of the structure-for-motion workflow (for more on this see *4.1*) used in generating the georeferenced orthophoto below. The other inserts in Figure 43 are meant to demonstrate how useful the extreme high-definition of the orthophoto can be in locating unidentified features as wells as for later analysis and presentation purposes.

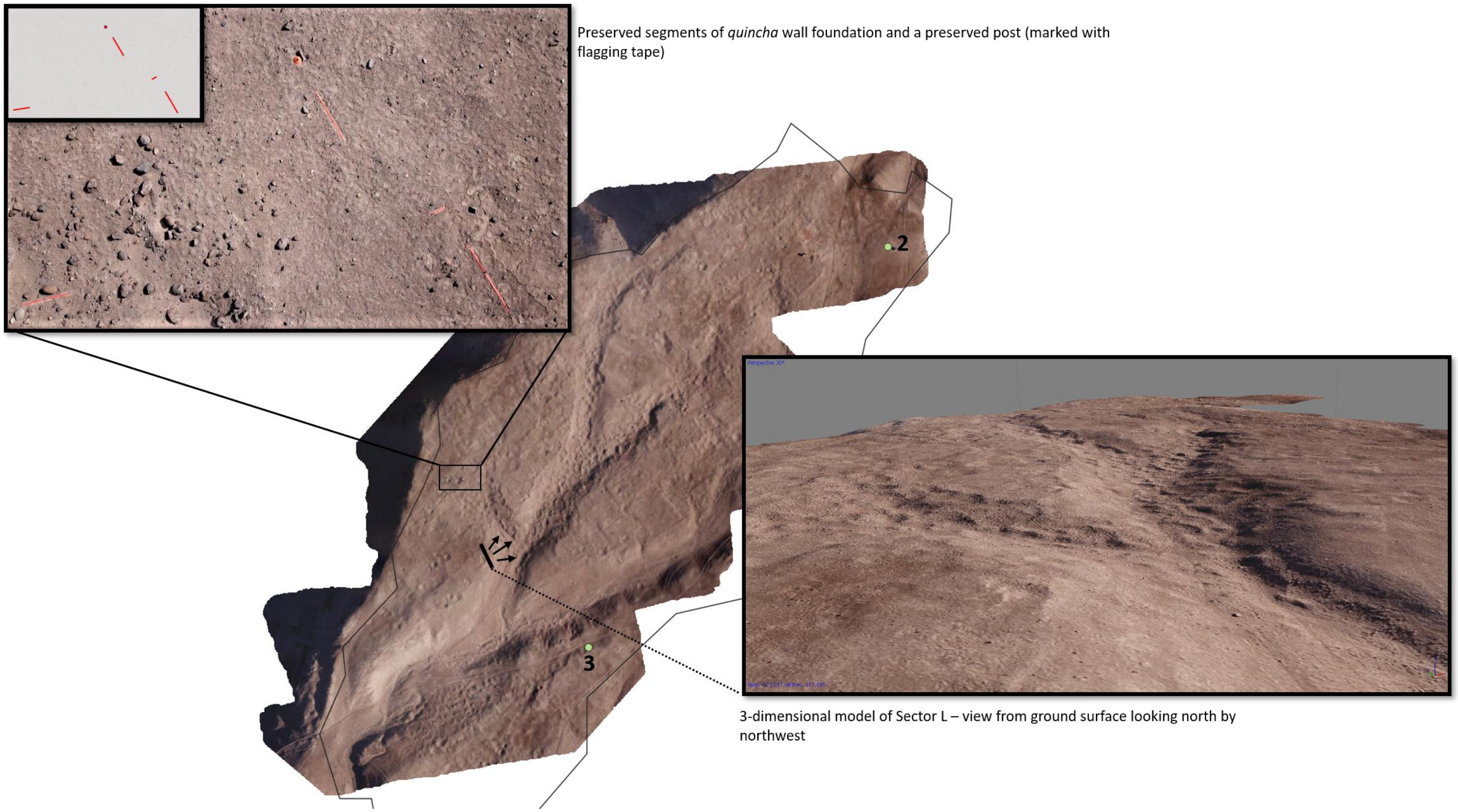


Figure 44. Orthophoto mosaic of Sector L with inserts of important details that can be observed in the structure for motion model. This includes exposed *quincha* wall foundations of Middle Horizon era domestic structures (*top left*) and an example of the useful perspective offered by the 3D structure-for-motion models (*lower right*).

Figure 44 is very similar to Figure 43, in that it is centered on the highest-quality orthophoto generated from modeling Sector L. The inserts here present an example as to how fine-grained details of sectors, like barely visible segments of cane wall and posts, can be captured and mapped through UAV photography (*upper left*). The other insert (*lower right*) depicts the three-dimensional qualities of these mosaic images - depicting the network of quebradas that cross the L1L surface.

5.5 Chapter Summary

Chapter 5 has presented the results derived from the largely non-intrusive data collection methods, termed here Reconnaissance. While the methods used to collect these results are quite varied, they all orbited the goal of generating useful maps and other tasks facilitating more advanced work to be done later.

5.1: Here I outlined my initial reconnaissance work surrounding the pre-modern occupation of the site of Cerro San Antonio. This involved generating maps from existing sources as well as my initial, largely informal site visits.

5.2: This subsection reviewed results of more systematic forms of pedestrian reconnaissance. This work involved completing organized transects with formal field crews. The primary result here was the delineation of formal inter-site sectors.

5.3: This reviewed just the basic results of Spot Find collections. This data collection method involved collecting diagnostic, delicate, or otherwise important materials encountered on the surface for later study.

5.4: Here I covered initial results of low-altitude photography via a UAV and the photogrammetry-based model-building processing work undertaken with the photos.

Next: Chapter 6 presents the results gathered from systematic collection methods.

Chapter 6 - Systematic Surface Collection

In Chapter 6 I present the results of extensive systematic surface collections undertaken at Cerro San Antonio. This systematic form of collection-based survey targeted the primary Tiwanaku-affiliated domestic sectors (Sectors A, L, U) as identified and documented in the reconnaissance work described in Chapter 5. However, unlike the reconnaissance mode of data collection, the results presented in this chapter are primarily from the single task of systematic surface collection.

6.1 Surface Collection Units

The systematic surface collection utilized the broader site grid which is based on 50x50 meter ($2500m^2$) units. In total the full L1 surface grid contained 1304 50x50 meter units, however only 741 of these fell within the formal site boundary. As described in Chapter 4, the systematic surface collection strategy employed here is a stratified sub-sampling method in which a 10x10 meter ($100m^2$) unit was collected in the southwest corner of each sampled 50x50 meter grid unit.

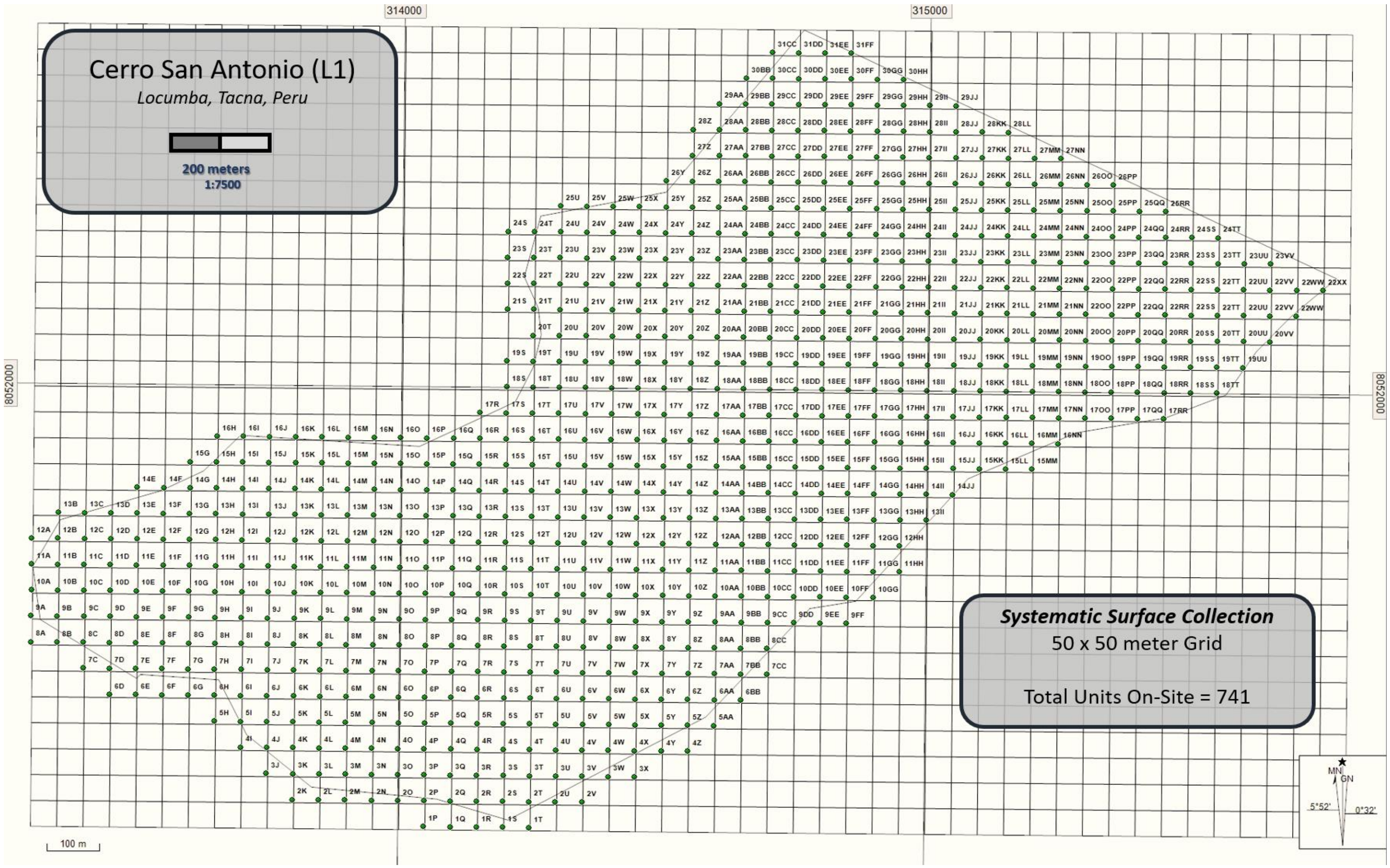


Figure 44. Orthophoto mosaic of Figure 45. Map of the 50m² L1 site grid with on-site units labeled.

In total 145 surface collection units were sampled at Cerro San Antonio, which is just under 20% of the total on-site surface units. The vast majority of these were collected in 2016 (n=127) with the remaining sampled in 2018 (n=18). Of these sampled units 140 were directly associated with the Tiwanaku domestic sectors: Sector A, Sector L, and Sector U. This resulted in complete, 100% surface coverage of these three sectors. Again, as noted in Chapter 4 the sampling strategy[152] employed at Cerro San Antonio resulted in 4% actual areal coverage, meaning 4% of all surface materials have been collected from these three sectors.

[152] Again, this sampling strategy roughly matches that employed by Goldstein in the Moquegua Archaeological Survey (MAS) project in the middle Osmore drainage (Goldstein 2005:189-190).

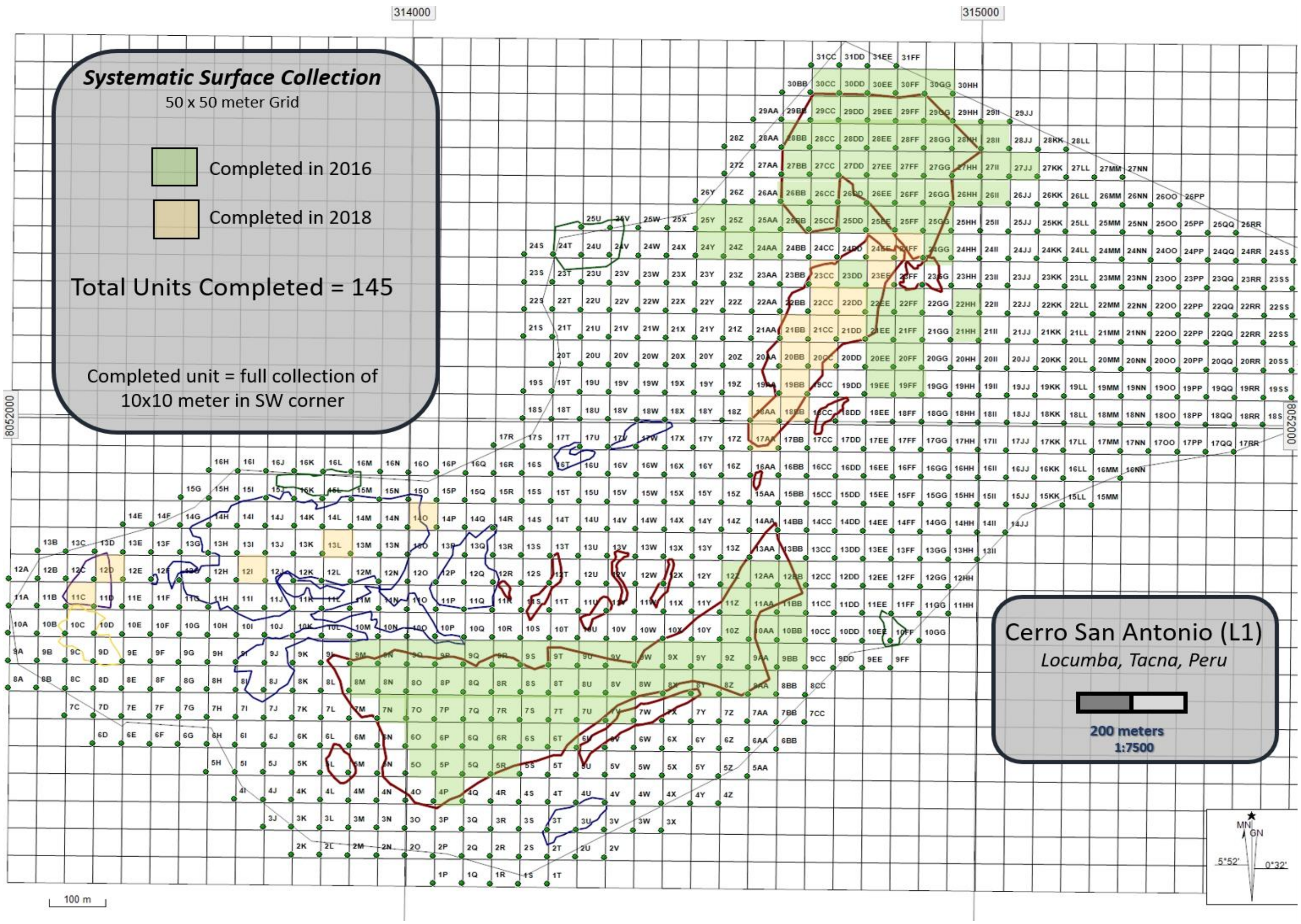


Figure 44. Orthophoto mosaic Figure 46. Map displaying all sampled 50x50 meter grid units. Each unit was sampled by collecting all surface materials in a 10x10 meter subunit

The systematic surface collection produced 181 separate specimens containing thousands of individual material fragments (see Appendix XX for unit inventories). Despite the preservation qualities of the local hyperarid climate, the most ubiquitous materials found during surface collection were typical durable, non-organic material types. Ceramic specimens were by far the most ubiquitous and numerous material type - a total of 20,210 individual sherds, were collected in the Tiwanaku affiliated surface collection units. All ceramics were sorted, counted, and weighed in the field, however due to logistical constraints, only diagnostic sherds were curated for future analysis and undecorated body sherds were left in the field (see Chapter 4 for more detailed description).

With these restrictions we collected 92 Ceramic specimens totaling 1,668 individual diagnostic ceramic sherds. The second most common material type was durable, mostly inorganic animal byproducts, categorized here as Fauna. 56 Fauna specimens were collected totaling 648 grams. The most ubiquitous Faunal material type found in the surface collection was marine shell, mainly from the species *Choromytilus sp.* and *Oliva peruviana*. Also recovered in the Fauna specimens were small amounts of camelid bone as well as fragments of coral. 30 specimens collected in these surface collection contexts were Lithics, with the vast majority of these belonging to the Flaked Lithic sub-material category. While many of the Flaked Lithic specimens were simple debitage (flakes and chunks) there were a number of projectile point fragments, side-scrapers, and hoes. While only 4 Ground Lithic specimens (containing 5 ground-stone fragments) were collected, an additional 23 were documented and left in the field due to logistical constraints. The remaining 3 specimens that fall outside these mentioned material categories were likely out of context or intrusive materials[153].

[153] This included a colonial-historical shell button (ART), a maize cob (BOT), and an unidentified mineral sample (MIN).

6.2 Material Density Distributions & Heat-Maps

Cerro San Antonio is an ideal locale for the type of surface collection strategy described here as there is absolutely no natural vegetative ground cover, very little sediment accumulation, and (at least in the three domestic sectors discussed here) relatively minimal human disturbance. This is not to say that the materials documented in this systematic surface collection were necessarily always in situ; some portions of these sectors had complicated depositional sequences and that is reflected in surface material distributions. However, the maximal material surface exposure and relatively undisturbed contexts have yielded useful distribution maps, particularly of the more ubiquitous material types. In the remaining sections of this chapter, I present initial results from these surface distribution mapping efforts, focusing primarily on ceramic materials but also incorporating lithic and faunal distributions. Here the results are presented for each sector individually, and while I provide some initial inter-sector comparisons, I save most of this discussion for my more substantial synthesis in Section 3.

Sector A

In total 65 systematic surface collection units were completed in or directly associated with Sector A. Reconnaissance observations had already identified some clear patterns in terms of material culture distribution within this sector. While very little architecture (quincha wall foundations, etc.) is still evident on the surface today, extremely dense scatters of cultural material coincided with extensive rockpiles throughout the western portion of the sector. These rockpile-middens are well-known features of Tiwanaku domestic contexts in the Moquegua enclaves to the northwest. These represent both[154] primary domestic middens and house clearing lots as well as remnants of abandonment site destruction events. Relatively central to

[154] See 3.2 for a more extensive general description of L1A and see 2.3 for a description of these types of contexts in the middle Osmore drainage.

this dense western portion of Sector A is the only definitive, extant architectural feature in the sector, the central plaza. Moving eastwards material scatters are continuous but they begin to taper off sharply and rockpiles are absent beginning approximately halfway across the sector. While the surface collection largely confirmed these initial observations, some far more nuanced patterns have emerged from this systematic work.

Ceramics were the most ubiquitous material type in Sector A, with only 2 of 60 units containing no ceramic sherds. Ceramic sherds were also extremely dense in Sector A, with single 10x10 meter collection units sometimes containing thousands of sherds. This density, coupled with the overall large area of the sector resulted in over 75% of recovered sherds (n = 15,548) coming from the 60 units collected in Sector A.

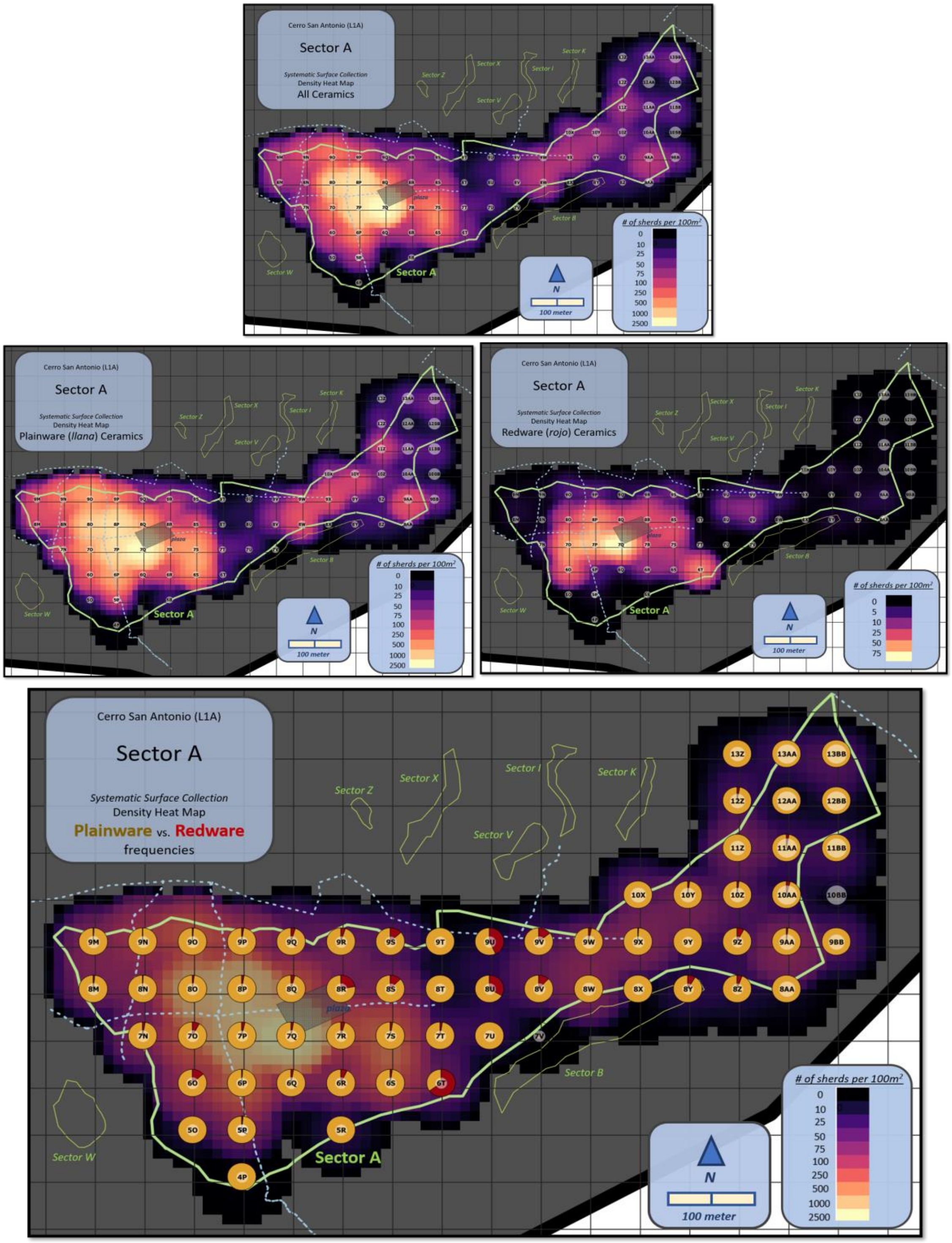


Figure 47. Heat-maps of Sector A visualizing the density of ceramics collected during systematic surface collection. (*top*) Map of density of all ceramic sherds collected. (*middle-left*) Map of density of plainware ceramic sherds and (*middle-right*) map of density of redware ceramic sherds. (*bottom*) Map includes background heat map of all ceramics as well as overlay of pie charts illustrating relative frequencies of Plainware vs. Redware sherds recovered in each collection unit.

As can be seen in the topmost heat-map in Figure 47, the overall ceramic density distribution largely confirms the patterns described above. In fact, even when broken down into plainware and redware this pattern remains - the western half of the sector is exponentially denser that the eastern half. However, far from uniform, the heat-map helps identify truly discrete areas of high-density clusters or “hot-spots.” The most notable density cluster is located in the area extending west from the central plaza. With an average of over 1500 sherds per $100m^2$, this area was the densest single area in the entire sample set. Significantly, the detailed heat-map helps recognize a true “hot-spot” directly adjacent to the southwest of the central plaza and largely restricted to the south and east of the primary N-S and E-W pathway crossroad just to northwest.

The middle heat maps as well as the frequency chart map on the bottom of Figure 47 clarify the differences in distributions between the Tiwanaku ceramic ware types that were recovered in the surface collection. As noted in Chapter 4, these ware types can be described most broadly as plainwares representing largely utilitarian vessel forms and decorated redwares (and more rarely blackwares) representing mostly serving or other ceremonial vessel forms. Clear similarities can be noted between the plainware and redware distributions, primarily that they both reflect the combined (total) distribution map and show a clear hot-spot just to the southwest of the primary plaza and more generally high densities in the western portion of the sector. However, clear differences can be noted as well. While the plainware distribution map largely mirrors the combined (total) map with extremely dense concentrations in the west, gradually tapering off, but with some scattered density clusters in the eastern portion of the sector, the redware is far more restricted in its distribution. This is most stark the eastern portion of the sector where redware is effectively absent, but even in the relative high-density western portion of the sector, redware is still very restricted when compared to plainware. In fact, the density clusters of redware are tied, almost exclusively, to the spaces directly surrounding the central plaza.

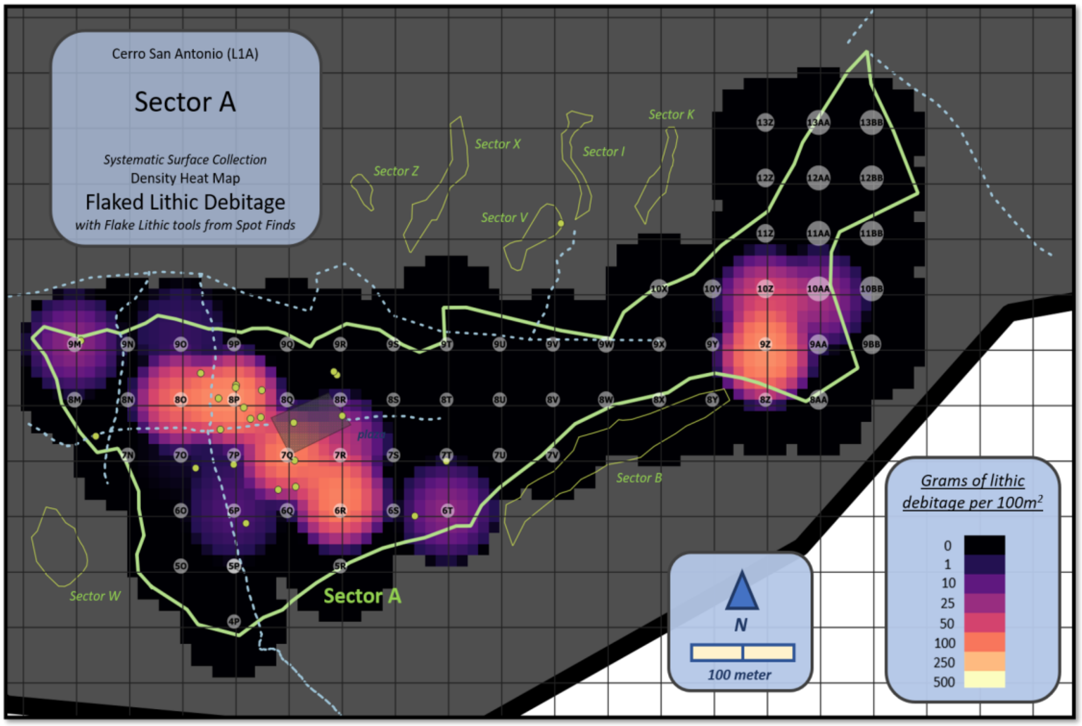


Figure 48. Heat-map of density distribution of flaked lithic debitage as recovered during systematic surface collection at L1A. Also indicated (*yellow dots*) are Flaked Lithic tools (projectile points, side-scrapers, re-utilized flakes) recovered as Spot Finds during reconnaissance.

Clear distribution patterns emerge in the heat-maps of other material types recovered most frequently in the systematic surface collection as well. The heat-map of debitage (flakes and chunks) left from the production and maintenance of flaked lithics shows start distributional patterns. For this material type there is extremely limited distribution with only a few density clusters to the west and south of the central plaza and a third hot-spot in the far eastern portion of the sector. Also noted in Figure 48 are the locations of flaked lithic tools collected as spot finds. Again, while not systematic completed flaked lithic tools were always collected when encountered so these points are displayed here to give at least some indication where these items were most frequently encountered.

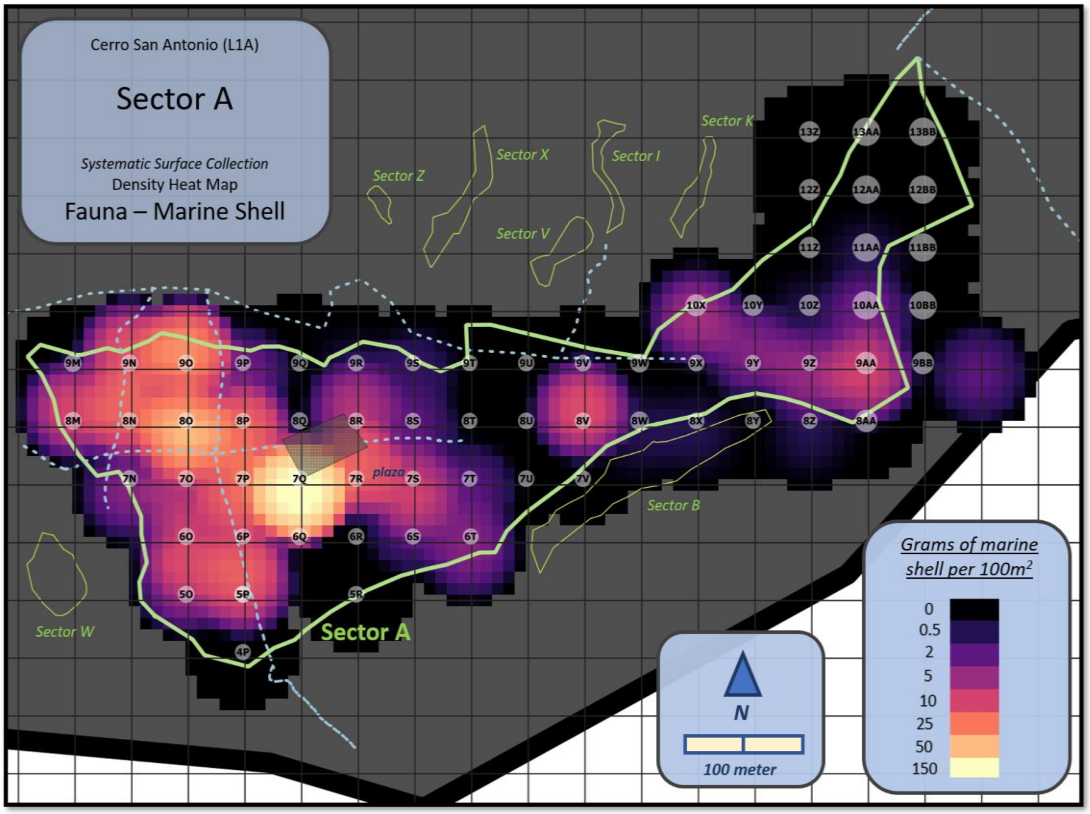


Figure 49. Heat-map of density distribution of marine shell as recovered from surface collection units in Sector A.

As noted above, marine shell was by far the most ubiquitous non-artifact material type recovered during surface collection and the only real proxy for substance remains. As with the other material types, marine shell shows clear high densities in the western portion of the sector, with an extreme spike in density, directly adjacent to the southwest of the central plaza. However, unlike other material types marine shell shows some more density clusters in the northwestern section of the sector as well as some less-dense clustering in the far eastern portion of the sector.

Sector L

In Sector L 38[155] 10x10 meter surface collection units were completed. As with Sector A, observations made during reconnaissance had given some solid impressions of the general distribution of surface materials across L1L. Rockpile-midden features were also present here, but unlike the sprawling nature of those identified in the western side of L1A, in Sector L they are largely restricted to the network of shallow quebradas which dissect the blufftop the sector occupies. The planar surfaces that sit above the quebradas are conversely relatively clear of rockpiles and appeared to contain significantly less overall cultural debris. These patterns would be largely confirmed through the systematic survey, but interesting deviations were also present.

[155] Six of these units were well outside the established eastern boundary of the sector, but were used to ensure this perimeter was indeed correct.

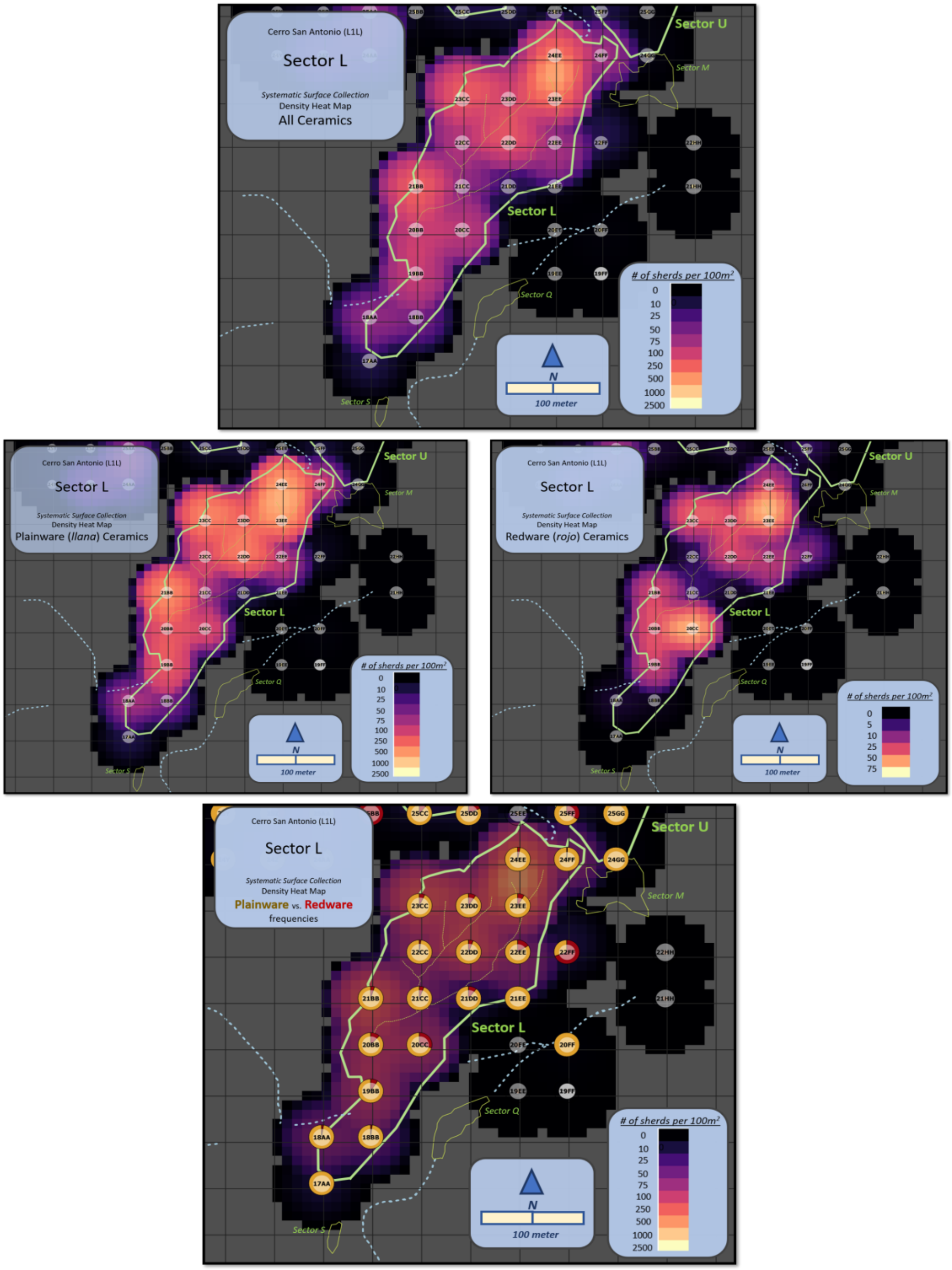


Figure 50. Heat-maps of Sector L visualizing the density of ceramics collected during systematic surface collection. (*top*) Map of density of all ceramic sherds collected. (*middle-left*) Map of density of plainware ceramic sherds and (*middle-right*) map of density of redware ceramic sherds. (*bottom*) Map includes background heat map of all ceramics as well as overlay of pie charts illustrating relative frequencies of Plainware vs. Redware sherds recovered in each collection unit.

Like Sector A, ceramic sherds were also the most ubiquitous material type collected during the systematic surface survey in Sector L. 4,295 total sherds were gathered in the collection units associated with L1L; however, only 25 specimens containing 573 individual sherds were collected for future analysis from these contexts. Importantly, when mapped out in the spatial heat-map format, ceramic sherd distributions do not necessarily conform to the observations made during reconnaissance. Primarily, ceramic sherds were not restricted to the quebradas, and while there were some hot-spots, the overall distribution of sherds, when taken as a whole, were relatively even throughout the central portion of the sector (Figure 50).

However, when broken down into major ware types some more uneven patterning becomes apparent within the ceramic assemblage. The plainware heat-map illustrates how while the majority of the sector had moderate and relatively evenly dispersed plainware sherd densities, there are higher densities found along the northern and western boundaries of the sector (Figure 50). The heat-map of the redware distributions show an extremely distinct distribution pattern. There are two clear density clusters of redware - one in the northwest portion of the sector and the other in the southeastern area of the sector (Figure 50). While both redware hot-spots have high densities, the frequency pie chart map in Figure 50 shows that redware made up a higher proportion of the ceramic assemblage in the southern hot-spot. Finally, there is a clear gap between these two hot-spots, suggesting truly discrete activity areas.

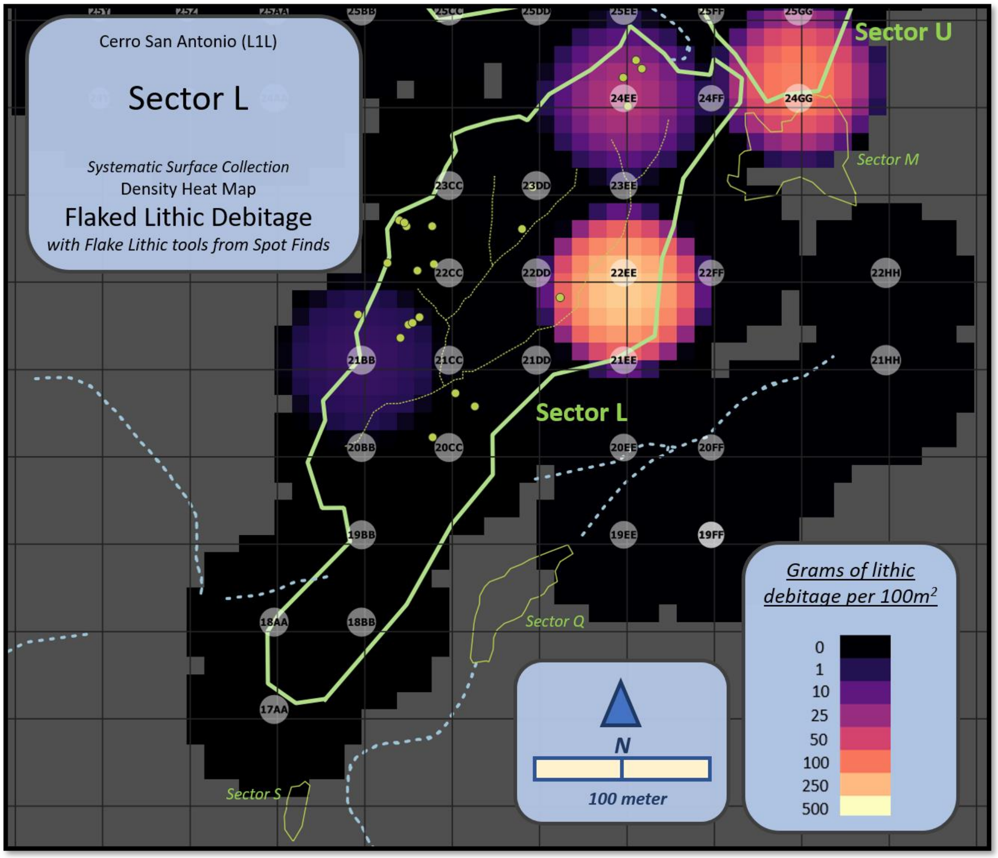


Figure 51. Heat-map of density distribution of flaked lithic debitage as recovered during systematic surface collection at L1L. Also indicated (yellow dots) are Flaked Lithic tools (projectile points, side-scrapers, re-utilized flakes) recovered as Spot Finds during reconnaissance.

Non-ceramic material types recovered in Sector L were far more restricted, in terms of quantity, ubiquity, and overall spatial distribution. Figure 51 shows how flaked lithic debitage was quite limited, with 88% of the debitage (by weight) deriving from a single collection unit (22EE), located in a quebrada bottom on the eastern edge of the sector.

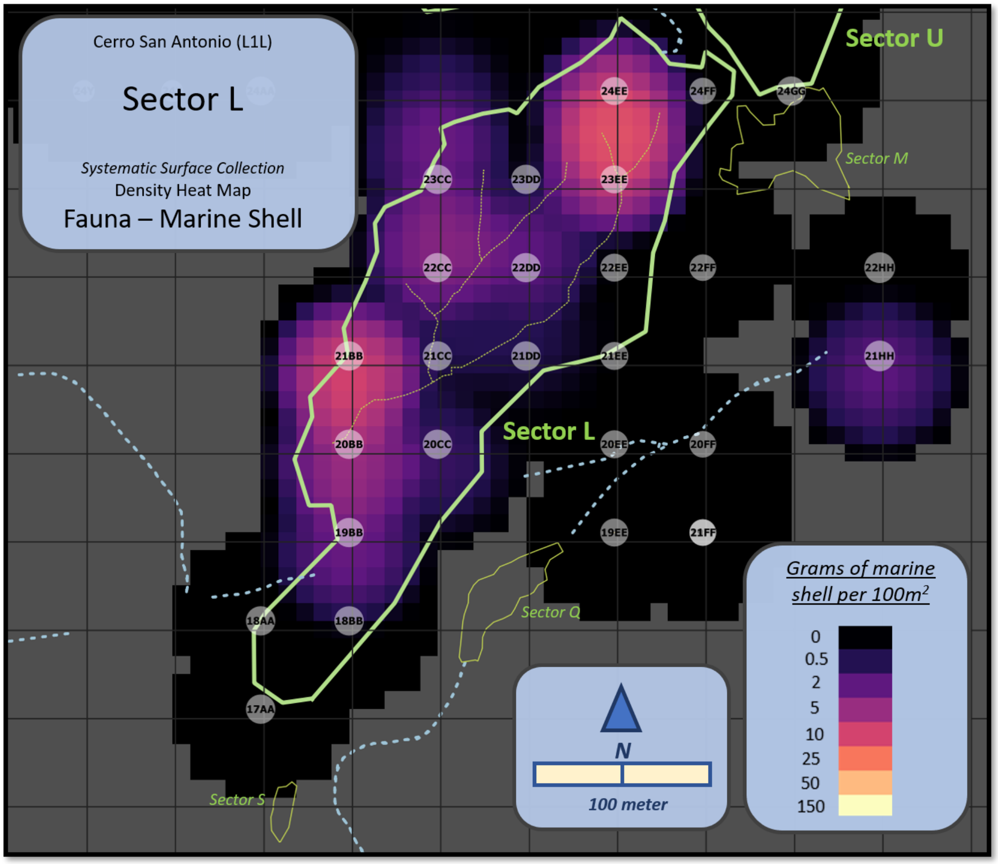


Figure 52. Heat-map of density distribution of marine shell as recovered from surface collection units in L1L.

The distribution of marine shell is more in-line with the initial observations of L1L. These fauna materials were found almost exclusively in the surface collection units that coincided with the rockpile-midden features in quebrada bottoms. Again, while preservation did not preserve remnants of other subsistence goods (foodstuffs, etc.) on the surface, as a proxy marine shell does suggest typical domestic, midden-based deposition patterns.

Sector U

Sector U is defined by continuous but sparse material surface scatter and lack of rock-pile midden features which made its boundary difficult to delineate, even through more intensive forms of reconnaissance. It is for this reason that L1U was the the only major Tiwanaku-affiliated domestic sector in which the systematic surface collection helped define its final perimeter. In total 37 surface collection units were completed within or directly associated with Sector U. Again, while this systematic collection largely confirmed initial observations it also shed light on features of the sector not readily detectable in reconnaissance.

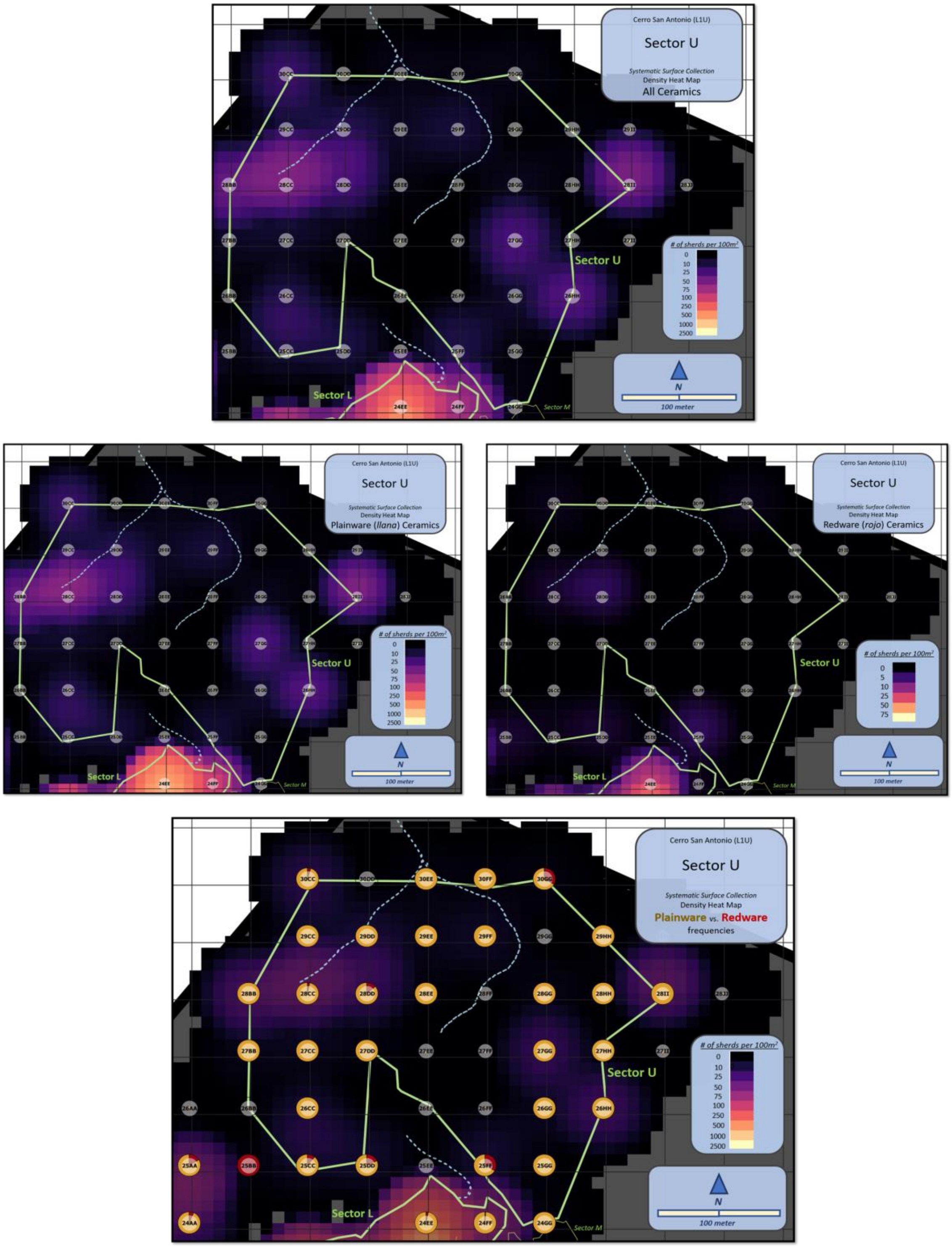


Figure 53. Heat-maps of Sector U visualizing the density of ceramics collected during systematic surface collection. (top) Map of density of all ceramic sherds collected. (middle-left) Map of density of plainware ceramic sherds and (middle-right) map of density of redware ceramic sherds. (bottom) Map includes background heat map of all ceramics as well as overlay of pie charts illustrating relative frequencies of Plainware vs. Redware sherds recovered in each collection unit.

While ceramics were still the most ubiquitous material type collected only 14 of the 37 collection units in L1U contained any ceramics at all, and these were in very low numbers. Relatively restricted and very sparse density clusters can be seen in the western and eastern edges of the sector (Figure 53). When separated into major ware types, it is evident that the majority of the L1U ceramic assemblage comes from plainware, as the redware density map barely even registers on the heat-map index. However, in spite of this low density, the systematic surface collection actually revealed a greater material surface imprint than would have been anticipated after reconnaissance.

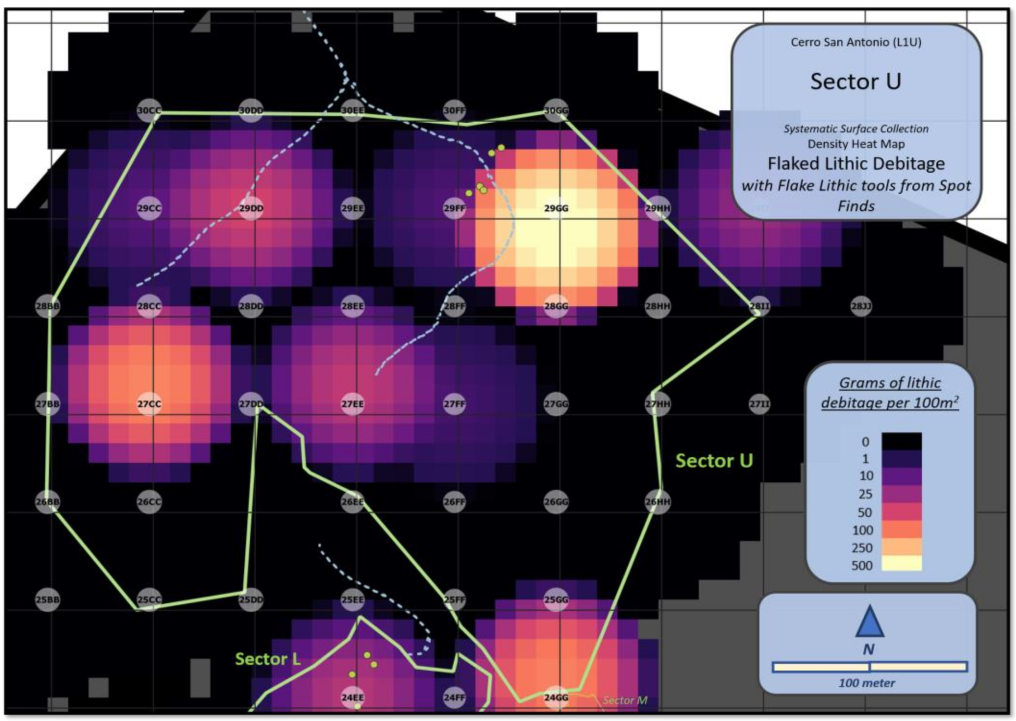


Figure 54. Heat-map of density distribution of flaked lithic debitage as recovered during systematic surface collection at L1U. Also indicated (yellow dots) are Flaked Lithic tools (projectile points, side-scrapers, re-utilized flakes) recovered as Spot Finds during reconnaissance.

One of the most striking results of the entire systematic surface collection at Cerro San Antonio came from the flaked lithic assemblage from Sector U. As reflected in the L1U heat-map in Figure 54, lithic debitage was found in very high densities in several locations within

Sector U, but particularly the northeastern section. Present in over 27% of the L1U collection units, not only did Sector U have the strongest hot-spots, but the highest ubiquity of lithic debitage. In addition to this, while there were some projectile points and other finished tools (or tool fragments) recovered, these types of spot finds were far rarer in Sector U.

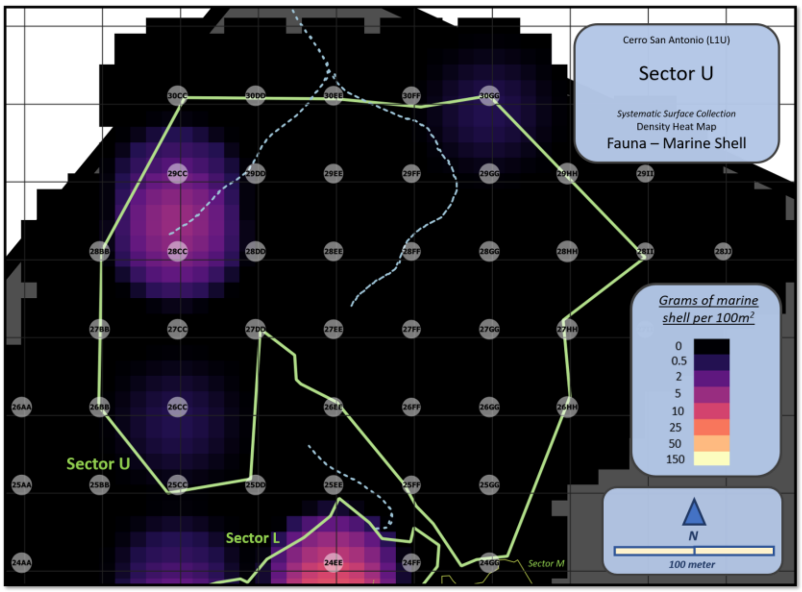


Figure 55. Heat-map of density distribution of marine shell as recovered from surface collection units in L1U.

Finally, unlike the other material types marine shell aligned with the observations made during reconnaissance. That is to say it was found in very few units and in extremely low quantities, barely appearing on the heat-map register (Figure 55).

6.3 Chapter Summary

In Chapter 6 I presented the results from the systematic surface collection at Cerro San Antonio (L1). This category of data collection involved the single task of using the site-wide grid to systematically sample the surface materials within each of the three Tiwanaku-affiliated domestic sectors.

6.1: Here I relayed the basic results from the overall systematic sampling strategy employed at L1. This involved collecting all materials within a 10x10 meter subunit for each sampled 50x50 meter grid unit.

6.2: In this subsection I presented the initial results from using the materials systematically collected in the field to produce heat-maps which help visualize the distribution of these surface materials.

Next: In Chapter 7 I cover the extensive results garnered from the various excavations that I undertook within these same Tiwanaku-affiliated domestic sectors.

Chapter 7 - Excavations

This chapter lays out the results for the excavations completed at Cerro San Antonio (L1) for this dissertation research. Excavations targeted and were completed exclusively in the three (3) Tiwanaku-affiliated domestic sectors: Sector A (L1A), Sector L (L1L), and Sector U (L1U). Here in this chapter, I focus almost entirely on context-based data collected from these excavations, and while I do provide some basic results of the materials recovered in those contexts, I reserve most of that information for Chapter 8 - Material Analysis. Excavations were conducted during two field seasons - 2016 and 2019[156]. Excavation strategies employed during these two seasons were quite different, with 2016 representing simple test excavations and 2019 representing extensive household archeology-style excavations. However, ultimately 243 major contexts (loci) were investigated across ten (10) primary test units/excavation blocks. As with other sections here I largely present data in discrete, context-based sections, with major comparisons and interpretation reserved for Section 3[157].

7.1 Test Excavations (2016)

During the 2016 field season[158] five (5) 2x2 meter (4m²) units were excavated in Sector A (L1A) with the UCSD Archaeological Field School. These were test excavations in the sense that they were arbitrarily 2x2 meter units with no amplifications or extensions and their primary function was to gauge logistics of future, more extensive excavations at the site. This included determining issues such as the standard depth of deposits and the quality of preservation in

[156] Most of these blocks were actually plotted and even some surface features mapped during the 2018 portion of this field season, so in some places these excavation blocks may be referenced as 2018-19 excavated contexts.

[157] Additional raw data (digitized field forms, specimen lists, additional excavation base-maps, etc.) can be found in Appendices XX and where otherwise noted in the chapter.

[158] All results here are in the publicly available informe submitted to the Peruvian Ministerio de Cultura.

subsurface materials and features. The location of these units was not random or arbitrary and excavations did target areas of interest within Sector A. These areas were determined through the reconnaissance and systematic surface collection described above (*Chapter 5* and *Chapter 6*). More information regarding the methods used in these test excavations can be found in Chapter 4 (see *4.1*). Below I go unit-by-unit providing basic context overviews and detailed descriptions of important, specific findings. However, here I wanted to highlight some of the commonalities between the units and results of the units when taken as a whole.

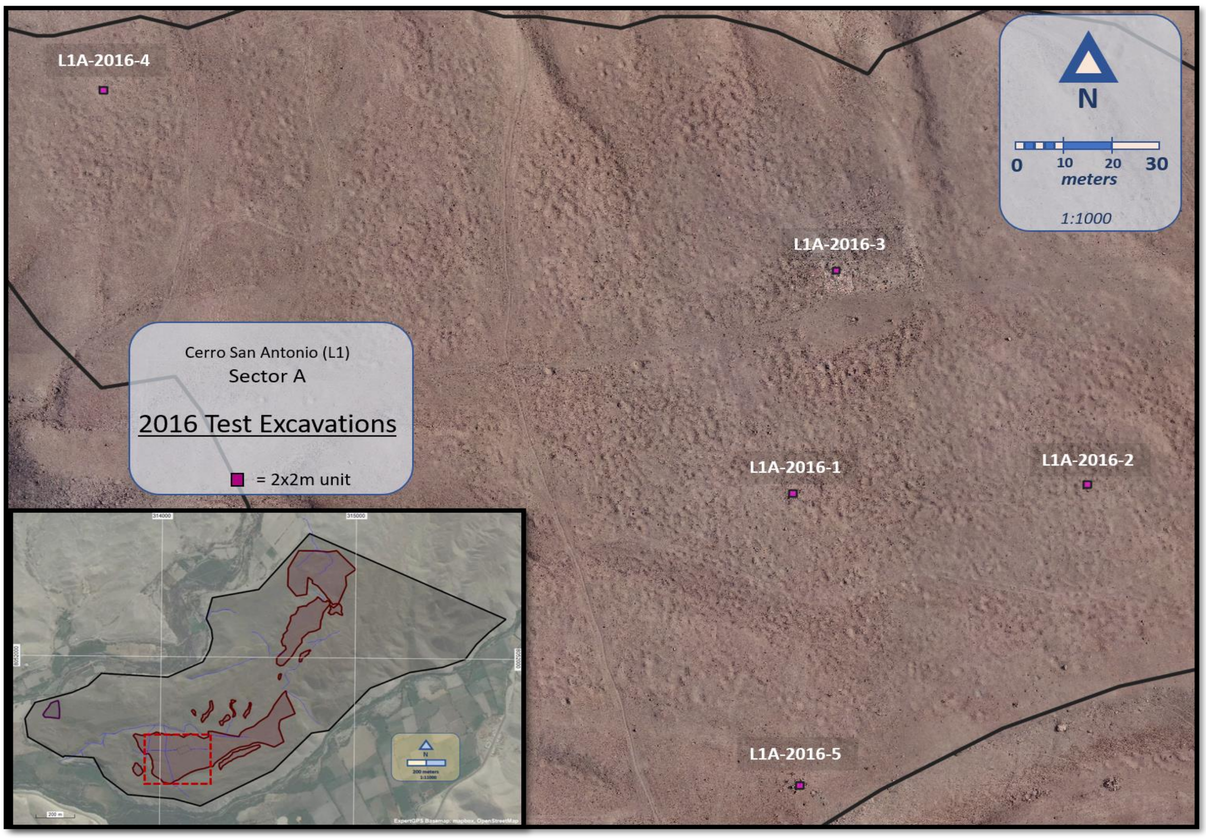


Figure 56. Map of the five test excavations completed during the 2016 field season. All five units are located in the western portion of Sector A (L1A).

All five test units were excavated in the western half of Sector A and fell within the dense concentration of rockpile-midden deposits centered there. As noted above, all five units were 2x2 meters in dimension and did not receive any formal amplification, therefore the total excavated area during 2016 was only $20m^2$. While completed unit base-level depths would vary, all five units were relatively shallow with deposits never exceeding one meter below the local ground surface[159]. In total 950 liters ($0.95m^3$) of sediment were excavated and sorted from 35 major loci in the five test units. Only six true features were identified and excavated within these units with only one clear example of in situ architecture located. However, material preservation, including that of organic materials, were quite good and 178 specimens representing 12 of the 16 major material categories were collected for future analysis (see *4.1* for more on material categorization).

Table 9. Basic information regarding five test units excavated during the 2016 field season.

Sector	Test Unit	SW corner (N)	SW corner (E)	Total Area (m^2)	Total volume excavated & fine-screened (liters)	Total Specimens	Major Structures included
A	L1A-2016-1	8051422	314102	4	101.25	27	-
	L1A-2016-2	8051425	314183	4	61.25	66	-
	L1A-2016-3	8051486	314115	4	122.50	38	Special Structure L1A-2
	L1A-2016-4	8051540	313920	4	55.00	19	-
	L1A-2016-5	8051335	314105	4	135.00	28	Special Structure L1A-1

In sum these test excavations largely confirmed initial assumptions that deposits in L1A, and likely in the majority of the site, were quite shallow and represented only a single period of occupation. This is not to say that there was no stratigraphy or other markers of diachronic occupational patterns, but rather that in no tested context did there appear to be superimposed strata deriving from different major cultural periods. All features and materials documented in these units held exclusive affiliation with known Tiwanaku forms and styles. However, each unit did produce relatively disparate assemblages and the final contexts revealed were at times quite

[159] As noted in Chapter 4 (*4.1*) each unit used its own localized datum - there were either place rebar or markers on local boulders.

different.

Below I present the basic results from each of the five test units separately, targeting their specific contexts and major material findings. Each unit description is effectively organized into three subsections: the initial context description, surface and initial excavation observations, and then a area-by-area breakdown of the specific contexts defined in each test unit.

Unit: L1A-2016-1

This 2x2 meter unit was placed, as closely as possible to the center of the L1A rockpile-midden density cluster, directly south of the central plaza (Figure 57). While the results from systematic surface collection presented in Chapter 6 were not available, data drawn from the initial reconnaissance (see Chapter 5) helped select this location. However, in addition to this general location selection, the specific placement of the final L1A-2016-Unit 1 location was to sample what appeared to be a rectangular clearing bordered by rockpile-midden deposits.

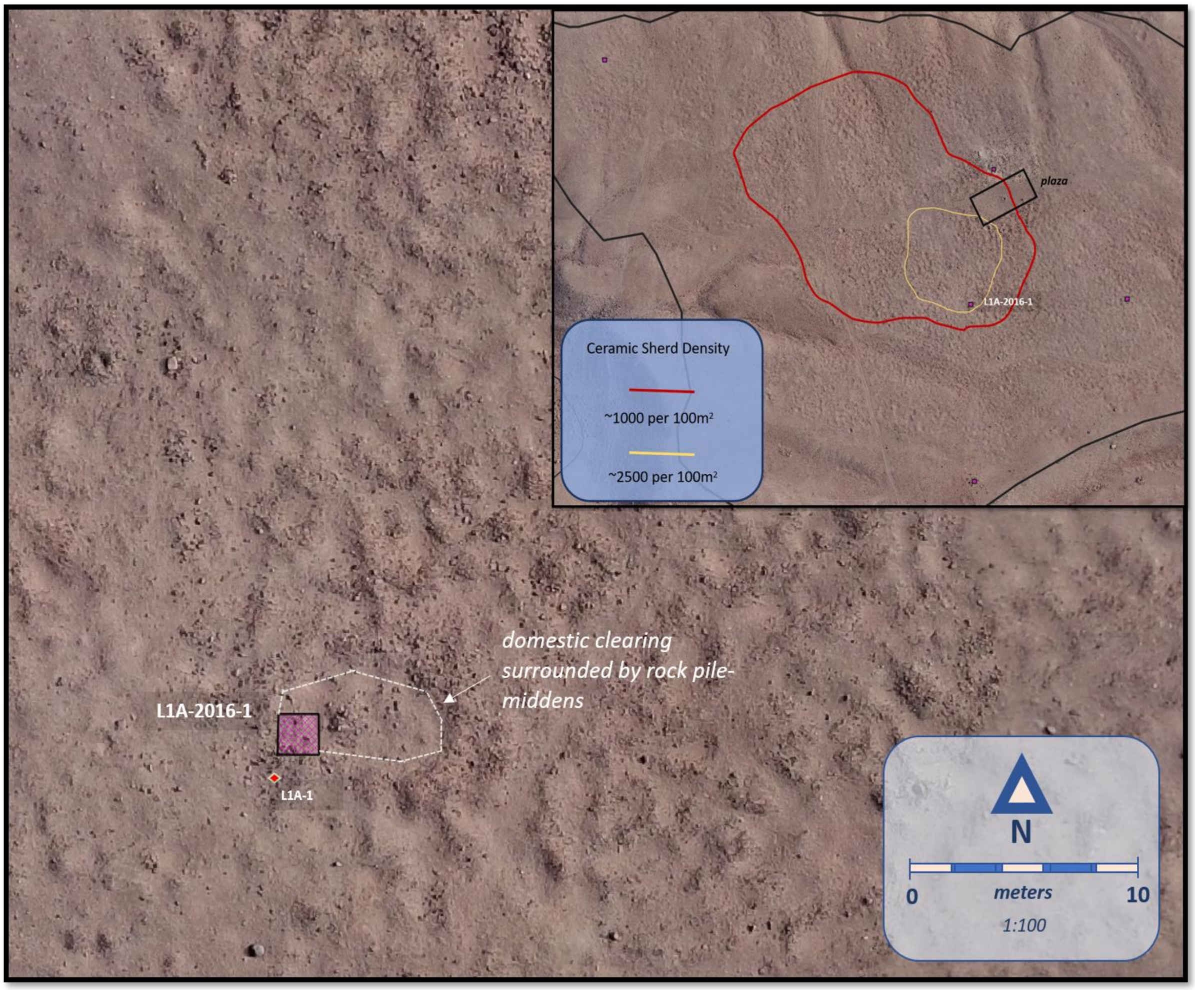


Figure 57. Detailed orthophoto indicating the location of test unit L1A-2016-1 which set to sample a particularly regular-shaped domestic clearing, bordered by deflated rockpile-midden deposits. (*insert*) indicates L1A-2016-1's location in the western portion of Sector A, including rough locations of ceramic densities.

Not only was this clearing a bit larger than most others, it also appeared to have more of a rectangular form compared to the more irregular clearings amongst the neighboring rock-pile midden deposits. I chose to place the 2x2 meter test unit in the southwestern corner of this clearing - making sure to also include small portions of the bordering rockpile-middens (Figure 57). Unit L1A-2016-1 utilized a single datum (Datum: L1A-1) which was a looped rebar set approximately 50cm to the south of the southwest corner nail.

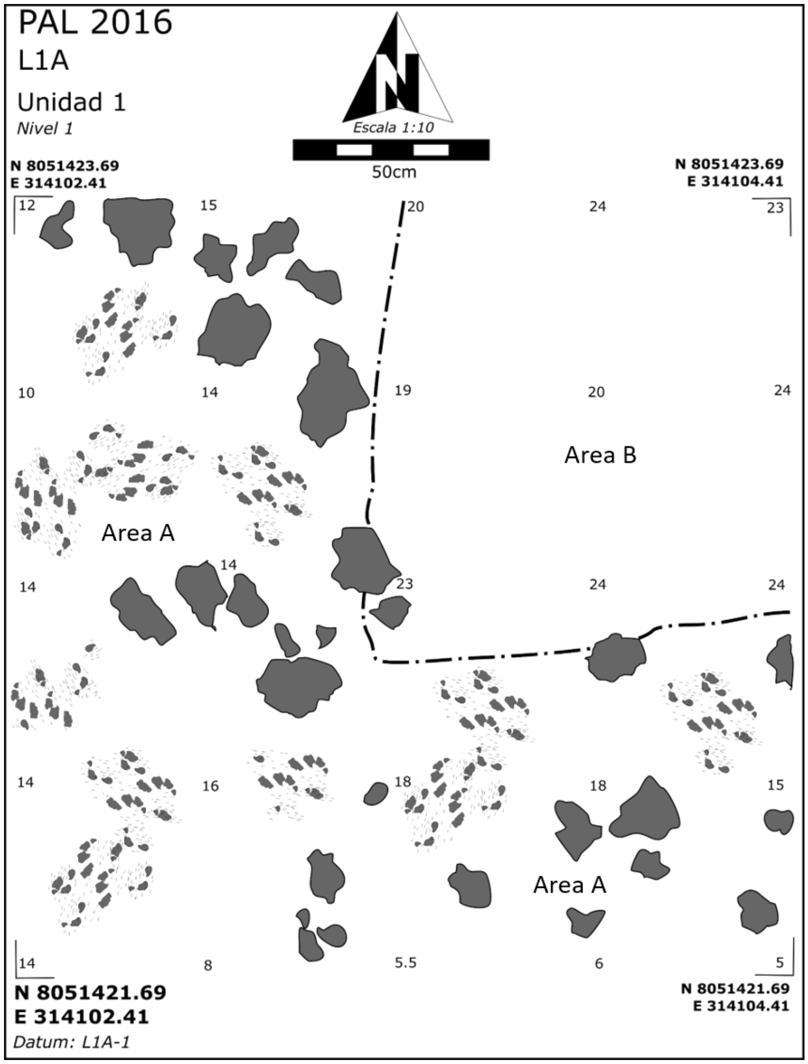


Figure 58. Unit level base-map for test unit L1A-2016-1. This is the base of excavation Level 1 (note: elevations are cm below local datum: L1A-1).

Two distinct areas were apparent from the initial establishment of this unit. The deflated rockpile-midden deposits which formed the border around the above-mentioned clearing ran along the entire western and southern edge of the unit (Figure 58). This area is defined by low-lying rockpiles, composed primarily of small cobbles and field stones as well as high concentrations of smaller angular gravel and other natural geological debris. These rockpile deposits also contained the vast majority of materials visible on the surface - almost these materials were almost entirely non-diagnostic Tiwanaku plainware ceramic sherds and three small fragments of marine shell. Conversely, an area relatively clear of debris defined the the northeastern portion of the unit (Figure 58). The exposed ground surface of both of these areas were ultimately defined by a thin, well-weathered patina crust formed through a combination of fog moisture and high levels of wind and sun exposure.

For Unit L1A-2016-1 the first level of excavation involved collecting all surface materials and completing a shallow scrape to remove the surface patina - this was kept to under 1cm in depth when possible. The 2x2 meter unit was excavated as a single context and all materials were kept together. This initial subsurface exposure confirmed what initial observations suggested. An approximately one-meter wide strip of rockpile-midden deposits ran along the western and southern portions of the unit, with a distinct area clear of stones and cultural debris defining the northeast corner of the unit (Figure 58 and Figure 59-a). Significantly, this initial subsurface exposure also confirmed that the rockpile deposits did intersect at roughly a 90-degree angle, giving further credence to the initial observation that the clearing being sampled was indeed an intentional domestic feature. Moving forward these two areas, Area A - the rockpile-midden deposits and Area B - the clearing, would define the excavations in this test unit moving forward.

Area A

Most of the unit fell within Area A, which designated the rockpile-midden deposits. After the initial Level 1 scrape, Area A received two more excavation levels: Level 2 and Level 3 (superpiso). In Level 2 all cobbles and cultural debris were removed from the deposits. There were no clear stratigraphic layers represented within the rockpile deposit, with most of the larger cobbles appearing on the same original ground surface or even piled directly on top of each other. Including rocks and sediment removed in this layer, the rockpile-midden features appear to have been approximately 15-25cm in height (see example of a profile in Figure 59-c).

Cultural materials were predictably also quite dense in this primary rockpile-midden removal layer. 4479 grams of cultural materials were recovered in the 90 liters of sediment removed in Level 2. The majority of this weight was from the 495 ceramic sherds (3827 grams). Sherds were predominately non-diagnostic Tiwanaku-style plainware with the few diagnostic sherds suggesting ollas were the most common vessel type represented; however, a small amount of decorated redware was also recovered from this context. There was also significant amounts of camelid bone and marine shell (288 grams) present. Botanics were also well represented and a particularly variable material category (265 grams), containing large amounts of consumable botanics (maize cobs, gourd fragments, and various seeds) as well as architecture-derived botanics (cane and wood). There were also small amounts of coarse-weave wool textile fragments, lithic flakes, and organics like camelid coprolites, animal fur, and feathers recovered in this rockpile removal level.

Level 3 in Area A removed a final organic lens which was exposed after removing the rockpile-midden deposits. While this level contained far fewer materials than the previous level, the organic lens was certainly the result of fine-scale debris that had filtered through and leeched out of the lager fragments of domestic refuse in the midden above. Also exposed here was a small, circular stain feature, likely representing a simple ash lens (Feature: R-1). No additional architectural features were identified under the rockpile-midden deposits.

Area B

As the portion of the unit defined by lack of cultural material or even stones, it is not surprising that Area B revealed very little cultural material in the single excavation level (Level 2) following the Level 1 scrape. After the surface patina was removed the underlying sediment was extremely loose silt, almost certainly wind-blown sediment that had collected over the centuries. No compacted or semi-compacted surface was encountered.

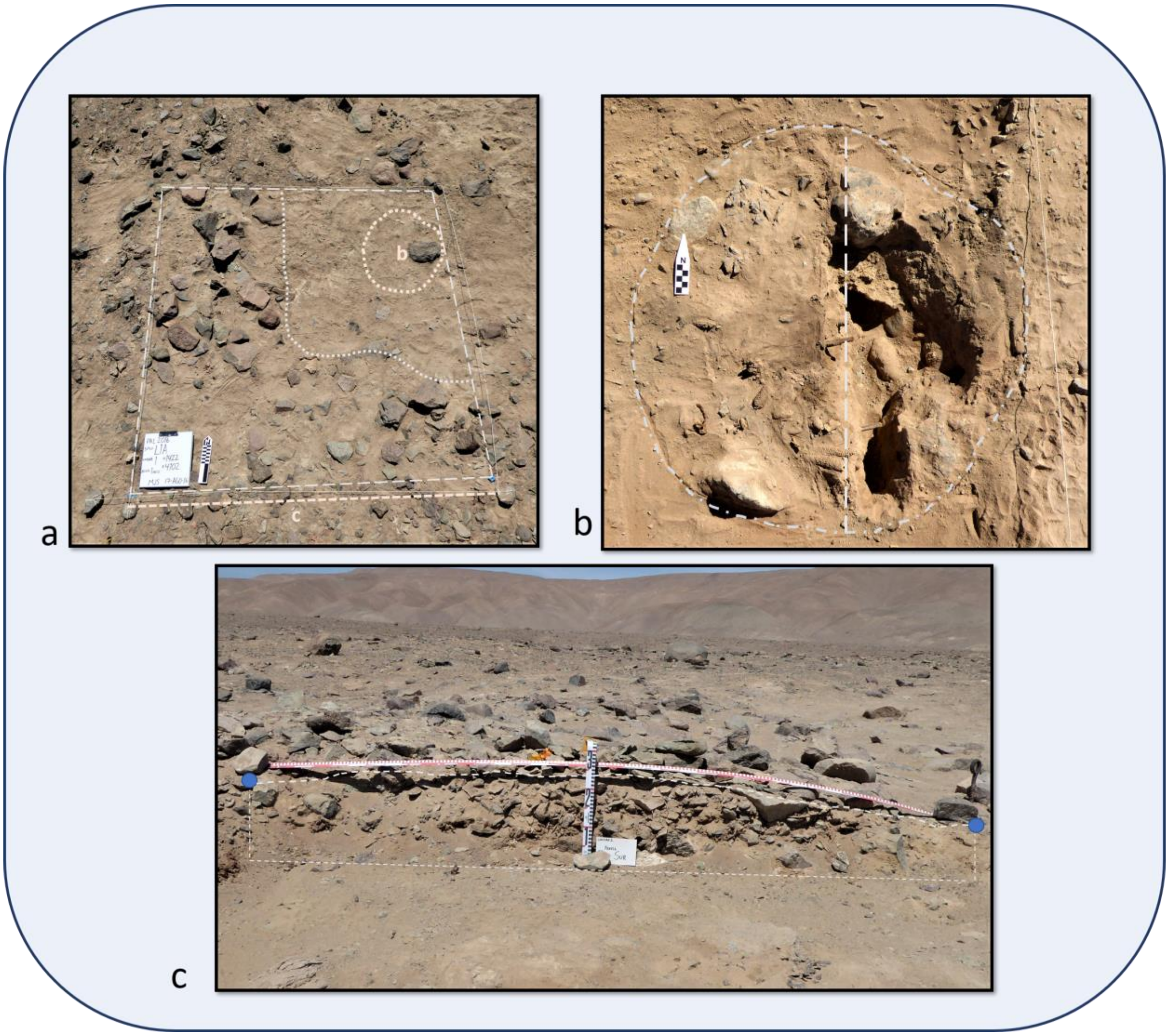


Figure 59. Selected photos of important features of test Unit L1A-2016-1. (*a*) Photo of the entire unit after the Level 1 scrape, (*b*) feature R-2 in Area B after the east 1/2 had been bisected - note maize cobs and other domestic refuse protruding from center profile, and (*c*) the southern profile of unit after completion, illustrating the depth of the deflated rockpile-midden deposit.

A significant find here in Area B was an informal pit feature (Feature: R-2) (Figure 59-b). The feature was quite small (0.58x0.7cm) as well as quite shallow (18cm). The base of the feature and one of the sides were bordered by bedrock, which like much of the site is often only centimeters below the ground surface, and likely explains why the pit was so shallow here. Some semi-compacted sediment along one corner of the pit may have been the remnants of some more formal pit preparation. The pit contained small amounts of wool cord, plainware ceramic sherds, camelid bone, and marine shell. However, most materials recovered from R-2 were botanic remains. Significant amounts of maize cobs and beans were recovered as well as moderate amounts of wood and charcoal.

Unit: L1A-2016-2

Test Unit L1A-2016-2 was placed approximately 75 meters due east of Unit L1A-2016-1 and was intended to sample the eastern extent of the dense rockpile-midden that defined the western half of Sector A. The final placement of the unit was relatively arbitrary, but it did contain three deflated rockpile-midden deposits. For this unit a medium-sized, but deeply planted boulder located just 0.5m from the south edge of the unit was used as the local datum (Datum: L1A-2).

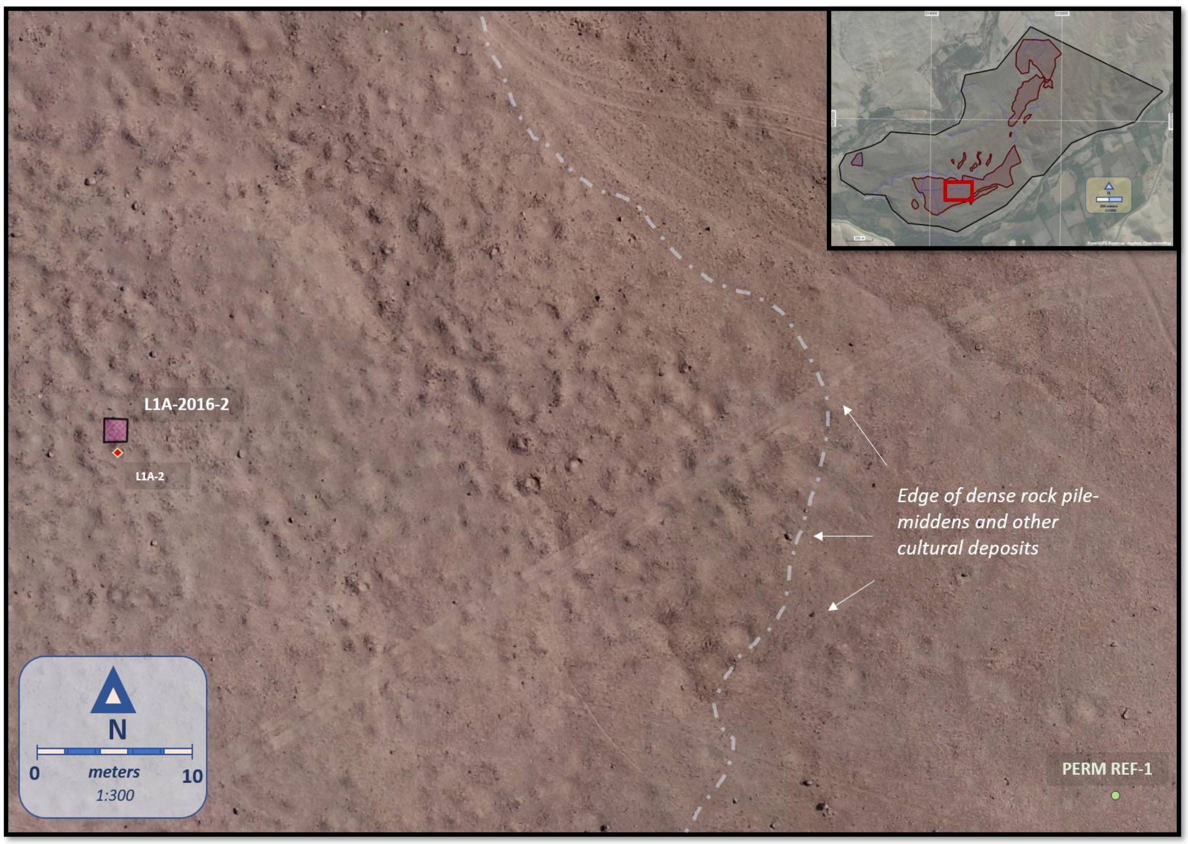


Figure 60. Detailed orthophoto indicating the location of test Unit L1A-2016-2 and its location at the eastern extent of the rockpile-midden deposits which define the western portion of Sector A.

Test Unit L1A-2016-2 contained small portions of three separate rockpile-midden deposits. Each of these deposits intersected the 2x2 meter unit in different corners - the northwest, southwest, and southeast (Figure 60). These piles were relatively distinct from the clear space that separated them, but they were nonetheless extremely deflated, rising less than 10cm above the modern ground surface.

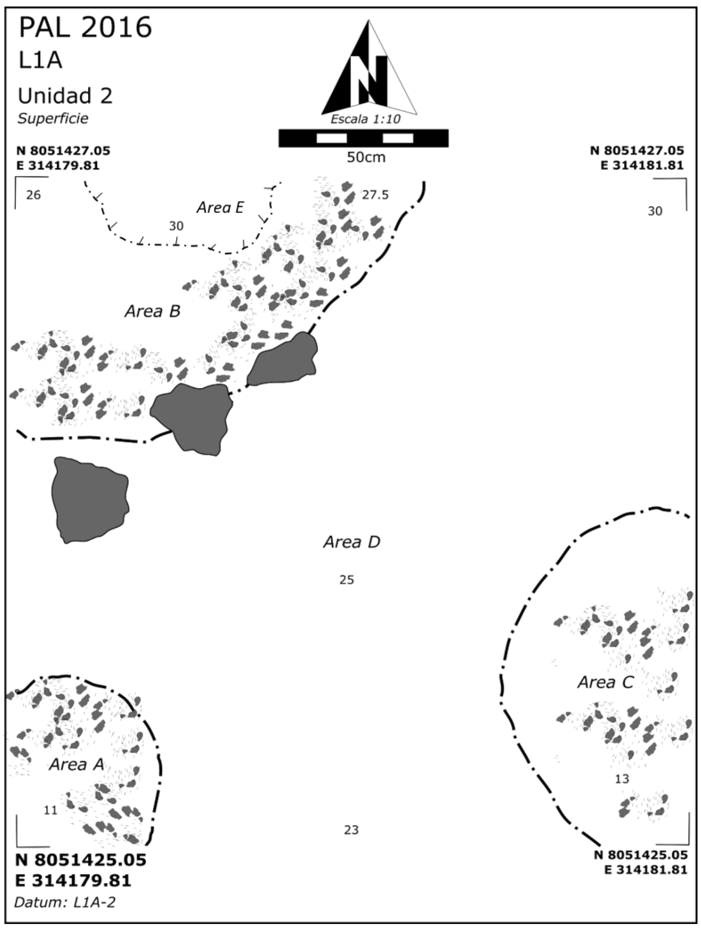


Figure 61. Unit level base-map for test unit L1A-2016-2. This is the base map for the surface (superficie) before excavation (note: elevations are cm below local datum: L1A-2).

Unlike the prior unit in this unit we used area divisions beginning immediately in Level 1. For L1A-2016-2 we used four areas for the initial patina scrape (Figure 61 and Figure 62 - a, b) - Area A (rockpile-midden in southwest corner), Area B (rockpile-midden in northwest corner), Area C (rockpile-midden in southeast corner), and Area D (is the clearing separating the rockpiles).

Area A

Area A was the rockpile-midden deposit which entered the unit in the southwest corner. While extremely deflated, we still excavated this area in two separate levels - Level 1 and Level 2. Overall, Area A was quite dense with cultural material. For instance, in the 10 liters of soil removed in the initial patina removal and surface clearing during Level 1 we recovered 118 ceramic sherds, 50 grams of macro-botanics, and a variety of other domestic refuse. Level 2 yielded fewer materials and largely involved removing small cobbles and gravel. Interestingly, once the rockpile-midden was fully removed a relatively compacted surface was exposed. This was excavated as a possible floor feature (Feature: R-2), however it is more likely that the compacted surface represents a laminated surface, generated by the formally overlying rockpile-midden deposit.

Area B

Area B covered almost the entire northwest quadrant. This rockpile-midden deposit was also quite deflated and contained a depression along the northern edge, leading out of the unit. Unlike Area A, Level 1 in Area B revealed only small amounts of cultural material. However, Level 2 revealed significant amount of domestic refuse. In just 10 liters we recovered over 200 ceramic sherds, 54 grams of macro-botanics - maize cobs and wood fragments in particular, and a large number of camelid bone and marine shell fragments. Again, unlike Area A, no compact surface was exposed once the rocks and cultural material had been removed. We excavated the shallow depression at the north edge of the rockpile as a separate area/feature (Area E/Feature: R-3). While this area did contain a significant amount of cultural material, it was generally similar to the surrounding Area B and was extremely shallow.

Area C

Area C was located in the southeast corner of the unit and as with Area A and Area B was an extremely deflated rock-pile midden deposit. Also like the other areas, Area C was excavated in two levels - Level 1 and Level 2. Here the upper level, Level 1, contain the majority of cultural material. Tiwanaku-style plainware ceramic sherds were the most heavily represented type though small amounts of decorated redware sherds, plain-weave wool textile fragments, and lithic flakes were also recovered. Again, like the other midden deposits, there were large amounts of macro-botanic materials recovered (wood, maize cobs, gourd fragments, cane) as well as some camelid bone, crustacean fragments, and marine shell. Level 2 was only a shallow scrape of the organic materials underlying the rockpile and yielded similar but far fewer domestic refuse.

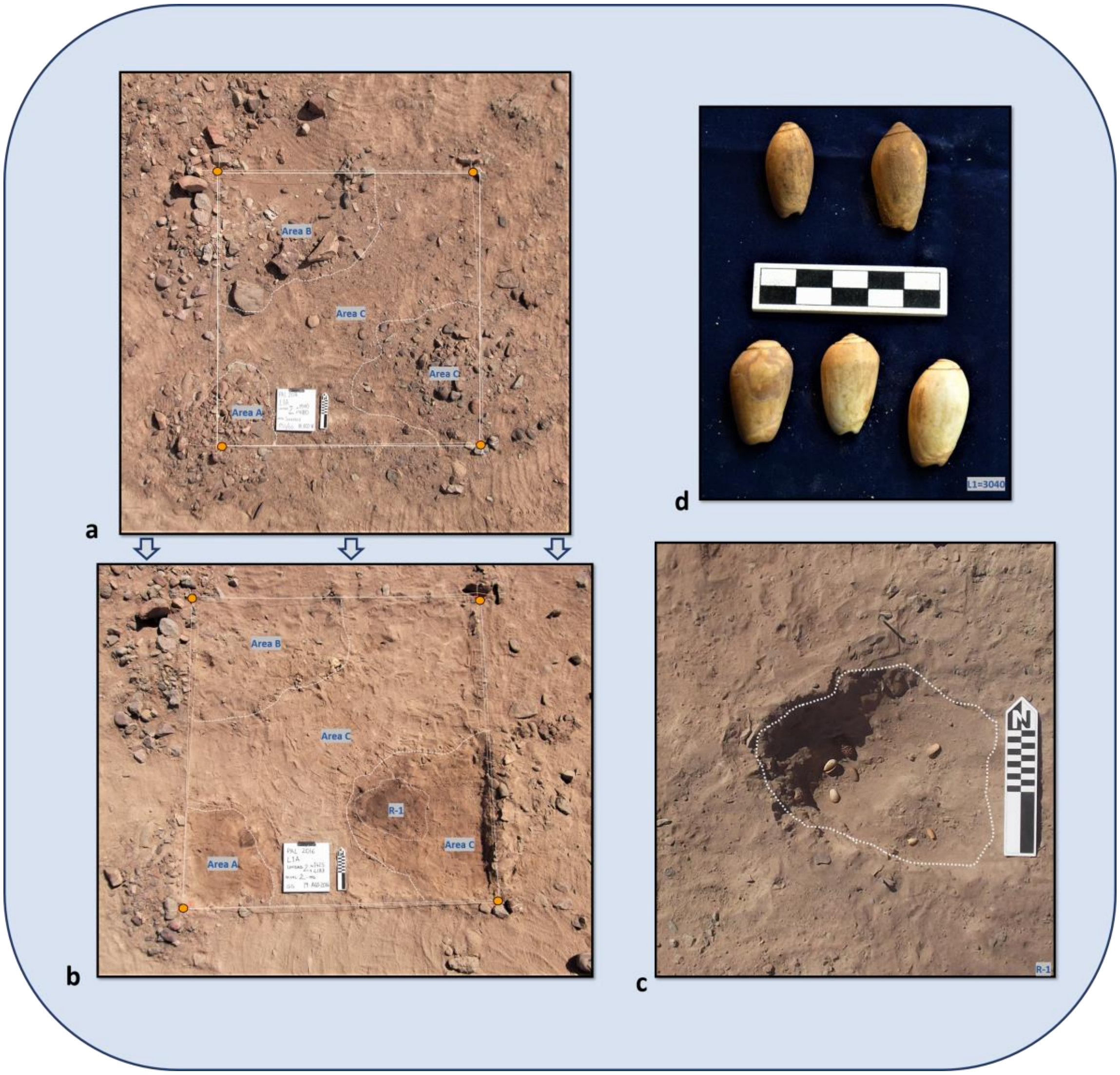


Figure 62. Selected photos of important features in test Unit L1A-2016-2. (a) overhead photo of original unit surface (superficie) before excavations, (b) overhead photo of unit after Level 2 hard been completed and rockpile deposits had been removed - note the organic staining, (c) shallow pit feature R-1 which was exposed under the Area C rockpile - note concentration of marine shell (olive shells) as pictured in post field catalog photo (d).

At the western edge of Area C, a distinct organic stain was noted at the base of Level 2. This feature was designated R-1. The pit was only 9cm at its greatest depth and only produced moderate amounts of refuse. Interestingly, no ceramic fragments were found and most collected materials were macro-botanics and camelid bone. However, an interesting find was made at the base of the feature, where a cluster of five well preserved olive shells (Figure 62 - c, d). While these marine shells are common within the broader assemblage at L1, the size and preservation of the specimens collected in R-1 are noteworthy.

Area D

Predictably Area D, which was the area relatively clear of both cultural and geological debris (Figure 61) did not produce much material. Only trace amounts of fauna, botanics, and some camelid coprolites were recovered here. Once all rockpiles were removed Area D was incorporated into a full 2x2m unit excavation level[160] that confirmed we had reached a culturally sterile base level.

Unit: L1A-2016-3

The primary goal of test Unit L1A-2016-3's placement was to test the area directly adjacent to the central plaza feature. The unit was approximately five meters north of the plazas poorly-defined northern edge. As described later (see *7.2*), while unknown before it was selected, this location turned out to be ideal as it sampled what would be the northern profile of a small mound feature[161]. The single local datum for this unit (Datum: L1A-3) was a large, deeply-set cobble, just south of the southern unit edge.

160 This is referred to as Area F in the notes and field forms.

161 This feature would be targeted for extensive excavations during the 2019 excavations - Block L1A-2019-2.

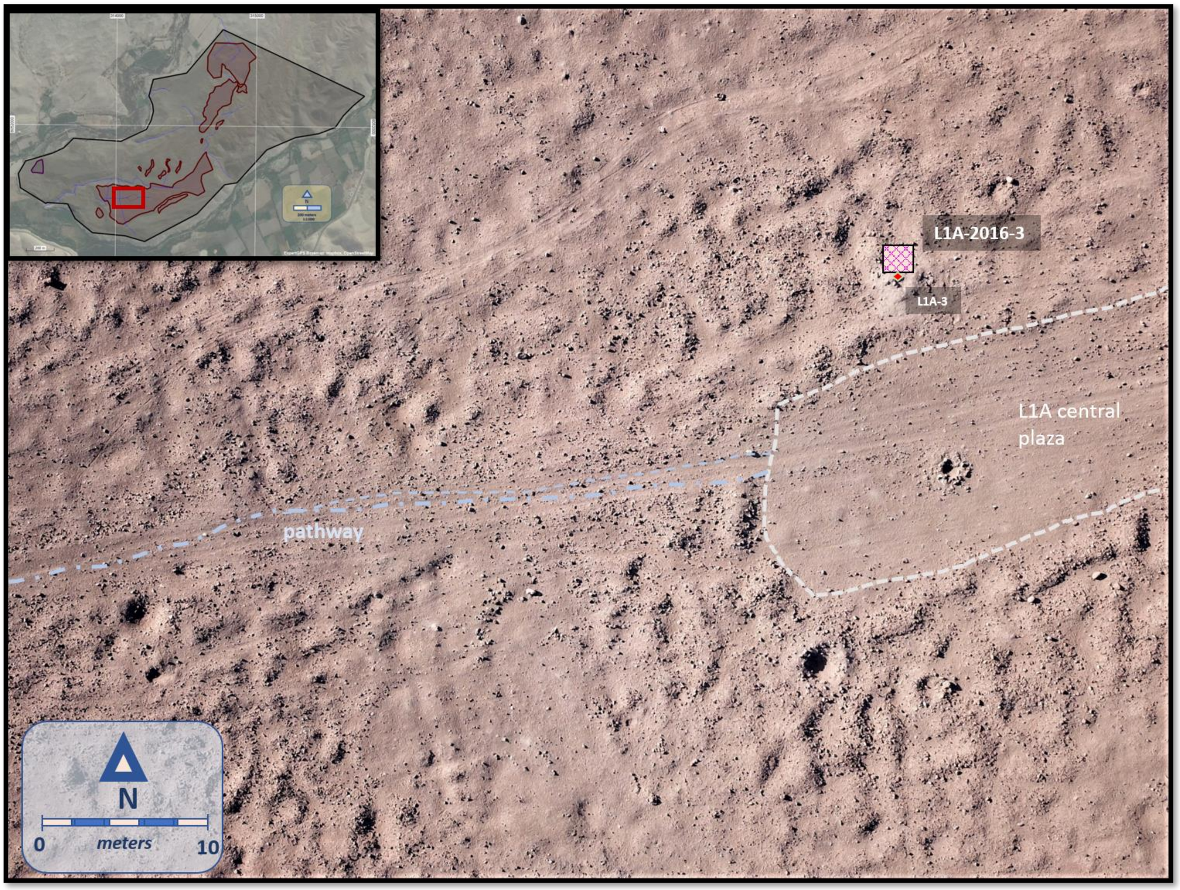


Figure 63. Overhead drone photo of the location of test Unit L1A-2016-3, just north of the central plaza feature of Sector A. Also depicted is the Middle Horizon-era pathway which crosses roughly due east-west across the center of the sector and directly through the plaza.

A portion of L1A-2016-3 was covered with a poorly defined, deflated rockpile-midden feature. The deposit covered the entire northwest quadrant of the unit and spilled into the remaining three quadrants as well. Medium to large cobbles were scattered throughout the 2x2m test unit with two clear clusters in the western half of the unit (Figure 63). As with the previous unit, in this test unit area distinctions were made from Level 1 onwards.

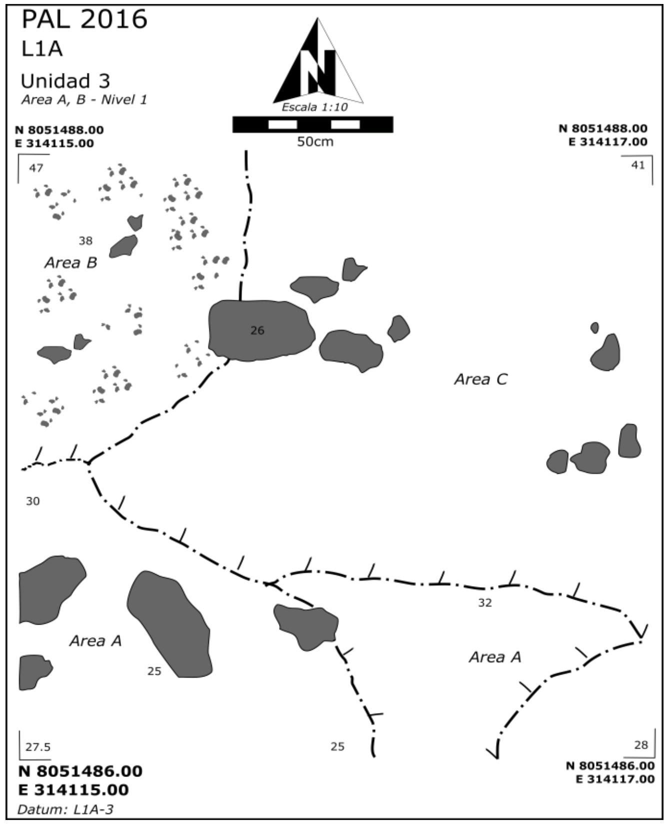


Figure 64. Unit level base-map for test unit L1A-2016-3. This is the base map for the base of Level 1 (except still superficie in Area C) before excavation (note: elevations are cm below local datum: L1A-3).

Three areas defined the excavations in L1A-2016-3: Area A - the slight slope in the southern portion of the unit that represents of the north edge of the mound feature, Area B - the main portion of the rockpile-midden feature which is largely restricted to the northwest quadrant.

Area A

Area A covered the entire southern third of the test unit and was composed of a surface relatively clear of debris and sloping downward to the north. Five large and several medium-small cobbles protruded from the subsurface in the western part of the area (Figure 64). This area was excavated in two primary levels: Level 1 and Level 2. While the patina crust present in most units was not as pronounced in this specific area, Level 1 was still a relatively shallow scrape. Level 2 was far more substantial, and ultimately 85 liters of sediment were removed to reach culturally sterile soil. In Level 2 we also removed some of the large cobbles that were in the more superficial levels. The base of Area A would be marked by a relatively compacted, but culturally sterile surface.

While not as dense as a typical rockpile-midden deposit, Area A did produce significant quantities of cultural material. 253 ceramic sherds were collected in the Level 1 and Level 2 specimen lots. Significantly, a few of these sherds would contain some of the clearest examples of Tiwanaku iconographic elements produced in the 2016 test excavation collections (see 8.1). The Level 1 and Level 2 excavations in Area A would also yield significant amounts of botanic material which was comprised mostly of small fragments of wood as well as a large number of maize cobs. Camelid bone, marine shell, and coarse-weave wool textile fragments were also found in moderate quantities.

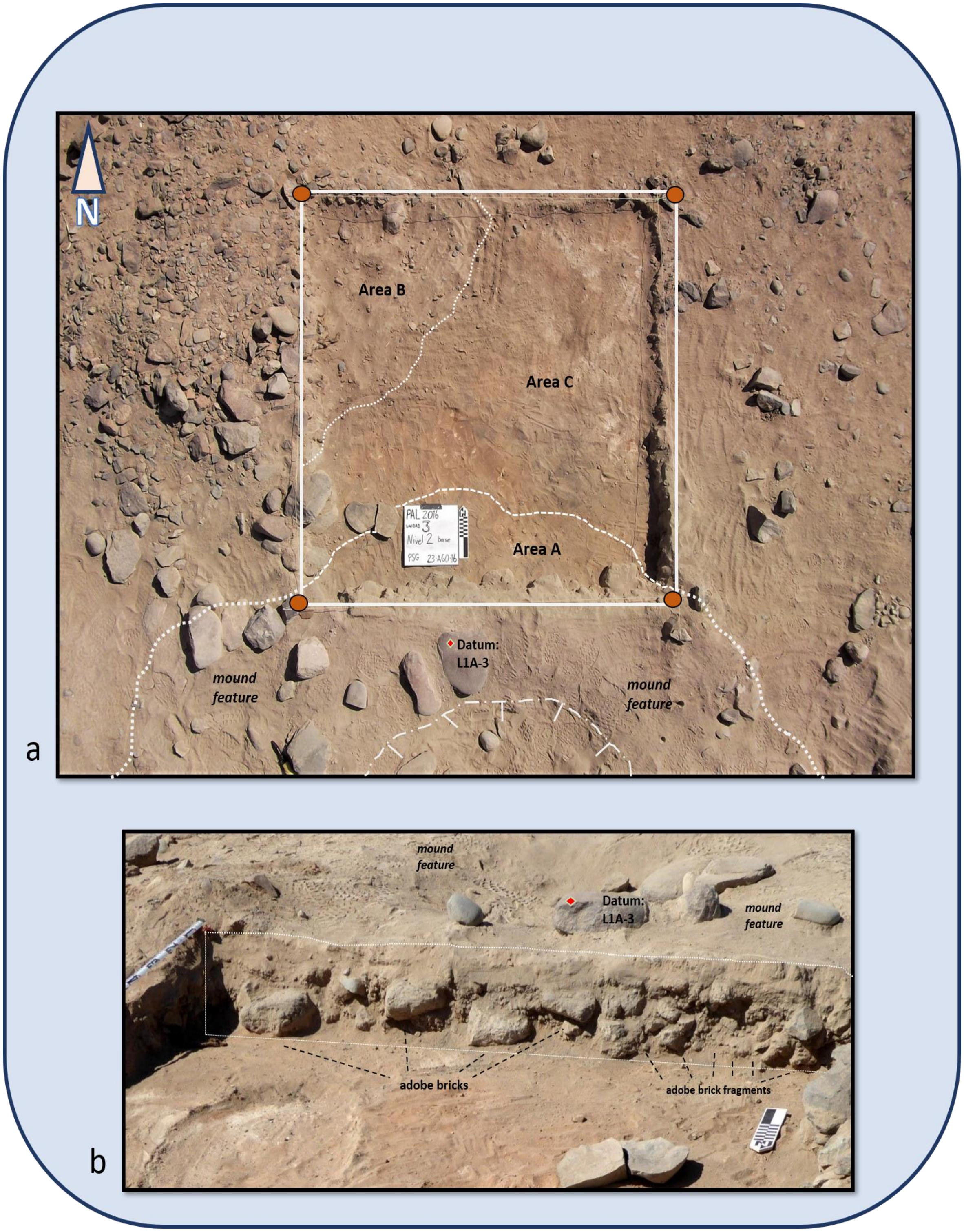


Figure 65. Selected photos from test Unit L1A-2016-3. (a) Overhead photo of the base of excavations (base of Level 2 in most areas)- note: the mound feature extending from the southern unit wall. (b) A photo of the southern profile of the unit - clearly visible are complete and fragmented adobe bricks, protruding from the mound feature (Special Structure L1A-2).

The most important find in Area A and in test Unit L1A-2016-3 more generally, was primarily exposed in the south unit profile. This finding was multiple adobe bricks and several large brick fragments protruding from the mound feature to the south. While only small amounts of fragments and no complete bricks were exposed in the unit itself, the positioning of the bricks in the south profile wall did suggest some of the bricks may have been in situ (Figure 65 - b). This finding suggested that instead of representing a standard rockpile-midden feature, the mound directly adjacent to Unit L1A-2016-3 was likely the remains of a more substantial architectural feature (Special Structure L1A-2). This mound feature would be the primary target for more extensive excavation in 2019 and was the location of excavation Block L1A-2019-2 (see *7.2*).

Area B

This area represented the rockpile-midden deposit that covered the entire northwest quadrant of the unit. Area B would be excavated in three levels: Level 1, Level 2, and Level 3. Level 1 was the most substantial level where we attempted to remove the bulk of rocks and cultural debris. Domestic refuse was quite dense here with 328 ceramic sherds collection and over 250 grams of faunal remains. Levels 2 and 3 were also relatively dense with cultural material but each level was about half the depth of Level 1. Overall, Area B was similar to the deflated rockpile-midden contexts excavated elsewhere in Sector A.

Area C

Area C was the area separating Area A from the Area B rockpile-midden, that was relatively clear of any ground debris. This area was excavated in a single level (Level 2), and while some materials were recovered, culturally sterile soil was reached relatively quickly.

Unit: L1A-2016-4

Test Unit L1A-2016-4 was placed with the intention of probing the edge of the Sector A rockpile concentration. It was placed as far in the far northwestern corner of the sector as possible, while still falling in the area with some evidence of domestic activity.

Figure 66. Detailed orthophoto of the northwestern corner of Sector A, indicating the location of test Unit L1A-2016-4.

Overall, this unit proved to be as expected. Deposits were far less dense, particularly in terms of cultural debris, in spite of its peripheral location did still contain some materials. The surface of this unit was defined to two areas: Area A - an extremely deflated rockpile-midden feature and Area B - an area relatively clear of any debris. Level 1 was excavated as a full 2x2 meter unit excavation level - a light scrape of the surface patina. The areas each received an separate area level excavation (Level 2) and Area A received a final excavation level (Level 3). In total only 110 liters of sediment were removed for this entire unit.

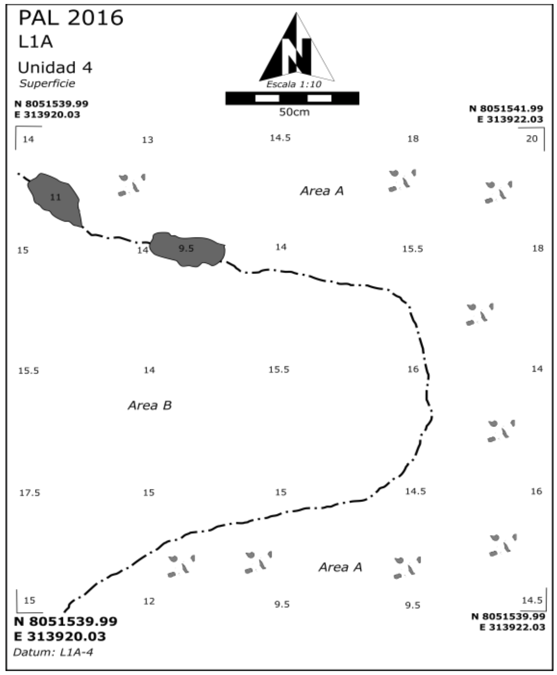


Figure 67. Base map of test Unit L1A-2016-4 before excavation (superficie).

While far less dense than the rockpile-midden deposits excavation in the previous three units, Area A did produce some moderate amounts of typical domestic debris, including: plainware ceramic sherds, camelid bone, marine shell, plain-weave wool textile fragments, and a variety of macro-botanics.

Figure 68. Overhead photo of final base level (Level 3 - Area A, Level 2 - Area B) of test Unit L1A-2016-4.

Only of the only notable aspects of Unit L1A-2016-4 was the significant presence of powdery white mineral throughout the unit (Figure 68). This is almost certainly a form of naturally occurring calcium-carbonate that has leached-up from the bedrock below.

<u>Unit: L1A-2016-5</u>

Unit L1A-2016-5, was the most specifically placed of the 2016 test units. This final 2x2 meter test unit was placed to further expose a relatively small but clear architectural feature visible on the surface. The feature was composed of medium-sized angular field stones and some more rounded cobbles set into the ground in a rectangular formation. It was unclear from the exposed portions on the surface whether this formation represented a collar of a rectangular subsurface feature or the foundation of walls for a super-structure. However, ultimately it would be decided that this feature represented the foundation of a larger structure, eventually designated Special Structure L1A-1. Finally, as will be elaborated more below, the feature had clearly been disturbed in the past with clear evidence for an intrusive pit in the center of the feature with a back dirt pile directly adjacent. However, based on inspection of other disturbance and looting features throughout the site, the patina covering the back dirt pile would suggest pre-modern timing for the disturbance.

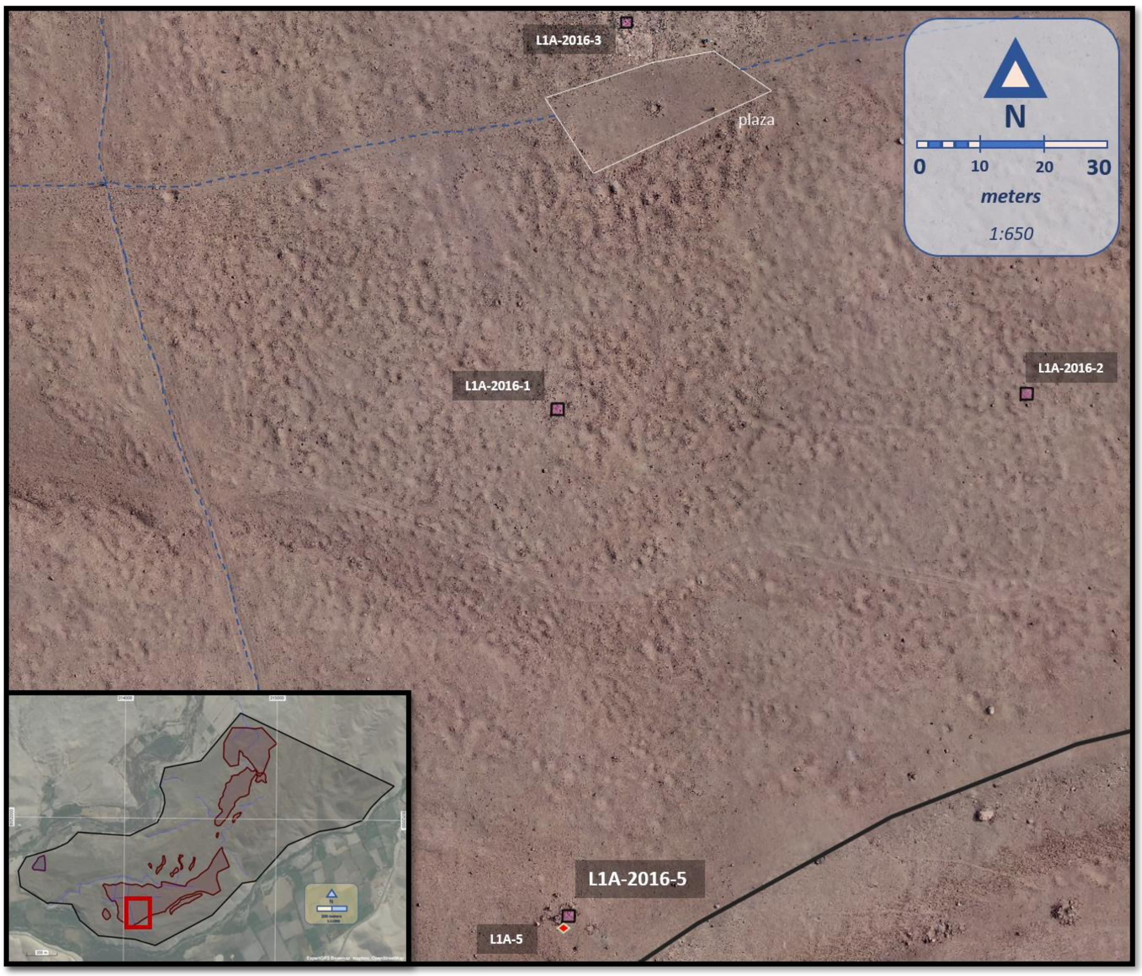


Figure 69. Detailed orthophoto indicating location of test Unit L1A-2016-5 in relation to other test units and identified features in Sector A.

The feature was located along the southern edge of Sector A, overlooking the quebrada which contains the Sector B cemetery just a few hundred meters to the northeast. Significantly, this feature was directly aligned, along a north-south axis to the central plaza feature, which is approximately 130 meters due north. However, the plaza and the architectural feature in Unit L1A-2016-5 are oriented in opposite directions, with the plaza oriented approximately NW-SE (40° west of north.) and the architectural feature oriented roughly NE-SW (10° east of north).

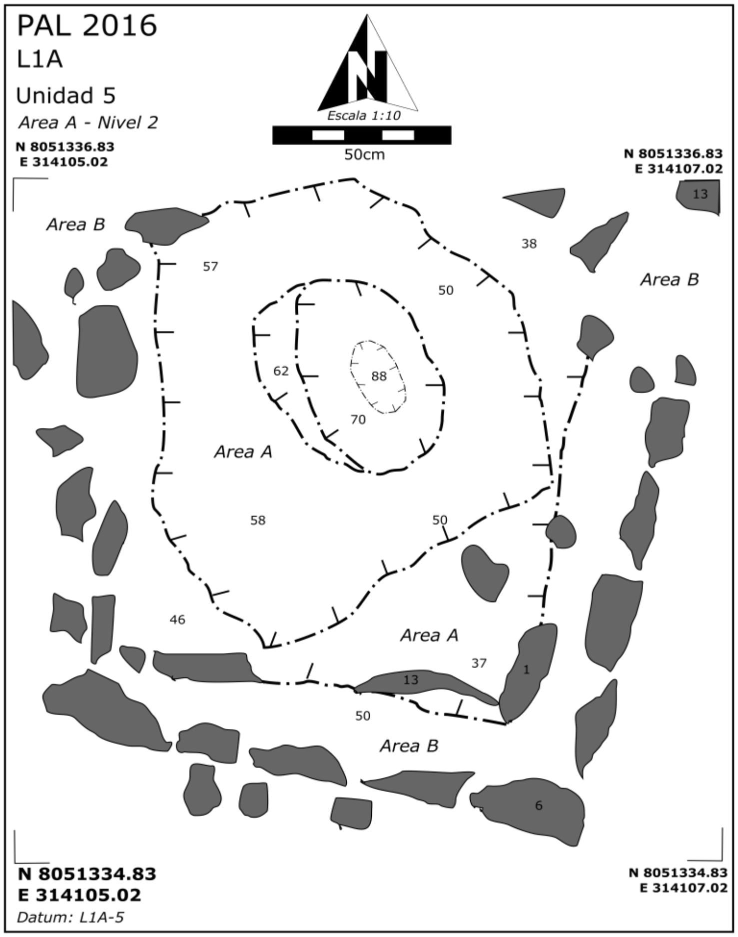


Figure 70. Base map of test Unit L1A-2016-5 at the base of excavations. Clearly visible is the uneven disturbance pit which damaged the entire interior of the feature.

Due to the small size of the architectural feature and the disturbed nature of the overall context, this unit was excavated in three basic areas: Area A - the feature's interior, Area B - the exterior of the feature, and Amplification 1 (AMP 1) - the back-dirt pile left from the disturbance, which partially fell outside the western boundary of the 2x2 meter unit (Figure 70 and Figure 71 - a, b).

Area A (Special Structure L1A-1)

Area A was the interior of the architectural feature. This space was approximately square with roughly equal dimensions of 1x1 meter. As noted above, this area was extremely disturbed with a large and uneven pit dug right in the center and encompassing most of interior. As such, the vast majority of sediment removed from Area A represented loose wind-blown sediment that had naturally deposited after the disturbance event took place. This sediment was removed in just two excavation levels. Level 1 was a relatively shallow level in which the main goal was to remove several medium-sized cobbles that were sitting in with the wind-blown sediment. Very little cultural material was recovered in this initial layer, consistent with the deposition pattern expected of a post-use disturbance pit.

Excavation Level 2 was more substantial, with 40 liters of sediment removed. Far more cultural material was present in this level as well. While not as dense as several of the rockpile-midden deposits described above, there was a fair amount of domestic debris found in this lower level. Tiwanaku-style plainware ceramic sherds and camelid bone were the two best represented examples of this debris. Interestingly, over 150 grams of charcoal was also recovered from this level. In fact, charcoal flecks and staining made up a substantial portion of the matrix in Level 2 as well.

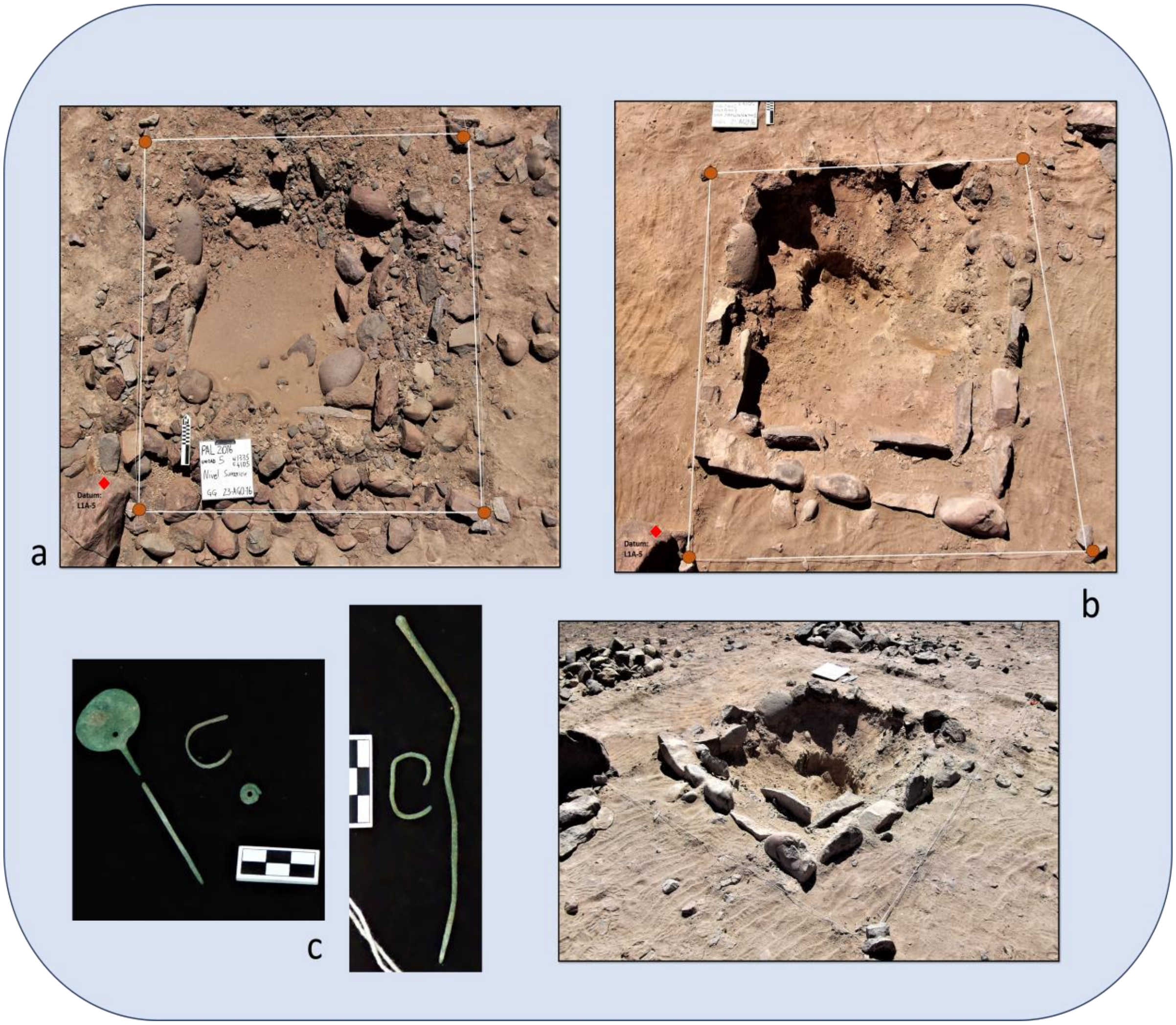


Figure 71. Selected photos from test Unit L11A-2016-5. (a) Overhead photo of unit surface (superficie) before excavation. (b) Both overhead and oblique angle photos of Unit L1A-2016-5 architectural feature (Special Structure L1A-1) after excavations. (c) Copper artifacts recovered from Area A and the AMP back dirt removal.

In addition to the more typical domestic refuse, a number of more unique material finds were made in this area as well. First, four sherds of miniature vessels were recovered. As will be discussed later (see 8.1) these miniature vessels (minis) almost always took typical plainware vessel forms and could range from low-fired pinch pots to more formally made, fired ceramics. The other significant unique find was four fragments of metal artifacts. Two fragments belong to a single artifact, a *tupu* pin - used for keeping clothing or hairstyles in their desired place. An additional two fragments were also recovered an could have originally derived from a similar item. All four fragments show various signs of being intentionally destroyed - the two fragments from the *tupu* appear to have been snapped clear and one of the other fragments has been intentionally rolled-up (Figure 71 - c). All materials appear to be made of the same metal with oxidation indicating copper as the dominant alloy. Again, the implication of these unique findings will be discussed in later chapters (see Section 3).

The excavations revealed that the field stones and cobbles were set into the ground surface forming an inner and outer course (Figure 71). Most of these courses were still in situ, however much of the northern course was largely destroyed. Ultimately, other than the disturbance pit feature, no architectural features or subdivisions were exposed within Area A. However, based on the lack of any evidence for formal subsurface features, it would seem that the stones composing this feature likely represent the foundation for walls as opposed to the collar of some subsurface structure.

Area B

This area was all areas of the unit that fell outside of the architectural feature. This was effectively just a narrow strip of area in the southeast portion of the unit and an additional small area in the northwest corner. This area was excavated in a single excavation level (Level 1). As with Level 1 in Area A, the majority of material removed here in Area B were dislodged cobbles and field stones. Just ten liters of sediment were removed and relatively small amounts of typical domestic refuse. However, also recovered were small amounts of the unique materials found in Area A, including sherds from mini ceramic vessels and two small fragments of copper.

AMP - Back Dirt

Finally, this unit also incorporated systematically removing and sifting the back dirt pile, associated with the disturbance feature. This was unique for the 2016 test units as the majority of this feature fell just outside the unit boundaries. The deflated and weathered back dirt pile covered approximately 3x1 meters of area directly outside the western unit wall. This feature was removed in a single, large level. In total this back dirt pile was composed of just over 200 liters of sediment. Both the matrix of the sediment in the pile and the materials recovered clearly confirmed that this sediment did indeed come from the disturbance pit. Significantly, two more substantial fragments of metal (copper) were recovered from this disturbance feature.

7.2 Household Excavations (2018-19)

In the multi-year field season lasting from 2018 through 2019, extensive excavations were completed in each of the three Tiwanaku-affiliated domestic sectors. Unlike the 2016 excavations in which just five arbitrary 2x2 meter units were excavated, these 2018-19 excavations took more of a household archeology approach. As explained in Chapter 4 (see *4.1*), these excavations sought to open large areas in order to expose any surviving architectural plans as well as articulated material scatters. It is for this reason that in this section, as opposed using the terms “unit” or “test unit” to refer specific excavations, I use the term “block” or “excavation block.” The ultimate goal of these large-scale excavation blocks was to delineate a comprehensive view of the spaces and activities that, at least partially, defined daily life for individuals and their encompassing communities at Cerro San Antonio. As with the previous subsection, here I go block-by-block and describe each major area in its own terms. Also, like the previous section, here most data presented are context-oriented with most discussion regarding materials recovered reserved for the following chapter (Chapter 8) and major comparisons and other synthesis held for the final section of this thesis (Section 3).

During the 2018 portion of the season the location of the excavation blocks were selected and their base parameters were established. During this time base nails were set at 2-meter intervals for the 4x4 meter units that formed the starting-point for the excavation blocks. Each of the three sectors being sampled (Sector A, Sector L, and Sector U) had multiple excavation block established, though only some of these would actually be excavated. In total eight (8) blocks were established with five (5) eventually being excavated (Figure 72).

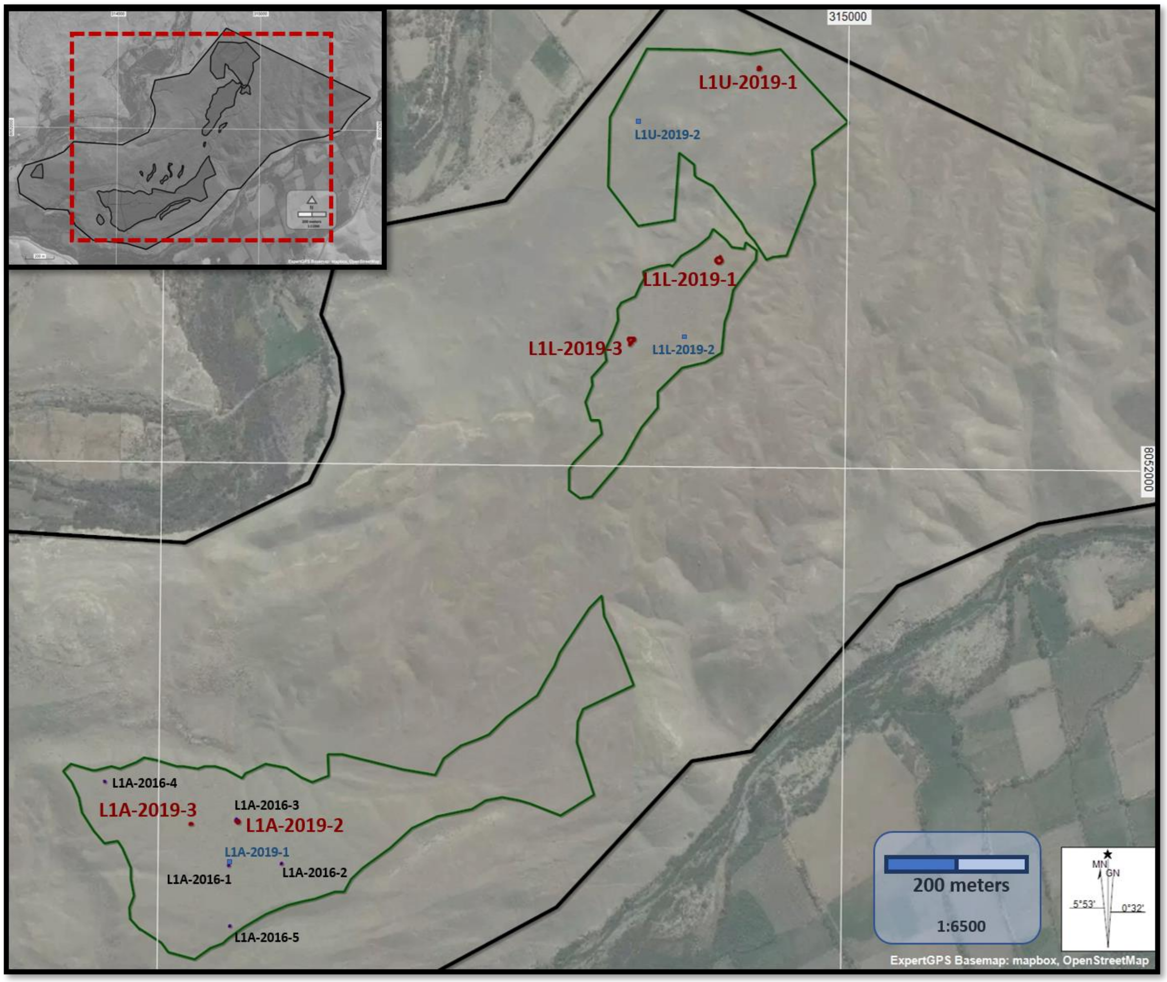


Figure 72. Map displaying the locations of (*red*) completed 2018-19 excavation block locations, as well as the (blue) location of blocks not pursued in 2019 excavations and (*black*) location of the completed 2016 test units in L1A.

In the end, two of the three excavation blocks in Sector A (L1A-2019-2 and L1A-2019-3), two of three excavation blocks in Sector L (L1L-2019-1 and L1L-2019-3), and one of two blocks in Sector U (L1U-2019-1) were completey excavated (Figure 72).

Table 10. Table of important information of all excavation blocks completed during the 2018-19 field season.

Sector	Excavation Block	Original SW corner (N)	Original SW corner (E)	Total Area (M^2)	Total volume excavated & fine-screened (liters)	Total Specimens	Major Structures included
A	L1A-2019-1	8051422.18	314103.76	not excavated	-	-	-
	L1A-2019-2	8051483.23	314114.53	24	635	251	Special Structure: L1A-2
	L1A-2019-3	8051480.50	314045.80	8	242.4	88	-
L	L1L-2019-1	8052294.25	314809.46	64	988.75	334	Domestic Structure: L1L-1
	L1L-2019-2	8052180.06	314711.92	not excavated	-	-	-
	L1L-2019-3	8052180.03	314686.75	60	945.4	313	Domestic Structure: L1L-2 & L1L-3
U	L1U-2019-1	8052570.23	314867.17	16	180	52	-
	L1U-2019-2	8052578.21	314868.28	not excavated	-	-	-

In total 176 square meters of area were excavated in five (5) separate excavation blocks across the three (3) sampled sectors (L1A, L1L, and L1U). Each of the five (5) excavation blocks' final area was different and the total area excavated in each sector would also be unequal (Table 10). The exact reasons for final block dimensions are explained for each individual excavation block below.

Block: L1L-2019-1

Excavation Block L1L-2019-1 was the largest single area excavated during the 2018-19 season[162]. In total 68m² were exposed revealing the remains of a single, multi-room domestic structure and its associated features. Here approximately 988.75 liters of sediment were

[162] Overall, L1L was the least disturbed sector investigated at the site and contained a significant amount of surviving architectural elements and *in situ* material deposits. It is for this reason that significantly more area was exposed here (and similarly in the other excavation block in Sector L - L1L-2019-3), as compared to blocks in Sector A and Sector U.

removed and fine-screened, with all cultural and non-sediment-based natural materials collected and sorted for subsequent analysis. Ultimately 334 material specimens, composed of thousands of material fragments were cataloged from this block.

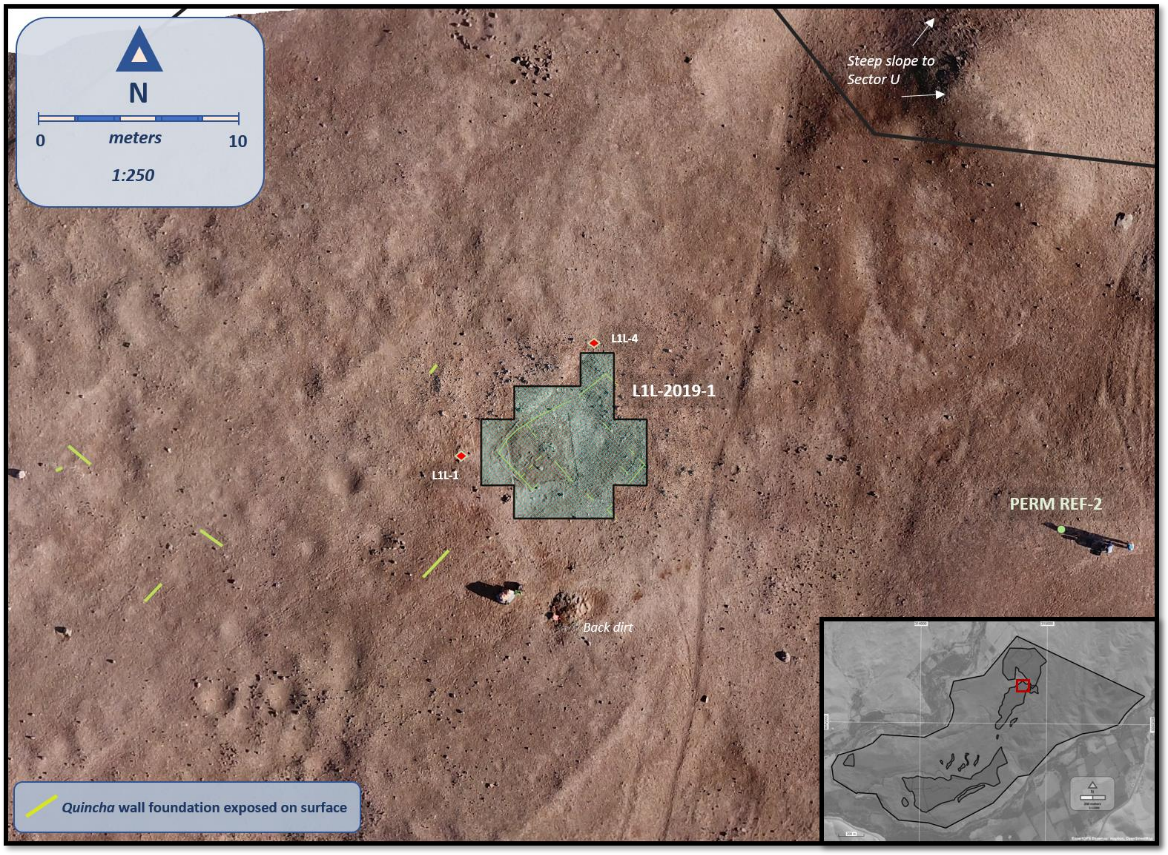


Figure 73. Detailed orthophoto showing broader context of Block L1L-2019-1 and associated surface features at the northern edge of Sector L.

This excavation block was located at the northern end of the relatively level blufftop plain that forms much of the Sector L surface, just 20 meters from the steep slope that marks the boundary of the sector. The specific location for Block L1L-2019-1 was selected due to a concentration of small segments of wall foundations. Like most architecture exposed in Sector L these walls were made using a wattle-and-daub construction style, known locally as *quincha*. The specific manifestations of *quincha* will be described in detail when pertinent below, but its important to note from the start that when quincha wall foundations are referred to here, this is generally referring to short (normally less than 5cm) segments of cane protruding from the ground surface in a linear formation. In the case of L1L-2019-1, multiple linear segments appeared to be roughly perpendicular in orientation, suggesting the remnants of multiple walls. In the original 4x4m unit that formed the starting point for the block contained three (3) separate segments of wall foundation, with an additional six (6) segments located on the surface in the various 2x2m expansion units.

Due to the size of the excavation block, two local datums were necessary. Datum L1L-1, located just to the west of the block, was a well-set rebar loop that was shot-in with a differential GPS. Datum L1L-4 served as a secondary datum and was located just northeast of the block and was exactly 10.31cm above Datum L1L-1 in elevation. While architectural areas would ultimately dictate the way in which excavation blocks were subdivided, standard practice for the more extensive excavation blocks was to complete initial surface collection (Level 1) and even the initial patina scrape level (Level 2) in arbitrary 2x2m sub-block units (see *4.1* for more details). This strategy was only partially followed for Block L1L-2019-1, which was eventually composed of 17 arbitrary 2x2m sub-block units, as the presence of wall foundations allowed for early division into architectural areas for Level 2.

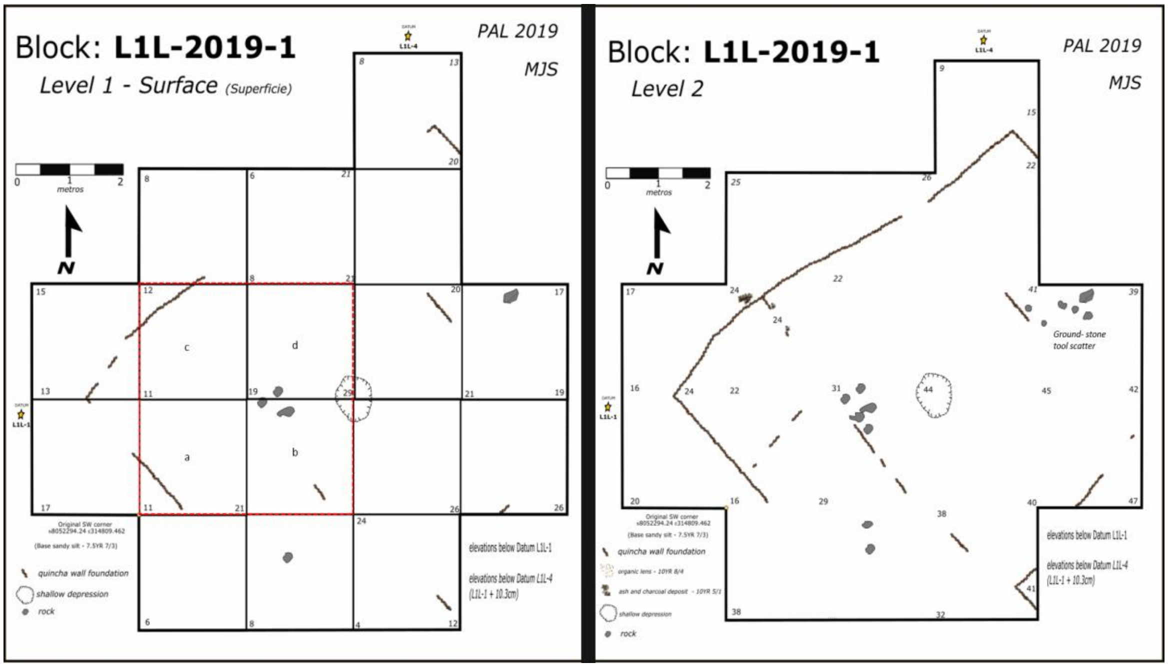


Figure 74. Plan map of (*left*) the surface (superficie) of excavation Block L1L-2019-1 - red box indicates the initial 4x4m unit that formed starting-point for the block and (*right*) the base of excavation Level 2.

Level 1 was simply used as surface collection - only materials sitting directly on the exposed surface. This level did use the arbitrary 2x2m subunits as the contextual control. Materials collected here were almost entirely relegated to plainware ceramic sherds, all falling within the typical Tiwanaku variations. Sherds were found in the highest quantities in the southern half of the unit with concentrations in the eastern and southeastern sub-areas - a pattern that would continue in subsurface levels. Significantly in the easternmost extension 2x2m unit a large fragment of a metate was exposed on the surface and was left in situ (Figure 74).

Similar to the 2016 test excavation strategy, here excavation Level 2 was geared specifically towards removing the thin patina that was ubiquitous throughout the block. However, in some areas of Block L1L-2019-1 this excavation level was relatively deep due to the presence of loose fill and gravel in some areas. In total 141.25 liters of sediment were removed and fine-screened for cultural material. Broadly speaking, materials recovered here aligned with typical domestic refuse. The highest density material types recovered included plainware ceramic sherds, camelid bone, marine shell, and a variety of macrobotanical remains. Significantly, large amounts of camelid coprolites were recovered throughout the block, but particularly in a shallow, roughly circular depression, situated in the center of the block. As noted above, due to the prevalence of wall foundations Level 2 was excavated in preliminary areas that worked to align with possible architectural spaces and not in the arbitrary 2x2m subunits.

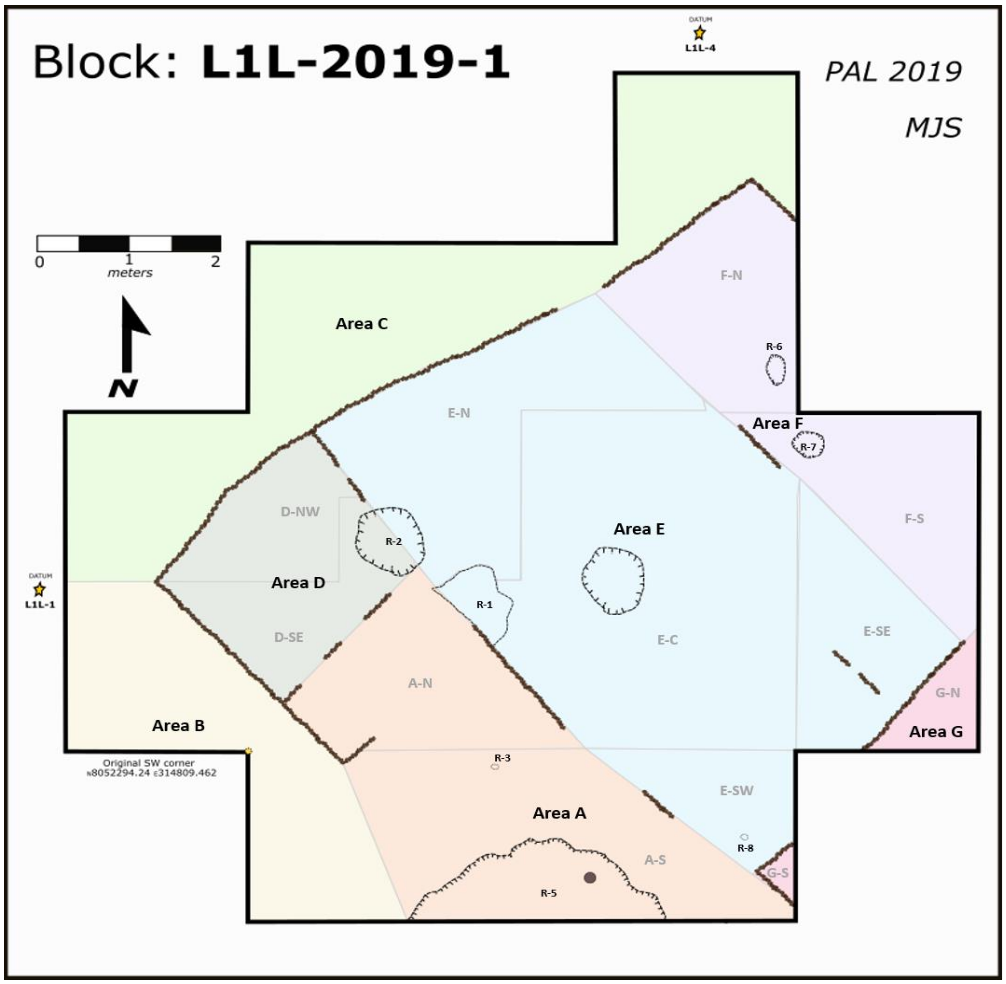


Figure 75. Major areas of excavation and features within excavation Block L1L-2019-1 (note: sub-areas in gray).

In total seven (7) primary architectural-based spaces (Areas A-G) defined the context of Block L1L-2019-1 - I use these excavation areas to organize the rest of the data presentation below. For each of the seven areas I review the general findings from the Level 2 patina scrape through the Level 4 superpiso level, in which the best-preserved strata were delicately excavated. Any additional features or associated contexts are also presented where pertinent. As always, here each area is largely presented as an independent context, with most comparisons and additional interpretive synthesis reserved for Section 3. However, here I wanted to highlight a few of the block-wide similarities in each major excavation level before breaking off into an area-by-area discussion.

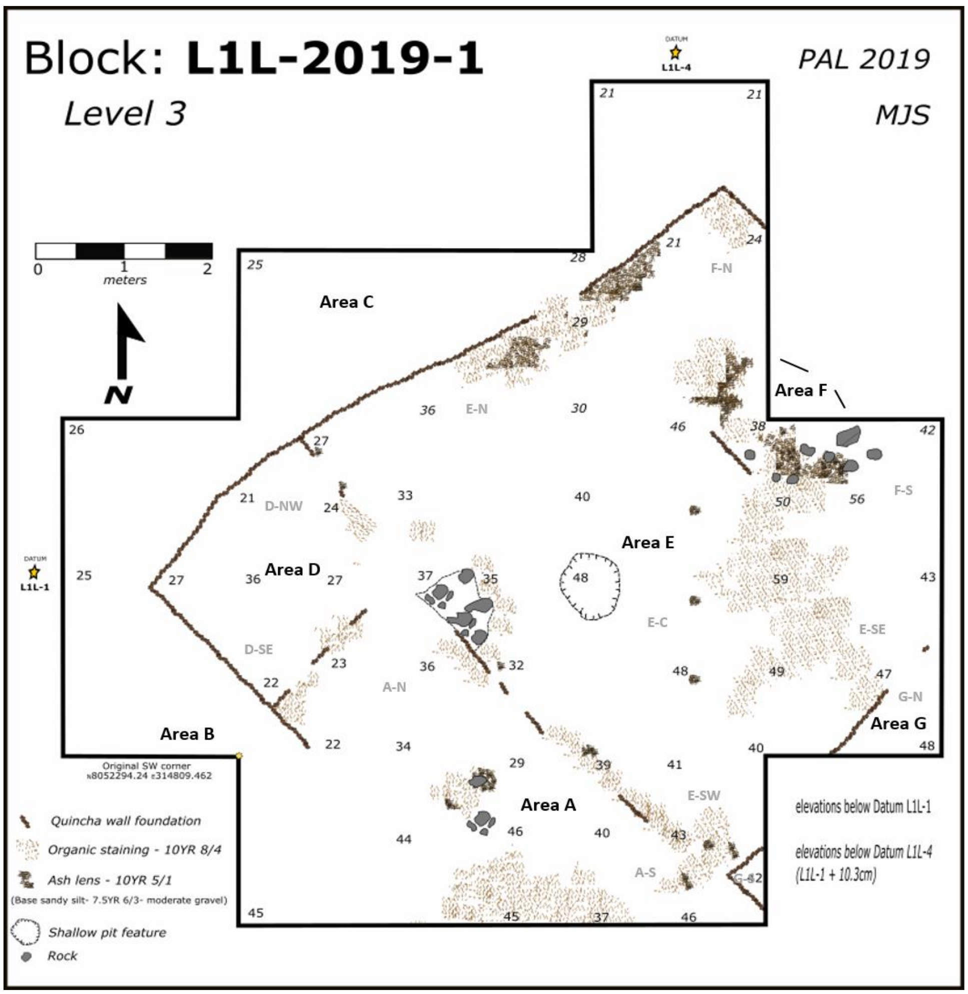


Figure 76. Plan view of the base of excavation Level 3.

Following Level 2 and the exposure of a few more architecture-based area distinctions, Level 3 would remove an additional, sometimes quite thick, deposit of wind-blown sediment. This level would ultimately remove and fine-screen 173.75 liters of largely silt-based sediment. Like Level 2, Level 3 would reveal more spatial distinctions, based on newly exposed segments of quincha wall foundations. Materials recovered fell within typical domestic refuse, however findings became more variable from area to area. In particular, this level would also expose extremely dense deposits of domestic debris and organic staining in the south portion of Area A and Area E as well as dense deposits of charcoal and ash throughout Area F (see below). Five 0.5-liter soil samples were collected from select contexts for future microanalysis (see 8.10). All features were left to be excavated with the subsequent Level 4-superpiso.

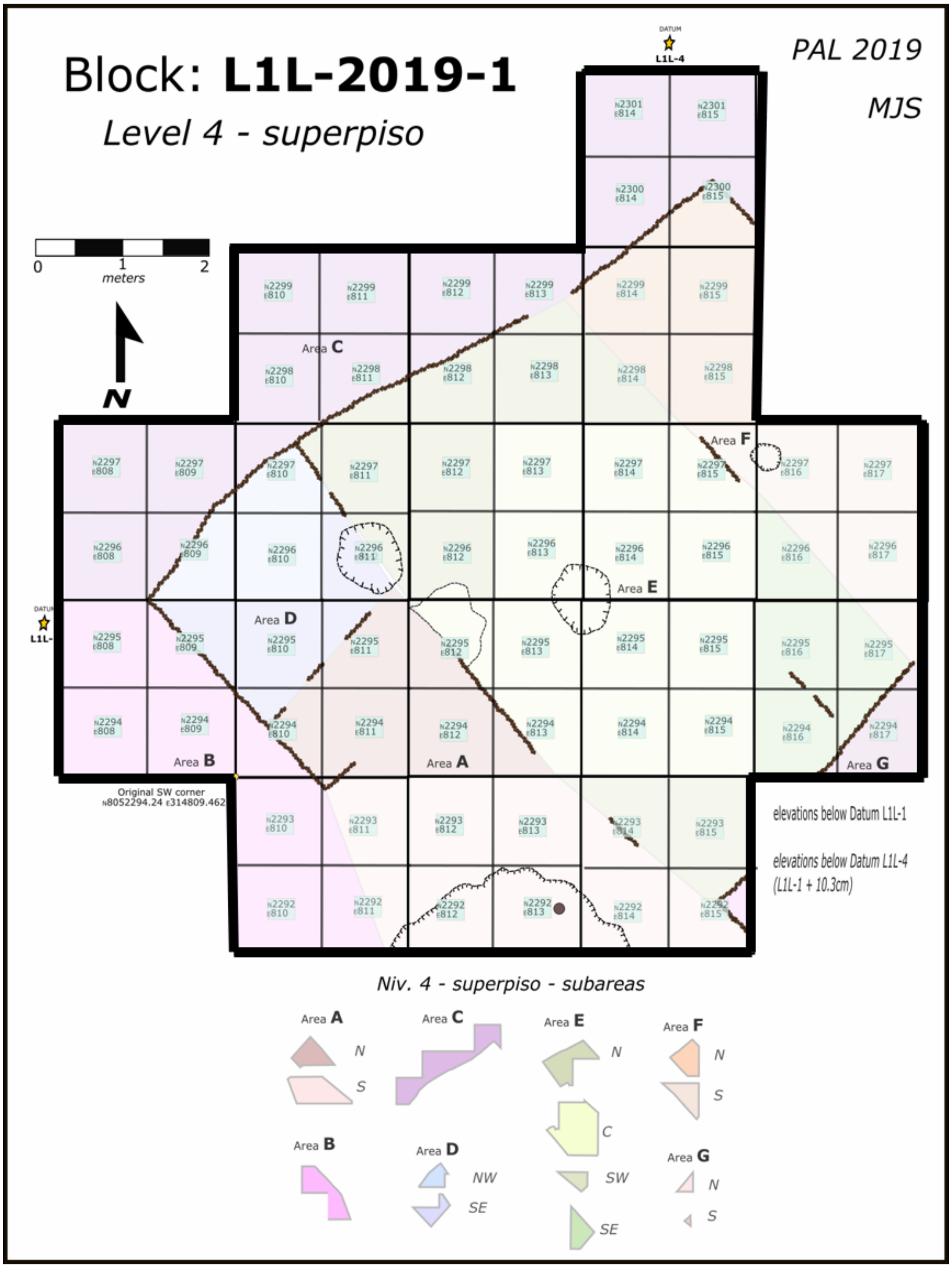


Figure 77. Level 4 - superpiso summary basemap for Block L1L-2019-1 - indicating major areas as well as subareas. Also projected here are the 1x1 meter units (note: displayed UTMs are abbreviated to last 4 digits for the northing (N 805XXXX) and 3 digits for the easting (E 314XXX)).

Based on the increasing occurrence of dense domestic refuse deposits and a number of exposed features, Level 4 was designated a superpiso level. As explained in Chapter 4 (see

4.1), the superpiso designation was reserved for excavation levels deemed to have a high likelihood of being associated with primary activity deposits and even architectural floors. In addition to being guided by the subareas designated in Level 3, Level 4 would also restrict excavations to 1x1 meter subunits. In total 68 1x1s split between 14 subareas and combined with 8 formal floor-associated features, resulted in a total 93 individual contexts within the Level 4 superpiso.

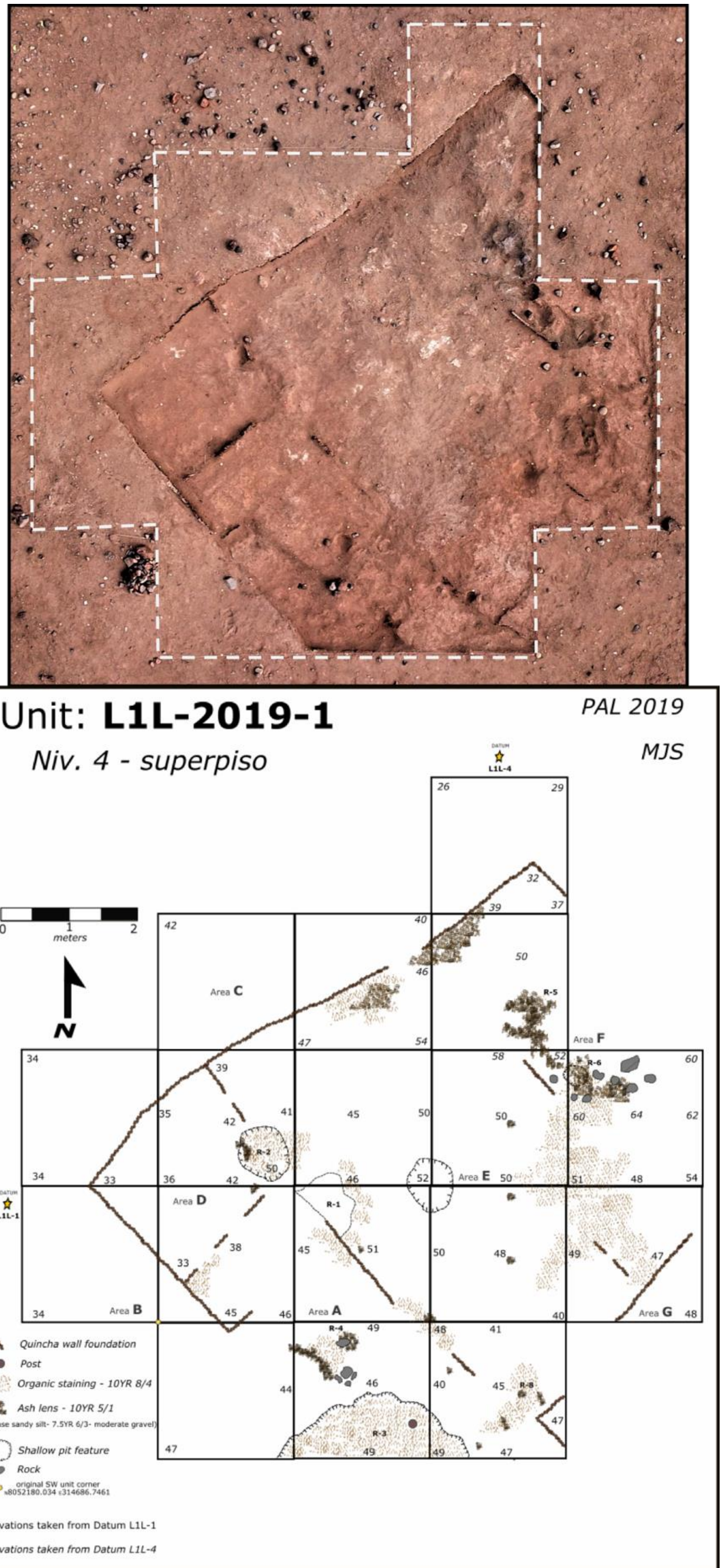


Figure 78. Base plan map and UAV photo of the base of Level 4 in Block L1L-2019-1. This was the superpiso level, associated with primary architectural use and the final full block excavation level.

The complicated suite of contexts that comprised Level 4 are presented in the area breakdowns below. However, ultimately 582.5 liters of sediment were removed during this excavation levels. The sediment matrix differed greatly from subarea to subarea, but fine wind-blown silt mixed with sand defined much of the block. Materials would again be found in variable amounts, but all fell within documented Tiwanaku domestic styles and forms. Sixty 0.5-liter soil samples were collected from select for future analysis. The primary eight features of the block were all excavated in direct associated with Level 4. For much of the block Level 4 would be the final level. However, in a small portion of Area E (see below), a compacted lens of domestic refuse led to an additional superpiso excavation level - Level 5. This limited superpiso II - Level 5 would only produce 27.5 liters of sediment for fine-screening.

Below I provide a more in-depth contextual description of each major Area delineated in Block L1L-2019-1. Here, I also introduce each area's more interpretive designation[163] where I distinguish between architectural rooms (e.g., *Room XX*) associated with Structure L1L-1 and non-architecturally bound spaces (e.g., *Exterior*).

Area A (Structure L1L-1 - Room 1)

Area A was an architectural area located on the southwestern side of Structure L1L-1. In the final architectural layout that defined this structure, Area A was likely only walled on three sides and may or may not have been roofed, however it is designated Room 1 (see 9.1). As with most areas in Block L1L-2019-1, this area was excavated in three separate levels (Level 2, Level 3, Level 4-superpiso). These excavations would produce 211.25 liters of sediment for fine-screening, ultimately yielding 66 major material specimens. There were two main contextual distinctions made within Area A, Area A - North (A-N) and Area A - South (A-S), as well as two of the formal floor features (R-3 and R-4).

[163] Again, these designations are discussed in greater detail in Chapter 9 in Section 3.

Area A - North (A-N) was the more architecturally complex portion of the area. Quincha wall foundations framed the southwestern, northwestern, and northeastern boundaries of the relatively small ($3.75m^2$) area and separated it from Area D (Room 2) to the north and Area E (Room 3) to the east. In addition, the final excavation levels revealed an additional segment of quincha wall foundation protruding to the northeast from the southern end of the southwestern wall segment - effectively forming a partial partition between the northern (A-N) and southern (A-S) portions of Area A. Most sediment removed here were relatively loose, wind-blown silts with some sand and low amounts of gravel. A number of small, extremely thin semi-compacted patches were exposed in the Level 4-superpiso level, but these appear to be laminates left from moisture accumulation as opposed to surviving segments of prepared floor. Overall, domestic debris was relatively light in A-N with small amounts of Tiwanaku plainware ceramic sherds, camelid bone fragments, and various macrobotanical remains being the best represented material types. During the excavation of the Level 4-superpiso, six (6) 0.5-liter soil samples were collected from selected 1x1m subunits, for microanalysis.

Area A - South (A-S) was less constrained by quincha wall foundations and therefore less architecturally complex than the northern portion of the area. However, A-S was a bit larger ($5.82m^2$) and far more complex in terms of features and other material deposits. Several small remnants of quincha wall foundation bordered the northwestern side of A-S and separated it from Area E (Room 3) to the east. A portion of this broken stretch of quincha wall foundation may have acted as a doorway into Area E and the main room of the structure. The southern extent of A-S entered the southern excavation block profile. In the northern portion of A-S or what would be the direct center of Area A there were a number of intersecting strips and patches of an ashy lens. While similar to A-N, excavated matrix of A-S would contain more sand as well as higher gravel content. Cultural materials were also far denser in A-S, and while the highest concentrations would be associated with the formal features (see below) the standard A-S matrix contained higher concentrations of plain ware ceramics, camelid bone, and macrobotanical remains. However, one significant isolated find here was multiple sherds from a single miniature olla-shaped vessel what contained a very simplified face modelled into the neck of the vessel (see *8.1* for more on ceramic finds). Finally, eight (8) unsifted soil samples were collected from selected 1x1m subunits for microanalysis.

R-3. Rasgo 3 in Block L1L-2019-1 was a relatively large but shallow pit feature exposed in the southern portion of A-S. In order to observe any internal stratigraphy, the feature was first bisected, with the eastern half excavated first. The feature entered the southernmost excavation block profile so the entire area could not be determined but the portion exposed in A-S was approximately 1.28m and 12cm below the excavated ground surface a its deepest extent. Both the perimeter and base of R-3 were very uneven and showed no signs of formal preparation. Interesting, the base of a moderate-sized post (max width: 5.37cm) was found still in situ in the eastern portion of the feature. The matrix was generally quite loose with a significant organic component. This correlates with the high amounts of domestic refuse, particularly macrobotanical remains and charcoal. A single 0.5-liter soil sample was collected for future microanalysis.

R-4. Rasgo 4 in Block L1L-2019-1 was a small, roughly circular hole, situated almost directly in the center of Area A-S. Originally, appearing a dark, circular stain underlying a small, rounded cobble, R-4 was ultimately 0.06m^2 and just over 9cm below the excavated ground surface. While small, R-4 was still bisected, with the south half excavated first. The primary contents of the feature were several large sherds of a small, heavily charred olla. The other primary contents of the feature were interestingly several complete (and uncharred) cotton leaves as well as some matted (unspun) cotton fiber and fragments of the more brittle boll. A single (1) 0.5-liter sample of unsorted sediment was collected for analysis.

Area B (exterior)

Area B was a non-architectural space, representing the exterior to the southwest of

Structure L1L-1. Area B only required two excavation levels (Level 2 and Level 3) which produced 32.5 liters of sediment for fine-screening. This exterior space had less dense concentrations of materials when compared to most interior spaces, but still produced 20 major material specimens, including moderate amounts of Tiwanaku plainware ceramic sherds and camelid coprolites.

Area C (exterior)

Area C was another non-architecture, exterior space, this time located to the northwest of Structure L1L-1. Only two excavation levels (Level 2 and Level 3) were needed to complete Area C producing 26.25 liters of sediment for fine-screening, which would yield just 15 material specimens. Materials were relatively sparse here with small amounts of plainware ceramic sherds and some botanics representing the best represented material classes. However, a small scatter of lithic debitage, including two bifacial core fragments were recovered up against the quincha wall foundation separating Area C from the interior Area D (Room 2).

Area D (Structure L1L-1 - Room 2)

Area D represents an architectural area on the western side of Structure L1L-1, designated Room 2. This room was walled on four sides, as indicated by well-preserved quincha wall foundations and was almost certainly roofed. At approximately 4.75m, Area D was also a relatively small space. Three excavation levels were employed to clear this area (Level 2, Level 3, Level 4-superpiso), producing 122.5 liters of sediment for fine-screening. This screening yielded 44 major material specimen collections. Lower levels in Area D utilized two subareas for better contextual control, Area D - Southeast (D-SE) and Area D - Northwest (D-NW). Additionally, a single formal floor feature (R-2) was associated with Area D excavations.

Area D - Northwest (D-NW) would sample the entire interior length the intact quincha wall foundation that framed the northwestern and northeastern sides of Area D. Significantly, this small subarea (2.1m²) would effectively sample the northern and western interior corners of this room. Absolutely no intact floor was exposed here. In fact, the fill matrix encountered in all levels was far less compact and had substantially less gravel content than other interior areas. Approximately 52.5 liters of sediment were removed and fine-screened with 16 separate specimens identified and collected for analysis. While there were some clusters of larger plainware ceramic sherds the overall domestic refuse content was much lower here than others. However, an important reoccurring find here was debitage left from decorative/ornamental stonework, specifically bluestone (likely turquoise). Additionally, three (3) half-liter soil samples were collected for post-field work analysis.

Figure 79. Detail photo (center) of Area A (Room 1) and Area D (Room 2) in Structure L1L-1. Also includes inserts depicting: (upper-right) bluestone bead manufacture debitage from Area D, (lower-right) textile-related items (spool for thread, ceramic rueca (spindle whorl), and cactus spine needle) from Area E, and (lower-left) a detail of Rasgo 4 before excavation (with mano and ceramic sherds protruding) from Area A.

Area D - Southeast (D-SE) was just a bit larger than D-NW at 2.67m². This subarea was composed of the interior of the quincha wall foundation that framed the southwest side of the room as well as the more fragmentary stretch of quincha wall fragments of the southeastern wall. Like its counterpart this portion of Area D also had no discernable intact floor and a generally loose, gravel-free matrix. However, D-SE was significantly denser with materials, particularly large amounts of plainware ceramic sherds and interestingly camelid coprolites. A total of four (4) 0.5-liter soil samples were removed from select 1x1m subunits for microanalysis and other future analysis. Finally, bordering the northeastern side of this subarea, directly along the fragmented quincha wall foundation dividing Area D from Area E to the east was feature R-2.

R-2. Rasgo 2 in Block L1L-2019-1 was a relatively shallow pit feature that interrupted the quincha wall foundation that divided Area D and Area E. At 0.45m² the feature was also relatively small, only producing about five liters of soil for screening. The base of the feature was relatively uniformly compacted, suggesting this was an informal feature, possibly for refuse disposal, with some ashy pockets in the matrix suggesting dumping of hearth refuse. While general refuse was low in R-2 there were a significant amount of plainware ceramic sherds recovered as part of the three major material specimens collected.

Area E (Structure L1L-1 - Room 3)

Area E, ultimately designated Room 3, was the largest architectural area in Block L1L-2019-1, at just over 23m2. Surviving segments of quincha-style wall foundations and staining, indicating former locations of walls, indicate that this area was a fully-enclosed architectural space. The room was relatively open, in terms of architecture, with the exception of a short segment of quincha wall that protruded from the southeastern wall, effectively dividing the southeastern portion of the room into two spaces. Additional evidence (post molds) suggest that at least the southern part of this relatively large interior space was roofed. Most of this area was excavated in the standard three (3) subsurface excavation levels (Level 2, Level 3, Level 4-superpiso), but one subarea, Area E-C was the only context in this block to receive a secondary superpiso excavation level (Level 5-superpiso II). 401.25 liters of excavated and fine-screened sediment would produce 118 major material specimens from Area E and associated features. For increased contextual control, this larger room would be divided into four arbitrary subareas: Area E - North (E-N), Area E - Central (E-C), Area E - Southeast (E-SE), Area E - Southwest (E-SW). Three (3) of the block's formal floor features were excavated within or directly associated with Area E. Finally, twenty-nine (29) 0.5-liter unsifted soil samples were collected for future analysis.

Area E - North (E-N) was the northernmost 5m² of the architectural space. E-N was bound in the north by the nearly complete stretch of quincha wall foundation that separated Area E from structure exterior (Area C). There was only a small portion of this section of wall that was absent. Significantly, this break in the northern wall is directly where the wall, which presumably had been present to separate Area E from Area F (see below), would have coupled. Dark staining and the presence of significant amounts of charcoal flecks and other burnt debris in the matrix suggests that fire damage may be responsible for the absent wall here. The entire southwestern edge of E-N was also marked by a complete section of quincha wall foundation. Importantly, this section of quincha wall, which separates Area E from Area D to the west, articulates with the northern quincha wall, forming the interior northwestern corner of Area E - Room 4, and ends in the shallow pit feature - Rasgo 2 (R-2). The slight incline on which Block L1L-2019-1 was positioned was most pronounced in E-N. This resulted in less wind-blown sediment accumulation and higher coarse sand and gravel in the matrix. While there was some standard domestic refuse recovered here, there was significantly less material in E-N than other subareas in Area E. 100 liters were removed and screened in E-N, producing only 11 specimens.

Area E - Central (E-C) represented the entire central portion of the room (12.9m²), with arbitrary boundaries between E-N in the north as well as E-SW and E-SE in the south. However, the western and eastern edges of E-C were bound by articulated sections of quincha wall foundation; the walls separating Area E from Area A in the west and Area F in the east, respectively. In the center of this subarea was a slight depression (~ 0.8 x 0.6 meters), that had been apparent since initial surface observations. This depression was likely a post-abandonment feature, and the recovery of significant amounts of camelid coprolites in initial excavation levels indicated that this area may have been used as a temporary corral for camelids sometime after the primary structure occupation. However, more significant for the primary occupation were three circular stains, that likely represented post-molds. These stains were located almost exactly one meter apart from each other, almost perpendicular to the quincha wall segment which subdivided the southern portion of the area. This location may suggest that at least the southern portion of the relatively large and open Area E was roofed.

The matrix and material culture content of the northern portion of E-C was much like E-N, but the southern portion E-C would shift significantly. Here, there was an exceptional amount of domestic debris, particularly in the southeastern portion of the area, where E-C met E-SE. The three southeasternmost 1x1 meter superpiso units required a secondary superpiso level (Level 5 - superpiso II). This was the one location in the structure where there was a clear occupational surface. Instead of a prepared floor, it was only apparent in the highly compact nature of the upper superpiso level. Eventually, a shallow and uneven pit feature, designated Rasgo 7 (R-7) would underlie this secondary superpiso surface. This patch of dense, trampled refuse was quite diverse in content, but the best represented materials were Tiwanaku-style plainware ceramic sherds, plain-weave wool textile fragments, camelid bone, and a variety of macrobotanical remains. Ultimately, 125 liters of sediment were excavated from E-C and associated features, yielding the bulk of materials from Area E, with 45 major specimens collected.

Area E - Southeast (E-SE) would extend directly off of the dense southeastern portion of E-C. While no section in E-SE required a secondary superpiso level, materials were also very dense here. In fact, a significant portion of the overall matrix encountered in E-SE was entirely pulverized botanic material, mostly wood, cane, and grass - all architectural-associated materials. This subarea was quite small, at only 3.4m^2, but was particularly thick in terms of sediment and cultural materials. 122.5 liters of sediment were excavated from this small corner with 13 major specimen lots sorted. In addition to this complexity within the matrix, this small subarea also contained the southern subdividing quincha wall segment. There was a clear distinction between deposits recovered from the southwestern side of this room divide, with deposits far denser on the northeastern side of the wall than the southwestern side.

Finally, Area E - Southwest was the smallest subarea, covering only 1.84m² of the southwestern corner of Area E. While the overall fill here would be relatively loose and homogeneous, multiple small, compacted surfaces were exposed, not floors, but likely trampled surfaces. The quincha wall foundation that is preserved and present just to the north, dividing E-C from Area A, is absent for most of the western edge of E-SW. However, it does pick up in the southernmost portion of the subarea, as well as make a perpendicular turn to the northeast - this divides E-SW from Area G-S. The gap in the western wall may be intentional, representing the primary Structure L1L-1 doorway - from Area E to the exterior. In the end 32.5 liters of sediment were removed, screened, and sorted. This resulted in the identification of 13 major material specimens.

R-1. Rasgo 1 (R-1) was a feature that had actually been present since the initial excavation levels in Block L1L-2019-1, but was ultimately excavated associated with the Level 4-superpiso excavation level in Area E-C. R-1 was a cluster of small cobbles which directly abutted an intact portion of the quincha wall foundation that divided Area E-C and Area A-S. Originally, R-1 was believed to be the remnants of a hearth or other formal feature, and while it clearly was an intentionally laced pile of stones there was not soot, charcoal, or other materials to suggest a hearth feature. While seven (7) material specimens were recovered after excavating R-1. Including some large pieces of lithic debitage, there were not particularly dense amounts of materials here. In the end, just under 15 liters of sediment were removed, as well as 3 liters-equivalent of small-medium cobbles.

R-7. Rasgo 7 (R-7) was an informal and relatively shallow pit feature filled with extremely dense amount of domestic refuse. This is the feature which was exposed after excavating the second superpiso level (Level 5) in Area E-C. Like the overlying strata the materials recovered here were varied but particularly high amounts of plainware ceramic sherds, plain-weave textile fragments, and a whole variety of macrobotanics were recovered. R-7 was likely an informal pit used to dispose of refuse, with no indication it was used for more formal storage purposes. 2.5 liters of soil were removed from feature and screened, with a 0.5-liter soil sample reserved for analysis later.

R-8. Rasgo 8 (R-8) was a small (0.2 x 0.25 m) particularly dark, circular stain. It was located just to the east of the quincha wall line that separated Area A and Area E-SW. R-8 was specifically located directly in the middle of the gap where there is no quincha still present, and no real evidence for a wall trench stain. It may be that R8 would be a disturbance feature in what was the doorway connecting Area E to Area A and ultimately the exterior (Area B). R-8 contained a significant amount of ash and small fragments of charred camelid bone, but little other materials. This feature would only produce 1 liter of soil for fine-screening.

Area F (Structure L1L-1 - Room 4)

Area F was the second largest room in Structure L1L-1 (8.24m²) and the architectural space with the clearest discrete activity area. Two features, R-5 and R-6 (see below) were multi-use hearths, that almost certainly acted as the primary food preparation (cooking, etc.), dense amounts of charcoal, ash, and associated materials, like plainware ceramic sherds and macrobotanical remains were also found in the densest quantities in Area F as well. The exact architectural layout of Area F, or Room 4, is unknown as it ran up against the eastern excavation block boundary. However, the northeastern quincha wall segment that was exposed within the block suggests that this may be an exterior wall that continues and would have framed in Area F. Only a small portion of the interior wall that divided Area F from Area E to the west is left intact. It was difficult to determine if Area F - Room 4 was roofed or open-air. In total the three excavation levels (Level 2, Level 3, Level 4-superpiso) in Area F would produce 180 liters of sediment for fine-screening, which would yield 37 major material specimens. Two major subareas were employed for contextual control: Area F - North (F-N) and Area F - South (F-S).

The northern 3.9m² of Area F was designated Area F - North (F-N) for the final excavation levels. The northern boundary of F-N was marked by fully articulated quincha wall foundations, including the northeastern-most corner of the structure. The only break in the northern wall is where Area F meets E-N, which as described above, is defined by significant amount of charcoal and ash, suggesting fire damage. More complex is the southern portion of F-N, which was define by a matrix extremely dense with ash, charcoal, and a variety of charred domestic refuse. This lens covered almost 1m2 and was centered on R-5, an informal, but heavily used hearth. This charcoal and ash lens continued south and ultimately merged with the ash lens surrounding a second hearth, R-6. 77.5 liters of sediment was excavated for fine-screening. 13 material specimens and four (4) 0.5-liter soil samples were collected from F-N.

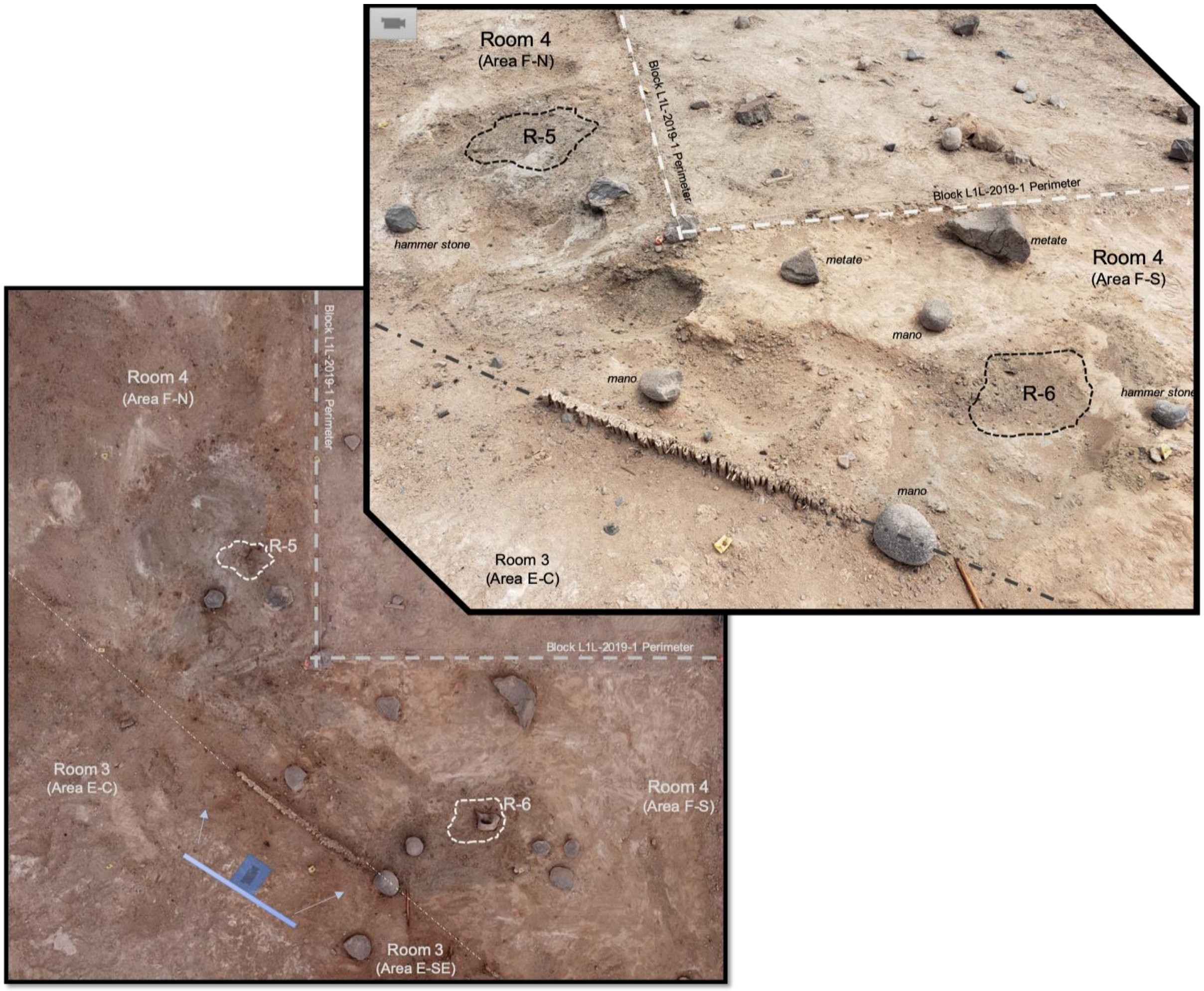


Figure 80. Detail photos centered on Area F or Room 4 within Structure L1L-1. Both the low-altitude aerial photo (lower-left) and the oblique angle shot (upper-right) clearly show the two hearth features and extensive ash and charcoal-heavy matrix and surface staining that define the area more broadly. Also visible are the multiple lithic tools that were recovered here, including multiple grinding manos, hammer stones, and a metate.

Area F - South (F-S) represents the remaining portion of Area F. F-S was 4.2m² and was only bound arbitrarily by the edge of the excavation block in the north, east, and south and by a short segment of quincha wall foundation in the north separating it from Area E-C to the west. The southern portion of F-S contained very little cultural material and was marked by gravel. However, the northern portion of F-N however was a continuance of the dense ash and charcoal deposit noted for F-N. Here in F-S this ashy lens was centered on F-6, another multiuse informal hearth. Also, present in the northern portion of F-S was a large fragment of a metate and five fragments of manos, likely in situ next to the hearth. Ultimately, 47.5 liters of sediment was excavated and fine-screened, producing 13 material specimens with three (3) 0.5 liter unsifted soil samples collected.

R-5. Rasgo 5 (R-5) was an informal hearth located in the southern portion of F-N. While relatively small (0.24m²) with no supporting infrastructure (no rock collar), R-5 was clearly heavily used, with thick layers of compacted ash and charcoal. Charred and even vitrified earth and clay were also present in and around the feature. 5 liters of sediment were excavated and screened with four (4) major specimens collected.

R-6. Rasgo 6 (R-6) was another informal hearth feature. Again, quite small (0.05m²), and the same depth as R-5 (3cm), R-6 was also without any architectural elements (stone-lining), but well-used. Also, like R-5, Rasgo 6 would contain significant amounts of ash, charcoal as well as significant amounts of charred plainware ceramic sherds, camelid bone, and a variety of both carbonized and non-carbonized macrobotanics. 7.5 liters of sediment were removed in R-6.

Area G (Structure L1L-1 - Room 5)

Only a small portion of Area G fell within the boundaries of Block L1L-2019-1, as such, less than 1m2 (0.94 m²) of this area was exposed. Only two excavation levels (Level 2 and Level 3), producing 15 liters of sediment for screening, were needed to fully excavate this area. Area G was separated into two subareas, Area G - North (G-N) and Area G - South (G-S).

Block: L1L-2019-3

Work within Block L1L-2019-3 would result in the second largest single-context area excavated at L1. In total 60m² would be exposed and approximately 945.4 liters of sediment removed and sorted as part of investigations in this block. Like it's neighboring Sector L block (Block L1L-2019-1), the architecture and associated materials would be quite well preserved in

Block L1L-2019-3, with the remains of at least two domestic structures and associated features uncovered.

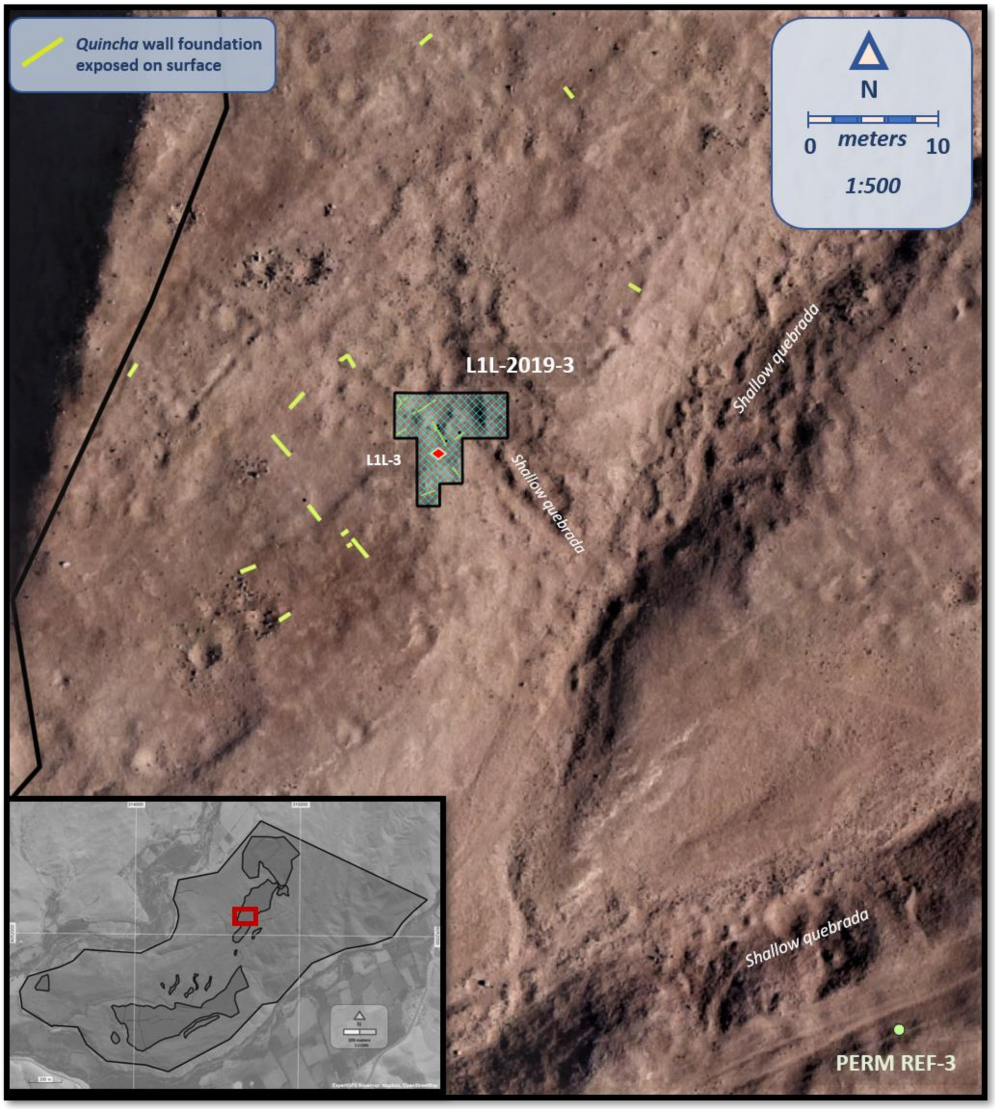


Figure 81. Orthophoto with the location of excavation Block L1L-2019-3 and associated surface features indicated.

The location for excavation Block L1L-2019-3 was selected in order to sample a domestic structure indicated by the presence of multiple small segments of quincha wall foundation as well as multiple posts. This block was also specifically positioned to sample a small portion of multiple rockpile-midden deposits. Therefore, this block was established just on the edge of one of the shallow quebradas that cut across the otherwise flat blufftop that defines Sector L. This was also just 30 meters east of the steep slope that defines the western boundary of the sector.

While Block L1L-2019-3 was quite large, only one local datum, Datum L1L-3, was needed for all elevation measurements. This would be a looped rebar[164], which was shot in using a differential GPS. The location of the datum rebar would eventually be subsumed by the excavated block. The position of the datum was preserved by leaving a baulk area of unexcavated area, measuring approximately $50cm^2$.

Arbitrary 2x2m subunits were used for Level 1, which was limited to surface collection. Predictably, only ceramics sherds were recovered in this initial collection. Surface distribution of ceramics was quite sparse, with the exception of the rockpile-midden deposits in the easternmost end of the block. In total, five short segments of quincha-style wall foundations were located on the surface in various parts of the block. While fragmented, it was clear that some of these wall foundation segments were oriented perpendicular in relation to each other. However, despite this[165] it was decided to continue using the arbitrary 2x2 meter subunits for the initial surface patina scrape.

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[164] The unit would ultimately surround the datum resulting in a baulked area (~ 50x50cm) surrounding the rebar.

[165] This was also because the potential architectural areas indicated by the quincha aligned closely with the arbitrary 2x2m subunits.

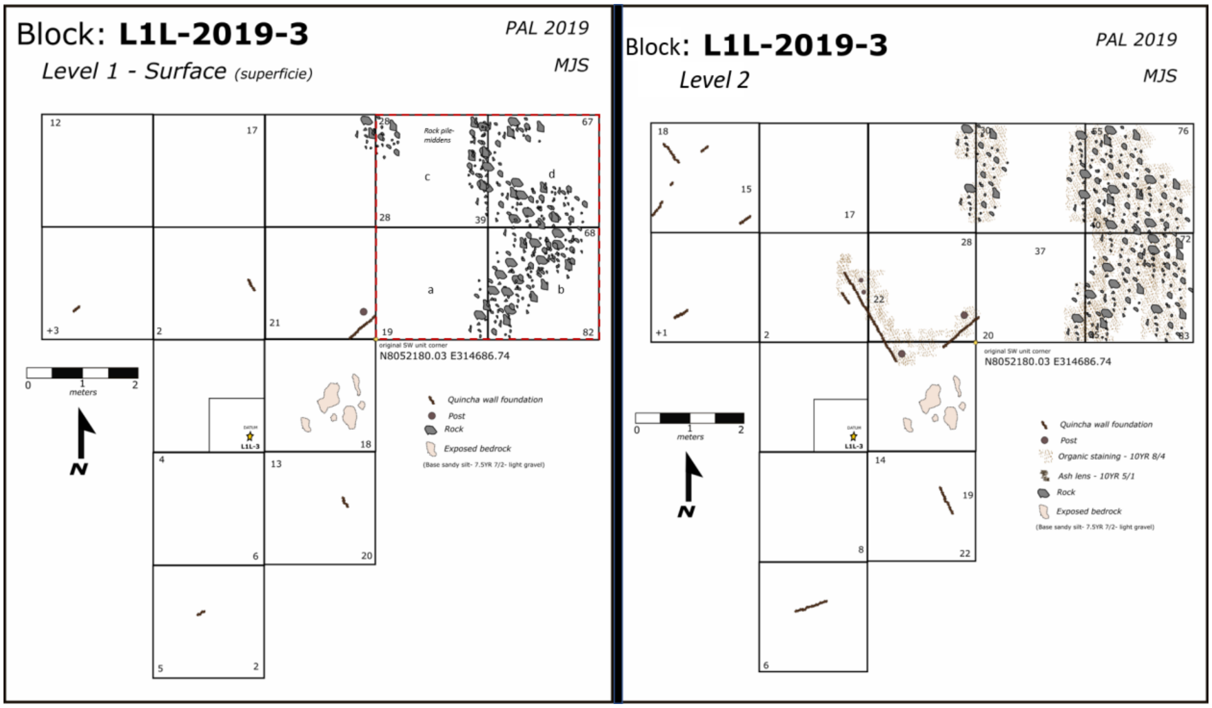

Figure 82. Plan map of (*left*) the surface (superficie) of excavation Block L1L-2019-3 - red box indicates the initial 4x4m unit that formed starting-point for the block and (*right*) the base of excavation Level 2.

The Level 2 patina scrape would produce 187.5 liters of sediment for screening and reveal more architectural remnants. Through these excavations five additional segments and three additional structural posts were exposed. Typical domestic refuse and associated materials were recovered in varying amounts. This included significant amounts of Tiwanaku-style plainware ceramic sherds and limited amounts of lithic debitage and plain-weave wool textile fragments as well as significant amounts of camelid bone, marine shell, and various botanic remains associated with both dietary and architectural uses.

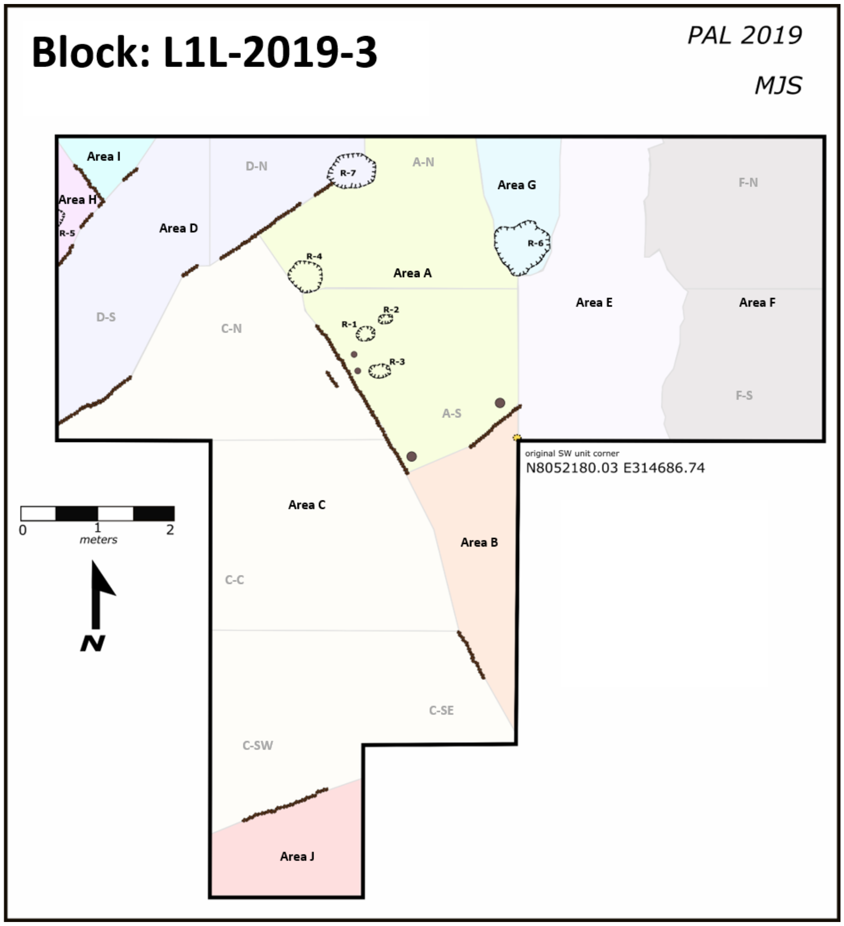

Figure 83. Major areas of excavation and features within excavation Block L1L-2019-3 (note: sub-areas in gray).

The additional architectural elements exposed in Level 2, allowed for more context-based excavation areas to be employed for the rest of excavations. In total ten (10) major architecture-based subareas (Areas A-J) were defined in Block L1L-2019-3. These areas will each be described individually below, however, level-wide trends will be detailed first.

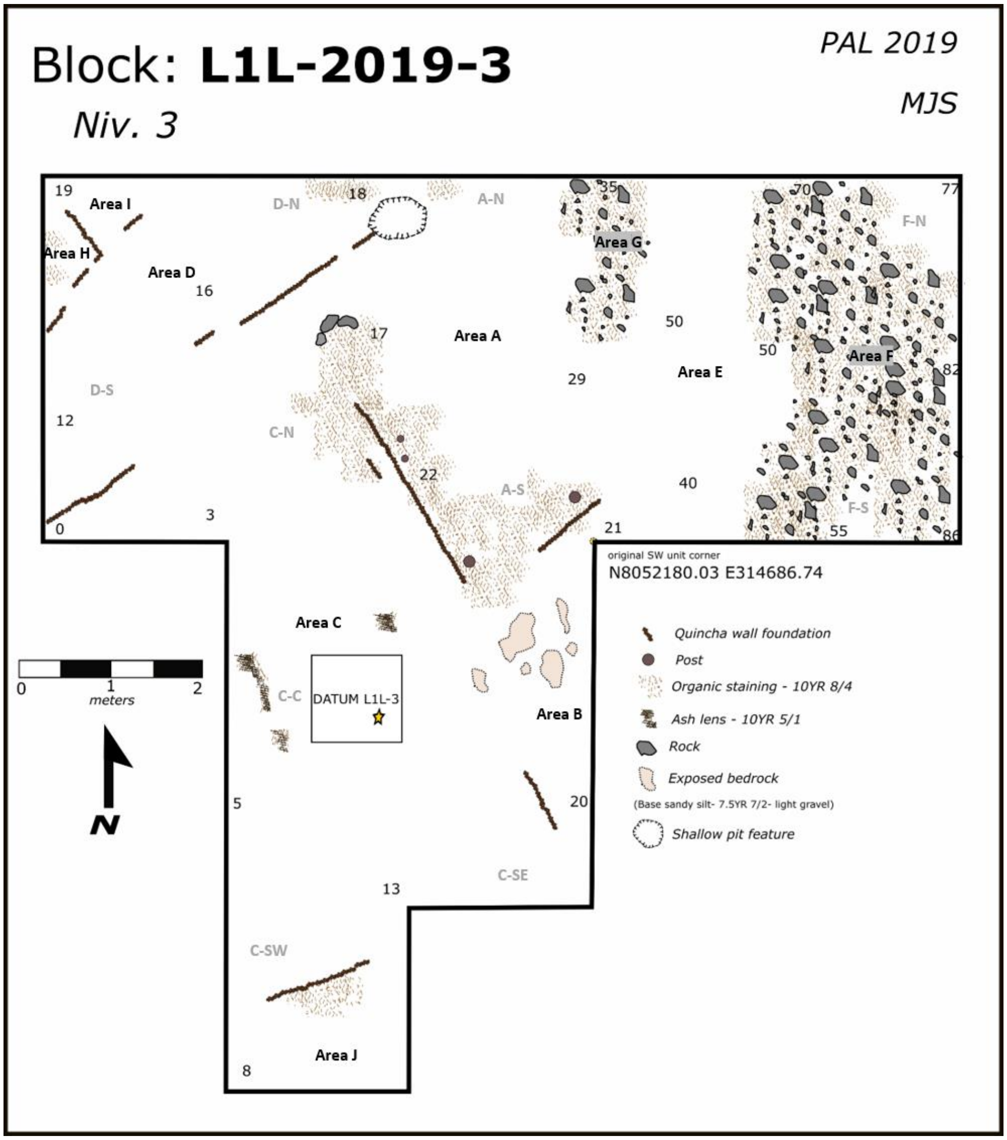

Figure 84. Base map of base of excavation Level 3 in Block L1L-2019-3.

The broader goal of excavation Level 3 was to remove remaining wind-blown sediment, pausing just above whatever remained of primary floor-associated deposits for the superpiso excavation level. Approximately 520 liters of sediment were excavated and fine-screened for cultural materials. Again, relatively typical domestic debris was recovered with particularly high amounts of Tiwanaku plainware ceramic, marine shell, camelid bone, and a variety of macrobotanical remains. While there would be a number of different contexts with specific concentrations of specific material types (see below), the most substantial concentration was the rockpile-midden deposits (Area F) in the east end of the block.

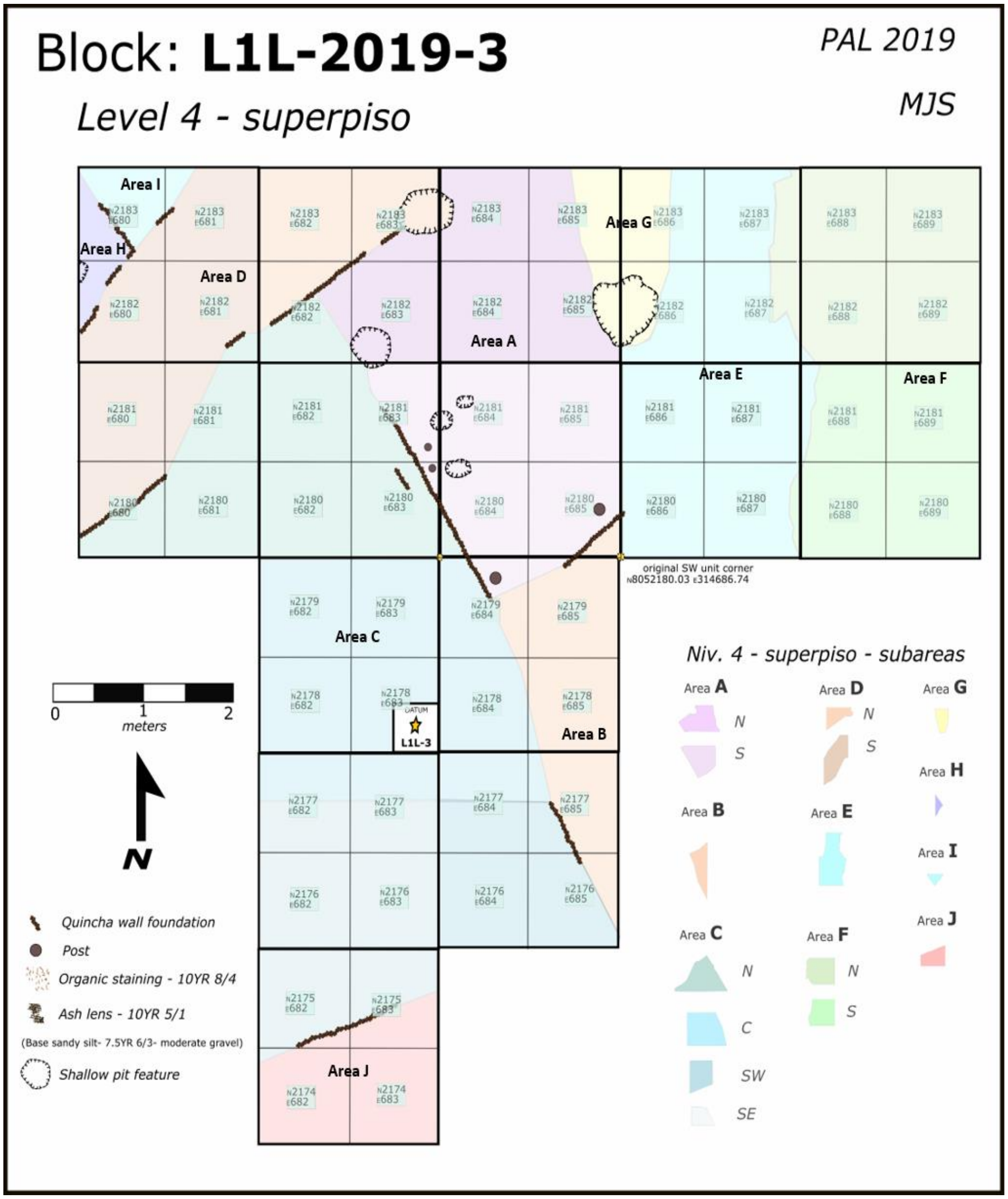

Figure 85. Level 4 - superpiso summary basemap for Block L1L-2019-3 - indicating major areas as well as subareas. Also projected here are the 1x1 meter units (note: displayed UTMs are abbreviated to last 4 digits for the northing (N 805XXXX) and 3 digits for the easting (E 314XXX)).

Level 4 would be the only superpiso excavation level for Block L1L-2019-3. The primary ten architectural areas and their internal subareas (16 total) would still be the primary contextual divisions, but following superpiso protocol, 60 arbitrary 1x1 meter subunits were also utilized for additional contextual control. Thus, in total (including the 7 formal features) there would be 92 individual contexts investigated as part of the Level 4 - superpiso excavation in L1L-2019-3.

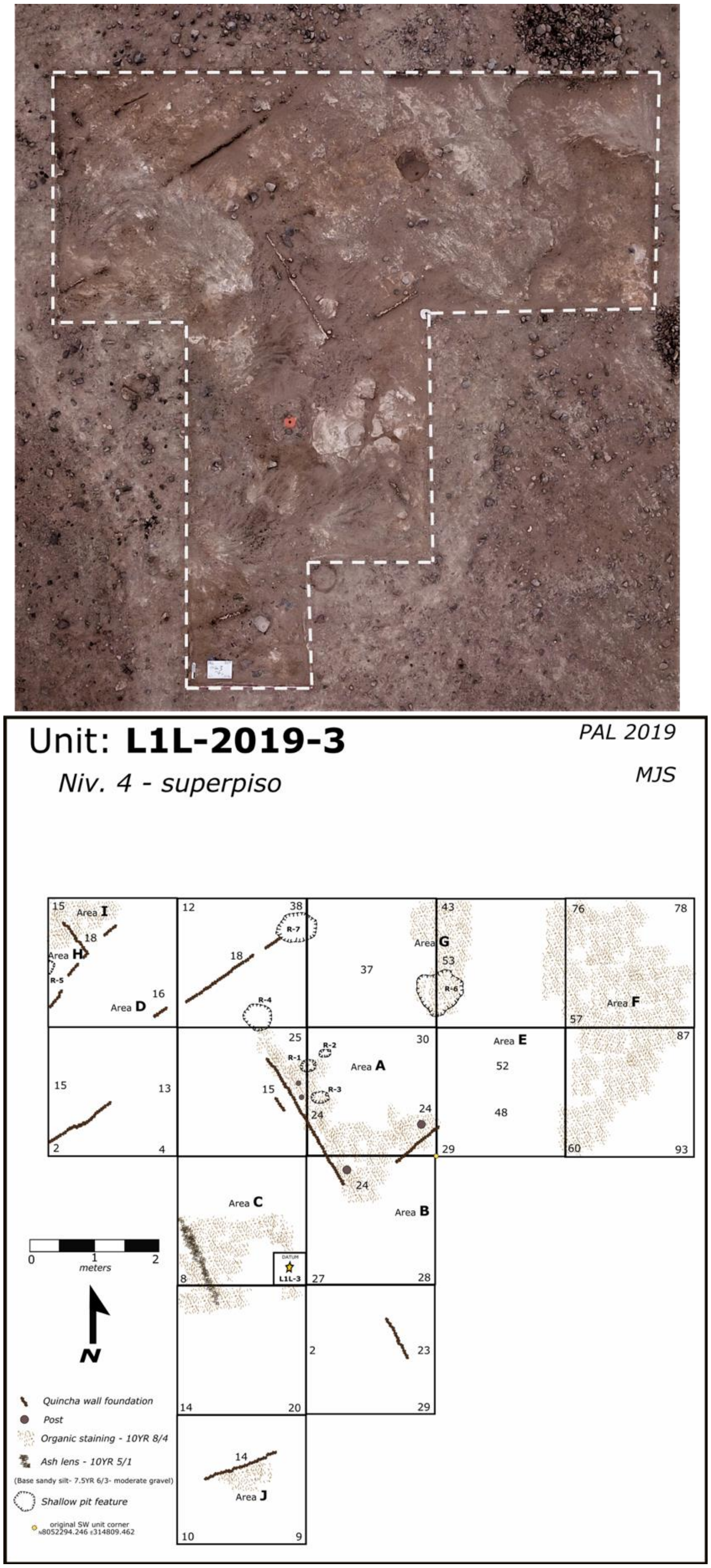

Figure 86. Base plan map and UAV photo of the base of Level 4 in Block L1L-2019-3. This was the superpiso level, associated with primary architectural use and the final full block excavation level.

As noted above, the architectural remains in Block L1L-2019-3 represent at least two separate structures with at least one additional major context cluster in the rockpile-midden deposit, also already noted above. Preservation throughout the various subareas was variable, there were no formal, prepared architectural floors exposed anywhere. Ultimately, Level 4 produced approximately 237.9 liters of excavated sediment which was all fine-screened. Material inventories for each subarea grouping would differ quite greatly, but typical domestic refuse defined all assemblages. Plainware ceramic sherds, camelid bone, marine shell, crustacean remains, and a whole variety of macrobotanics would dominate the overall assemblage. The highest densities of materials were associated with the rockpile-midden deposits, but other pockets of materials were often identified associated directly with the various quincha wall foundation segments. Finally, 26 0.5-liter soil samples were collected from selected contexts for future microanalysis.

Below I provide a more in-depth contextual description of each major area delineated in Block L1L-2019-3. Here, I also introduce each area's more interpretive designation where I distinguish between architectural rooms (e.g., *Room XX*) associated with Structure L1L-1 and non-architecturally bound spaces (e.g., *Exterior*).

Area A (Structure L1L-2 - Room 1)

Area A, or Room 1, was one of the major architectural areas, associated with Structure L1L-2 in Block L1L-2019-3. Well-preserved quincha wall foundations suggest that Area A was likely not fully walled, but rather had quincha walls on three sides, but despite only being partially enclosed was also roofed. Ultimately Area A would have acted as the back/front porch of Structure L1L-2, facing the shallow quebrada that borders the structure to the northeast. Multiple, small informal pit features here suggest this area was used for a variety of domestic tasks. Just two excavation levels (Level 3 and Level 4-superpiso) were directly associated with

Area A, totaling 76.65 liters of sediment for fine-screening. 55 individual material specimens were collected from these excavations in Area A. In order to provide contextual control, Area A was arbitrarily separated into two subareas: Area A - North (A-N) and Area A - South (A-S).

Area A - North (A-N) comprised the northern 4.5m² of Area A. This northern portion of Area A was less architecturally complex than the southern half but was bound in on the northwestern edge by preserved quincha wall foundation. The quincha wall segment that would frame in A-S were not present here. The eastern edge of A-S would be marked by the rockpile-midden deposit that is designated Area G. Two shallow pit features (R-4 and R-7) were excavated as part of A-N Level 4-superpiso excavations. When compared to A-S (see below) cultural materials were far less dense but just as variable here, in addition to the fill be far more loose with higher sand content. Materials here were typical domestic refuse. Plainware ceramic sherds, marine shell, and various macrobotanical remains were best represented in the 27 material specimens that were cataloged from the 35 liters of sediment sorted for this subarea. Just one (1) 0.5-liter unsifted soil sample was collected for future analysis.

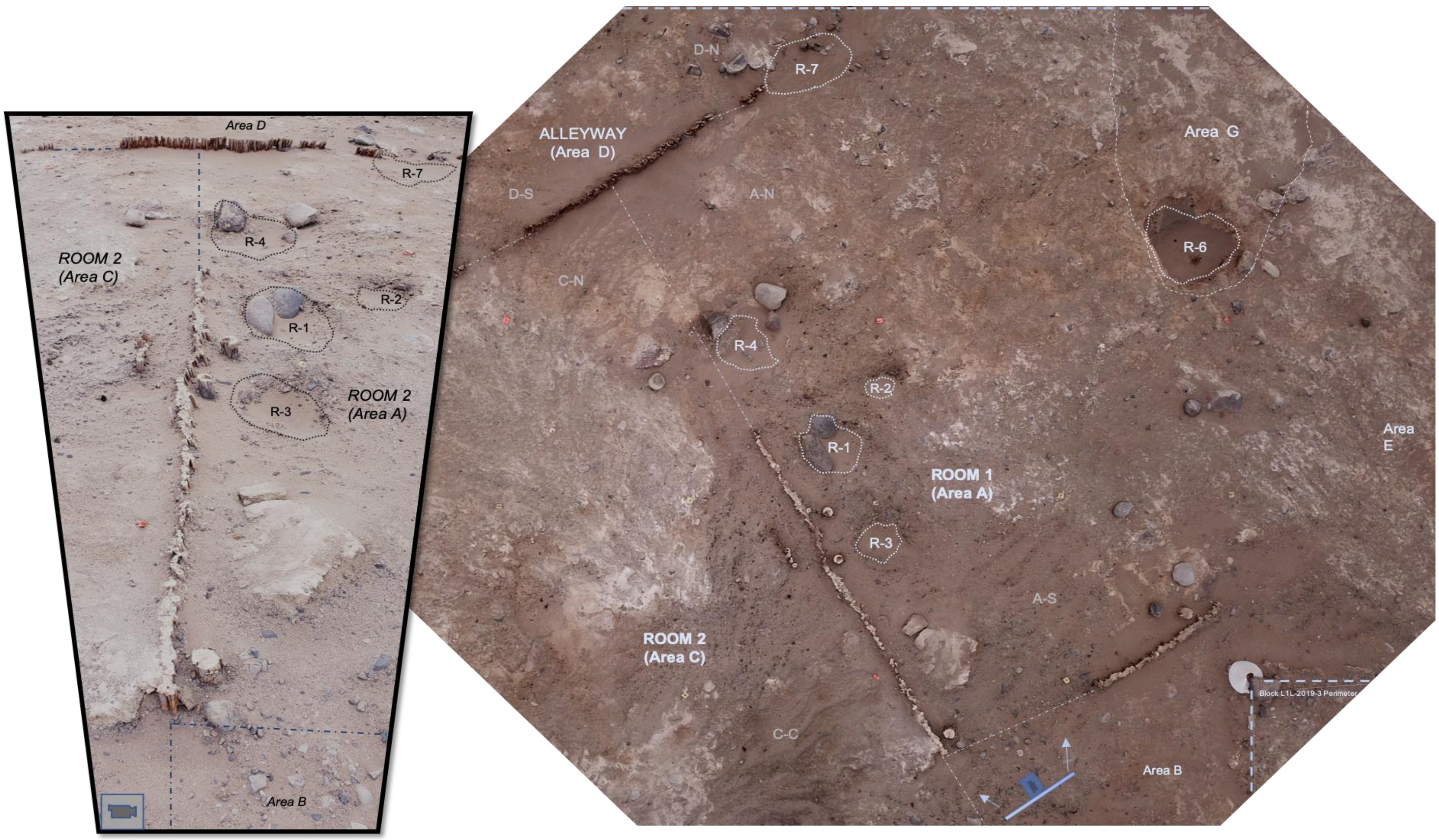

Figure 87. Detail photos centered on Area A or Room 1 in Structure L1L-2.

At 5.2m², Area A - South (A-S) was slightly larger than its northern counterpart (A-N), but far more architecturally complicated. A-S was only partially bound on two sides (the southwest and southeast) by quincha wall foundations, running perpendicular from each other. However, A-S would also include four different posts associated with these quincha wall segments[166]: one post (dia. ~15cm) at the northeastern end of the southeastern quincha wall segment, which separated A-S from Area B, one post (dia. ~13cm) at the southernmost end of the southwestern quincha wall, and two more slightly smaller posts (both dia. ~9.5cm) just 10cm apart from each other situated more towards the northern end of the same wall foundation segment. While the matrix encountered in subsurface excavations (Level 3 and Level 4-superpiso) were more compacted to that encountered in A-N there was still no clear examples of preserved floor in A-S. In fact, much of the final excavation level, Level 4-superpiso, was marked by a gravel-heavy sand with relatively little cultural material. Three, shallow and relatively small informal pit features were exposed clustered together just east of the two posts at the north end of the southwestern quincha wall segment. In approximately 41.65 liters of fine-screened sediment 29 major material specimens were collected. As with A-N, these materials represented typical domestic refuse, with plainware ceramic sherds, plain-weave wool textile fragments, fragments of crustacean shell and fish bone, and a variety of macrobotanic remains were the best represented materials.

R-1. Rasgo 1 (R-1) was a small (25x25cm) and shallow (~6cm deep) pit feature located just 30cm east of the southwestern quincha wall. R-1 was also directly associated with R-2, just centimeters to the east and R-3 just 30cm to the south. Rasgo 1 appeared relatively roughly dug, however two medium-sized cobbles situated directly at the upper rim of the feature suggest this pit may have had a partial collar. The fill of R-1 was relatively loose wind-blown sediment with moderate amount of material. In just 2.5 liters of screened sediment 6 major material

[166] All four of the posts would be between 14.5 and 18.5cm from the quincha wall foundations.

specimens were collected, including plainware ceramic sherds, fish bone, crustacean shell, and various botanic remains. One 0.5-liter soil sample was collected for microanalysis.

R-2. Rasgo 2 (R-2) was a small pit feature (10x10cm) just adjacent to the east of R-1. Also, roughly dug and shallow (~7cm deep), R2 was likely used for informal storage or refuse disposal. The matrix of R-2 was similar to R-1 but contained more flecks of charcoal and other carbonized material. Just 1.65 liters of sediment were extracted from R-2 with just four specimens identified, included guinea pig coprolites, marine shell, and botanics.

R-3. Rasgo 3 (R-3) was also part of the pit cluster with R-1 and R-2, located just 30cm to the south. R-3 was also quite small (~20x20cm) but at 13cm in depth, was a but deeper than the other features. This feature contained the least amount of cultural material, with the 2.5 liters of screened sediment only yielding four specimens. However, some of these specimens were relatively unique, including a small feather and multiple Tiwanaku-style redware sherds from a kero.

R-4. Rasgo 4 (R-4) was another shallow pit feature, located in the southwestern corner of A-N, just inside where the southwestern quincha wall foundation, that separates Area A from Area C, would need to cross to meet the perpendicular quincha wall foundation that separates A-N from Area D-N. At 40x40cm, R-4 was a bit larger than the cluster of pits (R-1, R-2, R-3) just 0.75 meters to the south in A-S. In the 2.5 liters that were fine-screened from Rasgo 4, six (6) major specimens were collected, with significant amount of plainware ceramic sherds making up the assemblage. A 0.5-liter soil sample was collected for future micro-sorting and analysis.

R-7. Rasgo 7 (R-7) was the final pit feature associated with Area A. Unlike the other four features found in Area A, R-7 was likely a disturbance feature, involved in dismantling the structure. This was surmised to be the case given R-7 directly interrupts the otherwise well preserved and complete length of quincha wall foundation, that separates Area A-N from Area D-N, also the northmost wall of Structure L1L-2. This 50x60cm roughly dug pit, appears to have been at least partially established to dislodge a large post that likely marked the end of the original wall segment. This would make the architectural pattern here, similar to that observed in the southern wall segment and associated post that marks the southern boundary of A-S. In the 5 liters of fill sediment removed from R-7 a significant amount of refuse was present, resulting in six (6) major material specimens, including relatively large quantities of plainware ceramic sherds, guinea pig coprolites, crustacean shell, and camelid bone.

Area B (exterior)

Area B was believed to be an exterior area, that showed very little evidence for direct use. This area was separated from Area C to the west by a short segment of quincha wall foundation as well as Area A to the north by a short segment of wall foundation. The 3.5m² area that comprised Area B was largely covered by sections of exposed bedrock[167]. Interestingly, the most substantial exposure of bedrock would have interrupted the wall that presumably separated Area B from Area C. In total, only 8.5 liters of sediment was removed from the two excavation levels that were needed to fully complete explorations in Area B. Only nine (9) specimen lots were needed for this area, in which plainware ceramic sherds, fish bone, marine shell, rodent bone, and guinea pig coprolites were some of the most represented material types.

Area C (Structure L1L-2 - Room 2)

Area C was the largest single area (19.9m²) and likely the only fully-enclosed architectural space of Structure L1L-2, exposed in Block L1L-2019-3. Overall, Area C, later designated Room 2, was an open architectural space, and enclosed on three sides (north, east, and south) by quincha walls. Almost directly in the middle of Area C (specifically in C-C) was the primary datum used for Block L1L-2019-3 (Datum L1L-3), so a 50x50cm block surrounding the datum was left unexcavated in this particular area. Approximately 207.5 liters of sediment were

[167] As noted in other locations at L1, this bedrock was a porous limestone. These are often accompanied, as they were here in Area B, with deposits of calcium carbonate and other leaching minerals.

extracted from Area C, which included the collection of 52 major material specimens. Three principal subareas were used for contextual control in the two excavation levels (Level 3 and Level 4-superpiso) that targeted this area: Area C - North (C-N), Area C - Central (C-C), and Area C - South (C-S).

Area C - North (C-N) represented the northernmost 6m² of Area C - bound on the north and east by fragmentary sections of quincha wall foundation. The relatively well-preserved section of quincha foundation that divides C-N from Area A-S contained an interesting feature, a second segment of quincha, running parallel with the other. Interestingly, this supporting segment of quincha, while only 27.4cm in length, is directly opposite the primary quincha wall foundation as the paired posts in A-S. The 72.5 liters of sediment removed in the two excavation levels in C-N was largely a silty sand mix with significant densities of small to medium angular gravel in the lower strata. While cultural materials would taper off significantly in the final superpiso level, a fair number of cultural materials were represented here. In total, 21 major material specimens, including plainware ceramic sherds, fish and camelid bone fragments, marine shell, and various botanical materials. Finally, two (2) 0.5-liter soil samples were collected from select 1x1m units in Level 4 for future analysis.

To the south Area C - Central (A-C) was the largest subarea component of Area C (7.1m²). E-C fell between the present quincha wall segments, so the boundary between Area A-S and Area B to the east. As noted above, Datum L1L-3 and the baulk left around it was located in the center of this subarea. While no formal features were designated here, a clear stain, located along the western edge of the subarea and entering the western block profile, likely represented a temporary hearth location was located here. In the fact the matrix throughout Area C-C contained a significant ash content as well as fragments of burnt and even vitrified sediment. From the 57.5 liters of sediment excavated and fine-screened, 15 specimens were extracted. Of these, charcoal, plainware ceramic sherds, and twisted wool cording. Finally, two (2) 0.5-liter soil samples were collected from select 1x1m units in Level 4 for future analysis.

Finally, Area C - South (C-S represents the southernmost 6.8m² of this architectural area. The final excavation level (Level 4-superpiso) would excavate this subarea as two subareas (Area C - Southwest (C-SW) and Area C - Southeast (C-SE)), but ultimately count all materials together. C-C was separated from Area J to the south and Area B to the east by short segments of surviving quincha wall foundation. Overall, cultural materials were quite sparse here. Fine-screening approximately 87.5 liters only yielded 16 material specimens that each contained relatively few individual material fragments. Just one (1) soil sample (0.5 liters) was collected from subarea C-C.

Area D (alley)

Area D represented a relatively narrow (~1.5m[168]) exterior space that separated Structure L1L-2 in the south from Structure L1L-3 to the north. Area D was subdivided into two areas, Area D - North (D-N) and Area D - South (D-S). Both subareas contained very little materials overall, with only 20 specimens collected between both. Area D-N was relatively loose and silty fill. Conversely, D-S, which covered the slight rise that Block L1L-2019-3 more generally occupied, was far sandier with heavy amounts of gravel. Ultimately, 62.5 liters of sediment were removed and fine-screened, with two 0.5-liter soil samples reserved for future work.

Area E (exterior)

Area E was the designation for the exterior space that covered just over 6.5m² of the slight slope that separated Area A and the rest of Structure L1L-2 from the rockpile-midden deposits to the northeast on the slope (Area G) and at the bottom of the shallow quebrada (Area

[168] This narrow alley between these structures ranges between 1.4 and 1.69 meters in width.

F). Area E would ultimately prove to be extremely sparse in terms of material culture. In the approximately 40 liters of sediment removed here, only nine (9) specimens were collected, included a single soil sample (0.5 liter) for future analysis.

Area F (exterior)

Area F represented the dense rockpile-midden deposits that covered the majority of the quebrada bottom that fell within the far eastern end of Block L1L-2019-3. These deposits were composed of hundreds of small to large cobbles and large gravel piled haphazardly over approximately 4.32m² of area. These stones, which all appear to have been collected from the surrounding natural surface liter, were intermixed with extremely dense amounts of material culture. In fact, within these deposits as well as the area directly surrounding them, domestic debris and associated materials made up the majority of the matrix. In total 27.24 kilograms of materials, cataloged into 36 major specimens were collected in Area F. Most materials were typical domestic debris observed elsewhere, just in much higher amounts. Here, this included large quantities of Tiwanaku plainware ceramic fragments, lithic debitage, camelid bone, plain-weave wool textile fragments, vegetable-fiver cording, maize cobs, wood fragments, and a whole suite of other macrobotanical remains. More unique finds were also recovered here, including a significant amount of decorated Tiwanaku redware ceramic sherds, a wooden spoon, several fragments of cotton netting, carved wooden net floats, and a small fragment of an embroidered four-cornered hat.

For contextual control Area F was split into two subarea, Area F - North (F-N) and Area F - South (F-S), but there were few internal distinctions noted between these subareas or even within the deposits themselves. The two arbitrary excavation levels here were used to carefully pull away stones, attempting to note any internal differentiation suggesting clear episodes of refuse disposal. While materials had settled with finer fragments, seeds, and other smaller materials sifting to the bottom of the piles, there were no clear depositional strata. This would suggest either the rockpile middens were deposited all at one or gradually over time. The latter is the most likely scenario given the great variety of materials present. Ultimately 220 liters of sediment and the equivalent of 125 liters of small cobbles were removed from the total of Area F.

Area G (exterior)

Sharing the same gradual hillside as Area E, Area G is a small rockpile-midden deposit. This deposit covered just over 2m² before entering the northern profile of the excavation block. Like the deposits described in Area F, here the medium to small cobble were piled relatively haphazardly, though despite being more deflated, the Area G rockpile was far more discrete than the sprawling deposits that defined Area F. Ultimately the Area G deposit would prove to be domestic refuse that continued to be piled over a filled pit feature (R-6). Area G was excavated in two levels though no stratigraphic distinctions could be made. In total, 40 liters of sediment were removed and fine-screened, and about 17.5 liters worth of small-medium cobbles were also removed. 23 major specimens were located and while this deposit was not as dense with material culture as Area F, there were still very dense amounts of plainware ceramic sherds and botanical remains.

R-6. Rasgo 6 (R-6) was informal pit feature that was exposed under the rockpile-midden deposit that defined Area G. This pit was approximately 65x70cm and 13cm in depth was very roughly dug. The primary purpose for the pit appears to have been refuse dispose. Like the overlying midden deposit here significant amounts of plainware ceramic sherds and botanical remains dominated the five (5) major specimens collected. In total, five liters of sediment and 2.5 liters equivalent of cobbles were removed from R-6.

Area H (Structure L1L-3 - Room 1)

Area H was one of just two very small spaces that were excavated in second structure to fall within Block L1L-2019-3, Structure L1L-3. Just over 0.5m² of area of Area H or Room 1 was excavated here, representing what would have been the southeast corner of the room. Both the quincha wall foundation segments that separated Area H from the other Structure L1L-3 room exposed, Area I-Room 2, and the segment separating Area H from the Area D alley were almost completely present. Only 8.75 liters of sediment were removed here, producing just 12 specimen collections. Significantly, the faunal assemblage here was dominated by a variety of marine shell species and also included fish bone. A single 0.5-liter soil sample was collected for future microanalysis.

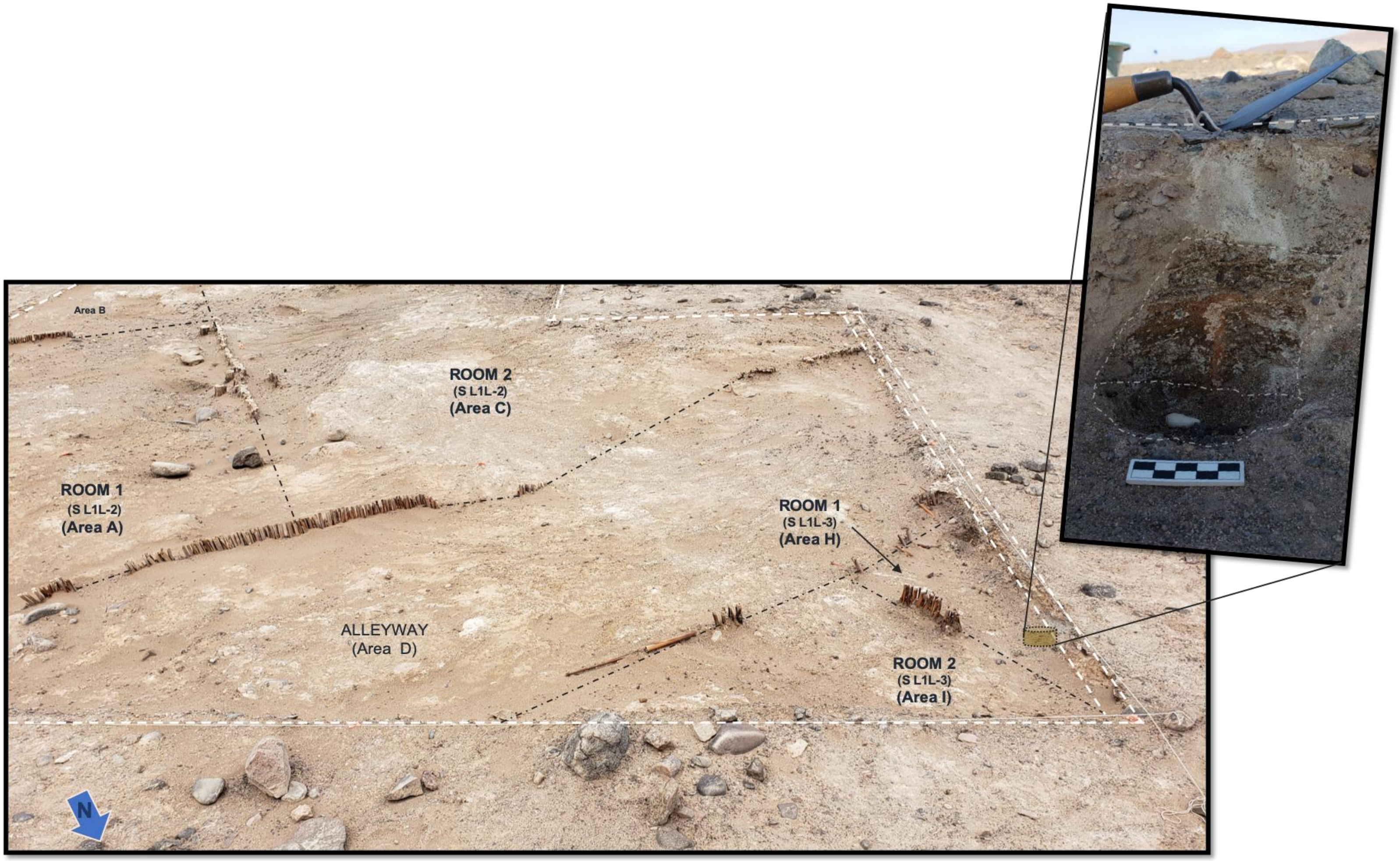

Figure 88. Detail view of Block LiL-2019-3 from the north, looking south. Closest are the two small portions of Room 1 and Room 2 from Structure L1L-3, including an inset of Rasgo 5 (note the olive shell at the base of the feature). Also, clearly depicted are the northernmost portions of the rooms from Structure L1L-2 and the Area D alleyway that separates the structures.

R-5. Rasgo 5 (R-5) was a small, carefully dug pit feature located in Area H. The pit was generally cylindrical measuring 10cm in diameter and going to a depth of just over 4cm. The fill of the feature was a homogeneous sandy silt that was almost entirely culturally sterile. Significantly, the exception was a single, complete oliva marine shell. Given the presence of marine shell in the primary occupational surface it is difficult to tell discern if this was an intentional offering or not. However, the fact that the shell was found placed evenly on the pit base, combined with the homogeneous fill does suggest intentional placement and covering of the shell.

Area I (Structure L1L-3 - Room 2)

Area I was the second architectural space exposed in Block L1L-2019-3 that was part of Structure L1L-3. Like the neighboring Area H to the west, only a small portion of Area I (0.61m²) was exposed here. This small space would have represented the southwest corner of Room 2, as Area I would be designated. Most of the quincha wall foundations marking the western and southern walls were still present. In the approximately 20 liters of sediment excavated in Area I, 10 specimens were collected. These materials consisted of plainware ceramic sherds, fish bone, marine shell, crustacean shell fragments, and a variety of seeds and other botanic remains. One (1) 0.5-liter soil sample was collected in this area.

Area J (exterior)

Area J was the southernmost space excavated in the block and likely represented an exterior space south of Structure L1L-2. Area J covered 2.3m² of area and was bordered to the norther by a quincha wall foundation segment that separated it from Area C-S. The matrix of Area J was relatively loose and had significant amounts of degraded rock. Cultural materials were relatively sparse, except for right up against the quincha wall segment. Ultimately, 8 specimens were collected after fine-screening 27.5 liters of removed sediment.

Block: L1A-2019-2

At 24m², excavation Block L1A-2019-2 was the largest single excavated context in Sector A. In total approximately 635 liters of sediment were excavated for fine-screening, resulting in the collection of 251 major material specimens across 44 primary loci. Ultimately Block L1A-2019-2 would expose a badly disturbed cobble stone and adobe brick platform - likely part of a minimal but formal suite of architectural elements associated with the central plaza at the center of Sector A domestic occupation.

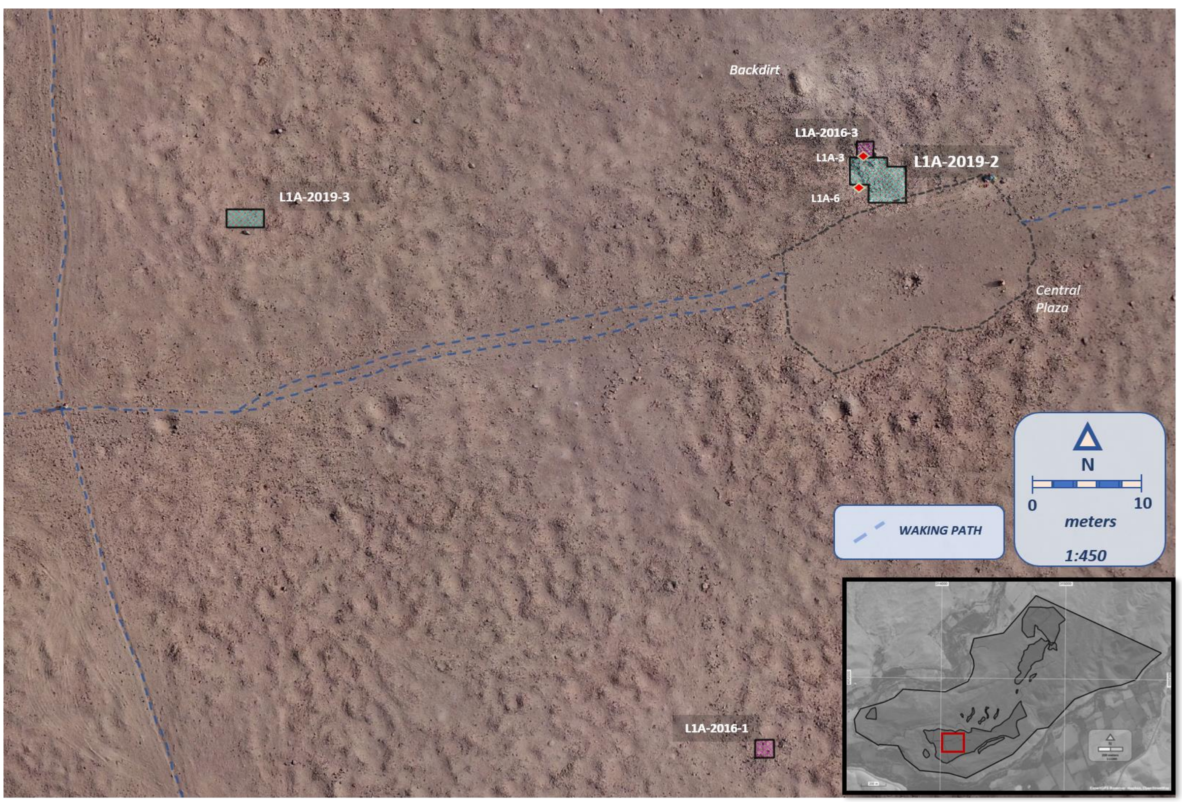

Figure 89. Orthophoto of the central portion of Sector A with Block L1A-2019-2 and associated features and excavation blocks/test units indicated.

Block L1A-2019-2 would be the only excavation block to expand directly on the 2016 test units - extending south from Unit L1A-2016-3. As noted above, while located in the center of the broader Sector A domestic sector, this block would specifically target a non-domestic context. This context would center on a relatively low-lying (less than 0.5 meters in height) and small (roughly 3x4 meters) mound feature, located just over five meters north of the central plaza in Sector A. As noted above and discussed below, this feature would prove to be severely disturbed. However, from what remained, it appears the feature represents a relatively small cobble stone and adobe brick platform structure, that was almost certainly directly associated with activities that took place in the central plaza.

Because Block L1A-2019-2 expanded directly from the formally excavated test Unit L1A-2016-3, the datum L1A-3 was reused for assessing the elevations in initial excavation levels in the new block. This datum was a large cobble that fell within the block and would ultimately be removed as part of excavations. Datum L1A-3 would be replaced by Datum L1A-6 - another large cobble, but this time outside the block (just to the west of the initial block parameters). In addition, before beginning excavations in Block L1A-2019-2, the backfilled sediment was removed from the southern half of previously excavated Unit L1A-2016-3. This was done to expose the previously excavated unit's southern profile and specifically the adobe bricks that protruded from that profile. This would be used as an essential reference in setting the constraints to excavation levels in Block L1A-2019-2.

Excavation Level 1 in Block L1A-2019-2 would act as a surface collection. Here all materials that were directly exposed on the surface were collected. For this process arbitrary 2x2 meter units were utilized[169] for contextual control. Overall cultural materials were relatively sparse with only plainware ceramic sherds recovered, with the 2x2m units closest to the central plaza and furthest from the adobe feature yielded the highest number of sherds.

[169] As can be noted in the base maps, Block L1A-2019-2 contains rare1x2 meter subunits in the north - this was due to a slight miscalculation of exactly one (1) meter, while establishing the block with the differential GPS.

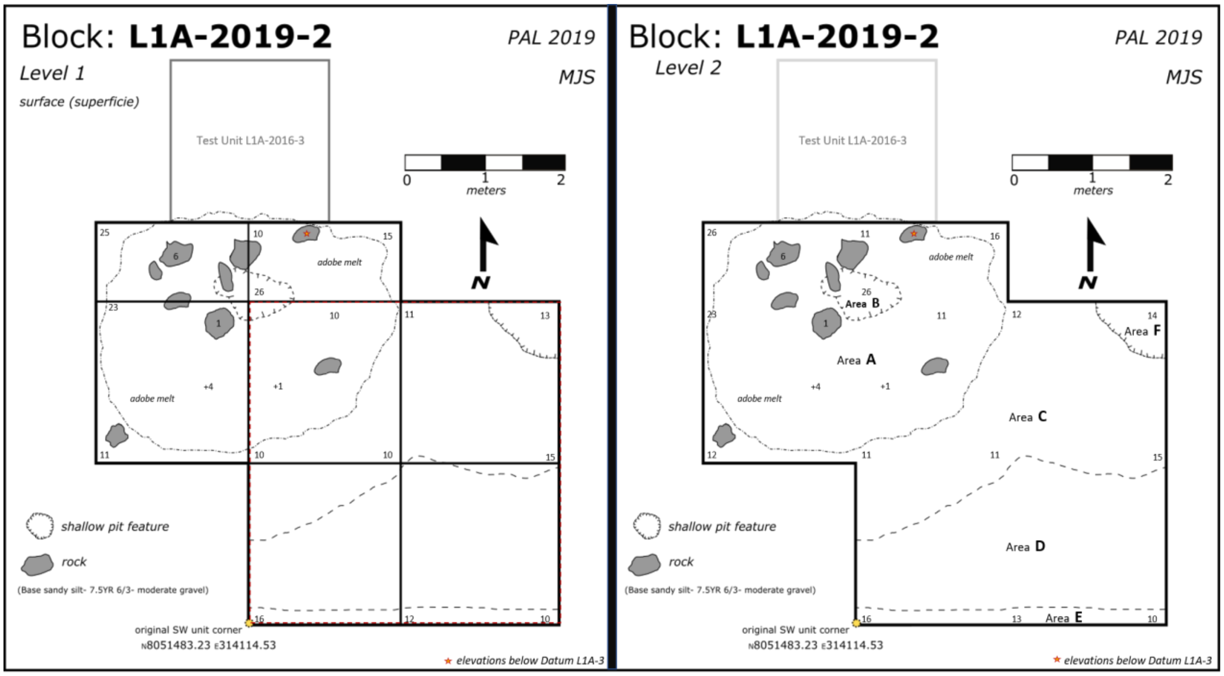

Figure 90. Plan-view base maps of Level 1 (surface) and Level 2 in excavation Block L1A-2019-2.

From Level 2 onwards context-based areas were used to dictate excavations. In total six areas were initially defined (Areas A-F) with subareas used to further subdivide these areas for more contextual control when needed. As with previous blocks these areas are discussed individually below, but first I highlight some block-wide patterns as they occurred level-by-level.

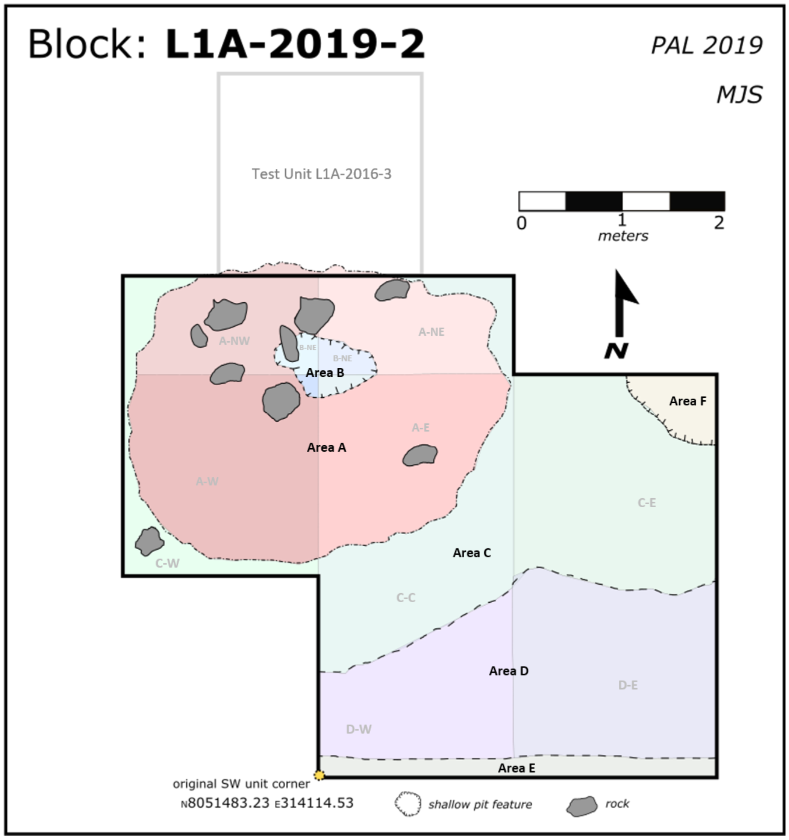

Figure 91. Basic plan-view of excavation Block L1A-2019-2 with major excavation areas (Areas A-F) indicated (note: sub-areas in gray).

As with other blocks, Level 2 in Block L1A-2019-2 would be the first formal subsurface excavation level. This would be a relatively shallow level - used primarily to remove the relatively thin but ubiquitous sunbaked surface patina. However, the thickness would be quite variable depending on the area. For instance, Level 2 in Area A, which represented the remnants of the architectural feature, would remove less than one centimeter of sediment before hitting a strata of adobe melt. However, most areas would have 1-2 centimeters of sediment removed. Taken together excavations in Level 2 would produce approximately 95 liters of sediments to be fine-screened, which yielded 57 material specimens.

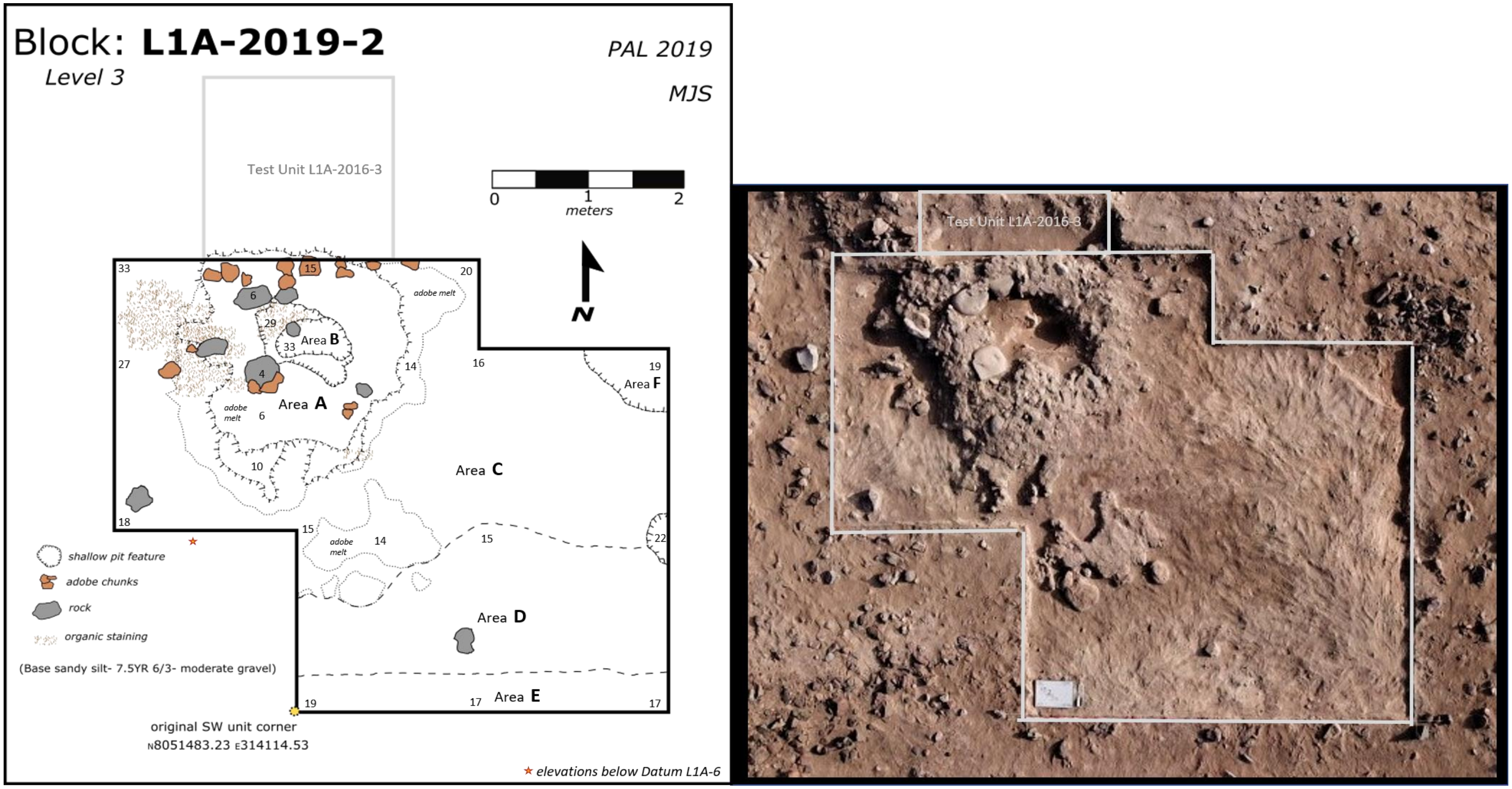

Figure 88. Detail view of Block Figure 92. Plan-view base map (left) and overhead photo (right) of the base of excavation Level 3 in Block L1A-2019-2.

Again, like many of the other excavation blocks, Level 3 in Block L1A-2019-2 would work to remove the most substantial layer of wind-blown sediment. However, unlike other blocks, a significant goal in this block would be to further define the adobe melt and even semi-articulated bricks and chunks associated with the central architectural feature (Area A). In total approximately 330 liters of sediment were removed and fine-screened as well as approximately 5 liters of small adobe fragments and 20 liters worth of small cobbles and large gravel. A number of medium to large cobbles would also be removed - including the cobble used as Datum L1A-3. This would produce 99 material specimens, including some important spot finds, such as a large intricate basket and a significant portion of a textile 4-cornered hat (see below).

A few areas (Area B, Area C-E, Area E) would be completed with Level 3, but all others would receive a Level 4 and even Level 5. While major areas would remain the same for these additional levels, there would be refinements made to their boundaries (Figure 93). In addition, both additional excavation levels would be considered superpiso levels and therefore in addition to area and subarea distinctions, the excavated contexts would also be limited by arbitrary 1x1 meter subunits. Between 12 subareas further subdivided by 24 1x1 meter - 35 individual contexts would be sampled in these superpiso levels.

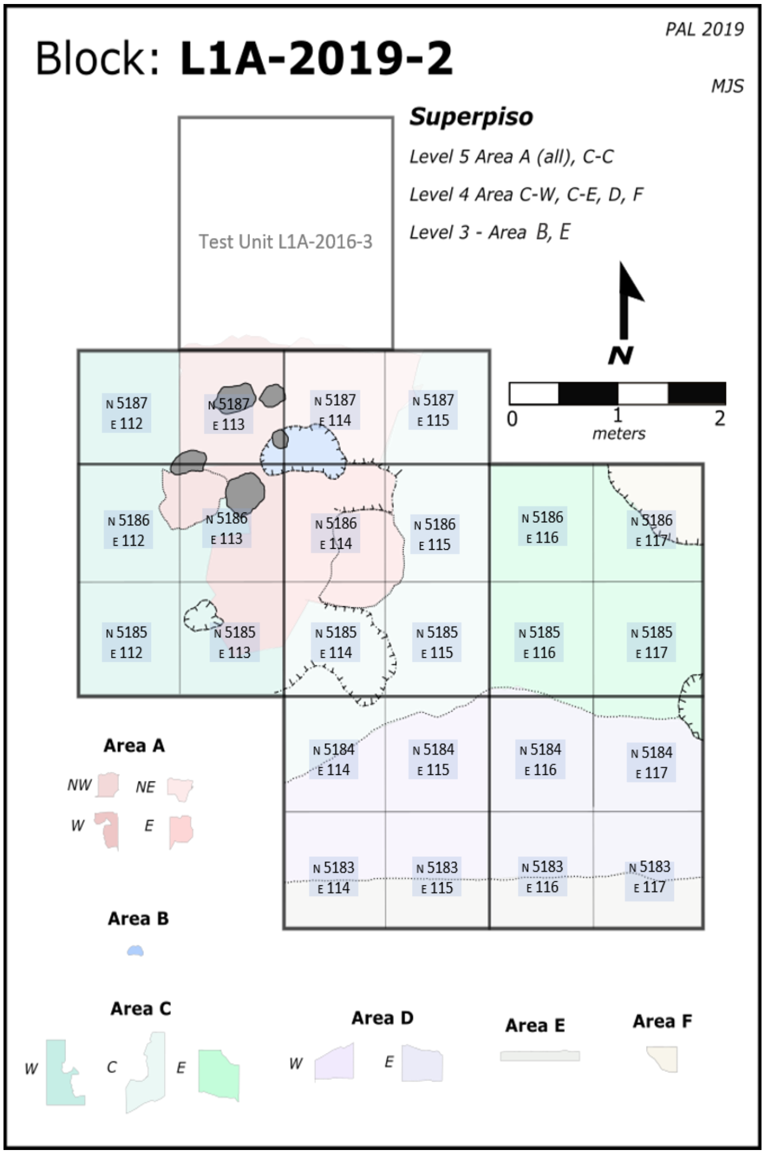

Figure 93. Level 4 and Level 5 - superpiso summary base map for Block L1A-2019-2 - indicating major areas as well as subareas. Also projected here are the 1x1 meter units (note: displayed UTMs are abbreviated to last 4 digits for the northing (N 805XXXX) and 3 digits for the easting (E 314XXX)).

Level 4 would be quite different for each context which was excavated. It would be the final excavation level in Area D and Area F as well as part of Area C (C-W). In these areas a final layer of wind-blown sediment would be removed. However, in Area A and part of Area C (C-C) the majority of Level 4 would focus on removing all adobe melt, only leaving semi-articulated bricks and fragments which appeared to be on the original occupational surface. Most additional cobbles would be removed, again only leaving those that appeared to be on the original occupational surface. Unfortunately, even after removing the melt and other debris, there was very little sign of articulated architecture. All together approximately 165 liters of sediment were excavated and fine-screened for materials. In addition to approximately 50 liters worth of small adobe fragments and the equivalent of 7.5 liters of small cobbles and large gravel. A total of 55 major material specimens were collected.

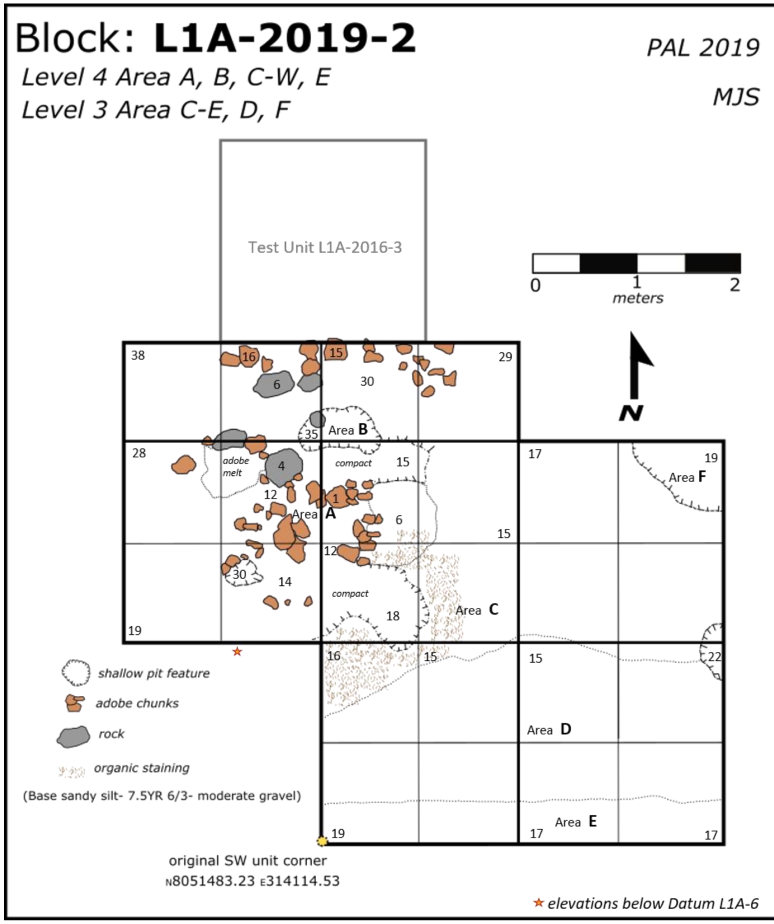

Figure 88. Detail view of Block Figure Figure 94. Plan-view base map (left) and overhead photo (right) of the base of excavation Level 4-superpiso in Block L1A-2019-2.

Level 5 would be limited to Area A and part of Area C (C-C) and would almost exclusively involve removing the last remaining adobe chunks, cobbles, and any remaining sediment and cultural debris. This would reveal a heavily compacted surface but no clear indication of a formal architectural foundation for the Area A architectural feature. These limited excavations would produce approximately 45 liters of sediment to be fine-screened and an additional 22.5 liters of adobe fragments. Collectively, 34 major material specimens were collected in Level 5.

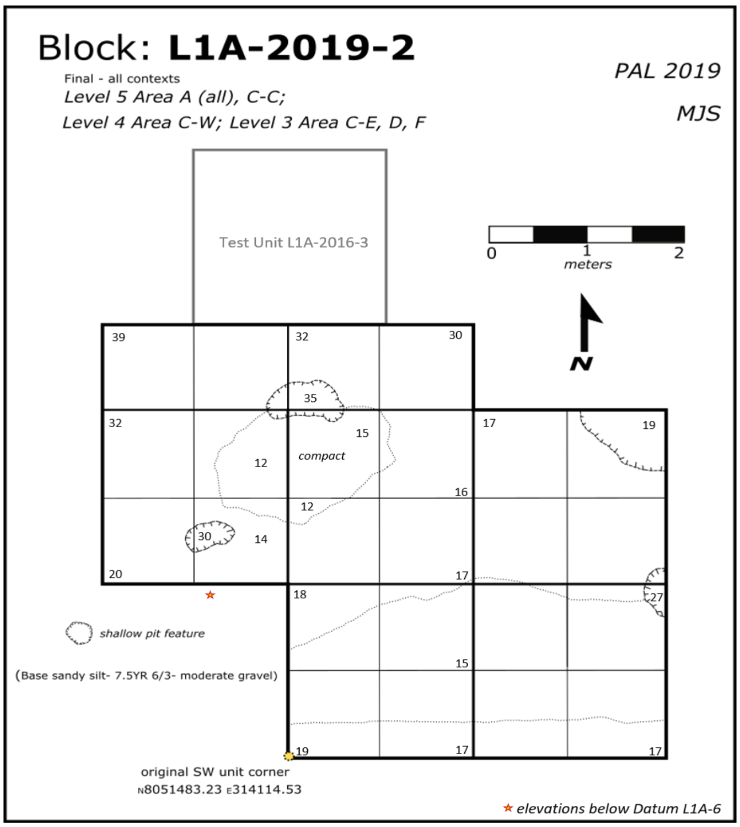

Figure 95. Plan view base map of the final excavated surface in Block L1A-2019-2 after the excavation of Level 5-superpiso.

Below I provide a more in-depth contextual description of each major area delineated in Block L1A-2019-2. As noted above, the areas within this block do not correlate with architectural rooms, as the blocks in Sector L, but instead refer to a number of features. The areal coverage of these features, particularly Area A, would shift as excavations proceeded. For this reason, most areas provided for these major intrablock excavation Areas are the maximal extents, unless otherwise noted.

Area A (Special Structure L1A-2)

Area A was the most complicated context excavated as part of the broader 2018-19 excavations. As noted above, Area A had already been partially exposed by test Unit L1A-2016-3 but was fully excavated by Block L1A-2019-2. Ultimately, Area A would prove to be the remnants of a small platform structure, almost certainly directly associated with the L1A central plaza, located just over 3 meters to the south. While a significant amount of architectural debris, in the form of large cobbles and adobe brick fragments, were still present, the structure was badly damaged in the past, both through intentional destruction and bioturbation-based events, making the depositional sequence particularly complicated here as well. In total Area A would involve the removal and fine-screening of approximately 320 liters of sediment as well as the equivalent of 72.5 liters of adobe brick fragments and about 15 liters of small cobbles and gravel. Area A would yield a significant amount of materials, totaling 117 major specimen collections. Many of these materials were standard domestic refuse, but as noted below, a number of unique finds were also found associated with Area A. For contextual control, all four (4) subsurface levels in Area A would be dived among four subareas (Area A (A), Area A - Northeast (A-NE), Area A - Northwest (A-NW), and Area A - West (A-W)). However, because these areas were arbitrary, I will use the depositional sequences to structure the rest of the description of Area A here.

As has already been discussed, the original structure established in this location was a rectangular (possible roughly square) platform that likely measuring no more than 2x2 meters at the base. The foundation of the structure was composed of large cobbles placed onto a heavily compacted and leveled patch of the natural ground surface. The cobbles don’t appear to have been formally set or cemented to this surface. Then an estimated 2 to 3 rows of adobe bricks were placed on this foundation, and possible in a single course surrounding the cobbles. At least a few of the adobe fragments showed evidence that they are covered in a final layer of a light-colored mud plaster. Given the disturbed nature of the structure it was difficult to determine the original height, but it was likely at least 0.5 meters and no more than 1 meter in height. Finally, there is no evidence that there was space “inside” this structure, such as a storage bin or a more ritually oriented small structure (such as Special Structure L1A-1 in test Unit L1A-2016-5 - see above); to the contrary all evidence suggests it was solid, which has led to the designation of what would be Special Structure L1A-2 as a platform.

Significantly, due to the later disturbances, it is difficult to determine how many, if any, of the recovered specimens were directly associated with the primary construction and use of this platform. However, its proximity to the central plaza of this large sector would alone suggest it was in some way associated with the public activities that would take place there. Importantly, while almost no portion of the Special Structure L1A-2 was left in place, the nature of the structure decomposition suggests that the structure was oriented just about 12° west of north - roughly a NW-SE orientation - the same as the central plaza just a few meters to the south.

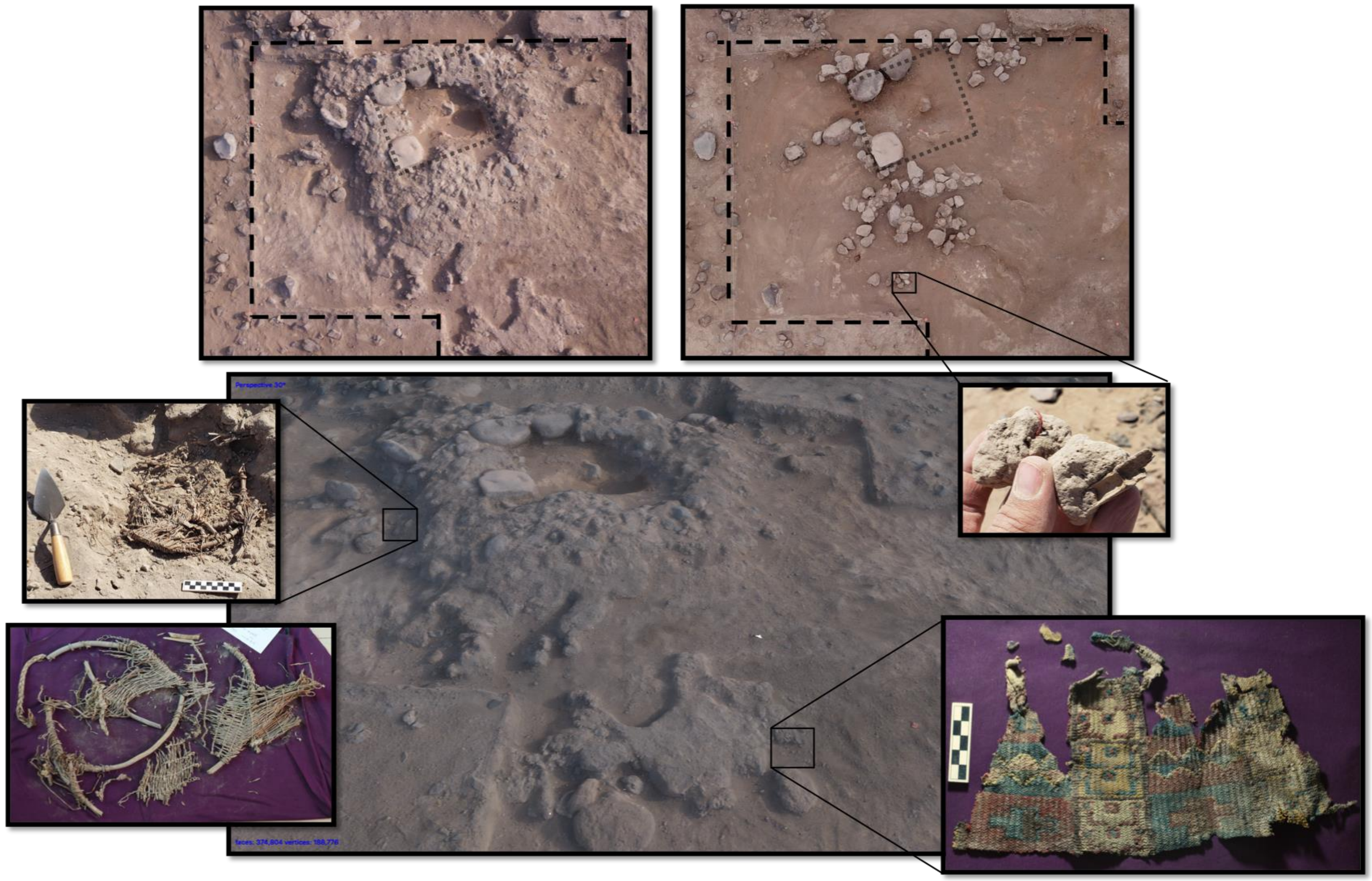

Figure 88. Detail view of Block Figure Figure 96. Detail of Area A (Special Structure L1A-1), including structure-for-motion 3D model and detail photos of important associated material finds.

While Sector A was still occupied, the platform clearly fell into disrepair and was perhaps even badly damaged. Without careful absolute dating, establishing the exact timing for the sequence of abandonment and destruction of the platform structure would be difficult to determine. However, all material associated with Area A, even after the structure clearly began decomposing, were unambiguously Tiwanaku-affiliated forms and styles. This indicates that the platform was not simply destroyed via looting sometime after the Middle Horizon but abandoned while the sector was still in use. Most of the cultural material recovered in Area A likely derived from this initial period abandonment of the platforms primary function and its decomposition. In fact, 96 of the 117 specimen collections made in Area A were collected from the three excavation levels associated with this depositional period (Level 3, Level 4-superpiso I, and Level 5-superpiso II). It appears the remnants of the platform would become a location for disposing of a variety of cultural materials. A significant portion of this material would fall within typical domestic refuse material types, including large quantities of plainware ceramic sherds, camelid bone, and a variety of macrobotanical remains. However, less common items were also found in higher-than-normal quantities here included camelid hooves, projectile points, and fine-weave, decorated textile fragments. Other truly unique finds included a adolescent camelid tail (complete with fur and skin) recovered clustered with multiple camelid hooves as well as a large single deposit of thousands of boiled and mashed maize kernels. The most striking find here was a well-preserved but badly damaged large basket. This hard-frame basket included elements of twisted human hair and a variety of types of reed and cording, and was likely a specialized for carrying human infants (See *8.4*).

Two final disturbance events would further transform this structure in Area A. First, and likely contemporary with the secondary use of Special Structure L1A-2, was a bioturbation-based event. Rodents, likely common field mice, occupied the remnants of the platform. This infestation was quite extensive with a network of small nests found throughout the structure remains. This included large quantities of wadded cotton and botanic materials as well as rodent coprolites. The rodents clearly dragged a variety of refuse material into what had remained of the platform. Finally, a secondary destruction event would be carried out at the structure resulting is massive damage to what remained to the structure. This was an intentional destruction event, in which a clear hole was dug into the center of the platform, destroying any remaining complete bricks, with the cobble encountered cast outside the pit. This disturbance area is given the designation Area B and discussed more below. Ultimately the destroyed structure would further decompose, ultimately resulting in the slight mound, covering just over 9m², as first encountered on the surface in Unit L1A-2016-3 and Block L1A-2019-2.

R-1. Rasgo 1 (R-1) was a shallow pit feature directly adjacent to the west of the primary architectural pile of Area A-W. This feature was likely developed during the secondary, refuse disposal-stage, of the Special Structure L1A-2 sequence. Only 5 liters of sediment were removed to complete the feature excavation and it yielded mostly typical domestic refuse. However, R-1 also contained a large portion of a Tiwanaku vertical stripe-style tunic fragment as well as multiple coca seeds.

Area B

Area B was the designation given to the pit left from the final disturbance event in the center of Area A. As noted above, this pit was the result of a looting event. During this event a pit was dug directly in the center of what was left of the platform after it was first abandoned. Any remaining complete bricks would have been destroyed and the cobbles encountered while digging the pit were discarded along the side of the platform. The pit was very uneven (~ 0.38m² at the greatest extent), with no evidence it was carefully completed. This event could have been done to take cobbles or other building materials, but more likely was completed in search of an offering within the structure. Ultimately, just 35 liters of wind-blown sediment were scooped from this feature with very few materials (20 specimens). The lack of refuse materials, like those found in Area A, seem to confirm the event leading to this pit occurred after the Middle Horizon occupation.

Area C

Area C was the designation given to the entire area surrounding the west, south, and east sides of Area A. At its greatest extent this area would cover 8.15m². The matrix and material content of this area would depend greatly on the proximity to Area A. For instance, the easternmost portion of Area C, the subarea Area C - East (C-E) was quite sparse in terms of materials (8 specimens) and only required two (2) excavation levels (Level 2 and Level 3) (50 liters). Conversely, Area C - West (C-W) bordering the west side of Area A would receive three (3) excavation levels (Level 2, Level 3, Level 4-superpiso), yielding 45 liters of sediment for fine-screening which produced 14 major material specimens. Finally, Area C - Central (C-C would actually receive four (4) excavation levels (Level 2, Level 3, Level 4-superpiso I, Level 5-superpiso II), producing just over 95 liters of sediment and 26 major material specimens. Area C-C, specifically the portion directly south of Area A, would contain a thick layer of adobe melt, left as the adobe bricks which formed the superstructure eroded away. Most of this strata of melt was heavily trampled and compacted, suggesting foot-traffic - again, supporting the interpretation of the secondary use of the structure in Area A after it began degrading. One of the most significant finds of the block was also located here - a large portion (roughly 40%) of a Tiwanaku 4-cornered textile hat was located in C-C within the adobe melt strata.

Area D

Located directly south of Area C and running the entire west-east length of the block, Area D was a very deflated rockpile-midden deposit. Covering 6.26m², Area D would be split into two subareas for contextual control, Area D - West (D-W) and Area D - East (D-E), but was relatively homogeneous. While less dense than other rockpile-midden deposits excavated elsewhere there were still 14 specimens collected here containing significant amounts of plainware ceramic sherds, grinding stone fragments, plain-weave textile fragments, along with other typical domestic debris.

Area E

Area E was the southernmost strip of Block L1A-2019-2 and represented where the northern edge of the L1A central plaza crossed through the block. Covering less than 1m2 (0.96m²) of area only two (2) thin levels (Level 2 and Level 3), totaling 12.5 liters of sediment were required to complete this area. The surface was quite compact with some gravel, but no clear prepared architectural floor was identified. Very few materials (4 specimens) were recovered in Area E.

Area F

Area F was a very small area located in the northeastern corner of the block. This area was just 0.48m² area represented a extremely deflated rockpile-midden deposit that intersected the block. This space was disturbed as it was the location of the backdirt pile for the 2016 test unit, Unit L1A-2016-3. Ultimately, only 7.5 liters of sediment were fine-screened producing four (4) specimen collection for this area.

Block: L1A-2019-3

Block L1A-2019-3 was the smallest of the 2018-19 excavation blocks. In total this block only exposed 8m² of area - effectively two 2x2 meter subunits. Originally selected to expose the only in situ posts identified in Sector A, Block L1A-2019-3 would expose a number of important features. This included the only formal (stone/plaster-lined) storage pit revealed in excavations as well as a number of posts and quincha wall foundations. While relatively small, excavations in this block would yield 242.4 liters of sediment for fine-screening and 88 major material specimen collections.

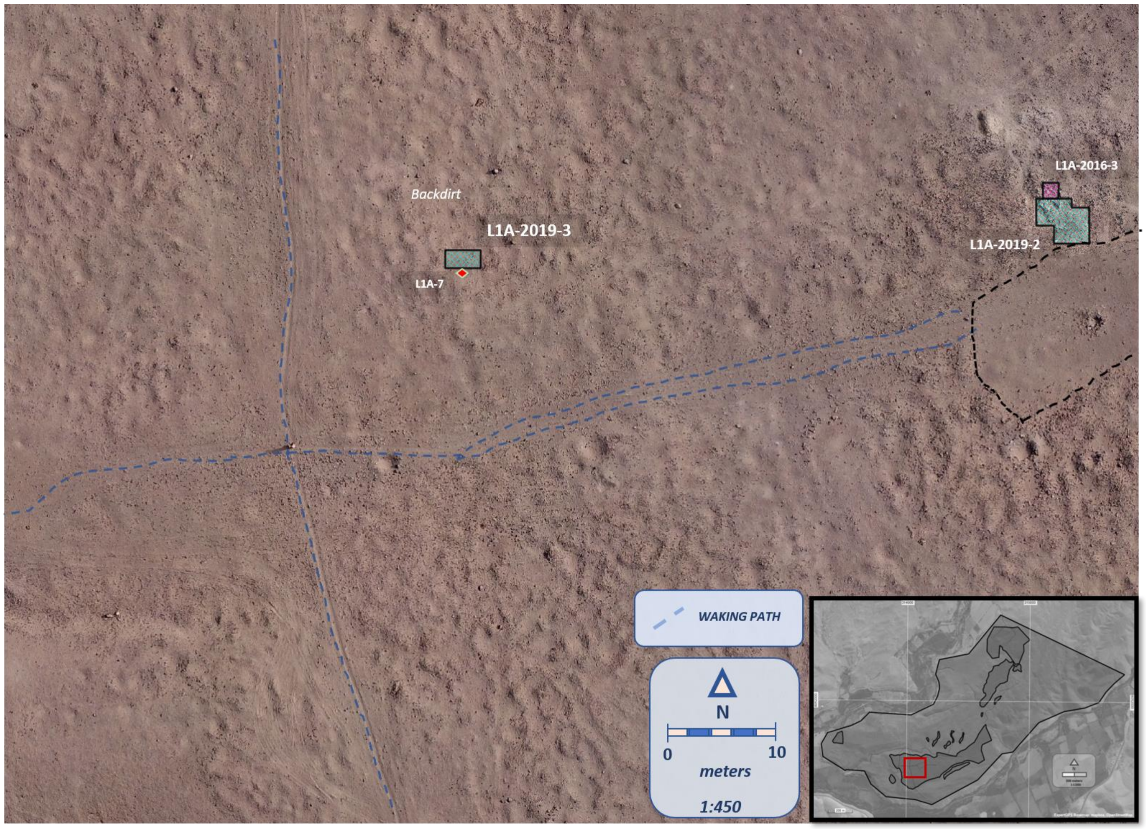

Figure 97. Orthophoto of the central portion of Sector A with Block L1A-2019-3 and associated features and excavation blocks/test units indicated.

Block L1A-2019-3 was in the central portion of Sector A - approximately 60 meters due west from the central plaza and Block L1A-2019-2 (Figure 97). As noted above, the location of Block L1A-2019-3 was selected specifically to further expose two closely associated posts that were visible on the surface. No other architectural features could be observed on the surface in the surrounding area. Significantly, Block L1A-2019-3, and the features that would be revealed inside, were located just 25 meters northeast of the major crossroads of the two central walking paths that would have acted as the primary way into and through the domestic sector during its occupation.

The relatively small size of Block L1A-2019-3 made most measurements and elevations less complicated than other blocks. Only a single datum was used for this block - Datum L1A-7. For this local datum we used a marked point on a well-set boulder, located less than a meter from the southern border of the block.

Level 1 in Block L1A-2019-3 would work to map the surface features as well as collect any cultural materials exposed on the surface. The two posts first identified in the unit were 2.45 meters apart on roughly a SW-NE axis. Between the posts was extremely deflated rockpile-midden deposits. An additional rockpile-midden deposit intruded into the northwest corner of the block as well (Figure 98). The surface collection was conducted using arbitrary 2x2 meter subunits. These collections yielded high densities of plainware ceramic sherds, mostly relegated to the rockpile-midden deposit contexts.

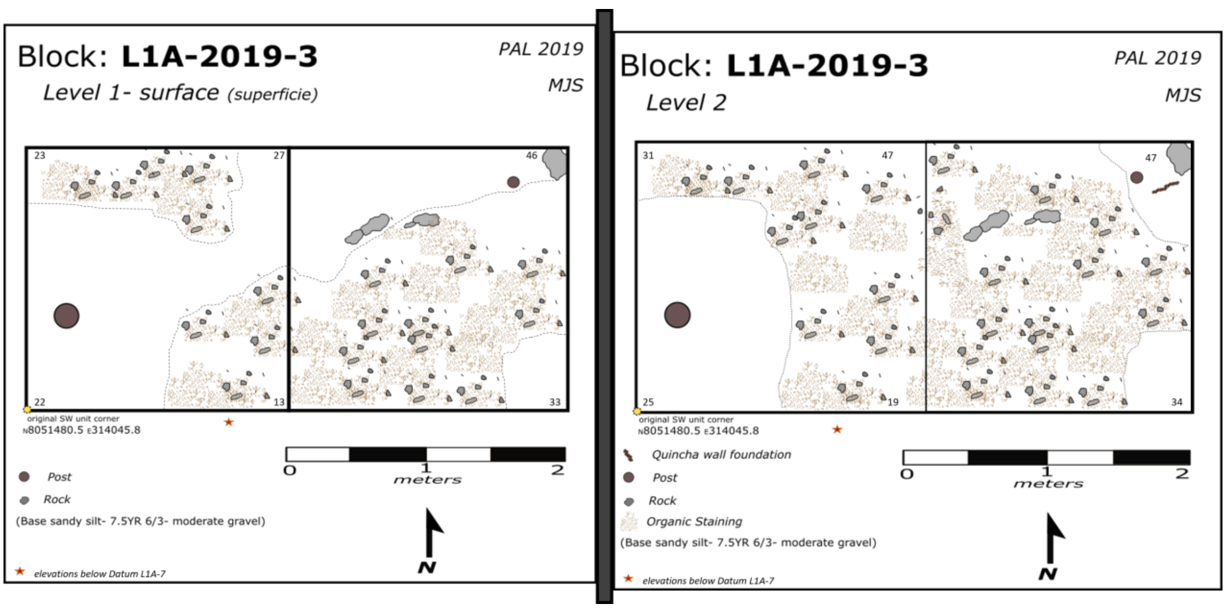

Figure 98. Plan view base maps of both (*left*) excavation Level 1 (surface collection) and (*right*) Level 2 in Block L1A-2019-3.

The first subsurface excavation level would be Level 2. For Block L1A-2019-3 the arbitrary 2x2 meter subunits would also be used for this level. Here, as with the other blocks, Level 2 would be geared towards removing the thin surface patina that covered most nondisturbed contexts across the site. This involved a relatively shallow, scrape of the entire block. This was true for the eastern portion of the block (quadrant b), but a number of areas in the western portion of the block (quadrant a) would ultimately remove 3-20 centimeters of sediment from the surface. This would reveal a slightly different configuration of the rockpile-midden deposit than originally appeared on the surface, with more hyper-deflated rockpile-midden deposits connecting the formally discrete features. Significantly, this initial Level 2 scrape would also reveal a short segment of quincha-style wall foundation, just centimeters to the southeast of the post in the northeast corner of the block and running roughly along the same orientation as the posts (SW-NE) (Figure 98 - right). The most substantial deposits, in terms of overall material density, appeared to run north-south through the center of the block. Approximately 35 liters of sediment were removed for fine-screening, in addition to 10 liters worth of small cobbles and large gravel. This would produce 13 major specimen collections. The majority of materials were found associated directly with the rockpile-midden deposits and were generally composed of typical domestic refuse.

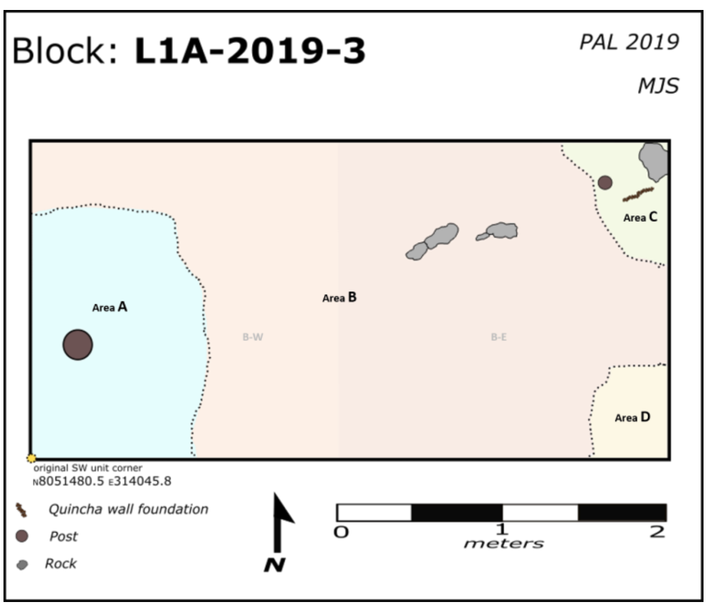

Figure 99. Major areas within Block L1A-2019-3 (Areas A-D).

From Level 3 onwards areas were used to direct excavations. These areas were effectively defined by the rockpile-midden deposit that covered much of the central portion of the block (Area B) and the various clear areas that surrounded it to the southwest (Area A), northeast (Area C), and southeast (Area D).

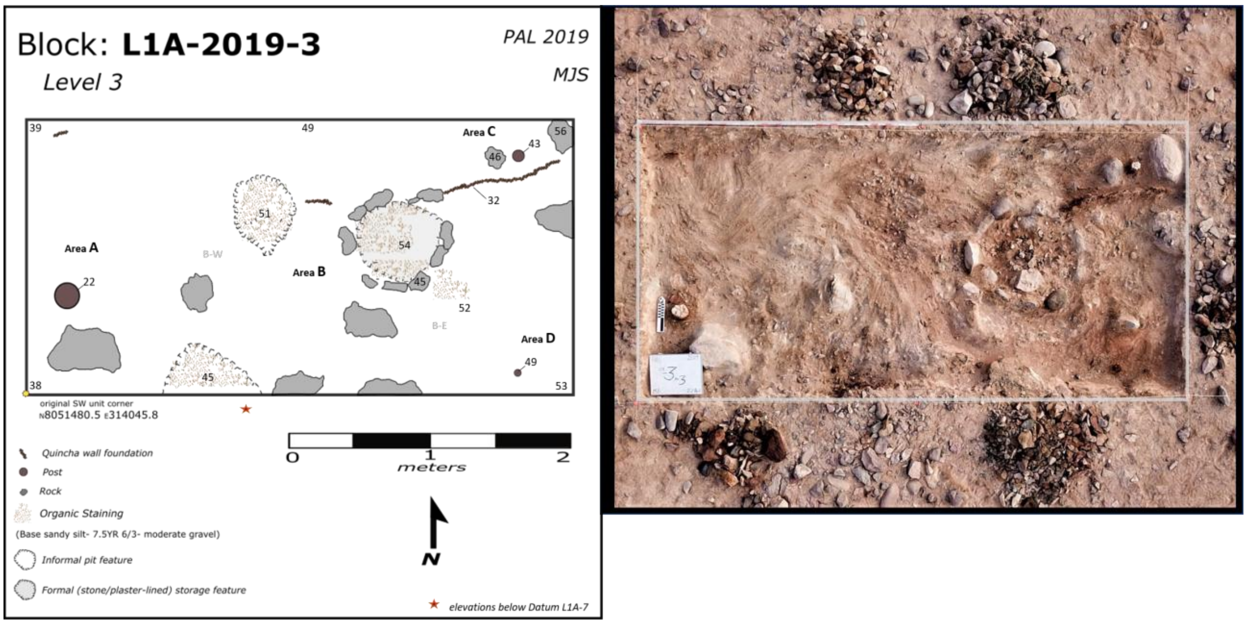

Figure 100. Basemap and overhead photo of base of excavation Level 3 in Block L1A-2019-3.

While it would be slightly different in each area, Level 3 would be the deepest excavation level in all contexts. A total of157.5 liters of sediment was removed and fine-screened. Level 3 would also be an extremely important level that revealed a number of important features. The most significant feature was the formal, stone and plaster-lined storage pit, located in the eastern portion of Area B. While not excavated with Level 3, the stone collar of this important feature was fully exposed and defined at this time. The top of two additional, more informal (no stone-lining) subsurface features were also exposed in the central portion of Area B. In addition to these three pit features two additional segments of quincha wall foundation were exposed - one in the northwest corner of the block and another short segment running between two of the features in Area B (Figure 100). Finally, a third post was also exposed in the southeast portion of the block (Area D).

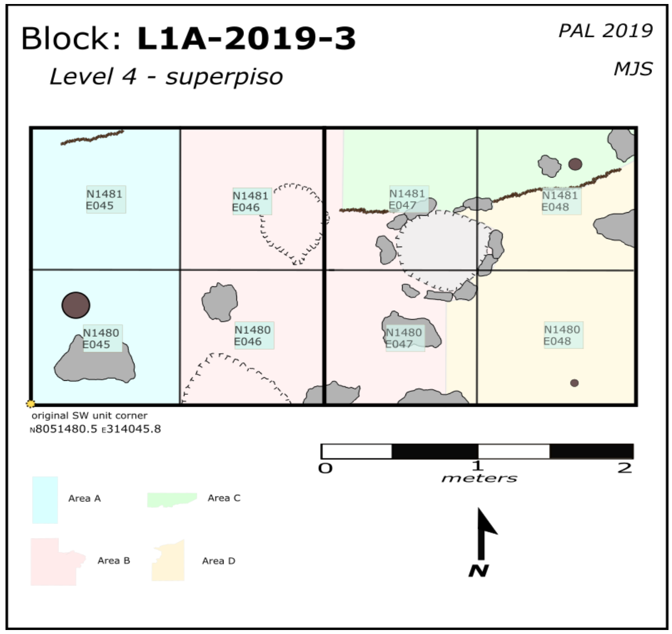

Figure 101. Major areas and subareas used in excavating the final levels of Block L1A-2019-3.

The four primary areas that defined Level 3 would continue to define Level 4, although the perimeters of the areas would be slightly altered (Figure 101). Excavation Level 4 would define the first and only superpiso excavation level in all areas. As such 1x1 meter subunits were utilized for additional contextual control. Ultimately with the 4 areas subdivided by the eight 1x1 meter subunits, in addition to the three major features, a total of 13 individual contexts were excavated as part of this final excavation level.

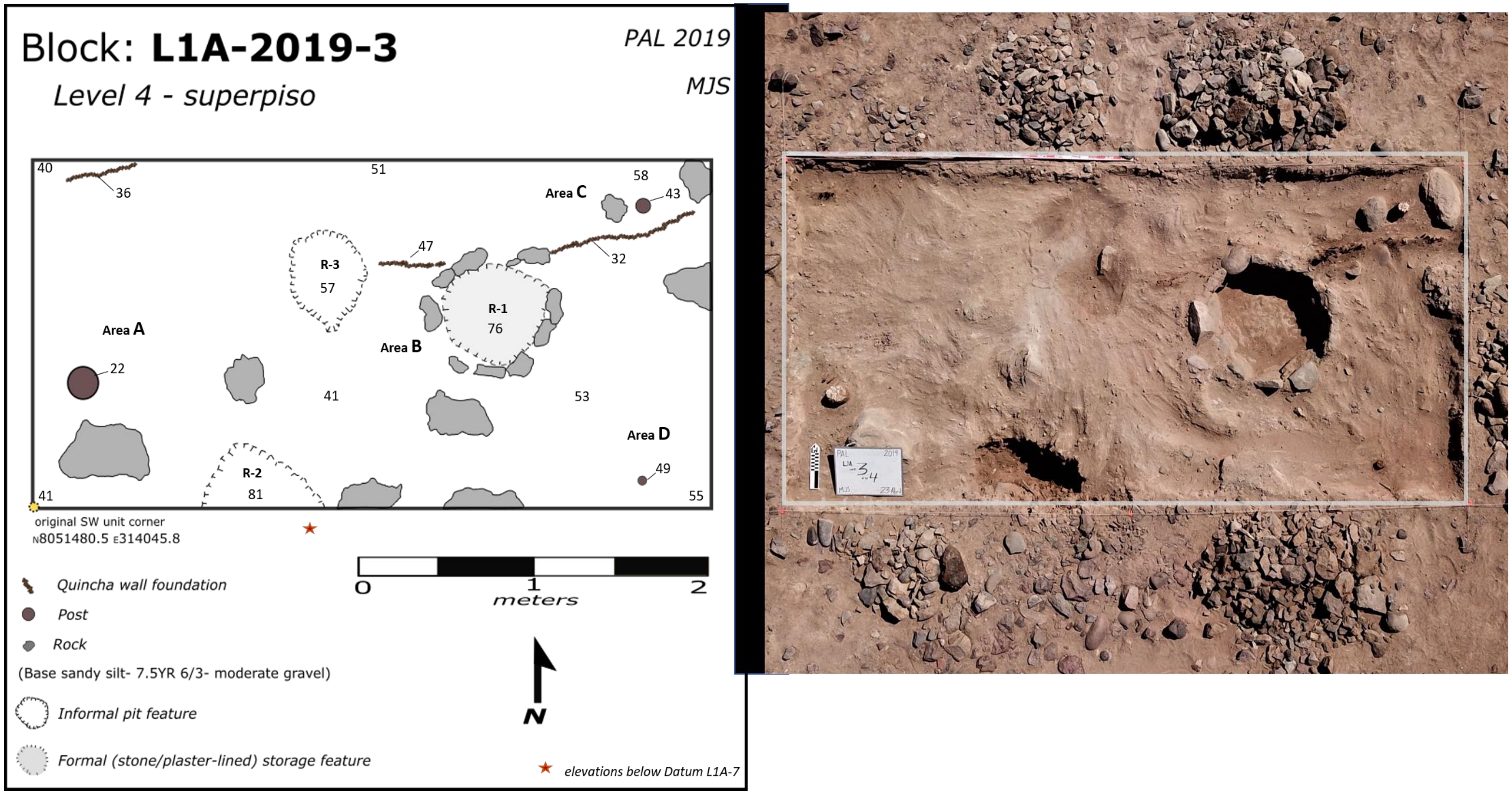

Figure 88. Detail view of Block Figure 102. Base of Level 4 (superpiso) in Block L1A-2019-3.

The Level 4 - superpiso excavation was relatively shallow in most areas, with most areas receiving a simple scrape of 1-3 centimeters. Of the approximately 50 liters of sediment removed in Level 4, 30 liters came from excavating the three features. This final excavation would not reveal any new features or any identifiable sections of prepared architectural floors. However, the existing features were further exposed and features refined. As noted above, all of the three features were excavated as part of this broader excavation level. Each feature was bisected, when possible, in order to best define internal stratigraphy. All three pit features were full of a variety of domestic refuse and wind-blown sediment, with little evidence for recognizable internal stratigraphy. In the end the Level 4 - superpiso level would produce 18 major material specimen collections and five 0.5-liter soil samples were collected from selected contexts for future analysis.

Below I provide a more in-depth contextual description of each major area delineated in Block L1A-2019-3. Due to the much smaller size of this block (compared to the other blocks) the sampled areas here were also much smaller as so descriptions tend to be shorter here.

Area A

Area A was the westernmost side of this excavation block - effectively a 2x1 meter strip along the western edge of Block L1A-2019-3. Originally the boundary around Area A was marked by the lack of rockpile-midden debris that defined Area B to the east, but ultimately the boundary between these two areas was just arbitrary. The first notable feature in Area A, visible from the first surface observations of Block L1A-2019-3, was the base of a large post (dia. 17.7cm). Eventually in the northwest corner of the area a short stretch of poorly-preserved quincha wall foundation, running roughly west-east, was exposed. The fill was relatively loose silty sand (7.5 5/4) with only moderate gravel content. A very large cobble, deeply set into the natural ground surface was exposed just a few centimeters south of the post. In spite of the important architectural features very little cultural material was found in Area A overall with no formal features. After approximately 30 liters of sediment were fine-screened only nine (9) specimens were collected. These specimens were all typical domestic refuse, including plainware ceramic sherds, camelid bone, and a variety of macrobotanical remains.

Area B

Area B was the most contextually complicated and significant area with the block. Originally defined by a deflated rockpile-midden deposit, Area B would eventually prove to be the location for three separate pit features (R-1, R-2, and R-3). At its final extent, Area B would cover just over 3.27m2 directly in the center of Block L1A-2019-3. The area was effectively defined by the three pit features noted above with the northern area boundary was defined by a short stretch of quincha wall foundation that runs between the R-1 and R-3 pit features. However, four large cobbles, well-set into the ground surface also mark the southern portion of this area. Excavating Area B and the associated features would result in fine-screening 147.5 liters of sediment as well as the removal of the equivalent of approximately 32.5 liters of small cobbles from the upper excavation levels (Level 2). Area B would yield a significant amount of materials, eventually totaling 44 major specimens composed of over 22 kilograms of recovered cultural material. As will be noted below, a significant amount of this material was found within the features, but still large quantiles of material were also recovered from the rockpile-midden deposits as well. This included typical domestic refuse, such as large amounts of plainware ceramic sherds, camelid bone, marine shell, and a whole variety of botanical remains. However, a few unique finds of noted here included multiple items of personal adornment, including a copper ring and multiple shell and stone bead fragments.

R-1. Rasgo 1 (R-1) was a formal storage pit that was ultimately filled with domestic refuse. R-1 is considered a formal storage pit feature as it was dug in uniform dimensions (0.56 x 0.59 meters), lined with small to medium-sized cobbles, and finally coated with a 0.5-1.5cm thick layer of mud plaster. The pit itself was relatively straight-sided with a relatively level base.

Rasgo 1 was 22cm deep below the ground surface, but also constrained a small cobble stone collar that was also plastered in place and extended the rim of the feature about 2-3cm above the ground surface. Interestingly, R-1 interrupts the west-east running segment of quincha wall foundation that separates Area B from Area C to the north, indicating this feature was established after this wall had fallen out of disuse.

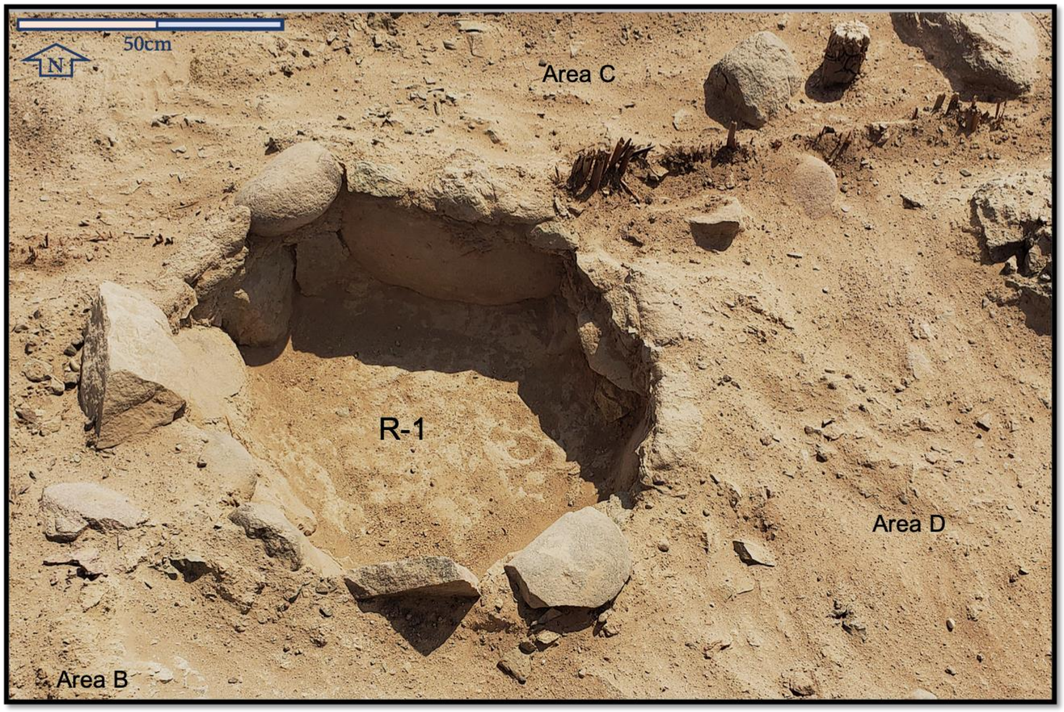

Figure 103. Photo of the formal stone and plaster-lined storage pit after being fully excavated, with associated *quincha* wall foundation and post in Area C.

It is presumed that R-1 was originally established for storage of foodstuffs or other important resources, but ultimately it was used as refuse disposal. In fact, the matrix of the feature was almost entirely cultural material - 4573.12 grams of cultural materials were removed from just 15 liters of extracted sediment. The materials would largely fall within typical domestic refuse material types, including plainware ceramic sherds, camelid bone, marine shell, lithic debitage, and a variety of macrobotanic remains. Other, more rare items were also recovered including a stone hoe, a wooden spoon, and one of the few confirmed Tiwanaku-style polished blackware ceramic sherds recovered at L1.

R-2. Rasgo 2 (R-2) was an additional pit feature, also ultimately used for domestic refuse disposal. Unlike R-1, which was located just over one meter to the northeast, R-2 was not stone-lined or plastered and appeared far more unevenly dug. Rasgo 2 would enter into the southern profile of the block, so was only partially excavated. Like R-1, this pit was also relatively straight-sided but had more of a basin-shaped base. Here the matrix removed was also almost entirely composed of cultural refuse, with 3820.6 grams of materials being found in the 30 liters of sediment removed from R-2. Again, most cultural materials recovered were typical domestic debris, with plainware ceramic sherds, camelid bone, and various macrobotanic remains making up the bulk of the assemblage. However, a few unique finds, such as a spondylus bead and fragments of coral were also recovered here. A single 0.5 liter soil samples was also collected.

R-3. Rasgo 3 (R-3) was a shallow depression that was also filled with domestic refuse. Located just north of R-2 and just west of R-1, Rasgo 3 was far less of a pit and appeared more as a slight depression where refuse had collected. Only 2.5 liters of sediment were needed to remove to clear R-3. This produced just six specimens and a single soil sample (0.5 liters) for collected for future microanalysis. Domestic debris here again consisted of plainware ceramic fragments, camelid bone, macrobotanical remains, amongst other debris.

Area C

Area C was the designation given to the space located north of the quincha wall that R-1 interrupts. At just under 1m2 (0.97m2), Area C was a small space. Two large, well-set cobbles protruded up into this area in the far northeast corner of this area. Between these two cobbles was the base of a post (dia. 8cm), likely associated with the quincha wall foundation just 12cm to the south. Only 12.5 liters of sediment were needed to excavate this area and it only produced 12 major specimens. While many of these specimens were typical domestic refuse, but one fine, a finely polished bone tube, was an important find made here.

Area D

Area D was the area in the southeastern corner of the block, effectively the area east of the R-1 and R-2 pit features and south of the quincha wall foundation segment that bounded the southern extent of Area C to the north. This area was just over 1.8m2 and was relatively undifferentiated internally. However, another narrow post base was exposed in south end of the area. Only 17.5 liters of sediment were needed to excavate Area D, which was completed in two levels (Level 3 and Level 4-superpiso). In total, only 10 specimens were collected here, including a soil sample, and included mostly typical domestic materials. The one exception here, was a thick chunk of worked copper.

<u>Block: L1U-2019-1</u>

Excavation Block L1U-2019-1 would be the only excavation to be completed in the more peripheral Sector U. This would be the second smallest excavation block, at $16m^2$, and also one of the shallowest, with only approximately 180 liters excavated for fine-screening. While L1U-2019-1 would reveal multiple domestic features, cultural materials were relatively sparse, with only 52 major material specimens collected.

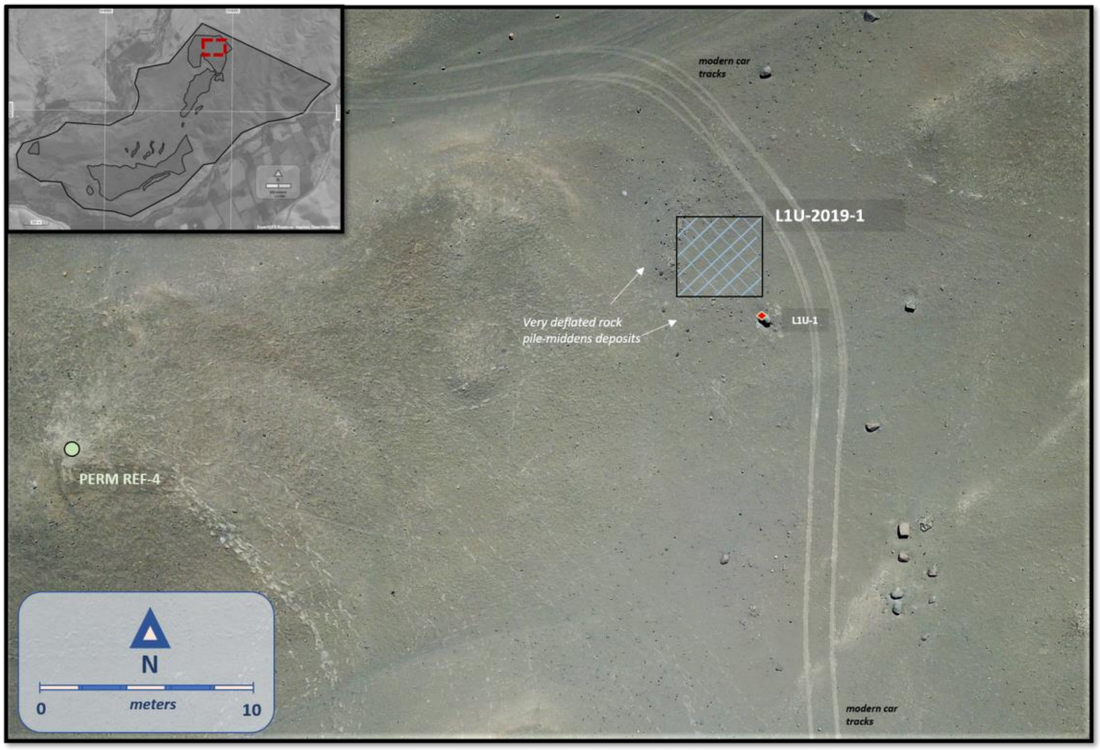

Figure 104. Low-altitude UAV photo of the broader context surrounding Block L1U-2019-1 within Sector U.

The location for Block L1U-2019-1 was selected to sample on of the only locations where rockpile-midden deposits were identified on the surface in Sector U. As noted elsewhere, the location of Sector U on the upslope of the interfluve landform on which the broader site is situated has led to much more significant accumulation of wind-blown sediments. The specific rockpile-midden deposits sampled by Block L1U-2019-1 were two roughly linear deposits oriented roughly perpendicular to each other. The block was establishing where the piles met. The local datum for the block, Datum L1U-1, was a designated point on a small boulder, just south of the blocks southeast corner.

While Block L1U-2019-1 would intersect with the rockpile-midden deposits, few meaningful context-based areas could be distinguished and therefore arbitrary 2x2 meter subunits were utilized for all but the final excavation level. As with all blocks, Level 1 in Block L1U-2019-1 would act as a surface collection level. This Level 1 surface collection yielded only a few ceramic sherds in three of the four 2x2 meter subunits. Level 2 would be the first formal excavation level with approximately 60 liters of sediment removed and fine-screened. Again, only limited materials were recovered - mostly concentrated in the southwest and northwest portions of the block.

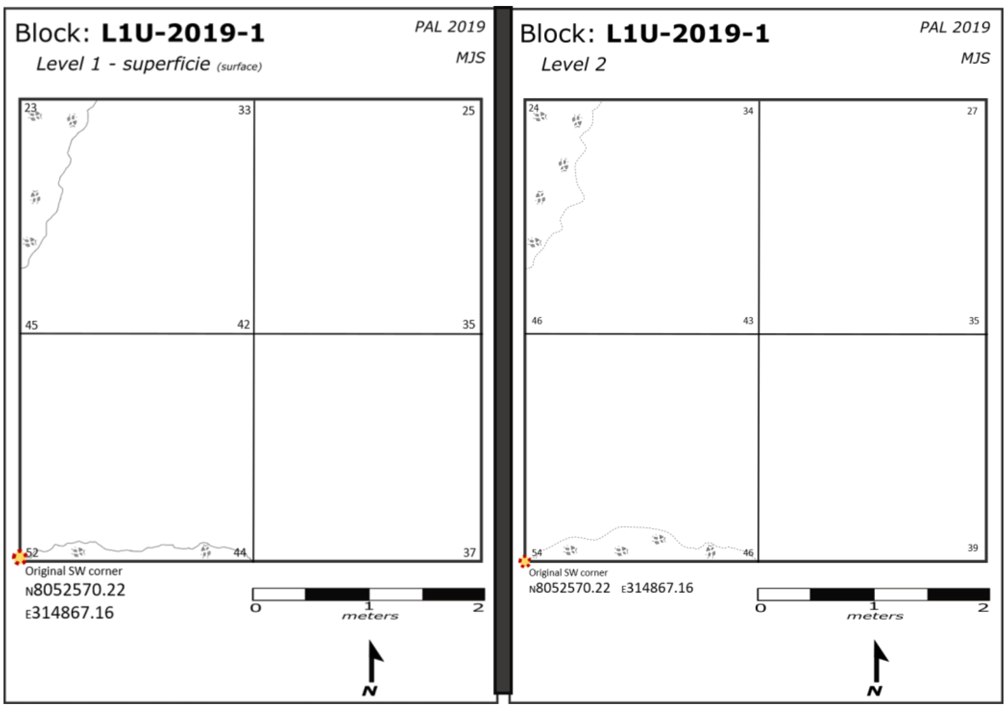

Figure 105. Plan-view base maps of excavation Level 1 and Level 2 in Block L1U-2019-1.

Level 3 would again use the 2x2 meter subunits and remove a bit more sediment, with 77.5 liters excavated. Here, cultural materials were slightly more dense than previous levels, but still relatively sparse compared to most other excavated contexts. At the base of Level 3 more context-based areas were defined and utilized in excavating Level 4, which would be the final excavated level (superpiso). In the end just 3 areas were defined (Area A-C) - effectively just the small portion of rockpile-midden that intersected the southwest portion of the block (Area A) and in the northwest portion (Area B), with the rest of the block being defined as Area C and not excavated in Level 4.

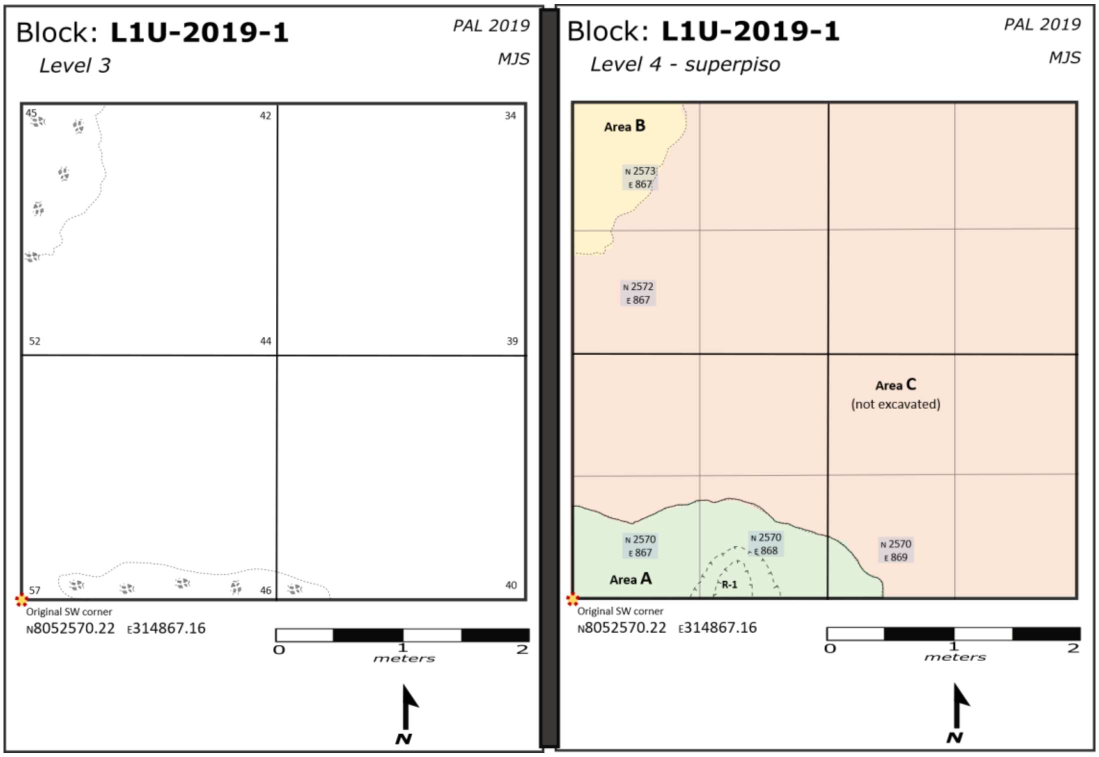

Figure 106. Plan-view base map of excavation Level 3 and simplified base map illustrating major excavation areas used in Level 4 superpiso in Block L1U-2019-1.

As the superpiso, Level 4 would not only be constrained by the areas defined at the base of Level 3, but also by arbitrary 1x1 meter subunits. Because only Area A and Area B were excavated in this final level, only a total of six contexts (including the only formal feature of the block - R-1) were excavated as part of Level 4.

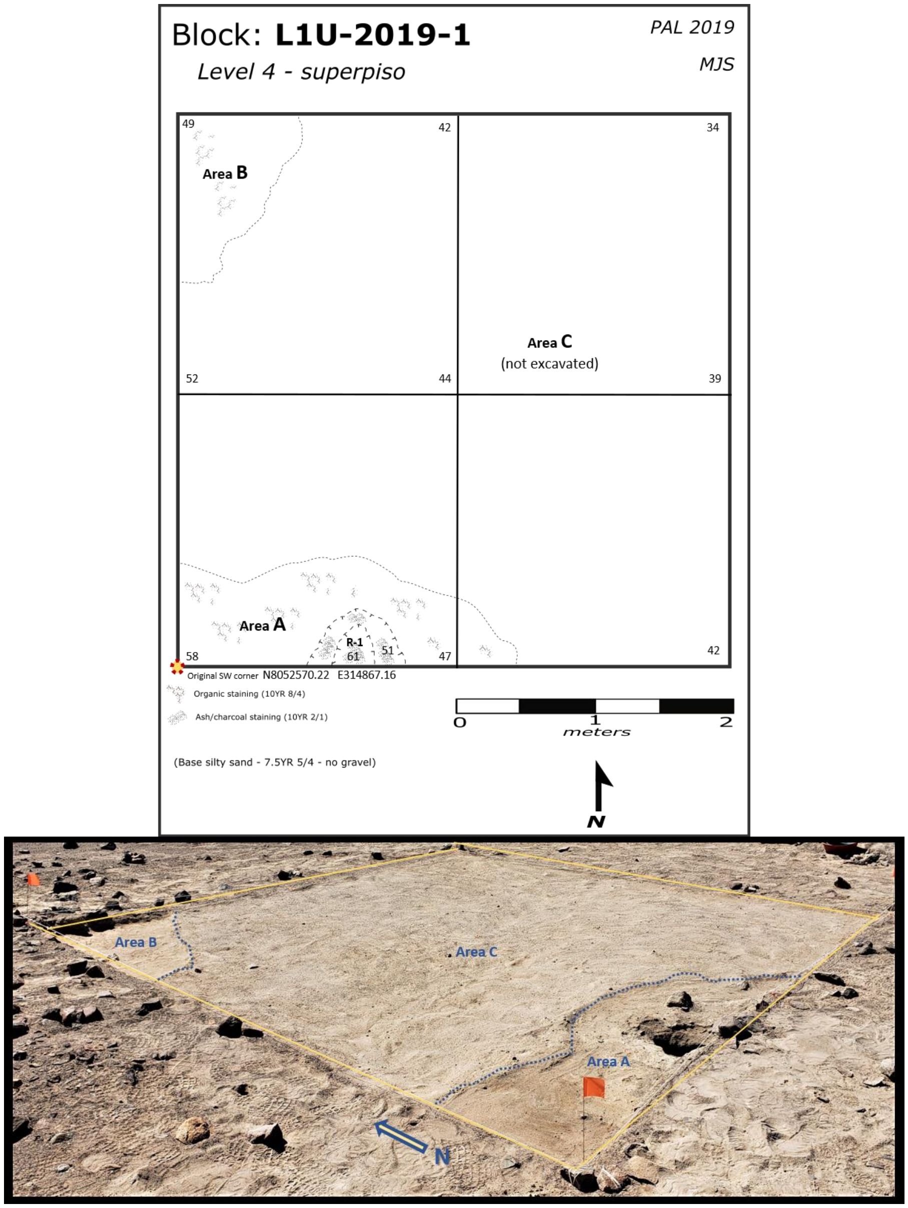

Figure 107. Final plan-view base map and oblique angle (ground-level) photo of Level 4 (superpiso) in Block L1U-2019-1.

Again, while the final context revealed within Block L1U-2019-1 would be far more simple than other blocks, at least one important feature was identified. This feature, while only a relatively simple hearth, would confirm the overall domestic function of at leas this context within Sector U. In the end the final Level 4 superpiso excavation would only produce 42.5 liters of sediment for fine-screening and ultimately only yielding 10 major material specimens, three of which were 0.5-liter soil samples collected for future micro-analysis.

Area A

Area A was the rockpile-midden deposit located in the southwestern corner of the block. As noted above, this deposit was very deflated and was not nearly as dense as the more common rockpile-midden deposits observed in Sector A and Sector L. Only 22.5 liters of sediment and just 2.5 liters worth of small cobbles and gravel were needed to fully excavate this area. Only 8 specimens were produced, most of which were directly associated with Rasgo 1.

R-1. Rasgo 1 (R-1) was a small pit and informal hearth feature located underneath the Area A rockpile-midden deposit. The feature would enter the southern block profile so complete dimensions could not be ascertained, but R-1 was 70cm at its widest extent and approximately 10cm at its greatest depth. Significant ash and charcoal content in the feature's matrix along with charring of the earth along the rim of the shallow pit suggest it was used primarily as a hearth.

Area B

Area B was the designation given to the small portion of rockpile-midden deposit located in the northwestern corner of Block L1U-2019-1. Only a single excavation was needed to remove this very deflated deposit. Only 17.5 liters were excavated and fine-screened here, producing just two specimen collections.

7.3 Chapter Summary

In Chapter 7 I presented the results from two seasons of excavation at the site of Cerro San Antonio. I attempted to present context-based results, as revealed via excavation, on their own terms, without substantial interpretation. This involved a unit/block-by-unit/block as well as area-by-area walk-through of all contexts within Sector A, Sector L, and Sector U, that were subject to excavation.

7.1: Here I presented results from the five (5) test units which were excavated exclusively in Sector A at L1 (L1A) during the 2016 field season. All five (5) units were arbitrary test units, each just 2x2 meters in dimension. These units targeted both standard domestic rockpile-midden deposits as well as more specialized domestic structures within this large sector.

7.2: This subsection presented the results from the far more extensive excavations completed during the 2018-19 field season. These were full excavation blocks, undertaken using methods and techniques developed under the umbrella of household archaeology. While all units would be different dimensions, a total of 176m² would be excavated across five major excavation blocks in all three sampled sections (L1A, L1L, L1U).

Next: In Chapter 8 I present the results from the various forms of attribute-based analysis that was conducted on all material types collected in all forms of field work (specialized spot finds, systematic surface collection, excavation).

Chapter 8 - Material Analysis

In this chapter I present the data and results gained from conducting a variety of different lab-based documentation and analysis procedures on the cultural materials collected during field work at Cerro San Antonio (L1). As such, this chapter is divided into subsections based on the major material classes (Ceramics, Textiles, Botanics, etc.) outlined in Chapter 4 (see 4.1). Similar to other chapters presented in Section 2, my discussion here is restricted to describing the data and results on their own terms with more synthesis-based analysis and interpretation reserved for Section 3. That said, I do distinguish between major material collection types, namely surface collection versus excavation, as well as a few other context-based distinctions in the following data presentation. Finally, I restrict my discussion here to materials recovered in the three primary Tiwanaku-affiliated domestic sectors (Sectors A, L, U), the associated Middle Horizon mortuary sectors (Sectors B, I, J, K, M, Q, S, V, W, X, Z), as well a Tiwanaku-affiliated spot finds made elsewhere on the site. An inventory of materials recovered from sectors with different cultural-temporal affiliations can be found in Appendix XX.

8.1 Ceramics

The material category of Ceramics would receive the most intensive post-field sorting and analysis. After the sustained washing and drying process ceramic sherds would effectively go through three stages of sorting, before undergoing more detailed attribute analysis. Again, these procedures are described in Chapter 4 along with the rest of the methods employed here. However, in each subsection below I provide more background context as well as providing some of the typologies and other datasets I have used in developing these.

The first stage of post-field ceramic sorting would be to assign a preliminary cultural-temporal affiliation to all recovered sherds. As explained in Chapter 4 and Chapter 5, primary (and if necessary secondary and tertiary) cultural affiliations were assigned to all sectors during initial reconnaissance and mapping. The primary sectors being discussed here (Sector A, Sector L, and Sector U) were given the single cultural-temporal affiliations of Tiwanaku-Middle Horizon. Effectively, no materials recovered in these sectors, no matter the collection strategy, fell outside the suite of ceramic traditions that have been documented as deriving from the greater Middle Horizon Period. Derived from spot finds (special collections), systematic surface collection, and excavation 456 major Ceramic specimens, composed of 33,960 individual sherds, were assigned this Tiwanaku-Middle Horizon affiliation. However, as will be discussed below, even this assemblage, considered to be Tiwanaku or Middle Horizon in affiliation was not without variation. After discussing a few more broad trends observed in general sherd sorting, I move on to a more detailed discussion regarding variation within the assemblage and the range of more specific cultural-temporal affiliations that may be present in the L1 ceramic assemblage.

Ceramic Wares

The second stage or sorting for ceramic sherds was by ware. The category of ware was actually a number of features regarding the overall technological approach to creating the ceramic vessel as well as final appearance. Generally, Tiwanaku ceramic assemblages have been divided into three major ware categories: Plainware (*Llana*), Redware (*Rojo*), and Blackware (*Negro*). Here I provide a description of each major ware type, specifically as they are represented in the Cerro San Antonio assemblage with some supplementary context provided from other Tiwanaku-affiliated ceramic assemblages found elsewhere.

Tiwanaku-style *plainwares* are generally defined by well-fired, fine-grained undecorated ceramics. Plainware pastes are relatively dense and homogenous with very fine-grained sand as the primary temper with larger (>0.5mm) and frequently angular grit inclusions (often a mixture of mica, quartz, and other locally found minerals). While ubiquitous and well-mixed, these larger inclusions are frequently absent from any given sampled sherd profile. While well-fired plainware sherds show little coring and are generally between 5YR 6/2 - 10YR 6/4 (pinkish gray - light reddish brown) The surface treatments of plainwares are relatively limited but consistent. Most plainware vessels appear to have received a single wash of tan or pale brown slip. Some relic smearing and even a few light impressions indicated that this exterior slip was likely wiped on thoroughly, but relatively irregularly, with a cloth before firing. Interiors may have been scraped, using a modified sherd, gourd fragment, or small wooden paddle during vessel construction or at the very least pre-firing. Rims and necks of plainware vessels appear to have received more finishing with additional signs of smoothing, scraping (rims), and even some light burnishing found up to the shoulder of some vessels. The average thickness of plainware vessels was just under 7mm (6.91mm) but could be as thin as 3mm and as thick as 20mm.

Figure 108. Example of sherds and profile cross-sections of each major ware type: (center) plainware, (left) redware, (right) blackware.

Redwares are defined as well-fired and extremely fine-grained decorated ceramics. Redware pastes aren't all that different from those described for plainwares and also generally express in the colors pinkish gray - light reddish brown. However, they do tend to be moderately better sorted with fewer angular inclusions. The firing of redwares was also probably quite different, with more of an oxidizing environment than those used for plainwares (Goldstein 1989:66). This is indicated in the prevalence of at least minor coring in redware sherds, which can range from 10R 7/1 to 10R 7/3 (light gray to pale red). Another structural difference between redware and plainware ceramic wares was general thickness, although not nearly as much as is often assumed. In fact, the average thickness of a redware vessel (6.90mm) was actually remarkably similar to plainware vessels. However, the range of vessel thickness was far more uniform, with redware thickness ranges restricted between and average minimum of 5.89mm and an average maximum thickness of 7.95mm. Redware thickness could also be affected by modelled embellishments, made to certain forms of redware serving vessels, the most common being raised horizontal bands (a torus).

Exteriors of redware vessels were given a relatively heavy red slip wash that generally appeared as slight variants of dusky red (10R 3/3 - 3/4), but relatively wide ranges in color could be observed in the L1 assemblage, with brighter, red-leaning hues (5R 3/6-3/8 - dark red) to more yellow-leaning red hues, making the slip appear more tan (5YR 5/3-5/4 - reddish brown). Almost always the exterior slip would go over the rim and down an average of 2cm into the vessel interior, where it was wiped. Redware exteriors were always burnished, often quite heavily. Burnishing was likely done using small pebbles in vertical motions, giving a uniform burnish. Redware vessels were also almost always decorated with painted motifs. These motifs are described in more detail in the attribute analysis subsection below, but these could range from relatively rudimentary, geometric motifs and even simple vertical or horizontal stripes to more elaborate, fine-line figurative motifs. These painted motifs could range from monochrome techniques which almost always relied on black (essentially for design elements. However, many redware motifs would also incorporate relatively pronounced white (10YR 8/1 - white) and a matte orange (10YR 5/8 yellowish brown) for details. Less ubiquitous, but still frequent paint colors could include a dark red (5R 2.5/3 - very dusky red), dark blue (GLEY2 4/1 - dark bluish gray), and more muted (likely wiped) versions of grey (10YR 6/1 - grey) and yellow (5Y 8/3 - pale yellow). Almost all redware motif painting occurred pre-firing, though different paints/design elements, may have been applied at different stages of firing. One exception found on a number of sherds, but relatively restricted to a single context was a post-firing matted white paint that was wiped on and only minimally burnished. Even in vessels that utilized many or all of these paints, black would be used for most framing panels and essential figure lines.

Finally, blackware vessels were by far the rarest ware type in the Cerro San Antonio ceramic assemblage, as they almost always are across the documented Tiwanaku sphere. Blackware ceramics were very similar to redware vessels in terms of technological construction and paste, but differed in terms of firing and finishing technique. Like redware vessels, blackware was composed of very dense, well-sorted pastes with very few inclusions. However, the firing environment of blackware vessels was a low-oxygen firing environment resulting in some coring but effectively turning the paste color a uniform grey (10YR 6/1 - grey). Exteriors of blackware vessels were also heavily slipped but the original color is difficult to determine as the firing process result in a deep black exterior color (10YR 2/1 - black) that was then very heavily burnished. Blackware vessels almost certainly went through multiple stages of pebble burnishing, possibly pre- and post-firing. Finally, the primary mode of decoration for blackware vessels was modelling, most commonly in elaborate portrait head keros.

Ware Frequencies

Every single sherd (and complete vessel) collected would go through the ware sorting process, and all Tiwanaku-affiliated sherds collected fell comfortably into these three ware categories as described. The collection strategies in which sherds were systematically collected, namely the systematic surface collection units and excavations, the frequency of major ware types can be indicative of other underlying patterns in the assemblage, such as vessel forms and function.

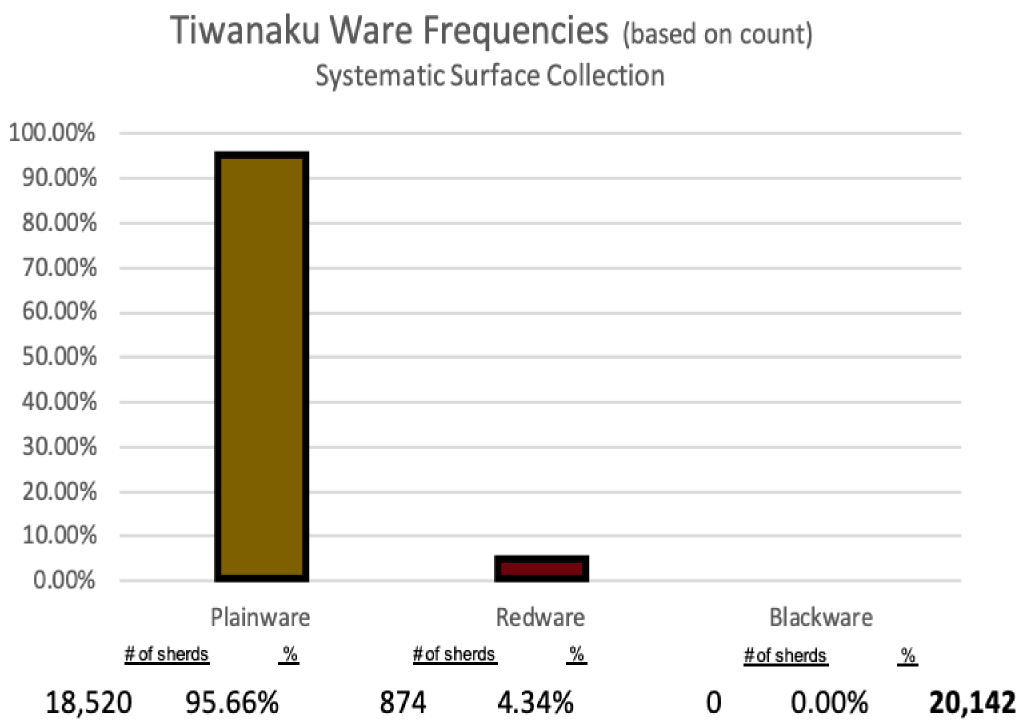

Figure 109. Graph illustrating the overall frequencies of major Tiwanaku ware categories (Plainware, Redware, Blackware) based on raw sherd counts from the 140 systematic surface collection units in Sectors L1A, L1L, and L1U.

As was presented in Chapter 6, the three primary Tiwanaku domestic sectors (Sector A, Sector L, and Sector U) were systematically sampled through surface collection. Here, every 50x50m unit of the L1 site grid that fell within each sector perimeter was sampled with a 10x10m unit. In total, 140 such units were used to sample Sector A, Sector L, and Sector U, which yielded 20,142 individual ceramic sherds. The plainware sherds make up the bulk of the assemblage (95.66%) with redware sherds making up the remainder of the systematic surface collection, as no blackware sherds were found in this collection method (Figure 109).

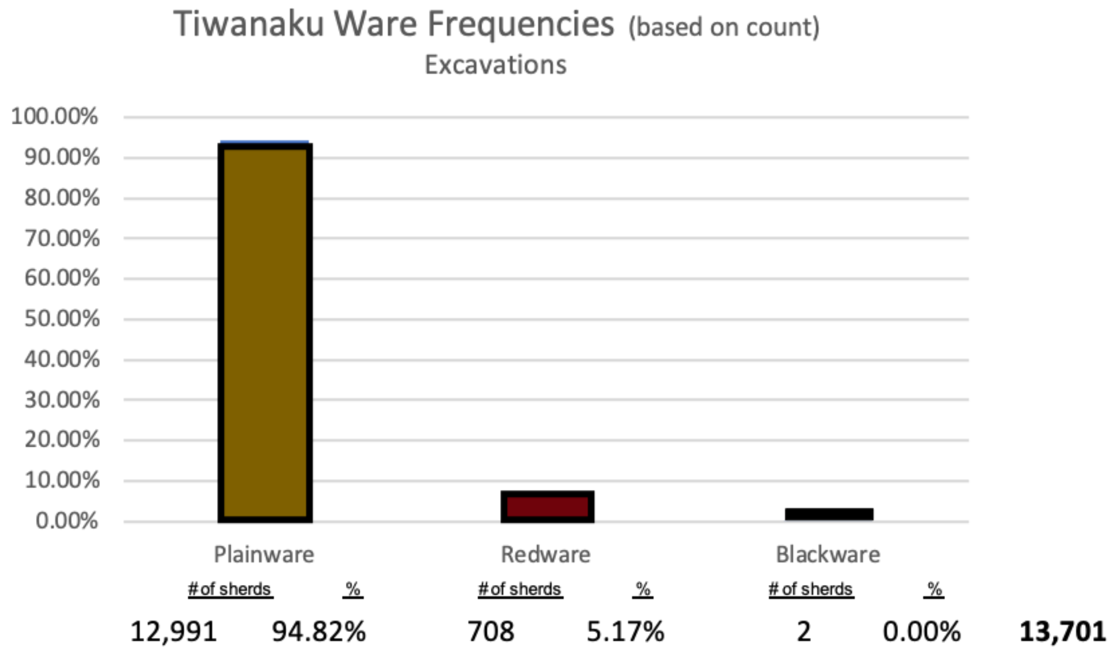

Figure 110. Graph illustrating the overall frequencies of major Tiwanaku ware categories (Plainware, Redware, Blackware) based on raw sherd counts from the five (5) 2016 test units in L1A and five (5) 2018-19 excavation blocks in L1A, L1L, and L1U.

Excavations also produced a large enough ceramic sample size in which these broad ware frequencies can be telling. The excavations targeted the same three sectors highlighted above (Sector A, Sector L, and Sector U) and ultimately produced 13,701 individual sherds. Significantly, the breakdown of major ware frequencies here in subsurface investigations were remarkably similar to those derived from the systematic surface assemblage (Figure 110). Here in excavations plainware sherds made up 94.82% with redware making up a bit more of this assemblage at 5.17%. While not even registering on the frequency chart, it is not insignificant that excavations did produce 2 blackware sherds.

<u>Diagnostics</u>

While all complete or semi-complete vessels encountered or collected in the field were by definition diagnostic, all ceramic fragments or sherds had to be sorted into those deemed diagnostic or non-diagnostic. As noted in Chapter 4 (4.1), diagnostic sherds refer to any sherd including elements that can identify a vessel's primary form (primarily rims, bases, and handles) as well as any sherd that includes decoration (paint, modeling). It is for this reason that non-diagnostic sherds are almost entirely composed of body sherds from plainware vessels. As will be noted below, non-diagnostic sherds would also undergo attribute analysis, but did not yield nearly as much information regarding vessel forms and functions as diagnostic sherds.

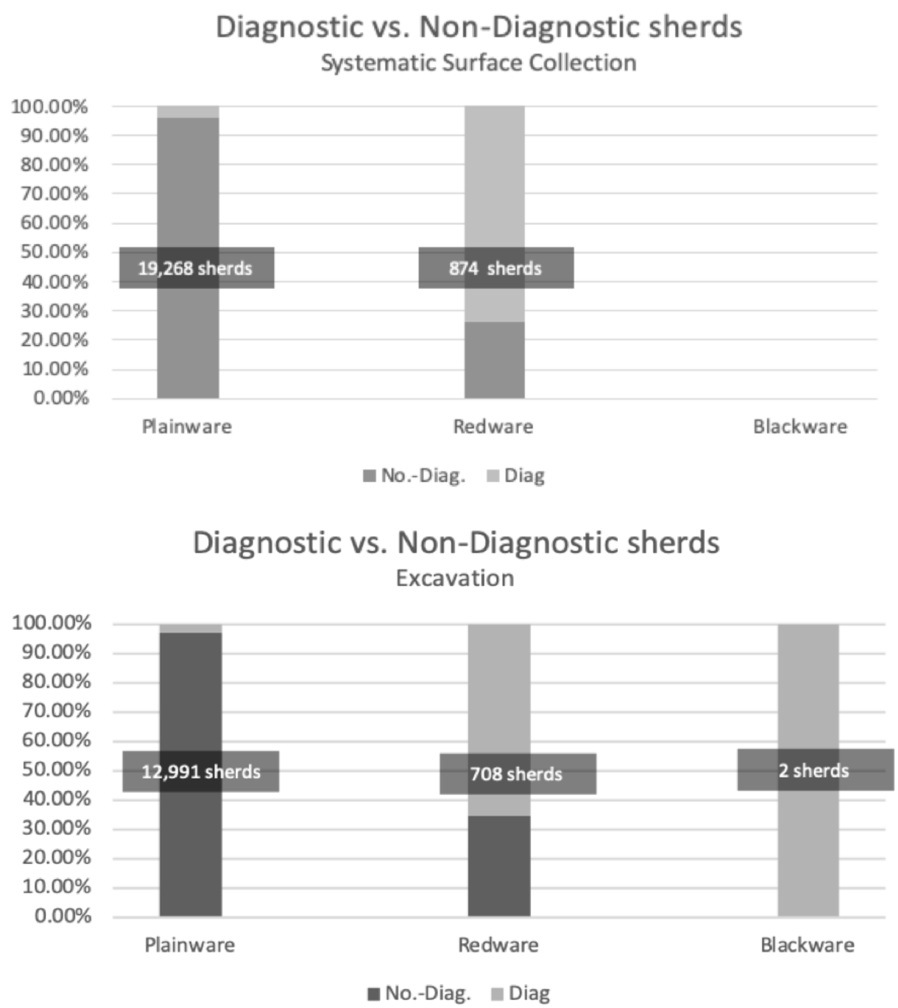

Figure 111. Charts illustrating the overall breakdown of diagnostic versus non-diagnostic sherds in each of the major three ware categories for both systematic surface collection assemblage as well as the excavation assemblage.

All sherds, and particularly diagnostic sherds, are given far more discussion below in the presentation of the ceramic attribute analysis. The breakdowns of diagnostic vs. non-diagnostic depicted above (Figure 111), illustrate above all else, that due to the non-technologically functional embellishments added to redware vessel types, primarily in the form of painted motifs, far more of their sherds, and as a result more of the original vessels themselves, provide important cultural cues, than their plainware counterparts.

Ceramic Attribute Analysis

Finally, a portion of the Cerro San Antonio ceramic assemblage would be subjected to the far more intensive attribute analysis, in which several measurements and other observations would be recorded for each individual sherd. As noted above, diagnostic sherds would yield about twice as many formal attribute data points as non-diagnostic sherds, but both types were subjected to this analysis. However, due to time constrains during lab work, attribute analysis was only completed for the ceramic assemblages collected as specialized surface spot finds (n = 117 sherds) and the entire excavation collection (n = 10,128 sherds), with only a few select sherds from the systematic surface collection analyzed (n = 45). Finally, a select number of diagnostic sherds were drawn and photographed (n = 175 sherds) . For this reason I utilize the excavation ceramic assemblage as the primary dataset but do bring in specimens from spot finds and other contexts where needed.

Attribute analysis of all sherds (both diag. and non-diag.) involved recording a number of very standard measurements. These included weights, maximum and minimum thickness, basic exterior/interior surface treatments, and the presences of burning or modification. However, diagnostics would also receive additional measurements, such as the diameter of rims and bases, thicknesses of handles and other vessel modifications, and of course any type of decoration, painted or otherwise. Most importantly, diagnostic sherds could also generally be assigned to a general vessel form type and often even be identified to more specific variants. Below I utilize the major vessel types as well as the already discussed major ware categories to organize the ceramic attribute results. While some vessel types and other major patterns in attributes can be found in multiple ware categories, most are restricted to one ware type or another. As with the other ceramic results above, here I primarily describe the Cerro San Antonio assemblage on its own terms, only supplementing with descriptions of Tiwanaku ceramics elsewhere for comparison, when necessary.

Plainware Vessel Types & Major Attributes

In the attribute analysis stage, sherds categorized as plainware came almost exclusively from the excavated assemblage (just 18 plainware sherds were collected as spot finds). As noted above, this included 12,991 individual sherds, of which just over 4% or 550 individual sherds were deemed diagnostic. However, before moving onto discussing the forms and other attributes represented by these diagnostic sherds, there was some significant data gathered from the non-diagnostics as well.

First, in addition to making up the bulk of the excavated ceramic assemblage, the plainware non-diagnostic sherds were the largest categories, by weight and volume, of all materials in the excavation collection. The 12,441 non-diagnostic plainware sherds weighed approximately 104.92 kilograms or almost 69% of total weight of all materials collected in the 2016 and 2018-19 excavations (not including soil samples). Significantly, over 95% of non-diagnostic sherds show some signs of use-based burning. This could range from slight fire flare marks to true sooting and carbon build-up on vessel surfaces. Almost always this burning was observed on the exterior, although 7.5% of these sherds also showed evidence for burning on what would have been vessel interiors and a little over 4% of burnt sherds were truly charred. By definition, 100% of the non-diagnostic sherds were body sherds, and had an average minimum thickness of 5.88mm and an average maximum thickness of 7.94mm, however sherds could be found as thin as 4mm and as thick as 15mm. These body sherds almost certainly derived almost exclusively from olla vessel forms (see below), but again, could not definitely be assigned to one vessel type or another.

The remaining 550 diagnostic plainware sherds could accurately be assigned to at least a general vessel form category, if not a more specific form variant. These general and specific ceramic vessel forms represented three even broader functional classes of ceramics, defined here as: Utilitarian (ollas, tinajas), Ritual (incensario, hollow-based libation bowls, miniatures), and Reutilized Sherds (disks, ruecas, and polishers).

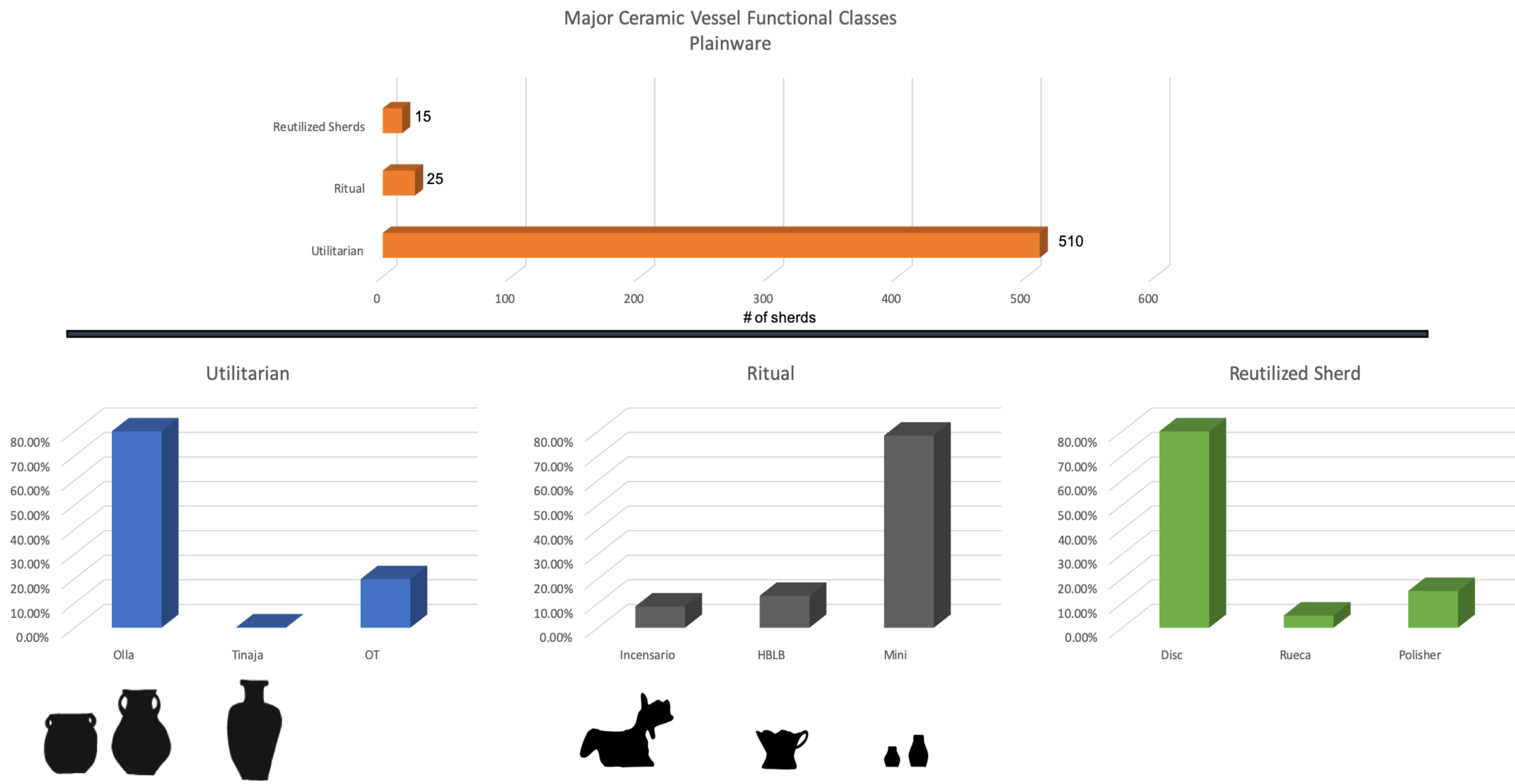

Figure 112. Simple frequency charts illustrating the breakdown of plainware diagnostic sherds into (top) major functional classes of plainware vessels, and (bottom) individual breakdowns of vessel forms within each major functional class (Note: also included on bottom are simplified profiles of some of the more common form variants).

While the patterns illustrated in Figure 112 above will be delineated in more detail, at least one major trend is worth highlighting. Sherds representing vessels that fall into the utilitarian vessel class made up the vast majority (92.72%) of the diagnostic plainware assemblage. Again, this correlates with the high prevalence of plainware non-diagnostic body sherds, that are assumed to derive almost entirely of vessels from the utilitarian vessel class.

Ollas. Ollas[170] were certainly the most common type of plainware vessel as identified in the diagnostic sherd attribute analysis, but also likely the most ubiquitous vessel type in the Tiwanaku ceramic assemblage more generally. These utilitarian vessels were likely used for a variety of domestic tasks, particularly cooking and storage. The general olla form is a globular plainware vessel with relatively minimally pronounced shoulders, restricted necks and flaring rims, creating a generally open-mouthed vessel. While no complete ollas were recovered in the L1 assemblage, full Tiwanaku ollas recovered elsewhere suggest two major variants[171] of this general form defined most utilitarian assemblages: one was a stouter olla form with very wide mouth and almost no shoulder and the other was a taller, “pear-shaped” olla form with a longer, more-restricted neck and more pronounced shoulder (Goldstein 1989:64-65; Janusek 2003:57-60). Significantly, because almost every component of an olla vessel (base, body, handles, shoulder) were similar to those of tinajas (see below), only diagnostic rim fragments could be definitively identified as belonging to ollas. However, given that only a single tinaja rim was identified in the excavation assemblage, it is assumed that most sherds identified as OT (olla-tinaja) derived from ollas and are also discussed here.

As noted above, sherds containing portions of vessel rims were the only sherds that

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[170] Ollas were referred to as slope-sided jars in Tiwanaku contexts in Moquegua (Goldstein 1989:64-65), fermentation jars at the site of Tiwanaku (Ryden 1947:2), and are called *phuccu* in modern Aymara (Janusek 2003:58).

[171] These reference Janusek and Alconini’s Olla Type 1.1 and 1.2 vessel forms from Tiahuanaco (Alconini 1992; Janusek 2003).

were definitively deriving from ollas. Tiwanaku olla rims were most frequently moderately flared and could vary in overall thickness, averaging between 5.89mm and 7.85mm in thickness. All olla rims appear to have been wiped pre-firing but only received minor burning on exteriors, normally limited to where the rim meets the vessel neck. Importantly, while all olla rims would take this same basic flaring form and construction, seven (7) major variants or types of olla rims were identified in the L1 excavation assemblage.

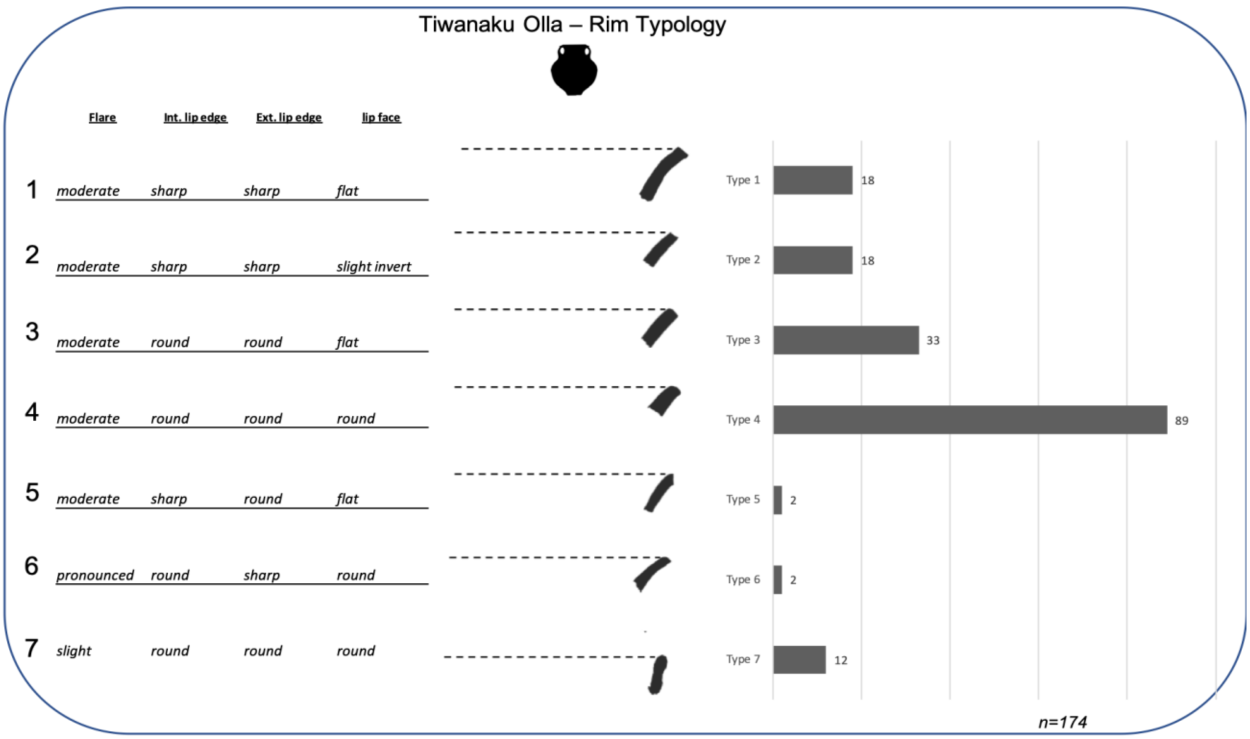

Figure 113. Graphic (center) illustrating the seven types of olla rim as encountered in the L1 excavation collection, including (left) a brief description and (right) chart depicting type frequencies.

It is difficult to say if these olla rim variants were more than simply an aesthetic choice, but all were made with relatively similar basic technological approach. All were made by shaping and smoothing the final coil of a completed vessel. However, those with sharp lip edges, and particularly with flat lip faces were also finished using a shaping tool whereas the rounded rim variants were simple shaped via pinching and smoothing directly with the fingers. This may be why the completely rounded rim variant (Type 4) makes up just over half (51.1%) of the assemblage, as the simple hand-shaped rim variants involved one less step in the final vessel construction process. That is not to say that the more sharp-lipped variants were underrepresented. Two of the most intensively shaped rim variants, specifically Type 1 and Type 2 made up more than 20% of the assemblage (Figure 113).

The overall sizes of ollas could vary quite drastically. Both average and median olla rim diameter would be approximately 17cm, with the most common (mode) diameter being 20cm. Based on rim diameter two major other major variants of olla can be discerned, and though arbitrary can be telling of function and other technological choices. Large ollas were considered those with rim diameters of 12cm or greater, with small ollas being considered those with rim diameters of less than 12cm. In this breakdown large ollas made up just under 3/4 (74.7%) of the collected olla rims.

Most ollas likely had two handles, situated parallel from each other. Handles were almost always located towards the top of the vessel. The most common type (88.2% of all handles), called strap handles, were generally broad (average: 25-30mm wide), flat (average 8-12 thick) handles that connected from the upper body (normally the upper shoulder or lower neck) either directly to the rim (direct) or to the upper neck, just 1-2cm below the rim (indirect) (Figure 113). While only handle sherds that also contain at least a portion of the rim could be identified as direct or indirect, of those sherds that could be discerned 69 were the direct variety. Less common (11.8% of all handles), though still well-represented were nub handles. Nub handles were essentially protuberances (protruding anywhere from 10-30mm from vessel wall) that were pinched flat at the end, and generally rounded. These nub handles came in two major variants - vertical nubs and horizontal nubs. The majority were vertical nubs, which were almost always located somewhere on the vessel neck, often just below the rim. Horizontal nubs were also most frequently found on the neck of ollas but were found on at least 1 body sherd as well. Finally, while most nubs appear to have been part of the original vessel design, two examples from L1 assemblage (1 from spot finds and 1 from excavation) show evidence of broken strap handles be ground into horizontal nub handles.

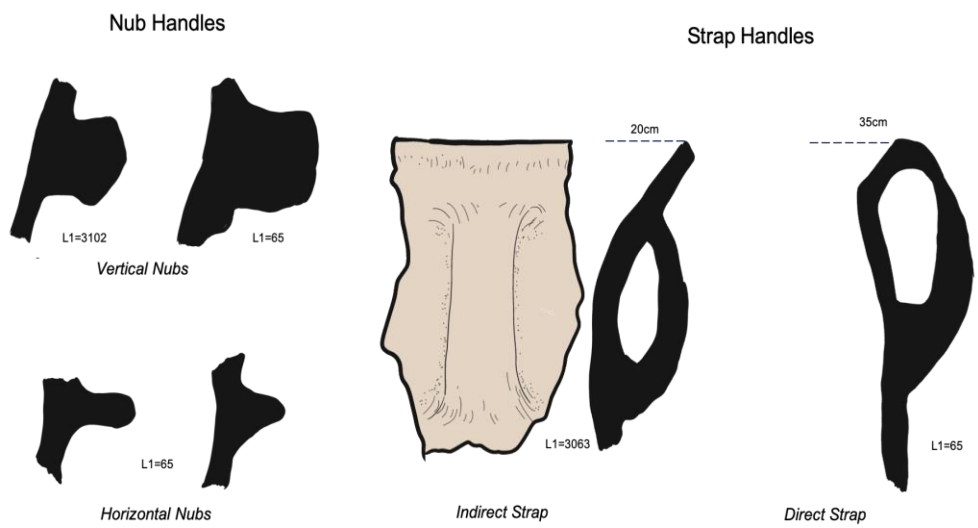

Figure 114. Examples of olla handle types, including variants of (left) nub handles and (right) strap handles.

The third major diagnostic morphological element from ollas were sherds from the base of the vessel. Like handles these major base forms and variants were also present in tinajas, so were not technically exclusive to ollas. That said, these utilitarian plainware vessel bases came in three major variants: direct, indirect, and rounded (Figure 115). Both the direct and indirect variants had completed flat bases and only differed in how the vessel body connected to the level platform base. The most common was the direct type (64% of all recovered base sherds), in which the globular olla body meets the base directly. The indirect type actually had two sub-variants, the true indirect and the more pronounced pedestaled base, which made up 32% of recovered bases. In both variants the vessel body would be slightly taped and placed on a coiled-up base (normally between 10-20mm in height). Both of these flat-bottomed base variants had average diameters of 8 to12cm. Finally, rounded base ollas, that would have needed a stand or foundation hole to stand upright, were just represented by a single example.

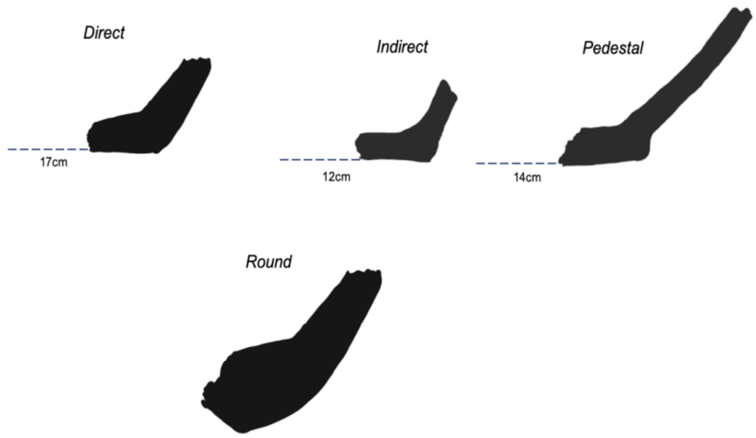

Figure 115. Example profile drawing of olla base sherd types as found in the Cerro San Antonio (L1) ceramic assemblage.

Finally, a rare morphological element only present in a single (1) olla sherd from the excavated ceramic assemblage, but observed and collected as spot finds from a number of contexts at L1, are modelled embellishments. The most common manifestation of this is the addition of modelled elements to relatively standard olla forms, that result in the appearance of a human(oid) face[172]. These can range from relatively clear representations of female faces to more simplified versions, only indicating rudimentary eyes and sometimes a protruding nose. Examples falling at both ends of this spectrum were located at L1 (Figure 116).

[172] These are distinct from the portrait head keros described in the Redware vessel typology below.

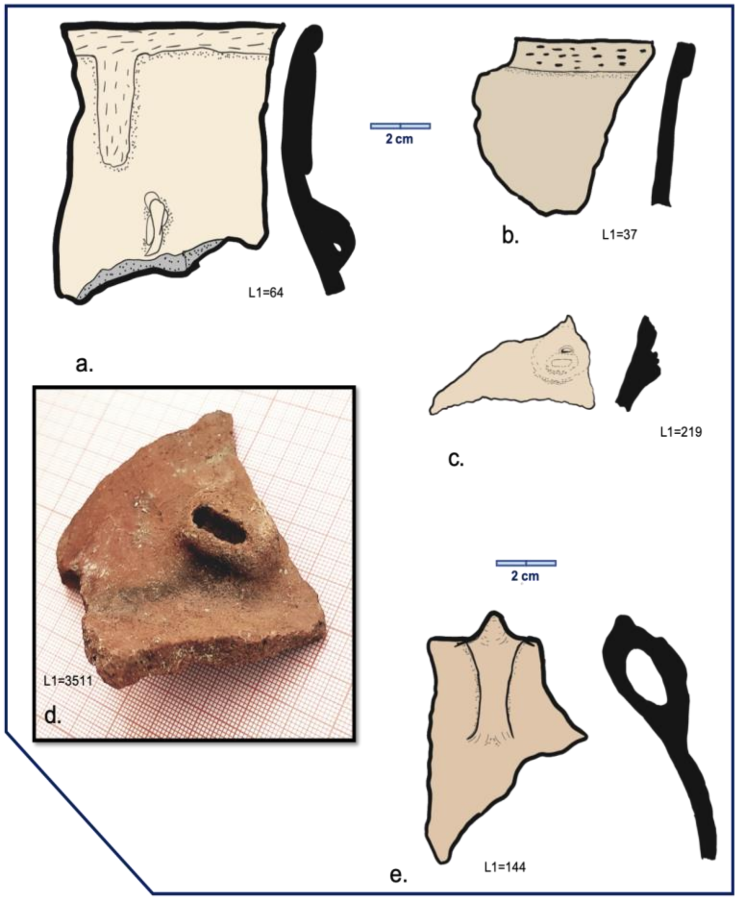

Figure 116. Examples of modelled olla sherds, including: (a) drawing/profile of large sherd of olla rim with braided-hair modelling and incising with detailed modelled ear (including hold for ear-spool), (b) drawing/profile an additional rim sherd with braid modelling/incising, (c) drawing/profile of modelled lower half of face - including chin and mouth, (d) photo of another modelled face element (likely mouth or eye), and drawing/profile of sherd with unique protuberance on strap handle.

A number of the more finely crafted examples of the modelled ollas found at L1 should clear representations of human hair, modelled along the vessel rim. This includes small incising to for detail and at least one (1) example has a parallel modelled hairline running down the vessel neck, representing braids. As will be noted more later, this form of utilitarian vessel embellishment, with elements that appear to represent female forms have been noted elsewhere in the Tiwanaku sphere, particularly in the Osmore (Goldstein 1989:251-253).

Tinajas. Tinajas represent the other primary form in the utilitarian class of plainware vessel. Like ollas, tinajas are generally globular in form with only slightly pronounced shoulders. However, the neck of tinajas tend to be longer and far more restricted than ollas with a much more pronounced, and even extreme, flare of the rim. It is generally believed that these vessels were used exclusively for storage, primarily of liquids, but other foodstuffs as well (Janusek 2003:58-60). As has already been noted, because the general body form and most diagnostic morphological elements (handles and bases are extremely similar between ollas and tinajas, it can be difficult to parse out the frequency of each vessel type. However, tinaja rims do differ sharply from those found in ollas, allowing for them to be differentiated. Tinaja rims tend to have an extreme flare and are often rolled and flattened at the rim face (Figure 117).

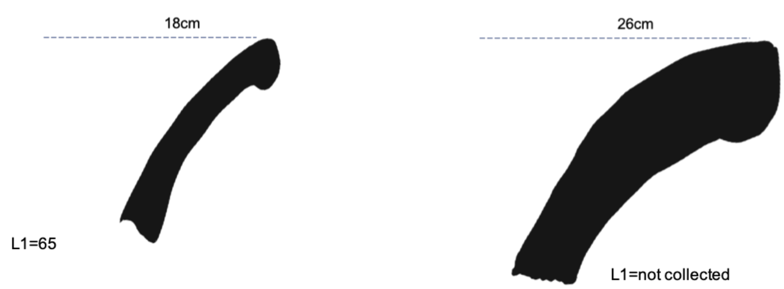

Figure 117. Profile drawings of tinaja rim sherds identified at Cerro San Antonio (L1).

In spite of these vessel types being common in most Tiwanaku assemblages, only a single definitive tinaja rim sherd was recovered in the L1 excavation ceramic assemblage, with only a few more observed or collected as spot finds. This makes tinajas a decidedly rare form type in the broader Cerro San Antonio Tiwanaku ceramic assemblage.

Incensarios. Modelled incense burners or braziers, called incensarios here, were another Tiwanaku vessel type, that was made using the plainware ware style. These vessels tended to be oblong, straight or slightly incurving walls with flat bases. Often the rims of incensarios would be scalloped with pronounced lobes protruding from a flattened rim. These incensarios were also frequently were adorned with more elaborate modelled elements including puma heads with square collars, avian, camelid, and a variety of other unique forms have also been recovered in many Tiwanaku contexts. These vessels were often also elaborately painted with motifs relating to the broader modelled form. Interestingly, for incensarios often it appears this painting was done post-firing. These vessel types were also decidedly rare in the L1 ceramic collection. Just two sherds from incensarios were identified in the excavated assemblage and only a few small fragments were noted in surface observations in general.

Hollow-Based Libation Bowls. Hollow-Based Libation Bowls (HBLBs)[173] were another form of brazier found throughout Tiwanaku contexts. HBLBs can be found in both plainware and redware variants, but because more of the L1 assemblage falls into the plainware category, they are described here. These vessels had pronounced flaring rims, leading to a tapered center, which then proceeded to flare out again at the base (effectively a stout hourglass shape, open at either end). As the name indicates the base remained hollow/open at both ends with a dividing segment that ran through the center of the vessel. This likely allowed for burning materials to be secured in the vessel, while keeping the base cool for transporting and placing on surfaces.

While not as rare as the modelled incensarios, still only eight (8) HBLB sherds were recovered in the excavation assemblage and only a handful of other examples were identified in surface collections. Significantly, 40% of these examples showed evidence for burning on the interiors - further supporting the interpretation they were used as braziers and even lamps (Janusek 2003:71).

Miniatures. Miniatures, often referred to simply as minis, represent miniature versions of standard utilitarian vessel forms, almost always ollas. Minis can come in a number of varieties and range in construction from low- or even unfired pinch pots to more finely

[173] These are also referred to as sahumadores (Janusek 2003:70-71).

constructed and standard-fired versions. Most pinch-pot versions were neckless and even had incurving rims and rounded bases. However, the more carefully constructed, and often more highly-fired variants often took on the more typical Tiwanaku utilitarian forms.

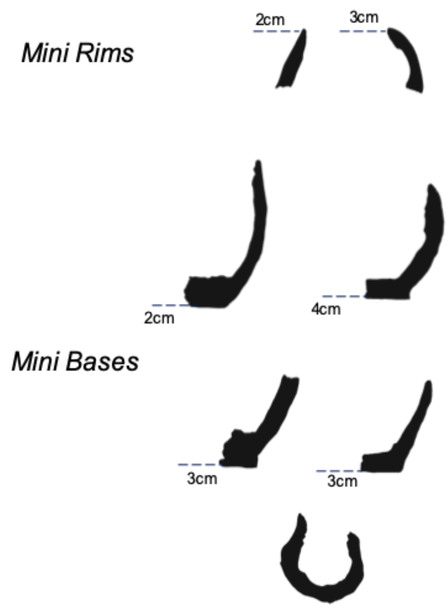

Figure 118. Profiles of miniature vessels (minis) found in Test Unit L1A-2016-5.

These types of vessels have been found in both domestic and mortuary Tiwanaku contexts but are associated most closely with more ceremonial or public architecture contexts. This holds true for the L1 assemblage, in which 88% of recovered miniature fragments were associated with Special Structure L1A-1 and Special Structure L1A-2 - both deemed to have at least some non-domestic functions.

Reutilized Sherds. The final major class of diagnostics within the broader plainware category are actually not a class of vessel, but reutilized sherds. These represent just that, plainware sherds which have been modified to be used in some other task. Almost always this modification involved grinding or smoothing of the break edges. Three forms defined the assemblage of reutilized sherds: disks, ruecas, and polishers.

Figure 119. Reutilized sherds - photos of ruecas (spindle whirls) and disks.

Both disks and ruecas were sherds that were ground into roughly circular shapes (anywhere between 25-55mm in width). Disks were left as circular ceramic fragments but ruecas (spindle whirls), had a single hole ground into the center. Finally, polishers were sherds of various sizes that tended to have just a single edge ground smooth from use.

Redware Vessel Types & Major Attributes

Sherds deriving from redware ceramic vessels received some of the most intensive focus during the attribute analysis, as they frequently contained additional decorative elements, particularly painted motifs, that allowed for stylistic observations to be made. The bulk of the redware samples analyzed here derived from the excavation collection (n = 708 sherds), but an additional 99 spot find specimen collections (containing an additional 217 individual redware sherds) were also processed in the attribute analysis and noted here. Finally, 18 complete vessels recovered during the formal arrest of looters at Cerro San Antonio are also referenced here.

Unlike plainware vessels in which the vast majority of the excavation assemblage would be non-diagnostic body sherds, just under one-third (32.4%) of the redware assemblage were non-diagnostic. As noted above, this is due to the fact that in addition to the standard diagnostic morphological elements (rim, base, etc.), redware sherds[174], frequently contained painted decoration, also making them diagnostic. In fact. while some of the 230 non-diagnostic redware sherds were simply undecorated body sherds, many were just very ablated or otherwise weathered with most of the surface slip and any decoration stripped away[175]. For this reason, non-diagnostic body sherds were not extremely useful and sherd thickness and other metrics were skewed due to sherd damage, but of intact sherds of this type averaged approximately 6.92mm in thickness with relatively standard paste composition and surface treatment.

Two-thirds of the redware assemblage, or 478 individual sherds (67.6%), from excavated contexts were deemed diagnostic. Like the plainware diagnostics, almost all diagnostics could accurately be assigned to at least a general vessel form category, if not a more specific form variant. These general and specific ceramic vessel forms represented three even broader functional classes of ceramics. The already noted Utilitarian (ollas and tinajas) and Ritual (HBLBs and minis) vessel classes were minimally represented in redware, but the vessel class of Serving (keros, tazóns, pitchers/bottles, escudillas, and bowls) vessels dominated the redware diagnostic assemblage.

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[174] This is particularly true of redware body sherds, as redware vessel bodies were often the primary location of decorative motifs.

[175] While very well fired and otherwise constructed the slip used for Tiwanaku redware vessels is ultimately prone to chipping off in semi-large segments when left exposed in the sun for extensive periods.

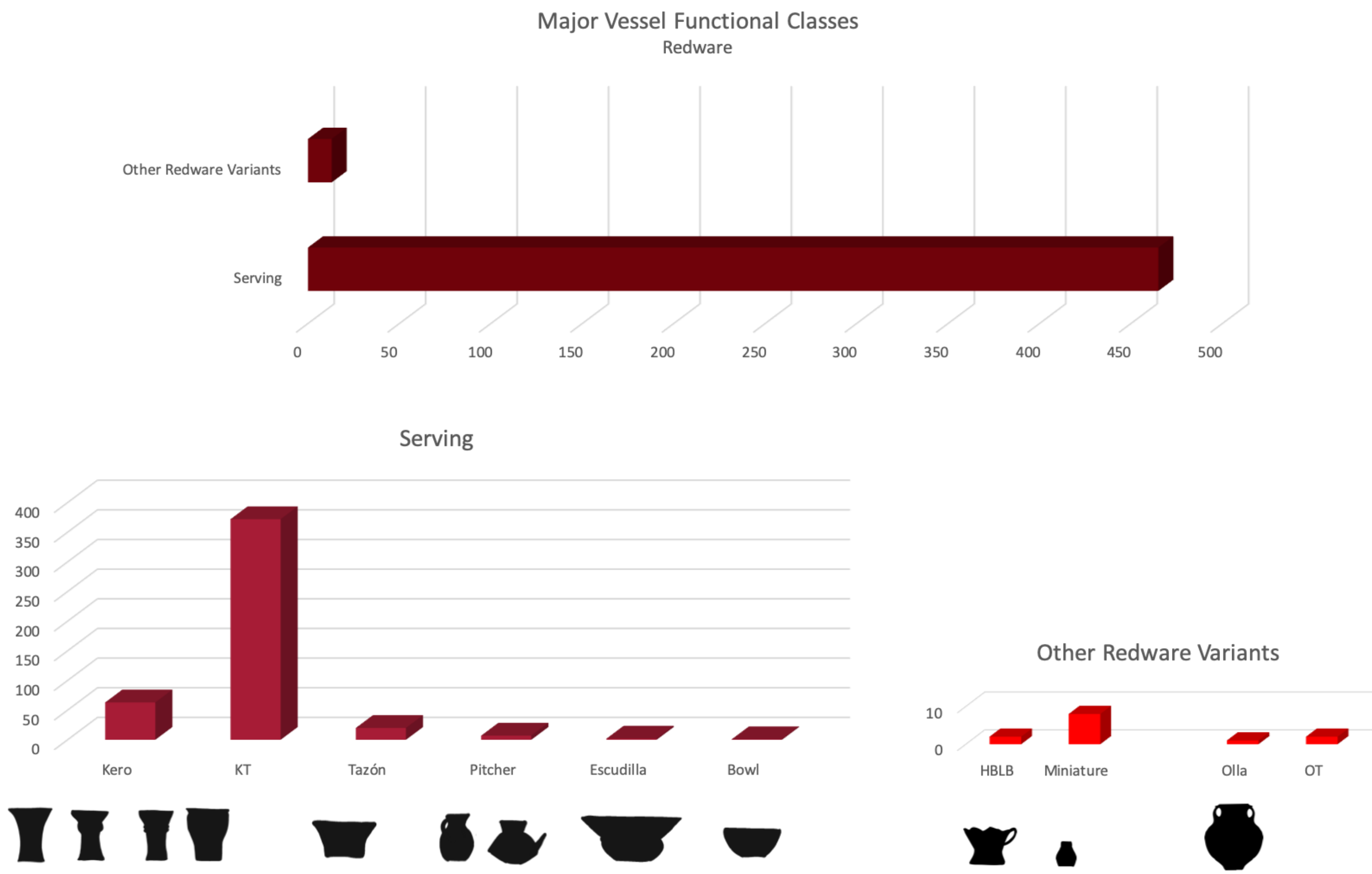


Figure 120. Frequencies of redware Diagnostic sherds (n=478) by vessel form in the L1 excavated assemblage.

Serving vessel sherds would constitute 97.2% of all diagnostic redware sherds recovered during excavation and 100% of the spot find sherds and complete vessels that will also be discussed here. 80% of the diagnostic sherds were assigned the form category KT (Kero-Tazón) because unfortunately, due to their morphological similarities (see below) sherds could not definitively be assigned to either the kero or tazón form type. Therefore, the general data gathered from these sherds is discussed with both form type descriptions below. In addition, while some descriptions of motifs and other decorative elements are discussed with form types when pertinent, more general description of redware motifs are discussed in the next subsection.

Keros. The most common type of redware vessel diagnostic sherd recovered at Cerro San Antonio was the kero. Keros were serving vessels used for serving and consuming beverages (e.g., Bray 2003). Keros are some of the most recognizably Tiwanaku ceramic vessels found throughout the South-Central Andes although related vessel forms were used extensively throughout the Central Andes more generally (Janusek 2003). This type of drinking goblet is most often associated with the consumption of the fermented drink, chicha (Goldstein 2003). While there are several variants of the kero they are generally defined morphologically by pronounced to extreme flared rims with a smooth taper down to a flat base platform. While there was some variation in rim shape, most kero rims were carefully shaped into a fine, but rounded lip edge. All keros were heavily burnished, using uniform up-down strokes. Kero interiors were generally cloth-smoothed while wet but left unburnished, with the exception of near the rim, where 1-4cm would receive a single application of the red slip used for vessel exteriors as well as at least some burnishing.

As noted above, while most keros conform to this flared-rim drinking goblet for, there were a number of variants that have been identified in a number of Tiwanaku contexts, and the same is true in Locumba. For this ceramic collection I have divided these variants into four major categories: Standard Keros, Banded Keros, Modelled Keros, and Shouldered Keros. Frequencies of these categories as vessels are a bit unreliable as any sherd that did not have a morphological element distinguishing it as banded, modelled, or shouldered was counted as standard.

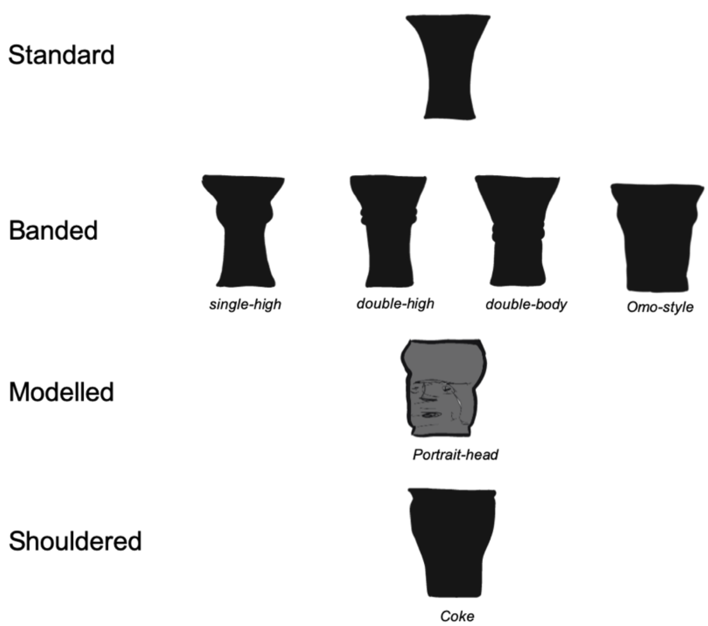


Figure 121. Typology of kero variants and sub-variants.

Standard keros match the general kero description above, with pronounced flaring rims that gently tapered to a flat base. The ratio between rim and base diameters was almost always approximately 2:1 with the most common measurements as 16-17cm rim diameters to 8-8.5cm base diameters. Height usually equals rim diameter. Sherds of these standard varieties, which were counted along with sherds of unknown kero varieties may be slightly overrepresented, as they made up the majority of the kero diagnostic sherds at 74.6%.

Figure 122. Photos of keros recovered from looters at Cerro San Antonio (L1) in possession of MNC Tacna.

Banded keros were the next most common kero variety among sherds in the L1 excavation assemblage, at just over 20% of the kero diagnostic sherds. Banded keros were defined by the presence of a raised band or bulge (often called a torus) that wraps around the circumference of the vessel. Four major subvariants of banded keros were found in the broader Cerro San Antonio assemblage, though only two of these subvariants were recovered in the excavation assemblage. The most common subvariant was the single-high banded kero, which had a single raised band found within the upper 1/3 of the vessel, almost always within 2cm of the rim. Double-banded keros, in which two raised bands weredirectly adjacent to one another, were also identified but only in a few surface spot finds. Finally, Omo-style keros (Goldstein 1989), defined by slightly wider and stouter overall forms and a single-high band were represented by a single spot-find of a semi-complete vessel in one of the Tiwanaku mortuary sectors (L1I). The technological approach of banded keros could differ, particularly in the single-banded subvariants. Some raised bands were actually a true torus, in which during vessel construction a wider segment/coil was added separately, as indicated by sharp interior marking and evidence in a few examples of scoring in vessel interiors. However, many raised band examples appear to have been made simply by pushing outward from the vessel interior, likely simply with the fingers. Finally, banded keros could also contain any number of design and motif elements, but almost always incorporated the Step-Stair motif as a primary design element.

Another major variant of keros includedmodelling. These modelling elements could be embellishments or elements added to standard kero forms or more substantial modelling which more substantially altered the vessel form. The most common subvariant in which modelled keros were found was in the form of portrait-head keros. Here broad-form keros would be modelled, often with apparent realism to model a human face. These vessels would often model the chin and mouth, nose, ears, brow, and a few other framing elements with other details painted on. with with slip painting. Just a single example of a portrait head kero sherd was found in excavations, but a number of modelled elements from these vessels were recovered in surface spot finds and systematic collection. Other modelled redware elements were recovered in excavations, including what may be a nose from a front-face god kero, but its fragmentary nature makes it difficult to determine.

Finally, the shoulder kero variant was represented by a single vessel type, what has been called the coke or coca-cola glass kero form in Tiwanaku contexts in the Osmore drainage (Goldstein 1985). These kero variants are distinguished by bulging outward from the rim before returning to the narrowing taper to a standard kero base. This gives coke or coca cola glass keros a slight shoulder as well as a very slightly restricted neck. Just two (2) sherds of this type were found in excavations with a few other examples located as surface spot finds.

Tazónes. Diagnostic sherds from Tazónes were the second most common type of redware vessel diagnostic sherds in the serving class. Tazónes are believed to have been used to serve both solid and liquid foodstuffs in a variety of contexts. These vessels were very similar in form to keros, with pronounced to extreme flared rims that smoothly tapered down to a base. In fact, tazónes are essentially just the top half of a kero. This is why while tazón rims are generally 16cm in circumference but bases are two centimeters wider than kero bases on average. It is for this reason and their differing profile angle that base sherds can often definitively be assigned to the kero or tazón forms.

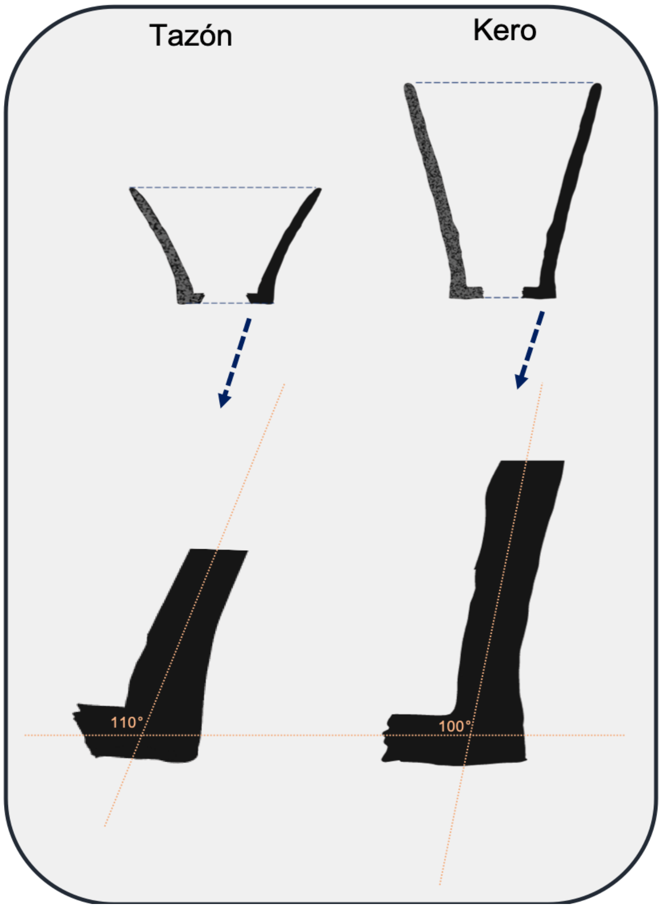


Figure 123. Example of kero and tazón base profile and the differing flare angle - almost always about a 10° difference. Note how kero bases invert slightly before proceeding smoothly up to the rim, whereas tazónes flare immediately at the base.

Tazónes came in two varieties. The standard variety was easily the most common, accounting for 99% of the tazon diagnostic sherd assemblage. Like keros, tazóns were almost always painted with at least a simple horizontal stripe near the vessel base and could contain any other motif elements, but the vertical and horizontal "S" and flamingo/ibis motifs were particularly common.

Figure 124. Photos of complete tazónes rescued from looted contexts at Cerro San Antonio (L1) by MNC Tacna.

The second subvariant is referred to as a recurved tazón (Janusek 2003a:65). Recurved tazónes were very similar in form to standard tazónes, but had a much less pronounced rim flare and more straight sided body, leading to a slightly rounded connection to a flat base, giving these vessels more of a standard bowl appearance. These variants were only found in a few spot finds.

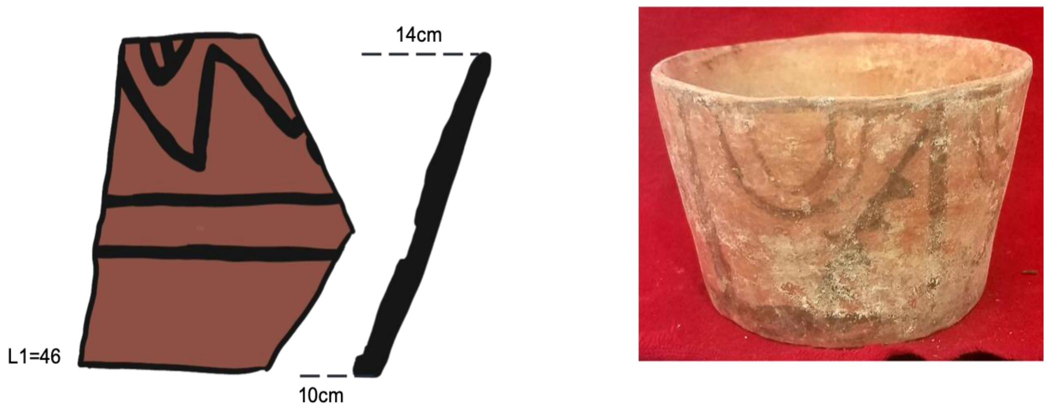


Figure 125. Examples of recurved tazónes as found at Cerro San Antonio: (right) complete vessel from materials recovered from looters and complete profile diagnostic sherd recovered as a spot find.

Pitchers. While making up only 1.5% of the redware diagnostic sherd assemblage, pitchers were the third most represented redware serving vessel sherd type. While several variants were identified, the most typical form for pitchers to take were moderate to pronounced flaring rims which connected directly to globular bodies with flat base platforms. The most common variant also had a narrow strap handle which would connect from the shoulder to just below the rim.

Figure 126. Examples of complete pitchers and diagnostic sherds recovered at Cerro San Antonio, including: (right) complete vessels recovered from looters in 2016, (center-right) sherds of standard pitchers, (center-left) a polychrome decorated sherd from a spouted-pitcher, and (left) a sherd from a bottle-style pitcher.

Rarer variants of pitchers included a more elaborate form in which a cylindrical spout (tube) was inserted directly into the vessel body, which tended to be more angular. These spouted pitchers were at times elaborately decorated with panel motifs and incorporated some of the rarer paint colors (particularly blue). Other pitcher variations were simpler and could even be considered bottles. These tended to be much smaller than the standard pitcher but and had more of a pear shape and may or may not have had a handle.

Other Serving Forms. Very few examples of diagnostic redware sherds were found, in any collection method, that didn't fall into the above-mentioned form types. However, two (2) sherds from the excavation assemblage were recovered that were believed to derive from an escudilla form. These escudilla redware vessels were extreme flared rim bowls, in which the interior of the extended flared rim would often be used for the primary vessel decoration.

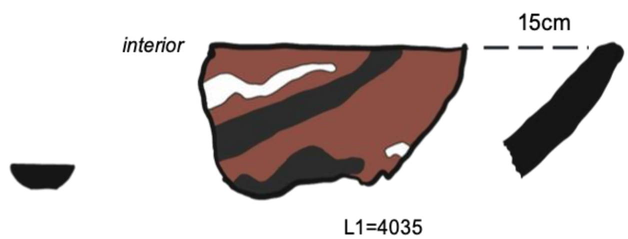


Figure 127. Drawing of rare example of Tiwanaku-style redware bowl with interior decoration.

An additional sherd (1) was recovered that was a true semispherical bowl, also with decoration on the interior. This sherd was heavily burnished on the rim but only lightly burnished on the decorated interior.

Other Redware Forms. Finally, a few forms that have already been described in the plainware subsection were also found with redware variants. These included two (2) sherds of a redware hollow-based libation bowl or incensario. Also, eight (8) sherds from a single, well-fired miniature vessel, which had the typical redware slip but was not burnished like typical redware serving wares. Importantly this vessel included a modelled face on the neck. This face was more rudimentary than most modelled plainware variants, with two slight, round indents for eyes and a small protruding, roughly triangular nose. This was a unique find with no other similar vessels found at L1.

Redware Painted Designs & Motifs

A significant element of almost all redware vessel forms was painted decoration. While the major technological aspects, including colors utilized and overall production process, are described above, it is worth noting some general trends in the designs and more articulated motifs found in the Cerro San Antonio ceramic assemblage. This is not meant to be an exhaustive review of Tiwanaku iconography or a comprehensive description of every element represented at L1, but rather a general reference for the major motifs that were found throughout the Middle Horizon-affiliated sectors at Cerro San Antonio.

However, before describing some of the specific repeating design element and motifs it is worth noting some general trends in the overall stylistic approach as observed in Locumba. Significantly, almost any stylistic manifestation that has been observed in the Tiwanaku sphere, has also been identified at L1. This includes limited examples of Early Middle Horizon Tiwanaku styles, including more fine-line figural motifs with specific geometric elements, like volutes and other spirals. Far more of the assemblage is defined by Late Middle Horizon Tiwanaku styles that include more abstracted but uniform geometric design elements, often articulated into panels, including step-stair motifs. Also included in the L1 assemblage were even more abstracted versions of these Tiwanaku geometric motifs, often far more simplified and even sloppy in application. These more rustic variants may be associated with the Terminal Middle Horizon and even continuance of Tiwanaku symbolic elements into the Late Intermediate Period in Tumilaca and Cabuza sub-variants (e.g., Owen 1993:358-386; Uribe 1999:199). More on the temporal sequencing of these design elements and how they were spatially distributed at Cerro San Antonio is discussed in Section 3.

Figural Design Elements. Figural design elements and motifs took on almost exclusively animal forms. These zoomorphic elements always utilized black paint as the primary framing color but were frequently polychrome designs. Tiwanaku tended to used an additive style in their polychrome motifs, in which different elements and different colors were clearly applied at different times.

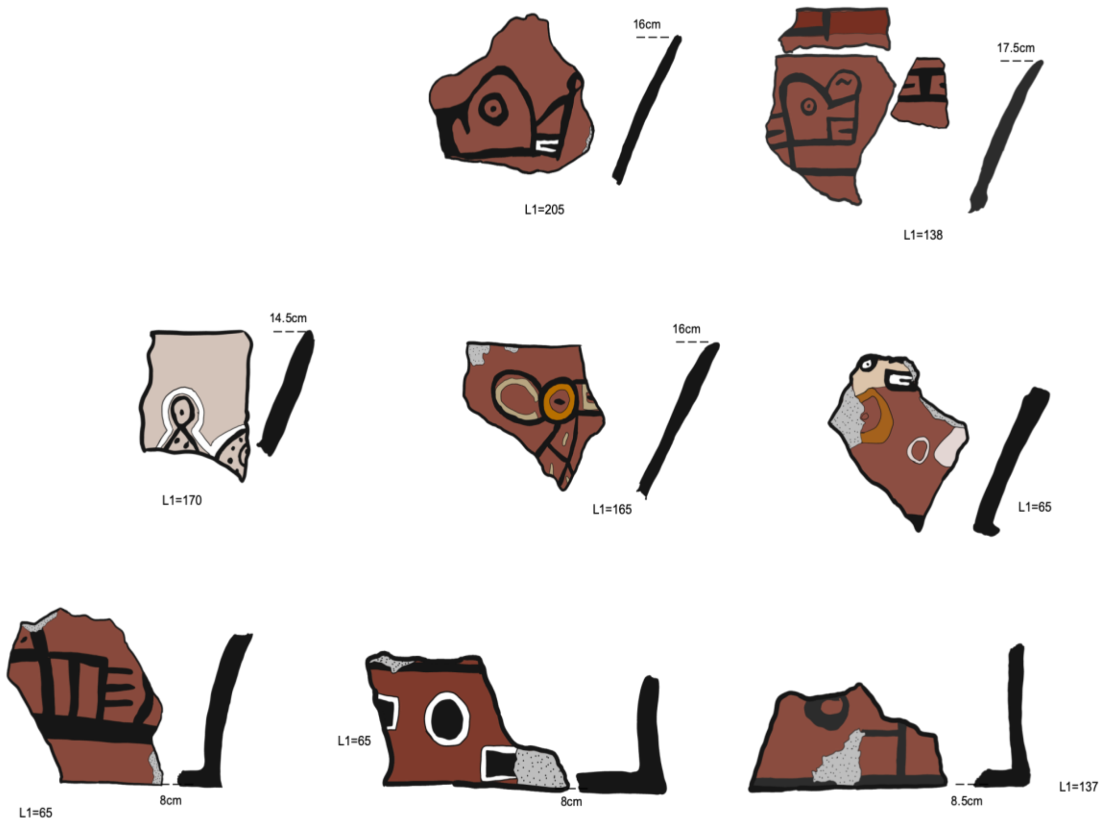


Figure 128. Examples of various feline-related figural design elements as found on redware serving vessel sherds at Cerro San Antonio.

Tiwanaku-style feline imagery was relatively rare but well distributed. No complete feline or puma panels were recovered but several articulated segments and many small elements were identified in a variety of contexts. A few examples of full body puma representations were identified in both the fine-line style, often associated with Early Middle Horizon Tiwanaku in the south-central highlands and the Omo-style in the middle Osmore (Goldstein 1989:66; 2009:242-243). These are often complex, polychrome motifs, likely illustrated in multiple stages of painting.

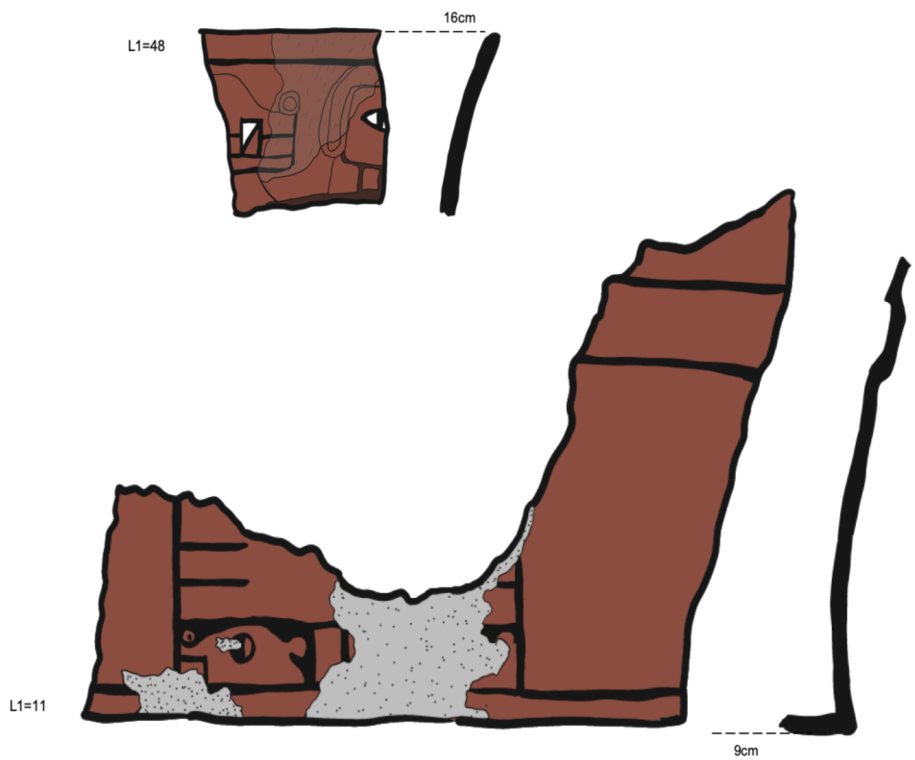


Figure 129. Examples of Omo-style feline figurative motifs.

At least one example of the diagnostic Omo-style split eye was identified at L1. More schematic, simplified versions of feline heads, sometimes even with crown-like elements were also located in a few contexts. Finally, even more stylized forms of felines, including isolated elements like the abstracted split feline eye, were often incorporated into more geometrically dominated panel designs.

Figure 130. Examples of avian elements, specifically triple tail-feather elements, from the L1 collection.

Avian representations were more common in the Cerro San Antonio assemblage. Some examples of the more abstracted Tiwanaku avian motifs, often thought to depict condors, were identified in limited fragments. Similar to the more complicated feline motifs, these were often polychrome with complicated design elements. These were frequently indicated by the diagnostic triple tail-feather element.

However, far more common were depictions of flamingos and ibis. These are almost always full-bodied depictions of these birds, almost always in simple black line style. While often defined simply as a flamingo motif, there are clearly other species, particularly ibis, depicted in these designs.

Figure 131. Examples of the flamingo and ibis motifs as recovered in the L1 diagnostic ceramic assemblage.

Other examples of zoomorphic figural elements include limited examples of more abstract images such as the “crab” element, (Goldstein 1985:121) which uses very similar design elements to those in the flamingo. As well as another more abstract head that may be another avian depiction or also possibly a fish representation.

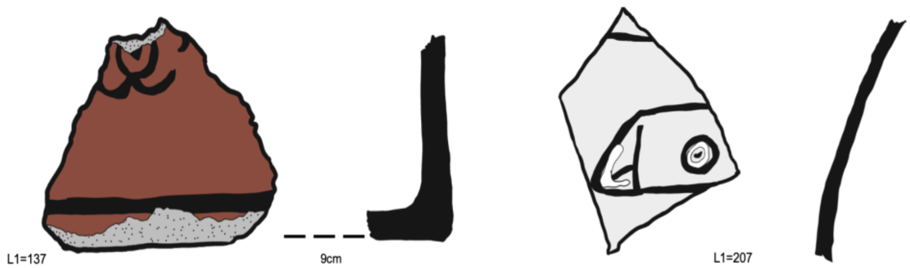


Figure 132. Examples of other figural zoomorphic iconographic elements: (left) the crab design and (right) an abstract depiction possibly a fish or another avian form.

The only anthropomorphic figural representation identified in the L1 assemblage is a very stylized face that is always incorporated to a repeating geometric motif. This is often referred to as the anticephalic head (Goldstein:1985:118) and comes in two primary variants. One variant the repeating geometric pattern is composed of opposing tringle set into a band with eyes represented by simple dots and mouths represented by a nested set of rectangular boxes. Another less common version would be similar but instead of triangles, would uses opposing segments of the step-stair motif (see below).

Figure 133. Examples of other non-zoomorphic figural representations, including (upper-right) eclipse motif and (lower-right, left) the anticephalic head motifs.

The only other non-zoomorphic figural element in the Cerro San Antonio assemblage is the eclipse motif (Goldstein 1985:138). This is represented as a black circle centered in a four-lobed white star, which as the name indicates, has been interpreted as representing an eclipse or some other celestial event. For that reason, it is included here, instead of the geometric category below.

Geometric Design Elements. Far more ubiquitous in painted motifs and designs were geometric elements. In fact, almost always, figural motifs included, or were even composed of a significant number of these more abstracted elements. As will be noted below, most of the following elements could be found as standalone design elements or found together as compound geometric motifs. Many geometric motifs were applied as panels, in which geometric elements would repeat. While there are many exceptions, symmetry was a general rule in Tiwanaku ceramic painted elements (i.e. a specific motif would often be seen repeated on the opposite side of the vessel).

Simple horizontal, and to a lesser degree vertical lines would often be the only decorative element on serving vessels. The most common single painted element recovered in the L1 ceramic assemblage were simple horizontal lines, painted in black, in an even band around serving vessels. These simple lines could range from 5-10mm in thickness and were most frequently found just above (2-5mm) the base and right along the rim[176]. Frequently horizontal stripes located near the vessel base would include a second stripe, painted in white or orange. Vertical and diagonal stripes or bands would often be used to frame panel motifs located on the body of many serving vessels. These vertical stripes, sometimes modified as wavy lines, would run between horizontal stripes near the base and rim. Other variants of simple line elements included a vertical or diagonal dashed line, always closely set between two solid vertical stripes were common elements in later more abstracted Tiwanaku-affiliated variants.

[176] It was not uncommon for the entire edge of the rim to be painted as well.

Another very common geometric element found frequently was a simple open circle with a dot in the center. This circle-dot element could be found isolated as a stand along decorative element or as part of other geometric compound motifs and even as part of figural designs. The circle-dot was again most commonly found in black but white variants were also fairly common. Less common were triangular or other angular geometric shapes also punctuated with a simple dot. In figural motifs the circle-dot would act as an eye or be used as more abstract filler.

Another reoccurring geometric motif was the cross. Cross elements could be found in simple variants, to intersecting perpendicular line segments. However, cross elements were also manifested as polychrome elements, with a fine-line cross of one color overlapping with a thicker, blocky cross of a second color. Some monochrome versions of the blocky cross variant would have a small circle left unpainted in the center, sometimes punctuated with a small dot. Like the circle-dot element, crosses could be found isolated or as part of ore elaborate geometric motifs.

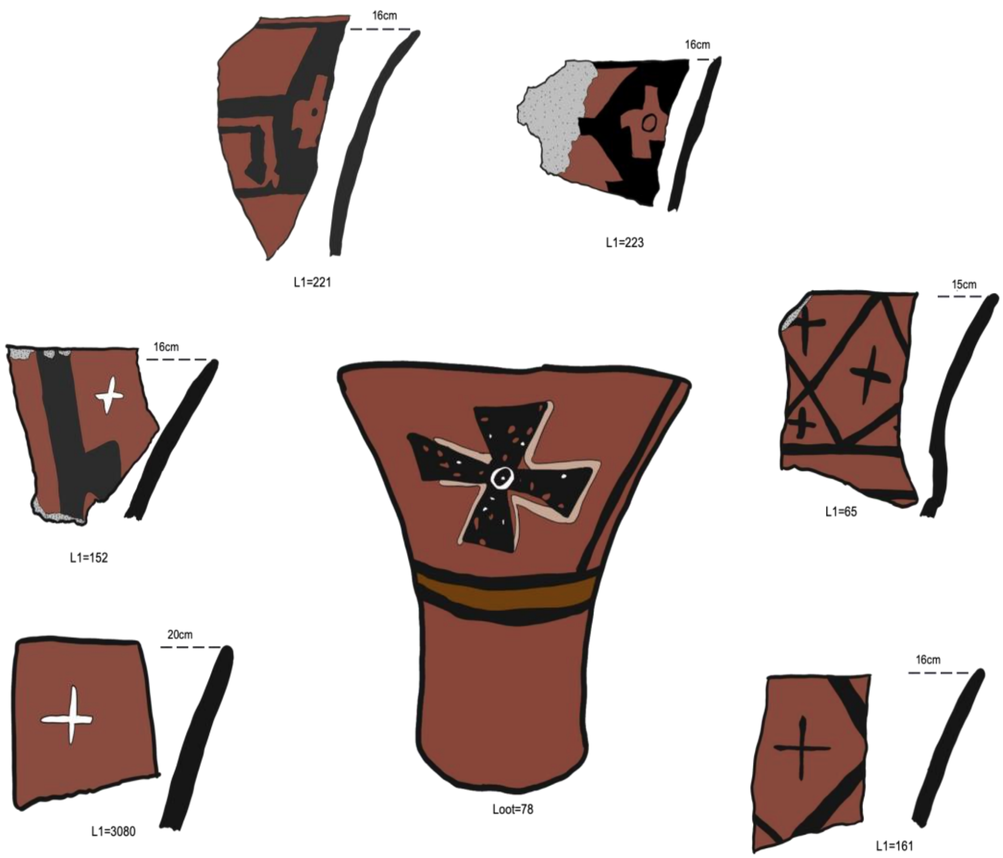


Figure 134. Examples of the cross motif.

Other than simple horizontal and vertical lines, one of the other primary framing elements used in compound geometric motifs was the step-stair motif. The basic form of this geometric element was a simple rectangular stair design, with at least two, but most frequently three steps. Two main variants of this basic design were found in the L1 assemblage, a fine or moderate line weight and a very thick blocky version. The blocky step-star variant was always found with banded keros. Step-stairs could be black monochrome elements or polychrome, often including orange, white, and dark red with the standard black. Sometimes these steps appear to have been partial representations of more elaborate cross designs. Step-stair motifs always came with other design elements, frequently punctuated with circle-dots or other geometric lines.

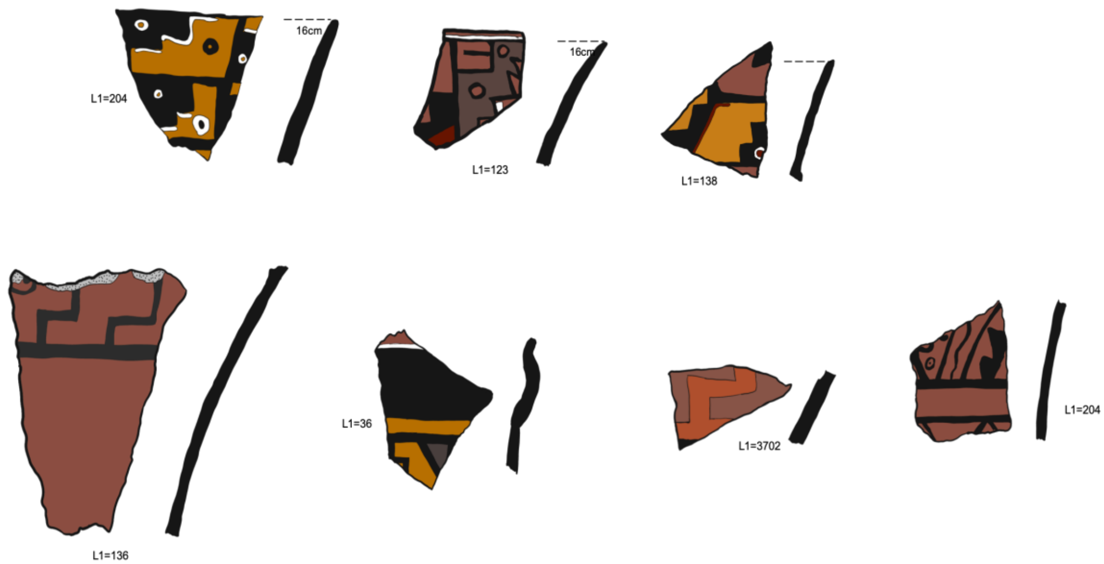


Figure 135. Examples of the step-stair motif as expressed in the Cerro San Antonio diagnostic ceramic assemblage.

The final geometric motif repeated with some frequency was the "S" motif. While it could come in variants, most recovered here were relatively fine-line. These S designs were most frequently oriented vertically but could also be found horizontally as well.

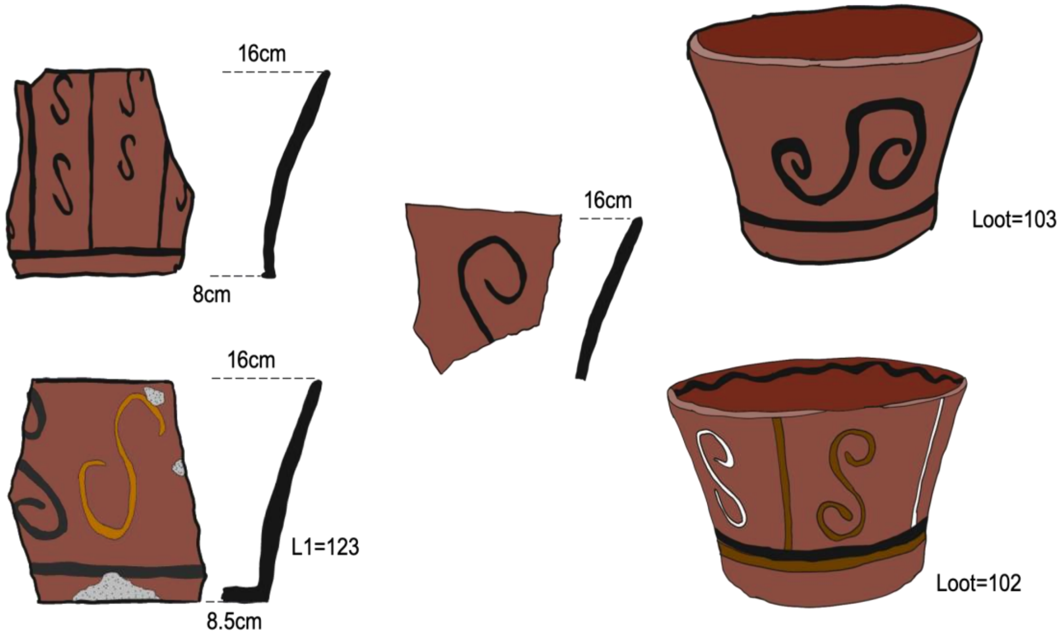


Figure 136. Examples of the "S" motif as found on ceramics from Cerro San Antonio.

Other geometric design elements and compound motifs included repeating angular chevron designs as well as more pronounced repeating diagonal line elements. Horizontal lines, punctuated with pendants were found in a number of sherds, as were interlinking chain designs (Figure 137; Goldstein 1985:135).

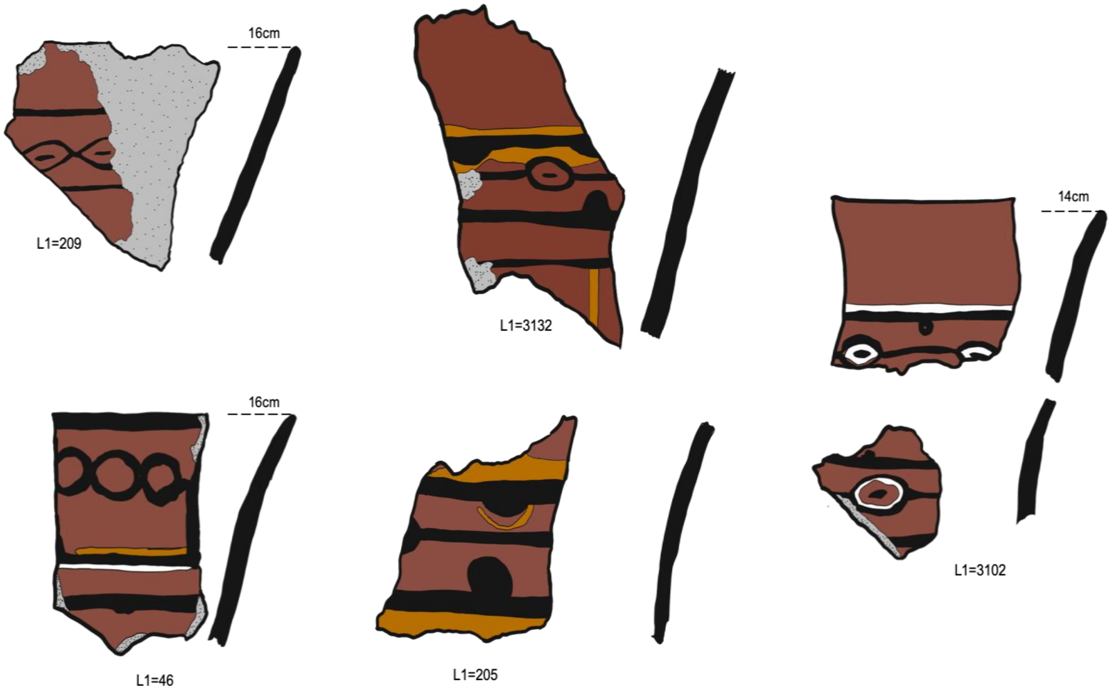


Figure 137. Examples of variations of the chain motif and pendant design elements.

Black fine-line cross-hatching or a net pattern was used as filler and sometimes to represent hair (on redware portrait head vessels). Fine-line spirals a rounded volute (Figure 138), often associated with the Omo-style ceramic suite in Moquegua (Goldstein 1985:87-90), were located in a number of contexts as well. Finally, a number of sherds with partial geometric elements in future analysis may be associated with other documented Tiwanaku motifs.

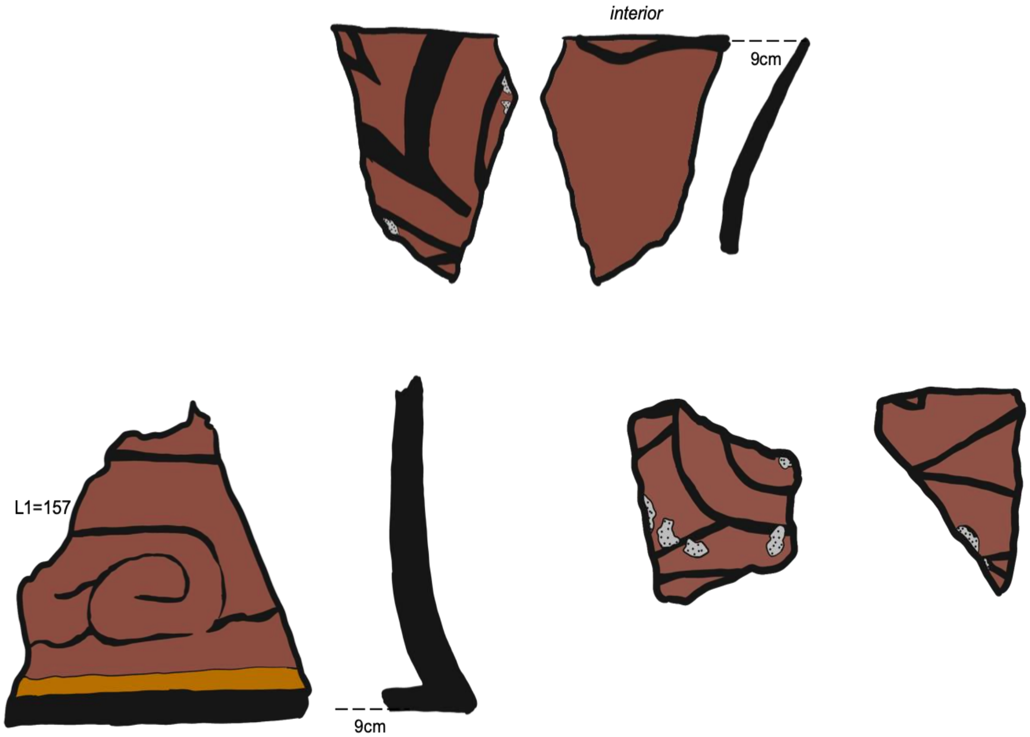


Figure 138. Examples of continuous and discrete volute design elements from the L1 collection.

It appears possible that figural elements were more common at first, but over time became not just increasingly replaced with geometric elements, but synthesized with them. .

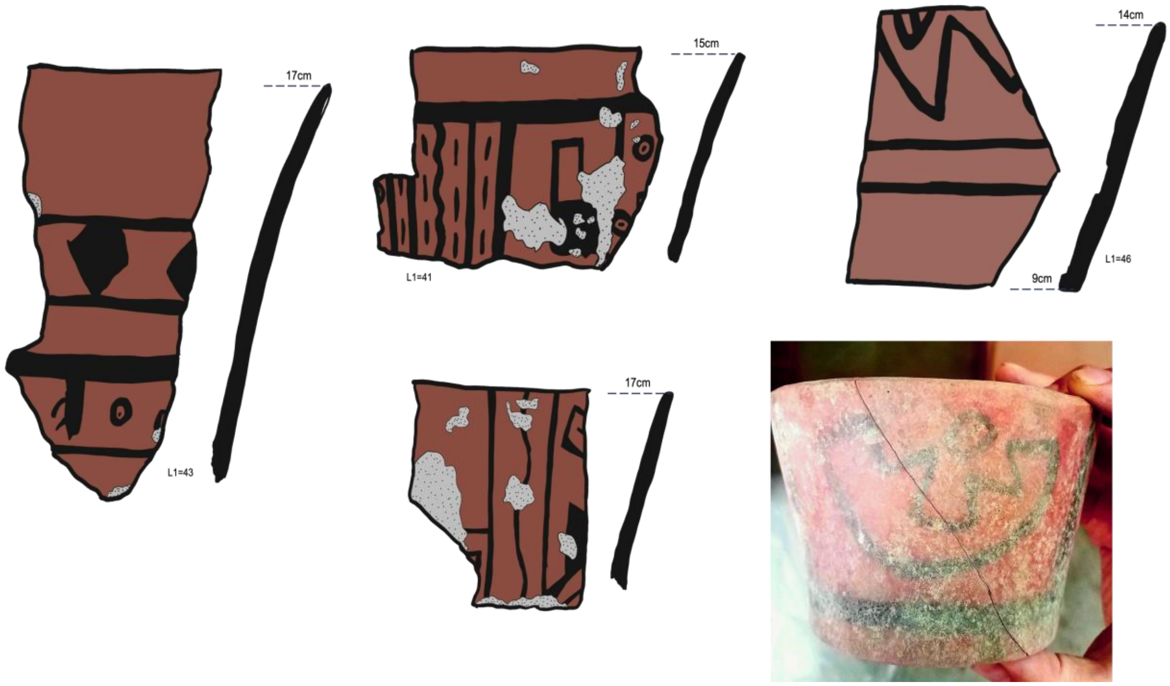


Figure 139. More rustic versions of typical Tiwanaku motifs, included conglomerated or synthesized design elements, often associated with Tumilaca and Cabuza affiliated communities.

A number of diagnostic sherds and even complete vessels at Cerro San Antonio show this manifestation of synthesized and ultimately simplified motifs (Figure 139).

Blackware Vessel Types & Major Attributes

The least represented major ware type in the Cerro San Antonio sherd assemblage was Tiwanaku blackware. In fact, only three (3) sherds, two (2) from excavation and one (1) as a surface spot find, were recovered at L1. All three (3) sherds appear to have been part of modelled vessels, likely blackware portrait head keros.

Ceramic Production & Repair

Finally, a number of ceramics and related materials recovered at L1 give some insight into how ceramic vessels were produced and repaired at the site. Cerro San Antonio actually has a number of large outcrops of a homogeneous, fine-grained clay, that when ground and wetted, would have made a viable paste-base. Obviously, mineral sourcing, such as LA-ICP-MS, is needed to confirm if this truly local clay source was used in Tiwanaku ceramics. However, ovaloid or roughly disc-shaped chunks of unfired clay were observed and collected in a number of domestic contexts in Sector L. These appear to be blocks of this locally-sourced clay which were ground down, resulting in the observed clay discs; possibly representing material left from prepping a ceramic mixture.

While no contexts were definitively identified as firing locations for ceramics, other evidence for ceramic production on-site include examples of what appear to have been failed ceramic production attempts. One particular example of this in Sector L was a cluster of redware vessel pot busts that appear to be unused and smashed vessels. These "wasters" appear to have been unviable vessels lost in firing, due to cracking because of improper or lack of temper, resulting in uneven, swollen vessel walls. Exposed profiles revealed a very homogeneous paste that had turned completely grey and even vitrified causing internal bubbling, which ruptured to the surface in some instances. Other ceramic production-related finds included reutilized sherds and more commonly medium to large-sized pebbles that were likely polishers used in burnishing, among other tasks. A final noted feature, related to ceramic production, were the presence of engraved marks etched onto some redware vessels. These marks almost always of redware serving vessels appear to have been etched on after firing (Goldstein 1985:65).

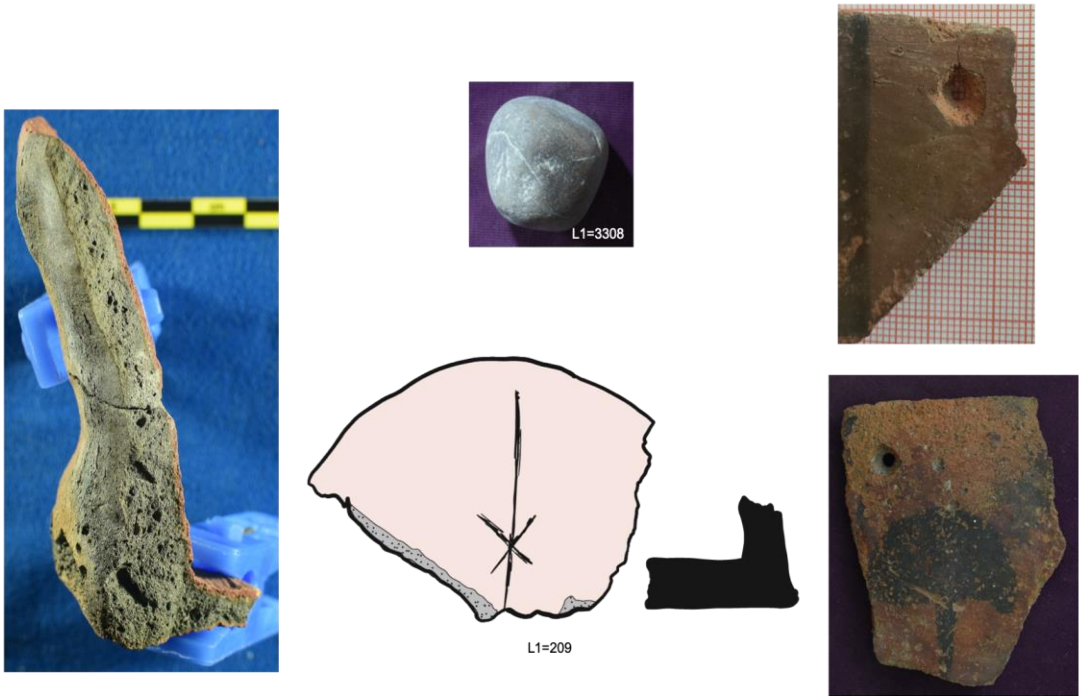


Figure 140. Examples of (right) sherds with repair holes, (center-top) a polisher stone used in ceramic burnishing, (center-bottom) drawing of base of a kero with post-firing, etched makers mark (left) a "waster" sherd from a failed ceramic firing event in which the firing temperature and/or paste mixture was incorrect leading to vessel vitrification and ultimate bursting.

Finally, ceramic repair, was dealt with by a single, standard technique. Individual holes (generally 2-6mm in diameter) would be ground on either side of the crack or damaged area. Then cord (generally vegetable-fiber twisted cord) would be strung through, bound, and likely sealed with some kind of botanic or animal fat-based mixture (though this is never preserved from archaeological examples). This general repair style was observed on all vessel types, from utilitarian plainware vessels to decorated redware serving vessels.

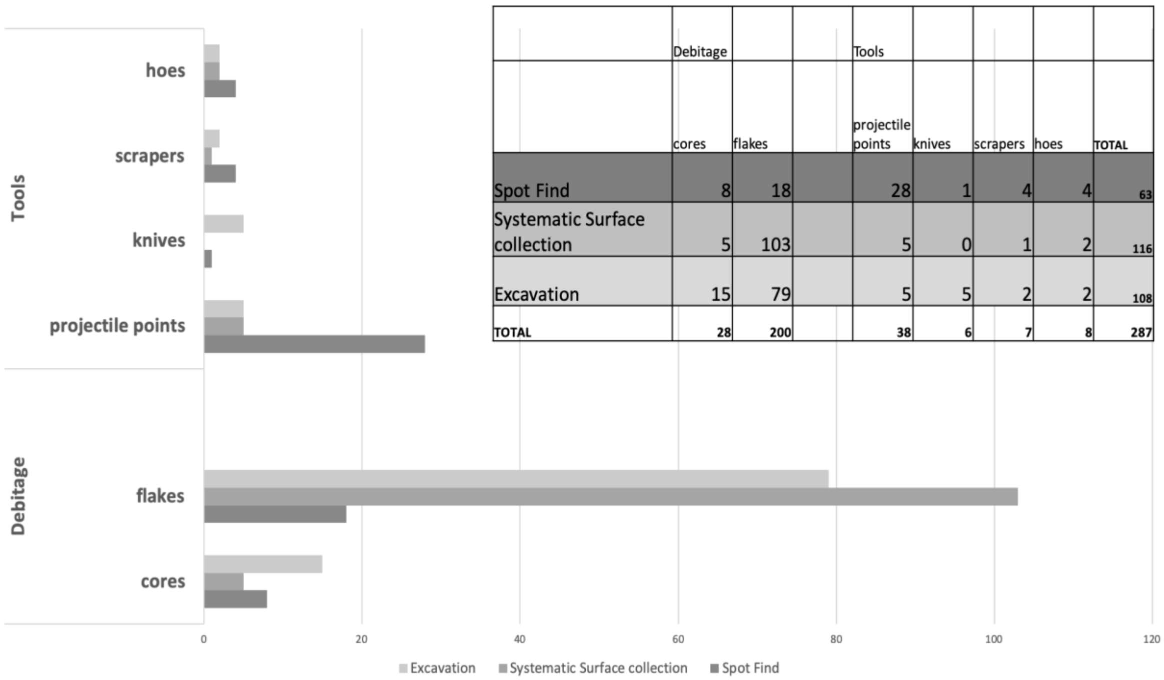
8.2 Lithics

The material category of Lithics or stone-based materials was separated into two major subcategories: Lithics-Flaked and Lithics-Ground. The major distinctions between these categories are delineated in Chapter 4 (4.1), but the primary difference is technological: Lithic-Flaked represent tools and debitage produced through percussive flint-knapping and related techniques whereas Lithics-Ground refer to stone tools made primarily through grinding and smoothing using other stones. Of course, other than some weathering, Lithics of both major types were preserved on the surface and were recovered in all major modes of material collection in the field. While the categories of Flaked and Ground are used to organize the discussion below, in total 167 major material Lithic specimens were recovered at Cerro San Antonio, composed of 287 individual artefacts weighing 13.49 kilograms.

Lithics - Flaked

While there seem to have been some general preferences in raw material for specific tool types (see below), most lithic materials recovered at L1 came from only a select few stone types. The most common was fine-grained, mostly white chert, but a number of cherts, quartzites, as well as denser metamorphic stones, like basalt, were also utilized. The cherts used tended to be colored in mottled dark greys, pale yellows, or a black-speckled white. No clear exotic materials were identified in the L1 Lithic-Flaked assemblage as all raw stone materials are believed to have been available locally in the broader Locumba drainage, but imports of certain fine-grained cherts are possible.

Lithic materials falling into the Lithic-Flaked category could be broken down into two major subcategories (Figure 141): flaked lithic tools an lithic debitage (generated from producing lithic tools).



	Debitage			Tools				
	cores	flakes		projectile points	knives	scrapers	hoes	TOTAL
Spot Find	8	18		28	1	4	4	63
Systematic Surface collection	5	103		5	0	1	2	116
Excavation	15	79		5	5	2	2	108
TOTAL	28	200		38	6	7	8	287

Figure 141. Simple counts of Lithic-Flaked materials as recovered in the three primary field collection methods at L1 (Spot Finds, Systematic Surface Collection, and Excavation).

The debitage category refers to stone refuse generated when flaked stone tools were produced through knapping and other percussive techniques. Only initial observations were made on these materials and lithic debitage was simply separated into cores and flakes. Most recovered cores were bifacial with flakes having been knapped off from multiple faces. In this division, flakes represent all other debitage, including primary, secondary, and tertiary flakes as well as other chunks. Exactly 200 flakes, deriving from all the raw stone materials described above, were found in the various modes of material collection. As is often the case, cores were found in much few numbers and often associated with rockpile-midden deposits.

Figure 142. Examples of (left) debitage produced in flaked stone tool production, including flakes and bifacial cores. As well as (right) two examples of hammerstones, one of the primary tools used in stone tool production.

Finally, while not technically a flaked stone tool or byproduct, but an essential related lithic tool, were hammerstones[177]. Nine (9) different hammerstones were also recovered in the L1 assemblage. These tended to be unworked, but clearly heavily used small cobbles that tended to be dense metamorphic and igneous stone (Figure 142).

[177] Hammerstones were actually also included in the ground-stone surface survey (see 5.2).

Figure 143. Examples of scrapers as identified in the L1 Lithic-Flaked assemblage, including: (left) side-scrapers and (right) end-scrapers.

Four major tool types were found in the Lithic-Flaked assemblage: projectile points, knives, scrapers, and hoes. As noted above, these tools were composed of quartzites, cherts, and more rarely andesites and could range in production style, from relatively simple hammerstone percussive knapping to more delicate bifacial pressure flaking techniques. For instance, scrapers were most frequently simple retouched flakes, in which a flake was pressure flaked at one end, generating a roughly serrated edge. These scrapers were found most commonly as side-scrapers meant for a roughly pull-based scrape motion, but end scrapers, designed for more push-based scraping were also identified (Figure 143).

Figure 144. Examples of agricultural hoes recovered at Cerro San Antonio.

Agricultural hoes were also often produced with relatively simple, unifacial knapping. Andesites and other fine-grained igneous stone types, many of with heavy feldspar inclusions were the primary stone type used for these tools. Without exception, the eight (8) hoes identified and collected at L1 all are naturally flat (i.e., less than 1cm thick with cortex on the majority of both sides) and roughly tear-drop-shaped sections of stone (average: 6-7cm on broad end, 2-4cm on narrow end and 9-10cm long). The broad end of the stone was then minimally pressure flaked to provide somewhat of an edge, but most modification, even on this end, was chipping and polishing resulting from use.

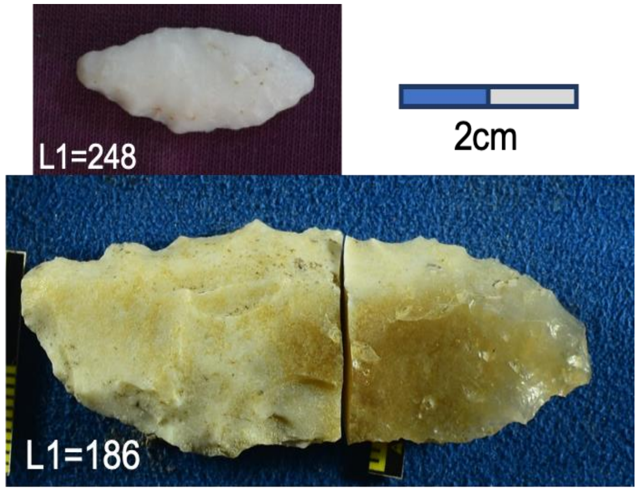


Figure 145. Examples of bifacial knives from Cerro San Antonio.

Knives are bifacial tools as defined here. These tools tend to be oblong or even roughly diamond in form with pressure flaking along all four edges (Figure 145). Some have just minor pressure flaking, like scrapers, but other examples show bifacial thinning well as more consistent pressure flaking, generating serrated edges. It should be noted that some of these have also been hypothesized to represent bifacial preforms for projectile points.

Figure 88. Detail view of Figure 146. Examples of projectile points associated with Tiwanaku sectors at Cerro San Antonio (L1). More elongated forms are displayed on the top and stouter forms on the bottom with the more flat-based, stout forms in the lower right.

Projectile points were the most elaborately worked bifacial flaked lithic tools identified at L1. While there was a great amount of minor variation, these projectile points were almost exclusively elongated narrow stemmed arrow points with barbed shoulders[178]. Variability could be found in how elongated the form would be, with the standard variant having a pronounced elongated form (2.9-4.1cm in length) and other variants with more stout or triangular forms (1.9-3.2cm in length). These stouter versions, which were far rarer, would also have flatter bases (0.9-1.5cm in width), but would maintain a narrow stem. The standard elongated point would generally have a slight to moderately concave base (1.7-2.2cm in width). 85% of the points and fragments had significant pressure flaking along the blade edges making them roughly serrated. Interestingly most recovered points from L1 have uneven barbs, in what was apparently an intentional choice in production. Finally, there was a clear preference for the white, fine-grained chert in projectile points, with 80% of the points using this material. The remaining examples were made using either a pale yellow or the black-speckled white chert, suggesting a preference for these white or light-colored stone types for this particular tool.

Lithics - Ground

Ground stone materials were primarily only found as completed tools. All ground stone tools were made from small to large cobbles that could vary but were almost always locally available igneous stone types with various diorites, andesites, rhyolites, and some dolerites and granites being the most commonly occurring. For most ground stone tool types, only minimal reduction of the original stone was undertaken, so other than a basic hardness, size and shape of the selected stone appear to have been more important than specific stone type. To this

[178] This aligns with Klink and Aldenderfer's Projectile Point Type 4E in their projectile point typology for the south-central highlands (2005:45; see also Giesso 2003:320-381; Goldstein 1993).

point, while many of these stone types could be found in the natural ground liter on the site itself (many unworked examples can be found in the rock-pile midden deposits), the vast majority of cobbles used were water-worn and almost certainly collected from the valley bottom. These river cobbles were pre-rounded making working into the final tool form a far less intensive task.

Importantly, due to their size and weight it was not uncommon to document (GPS point, photograph, weight) ground stone tools in the field and not collect them. This would be particularly true of the larger metate fragments encountered. However, in total 44 individual ground stone tools were ultimately collected for the L1 Lithic-Ground assemblage.

Table 11. Table of Lithic-Ground specimens collected in various modes of field work.

	Manos	Metates	Polisher	Sling Stones	Bola Stones	Total
Spot Find	8	1	0	5	1	**15**
Systematic Surface Collection	3	0	1	0	0	**4**
Excavation	23	0	2	0	0	**25**
Total	**34**	**1**	**3**	**5**	**1**	**44**

Again, while these Lithic-Ground specimens were selectively collected and not considered a systematic sample, they did help form the basis for some of the more intensive specific material observations used below.

The most common ground stone tool type collected, were manos. Mano is a generic name for almost any hand-held grinding stone. Most of these tools could be held in just one hand, though others would have required the use of both hands. Based on overall size and shape, almost all manos fit five (5) basic types. Three types, the discoidal, ovate, and loaf were likely used with metates (see below) and used in push-pull or more lateral grinding motions. These manos could be lightly used, with minimal grinding to much more heavily used with two or three faces of the tool used in grinding. Some of the most heavily used manos, particularly those of finer-grained materials, like dolerite or andesite, would take on a glossy appearance that feels waxy to the touch. The other two mano types, spheres and pestles, were also used for grinding tasks but also pecking, smashing, and other related activities, likely done with bowl-style metate (see below).

As indicated above, directly associated with manos are metates. Metates are, generally speaking, large flat or bowled stone tools, used as the grinding or striking platform for activities completed using manos as well as containers for the material being processed. Metates could be made from large to extra-large cobbles and small boulder-size stones. Most examples observed at L1 were technically portable, but some were quite heavy and certainly impractical for frequent moving. Three major form variants were found with metates: massive, bowls, and slabs. Massive were, as the name indicates, the largest variant, often made from small boulders with natural impressions in the stoned ground down for large concave grinding surfaces. Bowl and slab variants were both far more portable, but could also be quite bulky. Bowl-style metate variants were concave on once side, some varieties were small enough to be called mortars, but others were larger basin-style bowl sub-variants. Slabs were metates where the primary grinding platform was flatter and sometimes quite level. Like manos, metates could range from lightly worn rough grinding surfaces to extremely well-used glossy grinding platforms. Unlike manos, metates were frequently found as fragments and were likely reused, even by later cultural periods until they broke and were discarded.

Beyond the more utilitarian-oriented manos and metates, the other major class of Lithic-Ground tools were related to weaponry. The most common in this category were sling stones. These stones were spherical and relatively uniform in size (~ 5cm diameter). Sling stones were actually largely pecked into shape but ultimately smoothed with some grinding. All collected and observed sling stones were of the same material, likely diorite. Finally, a single example of a bola stone was recovered at in Sector A at Cerro San Antonio. This was a roughly ovaloid stone with a clear groove, for attaching a cord, was ground around the center of the tool.

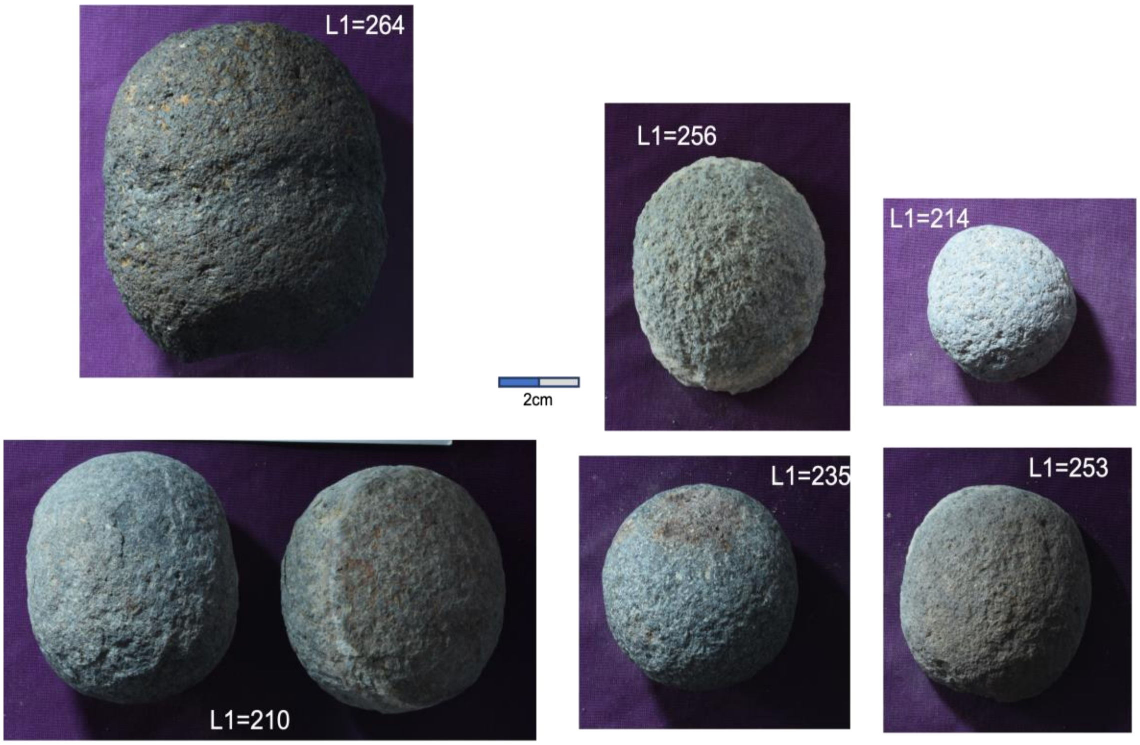


Figure 147. Examples of sling stones as well as single example of a bola stone (upper left) from Cerro San Antonio.

Importantly, while the Lithic-Ground collection (those samples actually collected) was not considered systematic or necessarily representative, an additional systematic ground stone surface survey was also conducted. This is considered a pilot study as just a single arbitrary area was sampled in Sector L. Nevertheless, in addition to the important spatial distribution data, this pilot survey also provided a more accurate, or at least systematic, look at ground stone frequencies.

8.3 Textiles

The material category of Textiles included any material composed of or deriving from cloth or other products made from twisted or spun plant or animal fibers. All textile materials collected in Middle Horizon contexts at Cerro San Antonio are composed of either wool, derived from camelids (presumed to be domesticated llamas or alpacas), or cotton. While local climactic conditions have and continue to allow for the remarkable preservation of textiles in some surface contexts, almost all textile materials discussed here come from the 136 Textile specimens collected in excavations and only a select few spot finds from recently looted Tiwanaku mortuary contexts. Materials included within these Textile specimens could largely be broken into two major material classes; woven cloth and other. As will be noted below, the other category could include anything from unspun cotton or wool fiber to multi-ply, twisted cording. Textiles, particularly woven cloth, are complicated materials and require specialized analysis that was not undertaken here, however some important initial observations were made regarding these materials.

Figure 148. Sample images of textile fragments as recovered from Cerro San Antonio excavations, including (center) schematic of typical Tiwanaku-style tunic (after Oakland 1986) with inserts of coarse and fine plainweave close-ups and neck plaque, (left) examples of fine plainweave vertical stripes, and (center-bottom) chart displaying frequency of wool and cotton-based textiles.

In regards to woven cloth, 99 individual fragments of textiles, large enough to conduct basic attribute analysis, were recovered from excavated contexts. These ranged from small fragments (~ 2x2cm) to largely articulated sections of garments and other woven textile-based materials. With only a few exceptions (see below), textiles recovered in the excavated Tiwanaku contexts at L1 are warp-faced plainweave cloth[179]. These could range from relatively coarse plainweaves to much tighter, fine plainweaves (Figure 148). Significantly, upwards of 20% of recovered fragments appear to be largely composed of cotton-fiber threads. The remaining 80% are wool, which is far more common for Tiwanaku contexts (e.g., Oakland 1992). Also, importantly, is the fact that coarse plainweave textiles were almost exclusively wool, whereas finer plainweave specimens were more evenly split between wool and cotton fiber; said another way, cotton fiber was largely only used in more fine weave cloth[180].

[179] These are called *ina sawu* in modern Aymara (Arnold and Espejo 2015:178).

[180] This is likely due, at least in part, to the fat that spun cotton tends to create a thinner thread than wool; though this of course depends on processing technique.

Figure 149. Examples of vertical weft design in (left) natural fiber colors and (center) dyed colors as well as (right) example of weft seam polychrome embroidered embellishment on a ch'uspa bag fragment.

Most recovered textile fragments were undyed, coming in a variety of natural brown, tan, and off-white colors (depending on the raw material). These natural colors could be found separate (monochrome textile) or combined into design elements in polychrome textiles. However, 16% of the textile fragments would contain at least some dyed design element. Dye colors included common reds and yellows as well as more rare light and dark blues, pink, and green. The most common design would be a polychrome vertical stripe pattern. These stripes could cover the entire textile or be limited to isolated bands (Figure 149). Other decoration elements on textiles were frequently completed in embroidery. One of the most common elements of this type were embroidered neck plaques that would be situated at the base of tunic neck openings (Figure 149). A single example of a more rare and elaborate embroidery style, a cross-knit loop stich (Plunger 2009:33), was found along a weft seam of what was likely a *wallqipu* (Aymara) or *ch'uspa* (Quechua) bag (textile bag for holding coca).

While most of the cloth fragments analyzed were too small to definitively identify what type of item it may have been utilized in, most diagnostic fragments appear to come from different variants of the typical Tiwanaku-style tunic or shirt. These were relatively simple in overall construction - a single rectangular[181] piece of woven cloth would be folded in half and stitched partially closed with space left open along the weft selvages for the arms and an opening and slight slit left open[182] at the top warp selvage for the head. Significantly, no fragments of more elaborate versions of these tunics, which use a much more labor-intensive tapestry weaving technique were identified in the L1 collection. As noted above, these tunics could be unembellished monochrome or polychrome garments, decorated frequently with vertical stripes and added embroidered elements. It is also possible that many plainweave fragments, especially coarser wool plainweaves, came from blankets or other cloth-based coverings.

[181] In complete tunics that have been analyzed the warps are about twice as long as wefts (Plunger 2009:30).

[182] Created during the weaving process through a discontinuous weft technique.

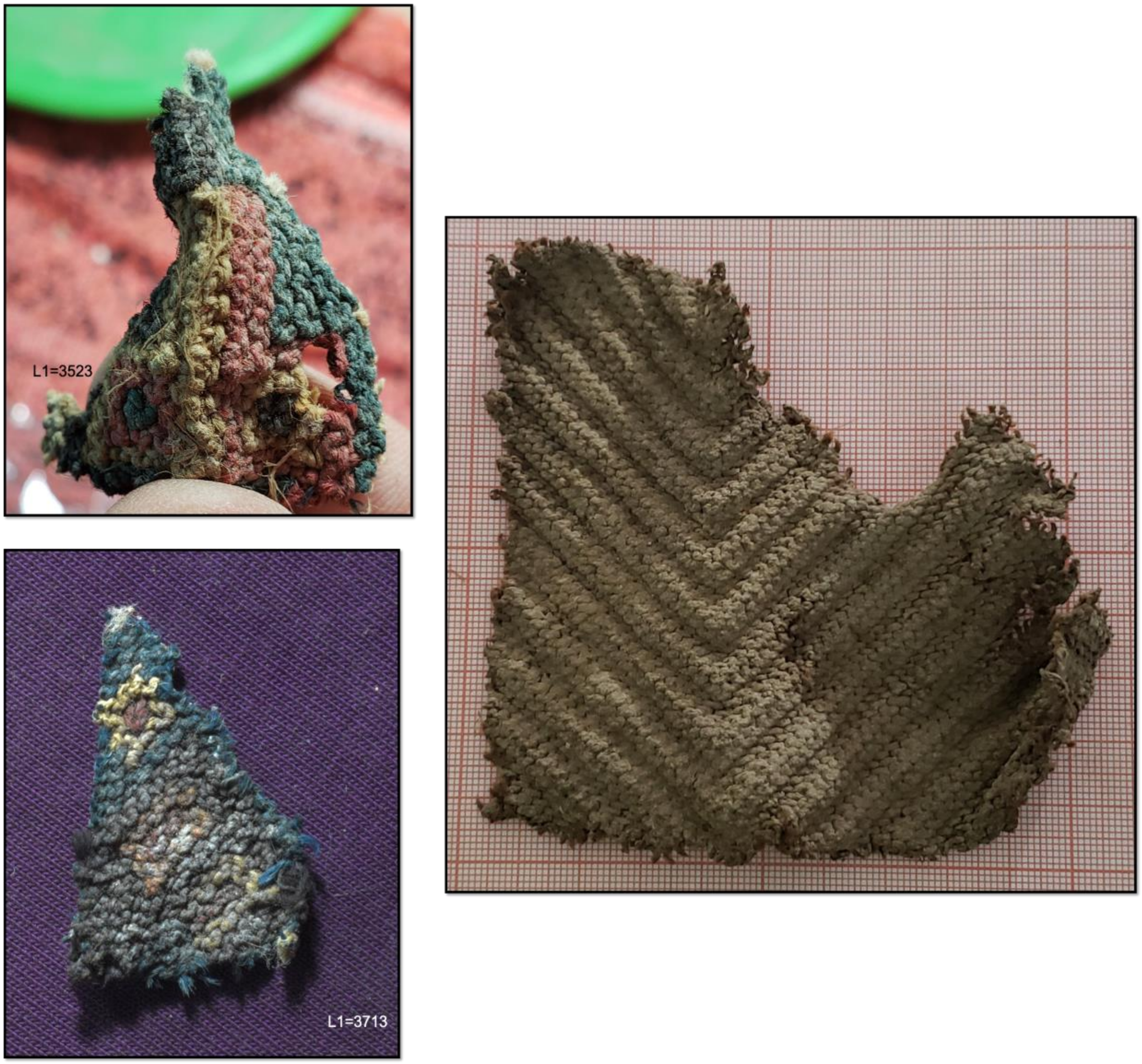


Figure 150. Examples of fragments from 4-cornered Tiwanaku hats that include (left) design elements from two different classic polychrome hats - (top) step-stair anticephalic head motif and (bottom) repeating star motif. Also depicted (right) is a monochrome hat fragment that utilizes a raised chevron design style.

Other textile-based items, often thought to be non-utilitarian or even ceremonial in nature were also recovered. As noted above, a large section of a *ch'uspa* or textile bag for holding coca and sometimes other ritual paraphernalia, was recovered. This example was made of a coarse plainweave but was embellished with embroidered geometric designs along the weft seem (Figure 150). However, some of the highest quality textile materials recovered in the L1 textile assemblage (in terms of labor investment and skill), derived from four-cornered hats.

These textile hats were roughly squared in shape with four tufts or points protruding upwards from each of the corners. Tiwanaku-style 4-cornered hats were made using an intensive knotted technique[183], that involved starting at the tips of the corner tufts and working down to the base of the hat, ultimately making the hat from a single cloth garment. Typical Tiwanaku-style 4-cornered hats would frequently carry elaborate polychrome designs, including both geometric and figural motifs (Figure 151). However, one recovered specimen was a monochrome hat which utilized a raised chevron design instead of typical dyed polychrome elements.

[183] Specifically, most analyzed hats have been found to use a larkshead knot (Conklin 2013:83).

Figure 151. Images of 4-cornered hat fragment recovered in excavation Block L1A-2019-2 near the central plaza in Sector A at Cerro San Antonio. Includes detail inserts that display: (top left) corner with fur tuft that may have protruded from end of point, (top right) possible stylized feline head motif, (lower right) consecutive diamond motif, and (lower left) bichrome cross motif.

The most complete 4-cornered hat specimen recovered at Cerro San Antonio was approximately 40-45% complete and revealed just how elaborate the motifs on these textile accessories could be. The motif involved two main alternating panels. One included a simplified stepped cross with a linked diamond motif stacked on top with an additional stepped cross on top of that. The second panel was narrower and was a single design element, that likely represents a repeating stylized feline head motif. Both motif patterns incorporated alternating color scheme that involved various combinations of red, dark red, blue, yellow, pale green, and pink. Another interesting element in this specimen was that both corner tufts that were present contained an unspun tuft of hair that certainly protruded inward into the hat, but may have also protruded outward, adding an additional embellishment.

Figure 152. Examples of twisted and braided cording from the L1 textile assemblage: (left) cotton netting, as well as attached sinkers, and (right) one of the more elaborate four-strand round braid made from polychrom wool threads.

One of the primary material types in the non-cloth or other category was multi-ply thread, generally referred to here as cord. Like the woven cloth the threads that made-up these cords were mostly Z-spun with the cords themselves S-plied. Cords were typically simple 2-ply twists but could be more elaborate 4-10 ply braided cords as well. Again, some cording would be undyed, naturally colored light and dark browns, off-white, black, and even a natural red-brown. However, these cords could also include dyed threads that included dark and light blue, red, orange, yellow, and green. All dyed cording was made exclusively from wool, but approximately 15% of the cording recovered was made primarily from cotton fiber. These cotton-fiber cords were always found as white (or sometimes off-white). Importantly, one of the important artifacts recovered made from cotton cording were knotted nets. These nets, likely used in fishing and hunting, were composed of tightly twisted cotton corded knotted ever1cm in a lattice, creating roughly 1cm2 rectangular gaps.

A final category of material that fell into this non-cloth textile were threads and wool and cotton fibers lightly to unspun. For example, 72.46 grams of unspun[184] wool, in colors of various browns, off-whites, and black, were recovered in excavated contexts. Interestingly, 92.18 grams of unspun cotton fiber was also recovered in various excavated contexts. Cotton seeds were also a relatively ubiquitous seed type in the macrobotanic assemblage.

[184] This could include anything from raw fibers to semi-prepared fleece, or semi-processed roving.

Figure 153. Examples of tools and other implements used in textile production and maintenance, including (top and right) multiple examples of spindle whirls, (middle-center) cactus spine needle, and (center-bottom) twig thread spool. Also depicted: (left-top) raw cotton with seed still attached and (left-bottom) various examples of raw and partially worked wool.

Related to these materials involved in textile production were a variety of other, non-textile artifacts that are worth noting here. The most common textile or weaving tool type recovered were spindle whirls (*ruecas*). These tools, used as weights in spinning wool or cotton fiber into thread, could be made from a simple stone but were most frequently found as modified ceramic sherds. Some sherds were simply perforated with a single drill hole but others would receive more modification in the form of smoothing and grinding of edges. However, one spindle whirl was clearly specifically designed, it was a rounded trapezoidal shape, perforated through the middle, with vertical score marks in four sets of three around the top edge (Figure 153). Other tools related to textile production and repair were needles made from large cactus spines; at least one had a clear perforation at the thick end (Figure 153). Finally, multiple examples of thread spools were identified in a variety of contexts.

8.4 Basketry

The general hyperarid climate of the region has also allowed for the preservation of all manner of woven or braided vegetable fiber materials to be preserved at Cerro San Antonio. These materials could generally be broken into two major categories: woven baskets or containers and twisted or braided rope or cord. Interestingly, in spite of preservation conditions and the ubiquity of organic materials like textiles, baskets were decidedly rare, only found in 2.5% of excavated contexts. Twisted rope or more tightly braided cord (often just 2-ply) would be more ubiquitous, recovered in just under 7% of excavated contexts.

Figure 154. Photos of example basket fragments from the L1 assemblage.

Basket remains were almost always quite fragmentary, with no complete example of a typical woven basket recovered in excavated contexts. However, from the fragments recovered it appears that a general coiling technique was probably used in most common baskets, but both twining and wicker weaving were also utilized.

Figure 155. Photos of the large basket, believed to be a cradleboard basket, recovered in excavation Block L1A-2019-2, including details of a number of the important components.

The most complete artifact, categorized as basketry, was a very unique specimen, that actually incorporated multiple materials, including human hair in its construction. This specimen was very complex, and while remarkably well preserved was badly damaged and tangled, making definitive form and function slightly difficult to interpret. However, what is clear is that this object was made using a hard frame technique in which a single branch (~2cm diameter) was bent into an oval shaped hoop. An additional branch was the bent into an arch that was situated perpendicular to the larger main frame. A loose twining technique using flexible fibers was used for the main superstructure of the basket with a thick braided grass roped incorporated for the primary handle or more likely head strap. Significantly a long-braided cord, made from human hair was also woven through the center of the basket. While I have yet to find a relatively similar example from an excavated Tiwanaku context, both the form as well as the incorporation of human hair suggest that this was likely a cradleboard basket, used for carrying infants. However, careful conservation work is needed to reconstruct this important artifact and properly interpret its form and function.

Figure 156. Examples of various twisted or braided vegetable-fiber rope and knots.

Finally, also included in the Basketry material category was twisted or braided rope. Rope was almost always just two-ply and made by simply twisting long grass or hammered reed together. Frequently, knotted portions of rope were the best preserved. This gave some insight into knot preferences, which were frequently simple overhand knots but more complicated sheet-style knots also were identified.

8.5 Metal

While relatively rare, materials made from metal were recovered in a number of excavated contexts as well as in a number of surface spot finds. All metal artifacts recovered in Tiwanaku-affiliated contexts at L1 appear to be made from copper or copper alloy mix[185]. This is indicated by the tell-tale green, rough exterior caused by oxidization. Significantly, all copper discussed here, both surface-based and excavation, would be recovered in Sector A.

Figure 157. Photos of examples of metal, specifically copper-based, artifacts recovered at L1, including: (top) ring, (bottom-left) thick unknown fragment, and (lower-right) flat copper knife or other sheet recovered on surface in Sector A as a spot find.

The majority of copper materials could be defined with relative certainty to a specific form or artefact type. All of the diagnostic copper material found in excavations was related to

[185] Based on in-depth metallurgical analysis undertaken in Lechtman (2003) these were most likely Cu-As-Ni alloy.

personal adornment. One of the more striking examples in this regard was a ring. This ring was approximately made from a single band of copper that has simply been twisted and slightly hammered, resulting in a simple band with a 0.9cm protuberance at the end. Significantly, this type of ring has been identified at the site of Tiwanaku as ring Type 2, and all examples there are made from a tin bronze (Lechtman 2003:417-419).

Other important metal personal adornment items were *tupu* pins, which were used effectively as brooch pin to hold clothing, likely shawls closed. Two relatively complete examples, each a different type of *tupu*, and a number of fragments were all recovered from test Unit L1A-206-5 and Special Structure L1A-1. One complete *tupu*, that represents *tupu* Type 1 from the Tiahuanaco collection (Lechtman 2003:417), was a straight robust pin shape, roughly 12cm in length. The other, represents *tupu* Type 2 from Tiahuanaco (Lechtman 2003:417) and was more delicate in construction with a broad, roughly oval shaped head, perforated with a small hole, that tapered sharply to a narrow 5.5cm long end. While the fragments were not diagnostic to a type, they significantly appear intentionally destroyed, with one piece in particular tightly coiled (Figure 157).

8.6 Other Artifact Types

A number of materials would be recovered that were clearly artifacts, but did not fall neatly into the major categories listed above. Some of these would receive the simple classification of Artefact but others were recovered frequently enough to receive their own separate category (i.e. Beads). Four major categories of artifact are discussed below: Beads, Wood-based items, Bone-based items, and Leather-based items.

Beads

Beads could be made from any number of raw materials, including: stone, marine shell, bone, and ceramic. The size and form of beads could be quite variable, but the majority were roughly circular with a centered perforation and generally less than 0.5mm in diameter. In total 27 complete or fragmented beads were recovered in excavated contexts.

Figure 158. Photos of the various types of beads as well as some raw materials as found at Cerro San Antonio.

The most common material used for beads was marine shell. At least two different taxa of marine bivalve were used. Purple and white beads were both likely made from choro (*Choromytilus choros*). Significantly, one bead fragment was likely made from Spondylus or the spiny Pacific oyster (*Spondylus princeps*). This is significant as spondylus was exotic, only found off the far north coast subregion (modern Ecuador), and while it is a well-known valued exchange item in the Central Andes, it is exceedingly rare in Tiwanaku contexts (Janusek 2008:287).

The second most common raw material used for beads in the L1 assemblage was stone. Twelve (12) fragments were found made from at least four different raw materials. The most common type was a chrysocolla or similar turquoise-related bluestone. These beads tended to be quite small, as size-grade often referred to as a seed bead. Importantly, a number of examples of this stone was found in various stages of working, particularly in Block L1L-2019-1. Other, slightly greener hues of stone were used in some recovered examples as well. Mica, worked into a pendant, was also recovered and considered a bead here.

<u>Wood</u>

A number of artifacts made entirely or primarily from carved wood were found in excavations as well as in a few surface spot finds. These wooden objects can be broken into three primary categories carved spoons, what I interpret as net-floats (bobbers), and fire-starting implements.

Figure 159. Carved wooden spoons recovered in (left) a looted mortuary context and (right) excavated domestic midden deposits.

Spoons are the only well know Tiwanaku utensil used in food consumption. Three definitive spoon fragments were recovered from three different contexts at L1. Two fragments, one a carved handle and the other just the cup end, were found in different domestic midden deposits excavated in Block L1L-2019-3 and L1A-2019-3. An additional spoon handle was recovered from a recently looted mortuary context (L1B), and included a stylized camelid profile projecting from the end of the handle.

Figure 160. Photos of other wooden implements recovered in the L1 excavation assemblage, including: (top) carved wood net-floats or bobbers and (bottom) implements used in starting fires.

Other wooden implements located in the excavation assemblage would be carved wood items, roughly conical in shape but often with a large head and a substantially more tapered tail or end. I believe it is most likely that these items acted as net-floats, or bobbers to hold nets afloat. One reason is simply that similar technology is and has been used for net-floats around the world as well as in the Central Andes. However, more significantly is that all three of these items were found in the same context as cotton fishnets (see above). However, it is possible that they acted as bottle-stoppers or corks. While all (even miniatures) ceramic vessel forms recovered in the L1 assemblage would be too wide for these, they could have been used with bottle gourds as well.

Another interesting class of item made from wood, would be various implements believed to be used in starting fires. One type of item was a straight stick, about 1cm in diameter, that had a number of circular drill marks partially bored into multiple sides that were also scorched on the interior. This appears to be a fire-board used in traditional friction fire starting, in which circular stick (the drill) is twisted rapidly into a fire-board using friction to generate enough heat to catch a tinder. Two such fragments were found in a single domestic midden context. The complementary drill or rotating implement was also found in another context, as indicated by its well work and singed end (Figure 160).

Figure 161. Photo of cane/reed panpipe located at Cerro San Antonio (L1B).

Finally, while not technically made from wood, an important item included here is the find of a cane-based panpipe. In a single recently looted mortuary context (L1B) a single badly damaged, but largely complete reed or cane panpipe (and associated twisted wool thread) was located. Again, this was a surface find in a disturbed context, but it does indicate that these types of musical instruments were present and could explain at least some of the cane remains uncovered in the broader assemblage.

Bone

In addition to the small beads described above, two other items were made primarily made from bone. One item was what appear to be a camelid rib fragment, with one end still wrapped in a poorly preserved textile and the other end should at least some signs of wear. Suggesting this was a bone tool with a textile handle, the exact function weather used in weaving or some other domestic task is unknown.

Figure 162. Photos of bone-based artifacts recovered in the L1 excavation assemblage, including: (top) polished bone snuff tube and (bottom) worked camelid rib with textile handle.

The other bone artifact was an important find made in a midden context in Sector A. This was a polished bone tube, almost certainly used in the ritual consumption (snuffing) of hallucinogenic substances used in Tiwanaku symbolic community practices. The 11cm long bone, likely deriving from a large bird species, was slightly polished across the surface but particularly at either end.

<u>Leather</u>

While some raw animal hide was recovered in the general excavation assemblage (see Fauna-Soft), formally processed leather was also recovered in a few select contexts.

Figure 163. Photos of leather artifacts from Cerro San Antonio, including: (right) leather sandal and(left) unknown leather straps.

A complete, articulated sandal was recovered from a recently looted mortuary context (L1B). This sandal was a simple design (Figure 163), involving a single, rectangular, thick-cut piece of leather as the sole. Long strips were left along the sides which were then crossed over the top as straps, punctured through and knotted at the corners. Additional leather straps, also likely associated with footwear, were also recovered in a single excavated context.

8.7 Fauna

One of the major classes of Ecofacts recovered in the general Cerro San Antonio assemblage was Fauna. Fauna would include any physical remains, byproduct, or other biologically-related material that derived from an animal, both vertebrates and invertebrates. As noted in Chapter 4, the major material class of Fauna would be separated into two major categories: Fauna-Hard and Fauna-Soft. Here in this subsection, as with other subsections in Chapter 8, I present these material results on their own terms, with most context based synthesis reserved for Section 3. However, unlike previous sections, here, as with the Botanics results below, I do present ubiquities, among other compiled statistics, to help counter some of the biases that come from comparing frequencies of the very different materials found within the broad category of Fauna (e.g. comparing animal bone and marine shell).

Fauna-Hard

This category of Fauna materials was primarily composed of bone and shell but also included crustacean exoskeleton and other types of aquatic invertebrate remains. Due to their durable nature, and inclusion of non-organic elements, these materials have much higher rates of preservation than the Fauna-Soft materials, both here in the Cerro San Antonio assemblage and more generally in the archaeological record. In addition, the materials within Fauna-Hard category differ in composition greatly, and therefore their weight-count ratio can also be misleading to compare directly. However, here I do present the results of all Fauna-Hard materials before breaking into discussing attributes of each material type separately.

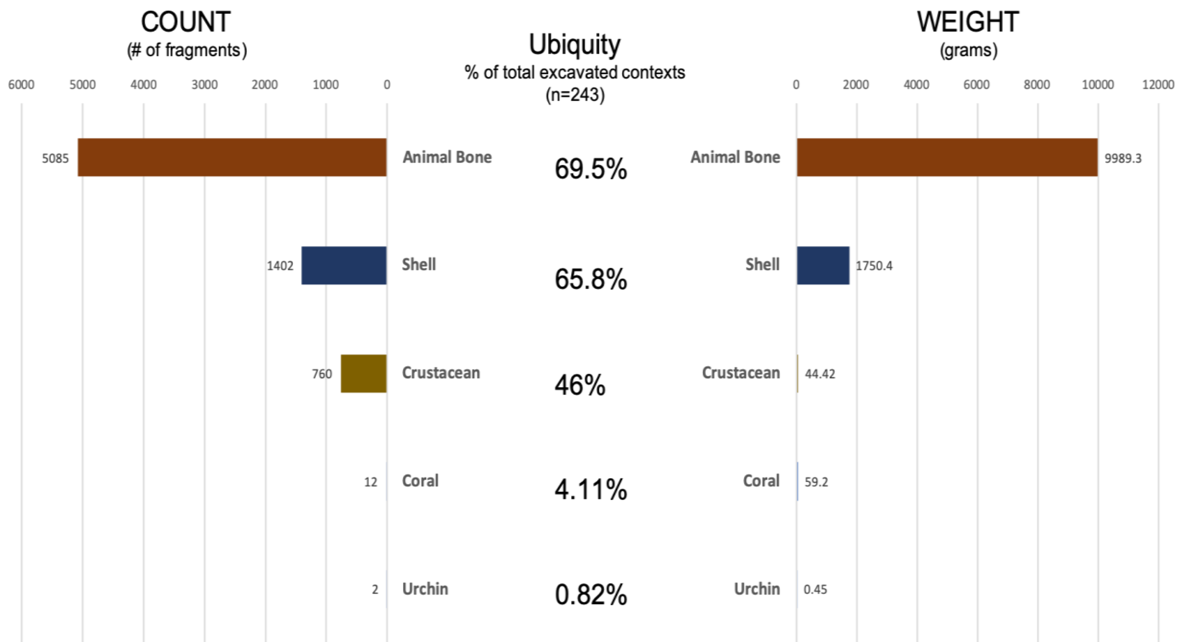


Figure 164. Basic counts (# of fragments) and weights (grams), and ubiquities for all major Fauna-Hard material types.

Both by count, weight, and general ubiquity, the Fauna-Hard assemblage is dominated by animal bone and shell. While there are exceptions (see below), the vast majority of all materials that fall into these two major faunal categories are believed to represent remains of basic subsistence activities, namely the production and consumption of foodstuffs. As indicated by their relatively similar ubiquities, animal bone and shell were found in a roughly similar number of contexts, but revealed by the much higher count and even more pronounced weight difference, bone was found in much greater quantities. Worth noting is that fragments of crustacean shell were found in just under half (46%) the excavated contexts and the other invertebrate marine remains in this category (coral and urchin) were decidedly rarer along any metric.

Animal Bone

The most substantial single material type within the Fauna-Hard assemblage was animal bone. The L1 bone assemblage would come from all five major taxonomic classes of vertebrate animal: mammal, bird, fish, reptile, and amphibian. Effectively 100% of the assemblage at this level or analysis could be sorted into one of these major taxonomic classes, giving the L1 animal bone assemblage a NISP (Number of Identifiable Specimens) of n=5085.

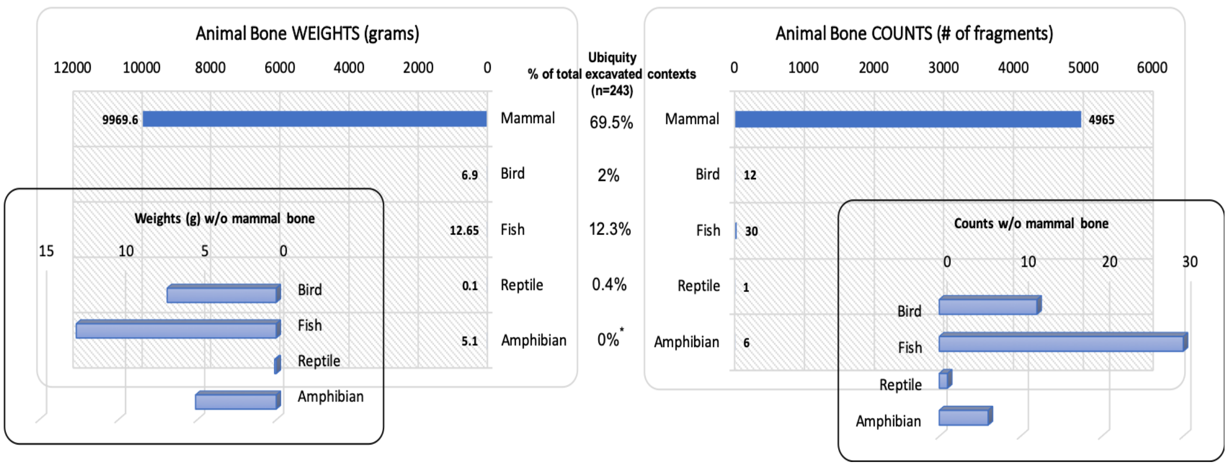


Figure 165. Graphs illustrating the weights (in grams) and raw counts of animal bone as broken into major taxonomic classes. Also, listed is the general ubiquity of animal bone types regarding presence or absence in excavated contexts[186].

Cleary, bone deriving from species of mammal represent the vast majority of the animal bone assemblage (99.8% by weight) as well as being well over five times as ubiquitous than the next most commonly occurring bone type. Within the class of mammal more distinctions could be made into major taxonomic order and even family, with assumptions made about likely genus and species affiliation.

186 The amphibian specimens actually are from a non-excavated context. These specimens were from two large frogs, found inside an olla vessel recovered from a recently looted Tiwanaku mortuary context (L1B).

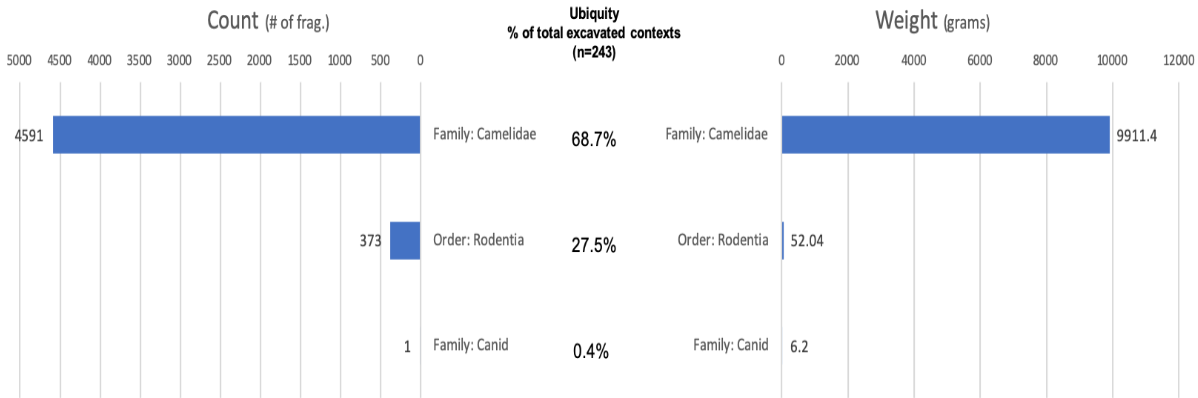
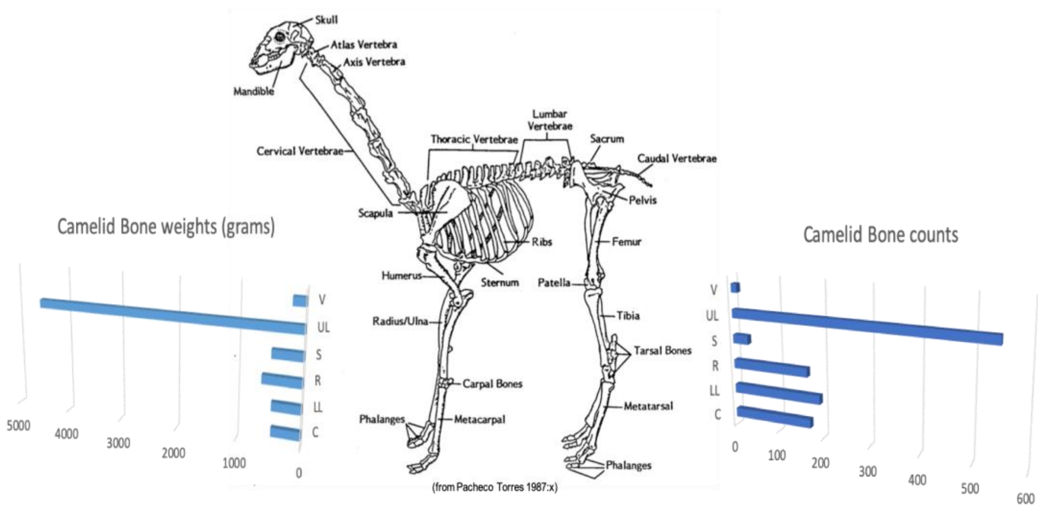


Figure 166. Graphs showing weights and counts of major taxonomic orders/families represented in the L1 animal bone-mammal assemblage.

Broken down to this level, again, one category clearly dominates the assemblage. Here, bone deriving from species with in the general family of *Camilidae* (New World camelids) made up over 99% of the recovered mammal bone. While more specialized analysis is need to confirm, the majority of this camelid bone is believed to come from the domesticated llama (*Llama glama*) but domesticated alpaca (*Vicugna pacos*) and even wild camelids[187] (guanaco and vicuña) are also possibly present.

[187] Some wild deer (*Cervidae*) and other quadruped bones may also be present, but all large diagnostic bones were clearly camelid remains and not other ungulates.

Cranium C	Vertebrae V	Scapula S	Ribs R	Upper Leg UL	Lower Leg LL
skull	atlas/axis	scapula	ribs	Femur	tarsals
mandible	cervical vertebrae		sternum	humerous	carpals
teeth	thoracic vertebrae			tibia	metatarsals
	lumbar vaertebrae			radius	metacarpals
	caudal vertebrae			ulna	phalanges
	sacrum			patella	



Cranium		Lower Leg		Rib		Scapula		Upper Leg		Vertebrae	
C ct	C wt (g)	LL ct	LL wt (g)	R ct	R wt (g)	S ct	S wt (g)	UL ct	UL wt (g)	V ct	V wt (9)
172	460.3	194	464.3	167	623.2	34	487.2	546	4493.5	13	206.9
18.9%		23.8%		20.5%		5.7%		23.0%		3.7%	

Ubiquity
% of total excavated contexts
(n=243)

Non-identifiable fragments

NO ID ct	NO ID wt (g)
3467	3335.03

Ubiquity 65.8%

Figure 167. Basic breakdown of camelid bone fragments as assigned to different anatomical zones on a camelid skeleton.

As displayed in Figure 167, camelid bone was sorted into major anatomical skeletal categories: cranium, vertebrae, scapula, ribs, upper leg, and lower leg. While more will be said on this later (see Section 3), the upper leg, lower leg, and ribs are the portions of the skeleton most closely associated with the primary meat packets (Miller 1979; Vallières 2012:240-241). It is significant then, that bones identified as belonging to these portions of the skeleton make up the majority of the excavated assemblage at Cerro San Antonio. Taken together, upper and lower leg bone fragments make up just under half the entire camelid bone assemblage (by weight), and both were found in over 23% of excavated contexts. Also notable, are the lack of certain elements, especially in terms of ubiquity. For example, the fact that vertebrae fragments were ony found in about 3% of excavated contexts, indicate that certain cuts of meat were limited in distribution and may suggest initial butchering was likely only done in certain locations. Again, time did not permit more detailed measurements to allow for estimations MNI (Minimum Number of Individuals), let alone more specifics, like age, sex, or presence of pathologies in the represented sample.

The taxonomic order of *Rodentia* (rodents), while dwarfed in proportion and prevalence to camelid bone was still found in over one-quarter (27.5%) of excavated contexts. This broad taxonomic order includes both wild and domesticated species. As with the camelid bone, time did not permit the analysis needed to definitely assign species or even genus to these rodent bones, but based on the overall robustness of most recovered samples (Figure 168) as well as associated material recovered in the Fauna-Soft material category (fur, coprolites), most rodent bones are believed to derive from domesticated guinea pigs (*Cavia porcellus*), though again, the presence of wild species, likely from the genus *Lagadium* (vizcacha and Andean hare), cannot be ruled out. Also present (roughly 15% of rodent bone assemblage) were far more gracile bones, believed to be associated with any number of wild species of mice or rat (*Sigmodontinae*) local to the area. Finally, just one example of what is believed to be a fragment of a canine mandible was located in a single excavated context.

Figure 168. Photos of examples of most major taxonomic classes of vertebrates, including: (left) assorted camelid bone fragments, (right) assorted rodent bone fragments, (center-top) amphibian (frog) bones, (center-middle) large fish vertebrae, (center-bottom) example of bird bone fragment.

Other taxonomic classes represented in the bone assemblage had even less specificity in terms of identifying intra-family genus and species distinctions. Fish bone, mostly believed to be marine species (as opposed riverine), were found in over 12% of excavated contexts. The most common skeletal element identified as fish were vertebrae, but some cranium and rib fragments were also identified. Bird bones, found in just 2% of excavated contexts were almost exclusively long bones. Just once specimen identified as reptile was either a snake or lizard found associated with an intrusive rodent nest. Finally, just a single amphibian sample was recovered as part of a surface spot find. Relatively complete skeletons of two large frogs were found in a plainware grave offering, excavated but abandoned by looters in Sector B.

Shell

Various types of shell, deriving from a variety of species of mollusk, were the second most prevalent material type in the Fauna-Hard assemblage. Most shell types present in the L1 assemblage are from salt-water dwelling species of mollusk that fall into the taxonomic classes of *Bivalvia* (bivalves) and *Gastropoda* (gastropods), however a single species of terrestrial gastropod was also well represented.

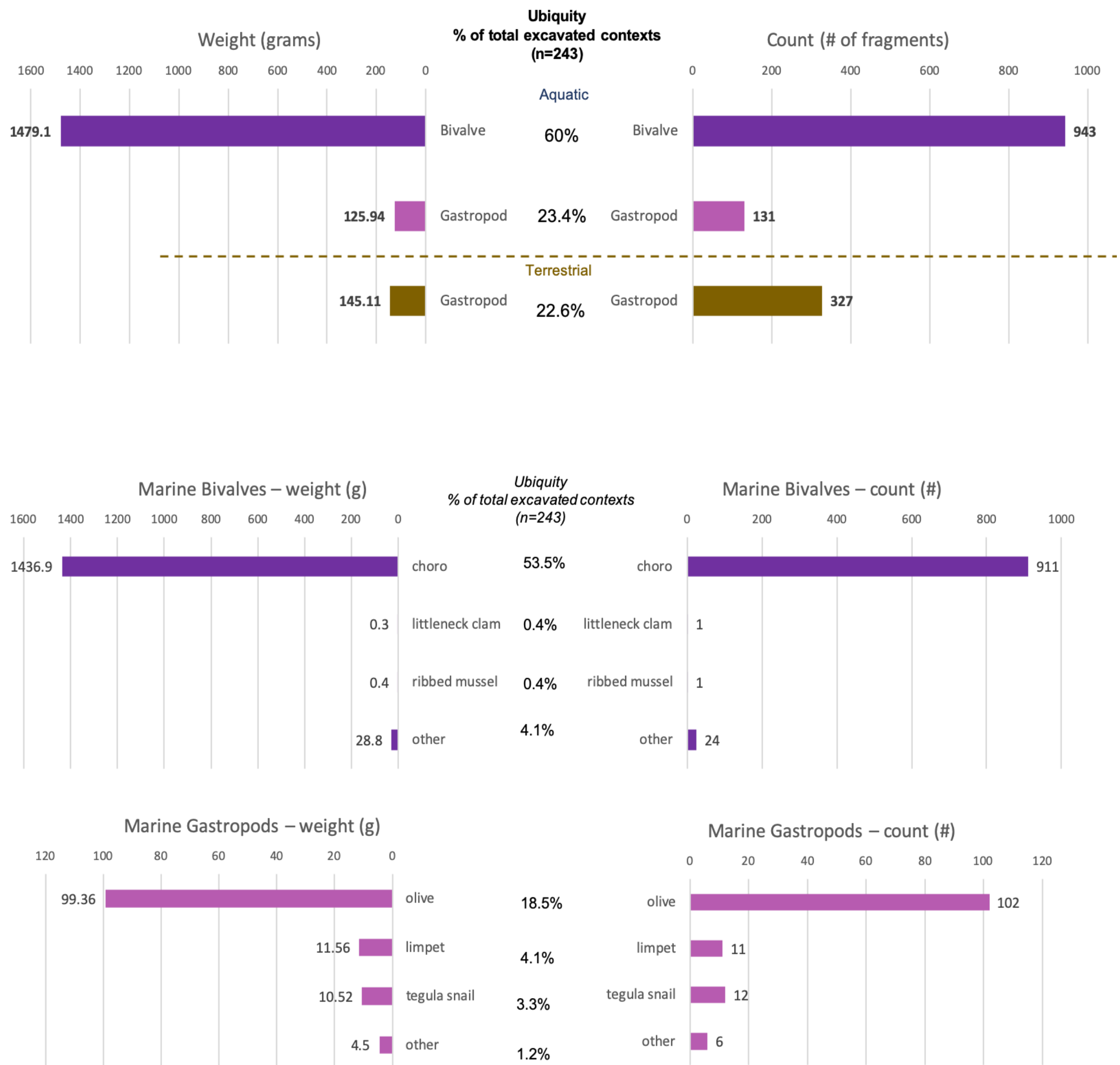


Figure 169. Charts illustrating the various weights (grams) and counts (# of fragments) of various types of shell as found in the Cerro San Antonio assemblage as well as the general ubiquities of these types in the excavation assemblage.

Bivalves were the most common type of marine shell recovered in the L1 assemblage, found in 60% of excavated contexts. Making up over 97% of the bivalve assemblage were shell remains from the choro mussel (*Choromytilus choros*). This mussel could range from 3-8cm in length and 1.5-4cm in width, exteriors ranged in color from an off-white to a deep purple and interiors of a glossy, slightly iridescent off-white (Figure 170). As indicated by its ubiquity, choro was likely use as a common foodstuff. However, small, circular beads were also found made from choro, certainly for its often-deep purple hues.

Many other bivalve shell fragments, clearly belonging to calm or mussels were recovered but could not be properly identified. However, clear fragments of littleneck clam (*Protothaca thaca*) and a ribbed mussel (*Aulacomya ater*) were also recovered. As with the choro mussel, it is believed that most of these bivalve remains represent remains from subsistence activities. It should be noted here that a single bead fragment, made from the Spondylus spiny oyster (*Spondylus princeps*), another marine bivalve was also recovered in excavations.

Figure 170. Photos of examples of various type of shell that define the L1 assemblage, including: (right) bivalves, (center) marine gastropods, and (left) terrestrial gastropod.

The sub-assemblage of marine gastropods was also largely dominated by a single species, in this case the olive snails (*Olividae peruana*). These marine snails are generally cylindrical in with a stout spire and a glossy exterior (Figure 170). Olive shells could range from 1.5-4cm in length and 0.5-2cm in width, but averaged around 2.5cm in length and 1.5cm in width. Often the spires of olive shells were found knocked off, and it is difficult to tell if this was intentional or merely because it is the weakest portion of the shell. While no example of olive shell in the L1 assemblage show clear signs of modification, some Tiwanaku contexts, such as those Moquegua have. This suggests that in addition to food, these shells ay have been used for adornment. While not nearly as ubiquitous as the choro mussel, olive shells were found in over 18% of the excavated contexts and dozens were observed and even collected in surface observations.

A number of other marine gastropod species were also identified, though in far more limited quantities. Multiple subspecies of limpets (*Acmaea sp.*) as well as a number of sea snails, such as tegula snails (*Tegula atra*), were also identified in 3-4% of excavated contexts. Like bivalves, a number of shell fragments could be identified as coming from gastropod shell, but could not be specified more.

Finally, over 22% of excavated contexts contained remains of terrestrial gastropods. These land snails came from a few different species within the Genus *Bostryx*. These gastropods can survive long periods of stasis, particularly during periods of aridity, and tend to be found in large numbers only during prominent coastal *lomas* blooms. Therefore, these land snails have been viewed as powerful climactic indicators of particularly wet seasonal periods. However, as will be noted later (see Section 3), these snails were largely restricted to midden deposits at Cerro San Antonio, a pattern noted at sites located in similar environs elsewhere (Beresford-Jones, et al. 2011:281), and are believed to have been brought to the site as foodstuff and were not naturally present.

Other Invertebrate Remains

A number of other invertebrate remains were also included in the Fauna-Hard material category. The most prevalent of these were crustacean exoskeleton remains, deriving exclusively from freshwater crayfish (*Cryphiops caementarius*). As noted in Figure 171, these remains were found in just under half of all excavated contexts (46%), suggesting they were a relatively common foodstuff. Significantly, these freshwater crayfish could likely be collected year-round in local rivers, but were found in the highest numbers during winter reproduction, particularly December-March.

Figure 171. Photos of examples of other invertebrates included in the Fauna-Hard material category: (left) fragments of freshwater crayfish exoskeleton and (right) fragments of coral.

The other two invertebrate remains included here were marine-based fauna. Coral was found in just over 4% of excavated contexts and was identified and collected in a number of additional surface contexts as well. All examples represent small fragments from some type of hard or stony coral type (Order: *Scleractinia*). The hardness and rough texture would have made these remains useful for sanding or burnishing, but interesting, no recovered coral show clear signs of use-wear of any kind. Two small fragments of sea urchin (*Loxechinus albus*) were also recovered in excavated contexts. Finally, while not collected multiple types of insect exoskeleton and pupa casings were encountered in the general excavated matrix. These were noted in standard excavation procedure but documented more systematically in the microanalysis of soil samples (see below).

Fauna-Soft

Within the broader L1 Fauna assemblage materials were also categorized a Fauna-Soft. These were often animal remains and byproducts composed largely of soft tissue, only preserved here due to the hyperarid climactic conditions. The dominant material type included in the Fauna-Soft material class would be preserved animal feces or coprolites.

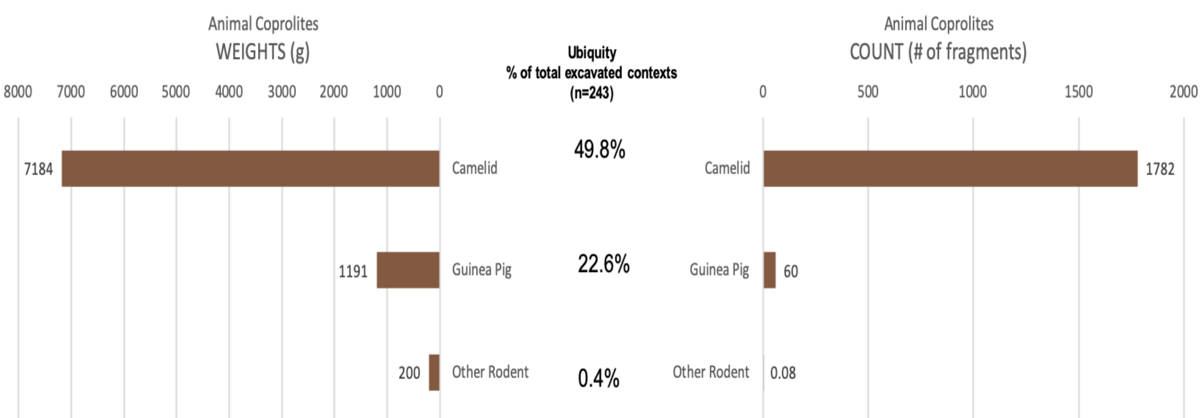


Figure 172. Charts showing weights, counts, and ubiquities of different types of animal coprolites as recovered in the excavation assemblage.

Found in just under half (49.8%) of contexts, camelid coprolites, almost certainly from domesticated llamas, were the most common coprolite type. However, large rodent coprolites, again almost certainly from domesticated guinea pigs, was also found in 22.6% of excavated contexts. Larger guinea pig coprolites were very discernable from smaller rodent coprolites, like mice. These were just found in a single context with a clear associated to an intrusive rodent nest.

Figure 173. Photos of examples from the Fauna-Soft assemblage, including: (left and bottom) feathers and (right) a segment of fur and skin from a guinea pig.

Other materials included in the Fauna-Soft assemblage included bird feathers. These were often poorly preserved and many could have been natural inclusions in the archaeological record, likely coming from local turkey vultures or ground owl; however at least three examples have red and orange coloring, suggesting possible more exotic species. Fur, often articulated with skin was identified in at least ten (10) contexts. Most of these finds were believed to come fromeiter dog or guinea pig. However, in one unique case the end of a juvenile camelid tail was found, with evenly split black and white coloring, likely in an offering context. Finally, camelid hooves were also identified in ten (10) different contexts.

8.8 Botanics

The other major material class of Ecofact in the L1 assemblage was Botanics or any remains deriving from plants of any kind. As with Fauna, the category of Botanics would contain numerous species falling into several major taxa distinctions. The preliminary analysis I conducted for this dissertation was based on field-screened collections. That said, a number of important trends were observed and are reported on here. It should be noted at the onset that additional botanic-focused analysis was conducted in the soil sample analysis, which is reported on separately below (8.9). Finally, it is important to reiterate here that the vast majority of Botanic remains in the macrobotanic assemblage are uncarbonized and simply desiccated due to the natural hyper-aridity of the broader Locumba drainage.

Botanic material would come in a number of forms and as noted in Chapter 4 (see 4.1), varied greatly in terms of how specific taxonomic identification could be. Some samples were sorted into very general categories, like wood or charcoal, while many, especially seeds, could be identified down to the species. However, before describing the specific results for each identified taxon, it is useful to present how Botanic specimens were organized into broader socio-functional categories. Here, for the field-screened sample study, five major categories of this type were used to organize the L1 Botanic assemblage: Consumable, Bulk, Textile, Ritual, and Wild.

Table 12. Chart listing five (5) major socio-functional categories into which all Botanics collected in the field were organized. Also listed are taxa in each major category as found in the L1 assemblage.

Consumable

Maize	Beans	Squash & Gourd	Peanut	Chili Pepper (ají)	Quinoa	Tuber	Algarroba	Peruvian Pepper (molle)	Walnut	Soap Berry	Pacey
Zea mays	*Phaseolus lunatus, Phaseolus vulgaris*	*Lagenaria siceraria, Cucurbita sp.*	*Arachis hypogaea*	*Capsicum sp*	*Chenopodium quinoa*	*Solanum tuberosum, Oxalis tuberosa*	*Prosopis algarrobilla*	*Schinus molle*	*Juglans neotropica*	*Sapindus saponaria*	*Inga feuilleei*

Bulk

Wood	Cane	Straw	Charcoal
Acacia macracantha, Schinus molle, Inga feuilleei, Prosopis algarrobilla, Galvezia sp.	*Gynerium sagittatum, Phragmites australis*	*Jarava ichu, Cenchrus echinatus*	

Textile

Cotton	Cactus
Gossypium barbadense	*Trichocereus sp.*

Ritual

Coca	Vilca
Erythroxylum coca	*Anadenanthera colubrina*

Wild

Burr	No-ID Leaf Fragments	No ID Seed Fragments
Cenchrus echinatus		

Again, some classifications of the field-screened collection are preliminary and need confirmation in a true paleoethnobotanic study of the Cerro San Antonio botanic assemblage. However, most identifications of specific taxa (like *Zea mays*), are accurate and identifications were made conservatively. Finally, while I do utilize relative densities of the field-screened collection in later context-oriented discussions (see Section 3), here I largely rely on absolute counts and weights as well as ubiquity to discuss general differences in frequencies of material types.

Below I discuss each major category separately, including the subdivisions and other nuances of each major type or taxa listed above (Table 12); however, some observations regarding general trends in these categories are worth noting here.

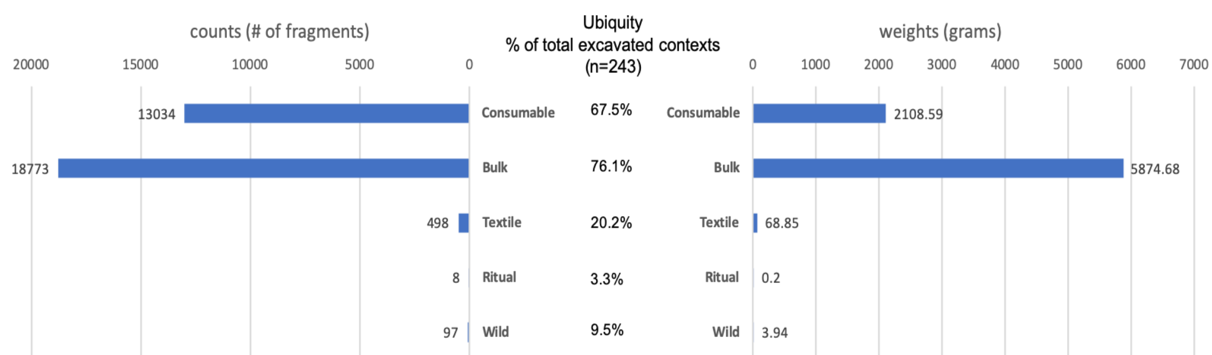


Figure 174. Charts illustrating the basic counts (# of individual fragments) and weights (grams) of major socio-functional botanic categories.

Of the major categories. it is clear that taxa falling into the Consumable and Bulk categories make up the vast majority of the assemblage - 99.1% of the Botanic assemblage by weight, when combined. Both Consumables and Bulk botanics were relatively ubiquitous, found in 65.7% and 76.1% of contexts, respectively. The other major socio-functional categories would then make up less than 1% of the Botanic assemblage by weight (0.9%); though, at least the Textile taxa, were relatively well-distributed, found in over 20% of contexts.

Consumable Botanics

The botanic remains categorized as consumable represent taxa that were either exclusively or primarily utilized as foodstuffs. That is to say, many taxa included here could be utilized in other activities but we believe consumables were primarily entered into the archaeological record during food preparation, consumption, disposal, and storage. At least fifteen (15) different species of edible plant were recovered in the L1 field-screened assemblage, 10 of which were full domesticates. In total, 13,034 fragments, weighing 2108.59 grams were identified as these Consumable taxa.

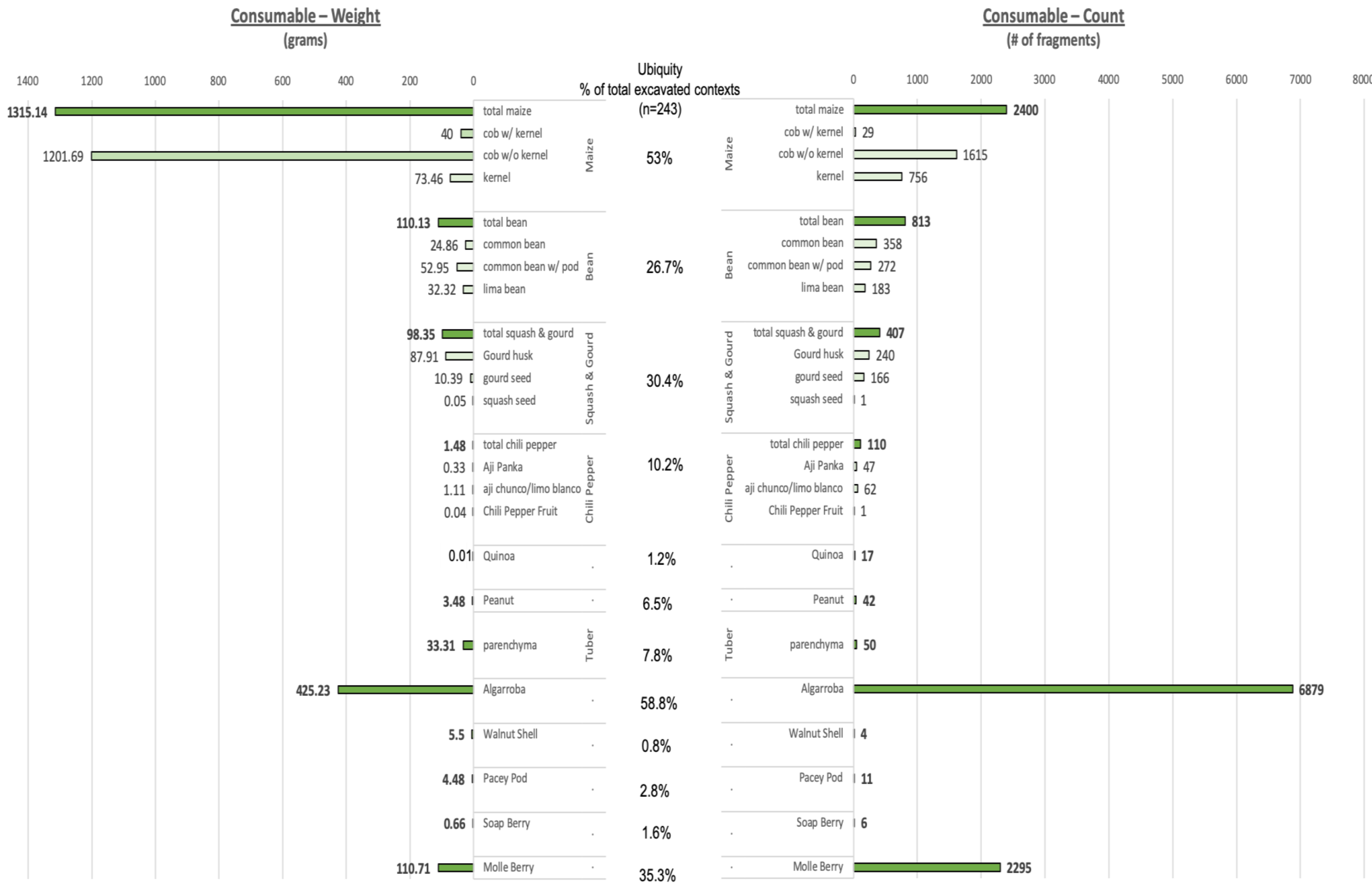


Figure 175. Breakdown of absolute counts and weights of various taxa in the Consumable category, including the ubiquity of these taxa across excavated contexts.

From the onset there are some prominent trends in the Consumable taxa. Some taxa were clearly more abundant and ubiquitous. The remains of maize, and particularly kernelless cobs, were the single best represented taxon in terms of weight. However, algarroba remains (seeds) were the best represented in terms of raw count as well as ubiquity. Five different taxa were represented in over one-fourth of all major excavated contexts. Three of these well-represented taxa, maize (53%), beans (26.7%), and gourd (30.4%), were domesticates and two, algarroba (58.8%) and molle (35.3%), were products from wild or tended trees. Significantly, all five of these taxa are local lowland cultivars and tree taxa. That said, the presence of largely highland cultivars, like tuber remains and even quinoa seeds, also suggest a utilization of non-local taxa as well. There are of course sampling issues at play here (these are outlined in Chapter 4), but as will be discussed below, the macrobotanic assemblage correlates quite closely to the microanalysis of soil samples, suggesting sampling here was at the very least consistent.

Maize or corn (*Zea mays*), when all of its components were counted together, made up 62.4% of all consumable tax, by weight and were found in 53% of all excavated contexts. While full cobs, complete with kernels (a few even with the husk still present) and individual maize kernels (seeds) were recovered, cobs without seeds were the most abundant and ubiquitous component of maize remains, found in 46.5% of all contexts. This is a common pattern, as kernels would be consumed with cobs generally discarded and only utilized for fuel and sometimes fodder. Less than 2% of recovered cobs in the L1 assemblage showed any signs of burning or charring. Finally, while different variants weren't confirmed, cob size and overall structure could vary quite greatly. While most were fragmentary, complete recovered cobs ranged from 3-9cm in length and roughly 0.5-2cm in diameter.

Figure 176. Photos showing examples of maize remains from the L1 assemblage, illustrating the variability in cob size. Also depicted (below) are maize kernels and portions of maize stalks with cob husk still attached (note: different scales).

Gourds (*Lagenaria siceraria*) and likely to a lesser degree squash (*Cucurbita sp.*) were also well represented, found in just over 30% of all excavated contexts. Both taxa here, but particularly gourds, could be dried and used as containers as well as acting as a foodstuff. Importantly, seeds could be definitively sorted between gourd and squash (likely pumpkin).

However, I could not definitively say which taxa shell fragments belonged to. However, of the seeds sorted here 166 were believed to be gourd, with only one (1) believed to be definitely squash, suggesting that the majority of shell fragments can be assigned to gourd, though other explanations are also very possible. Significantly, while the shell fragments would be the most abundant component found in terms of absolute count and weight, gourd seeds were more ubiquitous, found in 20.9% of excavated contexts, compared to 18.5% for shell fragments.

Figure 177. Photos of (left) various examples of bean (Phaseolus sp.) remains as well as (right) gourd seeds (note: images are at different scales).

Two different taxa of bean were identified in the L1 assemblage. The most abundant was the common bean (*Phaseolus vulgaris*) which was frequently found as individual beans as well as beans still embedded (at least partially) in pods. The beans had a glossy exterior with deep brown (almost black) color often modelled with a brown-orange and came three to five in a pod. This variety of bean was found in over 25% of all excavated contexts. The other taxa of bean identified here was the lima bean (*Phaseolus lunatus*). This legume was larger and tended to have a slightly wrinkled exterior. Lima beans were always found a individual beans and were found in just 2.9% of excavated contexts.

A fourth lowland cultivar that was recovered in the field-screened sample in a significant number of contexts (10.2%) was chili pepper (ají). Like bean, chili pepper was represented by seeds belonging to two taxa. When compared, one seed type was larger, thicker, and wavier, often with a pronounced break prominence, which I believe is most likely ají panka (*Capsicum baccatum*). The other chili seed type was smaller and smoother, both in profile and along the edges. This smaller seed type was likely either ají del arbol (*Capsicum annuumor*) or ají chunco (*Capsicum frutescens*). Despite their smaller size, the small ají seed type was found in higher numbers as well as more contexts (7.4%). However, the large ají seed type was still found in just over 4% excavated contexts. Just one example of pepper fruit, attached to a stem, was found in a single context.

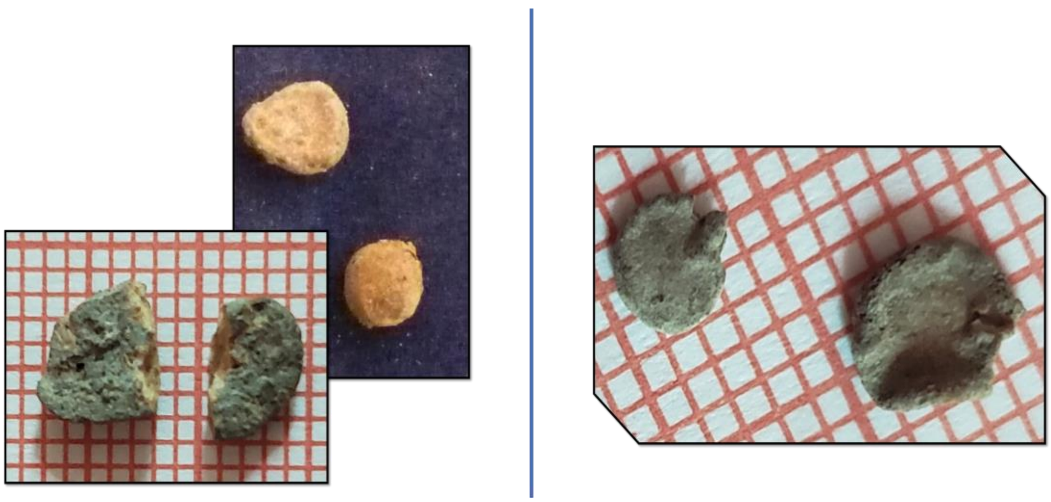


Figure 178. Photos of other lowland cultivars from the L1 assemblage, including: (left) peanut remains and (right) examples of the two taxa of Chili Pepper seed identified.

The final lowland domesticate that was identified in the Cerro San Antonio assemblage was peanut (*Arachis hypogaea*). Forty-two (42) fragments of peanut were recovered in just over 6% of the excavated contexts. No peanut shell was definitely recovered.

Highland associated domesticates were also present in the Cerro San Antonio assemblage. Seeds definitively belonging to the broader *Amaranthaceae* taxa, and believed to be true domesticated quinoa (*Chenopodium quinoa*) was present in just over 1% of contexts, though it is always possible these represent wild species that have been known to grow at least semi-locally (Biwer 2019:125). While the fine-screening process did capture these seeds, it is certainly the case that many escaped. This is further indicated in the higher presence of these important highland seeds in the microanalysis (Garvin 2020:67-74). Also recovered was portions of tuber, referred to here as parenchyma. While I am confident in the identified specimens belonging to some taxa of tuber, I could not discern which. However, the most likely species to be present would be standard potato (*Solanum tuberosum*), but again, a variety of other species and subspecies of potato as well as other tubers, such as oca (*Oxalis tuberosa*), could also be represented. All together tuber remains were found in 7.8% of excavated contexts.

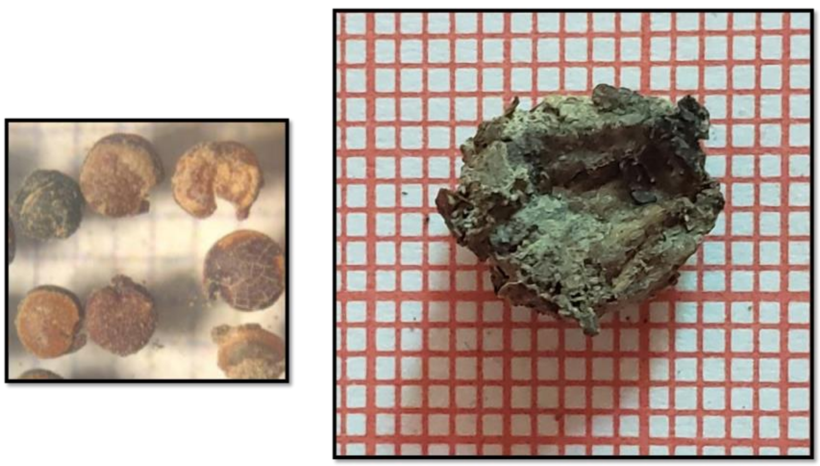


Figure 179. Photos of plant remains believed to be primarily highland cultivars, including: (right) a preserved fragment of some taxa of tuber and (left) examples of quinoa seeds from the L1 microanalysis (from Garvin 2020:68).

The remaining taxa represented in the Consumable category all game from temperate to subtropical lowland tree and shrub species. Some taxa were only represented in a select few contexts. Pacay pod (*Inga feuilleei*) was found in just seven (7) or 2.8% of contexts, soapberry (*Sapindus saponaria*) berries were found in 1.6% of contexts, and nutshell, likely representing walnut (*Juglans neotropica*), was found in less than 1% of contexts (0.8%).

Figure 180. Examples of (left) molle berries and (right) assorted algarroba remains as collected in excavated contexts at Cerro San Antonio (L1).

However, some of the best represented taxa in the L1 assemblage would come from these wild tree taxa. The most ubiquitous single taxa present would be seeds from the algarroba tree (*Prosopis algarrobilla*). Other than maize, algarroba was the only taxa to be represented in over half of the excavated contexts (58%). In addition to being ubiquitous, algarroba was also the most abundant taxa making up 52.7% of the Consumable assemblage, by count. Also well represented were berries or fruit from the Peruvian pepper or molle tree (*Schinus molle*[188]). These berries would be recovered in over one-third of all contexts (35.3%).

<u>Bulk Botanics</u>

Botanic remains classified as Bulk Botanics were even better represented than Consumable Botanics, found in over three-fourths (76.1%) of all contexts excavated at L1. Here I defined Bulk Botanics as taxa believed to be associated with architecture and as well as firewood. There were just four major categories of Bulk Botanics: wood, cane, straw, and

188 Significantly, seeds from the molle tree would also be identified during the microanalysis of soil samples (Garvin 2020:75-78).

charcoal.

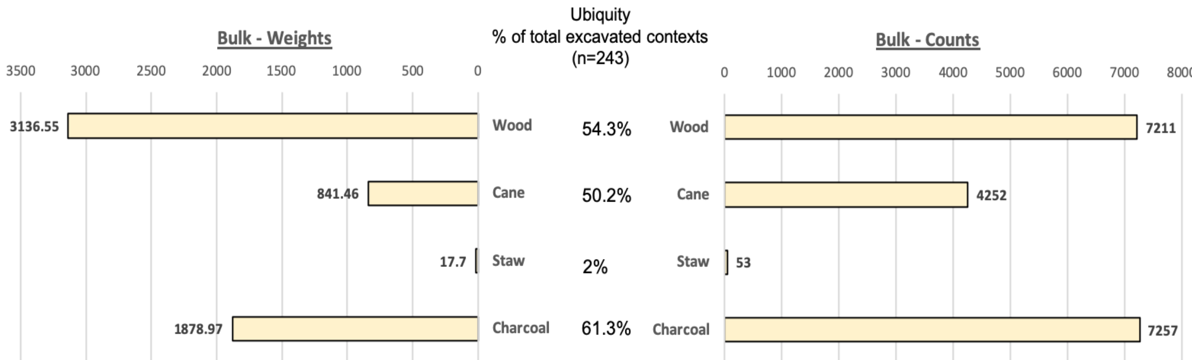


Figure 181. Breakdown of absolute counts and weights of various taxa considered to be in the Bulk category, including the general ubiquity of these taxa in excavated contexts.

Again, here in the Bulk assemblage the most abundant grouping depends on the metric used to gauge abundance. Wood fragments were easily the most abundant type by weight, representing 53.3% of the assemblage. However, when ranked by absolute count there was just slightly more charcoal. What's more, charcoal was significantly more ubiquitous, found in 61.3% of contexts where wood fragments were only located in 54.3% of contexts. While much less in terms of absolute weight and count, cane was also relatively ubiquitous, found in over half of all excavated contexts. Finally, straw would only be found preserved in 2% of contexts.

Wood fragments included any fragment of wood (including bark) recovered that was not burnt[189] or carbonized. Some of these fragments were large chunks of wood, but most were quite small. No specific taxa could be identified but based on the Consumable assemblage it is likely that at least some wood came from medium density algarroba and pacay trees as well as more hard wood molle and walnut. Based on small spines present on smaller twigs it is believe that small but hardwood yaro (*Acacia macracantha*) is also represented in the wood sub-assemblage. All of these trees could have been found in the middle Locumba drainage.

[189] While it was always an estimation, if a fragment was more than 50% burnt it would often be lumped in with charcoal.

As noted above, while not as abundant as wood and charcoal in terms of weight and count, cane fragments were also relatively ubiquitous. Found in just over half of the excavated contexts (50.2%), cane was the primary element utilized in quincha wall architecture, so is likely derived almost exclusively from architecture. While the cane assemblage here was not systematically separated it is believed that just one taxon was represented. Caña brava (*Gynerium sagittatum*) is a robust river cane that still grows along the river today.

An element only preserved in 2% of all contexts was straw or dried grass. The lack of straw in terms of ubiquity most likely has to do with its delicate nature. Again, taxa were not identified, but at least a few of the samples were ridge, very similar to bunch grass, such as the highland *ichu* (*Stipa ichu*).

Finally, charcoal was also very well represented, recovered in 61.3% of all excavated contexts - one of the most ubiquitous material types in the entire assemblage. Charcoal represented any type of carbonized wood or other dense plant matter. Charred ceramic, bone, fire-cracked rock (FCR), or any other material was removed before counts/weights.

<u>Textile Botanics</u>

Textile Botanics refer to botanic remains believed to be the byproducts of, or even tools used within, textile production and repair. Only two taxa are represented here: cotton seeds and fragments of cactus spines. Cotton seeds were moderately ubiquitous, found in 18.1% of contexts. It should be noted here that, when recovered cotton fiber would often be categorized directly into the Textile material category. Also of note here is that cotton leaves were found in at least one context but not counted towards the counts or ubiquity metrics here.

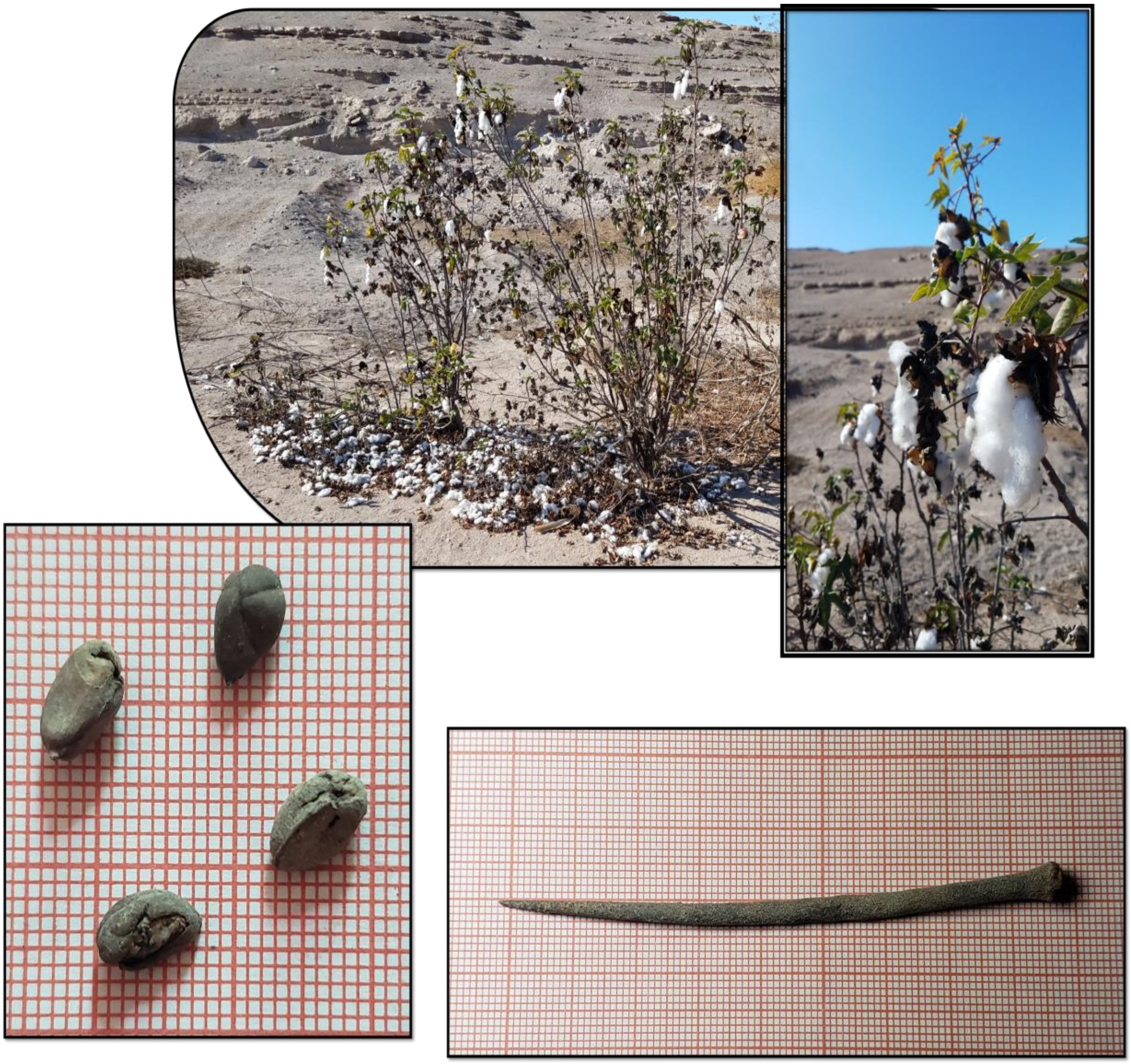


Figure 182. Photos of botanic taxa categorized as Textile Botanics, including: (lower-left) cotton seeds from the L1 excavation assemblage, (top) modern cotton plant growing on the margins of Cerro San Antonio along a relic canal, and (lower-right) a cactus spine needle.

Also included in the Textile Botanic category were complete or unmodified cactus spines. Six (6) such finds were made in six different contexts (2.4% ubiquity). Only large cactus spines, likely from a species in the genus *Trichocereus*, were counted in this category; smaller thorns from shrub trees, like yaro, were not counted. Modified examples of cactus spines, namely those with a small perforation at the proximal end for thread, were categorized in the Artefacto material category and have already been discussed in the Textile subsection.

However, even without this perforation, it is believed that these botanic remains could have been utilized in a variety of domestic tasks, particularly work with textiles.

Ritual Botanics

Ritual Botanics would refer to plant taxa believed to be consumed or otherwise utilized as a largely ritual or non-utilitarian practices. Just two taxa were represented here, one definitively identified, in all cases reported here, the other, just a single find is a far more tentative identification. Seven (7) coca seeds (*Erythroxylum coca*) were found in seven (7) different contexts, giving it a ubiquity of 2.9%. The distinct, roughly star-shape, of coca seeds make them clear to define. In addition, it is believed that coca leaf fragments were also identified in a single context, but is not included here.

Figure 183. Photos of examples of coca seed and leaf recovered in the L1 assemblage.

Less certain was the identification of a single vilca (*Anadenanthera colubrina*) seed fragment. The fragment had the correct round glossy exterior, but as it was just a fragment, in poor condition, it requires additional analysis to confirm.

Wild Botanics

The Wild Botanics category included any plant taxa that was identified as likely being wild or unidentifiable. One definitively wild inclusion of thin the assemblage were small burrs, likely deriving from the southern sandbur (*Cenchrus echinatus*). These burrs, found in 5.8% of all contexts, likely came into the assemblages attached on clothing of people or fur of animals. Additionally, as a grass the sandbur may have been included in general animal fodder as well. There seed fragments are believed to be part of the natural seed rain, including fragments of Chenopods and other grasses.

8.9 Microanalysis: soil samples

In select excavated contexts, mostly those associated with primary occupational contexts (what are referred to as “superpiso” levels) as well as formal features. As noted in Chapter 4 (see 4.1), a soil sample was a carefully measured and completely unsorted sediment sample. In total 134 soil samples were collected from excavated contexts across three (3) sectors at Cerro San Antonio. The majority of these samples (117/134) were just 0.5 liters in volume with the remaining samples taken as a full (1) liter.

These samples are ultimately intended for a variety of different sampling and analysis including elemental sourcing. However, 36 samples have already been processed by A. Garvin for her MA thesis (Garvin 2020). This work was botanic-focused but full size-grade processing and systematic sorting were completed of all 36 samples and materials recovered therein. A detailed presentation and analysis of that data can be found in that Master’s thesis, and more of the context-oriented data from can be found below in Section 3. However, a few major trends are worth noting here.

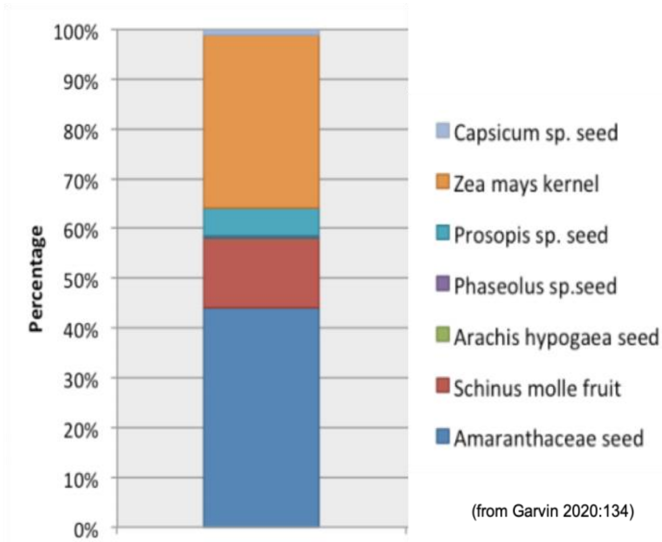


Figure 184. Overall frequencies of Consumable (or Market Basket) taxa as identified in the 36 analyzed soil samples (from Garvin 2020:134).

The soil sample microanalysis utilized systematic sorting technique of size-graded fraction. This allowed for the identification of much smaller seeds and fragments. This led to one of the more noticeable trends, the much greater abundance of *Amaranthaceae sp.* seeds (both domesticated and wild), at least in terms of count (Figure 184). With the exception of a few wild taxa identified in the microanalysis no additional domesticates were recovered, so overall presence-absence as discussed in reference to Botanics (see above) generally holds true here as well.

8.10 Human Remains

Due to the presence of at least 21 formal mortuary sectors containing hundreds of individual burials, coupled with the recent and historic looting, a significant amount of human remains being exposed on the surface at Cerro San Antonio. This is true of a number of the Tiwanaku-affiliated cemeteries, particularly Sector B and Sector W. The broader Proyecto Arqueológico Locumba (PAL), has worked to minimize damage to the dozens of individual human remains that have been disturbed, often severely, and left on the surface. More detailed and systematic work of these individuals is underway. However, based on the preliminary examination of the approximately 27 recently looted individuals left on the surface after the most recent event, it can be confidently state that almost all age-ranges (other than infants) appear present in burials. This was mostly gauged on the stage of epiphyseal fusion in long bones and vertebrae, signs of pathology like arthritis, and overall size of bones present. Likewise, clear examples of both biological sexes were also present in the observed specimen, though no detailed measurements were made to verify questionable cases.

Figure 185. Examples of human hair recovered at Cerro San Antonio (L1), including: (right) elaborate human braids recovered from looted contexts (L1W) and additional braided human hair recovered in excavations.

In addition to some skeletal remains containing soft tissue, one of the most important aspects of human remains in the L1 Tiwanaku-affiliated remains was the preservation of multiple sets of elaborate braids (Figure 185). While these thick masses of braids may have simply detached from the tissue of the skull due to differential preservation issues, two of the more elaborate sets of braids have no remaining tissues. This suggests these may have been wigs, possibly detached while preparing the bodies for burials and re-placed upon burial.

Finally, limited human remains were also identified in the excavation assemblage. A single human tooth was located in one context and what are believed to be fragments of human coprolites were also recovered from at least one context. Again, portions of human hair, often in small braids were located in three (3) separate contexts.

8.11 Secondary Compositional Analysis

Beyond the observational-based attribute analysis described above, a number of specimens were collected explicitly for the purpose of secondary compositional analysis. Human bones, teeth, and other remains were recovered from various looted contexts for various forms of stable isotope analysis. Additional select samples of ceramics, lithics, and other sediments collected in excavations have already been exported for geological sourcing via methods such as Portable X-ray Fluorescence (pXRF) and Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS). Both these forms analysis are either ongoing or planned but have not been completed. Finally, a number of carbon-based samples were selected from a variety of contexts for Accelerator Mass Spectrometry-based (AMS) radiocarbon dating.

AMS Radiocarbon Dating

Twenty-five (25) contexts in the 2016 test excavations, 2018-19 excavation blocks, as well as a few select spot finds were explicitly sampled for the purpose of AMS radiocarbon dating. Unfortunately, the majority of the samples, particularly those collected from the more extensive 2018-19 excavations are still awaiting export from Peru. However, eight (8) samples from Cerro San Antonio (six (6) from the 2016 test excavations) were exported and successfully processed at the Keck-CCAMS facility at University of California, Irvine.

Table 13. Results of the six (6) radiocarbon dates results from the samples collected in the 2016 test excavations in Sector A, with calibrated date ranges, using the INTcal13 and SHcal13 (these dates are used here with permission from P. Goldstein and PAL).

							INTcal13	SHcal13
SPEC #	Material	Basic Context	Sample Name	UCI-AMS-Lab #	^{14}C age (BP)	±	2 sigma (95.4%)	2 sigma (95.4%)
L1-3152	**charcoal**	Test Unit L1A-2016-5 - disturbance within Special Structure L1A-1	#25 L1-3152 SA U5	222573	955	15	1024 - 1153	1045 - 1184
L1-3097	**maize cob**	Test Unit L1A-2016-4 - superpiso midden deposit	#24 L1-3097 SA U4	222572	1105	15	894 - 985	909 - 1024
L1-3071	**maize cob**	Test Unit L1A-2016-3 - superpiso midden deposit	#23 L1-3071 SA U3	222571	960	15	1022 - 1152	1045 - 1179
L1-3030	**maize cob**	Test Unit L1A-2016-2 - superpiso rock pile-midden deposit	#22 L1-3030 SA U2	222570	965	15	1021 - 1151	1044 - 1174
L1-3106	**maize cob**	Test Unit L1A-2016-1- superpiso rock pile-midden deposit	#21 L1-3106 SA U1	222569	1055	15	971 - 1020	990 - 1105
L1-3159	**maize cob**	Test Unit L1A-2016-1- subsurface pit feature	#17 L1-3159 SA U1	222568	1200	15	773 - 881	797 - 972

Like all other material analysis presented above, the results of the AMS radiocarbon dating are discussed below in a more contextualized manner, but a few trends must be noted here. First, as suggested by others in the region (Marsh, et al. 2018:8), here I primarily rely on the SHcal13 correction for calibrating the dates, with the 2-sigma-based date range given a 95.4% confidence interval (Table 13). With the earliest date, most likely in the ballpark of AD 870 to AD 970 and the latest three nearly identical dates, all somewhere in the range of about AD 1040 to AD 1180, the calibrated dates provide a range spanning approximately 300 years. The clearest pattern in the L1 radiocarbon dates appear relatively late, three of five of the dates are firmly in the Terminal Horizon to Early Late Intermediate Period transition. Significantly, though these later dates align quite sharply, confirming that the contexts these samples came from were certainly contemporaneous. However, at least one date is firmly in the middle of the Late Middle Horizon. Again, I discuss the nuances as well as broader implications of these dates below, but overall, the dates suggest a continuous occupation beginning in the Late Middle Horizon and continuing into the Early LIP.

8.12 Chapter Summary

In Chapter 8 I presented the results from the attribute-based analysis conducted on all cultural material collected at Cerro San Antonio during the various modes of field work presented in Chapter 6, Chapter 7, and Chapter 8. While the form and intensity of post-field material analysis would vary greatly, depending on the material type, all materials would undergo some form of quantitative and qualitative assessment.

8.1: This subsection presents the results collection from Ceramics. This would be the material class that would receive the most intensive attribute-based analysis.

8.2: Here the material category of Lithics was presented. This included analysis of both Lithic-Flaked materials as well as Lithic-Ground materials.

8.3: In this section Textiles, both cloth and other associated materials, were analyzed. This included portions of actually clothing and other garments to the raw materials (wool and cotton).

8.4: This brief subsection presents results from attribute analysis of basketry as well as other vegetable-fiber materials, like rope.

8.5: Again, a brief subsection presents the few metal artifacts recovered at L1.

8.6: Here a number of miscellaneous artifact types are presented. This includes beads, made from a variety of materials to implements made from bone or wood.

8.7: Fauna is an extensive ecofact material category. Here all results collected, from animal bone and marine shell to rodent coprolites and dog hair, are presented.

8.8: Botanics is another relatively sprawling category of ecofact. This subsection presents the results of preliminary analysis of all macrobotanic remains.

8.9: As a follow-up I review results of largely botanic-oriented microanalysis completed on soil samples collected in excavations.

8.10: This very brief subsection presents some of the human remains that have been recovered both in secure excavated contexts as well as recently disturbed looted contexts.

8.11: In this final subsection, I present the results of initial AMS radiocarbon dates from materials collected in the 2016 test excavations.

Next: The next major section, Section 3, synthesizes all data presented here in Section 2 utilizing the methods and underlying theoretical approaches outlined in Section 1.

SECTION 3 - DISCUSSION

In Section 3 I provide the concluding discussion of this dissertation. These final three chapters work to synthesize the various data presented in Section 2 with the broader theoretical frameworks and socio-geographical information presented in Section 1. The primary goal here then, is to bridge the gap between the truly localized data collected from the Middle Horizon era components at the site of Cerro San Antonio in Locumba to my broader anthropological questions regarding the nature of Tiwanaku and the sociopolitical dynamics of archaic states. I utilize my community ecology framework to help scale up from microscale levels of analysis of individual spaces within excavated structures, to those based on intrasite contextual comparisons in the mesoscale analyses, before concluding with contextualizing Locumba within the broader macroscale of the South-Central Andes during the Middle Horizon.

As explained in Chapter 4 (see 4.2), one of the primary ways in which I attempt to both quantitatively compare as well as qualitatively visualize all scales of analysis are through various modes of network-based analysis. It should be noted at the onset that many of the more quantitative or formal network approaches (FNAs) applied here are preliminary, and represent the first stage in this mode of analysis with the Cerro San Antonio dataset. That said, many of these preliminary results are compelling and worth reporting in this early stage.

Chapter 9 focuses on my microscale analysis and works primarily to synthesize the detailed context information collected in excavations (Chapter 7) with the data collected in material analysis (Chapter 8). GIS-generated kernel density heat maps and bipartite affiliation networks are used to illustrate relative densities of various material types and how they correlate to indicate activity areas that give insights into how the microscale institutional venues of households emerged from multimodal community engagement at Cerro San Antonio during the Middle Horizon.

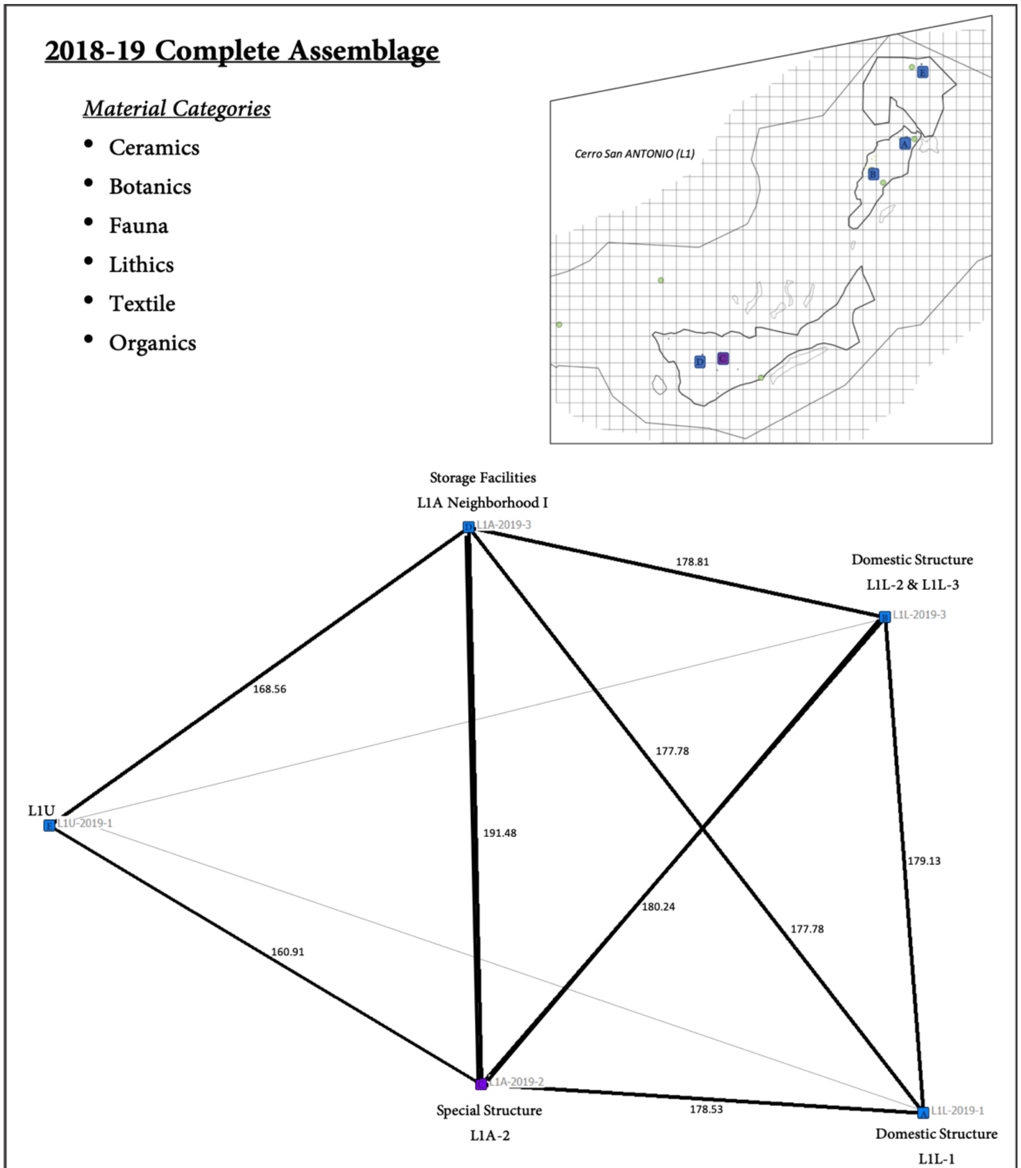
Chapter 10 scales up to the mesoscale of analysis and highlights trends in similarities and differences both within and between a variety of contexts at Cerro San Antonio. I use the different modes of community (residential, sustainable, and symbolic) to delineate different aspects of community life at the site during the Middle Horizon. This discussion focuses largely on the three (3) Middle Horizon era domestic sectors (Sector A, Sector L, and Sector U), as both the surface and subsurface remains in these sectors were systematically defined and sampled through mapping and surface collection (Chapter 5 and Chapter 6) as well as excavation (Chapter 7). This chapter works to synthesize that data to provide a comprehensive view of community life at the mesoscale institutional setting of the settlement. Here, I again utilize heat density maps generated using GIS techniques, this time of sector-wide material distributions. However, at this scale I also draw on other formal network approaches using a specialized variation coefficient statistical methods, coupled with network visualization software, to help isolate quantitative connections between different contexts both within and between these sectors.

Finally, Chapter 11 works to situate the broader Middle Horizon occupation at Cerro San Antonio (L1) in the middle Locumba Valley into the broader context of the South-Central Andes during the important Middle Horizon period. Here, I compare the major stylistic trends and more utilitarian practices delineated at Cerro San Antonio to other well-documented Middle Horizon contexts. I return to my hypotheses (see 4.3), weighing which one or combination therein seems to be most parsimonious with the data outlined in all previous chapters. The initial AMS radiocarbon dates are used to ground this discussion in time, assisting in highlighting the diachronic nature of Tiwanaku influence in the broader region. Ultimately, I provide an explanation for where I feel Locumba, and specifically the occupations at Cerro San Antonio, fit within the broader narratives surrounding Tiwanaku.

Chapter 9 - The Microscale: portraits of “the local” at Cerro San Antonio

In this chapter I examine what life was like at Cerro San Antonio during the Middle Horizon at the microscale. While this discussion draws on data collected in every mode of analysis across the site, the most detailed and comprehensive perspective of the microscale comes from excavated contexts. My primary work here is to synthesize the context-oriented excavation data presented in Chapter 7 with the material culture-based data relayed in Chapter 8. I rely on relative densities of materials as recovered in specific spaces, architectural and otherwise, as well as more powerful data visualizations of bipartite network graphs and heat-density maps to illustrate the relational and spatial aspects of this data. Again, ultimately the goal here is to provide a relatively microscale, context-specific view of daily life in some of the more intimate venues of community life at L1.

As noted above, while I will draw on data and observations from throughout Cerro San Antonio, this chapter is centered on the excavated contexts, primarily those located in Sector A (L1A) and Sector L (L1L). The majority of Chapter 9 works from excavated context-to-excavated context, explaining each on its own terms. While the 2016 test units (see 7.1) will be discussed, the main contexts utilized are the more extensive excavation blocks, completed in the 2018-19 season (see 7.2). Individual areas and subareas *within* each block will be compared and contrasted in order to determine the specific uses of specific spaces, eventually allowing for a more complete picture of the different modes of community that were expressed in the household and other domestic-oriented microscale institutions that defined these settlements during the Middle Horizon.



B-R Similarity Matrix

	L1L-2019-1	L1L-2019-3	L1A-2019-2	L1A-2019-3	L1U-2019-1
L1L-2019-1	200	179.1315411	178.5351349	177.7881287	155.4652693
L1L-2019-3	179.1315411	200	180.2490099	178.8150139	156.3548618
L1A-2019-2	178.5351349	180.2490099	200	191.4898531	160.9107675
L1A-2019-3	177.7881287	178.8150139	191.4898531	200	168.5665425
L1U-2019-1	155.4652693	156.3548618	160.9107675	168.5665425	200

Figure 186. B-R Similarity matrix and network visualization, illustrating the proportional similarity in the overall material assemblages collected from each major excavation block at Cerro San Antonio.

Finally, while the excavated contexts would yield major differences, the overall material assemblages they produced would be quite comparable. The Brainerd-Robinson (B-R) Similarity Index and accompanying network visualization in Figure 186 illustrate that the overall proportions of major material classes recovered in the 2018-19 excavation blocks were roughly similar. To review (see 4.2), the B-R Similarity Index is variation coefficient devised to quantify proportional similarities/differences in datasets with similar attributes (in this case of material assemblages) but very different values associated with those attributes (amounts of various material types). Here the higher the value (ranging from 0-200), the more similar the assemblage. The result is a similarity matrix which can be translated into a pair-wise network which greatly aids in visualizing these relational datasets. So, to return to the Figure 186 example, using total weights, the proportions of the six (6) most commonly represented major material categories (Ceramics, Botanics, Fauna, Lithics, Textile, Organics) were compared across the five (5) major excavation blocks completed in 2018-19.

Significantly, while the strength of similarity between contexts would vary greatly, as will be seen in later B-R examples, the lowest values all fall above 150, suggesting an overall high similarity index. In fact, it is only at this broad level of assemblage comparison that this strong of a similarity matrix is produced. Again, these nuances and even significant differences between these contexts and the materials recovered will be highlighted throughout this analysis, but this first B-R Index figure simply reiterates that there were indeed all domestic-oriented contexts which facilitated the same general suite of community action and are therefore comparable datasets.

9.1 The Domestic Structures of Sector L

In spite of the similarities highlighted above, it is necessary to note here that the types of structures investigated in Sector L would be very different from those excavated in Sector A. Sector L excavations would expose three separate domestic structures that were all largely constructed using a similar free-standing quincha-style. As I suggest directly below and in subsequent subsections, these Sector L structures were likely the loci for all different modes of community practices but ultimately acted as houses or the primary setting of daily activities for single household social units. It is important to reiterate, that under the community ecology framework I have defined here, households represent microscale institutions composed of individuals who otherwise affiliate with any number of different communities. This is actually different from most traditional formulations that see households as simple units that taken together form communities. As such, these Sector L domestic structures represent ideal contexts to investigate the intersection of multimodal community networks in the most intimate of settings. Excavating large portions of these multi-room structures have allowed for detailed room-by-room comparisons, something not possible with the contexts excavated in Sector A.

Domestic Structure L1L-1

One of the most complete domestic architecture-based contexts exposed in excavations would be Domestic Structure L1L-1. This structure was the primary focus Block L1L-2019-1 at the far northern end of the Sector L blufftop. The entire $68m^2$ opened as part of this this excavation block would be directly associated with either interior or exterior spaces of this single structure. All evidence suggests that Domestic Structure L1L-1 acted as the residence of a single household. As such, this structure acted as the grounding point for any number of multimodal community networks in the microscale.

As a structure dedicated to housing a multi-individual household unit, Structure L1L-1 is definitional material marker of the residential mode of community. Among all the other sustainable and symbolic community activities described below, this structure would have likely been the primarily sleeping quarters for a nuclear or extended family; though this activity is notoriously difficult to detect in the archaeological record. While the decisions and knowledge that underwrote the architectural and broader built environment construction choices, are clearly in the realm of symbolic modes of community, the structure itself is best seen is a direct manifestation of the residential community dimension of the household institution.

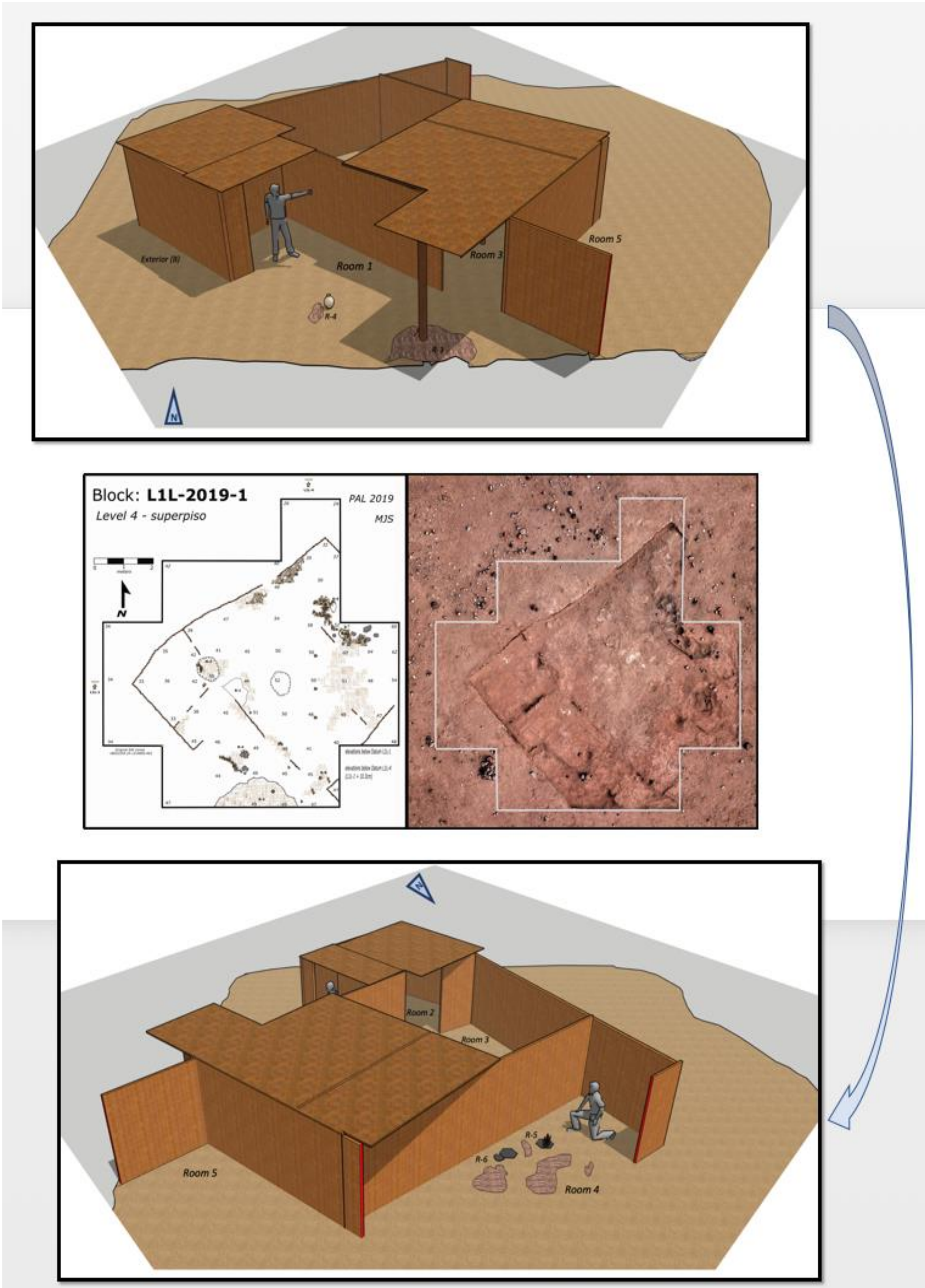


Figure 187. Sketch-Up 3D models of Domestic Structure L1L-1, from multiple angles.

Structure L1L-1 was composed of five distinct architectural spaces. Two rooms, Room 2 and Room 3, were true interior spaces, walled on four sides and likely roofed. Additional spaces, like Room 1, Room 4, and Room 5, were likely only partially walled, with awning-style shade structures but no true roofing. All architecture was constructed using wattle method (*quincha*), whereby relatively sturdy segments of local river cane (~2 meters in length) were planted into narrow trenches (~10-15cm in depth) to form free-standing walls. Posts, made from locally sourced trees, were only sporadically employed to hold up roofing, presumably made using woven reed mats. All floors and features in this structure appear to have been relatively informal with no evidence of truly-prepared floors or storage features present. Even the well-worn hearths (R-5 and R-6) in Room 4 were only informal, relatively shallow pits.

Structure L1L-1 also shows extensive evidence of activities rooted in sustainable modes of community. Evidence of these modes of community are most ubiquitous in the remnants of activities related to daily food preparation, consumption, storage, and disposal.

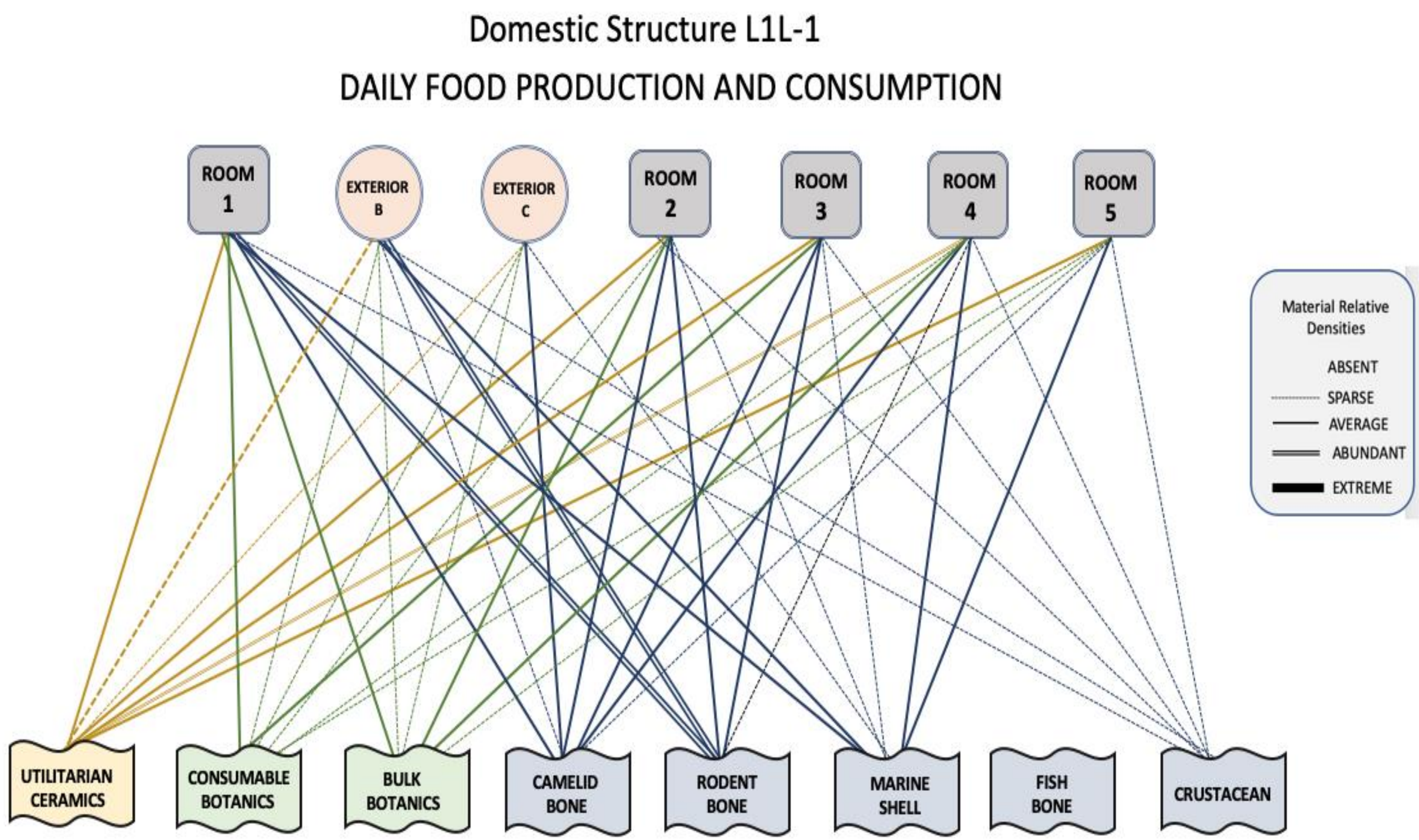


Figure 188. Bipartite Network Graph illustrating the relative densities of material types associated with daily food preparation and consumption as found in each room of Structure L1L-1.

The bipartite network graph in Figure 188 illustrates that materials associated with daily food preparation and consumption were relatively well-distributed throughout Structure L1L-1. Plainware utilitarian ceramic sherds were recovered in relatively average densities in most interior rooms, but with slightly higher concentrations in Room 3 and Room 4. Likewise, remains of foodstuff were found in sparse to average densities in most rooms, suggesting floors were kept clean. This observation is further bolstered by another visualization, this time in the form of a kernel-density heat-map.

Figure 189. Heat-map illustrating the concentrations of materials associated with food preparation and consumption (based on relative density: gram/liter).

Because the heat-map in Figure 189 used the more specific spatial data collected using the area, subarea, and 1x1m subunits utilized in superpiso excavation levels (sometimes getting spatial lots down to areas less than 50x50cm), more specific concentrations of these materials can be seen *within* rooms. In general, materials were found in higher concentrations along walls and in corners, where materials would have been brushed to the side during use as well as naturally collect upon abandonment.

It is no surprise that the densest concentration of these materials, especially those related specifically to food preparation (see Figure 188 for material types included), can be observed in the northern portion of Room 4. This is the same location where features R-5 and R-6, the two informal, but well-used hearths were located. What's more, this is also the context where a large metate fragment and several mano fragments were exposed in situ (see Figure 80). These correlating material densities and formal features make it clear that Room 4 was unambiguously the primary kitchen-space of Structure L1L-1, where food was prepared.

Looking deeper into the types of foodstuff present, or the preferred cuisines of the Structure L1L-1 inhabitants, gives insights into both sustainable as well as symbolic community manifestations. The bipartite network in Figure 188 illustrates that both camelid and rodent bone were both relatively ubiquitous. The rodent bone, almost certainly coming from domesticated guinea pig, were found in particular abundance in refuse deposits on the margin of Room 1 and in the exterior space (Area B) behind the north wall of the structure. Interestingly, while marine shell and crustacean remains would be found in relatively sparse but well-distributed amounts, fish bone was completely absent from the Structure L1L-1 faunal assemblage. Overall, the frequency of animal remains shows a general preference for protein from highland derived domesticated species.

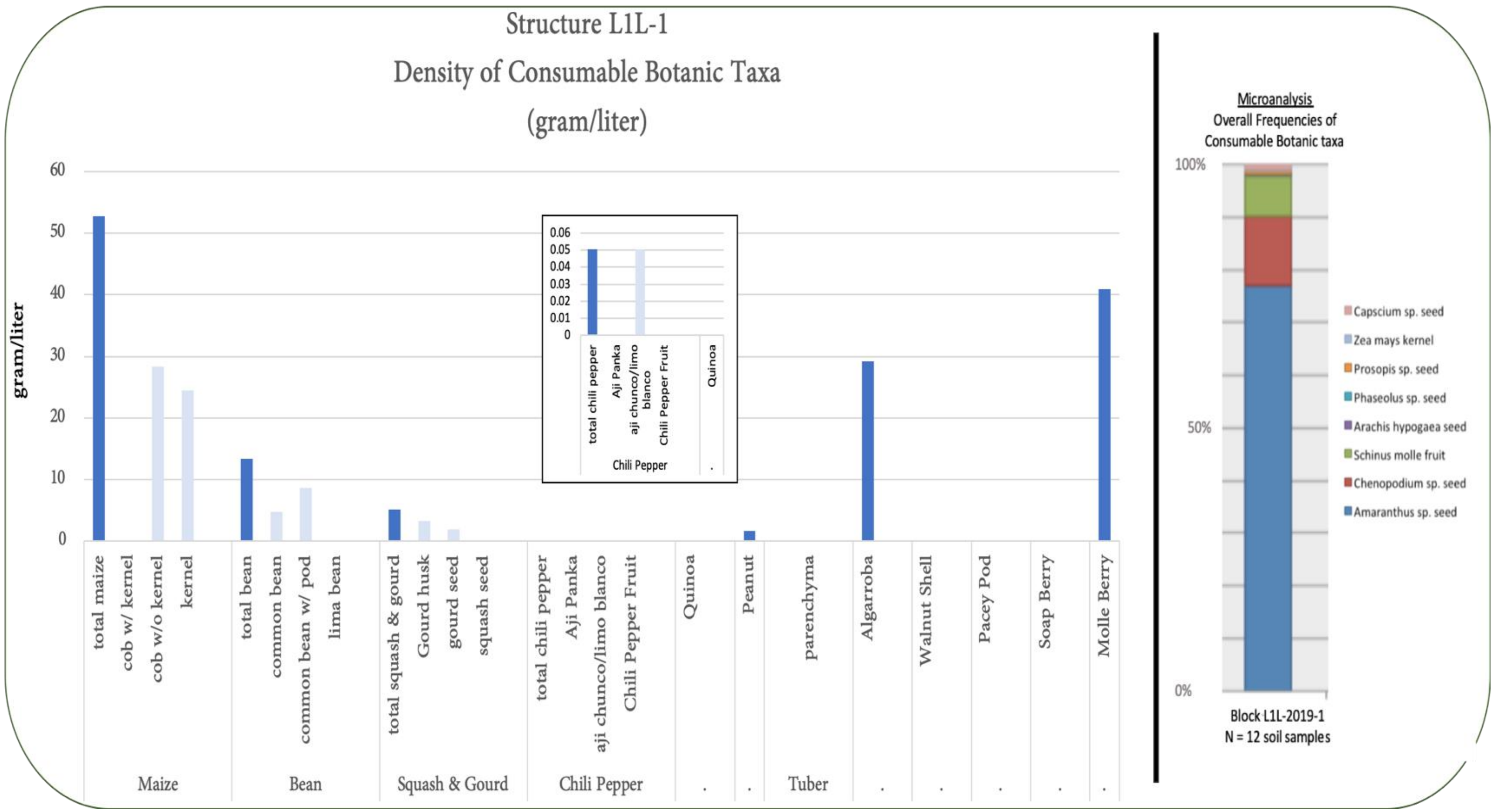


Figure 190. Chart displaying the relative densities (grams/liter) of taxa included in the Consumable Botanic category in macrobotanics. Also included are relative frequencies (based on count) of these same taxa as recovered in the microanalysis of the soil samples (after Garvin 2020:125).

Interesting patterns emerge when looking at the preferences in Consumable Botanics as well. For instance, lowland domesticates were found in the highest densities in the macrobotanic assemblage. Maize, particularly fragments of cobs without kernels, were the densest remains in this regard, with common beans and bottle gourd also found with relatively high frequency. Remains from wild lowland arboreal taxa, such as seeds from the algarroba (carob) tree and molle (Peruvian pepper) berries were also very well represented. Significantly, both algarroba seeds and molle berries were not consumed directly but boiled to make a variety of beverages and other seasonings, which like maize cobs, explains why they are frequently very well represented. While found in much smaller amounts, domesticates, such as peanut, chili pepper, and tubers, are also represented in the Consumable Botanics in this structure.

Microanalysis of soil samples from Structure L1L-1 would reveal significant amounts of a varety of species of *Amaranthaceae*, including domesticated quinoa and *kiwicha*. In fact, these highland crops were the most frequent botanic remain, by count, in soil samples from this structure. Overall, these botanics suggested a very mixed diet, with significant reliance on the local domesticates and wild species but still with strong preferences for highland taxa.

Other manifestations of broader sustainable community connections would be represented by evidence for crafting. For instance, evidence of textile manufacture and repair were found, particularly in Room 3, where higher densities of raw wool and cotton fiber, as well as cotton seeds were identified.[190] What's more, important artifacts, including a cactus spine needle and multiple spindle whirls (including the only decorated ceramic spindle whirl) were also located in this area.

[190] This pattern was also identified in the microanalysis of soil samples collected in this area (Garvin 2020:129).

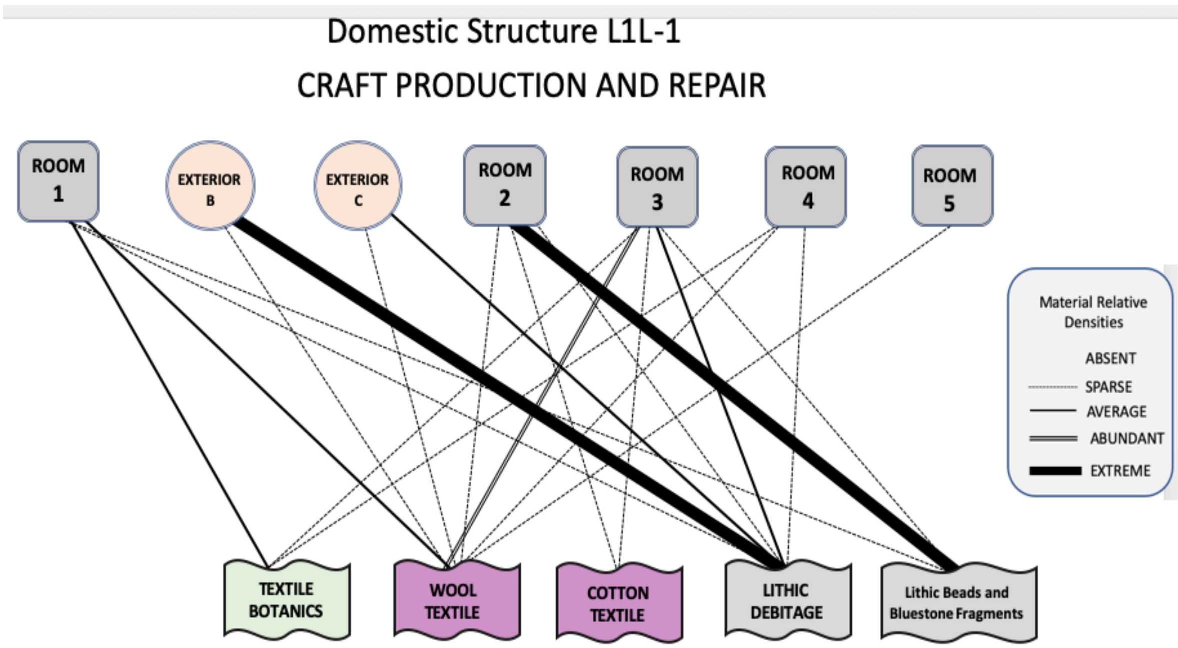


Figure 191. Bipartite network graph displaying the relative densities of various material types associated with various forms of craft production and maintenance as found in the various rooms of Structure L1L-1.

Crafting of lithic materials was also indicated. Manufacture and touch-up of flaked lithic tools were clearly relegated to the structure's exterior, particularly the Area B exterior space, where sharp debitage was out of areas of common foot-traffic. Finally, Room 2 appears to have been the locus for the manufacture of small bluestone beads that are found in many contexts across the site. Significant amounts of both worked and unworked chunks of bluestone (likely turquoise) as well as multiple bead fragments were identified here (Figure 191). As will be discussed more below (see 9.2), this is the only investigated context at L1 where this concentration occurs, suggesting a specialized activity.

While affiliation with various expressions of symbolic communities can be traced in the sustainable community trends, such as preferences in architecture construction materials or dietary cuisine, there are other, more explicit indicators of household-based symbolic community practices in Structure L1L-1. One of the clearest examples of explicitly ritual symbolic community behavior is the presence of coca seeds and leaves. In the Central Andes, both past and present, coca leaves were chewed (more seldomly boiled and consumed part of teas and other beverages) as a stimulant. Chewing coca can be a central element of both exceedingly rare as well as completely quotidian symbolic community settings. Also present in Structure L1L-1 was a large fragment of a specialized, decorated textile bag, known for holding coca and other ritual paraphernalia. Other evidence for ritual consumption, indicated by redware serving ceramics, most notably the kero and tazón forms, which were found in sparse but ubiquitous distributions throughout the structure.

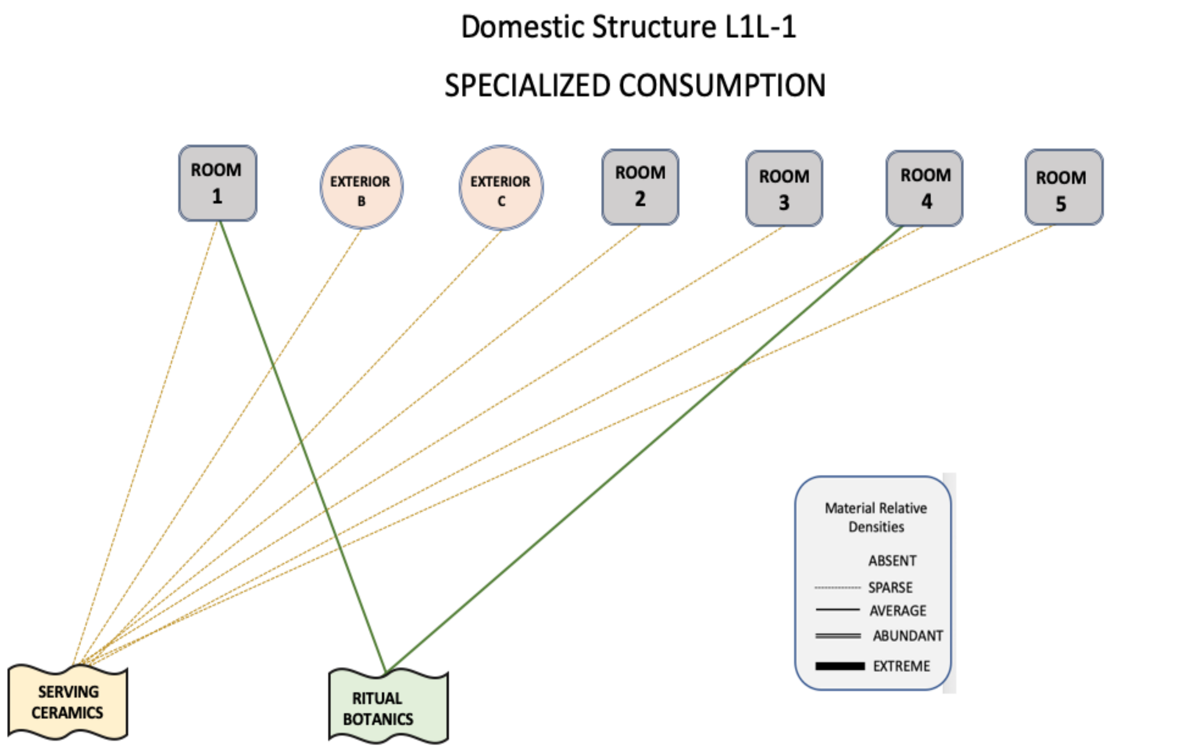


FIGURE 192. Bipartite Network illustrating relative densities of material classes associated with specialized forms of consumption as they connect to specific spaces in Domestic Structure L1L-1.

A final item of note, almost certainly relating explicitly to symbolic community affiliation, was a unique miniature redware olla with a simple face modeled on the vessel's neck. Significantly, this modelled vessel was located directly adjacent to Feature R-4, the small pit feature, that included fragments of a charred standard olla, still in situ. Also located here, were preserved (uncarbonized) coca and cotton leaves as well as a coca seed. Importantly, ash and charcoal in the matrix of R-4, along with the heavily charred olla fragments, in conjunction with no signs of in situ burning, suggest that this feature likely acted as a pot base where an olla would be transferred to, directly from the hearth in Room 4, possibly with some smoldering coals to keep the contents warm. Taken together with the specialized face-neck olla and coca seeds, this specific location in the center of the partially enclosed Room 1 - front porch, was the locus for hyper-local symbolic community practices in this microscale institutional setting of the household.

Domestic Structure L1L-2 & Domestic Structure L1L-3

The second major excavation block in Sector L, Block L1L-2019-3, would reveal portions of two additional domestic structures, Domestic Structure L1L-2 and Domestic Structure L1L-3, discussed here together. Most of Block L1L-2019-3 would center on Structure L1L-2, exposing two formal rooms as well as a number of associated exterior spaces, including two dense rockpile-midden deposits. Just one space, Room 2 was possibly fully walled, and likely not even roofed. The other formally designated room, Room 1, likely acted more as a semi-walled and partially roofed back porch, which opened into the shallow quebrada behind the structure. Most extant wall foundation segments in Structure L1L-2 would use the free-standing quincha method, with all identified posts used to support roofing that covered the partially-walled Room 1-back porch.

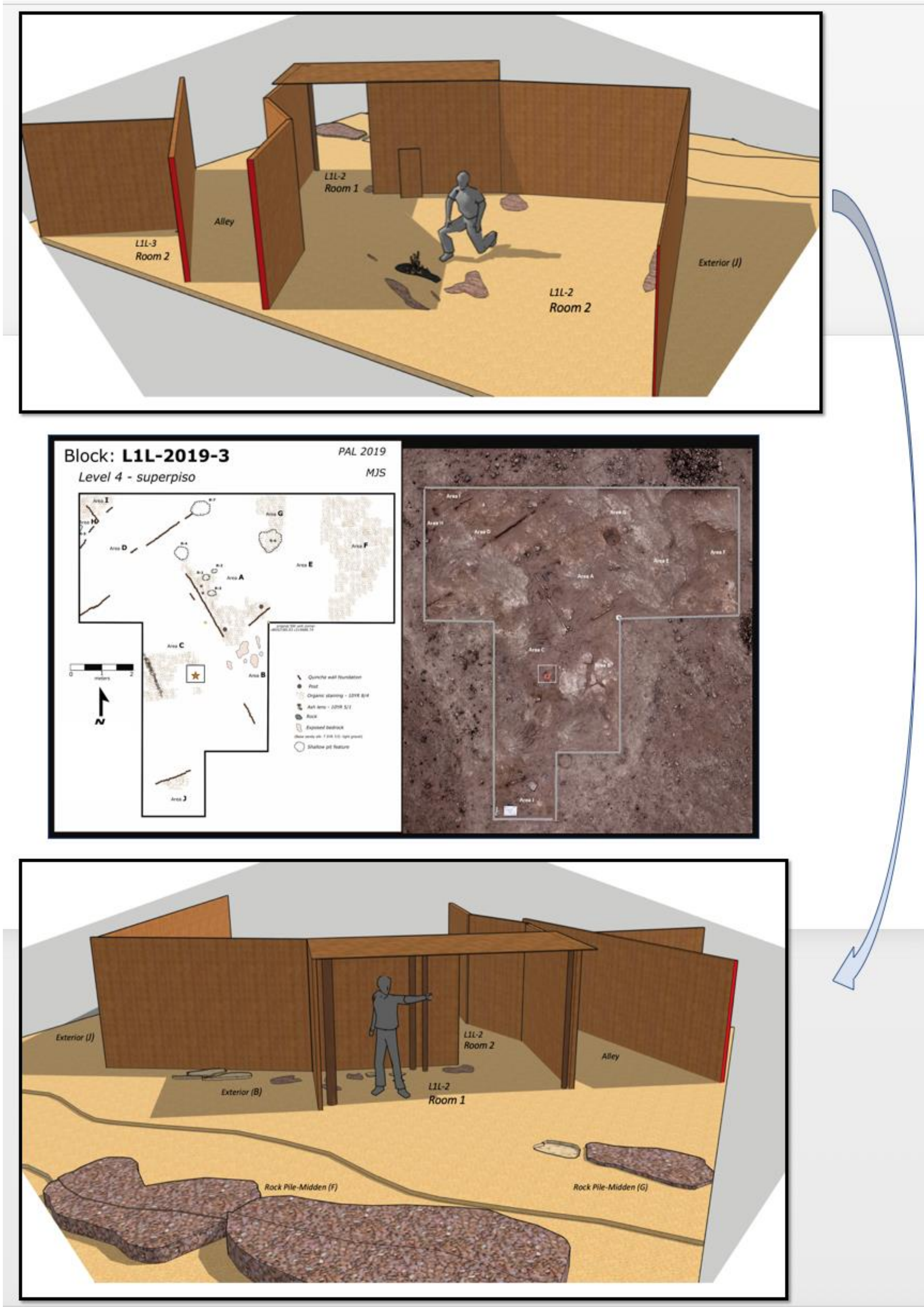


Figure 193. Sketch-Up 3D models of Domestic Structure L1L-2 and Domestic Structure L1L-3, from multiple angles.

Conversely, only a small portion of Structure L1L-3 would be exposed, just the inside corner of two interior rooms (Room 1 and Room 2). However, from what was exposed Structure L1L-3 also appears to have been constructed using the free-standing quincha style walls. A portion of the narrow alley that separated the structures (Area D), and likely served as a walking corridor, was also exposed here.

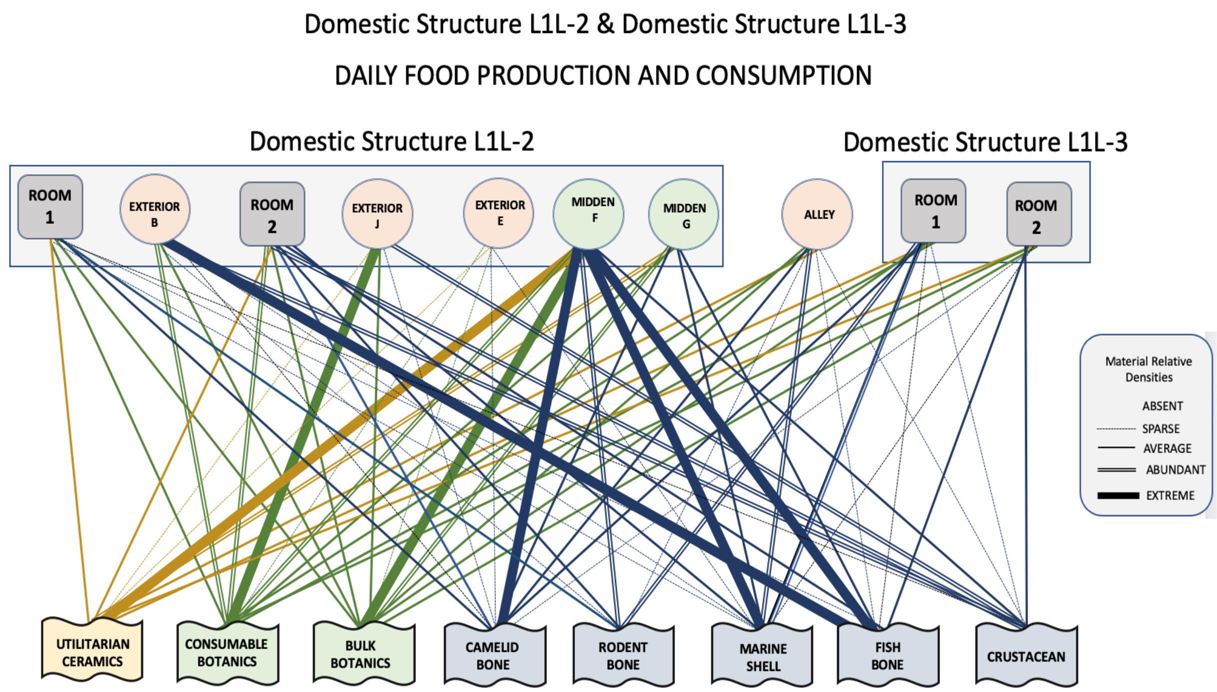


Figure 194. Bipartite network graph visualizing the relative densities of various material types associated with daily food production and consumption as found in each architectural space.

Many standard household practices, associated most directly with sustainable modes of community, were found in both structures. Clearly all major material types associated with food preparation, consumption, storage, and disposal are represented in these two structures, most are even very well distributed. However, one of the most striking patterns in the bipartite network is the extreme presence of several of the material types in the rockpile-midden deposit (Area F). Situated at the base of quebrada just below the Room 1-back porch of Structure L1L-

2, this was the densest midden deposit excavated at L1. Like most midden deposits of this type, the Area F-midden was likely first established as a pile of stones, gathered from the natural geologic surface liter, in preparation for establishing quincha domestic structures. After the piles were established they would have made naturally convenient locales for disposing of typical daily domestic refuse. Extreme amounts of utilitarian ceramic sherds, all taxa of bulk botanics as well as faunal remains like camelid bone, marine shell, and fish bone were recovered in this midden. Other largely utilitarian goods like coarse-weave wool textile fragments, twisted vegetable fiber rope, and wooden spoon fragments were also recovered in abundant quantities in this deposit. Additional utilitarian items, such as cotton fishing net fragments and carved wooden net floats were also found almost exclusively in this rockpile-midden deposit.

More standard deposits of materials associated with the ubiquitous sustainable community activities of food preparation and consumption are apparent in most other spaces in these structures. In general, Room 2 in Structure L1L-2 and Room 1 in Structure L1L-3 have the most abundant densities of most major material categories correlated with these activities. However, some of the exterior spaces associated with Structure L1L-2, particularly Area B and Area J would contain the most abundant and sometimes even extreme densities of foodstuffs like consumable botanics and crustacean shell of any non-midden contexts. Concentrations of these food remains were found in both outdoor areas, along with ash deposits directly against surviving segments of quincha wall foundations, suggesting some refuse from daily meals would be deposited outside of concentrated middens just behind the structure.

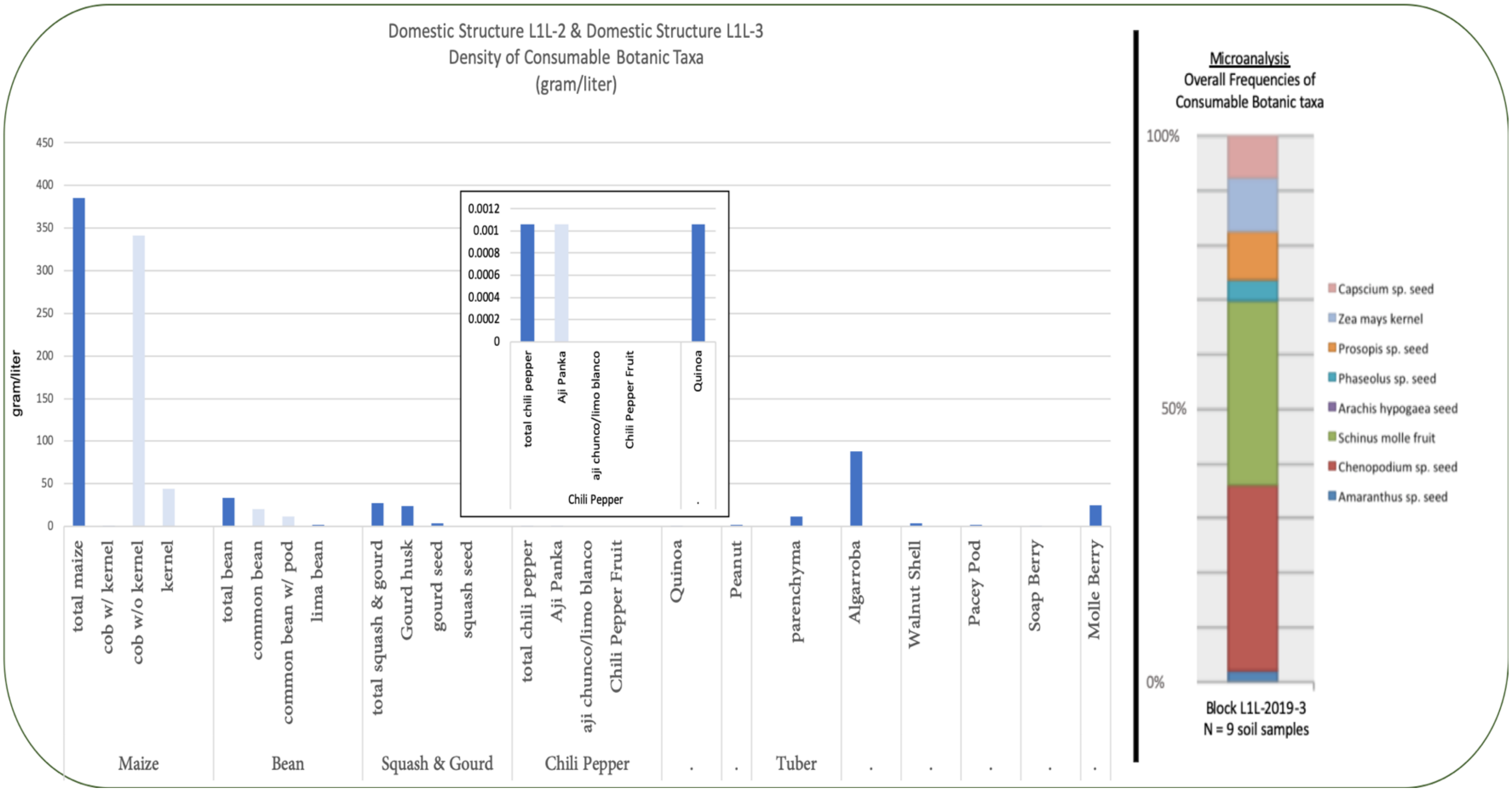


Figure 195. Chart displaying the relative densities (grams/liter) of taxa included in the Consumable Botanic category. Also included are relative frequencies (based on count) of these same taxa as recovered in the microanalysis of the soil samples collected in Block L1L-2019-3 (after Garvin 2020:125).

Overall, the occupants of both Structure L1L-2 and L1L-3 had a clear preference for lowland foodstuffs, both botanic and faunal. While camelid bone and guinea pig bone were found in very high quantities, particularly in the Area F midden, extreme amounts of marine shell and fish bone were found in a number of contexts, particularly the exterior areas associated with Structure L1L-1 and Room 1 in Structure L1L-3. Crustacean remains were also found in abundant densities in a number of contexts associated with these structures. Finally, while some highland cultivars were present, both the macrobotanic assemblage and microanalysis of soil samples revealed relatively high frequencies of lowland domesticates. Maize cobs were the best represented but significant amounts of beans (both common and lima varieties) and chili pepper seeds were also found in high frequencies.

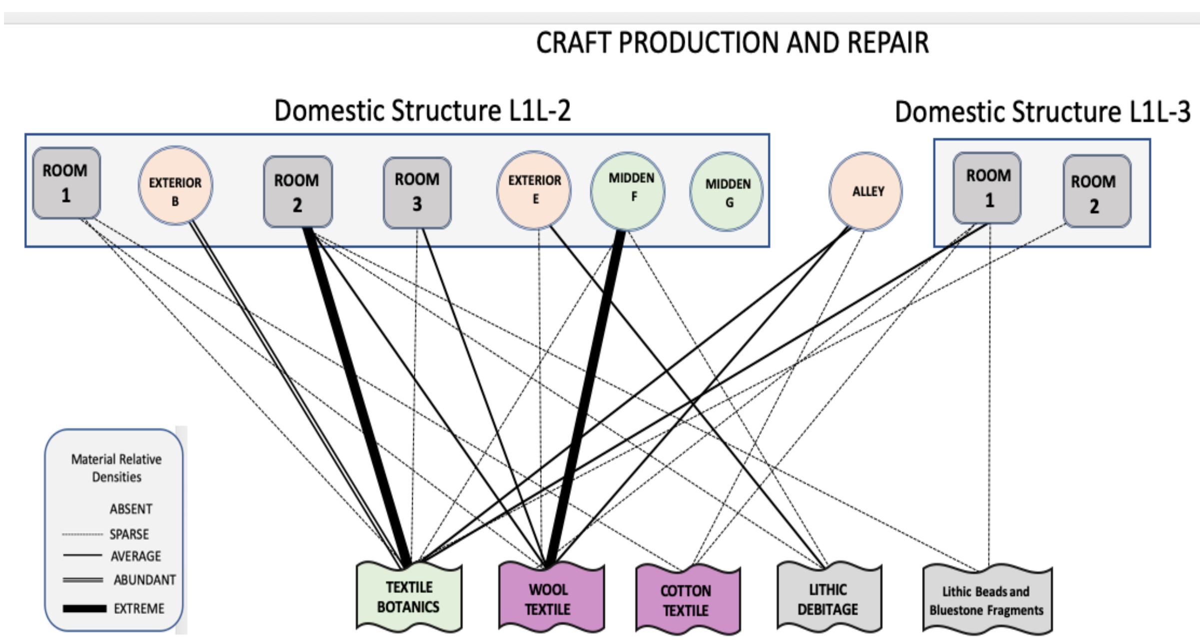


Figure 196. Bipartite network displaying the densities of material types associated with various types of craft production and maintenance as associated with excavated rooms in Structure L1L-2 and L1L-3.

Evidence for other manifestations of sustainable community can be found in material remains associated with crafting activities. Room 2 in Structure L1L-2 would show the clearest connection to textile production and/or maintenance, with extreme amounts of cotton seeds as well as raw wool textile materials. Extreme amounts of coarse weave wool textile fragments were identified in the midden deposits, likely deposited as simple refuse.

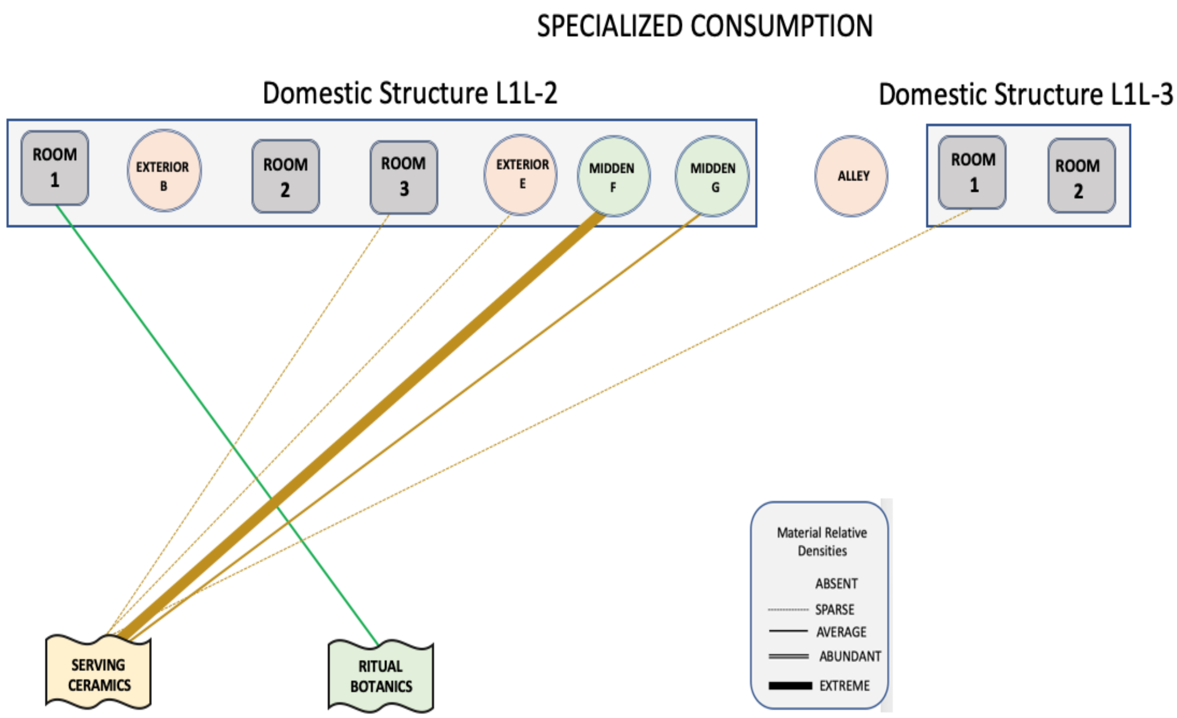


Figure 197. Bipartite Network illustrating relative densities of material classes associated with specialized forms of consumption as they connect to specific spaces in Domestic Structure L1L-1.

Finally, material traces of explicitly symbolic community behavior, as practiced by the individuals who occupied these two structures, could also be identified in a number of contexts. Redware serving ceramics were generally sparse in most areas but found in extreme densities in the Area F rockpile-midden. The vast majority of these serving vessel types belong to redware keros and tazónes form types that were most likely used in community libation and feasting events as well as quotidian household meals. The lack of reconstructable vessels suggest that already broken vessels were deposited here as refuse, as opposed to being the location of in situ pot smashing events. Other items found deposited in the Area F midden, certainly of value in the setting of symbolic community practices, were multiple fragments of a 4-cornered hat. These highly-valued polychrome textile garments are rare, particularly outside of mortuary contexts, and the presence of one in this midden suggests some clear symbolic community connections with the broader Tiwanaku sphere.

A final expression of what could only be considered ritual or explicitly symbolic community behavior in the microscale, was the presence of a small offering of an olive shell in a small hole placed in the corner of Room 1 in Structure L1L-3. No other materials were found in what appeared to be a carefully dug hole, approximately 5cm below what would have been the active floor surface. This marine shell offering placed in the floor of this domestic setting seems to suggest a broader symbolic community orientation that accompanied a clear sustainable community focus on marine resources. This is further emphasized by not just the extreme densities of choro mussel, that dominated the marine shell assemblage of most units, but the presence of the widest variety of marine shell taxa in any single context. Finally, the extreme to abundant densities of fishbone and crustacean shell along with implements (cotton nets, wooden net floats) used in fishing also support this interpretation.

9.2 The Special Structures & Communal Features of Sector A

As noted above, the overall nature of the contexts that were ultimately revealed in the more extensive 2018-19 excavations in Sector A were quite different from those exposed in Sector L. True multi-room structures could not be located in Sector A, at least not with the preserved quincha walls, like those exposed in Sector L. Instead, multiple structures, categorized as *Special Structures* here, were exposed in Sector A. These structures are believed to have had more specialized use as opposed to the more generalized nature of the domestic structures of Sector L. Again, these differences will be quantified below in the mesoscale analysis but the difference between datasets is worth noting from the onset as it does affect the type of analysis done in these contexts. For instance, because the three primary contexts of Sector A described here were each effectively centered on a single context, and in general a significant amount less area was excavated in these contexts. As such, fewer bipartite network graphs, based on material densities, are utilized and instead more feature attribute analysis and depositional history data are used here.

Special Structure L1A-1

What was termed Special Structure L1A-1 was exposed in the 2016 test unit, Unit L1A-2016-5. The majority of this structure's superstructure had long since been dismantled, removed, and the small interior completely disturbed from a looting event. However, from what remained, Special Structure L1A-1 was a roughly square structure just 1.85x1.85 meters at the foundational extents. Indeed, the only elements of the structure remaining were the foundations, which were constructed using flat field stones and oblong medium-sized cobble placed upright in a trench. Each of the wall segments was constructed using a double course method, whereby two parallel courses of stones, filled with rubble, were used as the foundation. It is unclear what the superstructure was constructed from and while no complete or fragmented bricks were located, it is believed that adobe melt was exposed in the fill of during excavation, suggesting adobes may have been utilized. Ultimately, it is unknown if this was a true walled structure, which would have amounted to a cramped booth, or if it would have been a low walled, above-ground bin or even the foundation of a platform (e.g., see Special Structure L1A-2 description below).

Again, while more will be said below on how this structure articulates with the broader sector, it is important to note that Special Structure L1A-1 was relatively isolated, located just a meter from the edge of the quebrada that forms the southern margin of Sector A and well-outside the densest scatter of domestic refuse and formal neighborhoods that composed the sector (see Chapter 10). In fact, no additional features or material scatters were found within or surrounding the Special Structure L1A-1 foundation.

An additional taphonomic issue in interpreting this structure was that it was substantially looted. It is difficult to say exactly when this disturbance event took place but based on the deflation in the backdirt left by looters, it was likely centuries before present. However, microanalysis of two (2) different soil samples from this context confirmed material scarcity as it was the only excavated context at L1 to produce no taxa of consumable botanics. The only botanics recovered here were some large fragments of charcoal that correlated with significant flecks of carbon in some of the excavated matrix.

Figure 198. Overhead photo of excavated foundations of Special Structure L1A-1, along with special artifacts recovered in looters backdirt, outside of the structure.

However, far from sterile, excavations would expose materials apparently missed or intentionally left by the looters. A number of items, interpreted here as explicit representations of specialized symbolic community behavior, were recovered from the disturbed structure interior, but primarily from the remnants of the deflated looter backdirt pile. Significantly, while these materials would include some faunal materials and again significant amounts of charcoal, the primary findings here were specialized copper artifacts as well as the only concentration of miniature ceramic vessels recovered at Cerro San Antonio. The copper items included two different varieties of *tupu* pins as well as other smaller fragments. Some of these items show classic indicators of being ritually destroyed or killed with one *tupu* clearly having been bent and coiled up intentionally. Likewise, the miniature ceramics were quite fragmented, also possibly having been intentionally destroyed.

Because of the looting it is difficult to delineate the microscale activities that may have defined this space during the Middle Horizon. However, it was clearly a grounding location for symbolic community practices. The artifacts recovered, although clearly disturbed, show signs that they had been ritually interred in this structure, possibly as subfloor offerings. Likewise, the general lack of utilitarian ceramics and foodstuff, suggest Special Structure L1A-1 was not used for typical domestic behaviors. Again, more will be said below on how this structure may have connected to a broader constellation of structures and features central to facilitating symbolic communities at Cerro San Antonio.

Special Structure L1A-2 & the Central Plaza

The second structure identified in Sector A excavations was Special Structure L1A-2, which was directly associated with the central plaza. This structure was first exposed in the 2016 test unit, Unit L1A-2016-3, but was fully excavated in Block L1A-2019-2. Similar to Special Structure L1A-1, Special Structure L1A-2 was a relatively small, roughly square construction, likely measuring just under 2x2 meters at its foundation. However, unlike Special Structure L1A-1, Special Structure L1A-2 was almost certainly a solid platform (as opposed to a small enclosure).

As explained in Chapter 7, Special Structure L1A-2 was constructed by setting several medium- to large-sized cobbles onto a prepared, heavily compacted and leveled surface. The spaces between these cobbles was filled with a gravel-heavy sterile fill. Finally, adobe bricks were stacked on top, likely just two courses high and possibly around the exterior, encasing the cobble foundation. Some of the adobes show evidence that they were plastered with a thin, light tan-colored mud. Ultimately then, Special Structure L1A-2 is likely best considered more of an architectural feature, likely used as a platform or an altar, than a true structure, but as will be detailed below, it was clearly an important element in the built environment of Sector A and the Middle Horizon occupation of Cerro San Antonio more broadly.

As with Special Structure L1A-1, this structure would suffer what was almost certainly a post-Middle Horizon looting event, destroying most primary context elements. However, by tracing the depositional history of Special Structure L1A-2 significant diachronic trends regarding how this platform anchored various symbolic modes of community can be delineated.

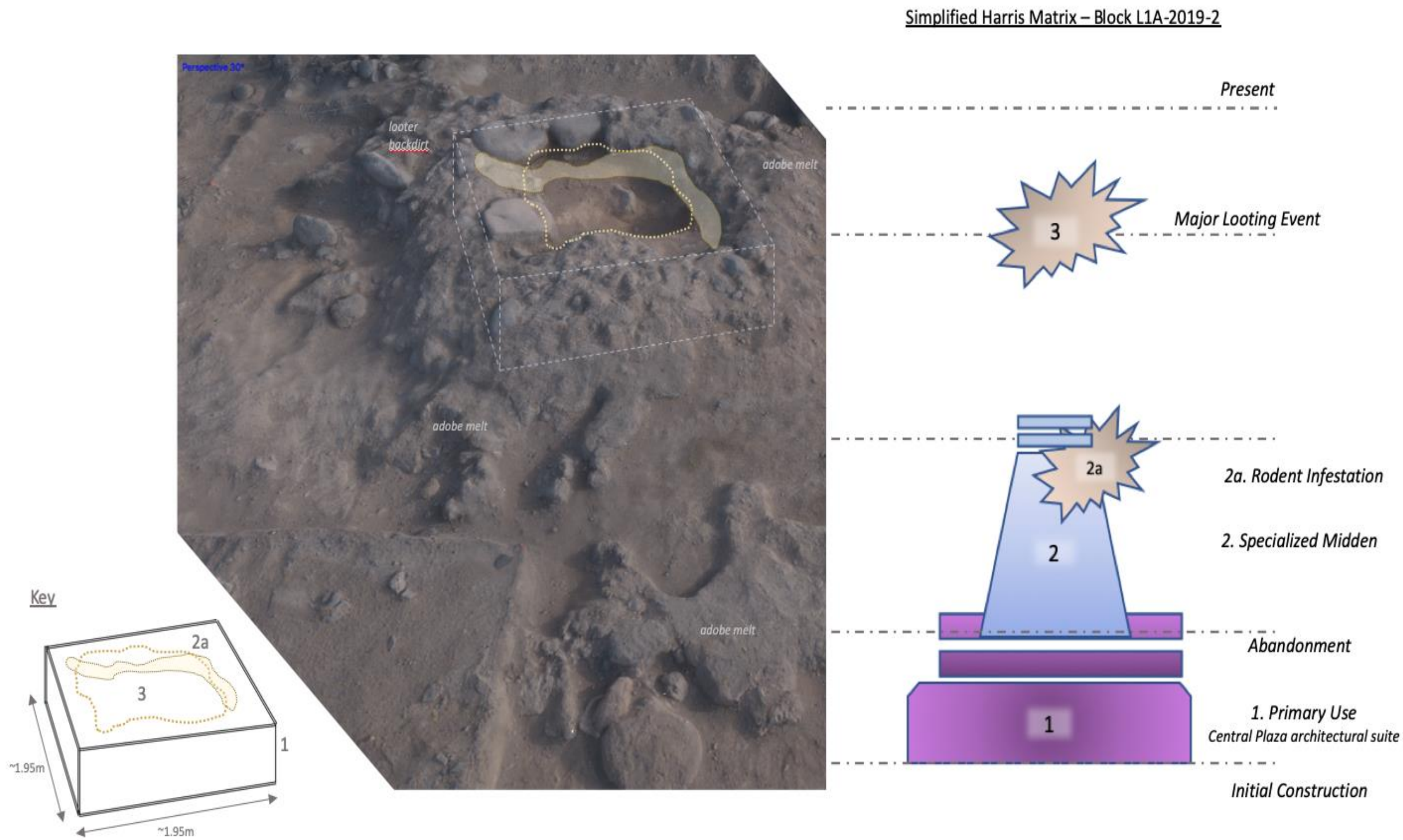


Figure 199. Structure-for-Motion 3D reconstruction of Special Structure L1A-2 in the middle of excavations and (right) a stylized depositional history displaying the major depositional and other formation processes that led to the state of the structure at excavation.

The first stage in this Structure L1A-2's use would obviously be its construction. As described just above, this construction was likely a relatively small cobble and adobe brick platform or altar. In the more comparative macroscale discussion in Chapter 11, I explain how this construction-style has a been observed in Tiwanaku-affiliated symbolic community built environment settings elsewhere. Unfortunately, the structure's degradation after abandonment and ultimate looting would not leave much in terms of primary context material scatters.

However, as noted above, the surface beneath and surrounding Special Structure L1A-2 was clearly a prepared surface. It does not appear that separate clay or other sediment was brought in, but the surface here was clearly leveled and intentionally compacted, similar to the L1A central plaza just a few meters to the south. In addition to Special Structure L1A-2's proximity to the central plaza, this general shared surface further bolsters the interpretation that constructions were both contemporary and likely part of the same broader built environment complex. Again, more will be said on this below, but it is likely that if Special Structure L1A-2 was a platform, that it acted as portal platform to the central plaza and if an altar, likely acted as a staging point for activities within the plaza. Either way, it is believed that this structure was likely central to some of the more globally-oriented symbolic community actions at Cerro San Antonio.

The second major stage in the use-history of Special Structure L1A-2 was its gradual disuse, disrepair, and transformation into essentially a midden, albeit one of special significance. Small chunks of adobe brick and substantial deposits of adobe melt were recovered intermixed with relatively dense deposits of both typical and atypical domestic refuse. This suggests that the structure degraded over time, as opposed to in a single destructive event. Again, much of the intermixed refuse would be relatively typical of domestic context middens excavated elsewhere. For instance, Consumable Botanics and Bulk Botanics were ubiquitous in contexts associated with this secondary use. However, some remains, like maize were found in much higher densities here.

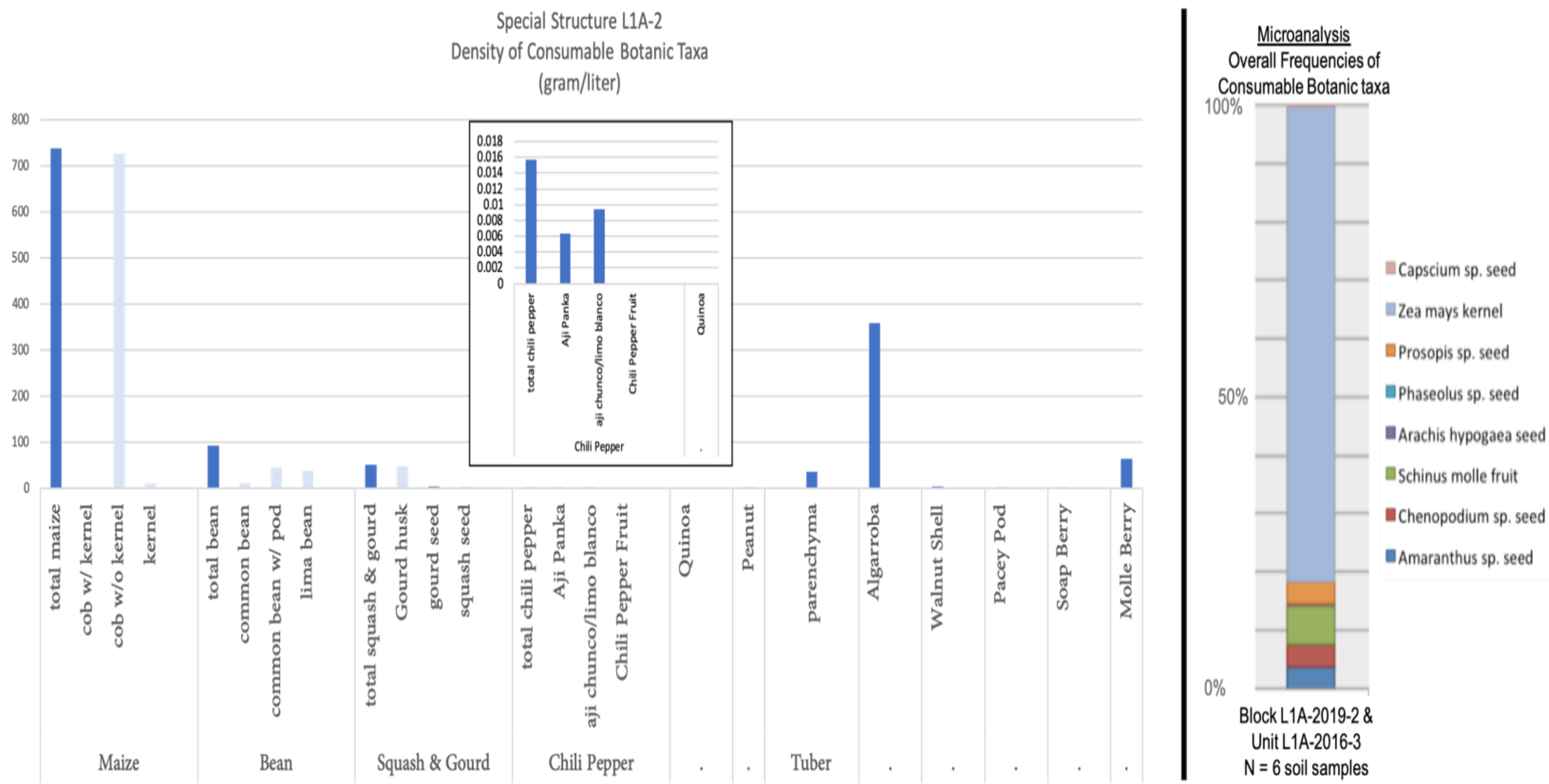


Figure 200. **Chart displaying the relative densities (grams/liter) of taxa included in the Consumable Botanic category. Also included are relative frequencies (based on count) of these same taxa as recovered in the microanalysis of the soil samples collected in Unit L1A-2016-3 and Block L1LA-2019-2 (after Garvin 2020:125).**

However, many remains recovered suggest that even in its disrepair, Special Structure L1A-2 was still more central to symbolic community behavior than a typical midden. Several small beads, multiple complete projectile points, and higher-quantities of fine-weave textile fragments defined the deposits here. Truly unique items like a large portion of a specialized basket, almost certainly a cradleboard, was found deposited along the sides of the degrading structure. Finally, a large portion of a 4-cornered hat was also recovered, just adjacent to the structure amongst the adobe melt. Significantly, this is the most complete such example of these high-status textile garments found outside of a mortuary context. Each of these items represent highly-valued, and at least in the case of the 4-cornered hat, high-status items. Again, that Special Structure L1A-2, even in disrepair, would still act as focal point for the deposition of these specialized items, further emphasizes its symbolic weight in the built environment that facilitated community practices in Sector A.

In spite of its retention of some reverence in the minds of the occupants of Sector A, its overall disrepair is further emphasized by the presence of a large rodent nest that was established throughout the structure's remains during this time. A number of small chambers stuffed with various botanic material, but specifically wads of matted cotton as well as small rodent feces[191] were found throughout the northern end of the structure. This rodent disturbance is worth highlighting here because it did significantly impact the matrix of the structures northern collapse, especially given that the final looting event would crosscut this rodent nest and further mix depositional debris. This was also the only such bioturbation-based process that seemed to have significantly affected subsurface remains at L1.

Finally, likely well-after Sector A was ultimately abandoned by the Tiwanaku-affiliated inhabitants, Special Structure L1A-2 would be significantly damaged in a looting event. The looters clearly targeted the structure specifically, as a single roughly dug hole was placed right

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[191] These rodent feces (smaller, generally black in color) were very distinct from those considered guinea pig coprolites (larger pellets, grey-brown in color) found in all other domestic contexts.

in the center of the structure. The looters carved through what were likely degraded and partially melted adobe bricks to the cobble foundations. At least four large cobbles were pried out and cast aside and the looters proceeded to penetrate the compacted underlying surface. The hole seems to have been abandoned just about 50cm below the prepared surface. It is unclear what the looters found, if anything.

Sector A Central Storage Facilities

The final context that was excavated enough to delineate microscale manifestations of community behavior would be central storage facilities within Sector A, as exposed in excavation Block L1A-2019-3. While architectural elements were uncovered here, this context is defined more as a cluster of features, as opposed to a formal structure.

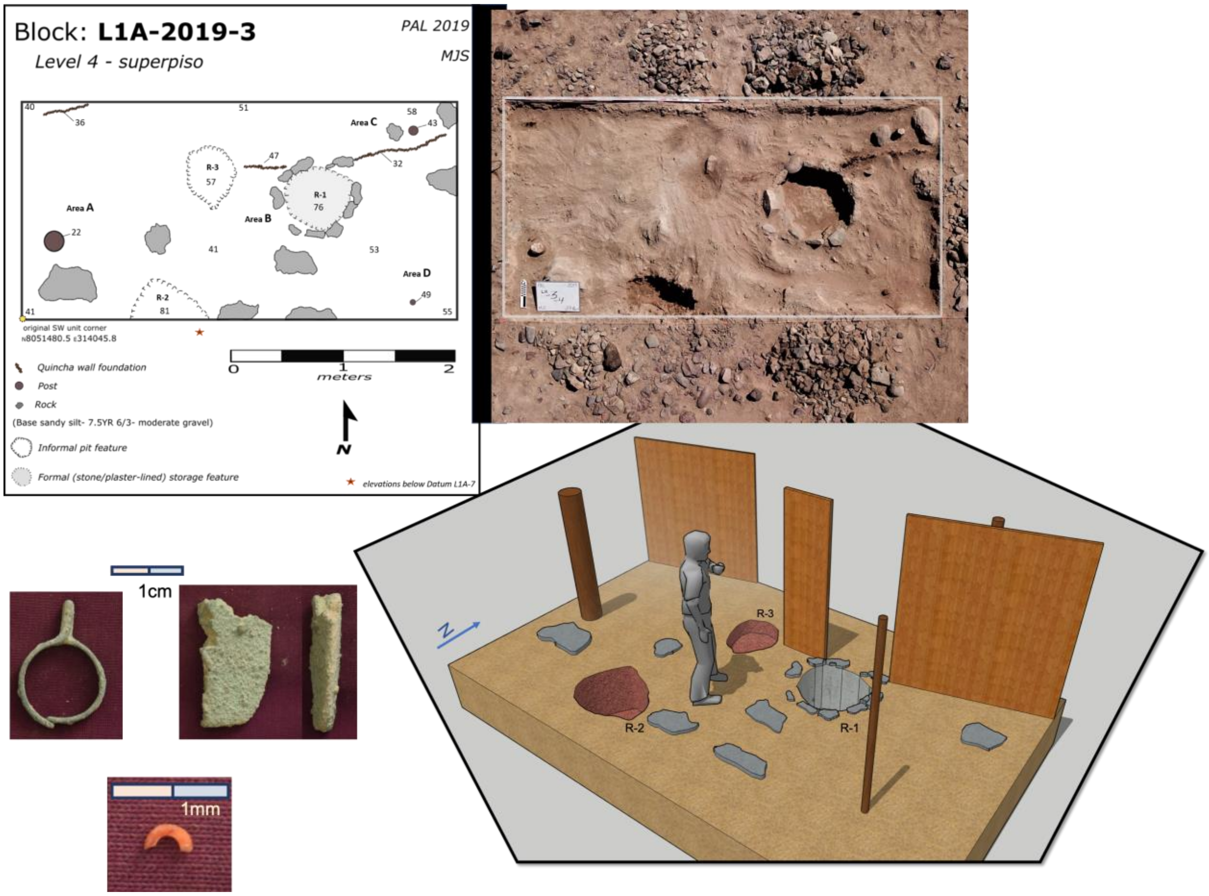


Figure 201. Sketch-Up 3D model of the central storage facilities in Sector A, as exposed in Block L1A-2019-3 and some of the unique material finds from this context.

The primary features that defined this area were three separate pits, each constructed using slightly different methods. Feature R-1 would be the most formal feature, a nearly circular and flat-based subsurface storage pit, just over half a meter in diameter and 22cm deep. This pit feature was not only carefully dug and lined with cobbles, including an aboveground stone collar, but would also be sealed with plaster. This plaster would be a light grey, clay-heavy mud mixture, layered along the base, walls, and even collar, approximately 0.5cm thick. Just one meter to the southwest would be Feature R-2, another subsurface storage pit. While this feature was also dug carefully, it would not receive the stone-lining and plastering like R-1. A final pit feature (R-3), located just west of R-1 was far more shallow and likely exclusively a feature for disposing of refuse.

Significantly, these do not appear to be isolated features but framed by other architectural elements. Three separate, poorly preserved segments of quincha wall were identified as well as three separate posts, amongst these storage/refuse features. Two of the quincha segments, running roughly west-east, were likely originally part of a single wall. However, this wall would be interrupted by the formal R-1 storage pit. It is quite possible that this was the location of a standard domestic structure before pivoting to a designated space for storage upon its abandonment. It is also possible that these walls were indeed associated with the storage pit cluster, and along with the posts supported a semi-walled and partially roofed space. Again, it will be discussed in the comparative discussion below but the partially sheltered storage pit concentration also has precedent in Tiwanaku contexts identified elsewhere, as at the Chen Chen site (Goldstein 2005).

Whether this was a converted domestic structure or a specialized storage facility from the onset, this area was clearly utilized as a designated storage locale and ultimately dumping site for refuse. Refuse disposal was effectively the only activity that could be detected directly as all recovered material remains appear to be secondary refuse and not primary deposits. As explained in Chapter 7, all three features were completely filled and ultimately converging, above-ground piles were formed. Only minimal wind-blown sediment accumulation was indicated, and no definitive separate dumping events could be identified. It is likely that much of the refuse here represent relatively slowly accumulated midden deposits from daily domestic activities.

However, this is not to say that this refuse dump didn’t contain some unique finds. A small bead fragment recovered here represents the only spondylus marine shell recovered thus far at Cerro San Antonio. While present in other contexts, spondylus is particularly rare on the south-central coast subregion and almost absent in the south-central highlands subregion during the Middle Horizon. Also recovered here were some of the only substantial metal artifacts recovered in excavations. One large fragment was a relatively large but non-diagnostic chunk of copper-alloy but a second find was a Tiwanaku Type-2 copper ring (see Lechtman 2003:419). It is interesting to find a presumably valuable item of personal adornment, without any apparent damage, found in a context of intentional refuse disposal. This suggests the ring was discarded intentionally. Another item of some significance, and not found anywhere else, was a nearly complete polished bone tube. This item, almost certainly used for inhaling botanic-based hallucinogens, was found fragmented but nearly complete, suggesting it too was discarded intentionally and not disposed as already damaged refuse. As will be noted just below in the mesoscale analysis, it is no coincidence that these centralized storage features as well as higher concentration of personal adornments were located at the central crossroads of the primary pathways that cut through Sector A.

9.3 Chapter Summary

Chapter 9 presented the microscale analysis of the broader discussion section. This focused primarily on synthesizing the detailed context-based data from excavations with material attribute analysis collected in subsequent laboratory work. This discussion worked to classify and describe in detail two major categories of domestic structure: standard domestic structures (e.g. houses and associated features) and more specialized or ceremonial structures (platforms, plazas, storage facilities).

9.1: This subsection worked to define and otherwise describe the standard domestic structures that defined the Middle Horizon occupation at Cerro San Antonio. This targeted the two. major excavation blocks in Sector L that exposed large portions of these house structures.

9.2: Here I described what were deemed more specialized domestic structures. This included both Special Structures excavated in Sector A as well as the Sector A-Neighborhood I storage facility.

Next: Chapter 10 presents the mesoscale level of analysis. This discussion focuses on the three major modes of community defined in Chapter 1 (see 1.2): residential, sustainable, and symbolic.

Chapter 10 - The Mesoscale: intersecting communities at Cerro San Antonio

Here in the mesoscale analysis I provide a broader explanation of community life at Cerro San Antonio during the Middle Horizon. To do this, I compare and contrast the various structures and other microscale contexts described above, along with more general spatial data sets, like those drawn from the systematic surface collection and general sector mapping. This contextual data, along with the material culture-based data, provide a relatively comprehensive view of how each sector may have been organized internally and the way in which certain contexts may have been particularly important for various modes of community interaction. In addition to more network-based data visualizations, like those above, I rely more heavily on the Brainerd-Robinson (B-R) Index statistical technique to compare the assemblages of various excavated contexts more systematically, both within and between sectors. In addition to providing objective comparative metrics, this data can be projected into useful visualizations using standard weighted networks (see 4.2 for more details).

In Chapter 10 I also compare and contrast the major districts, sectors, and neighborhoods more broadly. I utilize spatial syntax networks along with more observational data to discuss how the sectors may have articulated within the broader Cerro San Antonio site complex and the surrounding valley plain. Here, I go beyond the domestic contexts and provide more information regarding the numerous mortuary contexts and the important role they played in situating symbolic community behavior. Again, the goal here is to use these data to highlight social organization in the mesoscale, or various patterns in how residential, sustainable, and symbolic communities may manifested at Cerro San Antonio in the Middle Horizon. Below I use these three modes of community to help dissect the complexity of the implications these archaeological remains represent, but as always, these modes of community are not mutually exclusive and were certainly not experienced as such by the individuals living at Cerro San Antonio in the Middle Horizon.

10.1 Middle Horizon Residential Communities at Cerro San Antonio

As has been noted, residential modes of community are most salient in manifestations of the built environment and the way in which these relatively fixed features of residence almost always form nested sets of agglomerations. Within the site of Cerro San Antonio, Middle Horizon residential communities can be found in four nested socio-spatial units of affiliation: the "district", the "sector", the "neighborhood", and the individual domestic structure or "house", Each of these scalar categories of residential community will be discussed in-turn, with individual units within each category compared and contrasted. Here, I begin with the largest scale of residential community manifestations, the districts and their constituent sectors, and work down to the most localized expressions of residential community, of neighborhoods and their constituent houses.

Districts & Domestic Sectors

The largest[192] intrasite residential community manifestations are what I term districts, which are, in turn, groupings of sectors. These multi-sector districts would also be the largest spatial distinctions in Cerro San Antonio, and used more generally, dividing the entire site into two broad areas: the Northern District and the Southern District. These districts were defined as groups of sectors connected by proximity but also largely by the natural topography.[193] However, using methods developed in spatial syntax analysis I will test this visual coherence, and show that these districts were indeed clusters of well-integrated contexts.

The Southern District covers the terminal end of the interfluve that the broader site occupies and contains eight (8) sectors pertinent here. These eight Middle Horizon components

[192] Of course, the full site complex of Cerro San Antonio was the largest single residential community agglomeration and is used as such below in the macroscale subsection.

[193] These districts could also be referred to as the Upper District (Northern) and Lower District (Southern) due to their elevation difference.

are centered on the extensive Sector A, the only domestic sector of the district. The remaining seven (7) sectors represent mortuary components (Sector B, Sector I, Sector K, Sector V, Sector W, Sector X, and Sector Z), almost all of which are relatively small cemeteries located in quebradas surrounding the expansive (13.23 hectare) Sector A blufftop. Four of the seven points of access to the broader site would first reach this Southern District, and specifically Sector A. This would include direct access to the valley bottom of both the Cinto and Salado tributaries (including the Primary Salado Entrance) as well as the Main Quebrada Entrance, which was almost certainly the central entrance to the site complex.

The Northern District covers the sandy slopes and smaller hills and bluff-tops that define the upper portion of the site complex. This district contains just five (5) Middle Horizon-era sectors with two (2) sectors (Sector L and Sector U) representing domestic components and three (3) sectors (Sector M, Sector Q, and Sector S) representing mortuary components. Taken together Sector L and Sector U cover approximately 10.89 hectares. Three (3) valley bottom access points, two to the Cinto and one to the Salado would enter the Northern District of the site complex first, including what was likely the Primary Cinto Entrance.

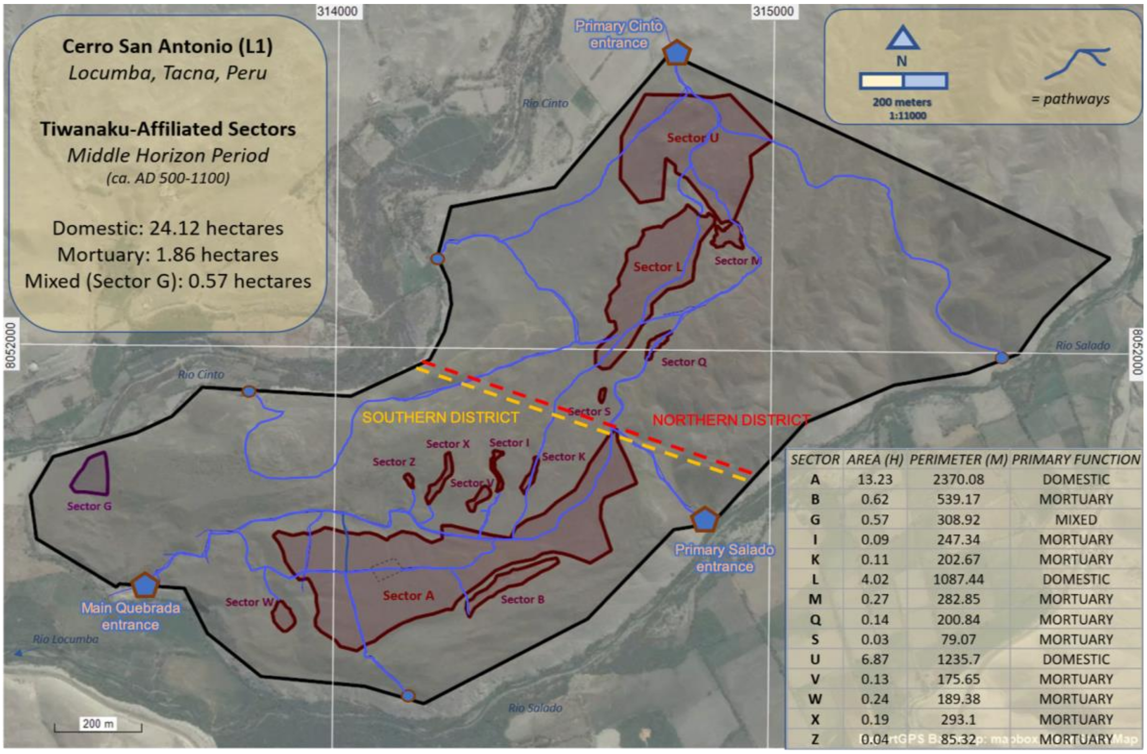


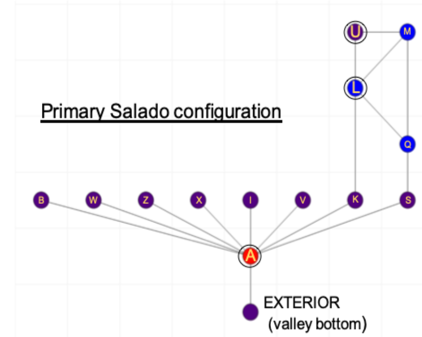
Figure 202. Map of Cerro San Antonio displaying Middle Horizon districts, sectors, major pathways, and points of site/valley bottom access.

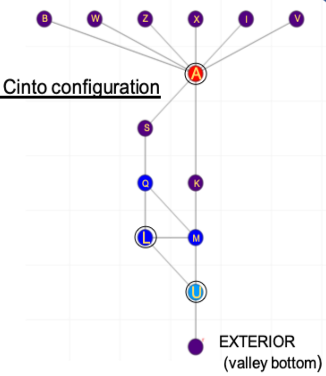
As noted above, the division between the major districts was initially largely arbitrary and logistical in nature. In other words, the site of Cerro San Antonio is quite large, covering over 166 hectares, and for the sake of managing the spatial data, certain basic divisions were necessary. That said, Figure 203 illustrates how the individual sectors within each district were indeed objectively clustered configurations. The network configurations depicted in Figure 203 were generated using modelling techniques developed in spatial syntax theory (Hillier and Hanson 1984), used to gauge the connectedness of discrete spaces within buildings and settlements (see 4.2). Each of the three access graphs illustrate a different major point of entry into the site. With just one exception,[194] all three configurations show the sectors falling into the above-noted districts.

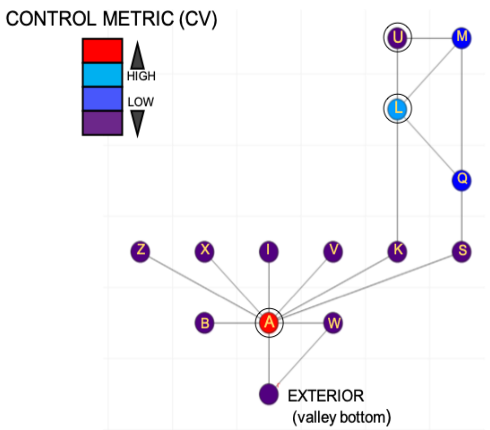
[194] The small cemetery, Sector S, is located on the main path connecting Sector A (Southern District) to Sector L (Northern District) and frequently falls into the Southern District in the spatial syntax access graphs.

AGRAPH justified-access graphs
spatial syntax analysis

Metrics
(CV)-control
(i)-integration







sector	Main Quebrada Entrance (i)-integration	Main Quebrada Entrance (CV)-control	Main Salado Entrance (i)-integration	Main Salado Entrance (CV)-control	Main Cinto Entrance (i)-integration	Main Cinto Entrance (CV)-control
A	13.00	7.00	13.00	8.00	8.00	7.00
B	4.00	0.00	4.00	0.00	3.00	0.00
EXTERIOR	4.00	0.00	4.00	0.00	2.00	0.00
I	4.00	0.00	4.00	0.00	3.00	0.00
K	7.00	0.00	7.00	0.00	6.00	0.00
L	4.00	1.00	4.00	1.00	5.00	1.00
M	3.00	1.00	3.00	1.00	3.00	0.00
Q	4.00	1.00	4.00	1.00	4.00	1.00
S	6.00	0.00	6.00	0.00	5.00	0.00
U	2.00	0.00	2.00	0.00	3.00	1.00
V	4.00	0.00	4.00	0.00	3.00	0.00
W	4.00	0.00	4.00	0.00	3.00	0.00
X	4.00	0.00	4.00	0.00	3.00	0.00
Z	4.00	0.00	4.00	0.00	3.00	0.00

Figure 203. Three different justified-access graphs illustrating how the Middle Horizon sectors (both domestic and mortuary) connect via formal footpaths, used in conducting spatial syntax analysis of the sector and broader district configuration.

However, more than simply providing useful visuals for looking at the interconnectedness of spaces, the spatial syntax justified-access graphs can also provide metrics to more intensively quantify how these spaces were configured (Hillier 2010; Hillier and Hanson 1984; Manum, et al. 2005). Most of these spatial syntax metrics align with various network metrics of centrality discussed in Chapter 4 (see 4.2). For example, the *(CV)*-control metric (which is color-coded in the three access graphs in Figure 203), largely aligns with the *eigenvector centrality* metric and quantifies which nodes (spaces) possess higher-control over access to other spaces. Similarly, the *(i)*-integration metric generated from spatial syntax access graphs align nicely with the *betweenness centrality* of general network analysis and gauges the overall connectedness of any given node. Again, metrics like (CV)-control and (i)-integration can help to quantify and even rank which nodes (sectors in this case) were the most important in terms of access to other portions of the site.

In this case, both the (CV)-control and (i)-integration metrics provide similar results (Figure 203). No matter the configuration, the three domestic sectors, Sector A, Sector L, and Sector U, all fall within the upper quartile of these metrics. This means all three of these sectors more central in terms of the movement of people within the site, both in terms of controlling access as well as overall integration. Of course, this is not surprising, as the domestic sectors were the primary expression of residential communities, which were in turn the arena in which most daily sustainable and symbolic community activities would take place. Significantly, Sector A in the Southern District, which was easily the largest domestic sector, with the most substantial infrastructure (central plaza, specialized features, etc.), always falls at the extreme high-end of both (CV)-control and (i)-integration metrics. This was the case even in the configurations in which the site was entered through the Primary Cinto entrances and the entire Northern District had to be traversed to reach Sector A. Again, these network-based visualizations and subsequent quantitative metrics confirm that the residential communities, represented here by the domestic sectors, were truly the focal points of social interaction within the broader Cerro San Antonio site complex.

While the two districts may have been salient distinctions in the minds of community members, it is likely that the individual sectors themselves were the most conspicuous marker of residential community affiliation. As noted in Chapter 5, sectors were carefully defined in the field using the true extent of material and feature surface scatter to designate perimeters. Sector A and Sector L both occupied planar blufftops, surrounded by steep sandy slops, so the residential community extent would have been particularly well distinguished for residents of these sectors. Needless to say, that in spite of their close proximity and despite no clear evidence of formal perimeter markers, exiting one residential sector and entering another would have been very apparent. The sustainable and symbolic community dimensions of these districts and sectors are discussed more below, however one more topic in the realm of residential community that can be noted at this broader level is population.

Population

To calculate population for Middle Horizon residential communities at Cerro San Antonio I used previous studies (Bandy 2001:72; Drennan 1988:281) to define a three-tier population density index: high (75 individuals per hectare), average (50 individual per hectare), and low (25 individuals per hectare). Specifically, this population density index aligns with what have been termed high density compact villages in other prehistoric New World contexts (Berrey, et al. 2021; Drennan and Peterson 2008; Parsons 1976:72) and with some of the more rigorous survey-based non-urban settlement population estimates in the southern Titicaca Basin (Bandy 2001; La Favre 2016).

Estimates of surface density of materials were made at 10 to 15-meter intervals during initial sector mapping (see Chapter 5) and were further defined during systematic surface collection (see Chapter 6). Using these surface materials as a proxy,[195] an estimation was made as to what percentage of each of the three residential sectors fell into each population density tier[196]. These population density distribution estimates are displayed in Figure 204, illustrated both spatially as well as proportionally. Here, some immediate distinctions can be made. While roughly proportionally similar, there are still some substantial differences between the principle residential sectors, Sector A and Sector L. Both sectors were covered most substantially with an average population density (Sector A = 60%, Sector L = 50%), however Sector L would have almost twice the proportional coverage in the high population density tier (Sector A = 20%, Sector L = 40%).[197] Clearly, the major outlier is the extremely sparse and more peripheral Sector U, which falls exclusively into the low population density tier.

[195] It is possible that the density of surface materials may be indicative of a temporally intensive occupation as much as a population intensive occupation (see Bandy 2001:58-86 for detailed discussion on this).

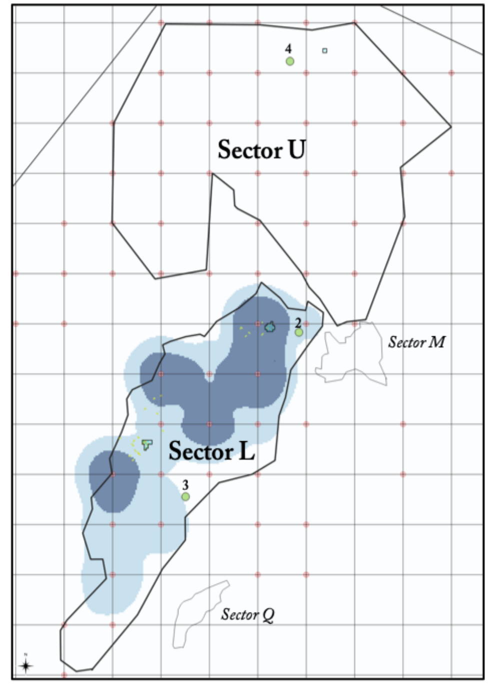
[196] During initial sector mapping, basic material culture ground cover estimates were categorized as sparse, light, moderate, heavy, and extreme. Later these estimates were correlated with the surface density data garnered from systematic surface collection as well as the extents of mapped rock-pile midden deposits (see 4.2 for more details on data collection methods in the field and Chapter 5 and Chapter 6 for the results).

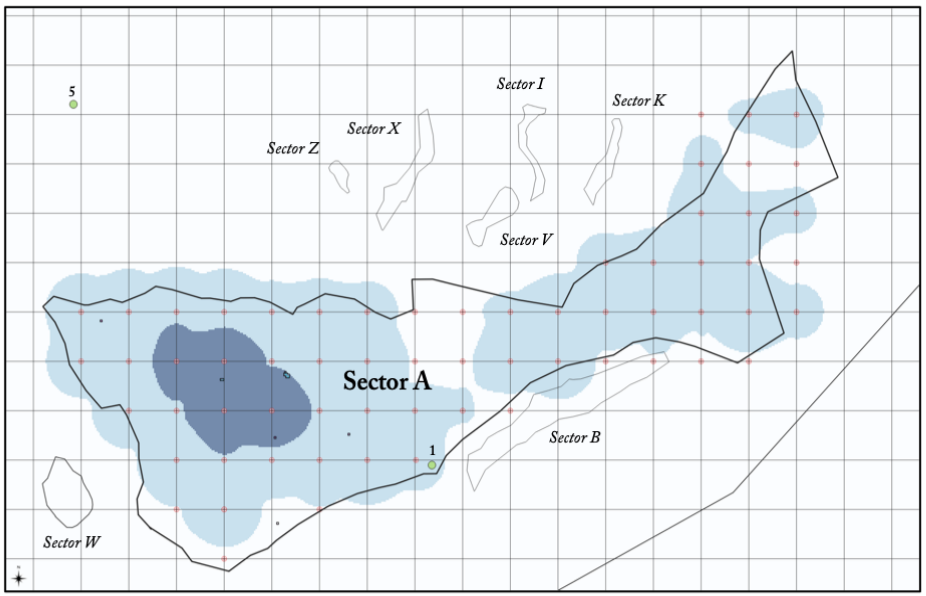
[197] It is important to remember that these are proportional differences. Based on area, 2.6 hectares were high population density in Sector A, versus only 1.6 hectares in Sector L.

Middle Horizon Population Estimates - Cerro San Antonio (L1)

Maximum Residential Community Population = ***1,063 individuals***

District	Sector	total area (hectares)	Population *(individuals)*
South	Sector A	13.23	661
North	Sector L	4.02	231
	Sector U	6.87	171





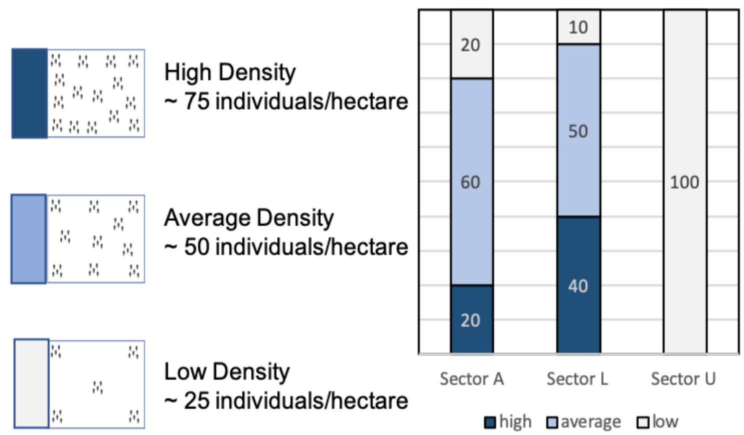


Figure 204. Population estimates for Middle Horizon residential communities at Cerro San Antonio (L1).

Population estimates were made for each sector, using these population density spatial coverage estimates. Due to its significantly larger area, Sector A (13.23 hectares) could have comfortably accommodated the largest residential communities, composed of at least 661 individuals at any given time. Even though it was substantially smaller than the other two residential sectors, Sector L (4.02 hectares) would have the second largest sector-sized residential community population, likely accommodating at least 231 individuals. Again, in spite of it sprawling over almost seven hectares (6.87 hectares), its sparse and sporadic materials suggest Sector U never contained substantial residential community populations (171 individuals). Importantly, based on population and sector size Sector L would likely have held an average of 57 individuals per hectare, which was slightly denser than Sector A's average of 50 individuals per hectare. Both Sector A and Sector L at least twice as dense as the 25 individuals per hectare that were estimated for Sector U. However, in spite of this density difference, the Southern District (~ 661 individuals), centered on Sector A, would still have held significantly higher populations than the Northern District (~ 402 individuals) with Sector L and Sector U populations counted together.

Neighborhoods

Neighborhoods are even smaller spatio-social units of affiliation that can be identified within sectors. Neighborhoods are clusters of household units. Household units, as has already been discussed in the microscale subsection (see 9.1), are where overlapping sustainable and symbolic communities anchor most basic and necessary needs in the residential community venue of the house. Neighborhoods are thus an intermediate residential community-based affiliation between the sector and the house cluster.

Neighborhoods, like households, are best seen as emergent socio-spatial institutions

(Pacifico and Truex 2019), that is, salient locations in which multiple modes of community consistently overlap. Indeed, like households, some of the more cogent aspects of neighborhoods are in their sustainable and symbolic community dimensions and are discussed more below. However, as is frequently the case, the residential community dimension of these mesoscale institutional settings are best detected in the built environment and other spatial aspects of the archaeological record. As discussed in Chapter 1, the neighborhood is increasingly evoked in discussions of residential communities, particularly as a subunit of urban-level settlements, and here, my definition largely aligns with those employed in a number of New World case studies that define neighborhood as a socio-spatial nexus (e.g. Arnauld et. al 2012; Pacifico 2019).

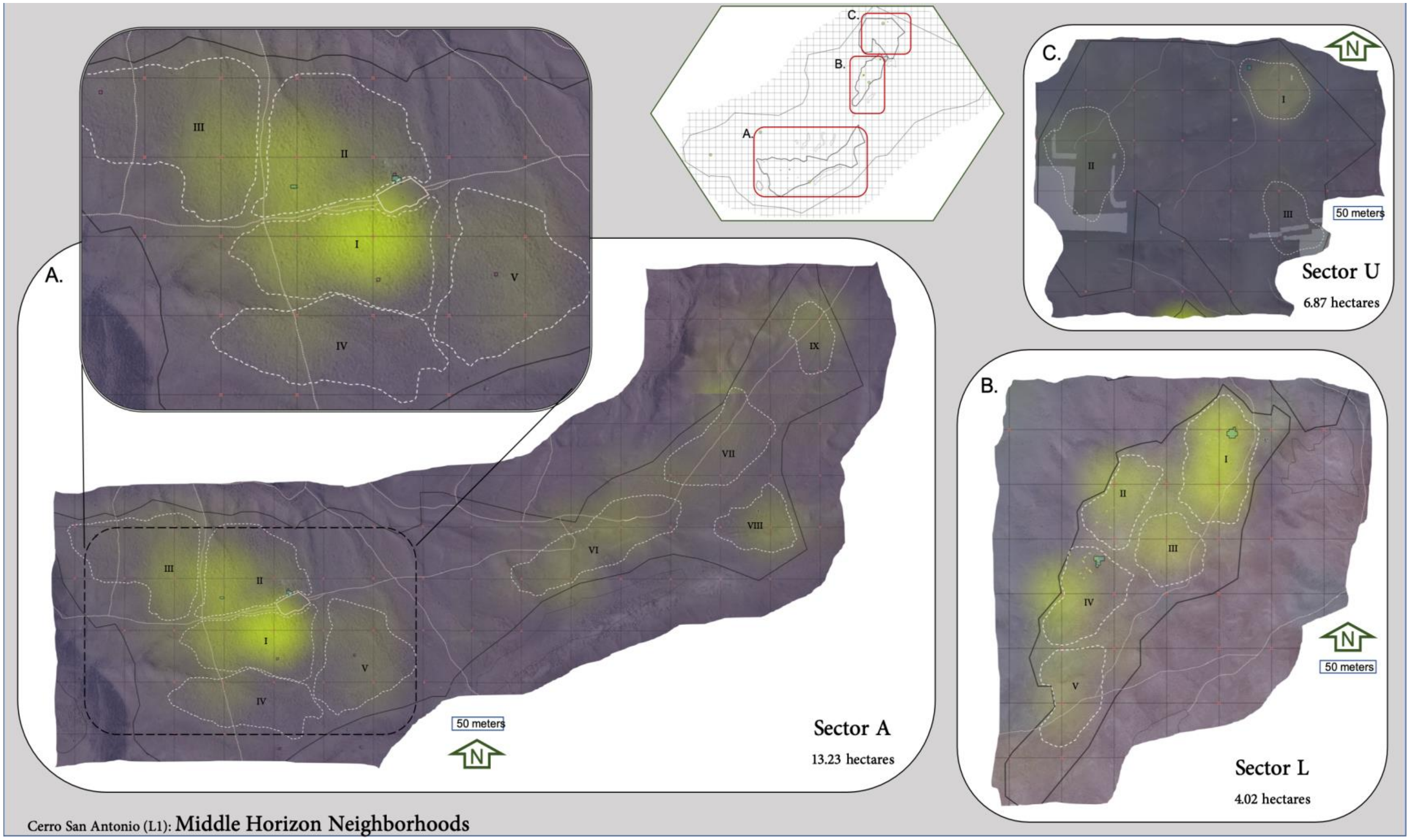


Figure 205. Orthophoto-based maps of the three (3) Middle Horizon domestic sectors with their constituent residential neighborhoods denoted (intensity of yellow shading indicates density of surface materials as well as rockpile-midden deposits.

A total of seventeen (17) neighborhoods have thus far been delineated in the three Middle Horizon domestic sectors at L1. The spatial extents of these neighborhoods have been defined from systematic surface collections, systematic and informal mapping, as well as low-altitude aerial photos. Figure 205 includes the extents of these neighborhoods as well as the estimated overall density of the surface materials (rockpile-midden deposits and materials scatters). Like the broader sectors, there do not appear to have been intentionally constructed material indicators of neighborhood boundaries (i.e., no walls or other architectural separation). However, some neighborhoods, particularly those in Sector L were separated by shallow quebradas and at least a few examples were separated by footpaths and most inter-neighborhood space was left relatively open and sometimes free of refuse.

The overall size of neighborhoods could range quite drastically and seems to have been relative to the overall size of the sector they were a part of. Again, while exact areas are still being precisely delineated, preliminary neighborhood areas range from 0.18 hectares to 0.69 hectares, with neighborhoods in Sector A averaging around 0.6 hectares in size, Sector L neighborhoods averaging around 0.25 hectares, and those in Sector U around 0.3 hectares. The population density of these neighborhoods also likely varied significantly. For instance, the number of individuals living within Neighborhoods I and II in Sector A and Neighborhoods I, II, II, and IV in Sector L were likely significantly higher than the other neighborhoods in these sectors and certainly higher than those found in Sector U. It should be noted, there is always an issue of temporally intensive occupations (i.e. longer occupations as opposed to greater number of individuals contemporaneously), however this is discussed more below in the macroscale analysis.

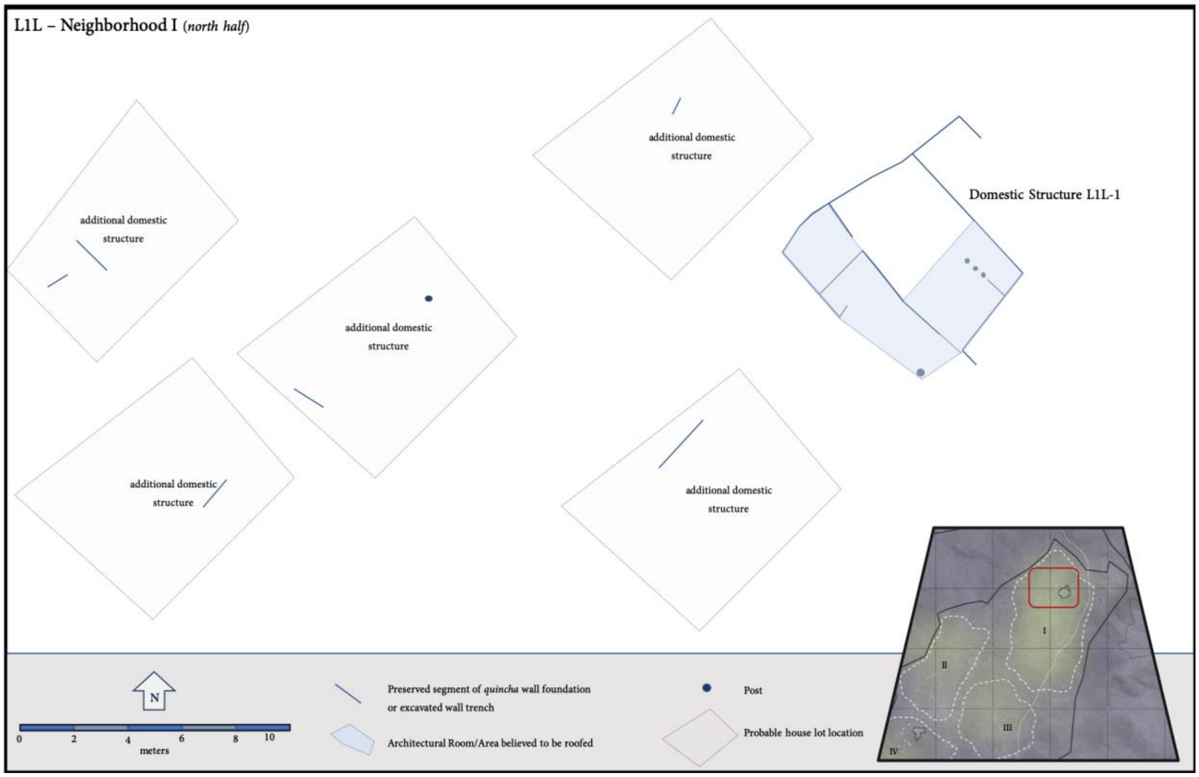


Figure 206. Schematic map of exposed quincha wall foundations in Neighborhood I, including excavated Domestic Structure L1L-1 and likely positions of additional domestic structures.

In terms of the built environment, neighborhoods were internally composed of a number of individual domestic structures, each presumably housing a family unit. As has been discussed above and will be again below, these were free-standing quincha-wall structures, with most major architectural elements (e.g. walls), oriented the same way. Exposed quincha wall segments on the surface and intensively excavated contexts suggests that these neighborhood house structures were likely clustered together, separated by narrow alleyways, with refuse disposed of locally behind walls or in dis-used storage pits. Obviously, the number of individual house structures would vary, depending on the size of the neighborhood, but even the smallest likely contained a minimum of two domestic structures and associated external storage facilities.

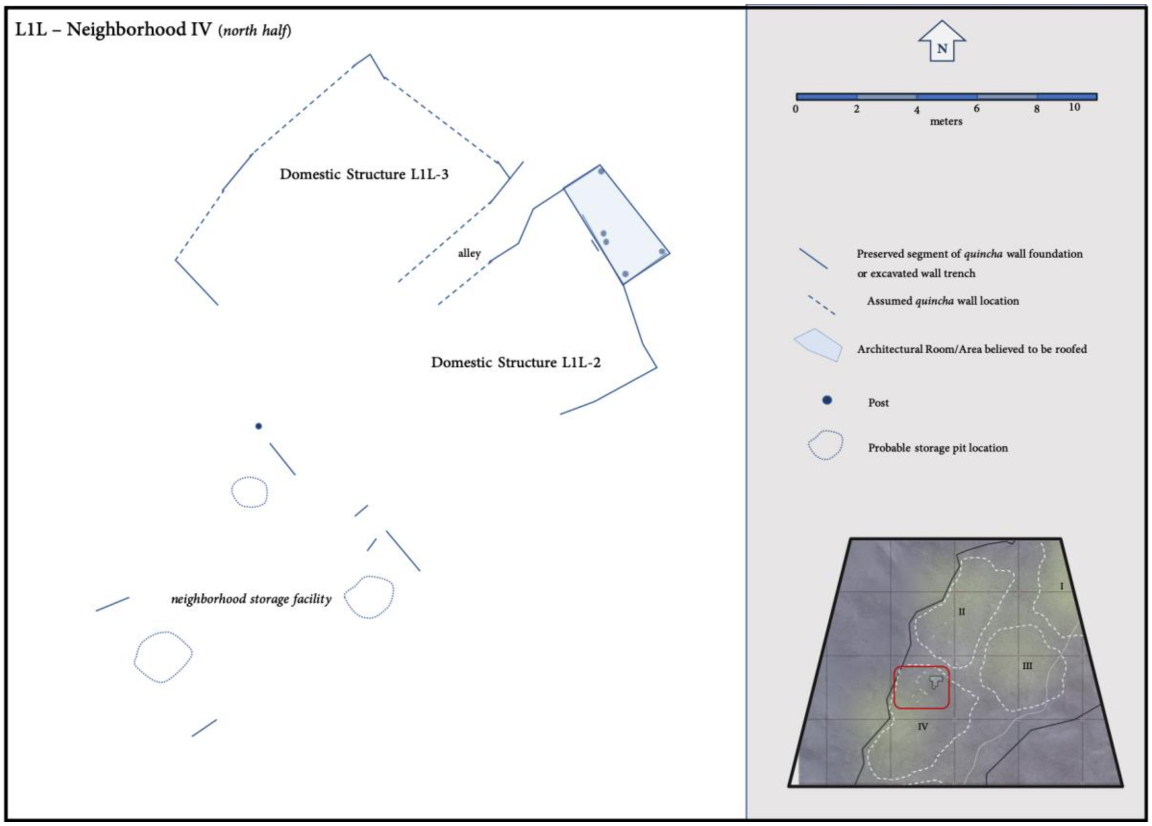


Figure 207. Schematic map of exposed quincha wall foundations in Neighborhood IV, including excavated Domestic Structures L1L-2 and L1L-3 and likely location of neighborhood storage facilities.

Finally, the smallest unit in which residential communities would manifest were as part of individual households. While the built environment was constructed to facilitate all community modes of the household, the residential community element was epitomized by the primary domestic structure or the house. Again, the intensively investigated house structures excavated at Cerro San Antonio have already been described in detail, but a few general trends are worth reiterating here. Individual houses were multiroom structures that were likely between 50 and 70 square meters in area. As detailed above, the typical house plan appears to have been centered on one large interior room which was flanked by one to three smaller interior rooms as well as at least one semi-walled space, which I have referred to as the front or back porch. Post patterns indicated that the smaller interior rooms were likely completely roofed with the larger interior space only partially roofed. In addition, the semi-walled porch areas were always provided with an awning-style roof extension as well.

All houses were constructed using the same methods. Lengths of cut cane[198] were planted evenly into linear trenches (~8-12cm in depth) to form free-standing walls. Posts of varying diameter, made from locally sourced trees, were used intermittently and almost exclusively to hold up roofing, though they also likely provided nominal structural support for walls. Based on these architectural clues and contexts elsewhere, it is assumed that roofing was composed of woven reed mats that would effectively span across open spaces, from wall to wall, supported where necessary by the aforementioned posts. Again, most other aspects of these microscale settings are more appropriate to discuss in the context of sustainable and symbolic community modes, but again, these houses appear to have been the home of extended family units, that along with their broader neighborhood, likely completed most day-to-day activities.

10.2 Middle Horizon Sustainable Communities at Cerro San Antonio

Many of the day-to-day activities that would have defined household, neighborhood, and broader community life at Cerro San Antonio during the Middle Horizon are most effectively discussed in relation to sustainable modes of community. In the investigated contexts, these sustainable community activities ranged from the most quotidian of tasks that define daily-level subsistence (e.g., sleeping, cooking, eating, etc.) as well as more punctuated, but still mundane tasks involved in farming, herding, and other subsistence requirements. Beyond basic subsistence, activities like craft production and maintenance define most other readily detectable sustainable community manifestations in the archaeological record. Like residential modes of community, these sustainable community activities can be detected in a number of

[198] Based on examples found on the surface these lengths are believed to have likely been between 2-3 meters in length.

different contexts and at a number of different scales. Some microscale contexts, like households and neighborhoods, would be host to all manner of subsistence activities, truly generalized points of convergence for sustainable modes of community. Conversely, other activities seem to have been relegated to specialized locales which served as nodes in broader sector or even district-wide sustainable community networks.

Here, sustainable communities will be discussed as falling into two main categories: basic subsistence and craft production. Two points regarding sustainable communities in the mesoscale should be noted from the onset. The first is that sustainable modes of community are the primary venue for exchange of materials (or otherwise), and therefore are inherently connected to non-local contexts well-beyond the site of Cerro San Antonio. Discussion of these broader connections will be reserved for the macroscale discussion below (see Chapter 11). Similarly, as noted back in Chapter 1 (see 1.2), almost any manifestation of sustainable modes of community are underwritten by symbolic modes of community. At the most basic level, sustainable communities demand a shared understanding of value, to at least a certain degree. What's more, all sustainable community practices, from farming to crafting, require some amount of time in both explicit and implicit training. This point of intersection between sustainable and symbolic modes of community has become known elsewhere as communities of practice (Lave and Wenger 1998; Roddick and Stahl 2016). These more symbolic-oriented dimensions of community will be discussed just below in the symbolic community subsection.

<u>Basic Subsistence</u>

As one of the basal functions of sustainable communities, activities involved in basic subsistence define most of the detectable remains of these modes of community at Cerro San Antonio. As noted above, some of these activities, like cooking and food waste disposal, can be found in most individual domestic structures, whereas other activities involved in basic subsistence are only found in specific locations. Here, datasets from the various residential community units defined above (houses, neighborhoods, sectors, and districts) will be compared and contrasted to highlight both ubiquitous and more specialized subsistence activities. These basic subsistence activities will be presented in three major categories: 1) those involved in the production and procurement of foodstuffs (farming, hunting, etc.), 2) consumption (cooking, eating, etc.), and 3) the storage and ultimate disposal of these same consumables and other related goods.

Production & Procurement

The sustainable community functions dealing with the production and more general procurement of foodstuff and other essential subsistence goods tend to be those detected at the broader sector and even district level. The vast majority of raw resources were located outside the perimeters of the site and therefore these contexts were not directly investigated by this study. However, evidence for agricultural cultivation, camelid pastoralism, guinea pig tending, hunting, fishing, and the gathering of a number of taxa of wild plant and animal can all be detected throughout the Middle Horizon domestic contexts at L1. Of course, direct evidence for these activities can be observed in the remains of consumption (cooking and eating) of the goods themselves, but here I attempt to isolate the tools, implements, and other material byproducts of sustainable community activities most directly tied to the processes of production and procurement.

The cultivation of domesticated crops and the procurement of a number of wild plant taxa were likely some of the central collective tasks of a number of different sustainable communities at Cerro San Antonio. As will be emphasized in the following chapter, one of the primary reasons for the presence of Middle Horizon settlements at Cerro San Antonio, was the site's ecological position in the low altitude *yunga* ecozone. Here, below 1000 meters above sea level, many domesticated crops could be grown year-round, yielding multiple harvests, and a suite of wild fruiting trees and other native plant life were found in abundance. Again, as described in the initial site description (see 3.2), the entirety of the site and certainly the Middle Horizon occupations themselves sit well above the arable valley floor. However, within an easy hour walk (~ 3 kilometers) of the major site entrances there was likely at least 4500 hectares of arable land (Figure 208).

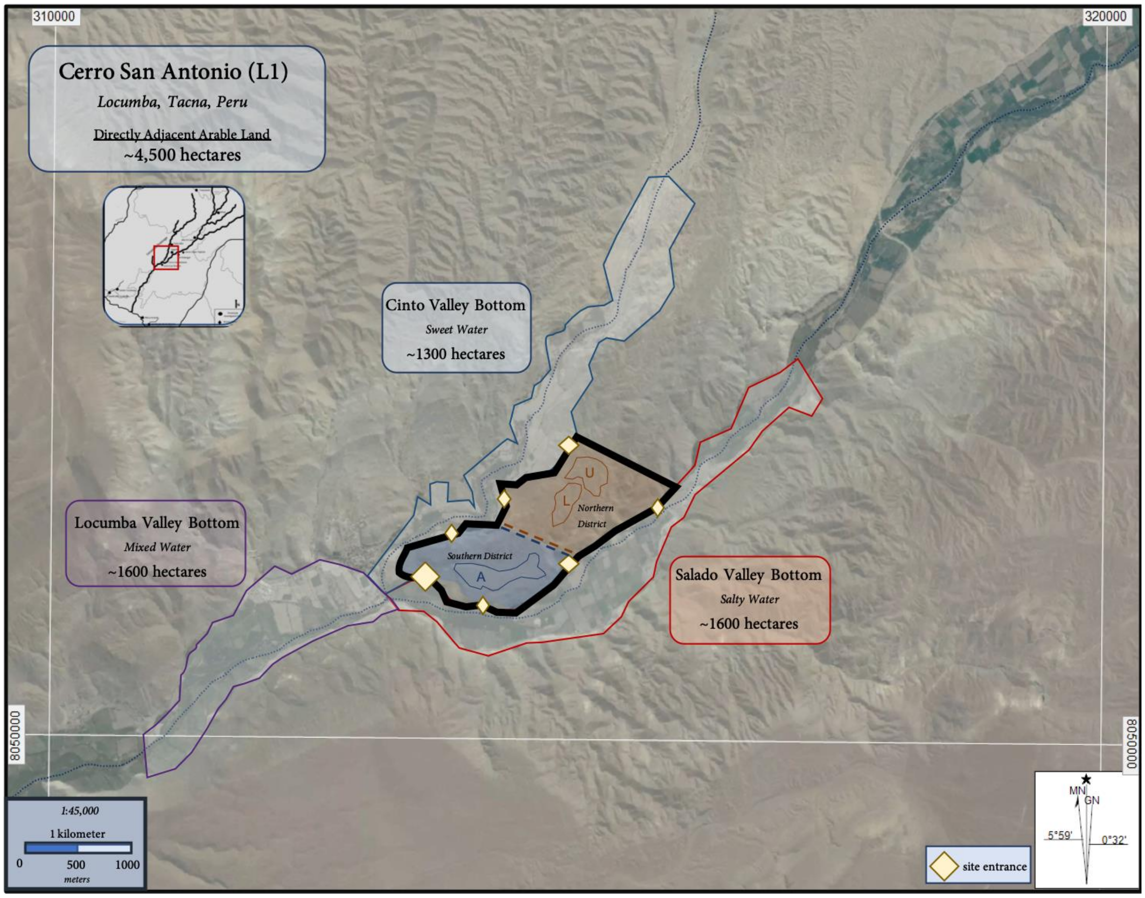
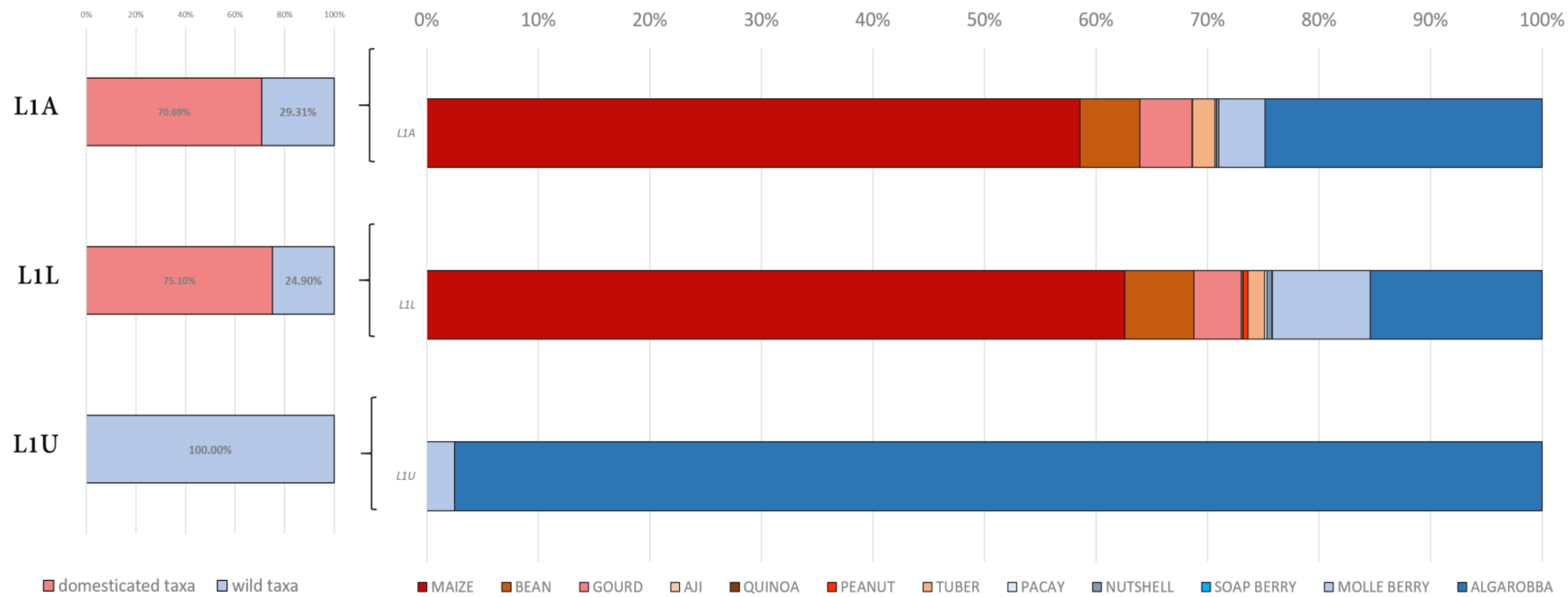


Figure 208. Map illustrating the amount of arable valley bottom area within approximately one-hour walk (~ 3 kilometers) from each major access points to the Middle Horizon settlements at Cerro San Antonio (L1).

Each major domestic sector at L1 would have relatively easy access to both valley bottom segments directly adjacent to the site. However, Sector A in the Southern District had more direct access with the Salado tributary and the Main Quebrada access that led to the central Locumba tributary leading down valley. Sector L and Sector U were much more oriented towards accessing the Cinto tributary. Again, as noted in Chapter 3, these tributaries, and the soils they watered were not of equal composition. Specifically, the Cinto tributary is known for having "sweet" water and is suitable for growing almost any crops, but particularly squash and gourd, peppers (ají), as well as all manner of fruiting trees. Conversely, the waters of the Salado tributary have well-documented arsenic contamination as well as higher saline content. These compositional issues likely limited the types of crops that could have been cultivated successfully here. However, important crops, like most varieties of maize and beans, do seem to grow well here. The lower, unified Locumba tributary is by nature a mixed composition, with some of the limitations of the Salado branch, but apparently capable of supporting more fruiting varieties of domesticated and wild plant species (see Chapter 3 for a more detailed description).



	MAIZE	BEAN	GOURD	AJI	QUINOA	PEANUT	TUBER	PACAY	NUTSHELL	SOAP BERRY	MOLLE BERRY	ALGAROBBA
L1A	58.55%	5.38%	4.68%	0.02%	0.00%	0.01%	2.04%	0.11%	0.21%	0.02%	4.15%	24.84%
L1L	62.59%	6.21%	4.21%	0.16%	0.02%	0.46%	1.46%	0.23%	0.44%	0.06%	8.75%	15.42%
L1U	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.50%	97.50%

Figure 209. (left) Overall frequencies of domesticated vs wild consumable plant taxa recovered from excavated contexts in each of the major Middle Horizon sectors at L1 and (right) a more detailed breakdown of frequencies of specific taxa, as recovered in the macrobotanic assemblage of the same contexts.

Most of the arable valley bottom space closest to the site was likely dedicated to the farming of domesticated crops. As illustrated in Figure 209, the vast majority of consumable botanic taxon recovered in the most extensively excavated contexts, come from domesticated species. More will be said about the specific dietary choices of Middle Horizon populations and how they relate to concepts like taste and cuisine below in the symbolic community subsection, but a few trends in crop choice are pertinent here. In both Sector A and Sector L maize would be the most common consumable plant taxa recovered by a significant margin. The ubiquity and density of maize remains at L1 not only emphasizes the importance of this crop, but reiterates that it was likely one of the few cultigens that could be grown, with success, in each of the valley bottom segments, including the contaminated Salado waters. While far less ubiquitous, common beans may also have been grown successfully in the Salado branch, amplifying the amount of area they could be cultivated as well. More fruiting cultigens, like ají peppers and squash were likely restricted to the Cinto fields and some locations in the down valley Locumba drainage.

Wild consumable taxa identified in the macrobotanic assemblage collected during excavations were largely restricted to fruiting trees, with the vast majority coming from two species: algarroba (carob) and molle (Peruvian pepper). These species, as well as the other definitively identified taxa (pacay, walnut, and soap berry), could have been found in all three directly adjacent valley bottom segments (Figure 208), but were likely found in the most significant numbers in the Cinto tributary. This assumption is at least tangentially supported by the consumable botanic taxa recovered in Sector U. A major departure from the other two sectors, which were defined primarily by domesticates, Sector U was defined entirely by wild taxa. There are a number of explanations for the absence of domesticate consumable taxa in the Sector U context, but the prevalence of wild tree remains is likely at least partially explained by its close proximity to the Cinto valley bottom.

Outside of the remains of the botanics themselves, little in terms of materials directly associated with farming were recovered on the site itself. One exception were the remains of stone hoes (Figure 210), used in plowing and tilling land for cultivation. These lithic tools were found exclusively in the form of minimally flaked flat stones, shaped roughly into a teardrop shape. Stone hoes were almost five times denser in Sector L (0.746 hoes per hectare), than Sector A (0.151 hoes per hectare), which was roughly equal to their density in Sector U (0.146 hoes per hectare). Without exception these hoes were found discarded in unambiguous rockpile-midden deposits. This makes sense as they would only have been brought to site for repair and disposal. In fact, the four (4) examples of hoes documented in the ground stone pilot study survey in Sector L (see 5.2) were recovered in two clusters (Figure 210), both in clear rockpile-midden contexts. This could suggest that hoes would be seasonally replaced with the old hoes being discarded into middens together.

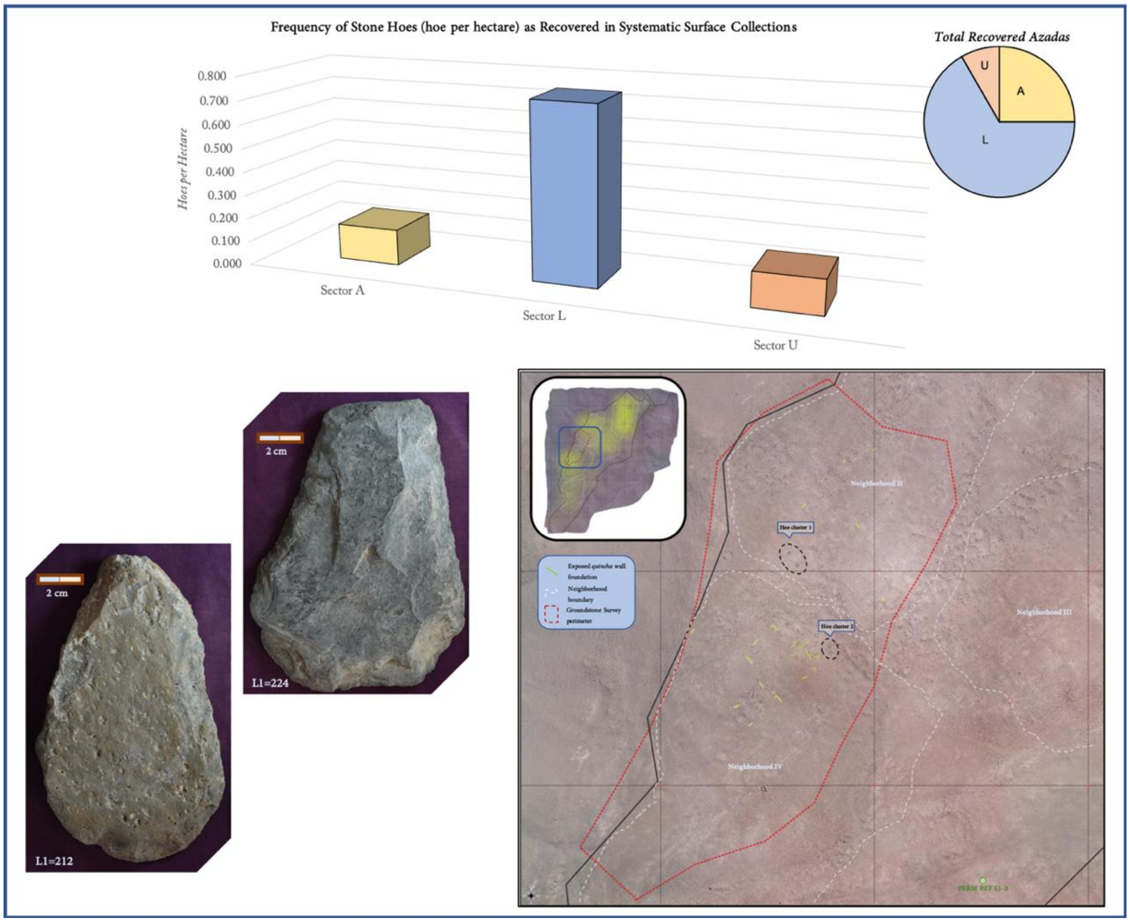


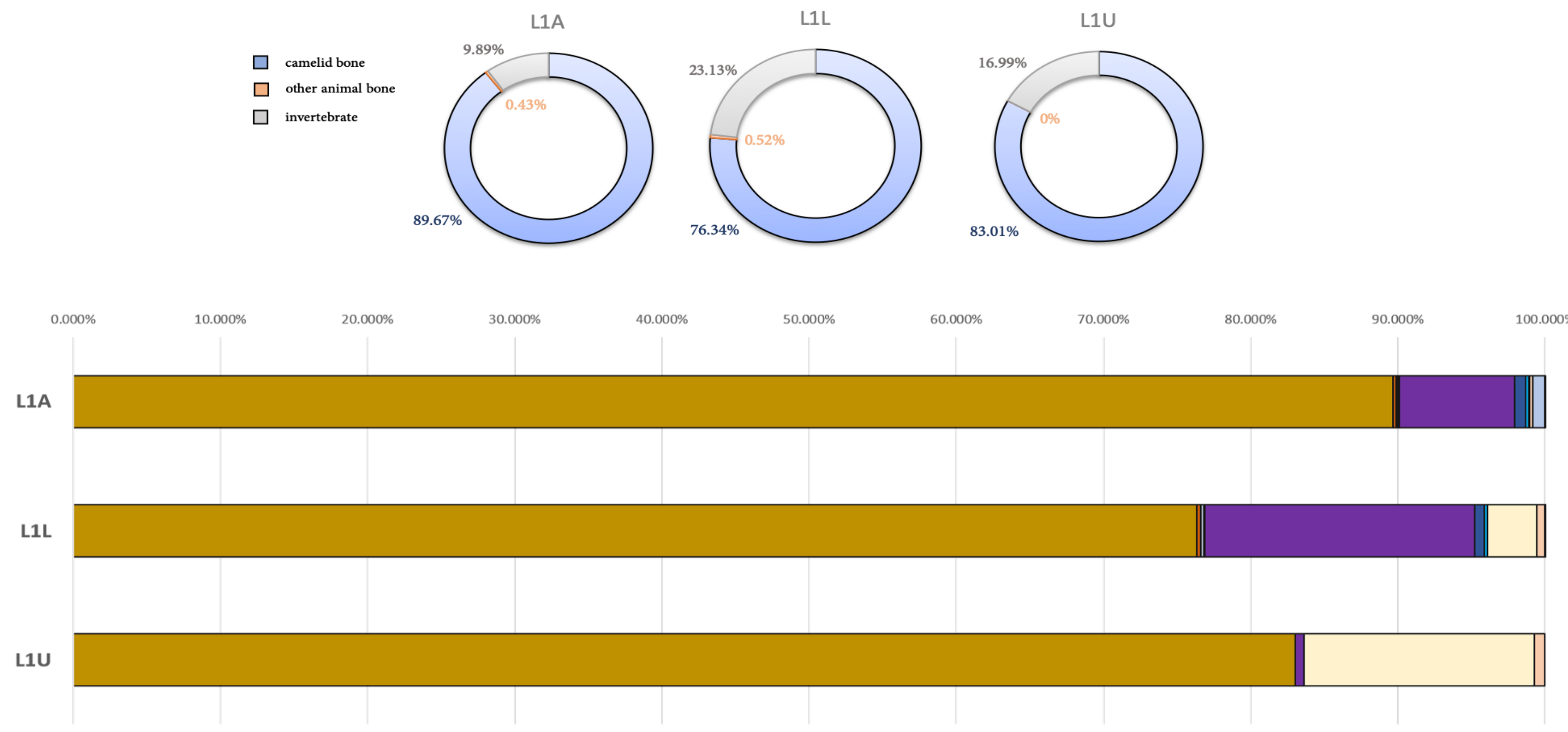
Figure 210. Figure illustrating (*top*) the raw number and frequency of stone hoes as recovered across all methods (spot finds, systematic surface collection, excavation) in the three domestic sectors as well as (*bottom-left*) photos of collected hoe examples and (*bottom-right*) map of Sector L ground stone pilot study survey with locations of hoes.

The only other recovered materials that were likely to have been used directly in agricultural production and procurement were baskets. As noted in Chapter 8 (see 8.4), in spite of excellent material preservation, very few basket fragments were recovered in any Middle Horizon context at Cerro San Antonio, so little more can be said about them here.

Camelid pastoralism, specifically the herding of domesticated llamas (though alpaca cannot be completely ruled out), was also an essential sustainable community endeavor that every residential community at the site relied upon for basic subsistence. Like the agricultural practices, the most obvious indication of pastoralism were the remains of the camelids themselves. Camelid bone fragments were the most common faunal remains, by any metric

(Figure 211), and additional elements such as fur, hooves, and even skin were located with some frequency as well. With few exceptions camelid remains recovered during excavations appear to be the result of butchering and consumption of remains for meat and will be discussed more below. However, the presence of significant amounts and overall ubiquity of camelid coprolites does suggest that living llamas were likely kept within the confines of the residential communities,[199] at least in punctuated events. For instance, significant concentrations of camelid coprolites in the uppermost excavation strata within the well-documented Domestic Structure L1L-1, suggest that this structure's final use was to pen camelids. It is likely that this was a common practice, if a house or other domestic structure was abandoned it could be used as a ready-made pen, among other re-uses.

[199] It should be noted that camelid dung is and was a common fuel supplement in the Andes (Wright 2003:391; Janusek 2013:203-204). So, the presence of camelid coprolites here can certainly be, at least partially, attributed to that activity.



	Camelid Bone	Rodent Bone	Fish Bone	Other Animal Bone	Choro Mussel	Olive Shell	other marine shell	Land Snail	Crustacean	Coral	Urchin
L1A	89.672%	0.233%	0.066%	0.132%	7.807%	0.777%	0.205%	0.066%	0.228%	0.813%	0.001%
L1L	76.349%	0.279%	0.172%	0.070%	18.367%	0.635%	0.224%	3.360%	0.505%	0.029%	0.010%
L1U	83.017%	0.000%	0.000%	0.000%	0.613%	0.000%	0.000%	15.635%	0.736%	0.000%	0.000%

Figure 211. Frequency breakdown of fauna remains as recovered in excavations within the three (3) Middle Horizon domestic sectors: Sector A, Sector L, and Sector U.

However, it is likely that most local herds would been pastured and spent the majority of time in fallow portions of the valley bottom below the residential sectors. The Salado, and to a lesser degree the central Locumba branch of the tributary, were likely targeted for camelid herding due to the limited crops that could be grown there. This hypothesis is supported by two reoccurring features. The first are the high concentration of petroglyph boulders marking the Main Quebrada entrance out to the central Locumba Valley as well as others marking entrances out to the Salado. The densest clusters of petroglyphs can be found on segments of the site with excellent views up and down the Salado. While the petroglyphs will be the focus of more symbolic community discussion below, it is important to note here that the majority of decipherable imagery from these petroglyphs involve camelids, often appearing to be interacting with humans and even canines. It is likely that many of the Middle Horizon era petroglyphs were made by sustainable community member tasked with looking over the herds in the Salado Valley bottom below.

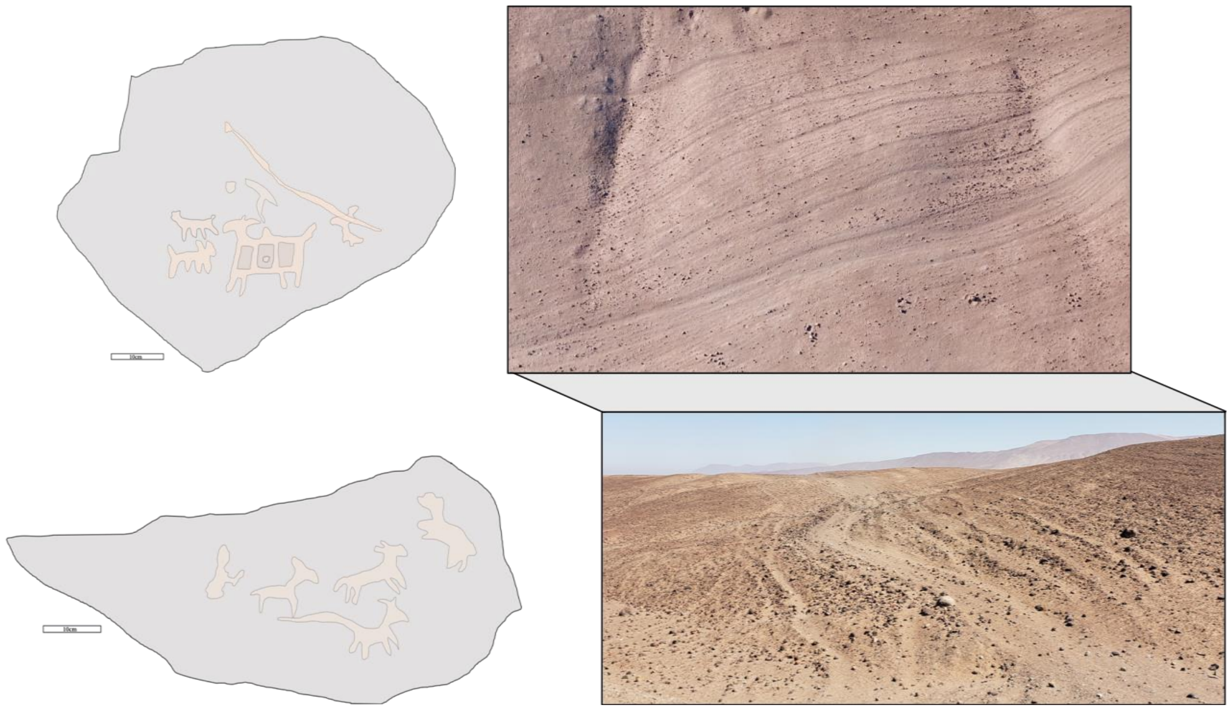


Figure 212. (right) Both overhead UAV and ground-level photos of relic established footpaths flanked by numerous parallel informal paths left from herding camelids and (left) two examples of camelid-centric petroglyph scenes from petroglyph boulders overlooking the Salado valley bottom.

The second significant feature indicating the presence of camelid herds on-site are relic footpaths flanked by numerous smaller parallel paths (Figure 212). This “raking” pattern has been identified, often along hillsides like the example in Figure 212, throughout the desert *yunga* and *chala* ecozones of the south-central cost and south coast subregions (Briones, et al. 2005:210; Valenzuela, et al. 2018:7). Again, most examples documented at Cerro San Antonio appear to be on the south side of the site in pathways associated with the Salado valley access points.

The other domesticated animal that played a significant role in the diets of Middle Horizon populations at L1 were guinea pigs, known locally as *cuy*. While far less ubiquitous and far less dense than those of camelids, the remains of cuy were the second most common vertebrate animal remain recovered in all investigated contexts. Like most archaeological and ethnographically documented cases, guinea pigs at L1 appear to have been kept in individual houses as opposed to specialized or specific locations.

Table 14. Cuy (Guinea Pig) remains (coprolites and bone) as recovered in excavated contexts.

Cuy Remains	Coprolites		Bones	
	# of coprolites per liter	grams of coprolites per liter	# of bone fragments per liter	grams of bones per liter
Sector A	0.7970	0.0399	0.2816	0.0462
Sector L	0.7604	0.0380	0.1978	0.0179

As indicated in Table 14, based on the density of bone recovered in excavated contexts residents of Sector A appear to have preferred cuy, as nearly four times the amount of cuy bone (by count) was found in Sector A as opposed to Sector L in the north. However, while bone may indicate a dietary preference, it does not necessarily indicate a sustainable community specialization, in terms of guinea pig rearing. Rather, the remarkably similar distribution of cuy coprolites, a far better indicator of in situ cuy husbandry, suggest that cuy were likely raised in the houses in which they were consumed. It should be noted that no cuy remains were recovered in the investigated Sector U context.

Procuring wild game through hunting and fishing was also a focused task of sustainable communities at Cerro San Antonio. Again, the chief indication of these activities were food remains or the result of consumption, but some indication of the actual practices of hunting and fishing were also indicated. Significantly, the only identified animal remains that can be definitely traced to a wild species that would have been hunted, are bird bones. However, it is possible that wild camelid or deer bone may have been misidentified as camelid bone and a number of wild rodent species may have been lumped in with the cuy remains (see Chapter 7).

The only non-faunal material remains that likely correlate directly with hunting this wild game are projectile points, specifically those used in arrows, as well as sling stones. Both arrows and sling stones could be multipurpose and may also have been used for weaponry in defense and warfare. However, at least one (1) example of a micro-arrowhead projectile point was identified (Figure 146). This point, collected at the margins of Sector U was likely used to hunt small wild game, such as birds or rodents. The final indication of hunting and wild game in general were in some representations in petroglyphs, which appear to show scenes of individuals shooting wild deer or camelids with a bow and arrow (Figure 213).

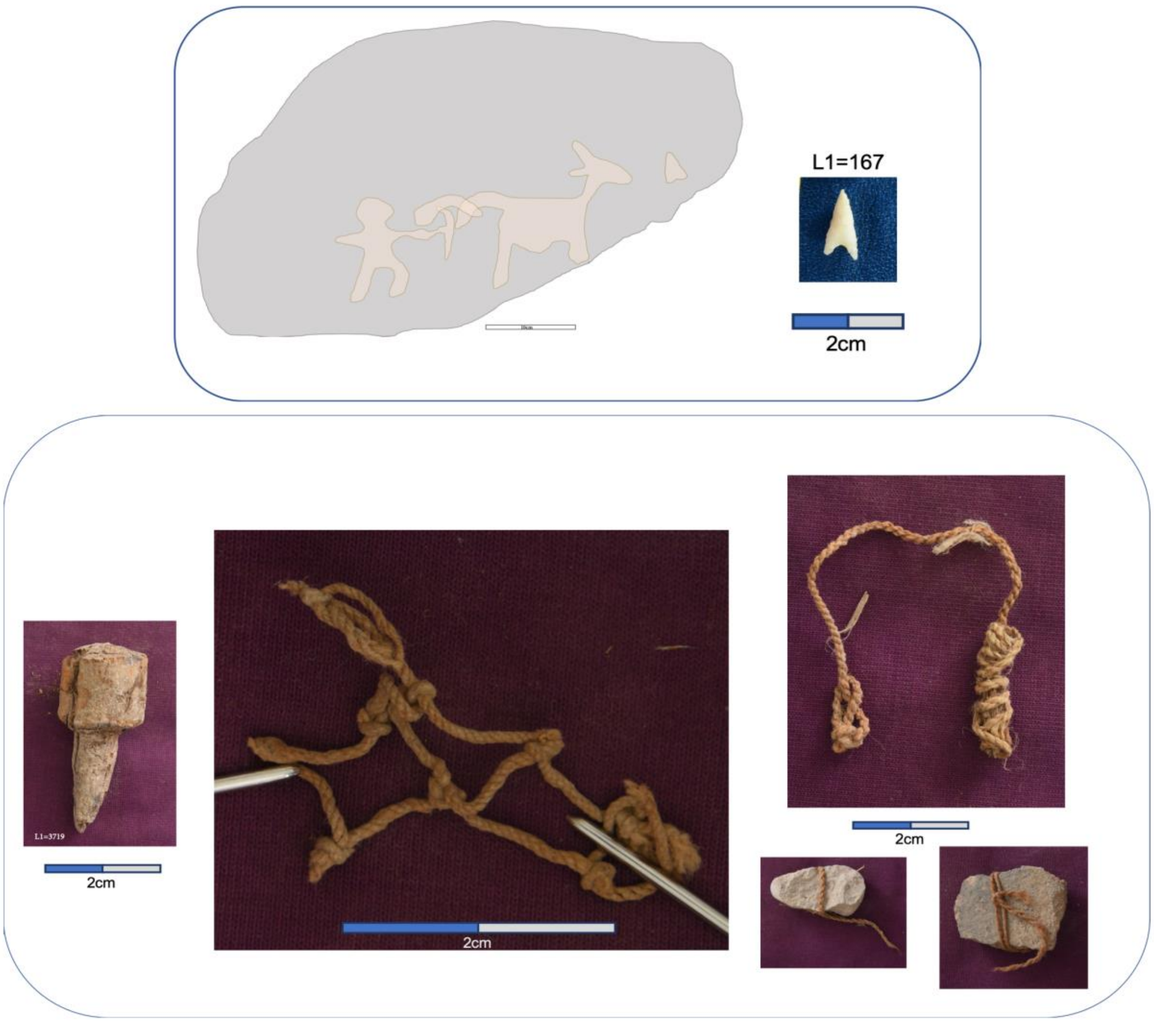


Figure 213. Evidence of the sustainable community practices relating to procuring wild game through (*top*) hunting and (*bottom*) fishing as described in the text.

Implements believed to be utilized in fishing were also recovered from domestic contexts. These material remains are varied but include cotton twine netting, stone and re-utilized ceramic sherd net-sinkers/weights, and carved wooden items, interpreted here as possible net floats (Figure 213). Unlike the other basic subsistence sustainable community activities described above, fishing appears to have been a specialized task. All of the materials depicted in Figure 213, as well as a number of additional fragments of net and fragmented wooden net-floats, were recovered in a single context - the rockpile-midden deposit (Area F) associated with Domestic Structure L1L-2 and Domestic Structure L1L-3 in Neighborhood IV in Sector L. Interestingly, no fishing hooks were recovered, possibly suggesting more shallow water and even riverine fishing practices. Consumption and broader choices in cuisine will be discussed in detail below, this fishing specialization in sustainable communities anchored to the Neighborhood IV residential communities, was reiterated in the emphasis of aquatic-based dietary choices. Fish bone, marine shell, and crustacean remains were found in higher densities as well as overall frequencies in these contexts as well.

Finally, closely related to fishing was the procurement of wild (mostly) aquatic invertebrates. Effectively, the only evidence for the procurement of both marine (mollusks, gastropods, urchin) and fresh water (crustacean) aquatic invertebrates as well as at least one species of terrestrial invertebrate (land snail), are the disposed remains of consumption (shells, etc.). However, the species present do reveal how these wild resources may have been procured. All crustacean remains derive from freshwater crayfish. These freshwater crustaceans can be found year-round in all permeant river channels, but are largest in size and numbers during the end of the rainy season (December - March) (R. Bauer 2013:642-644; Hartman 1958). Crayfish were likely caught by hand and collected in baskets, so did not require any additional tools in procurement. Similarly, land snails present in several contexts were collected locally, and as will be noted again below, were likely even collected from midden deposits in the residential sectors. These gastropods were likely available year-round but would have been present in greater numbers during periods of increased precipitation.

On the other hand, marine invertebrates, like bivalve mollusks and various gastropods, were necessarily acquired from the Pacific coast, approximately 35 kilometers away. While a round trip journey from Cerro San Antonio to the coast could have been comfortably completed in a week, marine resources represent the most distant resources used in daily subsistence. All marine shell species found in significant numbers (choro, mussel, olive shell, limpet, littleneck clam, ribbed mussel, and tegula snail) as well as less common urchin, could have been collected in the shallow coastal waters and tide pools that define the Locumba coastal delta.

Consumption

The main goal of the production and procurement of subsistence goods is of course consumption of those goods. Here in the discussion of sustainable community consumption activities I include: 1) any processing of foodstuff (butchering of meat, grinding of grain, etc.), 2) cooking (roasting, boiling, brewing, etc.) of foods and beverages, and 3) the actual eating and drinking of the final food products. I will return to the implications of these choices in consumption, regarding concepts like cuisine, later.

The majority of detectable sustainable community activities dealing with processing plant-based foodstuff appear to have been ubiquitous, taking place at the level of neighborhood or house. Some direct evidence of plant processing is evident in discarded inedible portions of plants. For example, most rockpile-midden deposits contained significant deposits of maize cobs with no kernels. These remains likely represent the cobs that were either dried and then systematically stripped of kernels for immediate cooking or for easier storage, or the discards of kernels consumed directly off the cob. Likewise, bean, algarroba, and pacay seed pods as well as walnut shell may also represent remains discarding in processing these plant products for storage or immediate consumption. While they could be found in different proportions and densities, these remains are ubiquitous in any deposit with domestic refuse, suggesting processing plant products in this basic way was a task carried out at the level of individual house.

Some of the most consistently used implements in the sustainable community activities that deal with processing plant-based food for both immediate consumption as well as storage of any length are ground stone tools. By far the most common ground stone tools used to this end are the mano and the metate. Essentially this is a dyadic toolset, whereby manos are used for grinding, pounding and a variety of other friction- or percussion-based motions on the metate, which is essentially used as both surface and container. Both tool types came in a number of varieties. Based on shape, size, and the location of use-wear and polish, five (5) varieties of mano were identified and three (3) primary varieties of metate (see 8.2). More study is needed of the exact functions each type of mano and metate and the combinations of their use together, but all certainly could have and likely were used to some extent in the food processing process.

While these ground stone implements were recovered in every form of material collection, the L1L ground stone lithic pilot survey was conducted explicitly to systematically target these tools and consider the feasibility of identifying any inter- and intra-neighborhood patterns of distribution. As described in Chapter 5 (see 5.2), this pilot study systematically recorded all ground stone and related lithic artifacts across a surface area of 5230m^2 along the western half of Sector L. This survey area would effectively sample the south half of Neighborhood II and the north half of Neighborhood IV (Figure 214). Analysis of this dataset is still in progress and while this was a limited pilot study, a few important patterns and their implications on sustainable community food processing are pertinent here.

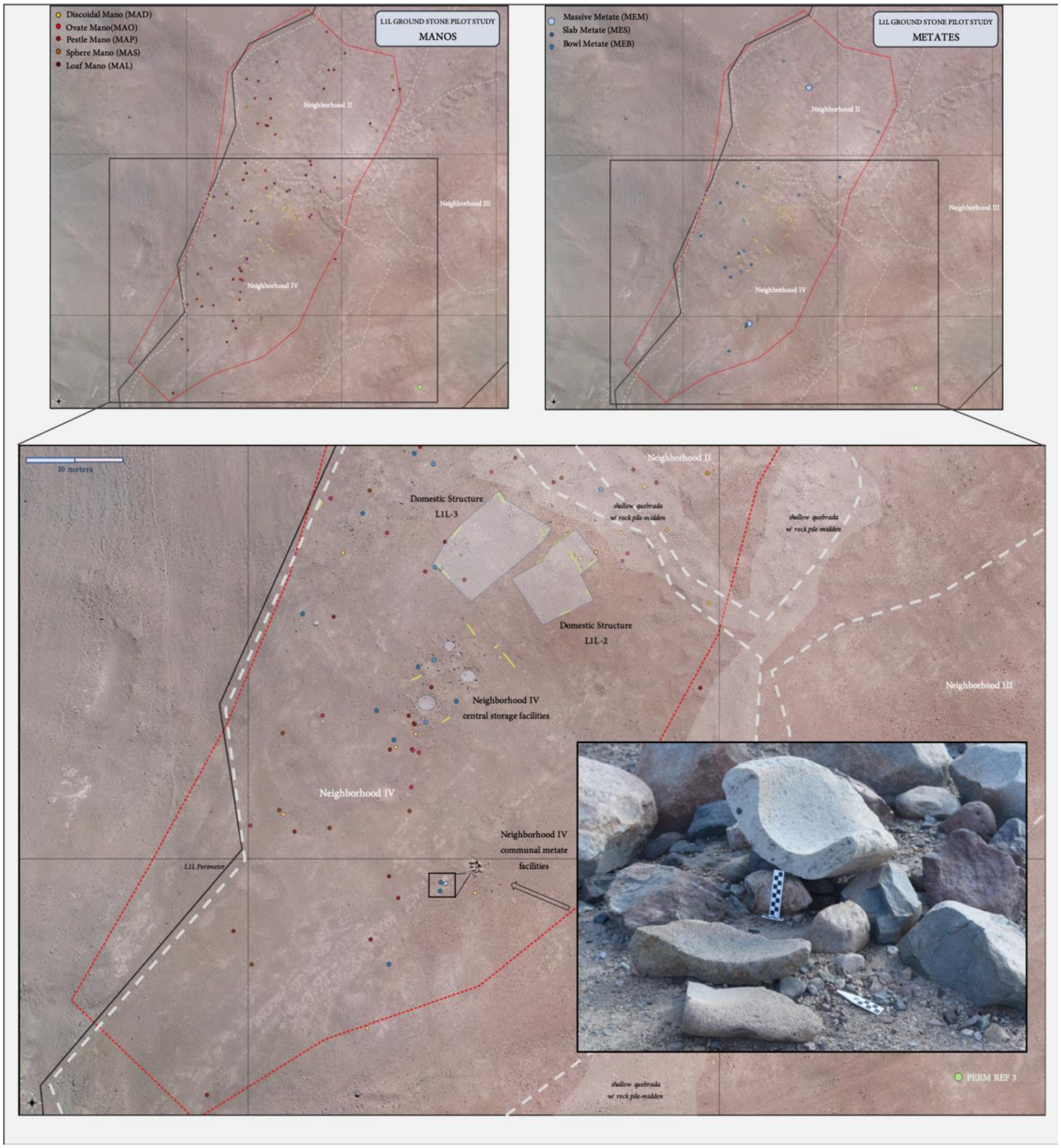
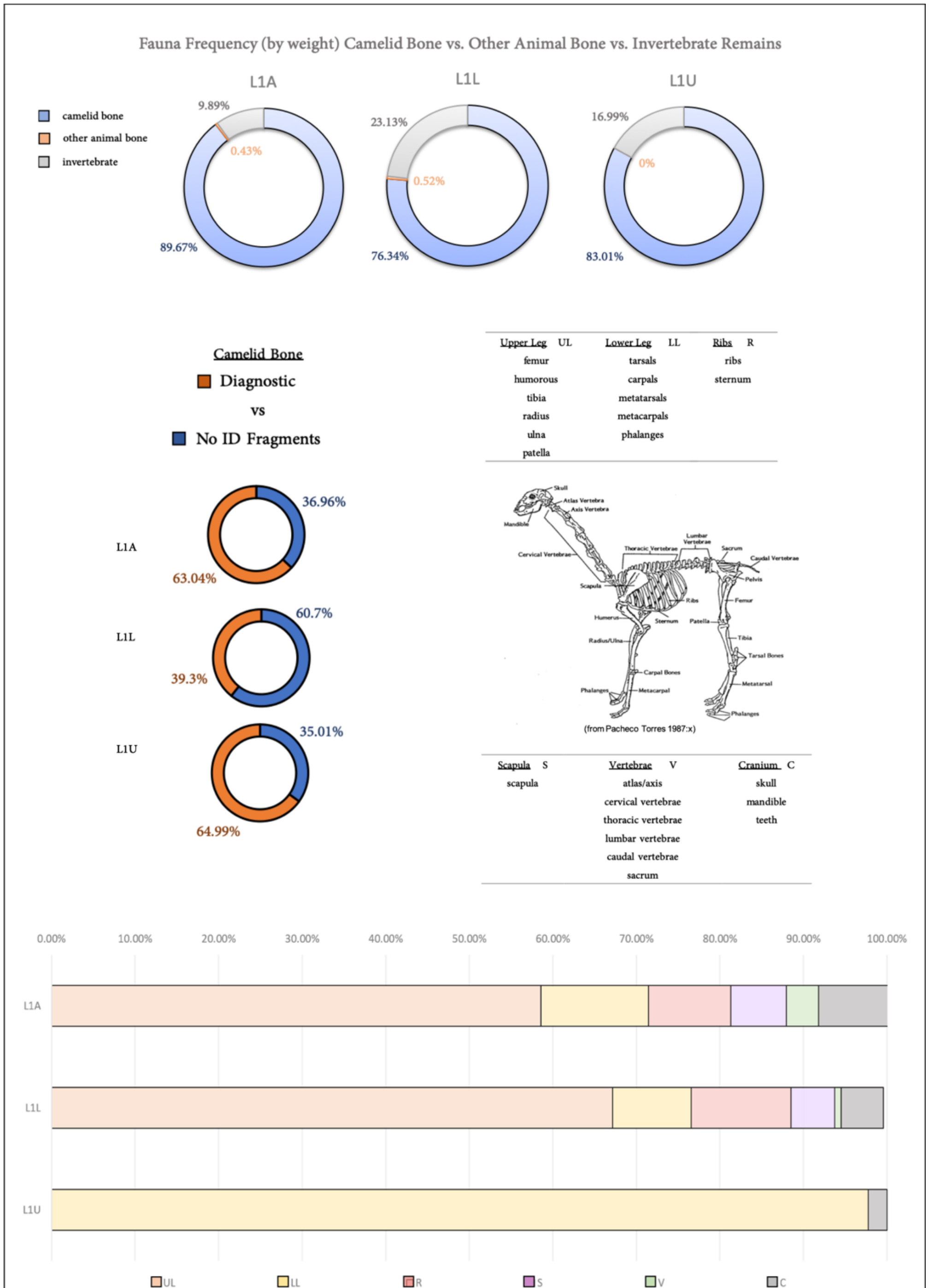


Figure 214. Maps of ground stone pilot survey results from Neighborhood IV, including (top-left) mano distribution, (top-right) metate distribution, and (bottom) combined distribution with neighborhood storage facilities and food processing facilities indicated.

One pattern that is immediately apparent is the widespread distribution of the various types of manos (Figure 214). While there are certainly more found in Neighborhood IV in the south, the wide distribution of these tools suggests some basic food processing was ubiquitous, likely taking place in each individual house. This is also true of the two smaller variety of metate, which while far more limited in number than manos, were still relatively well-dispersed, suggesting a presence in most individual houses in both neighborhoods.

However, there are indications that some ground stone-based food processing was more centralized. Only two (2) examples of the massive metate form (MEM) were identified, one in Neighborhood II and the other in Neighborhood IV (Figure 214). This likely suggests that some larger food processing activities may have been done at the neighborhood, as opposed to house-level, with communal implements. Additionally, in Neighborhood IV an additional cluster of both manos and metates of various types, surrounding what are believed to be features believed to be the central neighborhood storage features (remnant quincha wall foundation in conjunction with what appear to be at least three stone-line pits), suggest additional neighborhood-level food processing may have taken place here as well.



	UL	LL	R	S	V	C
L1A	58.57%	12.85%	9.85%	6.69%	3.86%	9.78%
L1L	67.15%	9.39%	11.99%	5.20%	0.78%	5.06%
L1U	0.00%	97.73%	0.00%	0.00%	0.00%	2.27%

Figure 215. Frequency breakdown of camelid bone remains as recovered in excavated contexts, including: (top) camelid bone frequency compared to other Fauna-Hard materials, (bottom-left) frequency of diagnostic vs. non-diagnostic camelid bone fragments and the frequency of camelid bone anatomical categories, (right) key of camelid bone anatomical categories.

Butchering domesticated camelids for consumable and storable packages of meat was another essential subsistence-based sustainable community responsibility. As with the processing of plant-based food goods, some butchering, particularly preparing partially pre-butchered portions of meat for daily consumption, appear to have taken place in most individual neighborhood and house contexts. This is indicated by the overall ubiquity of camelid bone, which was recovered in almost 70% of all excavated contexts (see 8.7), particularly of the bones associated with the most desirable meat packages (upper and lower leg and ribs).

In addition, both reutilized flakes, and formal side-scrapers and knives, used at least partially for butchering meat, were found in relatively even numbers across the three domestic sectors. However, the presence of significantly higher frequencies of bone associated with more non-desirable portions of the animal (vertebrae, crania) in Sector A (Figure 215), may suggest that more initial butchering took place here. This sustainable community specialization in initial camelid butchering in Sector A correlates with its close proximity to the Salado and Central Locumba valley bottom segments, which as noted above, may have been preferable for pasturing camelid herds.

Cooking both plant and animal-based foods appears to have also taken place in most individual houses. As noted above, it can sometimes be difficult to distinguish between food remains left from cooking and those that represent refuse discarded from either initial food processing or eating, especially after only initial analysis. That said, the charred plant remains and small bone fragments found in most excavated contexts, likely represent food remains that accidentally fell into the fire. However, more direct evidence for cooking can be identified from remains like shriveled molle berries or cracked algarroba seeds which almost certainly are the remains from boiling these arboreal-based plant goods in making a variety of different beverages.

Furthermore, utilitarian ceramics, particularly ollas, show clear signs for being used in a variety of cooking processes. Of the 12,835 ceramic sherds identified as diagnostically olla (Olla and OT) over 92% show evidence for direct contact with a fire and many of these show evidence for charring with thick sooting. Finally, every formal domestic structure sampled through excavation produced at least one hearth feature. While hearths could vary in dimensions, none were fortified with stone and were effectively just crudely dug holes.

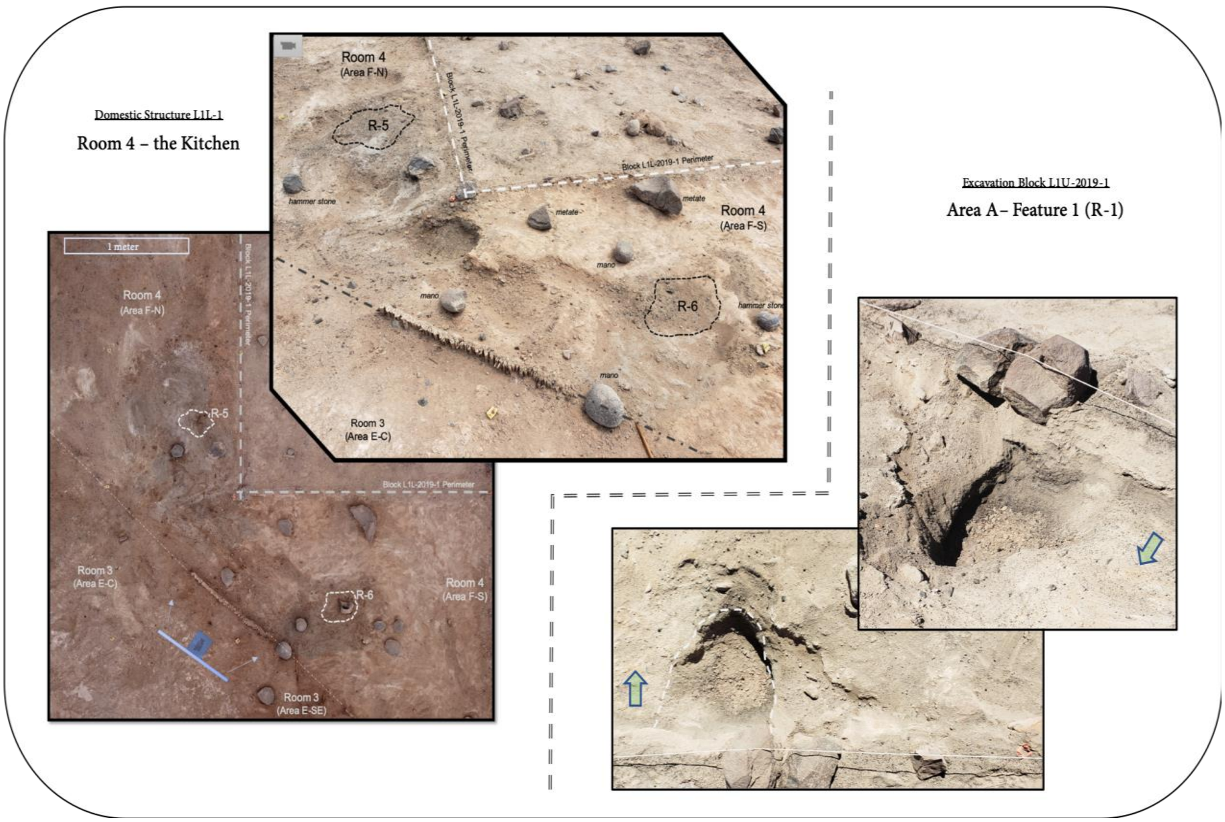
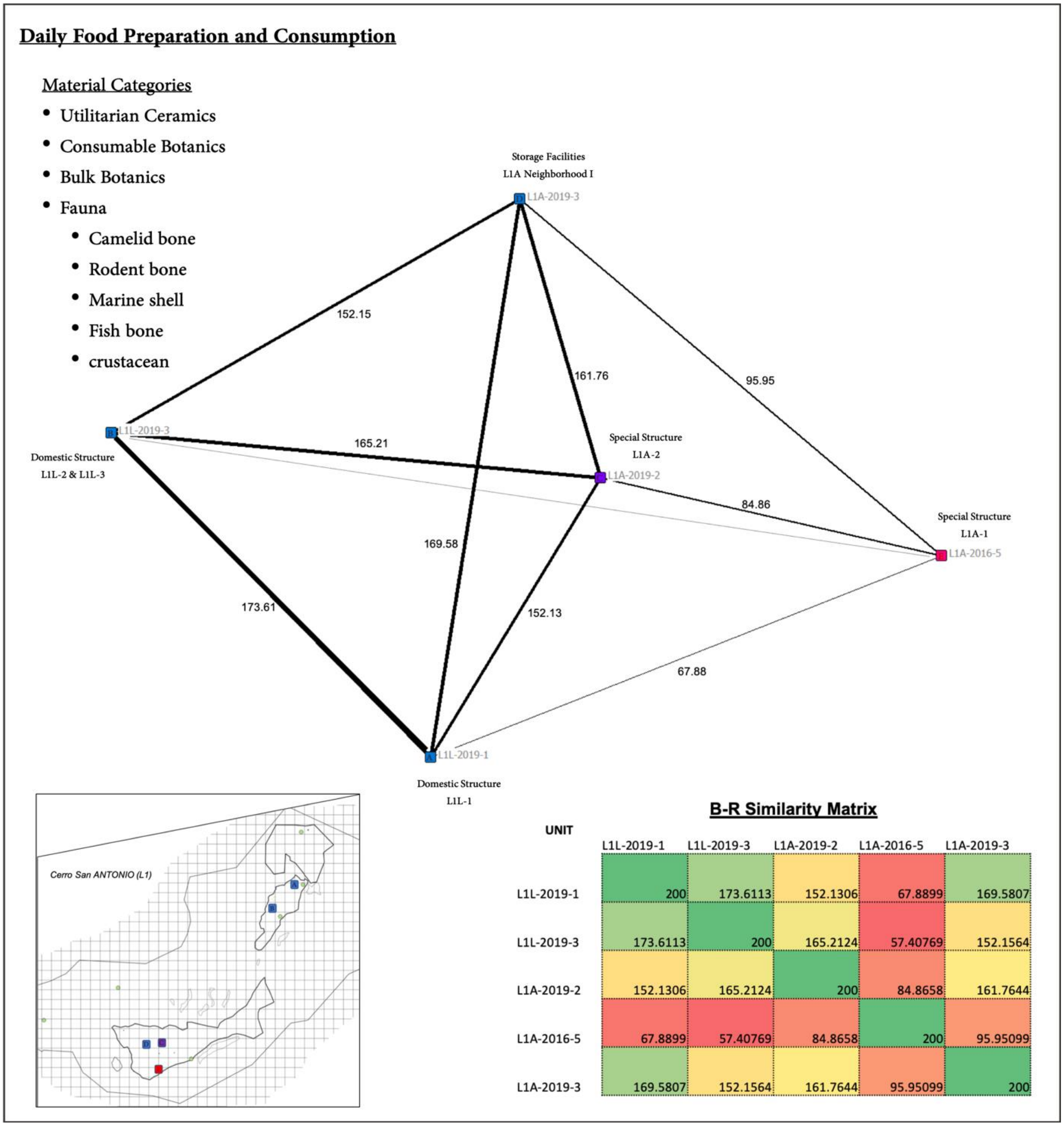


Figure 216. Examples of excavated hearths in Sector L and Sector U.

The clearest example of an architectural space designated for food preparation and specifically cooking, was Room 4 (Area F) in Domestic Structure L1L-1. Not only did Room 4 included multiple well-used hearths, quantities of charred plainware pottery, and food remains, but a suite of in situ grinding stone implements. Taken together these elements define a clear designated kitchen and while this was the only well-defined example, probably represent a ubiquitous feature to most individual houses.



UNIT	L1L-2019-1	L1L-2019-3	L1A-2019-2	L1A-2016-5	L1A-2019-3
L1L-2019-1	200	173.6113	152.1306	67.8899	169.5807
L1L-2019-3	173.6113	200	165.2124	57.40769	152.1564
L1A-2019-2	152.1306	165.2124	200	84.8658	161.7644
L1A-2016-5	67.8899	57.40769	84.8658	200	95.95099
L1A-2019-3	169.5807	152.1564	161.7644	95.95099	200

Figure 217. BR-Similarity Matrix and associated network visualization configured to show context similarities based on materials assemblages associated with daily food preparation and consumption, but specifically cooking.

The ubiquity of kitchen-spaces or at the very least cooking activities is supported by the B-R similarity coefficient matrix and associated network visualization in Figure 217. This BR-Similarity matrix is configured to quantify context similarities based on material assemblages most closely tied to cooking. The strongest connection in this network formation, by far, is that between the two contexts in Sector L (L1L-2019-1—L1L-2019-3 =173.61). These contexts are defined by the only three definitive house structures excavated (Domestic Structure L1L-1, Domestic Structure L1L-2, Domestic Structure L1L-3). So, while only excavations in Domestic Structure L1L-1 revealed the clear kitchen space, this correlation suggests similar activities were also present in or around the other excavated contexts.

Finally, the activity of literal consumption, or eating, while indicated by all the aforementioned subsistence activity, is also difficult in detect directly. In terms of food remains, by nature, eating leaves little in terms of the archaeological record. Notwithstanding, the presence of any food remains, could be an indication of eating, and given that these remains were ubiquitous, nearly every room excavated could have hosted individuals eating. However, also associated with eating are a variety of ceramic vessels as well as wooden utensils. The ceramic vessels most likely associated with daily easting is the tazón. This flaring rim bowl, while often decorated and associated with more conspicuous feasting events, is the only ceramic form type in the recovered assemblage that is appropriate for consuming any semi-solid or liquid foods. On average, diagnostic tazón sherds made approximately 3% of sherds from all excavated contexts. The only other material definitively tied to eating were wooden spoons. These items were decidedly rare in excavated contexts, with just a single example identified in the dense rockpile-midden deposit associated with Domestic Structure L1L-2.

Storage & Disposal

Closely tied to both the production, procurement, and consumption of basic subsistence goods, were the sustainable community tasks associated with the short- and long-term storage of surplus foodstuff and the ultimate disposal of unwanted waste materials. These before-and-after consumption activities are discussed here together because, as will be explained, they tended to use the same architectural features.

Storage of the various dried foodstuffs that composed much of the subsistence base of residential communities at L1 was completed in two primary modes: in utilitarian plainware ceramic vessels and in subsurface pits. As noted above, while at least 95% of sherds belonging to the olla vessel type showed evidence for use in cooking, the remaining 8% (n = 1,026 sherds) of diagnostic olla sherds are assumed to be associated with vessels used exclusively for storage. Interestingly, only a single sherd definitively identified as belonging to the tinaja vessel form was recovered in excavations. The rarity of tinajas, which are often thought to be exclusively associated with storing liquids, this suggest that olla vessel forms were multipurpose, used for storage and cooking. The multipurpose nature of this vessel type is reiterated by its ubiquity, found in approximately 70% of all excavated contexts and 80% of all systematic surface collection units. This ubiquity also suggests that each individual house would possess any number of these vessels for a suite of storage and cooking needs.

Unit/Block	Area	Rasgo	Dimensions (meters)	Average Depth (cm)	Storage Pit > Refuse Pit	Refuse Pit only	Other
L1A-2016-1	A	R-1	0.15 x 0.12	4		X	
L1A-2016-1	B	R-2	0.58 x 0.70	18	X		
L1A-2016-2	x	R-1	0.45 x 0.6	9		X	
L1A-2016-2	x	R-3	0.4 x 0.7	22		X	
L1A-2016-3	x	R-1	0.6 x 0.8	6		X	
L1L-2019-1	D - SE	R-2	0.6 x 0.4	9	X		
L1L-2019-1	A - S	R-3	0.9 x 3.5	12	X		
L1L-2019-1	A - S	R-4	0.3 x 0.3	9			X
L1L-2019-1	E - SE	R-7	0.4 x 0.4	9	X		
L1L-2019-1	E - SW	R-8	0.1 x 0.2	8		X	
L1L-2019-3	A - N	R-4	0.4 X 0.4	8		X	
L1L-2019-3	A - N	R-7	0.3 x 0.3	4	X		
L1L-2019-3	A - S	R-1	0.25 x 0.25	6		X	
L1L-2019-3	A - S	R-2	0.1 x 0.1	7		X	
L1L-2019-3	A - S	R-3	0.2 x 0.2	13		X	
L1L-2019-3	H	R-5	0.1 x 0.1	4			X
L1L-2019-3	G	R-6	0.45 x 0.45	13	X		
L1A-2019-3	B	R-1	0.6 x 0.55	22	X		
L1A-2019-3	B	R-2	0.35 x 0.8	36	X		
L1A-2019-3	B	R-3	0.6 x 0.4	4		X	

typical informal pit feature

formal pit feature

Figure 218. Breakdown of all formally excavated pit features, including (*top*) table listing all (non-hearth) pit features used for storage, refuse disposal, or both, as well as (*bottom*) photos of typical examples of both informal and formal (stone-lined and plastered) pit features.

Subsurface pits appear to have been the exclusive type of fixed feature for storage needs. Eight (8) pit features, exposed during excavations were believed to have been constructed exclusively for storage needs (Figure 218). Significantly, 25% of these storage features, including the only stone-lined and plastered storage pit, were found associated with what is believed to be the central storage facilities in Neighborhood I in Sector A (Figure 218). While not excavated, similar storage facilities are apparent on the surface within the bounds of Neighborhood IV in Sector L (Figure 218) as well. Other, more crudely dug pits, without any further structural reinforcement, were found associated with domestic structures and closely associated contexts in Sector A and Sector L. This pattern suggests that while some basic short-term storage was undertaken at the level of the household, more substantial and possibly long-term storage was done at the neighborhood or even sector level.

Subsurface pit features were also used as one of the primary means of disposing of waste. All excavated storage pits were ultimately re-used as refuse pits, with ten (10) additional pit features excavated that were likely exclusively used for refuse disposal. Refuse was thrown indiscriminately into pits with food waste mixed thoroughly with inorganic ceramic sherds and often a significant amount of loose stone and gravel. It appears that re-used storage pits and refuse pits alike were almost always filled to completion with piles forming above. These piles forming above filled refuse pits were indistinguishable from the rockpile-midden deposits.

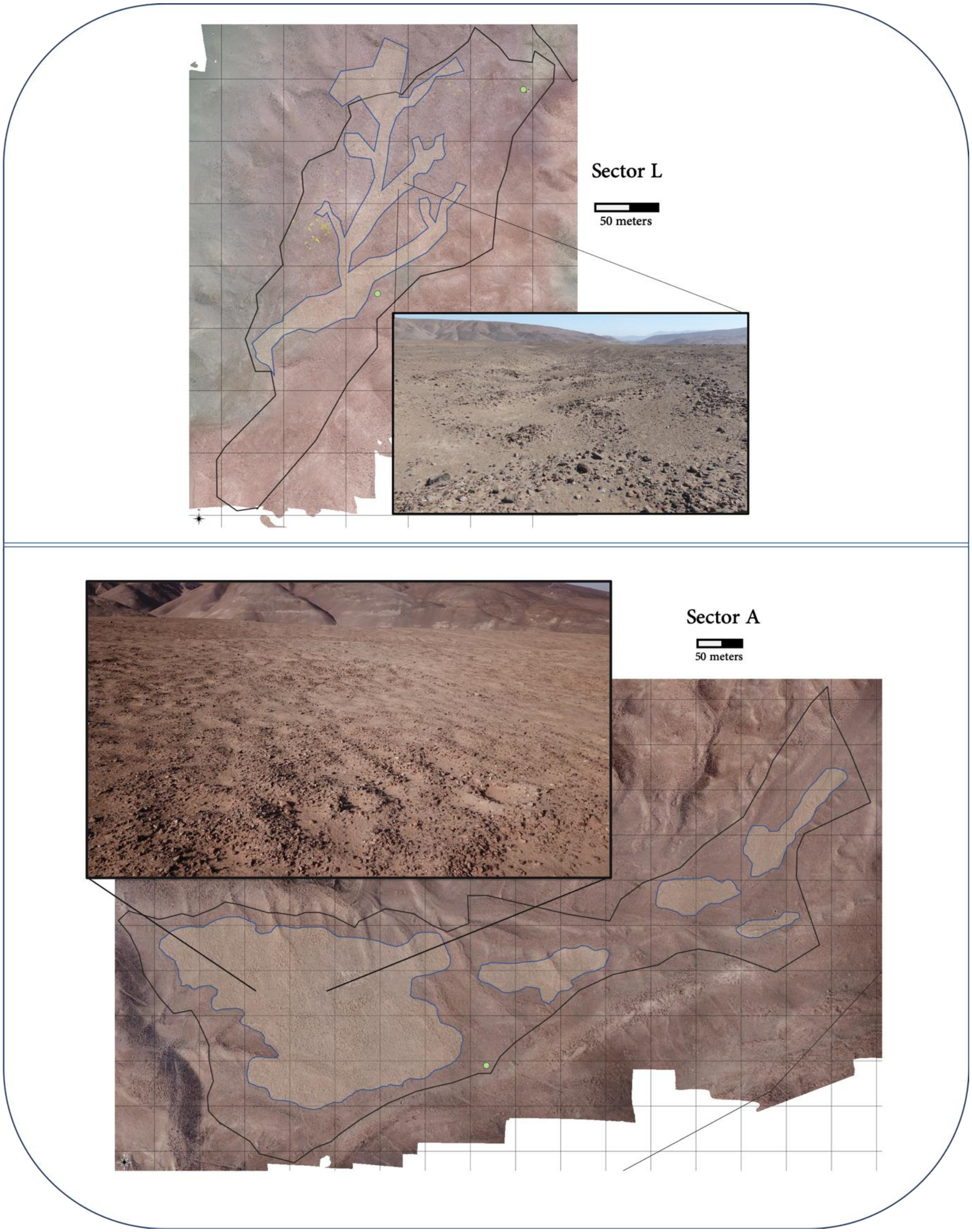


Figure 219. Approximate distribution of rockpile-midden deposits in (*bottom*) Sector A and (*top*) Sector L.

Rockpile-midden deposits were one of the primary diagnostic features of the Middle

Horizon domestic sectors, in particular Sector A and Sector L (Figure 219). As has been described a number of times, these features were largely formed as the residential community inhabitants cleared the medium to small cobble and large angular gravel that coated the natural ground surface of both sectors, while constructing their houses. These rockpiles then made for convenient locations to dispose of daily waste, including all manner of foodstuff byproducts, broken pots and other implements, as well as for discarding architectural debris. While these features defined both sectors, the difference in the topography of each sector, made for very different distributions of the rockpile-middens. In Sector A, which was defined by a sprawling and relatively unbroken planar surface, the rockpile-middens formed snaking, mostly articulated webs of refuse. Conversely, the more restricted blufftop that defined Sector L, was dissected by a network of shallow quebradas, which were used for refuse disposal and were therefore marked by dense rockpile-middens.

Craft Production

One of the other categories of sustainable community activity that is identifiable in the Middle Horizon era occupations at Cerro San Antonio, is craft production. Encompassing a suite of tasks required for the construction and maintenance of a number of the material types already described, from quotidian items like utilitarian ceramics to items of more restricted distribution like lithic beads, crafting would have been another primary occupation of sustainable community networks. Like the subsistence-oriented activities described above, some crafting tasks appear to have been relatively common, done at the level of the household, whereas others were clearly more specialized, completed in specific locations and likely by specialized sustainable community members. While several different crafts were likely undertaken at L1 during the Middle Horizon, my discussion here will target four types of materials for which the evidence for crafting is most readily identifiable: ceramics, lithics (flaked), textiles, and beads.

Ceramics

Ceramic vessels were one of the most essential tools utilized by sustainable communities for subsistence needs. Cooking relied exclusively on these vessels and they also acted as essential household-level storage devices. Also important were a variety of serving wares, used in both daily and in more conspicuous venues of consumption (i.e. feasting). Taken together, ceramic sherds represent the single largest material type collected at L1, with 33,960 sherds assigned to the Middle Horizon temporal period. It is quite possible that a certain percentage of the vessels present at the site were brought, as completed products, to the site through other sustainable community mechanisms, like trade. These possibilities will be discussed in the macroscale section (see 11.3), however there is evidence that on-site ceramic production was also undertaken. Again, while this is an oversimplification, here the ceramic production process is broken down into three sequential categories: acquiring raw materials (clay, temper, etc.), actually making and decorating the vessels (pre-firing painting, burnishing, etc.), and finally firing and finishing the vessels (any post-firing burnishing, etc.).

Far more than simple fired clay, ceramics can be an extremely complicated technology, requiring a number of materials for very specific paste recipes (Rice 1996a, 1996b; Sinopoli 1991). While initial paste types in the Middle Horizon ceramic assemblage were identified and described earlier (see 8.1), only more detailed observation and compositional studies (e.g. thin-section petrography, LA-ICP-MS, etc.) will reveal the geological origin for both paste and temper materials definitively. However, initial observations do suggest that the local geological composition would have yielded all materials identified in the ceramic paste matrix. For instance, extensive outcrops of relatively homogeneous clay deposits mark the entire north edge of the site complex, particularly along the southwest margins of Sector L (Figure 220). Significantly, worked chunks of this clay, in the form of ground-down discs were found in a number of contexts, but with particular density in the southern half of Sector L, associated with

Neighborhood IV and Neighborhood V (Figure 220). These rough clay discs may represent the final cores of chunks of clay ground down to a fine texture for the ceramic paste mixture. The single massive style of metate was located in close proximity to these discs (Figure 220) and may have been utilized for grinding clay and other minerals instead of/as well as the assumed foodstuffs.

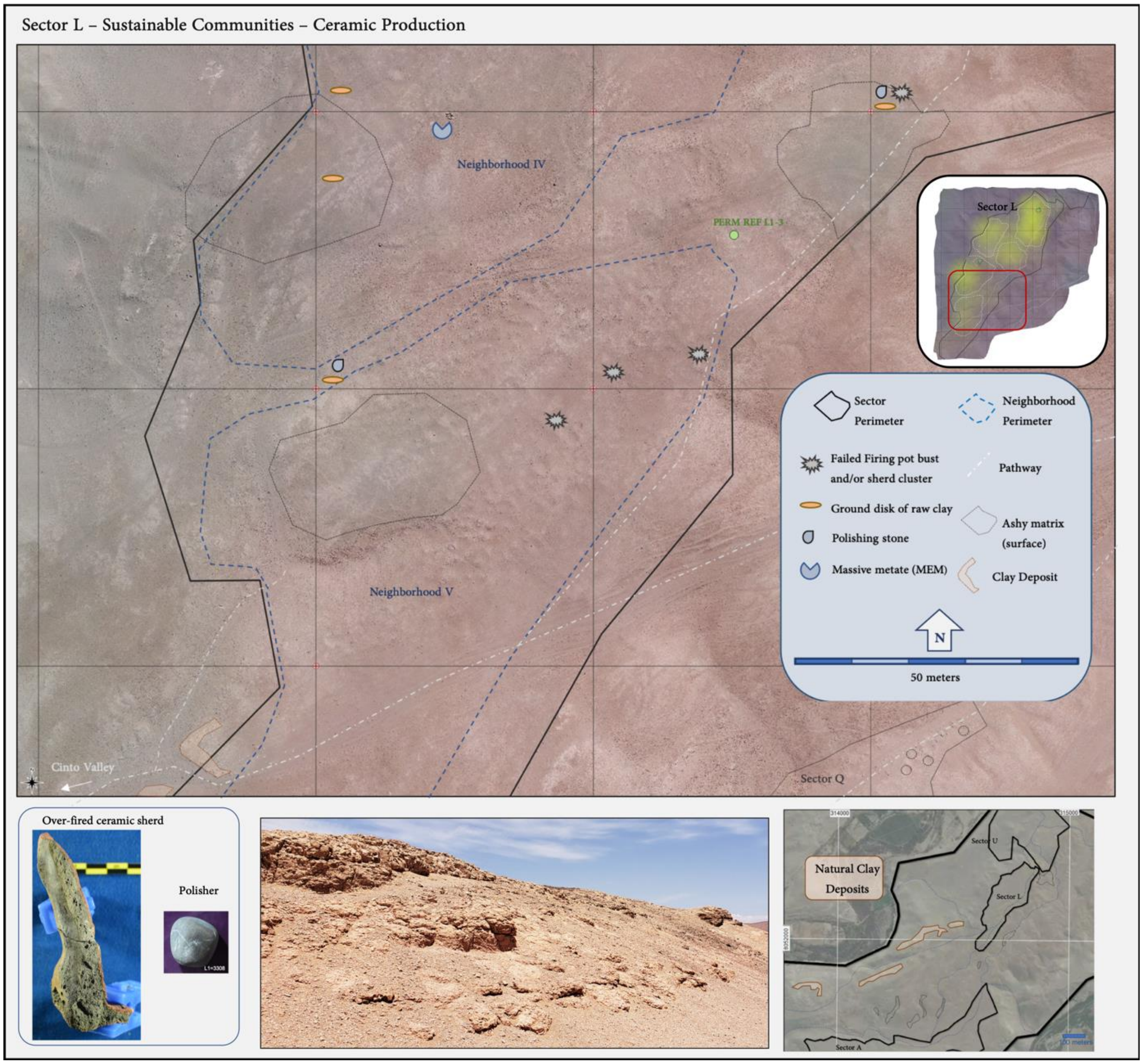


Figure 220. **(*top-left*) Map illustrating various spot finds and surface features that correlate with the production and firing of ceramic vessels, with included images of (*bottom*) map and photo of natural clay outcrops at L1 and (*center-right*) materials associated with clay manufacture and repair.**

While little was recovered in terms of direct evidence for initial pottery vessel construction, there was evidence for the firing of ceramics. Three different areas in the southern portion of Sector L (Figure 220) are defined by a markedly different soil matrix, noticeable from the ground and low-altitude aerial photography. These discrete patches of different matrix were defined by a darker color and ashy texture with no charcoal but some identified fire-cracked rock (FCR) fragments. This may suggest the location of significant firing events, but it should be noted that no formal kilns or large hearths features were apparent on the surface. However, additional evidence suggesting ceramic firing in this area was the recovery of a number of different examples of over-fired or even cracked/exploded ceramic vessels. Most of the sherds show evidence for bubbling on the surface and even complete vitrification of ceramic cross-sections suggest that most of these vessels were not viable and were likely discarded near the location of firing. More will be said regarding how these failed firing examples may signify more profound faltering in long-maintained local communities of practice or the symbolic community underpinnings of these crafting sustainable communities below (see 11.4).

Finally, there was widespread evidence for ceramic vessel finishing techniques, particularly burnishing. Polishing stones were found in a number of locations in all sectors, including in excavated house contexts. However, it was only in these same southern Sector L contexts in Neighborhood IV and Neighborhood V in which systematic surface collection captured these artifacts. Evidence for ceramic vessel repair was also widespread in the L1 assemblage. All repairs were done with a simple drilling method, with parallel holes drilled through on either side of the crack or break and then likely were bound with plant-fiber or sinew-based cording. It is unclear if this repairing was a specialized activity or simply done ad hoc at the level of the house.

Lithics

The suite of stone tools that define the Lithic-Flaked material category at L1 also appear to have been largely manufactured within the bounds of the site. While a total of 59 complete or fragmented flaked lithic tools (projectile points, knives, scrapers, hoes) were recovered across all collection methods, the 228 fragments of lithic debitage (flakes, chunks, cores) dominated this assemblage. The prevalence of lithic debitage suggests that at least some flint-knapping and other lithic pressure-flaking was ubiquitous. As noted in the microscale section, lithic debitage was found associated with most major domestic contexts. As is often the case in domestic spaces (e.g., Clark 1986), this lithic debris was found most often discarded along the exterior of walls or in restricted midden contexts, and certainly outside of areas with common foot-traffic. Additional evidence of on-site lithic manufacture was the presence of utilized hammerstones, which showed clear evidence for well-used percussive tool, definitive of flint knapping. Finally, at least two nearly completed but clearly unfinished projectile points (and likely several more fragments), represent further definitive evidence for local tool manufacture.

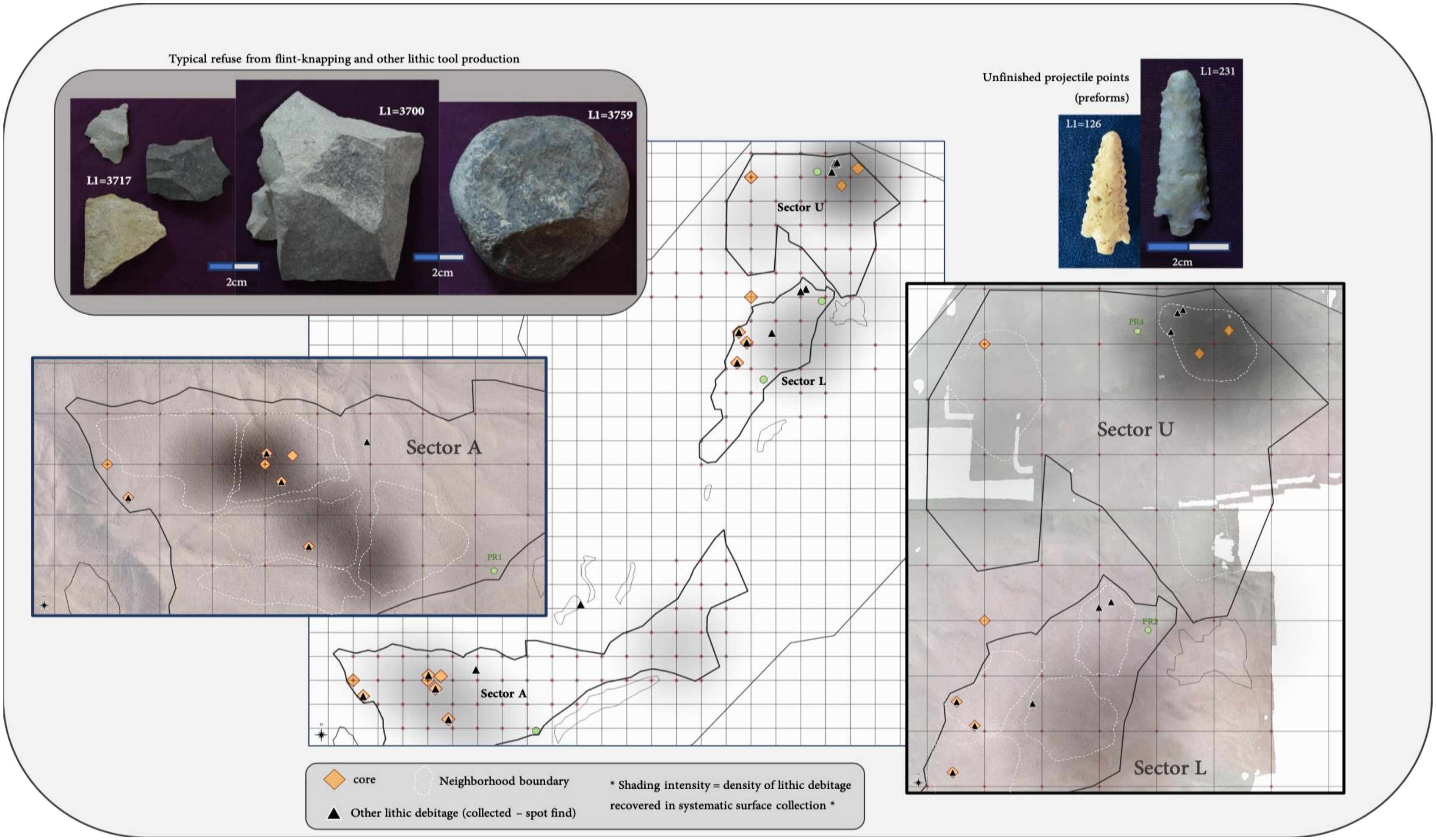


Figure 221. Map of Cerro San Antonio (L1) with insert details of Middle Horizon domestic sectors, illustrating the distribution and density of materials associated with the manufacture of flaked stone tools and implements.

While at least some amount of lithic tool production and/or maintenance was a relatively widespread activity, more sector-level spatial analysis reveals some clear focal points in this sustainable community task. Each major domestic sector (L1A, L1L, L1U) has its points of concentration in terms of the systematic surface density of lithic debitage and associated spot finds. For instance, sustainable communities center in Neighborhood II in Sector A and Neighborhood II and Neighborhood III in Sector L appear to have produced significantly higher amounts of lithic debitage than other neighborhoods in their respective sectors (Figure 221). However, the most notable point of departure in terms of lithic debitage density is found in Sector U. Representing a low-density outlier for every other material type, Sector U yielded the highest overall densities of lithic debitage, particularly in the northeast of the sector, surrounding Neighborhood I (Figure 221). The tendency for sustainable communities to conduct this activity in the more peripheral and far more scarcely inhabited Sector U is likely for the same reason these activities were restricted to exterior spaces in the microscale context of the house; flint knapping is a relatively messy process and produces extremely sharp debitage that can be difficult to clean (especially in sandy desert conditions). For this reason, these activities are often restricted to peripheral locations, which appears to have been the choice for Middle Horizon sustainable communities at L1.

Another notable pattern in the lithic debitage data is the prevalence of certain types of raw materials and the near absence of others. While detailed lithic raw material identification and compositional analysis is still ongoing, there was conspicuous pattern in the debitage data. That is the domination of flakes (primary, secondary, tertiary, and other lithic refuse) representing fine grained basalts and andesites, most commonly associated with hoes and other agricultural implements and conversely the near absence of flakes and debitage deriving from the fine-grained cherts from which projectile points were almost exclusively knapped. As noted in Figure 221, at least two (2) projectile point preforms have been recovered at L1 (one in

Sector A and another in Sector L), suggesting at least some local production, the absence of this debitage in most investigated domestic spaces may suggest a more specialized production of these tools.

Textiles

Another activity that produced both essential everyday items, as well as far more specialized items, was weaving or the production and maintenance of textiles. Fragments of woven garments, as well as other implements (e.g. hats, bags), were found in most contexts. With few exceptions these were always in the form of relatively small fragments, and while specialized analysis is still pending, several attributes were collected from these fragments (see 8.3). For instance, raw material for the warp and weft was always recorded, revealing that approximately 80% of textiles were made from camelid wool and 20% from cotton fiber. Additional evidence for the presence of woven textiles, and far more ubiquitous, were all manner of fragments of thread, semi-worked fiber, and other byproducts from processing wool and cotton. The implications of explicit decisions in textile variation, like preference in raw material, and particularly more conspicuous design elements noted on articulated fragments, will be discussed more in later sections (see 10.3), but here I highlight some aspects of the distribution of sustainable community-based tasks surrounding this technology.

Most textiles were made with a warp-faced weave style that would have required some semblance of a loom. Despite the incredible diversity in traditional weaving techniques in the Andes, few required any form of rigid-heddle loom and instead used a series of freestanding sticks or posts in a variety of ground or back-strap style setups (Cason and Cahlander 1976:156). This is raised here because these modes of weaving do not leave a significant archaeological trace, as the sticks and other primary elements of these looms are often indistinguishable from other wooden implements and architectural debris. However, several implements used in the broader textile production process are readily identifiable. For example, spindle whirls were employed for the spinning of fiber into thread. Several different examples of these items were recovered, ranging from simple perforated ceramic sherds, to at least one example of a formally made and decorated spindle whirl. Additional weaving-related implements recovered across the investigated domestic contexts include cactus spines used as needles or awls and a variety of items used as spools for spun threads. While these implements were not very common, most major excavated contexts produced some combination of these items, suggesting that at least some textile production and certainly maintenance occurred as general sustainable community task at the level of the household.

Despite its likely ubiquity some more specialized textile work was certainly evident in the recovered assemblage. For instance, some specialized textile implements, such as the 4-cornered hat fragments or embroidered embellishments on bag fragments, likely required true textile specialists. Of course, some of these items may represent imported goods and this will be addressed below (see 11.3), but evidence also points to textile specialization within the locally based sustainable community network. The best examples of general domestic textile-related activities as well as this local textile specialization comes from the extensively excavated Domestic Structure L1L-1. Many textile-related remains recovered within this house structure are relatively typical, including similar proportions of various un-spun wool and cotton fiber, cotton seeds, all variety of thread, and at least one ceramic sherd thread spool. However, unlike other contexts in which much of the textile-related materials were recovered in middens or other refuse-based contexts, here in Structure L1L-1 many of these materials were found in close association with in situ floor contexts, particularly in the eastern half of Room 2 (Figure 222).

Figure 222. Overhead photo of the base of excavation Block L1L-2019-1 and the remains of Domestic Structure L1L-1 with detail photos of recovered materials related to textile production and maintenance and bluestone bead production.

The Domestic Structure L1L-1 collection would also yield a number of more specialized implements, not recovered elsewhere. For instance, while small fragments of cactus needles were recovered in other contexts, two complete examples were recovered in this structure (Figure 222). One of these spines was clearly perforated at the proximal end and was used as some kind of sewing needle and the other was relatively blunt and possibly used to punch through leather or other fabric. What's more, the only recovered formal spindle whorl was recovered here as well. This was a fired-clay, roughly top-shaped spindle whirl, decorated with shallow incised lines (Figure 222). Taken together these materials suggest that the residents of Domestic Structure L1L-1 likely invested more sustainable community resources in textile-related work. Bolstering this interpretation further is that this domestic structure yielded evidence for an additional, but related craft specialization, lithic bead making.

Beads

The final crafting specialization that was clearly identified in the L1 domestic assemblage was the manufacture of bluestone beads. These minute stone beads, made from locally sourced were likely used to adorn clothing and other textile-based items (see 8.6). As noted above, the single context in which this focused sustainable community activity appears to have taken place was Domestic Structure L1L-1.

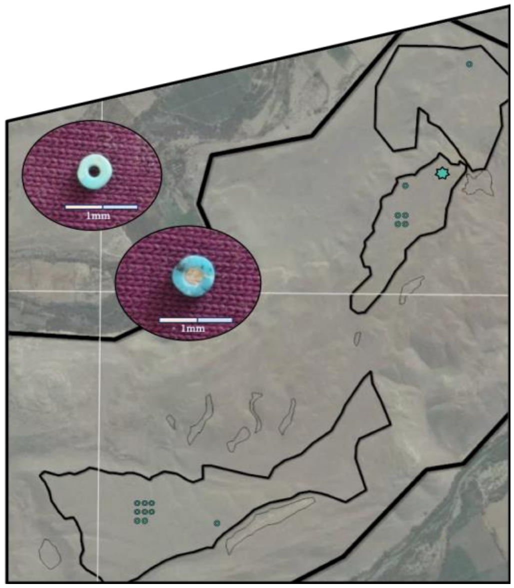


Figure 223. Map illustrating the distribution of bluestone chrysocolla recovered in spot find or excavated contexts as well as the likely site of their manufacture in Domestic Structure L1L-1.

While a total of fifteen (15) complete or fragmented bluestone beads were identified across all three domestic sectors (L1A, L1L, L1U), it was only in Domestic Structure L1L-1 that debitage from the manufacture of these small beads was recovered (Figure 223). A few stray pieces of chrysocolla were recovered from most formal architectural spaces in the structure, but it was the small Room 2 that was most likely the true location for the stone working. Here dozens of small chunks of chrysocolla, some still with patches of cortex present, as well as more advanced flakes were recovered from the superpiso floor excavations. Significantly, also found here was an incomplete bead, either lost while in process or intentionally discarded. Finally, the cactus spine sewing needle described above was also found in Room 2 of the structure and could have been used in stringing beads onto textiles.

10.3 Middle Horizon Symbolic Communities at Cerro San Antonio

As the social venue for the negotiation of value and the circulation of information, symbolic communities are the most pervasive as well as variable mode of community. These communities can represent some of the most ambiguous as well as more acute examples of community. For instance, symbolic communities can be reflected in implicit preferences in the resources provided by sustainable communities or decidedly more conscious and conspicuous forms of community affiliation, including public performance or religious ritual. A number of the more globally-oriented symbolic community formations evident at Cerro San Antonio are reserved for the macroscale discussion in Chapter 11. Here in the mesoscale analysis I divide symbolic communities into two primary (though not necessarily mutually exclusive) categories: 1) implicit symbolic communities that directly undergirded sustainable community habits and customs, and 2) more explicit symbolic communities that centered on ritual action and outward expressions of community affiliation.

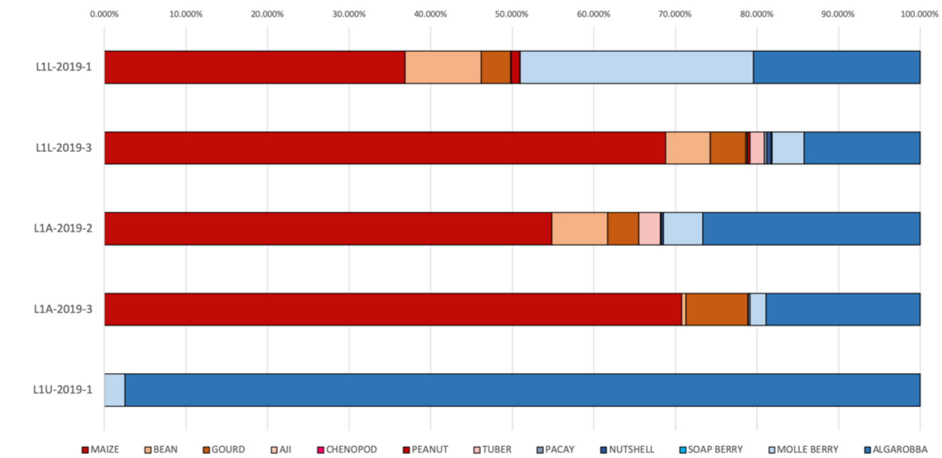
Habits, Customs, & Communities of Practice

As has been emphasized, the modes of community described in this thesis are never found in isolation and a fundamental junction in which they always come together is in how the constellations of knowledge maintained within symbolic communities motivate and constrain the practice of sustainable communities. For instance, the preference in basic subsistence goods that define so much of sustainable community investment are largely governed by symbolic community norms and tastes. In the specific context of dietary preference this symbolic-sustainable community intersection is referred to as cuisine (Graff 2020; Hastorf 2016). In a very similar sense, the way in which symbolic communities both explicitly and implicitly underly, interject, and otherwise influence the way in which specific sustainable community tasks are carried out, have become known as communities of practice. Best seen as various manifestations of situated learning in which specific skills are acquired and habits formed, communities of practice are particularly acutely reflected in material remains of crafting activities (Roddick and Stahl 2016). I use these two realms of symbolic-sustainable community interaction to coordinate the next portion of the discussion.

Taste & Cuisine

Dietary choices, from the types of foodstuff selected to the modes of preparation and cooking employed, are often viewed as some of the most revealing elements of the core symbolic community affiliations that comprise broader social categories like ethnicity (Twiss 2012). Of course, the types of foods consumed are greatly constrained by the local ecology and broader climactic conditions; nonetheless symbolic community preference always plays a role in the types of foods and certainly modes of preparation of even the most basal subsistence consumption activities (Graff and Rodríguez-Alegría 2012; Mills 2016; Stahl 2014).

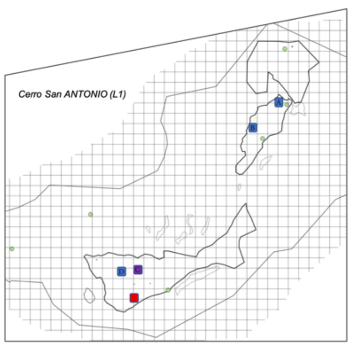
Significantly, most Middle Horizon contexts at L1 revealed the presence of a similar suite of consumable goods. As noted above (see Figure 209), with a few notable exceptions, excavations in Sector A and Sector L would yield roughly similar overall proportions of domesticates like maize, beans, gourd, ají, tuber, and peanut. Likewise, most contexts would also produce similar quantities of wild taxa like algarroba and molle. However, a closer look at the proportions of these botanic-based foodstuff between contexts, both within and between sectors, would reveal some significant differences in preferences of different communities. While many of these dietary preferences were presented separately in the context of the microscale analysis, Figure 224 utilizes the B-R similarity coefficient index coupled with a network projection borrowed from social network analysis (see 4.2) to help visualize the connections between, in this case, the consumable botanic assemblages from each of the five (5) major 2018-19 excavation blocks.

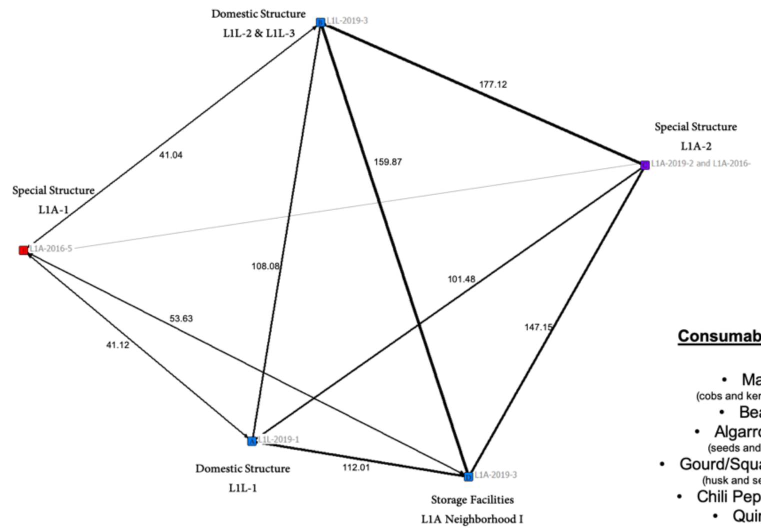


	MAIZE	BEAN	GOURD	AJI	CHENOPOD	PEANUT	TUBER	PACAY	NUTSHELL	SOAP BERRY	MOLLE BERRY	ALGAROBBA
L1L-2019-1	36.842%	9.361%	3.603%	0.035%	0.000%	1.095%	0.035%	0.000%	0.000%	0.000%	28.612%	20.417%
L1L-2019-3	68.802%	5.446%	4.360%	0.193%	0.019%	0.302%	1.800%	0.290%	0.545%	0.078%	3.953%	14.212%
L1A-2019-2	54.838%	6.849%	3.804%	0.012%	0.000%	0.012%	2.657%	0.081%	0.269%	0.023%	4.800%	26.655%
L1A-2019-3	70.745%	0.549%	7.566%	0.058%	0.000%	0.023%	0.000%	0.192%	0.000%	0.000%	2.002%	18.866%
L1U-2019-1	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	2.504%	97.496%

B-R Similarity Matrix

	L1L-2019-1	L1L-2019-3	L1A-2019-2	L1A-2019-3	L1A-2016-5
L1L-2019-1	200	108.082	101.4884	112.0153	41.12525
L1L-2019-3	108.082	200	177.1217	159.8798	41.04419
L1A-2019-2 and L1A-2016-3	101.4884	177.1217	200	147.1563	24.48987
L1A-2019-3	112.0153	159.8798	147.1563	200	53.63727
L1A-2016-5	41.12525	41.04419	24.48987	53.63727	200





Consumable Botanic Taxa

- Maize (cobs and kernels)
- Beans
- Algarroba (seeds and pod)
- Gourd/Squash (husk and seeds)
- Chili Pepper
- Quinoa
- Peanut
- Pacey (pod)
- Tuber
- Walnut (shell)
- Molle (berry)

Figure 224. B-R Similarity Matrix-Network and chart illustrating relative frequencies of consumable botanics recovered from major excavated structures.

The proportions of the remains of the eleven (11) taxa of consumable botanic species show the strongest connection (B-R 177.12) between the contexts surrounding Domestic Structures L1L-2 and L1L-3 in Sector L (Block L1L-2019-3) and the central plaza and adobe platform-central plaza contexts or Special Structure L1A-2 in Sector A (Block L1A-2019-2). Both of these contexts included dense midden deposits, so their overall similarity is not surprising. However, one of the most significant areas of overlap between these two assemblages, and where they both differ the most from all other contexts, was the similar high proportion of parancama or what we assume is some species of edible tuber. Although some domesticated tubers could and likely would have been grown locally, these tuber remains are some of the only recovered foodstuff with explicit connections to the non-local highland *quechua* and *puna* ecozones; a point that will be raised in the macroscale analysis later.

While there are any number of nuances in this comparison of consumable botanic choice, a low B-R Index score of note is between the major domestic contexts excavated in Sector L (Block L1L-2019-1 and Block L1L-2019-3). Again, these are the blocks that revealed the most complete and architecturally comparable house structures at the site, so their relatively low similarity index (B-R 108.08) is suggestive of different base-level dietary choices at the microscale institutional level of household. The differences in consumable species proportions is actually quite stark, with Domestic Structure L1L-1 producing half the amount of maize remains and twice the amount of beans as Domestic Structures L1L-2 and L1L-3 in the south. What's more, almost all other taxa are essentially found in opposite proportions between the two sampled areas. Structure L1L-1 in Neighborhood I produced relatively high amount of peanut as well as truly significant amounts of molle berries and algarroba seeds, all of which were found in much lower proportions in the neighboring structures. Conversely, domesticates like tuber and chili pepper were found in higher proportions in the Neighborhood IV context (Structures L1L-2 and L1L-3), and wild or tended arboreal remains of pacay pod, nutshell, and soapberries found here, were completely absent from the Domestic Structure L1L-1 assemblage.

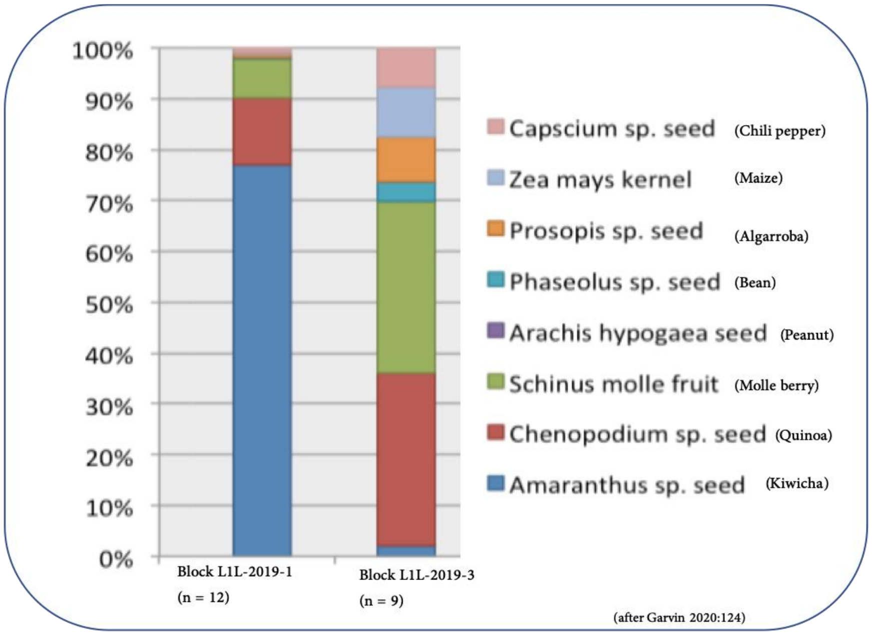
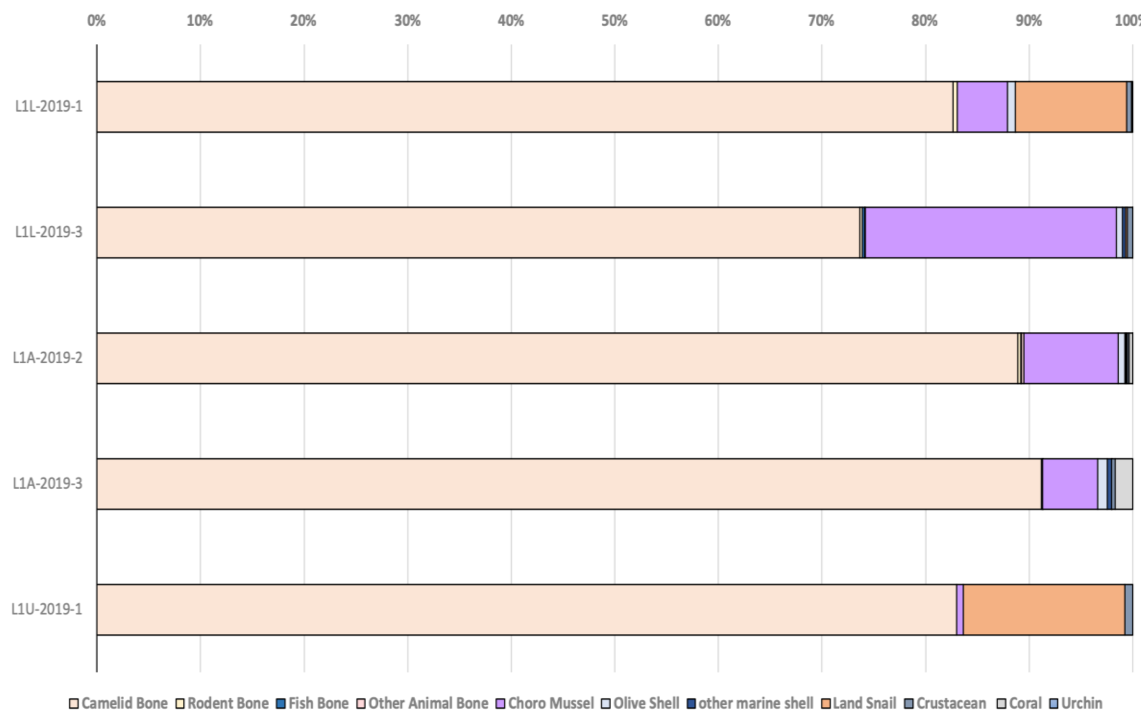


Figure 225. Results of Garvin's microanalysis of soil samples (Garvin 2020:124) collected from selected contexts in Block L1L-2019-1 and Block L1L-2019-3.

Significantly, the disparity between the consumable botanic assemblages and suggested sustainable-symbolic community cuisine that underwrote their selection, was also reflected in the paleoethnobotanic-oriented microanalysis conducted on selected soil samples collected in these two major Sector L contexts (Garvin 2020:123-126). The proportions, based on count instead of weight in this case, show major differences between the foodstuffs represented in each context. Probably the most important difference to note here in the microscale sorting is that just over 90% of the identified consumable botanics deriving from Domestic Structure L1L-1 belong to some variety of Amaranthaceae (Garvin 2020:123). While some species of Amaranthaceae plants, including the domesticates quinoa and kiwicha, could have been grown locally, they are more closely associated with the higher-elevation ecozones of the *quechua*, *suni*, and *puna*. Conversely, maize, the most common lowland-based macrobotanic consumable, barely registers in the Domestic Structure L1L-1 microbotanic assemblage. This correlates with the relatively low proportion composed by maize remains (36.84%) in the macrobotanic assemblage for the same structure, especially when compared to the neighboring L1L-2 and L1L-3 structures which were dominated by maize remains (68.8% of macrobotanic assemblage, 9.84% of microassemblage).



	Camelid Bone	Rodent Bone	Fish Bone	Other Animal Bone	Choro Mussel	Olive Shell	other marine shell	Land Snail	Crustacean	Coral	Urchin
L1L-2019-1	82.67%	0.38%	0.00%	0.00%	4.85%	0.75%	0.01%	10.73%	0.51%	0.10%	0.00%
L1L-2019-3	73.63%	0.24%	0.25%	0.10%	24.19%	0.58%	0.32%	0.19%	0.50%	0.00%	0.01%
L1A-2019-2	88.89%	0.29%	0.09%	0.20%	9.12%	0.68%	0.11%	0.09%	0.16%	0.36%	0.00%
L1A-2019-3	91.17%	0.13%	0.01%	0.00%	5.29%	0.96%	0.38%	0.02%	0.36%	1.67%	0.00%
L1U-2019-1	83.02%	0.00%	0.00%	0.00%	0.61%	0.00%	0.00%	15.63%	0.74%	0.00%	0.00%

Figure 226. The proportions of faunal remains as recovered in each of the five (5) major excavation blocks.

A final line of evidence which emphasizes what appears to be a truly different practiced cuisine between individuals who resided in these different residential neighborhoods in Sector L, can be found in comparing the proportion of faunal remains. The most glaring contrast here is the significantly higher proportion of the Domestic Structures L1L-2 and L1L-3 assemblage that comes from marine-based resources. Almost a fourth of the assemblage from these two

Neighborhood IV structures comes from choro mussel (24.19%), over five times that of Structure L1L-1 (4.85%) just to the north. Also, of note, is the relatively high proportion of fish bone found associated with Structures L1L-2 and L1L-3 (0.25%), which was completely absent in Structure L1L-1 (0.0%). Again, while the marine-based subsistence focus of Structures L1L-2 and L1L-3 has already been emphasized a number of times above, it is worth noting again here to highlight just how different the diets appear to have been with individuals occupying houses that, while in different neighborhoods, were only 150 meters apart.

Crafting Communities of Practice

As noted above, the way in which sustainable community crafting tasks are learned (and taught) as well as more generally shaped by the knowledge retained in symbolic communities has become one of the most commonly identified examples of communities of practice in the archaeological record (again, see Roddick and Stahl 2016 for a number of good examples). Like most manifestations of community, there are many ways in which the situated learning that define communities of practice can occur. Sometimes these expressions are symbolic community tastes playing out in the choice of raw materials that go into crafts. Like cuisine in relation to subsistence, while constrained by the availability of materials and technological ability, raw material preference for crafts can always be traced to more symbolic community-oriented decisions. These expressions of communities of practice have frequently been identified in archaeological assemblages in the presence of paste recipes for ceramics (Eckert, et al. 2015; Roddick and Cuynet 2020). As noted in Chapter 8 (see 8.1), several pastes (or at least variants on two to three major paste types), have been identified in the Middle Horizon associated ceramic assemblage from L1, but more systematic or compositional-based study is needed to define specific recipes.

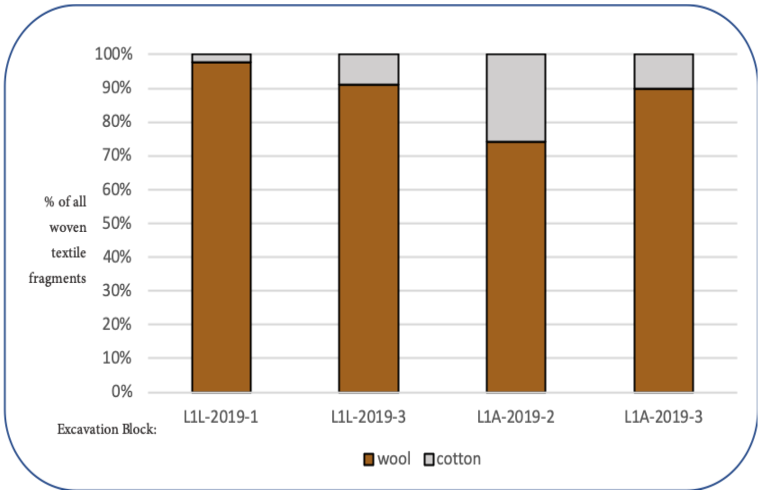


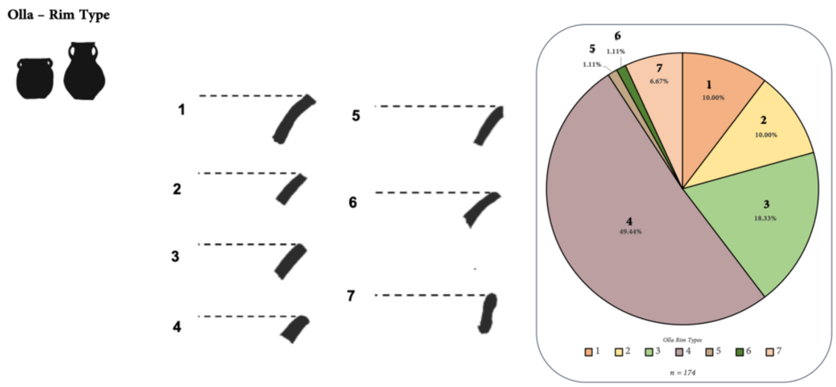
Figure 227. Frequencies of wool and cotton woven textile fragments as found in the four (4) major 2018-19 excavation blocks in Sector L and Sector A.

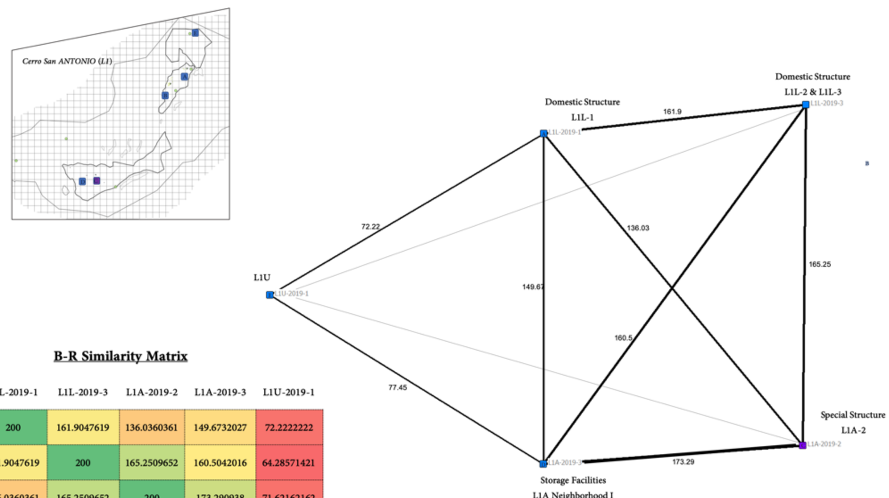
Evidence for communities of practice can also be gleaned from the raw material choice in other crafting materials as well. For instance, while all major blocks that produced fragments of woven cloth had a clear preference for camelid wool, there were substantial differences in the preference for supplemental cotton-based materials (Figure 227). For instance, the inhabitants of Structure L1L-1 (Block L1L-2019-1) had the clearest preference for wool textiles (97.67% of assemblage) with the converse being the materials deposited associated with central plaza adobe platform (Block L1A-2019-2) in which over a fourth of the assemblage (25.95%) were cotton fiber textile fragments.

Another area of raw material preference for specific tool-type manufacture was observed in projectile points. As noted in Chapter 8 (see 8.2), most flaked-stone tools come in a variety of stone types, most of relatively fine-grained cherts, and a suite of colors (grey, yellow, pinks). However, 80% of recovered projectile points were knapped from a single type of fine-grained white chert. It is still unclear if this material was locally sourced, but given the prevalence of a variety of local fine-grained cherts that could have been, and again were used for other tools, there is a clear concerted preference[200] for using this material for this tool type.

Beyond the preferences in raw materials and other technological aspects of production, communities of practice are also reflected in the realm of crafts in terms of form and style. Again, within the general limits of technological ability and the functionality of the craft, the variation in the basic forms of crafts are often relatively restricted. For instance, lithic tools tend to be restricted in form - the elongated barbed-shouldered and stemmed arrowhead (see 8.2) was effectively the exclusive form of projectile points at L1. However, other material types allow for more variability in terms of form, and certainly style. Both textiles and ceramics were primary crafting media for displaying true stylistic design elements like iconography. These will be discussed in reference to the more explicit projections of symbolic community affiliation as well as in reference to broader community connections in the macroscale context below.

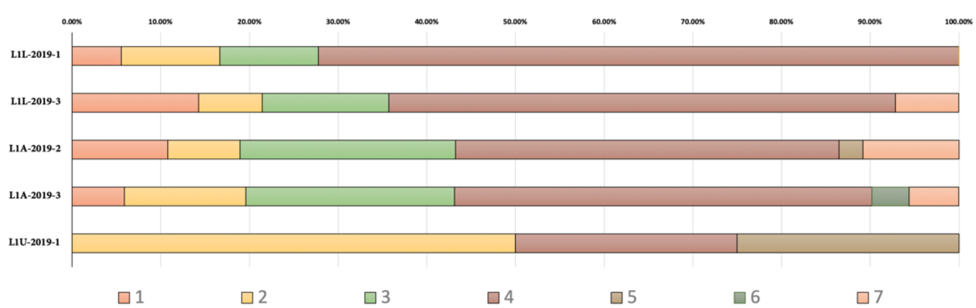
[200] As noted in Chapter 8 (see 8.2), all projectile points not made from this white chert were still made from relatively light-colored cherts. This preference for light-colored projectile points may have been a logistical choice as their bright color make them easier to recover when collecting missed shots in hunting. This is reinforced by the fact that they are one of the most common of the special surface spot find collections, due to their high visibility on the ground surface.





B-R Similarity Matrix

	L1L-2019-1	L1L-2019-3	L1A-2019-2	L1A-2019-3	L1U-2019-1
L1L-2019-1	200	161.9047619	136.0360361	149.6732027	72.2222222
L1L-2019-3	161.9047619	200	165.2509652	160.5042016	64.28571421
L1A-2019-2	136.0360361	165.2509652	200	173.290938	71.62162162
L1A-2019-3	149.6732027	160.5042016	173.290938	200	77.45098043
L1U-2019-1	72.2222222	64.28571421	71.62162162	77.45098043	200



	1	2	3	4	5	6	7
L1L-2019-1	5.56%	11.11%	11.11%	72.22%	0.00%	0.00%	0.00%
L1L-2019-3	14.29%	7.14%	14.29%	57.14%	0.00%	0.00%	7.14%
L1A-2019-2	10.81%	8.11%	24.32%	43.24%	2.70%	0.00%	10.81%
L1A-2019-3	5.88%	13.73%	23.53%	47.06%	0.00%	4.18%	5.62%
L1U-2019-1	0.00%	50.00%	0.00%	25.00%	25.00%	0.00%	0.00%

Figure 228. B-R similarity matrix-network and multiple charts illustrating the relative frequencies of the seven (7) different olla rim forms across selected excavated contexts.

However, more subtle evidence for crafting communities of practice were revealed in the attribute analysis of the utilitarian plainware vessel type of olla; specifically a number of reoccurring ways in which potters appear to have completed the rims of these vessels (Figure 228). These olla rim variants, essentially different combinations of the way in which the interior and exterior lip edge and face of the rim were either flattened or rounded, smoothed or left angular, were grouped into seven (7) types (see 8.1). While the most dramatic examples of these types may have been readily distinguishable at a glance, most would have required a closer inspection to tell the difference. Whether generated spontaneously through general observation-based embodiment or via more directed forms of apprenticeship in defined workshops (e.g., Wendrich 2013), small variants such as this, when found consistently, are clear examples of communities of practice in the context of crafting.

The very presence of multiple well-defined olla rim variants, suggests that multiple potting communities of practice produced this utilitarian vessel type for the Middle Horizon occupants at Cerro San Antonio. However, it is significant that while not every excavation block produced every rim type, every context did produce multiple examples of multiple types, suggesting at least some centralization, or a the very least lack of strict household or neighborhood-based production of pottery. For example, both olla rim Type 2 and Type 4 were found in all five major excavation blocks, with Type 4 making up just under half (49.44%) the total olla rim assemblage, and Type 1 and Type 3 were each found in four of the five blocks (Figure 228). Again, while found in varying frequencies and overall quantities, the dispersed distribution of these rim types suggests that all residents received, even the most utilitarian of vessels from similar sources. This is further reiterated by the overall high B-R similarity index scores between the major excavation blocks in Sector A and Sector L (Figure 228). That said, it is important to note that the highest similarity index score is found between L1A-2019-2 and L1A-2019-3 (B-R 173.29), which both sampled Sector A’s Neighborhood II, making a strong case for neighborhood-based preference in olla or at least the source from which they were acquired.

Individual Distinction, Community Solidarity, & Ritual Action

While the symbolic communities which underwrote and otherwise influenced sustainable community norms and tastes, as described above, may have been far more ubiquitous and pervasive, other manifestations of symbolic community likely served as much more punctuated markers of local as well as broader community affiliation. Some of these symbolic community markers were designed to distinguish individuals, whether by rank or role, from others in the community. Conversely, other punctuated expressions of symbolic community affiliation acted as mechanisms of mechanical social solidarity, and explicitly signaled conformity, or at the very least, a set of shared beliefs. Of course, as contradictory as individual aggrandizement and community solidarity may seem, these markers of symbolic community affiliation are often found working in tandem, especially in the context of ritual action.

Personal Apparel

Individuals, who ultimately generate the communities that have been discussed so much above, are often very difficult to discern in the archaeological record. As will be noted below, mortuary contexts, particularly burials, are often the most reliable archaeological source for data regarding individual lived experience, as by nature, these contexts preserve the bodily remains of individuals. One of the few places in which domestic-oriented archaeological contexts, like those that form the basis for this investigation, provide information regarding individuals and their role in community life, are in the remains of items of personal apparel (Mattson 2021). Various types of clothing are the central category here, but all manner of jewelry and other accessories and elements of adornment are also key elements.

While no complete pieces of clothing were recovered in the Cerro San Antonio Middle Horizon investigations, 99 fragments of woven textile were collected through excavations in Sector A and Sector L. As will be discussed below, some of these fragments belong to more accessory items like hats or bags, however the majority are believed to derive from clothing items. Based on comparative samples (see 8.3), most of these clothing textile fragments are believed to come from tunics. This relatively simple garment was likely the standard clothing item used by all ages and sexes. While these tunics were all woven with a plainweave technique there were differences in raw material and the overall coarseness of the weave used.

As discussed in Chapter 8 (see 8.3), the majority of cloth fragments were composed of wool (~80%) with the remaining made from cotton. The vast majority of wool fiber-based fragments were a relatively coarse plainweave with the cotton-based garments more evenly split between coarse and a finer plainweave style. As noted just above (see Figure 227) the distribution of these different clothing styles was not even across the sampled residential contexts. For example, the residents of Domestic Structure L1L-1 in Sector L almost exclusively used wool-based clothing, whereas over a quarter of the clothing fragments deposited around Special Structure L1A-2 and the central plaza in Sector A were finer cotton plainweaves.

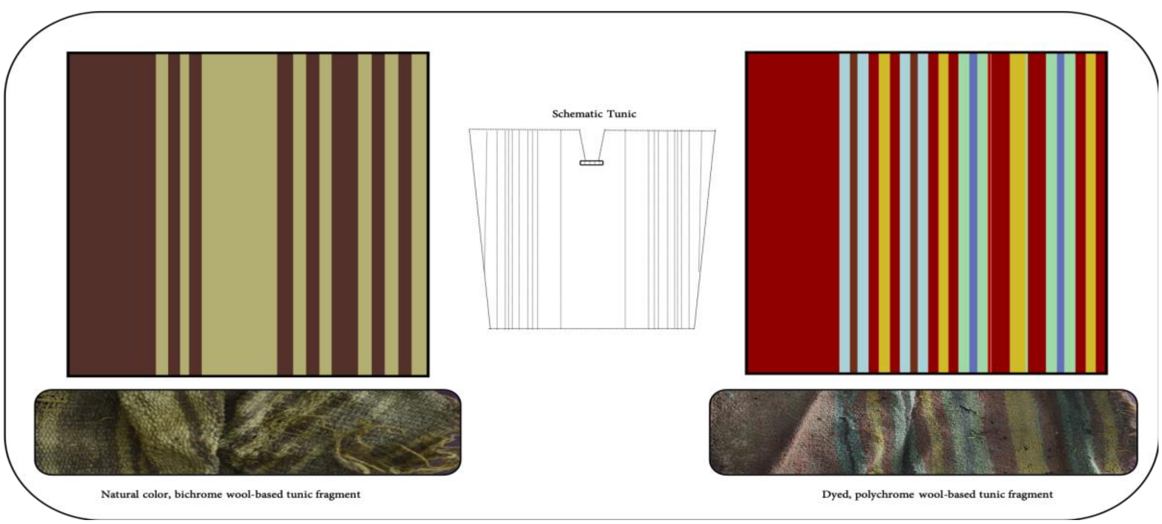


Figure 229. Examples of woven tunic fragments recovered in excavations at L1.

However, in spite of these broad similarities in this primary clothing item, tunics could still be essential elements in displaying more personalized markers of symbolic community affiliation and even more individual identifiers. This was done through largely color-based design elements. In the L1 samples, vertical running stripes and bands were the only design element worked directing into the primary garment itself. In wool-based tunics natural color variation in the fiber was often capitalized on. As depicted in Figure 229, these natural color wool items were frequently bichrome, with alternating browns, blacks, tans, or creams. However, far more elaborate vertical stripe-based designs were enacted via plant and mineral-based dyes. Again, as depicted in Figure 229, these could include up to six (6) different dyed colors. Further study is need to fully analyze the L1 assemblage, but these elaborately dyed examples clearly involved more sustainable community input (labor and material resources) and likely represented some of the clearer markers of embodied status in Middle Horizon symbolic communities at Cerro San Antonio.

Middle Horizon – 4-Cornered Hats

Polychrome – Tapestry Weave

Nearly complete hat fragment recovered adjacent to Special Structure L1A-2 and the Central Plaza

Two small fragments (likely from same hat), both found in the rock pile-midden associated with Domestic Structures L1L-2 and L1L-3

Figure 230. Examples of Middle Horizon-style 4-cornered hats - all examples found at L1 are made from dyed camelid wool and woven using a tapestry-style.

Closely related to these polychrome textile tunics, but likely far more symbolically potent items of personal adornment, were 4-cornered hats (Figure 230). Manufactured using a labor-intensive knotting technique, these polychrome garments were extremely rare, but found in two different contexts at L1. The most complete and contextually secure example was recovered in Block L1A-2019-2, directly between the adobe platform (Special Structure L1A-2) and the northern edge of the central plaza. As the most well-defined symbolic community expression in the built environment, locating this hat example in this context further emphasizes that beyond the labor-value embedded in these hats, they were most likely worn to clearly signal the individual wearer's heightened role in important activities that played out in these types of locations. Finally, while the repeating motifs of this specimen will be evaluated in the broader Middle Horizon context in Chapter 11, it is important to note that the icons displayed on this hat in particular further affirms that 4-cornered hats were utilized as important elements in symbolic community ritual.

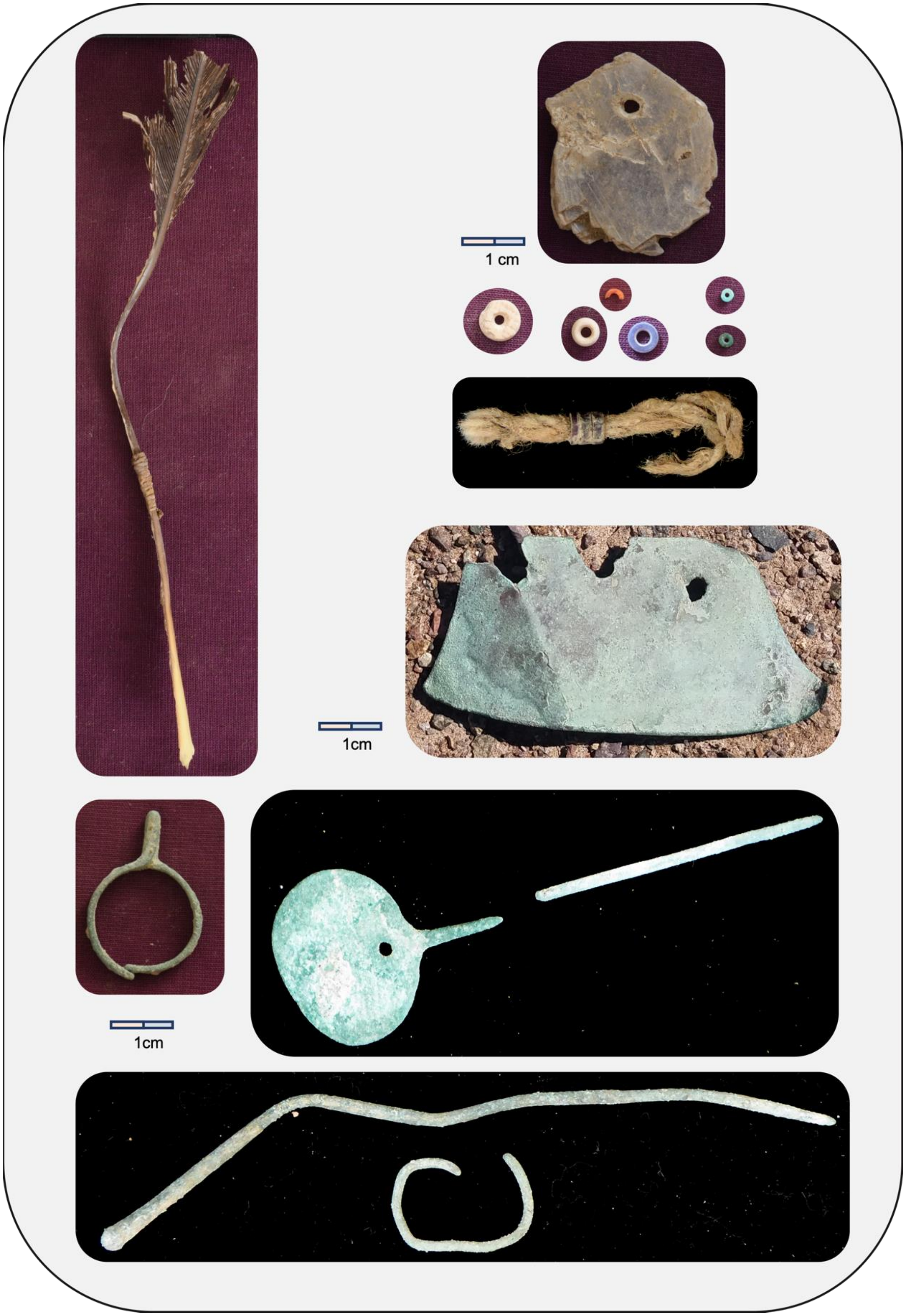


Figure 231. Examples of jewelry and other items used in decorating clothing and other components of personal adornment.

A final way in which individuals distinguished themselves from others was through smaller items of personal adornment. These items could range from explicit jewelry to accessories added to clothing for decoration (Figure 231). The best example of unambiguous jewelry from the L1 assemblage is a copper ring recovered in the Neighborhood I central storage facility in excavation Block L1A-2019-3 in Sector A. Similarly, a pendant made from mica and many of the lithic, shell, and bone beads were likely part of necklaces and bracelets. Multiple feathers recovered were still wrapped with sinew cord that likely attached them, along with beads, to headdress or other clothing items. At least one pounded copper plate was recovered that was likely used as a pectoral plate or in some other costume-accenting function. Finally, while found as offerings in the context of a ritual structure (Special Structure L1A-1), at least two different styles of copper *tupu* pins were collected at L1, and were also likely highly valued items of personal adornment.

Cemeteries & Mortuary Ritual

As noted above, human internments or burials are often one of the few consistent ways to access individuals in the archaeological record. The Middle Horizon complex at Cerro San Antonio is no different, with the numerous documented cemeteries being composed almost exclusively of single subsurface interments of individuals. Ten (10) distinct cemeteries were identified as being directly associated with the Middle Horizon era occupation, with seven (7) in the Southern District and just three (3) in the Northern District. Like the residential-based sectors, the ten formal cemeteries were all clearly spatially distinct locations. Most cemetery sectors were tucked away in narrow, and relatively private quebradas (L1B, L1I, L1K, L1Q, L1X) but some were located on more exposed hillsides (L1M, L1V, L1Z) or even on flat highly accessible areas (L1S, L1W). Based on on-the-ground mapping of the cemeteries and further analysis of low altitude UAV photos, it is estimated that these cemeteries collectively hold at least 407 identifiable individual burials (Figure 232). Again, while these burials and cemeteries were not the focus of the investigations reported on here, through the work completed for this dissertation a number of important observations were made regarding these mortuary contexts.

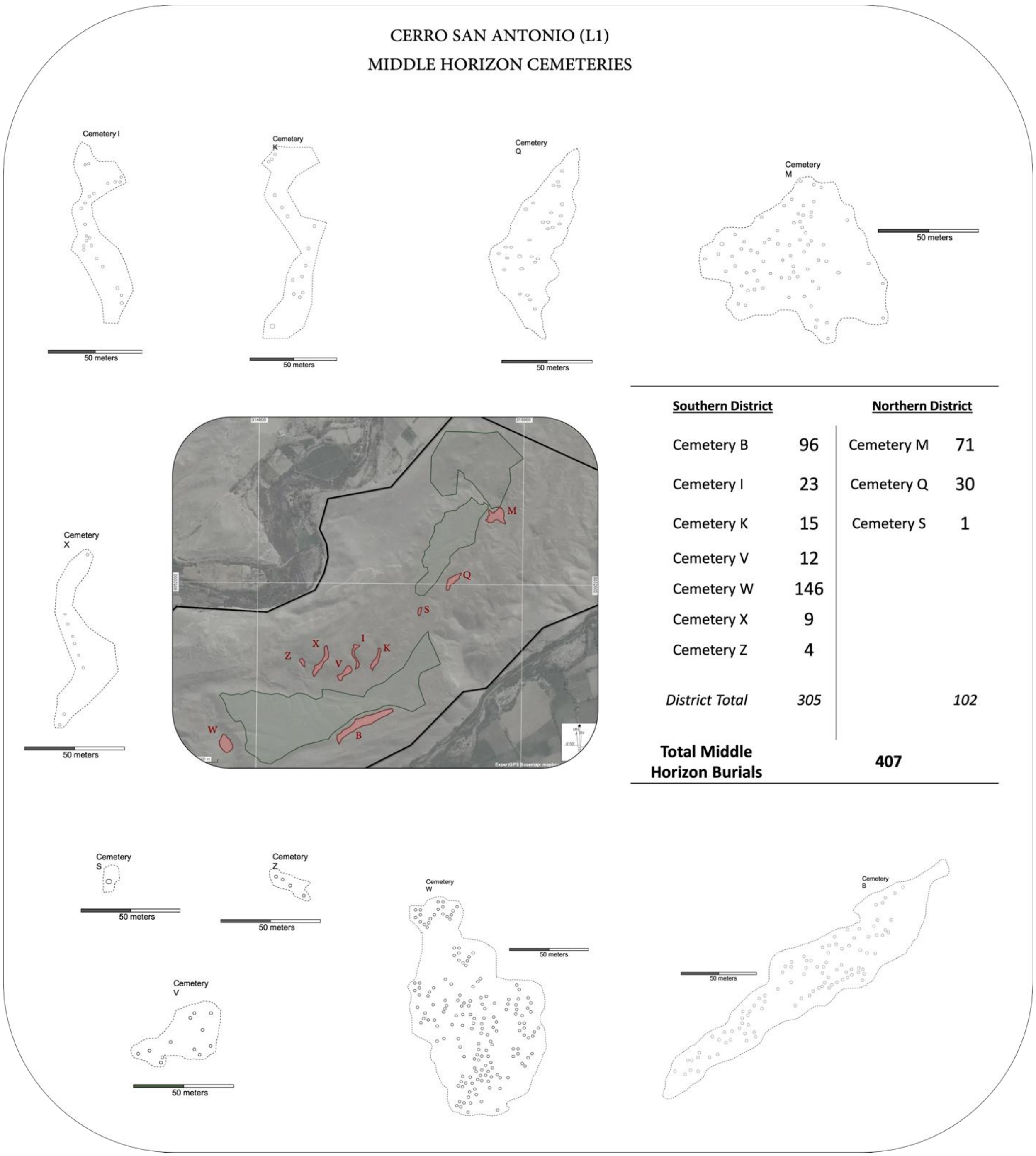


Figure 232. Schematic map of all mortuary sectors or cemeteries with Middle Horizon affiliation.

In terms of fixed features and the broader built environment, mortuary contexts actually showed more signs of symbolic community conformity than individual distinction. In spite of their spatial sequestration, there appear to have been relatively standard tomb construction techniques employed across all cemeteries[201]. All tombs documented in the Middle Horizon cemeteries are roughly circular, subsurface cists, most approximately 1 - 1.5 meters in depth. The majority of visible tombs were marked on the surface with a single course, cobble stone collar with anywhere between 60-85% (depending on the cemetery) of subsurface cists fully lined with cobbles as well. Additionally, while some tombs were capped with either flat stones or relatively short timbers (~ one meter in length), most appear to have been simply filled in with sediment. Finally, while no exposed burial reported on here was undamaged by looting, evidence suggests that the individuals interred in these tombs were situated in a uniform seated-flexed position. All these consistencies point to broader global symbolic norms regarding the proper practice for interring community members who had passed away.

Despite the above-mentioned similarities, burials do appear to have ultimately represented locales of individuality. Again, all burials directly observed here were only exposed due to illegal and often extremely damaging looting events and therefore the original locations of grave goods and even the treatment of the bodies themselves were often only roughly discernable. However, most individuals appear to have been dressed in at least one textile, most often a relatively coarse weave, undecorated tunic, which was then wrapped in an additional, often decorated tunic. While all individuals were treated this way, the textiles themselves varied greatly and all appear to have been worn in life, presumably by the individual themselves. Most burials appear to have been accompanied by grave goods, specific to the individual, as well. Serving ceramic vessels, like keros and tazónes, were the most common

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[201] Due to recent looting and the exposure of dozens of individual human internments, including the human remains, it is clear that these cemeteries contain both males and females as well as children and adults of a range of ages. Of course, more systematic study is needed to determine demographics of these mortuary contexts.

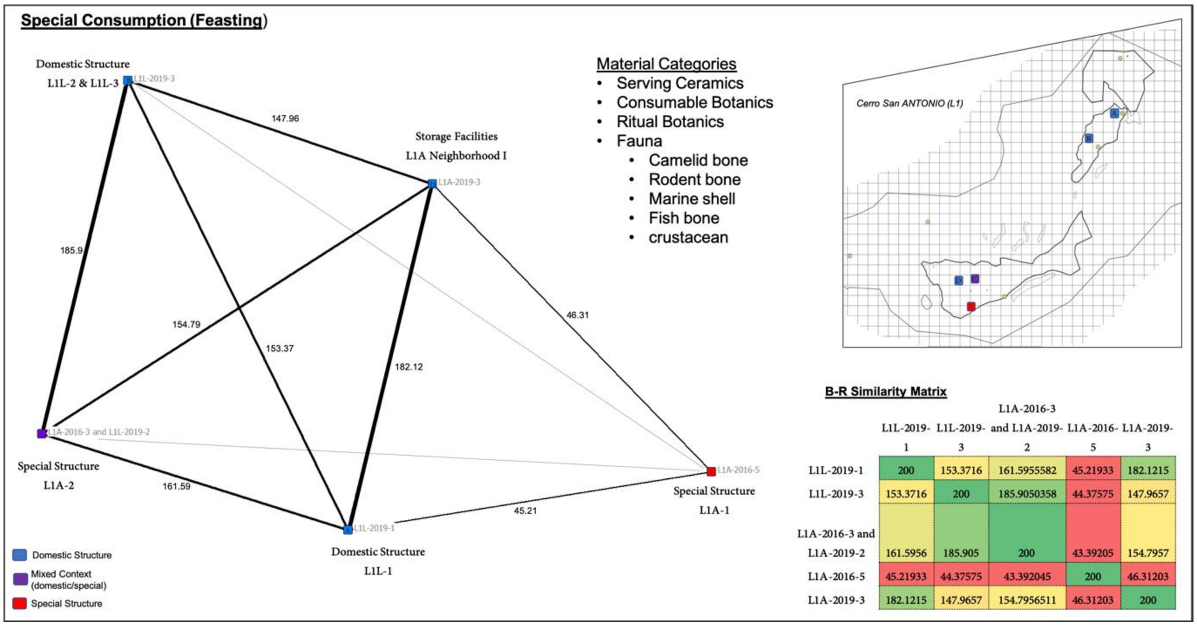
items here but all manner of other items, from carved wooden spoons to musical instruments, like panpipes, were also observed in these looted mortuary contexts. No two grave good assemblages were identical, again suggesting that these were goods specifically for the individual interred, and in all likelihood represent that individual's personal possessions.

A final important factor regarding the cemeteries is that while there is no obvious spatial correlation between individual cemeteries and individual residential neighborhoods, the greater number of internments (Northern District: 102 - Southern District: 305) corresponds to the larger district according to estimated residential capacity (Northern District: 402 - Southern District: 661). This general correspondence along with the close proximity of these cemeteries to the primary residential sectors (Figure 232) suggest that those individuals interred remained, at least partially, incorporated in broader symbolic community practices of the living.

Feasting & Specialized Consumption

One symbolic community practice that appears to have been present at every scale of residential community agglomeration at L1 was specialized, and often conspicuous, forms of consumption. As noted above in reference to sustainable community practices, consumption of basic foodstuff was definitionally a ubiquitous practice. However, the consumption of more specialized goods, like alcoholic beverages and other mind-altering substances, as well as feasting events, in which more quotidian foodstuffs would be consumed in larger quantities also appear widespread. Whereas communities of practice represent symbolic communities that develop to help maintain and pass on technical information needed in sustainable community practices, the symbolic community formations that form in and around specialized consumption, and particularly more directed events, like feasts, represent symbolic community practices that demand sustainable community investment (Dietler 2001; Dietler and Hayden 2010).

The B-R similarity index matrix and network visualization in Figure 233 help illustrate the proportional similarities in assemblages deemed most relevant to special consumption in some of the major excavated contexts in Sector A and Sector L. The material categories included here overlap significantly with those in daily food consumption B-R index (see Figure 224), particularly in consumable botanics and the various edible remains in the fauna category. However, the special consumption B-R index also centers on the proportions of serving ceramics as opposed to utilitarian ceramics, as well as incorporates ritual botanics.



	L1L-2019-1	L1L-2019-3	L1A-2016-3 and L1A-2019-2	L1A-2016-5	L1A-2019-3
L1L-2019-1	200	153.3716	161.5955582	45.21933	182.1215
L1L-2019-3	153.3716	200	185.9050358	44.37575	147.9657
L1A-2016-3 and L1A-2019-2	161.5956	185.905	200	43.39205	154.7957
L1A-2016-5	45.21933	44.37575	43.392045	200	46.31203
L1A-2019-3	182.1215	147.9657	154.7956511	46.31203	200

Figure 233. B-R similarity index matrix and network visualization of major excavation block assemblages pertaining to specialized consumption.

Overall[202], the B-R network shows a relatively tight clustering in the four main excavation blocks, with B-R index scores all exceeding 147. With a score of 185.9, the strongest connection is between Domestic Structure L1L-2 and L1L-3 (Block L1L-2019-3) and Special Structure L1A-2 or the Sector A adobe platform (Block L1A-2019-2), followed closely by another high index score of 182.12 between the other two major assemblages; those pertaining to Domestic Structure L1L-1 (Block L1L-2019-1) and the neighborhood storage facility excavation

[202] The exception being Unit L1A-2016-5 and the specialized context excavated surrounding Special Structure L1A-1 - no B-R index scores exceeded 46 when compared to this context.

in Sector A (Block L1A-2019-3). Below I will explain how these connections likely suggest that more concentrated feasting events took place in or around the former two contexts whereas more typical domestic consumption refuse defines the latter.

The material category of ceramic serving wares is one of the key components of this specialized consumption activity. With only one or two exceptions, serving vessels were manufactured in the redware style, with well-fired, homogeneous pastes and highly burnished red slipped exteriors (see 8.1). The flaring-rimmed, flat-based bowl, called a tazón, was primary vessel used for serving all manner of prepared foods and likely some beverages. The taller, flaring-rimmed goblet, or kero, was the primary vessel type for serving beverages. Pitchers, used for pouring liquids into keros, other types of bowls, and a blackware variant of kero were also found in very small quantities. As will be noted below, while there is certainly a range in terms of quantity and quality of the design elements and motifs present, painted decoration also appears to have been common features of these vessels.

While all excavated contexts produced redware serving vessels, their frequency ranged greatly. In most of these contexts serving vessels made up well under 10% of the ceramic assemblage. However, the ceramic assemblage associated with Domestic Structures L1L-2 and L1L-3 (Block L1L-2019-3) yielded significantly higher amounts of these vessels; almost 12% of this assemblage was composed of redware serving wares. The disproportionately high redware assemblage associated with Domestic Structures L1L-2 and L1L-3 was itself disproportionately composed of the kero vessel type (33.53%), suggesting drinking was the central activity producing these sherds. As noted in Chapter 9 (see 9.1), at the microscale these specific structures appear to be standard houses, the base for family units or the microscale institutional realm of the household. However, this household appears to have served a special function, that of reoccurring hosts for feasts or at the very least drinking bouts. This more symbolic community function may correlate with the sustainable community specialization filled by this household, those procuring a variety of marine-based resources (see 10.2).

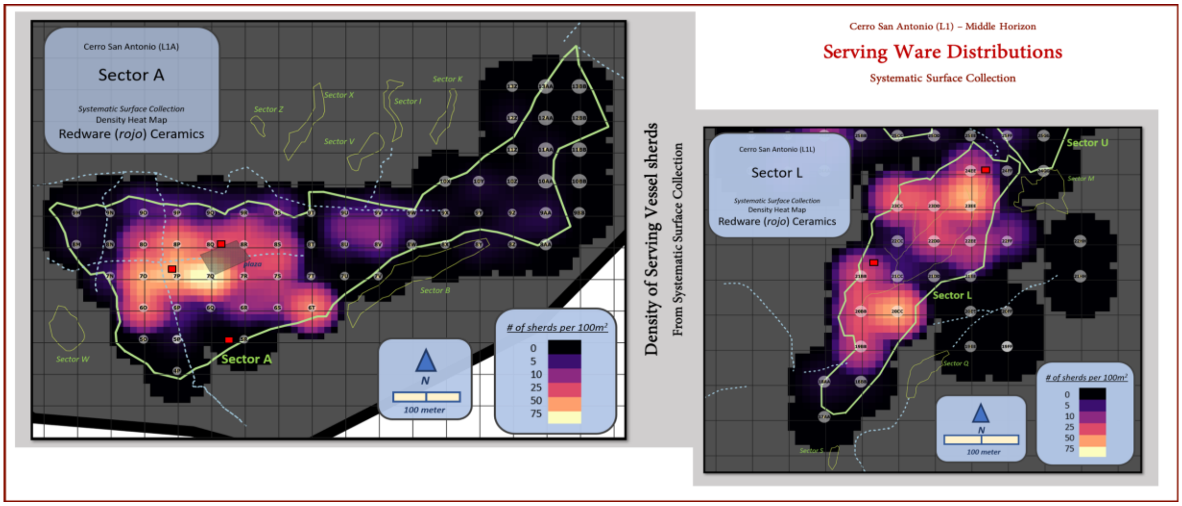


Figure 234. Heat density maps projecting the density of serving ware ceramics from systematic surface collection.

Included in Figure 234 are kernel heat density maps generated from systematic surface collection data (Appendix 2) and restricted to displaying the density of sherds of redware serving vessel types per 100m^2. While these maps largely mirror the patterns seen in the more general distribution of surface materials, they do show some points of significant concentration of serving vessels. The clearest point of concentration is the extreme density of serving vessel sherds recovered along the western side of the central plaza in Sector A. As will be elaborated on below, this reiterates the center of gravity maintained by this plaza in the broader symbolic community practices that occurred throughout the settlement. That said, the fact that there are multiple points of concentration in serving wares, not to mention their general ubiquity, suggests that a significant amount of serving with these vessels likely occurred in the home among family, with neighbors in neighborhoods and sectors, as well as more pointed district or even settlement-wide events.

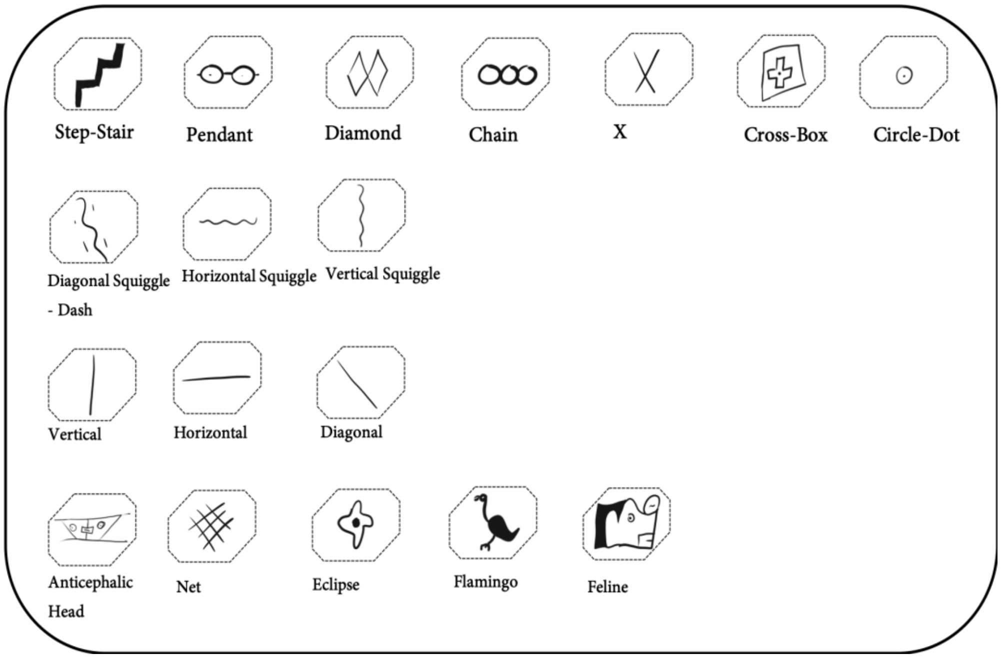


Figure 235. Design elements and simple motifs found on redware serving vessels in the L1 excavation assemblage.

Redware serving vessels were particularly important paraphernalia in explicitly signifying symbolic community affiliation as they were the most common materials to receive decorative elaboration. As mentioned above, a universal feature of redware serving vessels, both keros and tazónes, were painted decorations (see 8.1). The most common painted decoration, almost always black, were simple and arbitrary stripes or sometimes thicker bands running horizontally around the circumference of serving vessels or vertically to frame in panels incorporating other designs and motifs. However, more elaborate arrangements, such as a suite of geometric elements that would often be repeated or used in combination as well as a number of more representative or iconic figural motifs were also incorporated. These more complicated designs were also most frequently black in color but would incorporate any number of oranges, reds, blues, yellows, and white as well. While I reserve some of the broader cultural implications of these design elements for the macroscale discussion in Chapter 11, here it is worth noting how some of these design elements appear to have been distributed across the residential community contexts.

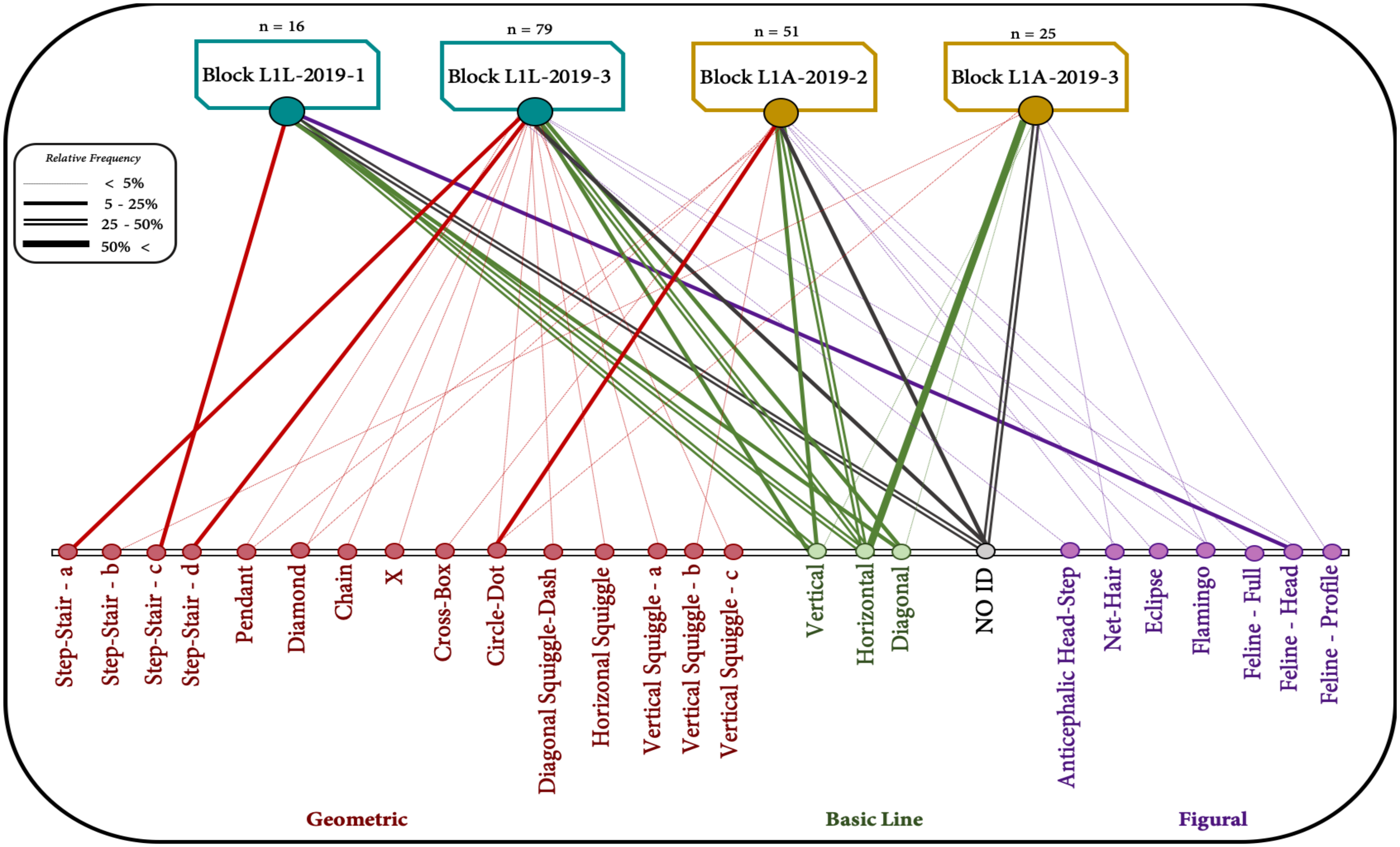


Figure 236. Bipartite network graph illustrating the relative proportions of different design elements and simple motifs identified on redware ceramic sherds as recovered in the four (4) major excavation blocks in Sector A and Sector L at L1.

The bipartite network graph in Figure 236 helps visualize some of the patterns in how these design elements were distributed across the four major excavated contexts in Sector L and Sector A. Again, the clearest pattern is that simple design elements, such as the aforementioned vertical, horizontal, or diagonal lines were by far the most common elements in every context. Other elements like the circle-dot geometric elements and the flamingo figural motif were far less common but found in the majority of contexts as well. However, beyond these ubiquitous elements the represented design elements varied quite greatly between all contexts. One of the most distinct divergences in the different proportional representation of design elements were between the two contexts that yielded the highest sample sizes of decorated serving wares: Block L1L-2019-3 (n=79) and Block L1A-2019-2 (n=51). The decorated sherds recovered associated with Domestic Structures L1L-2 and L1L-3 in Block L1L-2019-3 included a wide-ranging number of different geometric design elements with few figural motifs detected. Conversely, decorated sherds recovered in Block L1A-2019-2 and directly associated with the central plaza adobe platform (Special Structure L1A-2), clearly favored figural elements.

As has already been noted, while feasting events may have simply represented more conspicuous forms of consumption of otherwise mundane foodstuffs, more specialized substances were also consumed. As will be highlighted more in Chapter 11, the presence of redware serving vessels, and specifically keros, is thought to relate to the consumption of chicha or a maize-based beer (Goldstein 2003:150-152; Janusek 2008:141-144), and that is almost certainly the case at Cerro San Antonio as well. However, beyond the use of alcohol in symbolic community feasting events, evidence also suggests that other mind-altering substances were employed as well. A nearly complete polished bone tube (Figure 237), likely used in the snuffing of powdered substances was recovered in the midden deposit in the Neighborhood I storage facility in Sector A. In addition, a single seed fragment (Figure 237), tentatively identified as vilca (*Anadenanthera colubrina*), a well-known hallucinogen (Schultes and Hofmann 1979; Torres and Repke 2006) also points to the utilization of explicitly mind-altering substances in symbolic community ritual.

Embroidered seam edge of a woven bag – likely used to store/carry coca leaves

Example of a coca seed and leaf

	coca	vilca
L1L-2019-1	X	
L1L-2019-3	X	
L1A-2019-2	X	X (?)
L1A-2019-3	X	

Possible vilca seed fragment

Polished bone tube

Figure 237. Photos of materials associated with the consumption of mind-altering substances, such as coca and vilca as well as a table indicating the presence/absence of coca and vilca in the four major excavation blocks in Sector A and Sector L.

The best represented mind-altering substance, for which there is direct presence of the material itself, is coca (*Erythroxylum coca*). Coca leaves, primarily simply chewed but also brewed into beverages, has a well-documented use throughout the Central Andes as a mild stimulant. This ethnographic and historical use has ranged from truly quotidian to some of the most sacred contexts of Andean symbolic community life. Middle Horizon symbolic communities at Cerro San Antonio appear to follow this general trend. Each of the four (4) primary excavation blocks in Sector A and Sector L yielded at least one (1), but in some cases multiple coca seeds. The most substantial evidence for coca use came from Domestic Structure L1L-1 (Block L1L-2019-1). In this house structure, not only were multiple coca seeds uncovered in the macrobotanic assemblage, but multiple preserved fragments of coca leaves were recovered as well. What's more, this context also produced a large fragment of a textile bag, decorated with an elaborate embroidered element. Again, based on ethnographic examples these types of bags are frequently used specifically for carrying coca to be used in symbolic community ritual.

The Built Environment

One of the principle ways in which symbolic community behavior is framed and broader affiliation is expressed is via the built environment (Hillier 2010; Lawrence and Low 1990). From simple architectural elements to entire settlement plans, the built environment is most frequently manifested as features fixed to the landscape and inherently represent some of the most conservative or lasting elements in symbolic, and ultimately all modes of community. Some reflections of symbolic community in the built environment can be truly pervasive. Like dietary choices or crafting communities of practice, some aspects of the domestic built environment, like preferred materials for house construction or technological technique for shaping adobe bricks, can be a matter of subtle symbolic community norms and tastes. Of course, settlement patterns, from the articulation of neighborhoods to whole districts, like those discussed above in regard to residential communities at Cerro San Antonio, are clear manifestations of symbolic community in the broader built environment as well.

The built environment can also be one of the more effective ways for symbolic communities to expressly project their collective affiliation. One of the ways this is accomplished, like more portable material items, is through shared stylistic choices, but as detailed above (see Chapter 9), most of the L1 domestic structures, and particularly houses, were made in a relatively simple wattle-and-daub style with few, if any, decorative architectural embellishments detected. This uniformity in domestic architecture is itself an indication of adherence to a broader set of global symbolic community norms for this practice.

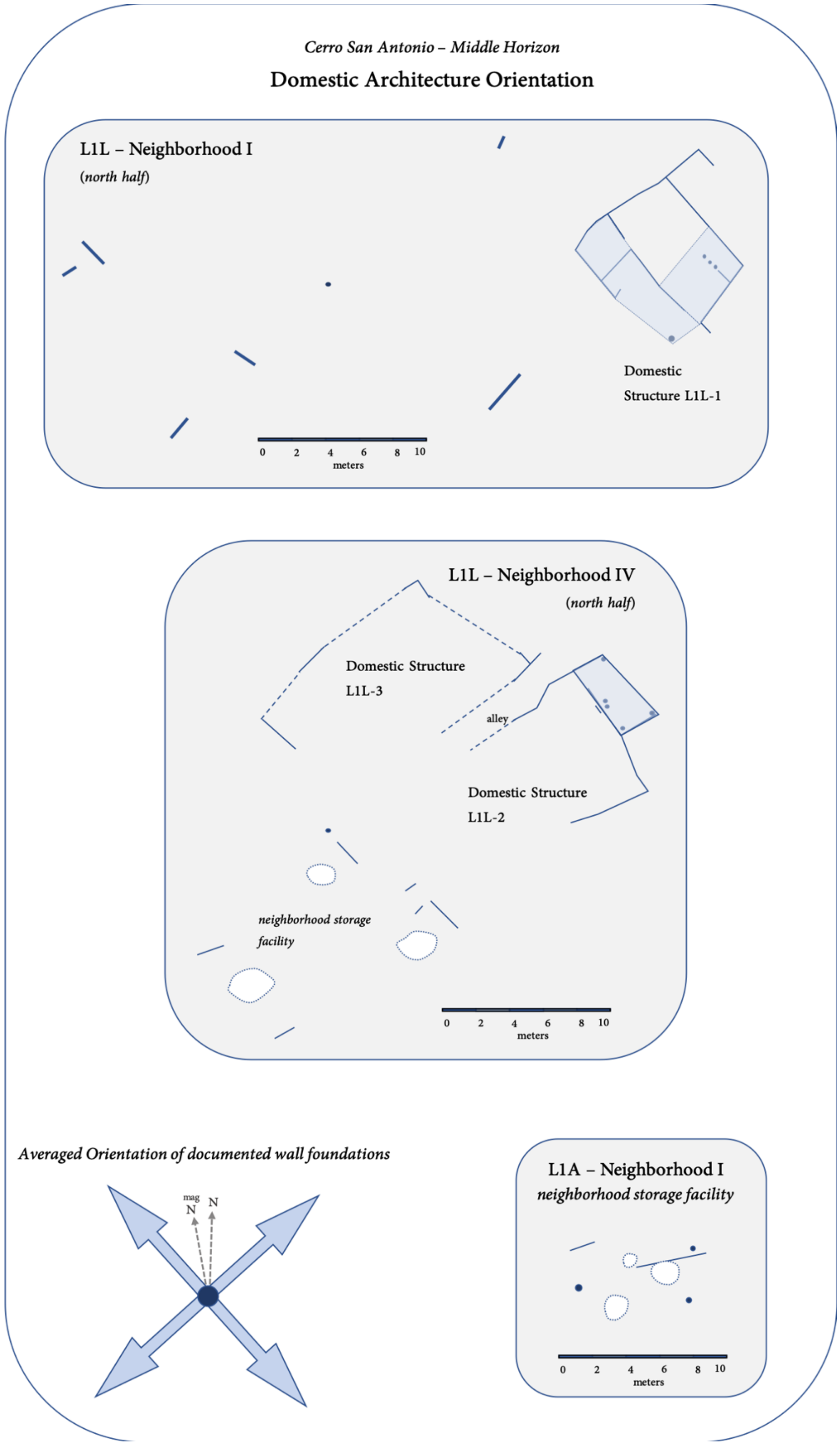


Figure 238. The roughly NW-SE orientation of domestic architecture illustrated via schematic maps of the quincha (cane) wall foundations best documented through surface mapping and excavation.

In addition to the architecture itself, explicit projection of global symbolic community affiliation can be found in the orientation of structures and other elements of the built environment. Again, like their uniform construction methods, the orientation of Middle Horizon domestic architecture also appears to have projected a unified symbolic community affiliation. All wall foundations and associated features, recorded both on the surface and through more intensive excavation, fell along a clear northwest-southeast axis or roughly a 315°NW orientation. This basic architectural uniformity, particularly in regards to orientation, is significant given the relatively pronounced variability in everything from daily cuisine to specialized sustainable community roles that defined the lives of the residential communities that occupied these structures. As will be noted below, this orientation was likely meant to articulate these fundamentally locally-oriented symbolic community built spaces to the truly globally-oriented symbolic community built spaces that punctuated the residential districts.

The most likely primary hub for symbolic community ceremony within the Middle Horizon occupation was the central plaza architectural suite in the western half of Sector A (Figure 239). The plaza was clearly discernable as it had been cleared of any debris with significant labor put into compacting the entire 422m² walking surface. Some local sediment borrowing was needed to build up low points, leaving a slightly depressed area just adjacent to the clearing and some extra rock piling was done along its margins, but the plaza itself lacked any formal architectural demarcations (walls, etc.). That said, a subsurface offering of at least one adult camelid, likely deposited during construction, and only visible now due to a historic looting event, was made in the direct center of the plaza (Figure 239).

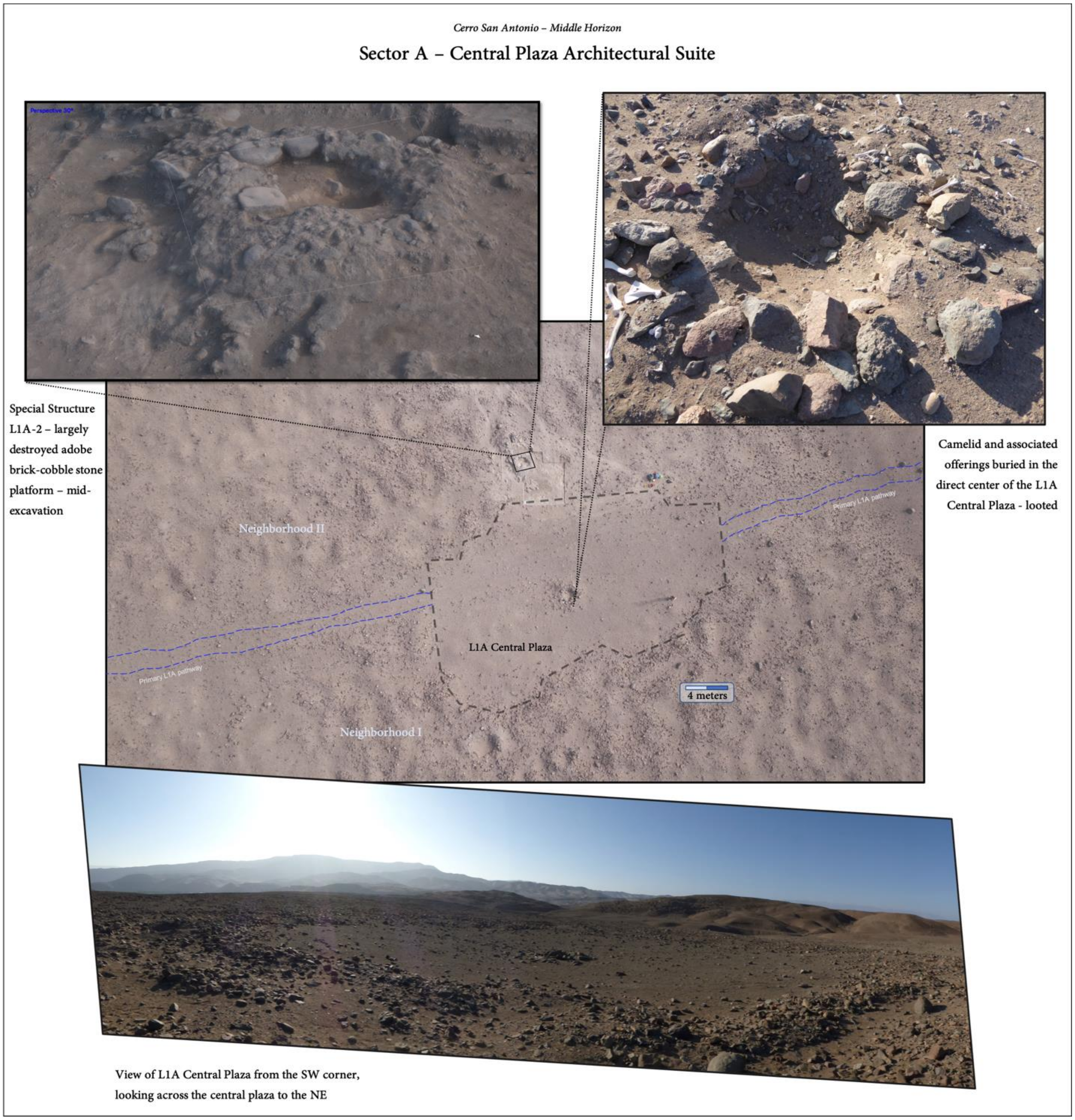


Figure 239. Sector A central plaza architectural suite, including: (*center*) overhead photo of plaza, (*top-left*) 3-D model of Special Structure L1L-2 during excavation, (*top-right*) photo of the looted camelid offering in the center of the plaza, and (*bottom*) photo of the plaza, taken from the SW corner.

While lacking formal walls or internal features, the plaza was architecturally elaborated with a small (1.95 x 1.95 meter) platform centered just five (5) meters off its northern perimeter. This structure, demarcated Special Structure L1A-2 has already been described in detail (See

9.2), but to review, was constructed using unshaped stone cobbles as a foundation and built up with multiple courses of adobe bricks to stand at least 0.75 meters in height. Again, due to a historic looting event, it is difficult to say, definitively, what role this feature played in the broader plaza's built-environment. It is clear however that this structure was directly associated with the plaza, possibly acting as a portal platform to enter the plaza or as an alter.

Often the locations of embodied performance, such as processions or dance, delineating the ritual action that defined plazas can often be difficult. However, as noted above (again see 9.2), the presence of higher percentages of redware serving wares, multiple ritual botanic species present, and the presence of a number of rare or unique items, including a 4-cornered hat (Figure 230), indicate that specialized consumption, involving important individuals likely took place here. While the platform in the north may have actually been used as an entrance, the primary flow of movement was along the SE-NW axis. This access pattern was clearly indicated as the primary west-east pathway through the center of Sector A passed directly through the northern portion of the plaza (Figure 240). Significantly, about 25 meters outside either entrance to the plaza the path split into two parallel, but distinctly separate footpaths. Whether designed simply to accommodate more foot-traffic or as part of a more choreographed procession, this dual access path format is different from anywhere else in the Middle Horizon trail system. What's more, following this central pathway and exiting the plaza to the northeast reveals the first possible glimpse of the snowcapped volcanic peak of Tutupaca in the distant highlands, a point that will be highlighted in the macroscale analysis below.

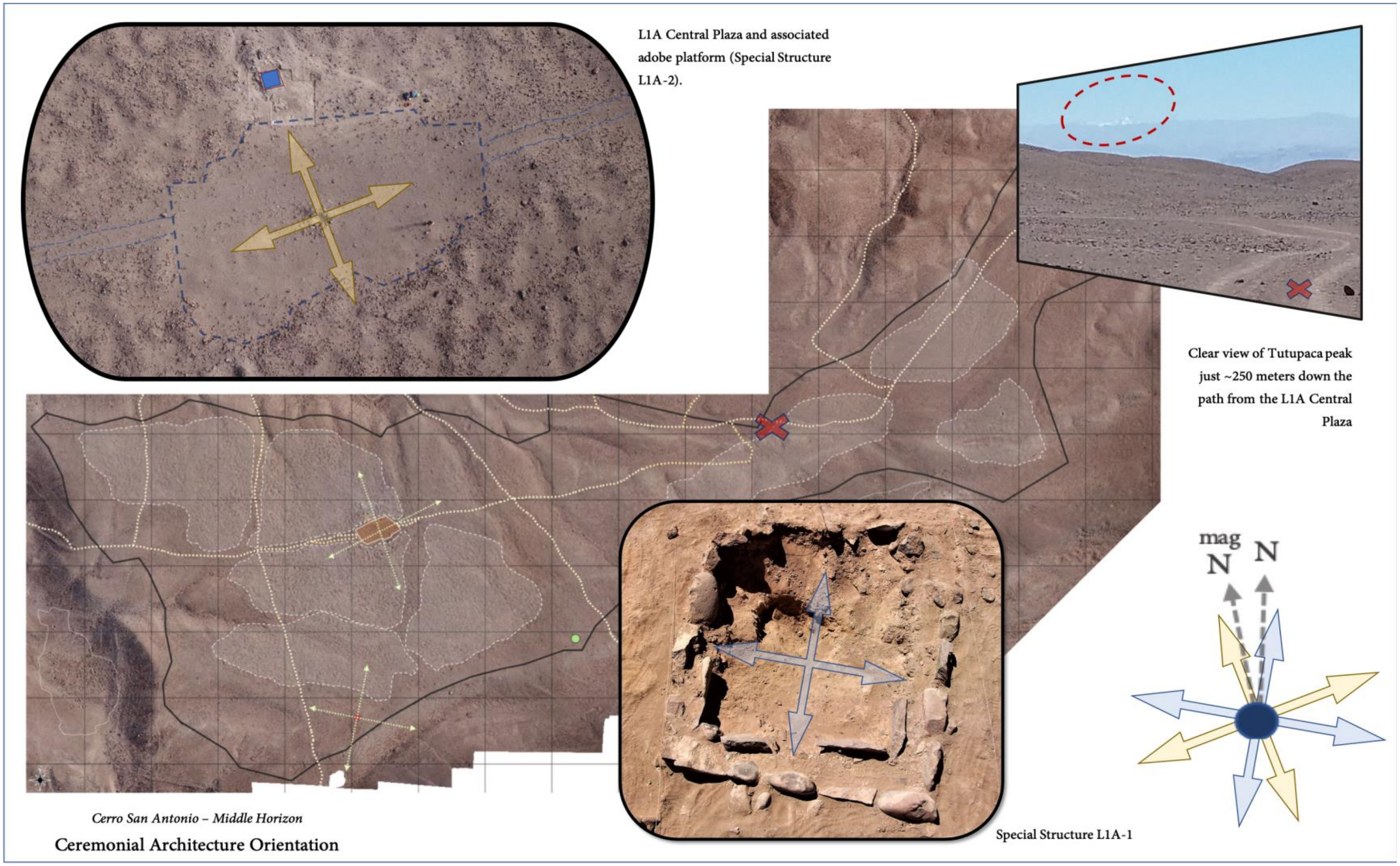


Figure 240. Aerial orthophoto of Sector A showing orientation of major ceremonial structures, including (top-left) central plaza and Special Structure L1A-2, (upper-right) view of Tutupaca volcanic peak from just down plaza processional pathway, (bottom-center) overhead photo of Special Structure L1A-1, and (bottom-right) orientations compared.

Significantly based on the clear access points of the pathway along with the orientation of Special Structure L1A-2 and the plaza itself (~340°NNW), the entire architectural suite roughly matches the general orientation of the domestic structures described above. This reiterates the central place that this built space likely held in articulating the various symbolic communities that defined the Cerro San Antonio settlement. An important detraction from this orienting pattern is found in the only other structure interpreted as associated exclusively with symbolic community activities, Special Structure L1A-1. At roughly 12°NNE, this small booth-like structure was oriented almost opposite to the other architectural orientations. Again, the presence of multiple ritually destroyed bronze *tupu* pins, sherds of miniature ceramic vessels, and almost no domestic refuse, suggests that this space wasn't just oriented differently, but hosted unique symbolic community activities.

10.4 Chapter Summary

In Chapter 10 I presented the mesoscale analysis of this dissertation research. This was, in a sense, the focal point of the broader project presented here, as it most intensively focused on the mesoscale or the realm of communities. As such, here I synthesized data from all modes of data collection as well as the more synthesized datasets presented in the Chapter 9 microscale analysis. Here the three major modes of community (residential, sustainable, and symbolic) served as the primary organizing themes for the mesoscale discussion.

10.1: This subsection focused of the residential mode of community. Here I discerned four major scales in which residential communities manifested within the broader Middle Horizon Period settlement at Cerro San Antonio: districts, sectors, neighborhoods, and individual households.

10.2: The sustainable community focused subsection targeted two major realms of sustainable community activity: basic subsistence and craft production. Basic Subsistence was further broken down into three categories of activity: the production and procurement of basic foodstuff through farming, pasturing camelids, and the collection of various wild resources, consumption of these goods from cooking to eating, and finally how basic subsistence goods were stored and ultimately disposed of.

10.3: Finally, the symbolic community subsection explored the immense ways in which the Middle Horizon populations at L1 affiliated with different symbolic modes of community. This covered everything from how symbolic communities inherently govern the underlying habits, customs, and even more focused communities of practice to more explicit forms of symbolic community expression both in distinguishing individuals and in expressing community solidarity.

Next: Chapter 11 presents the final stage of analysis in this dissertation: the macroscale analysis. Here I bring Tiwanaku back into the picture, drawing on a number of comparative examples to connect the Cerro San Antonio (L1) node to the broader macroscale Middle Horizon network.

Chapter 11 - The Macroscale: situating the Locumba node in space and time

Chapter 11 represents the final discussion chapter of this dissertation and centers on analysis in the macroscale. In addition to exploring how specific materials and features at L1 suggest specific connections to areas outside the middle Locumba Valley (macro-spatial), the more general goal of this chapter will be to insert the Cerro San Antonio node into the broader multi-modal community networks from which the suite of macrolevel institutions, that we collectively call Tiwanaku, emerged (macro-sociotemporal). Up until this point, any mention of Tiwanaku has been conspicuously absent from my Section 3 analysis, this chapter changes course and works explicitly to embed the L1 dataset into the broader Tiwanaku story. To do this I explore the global implications of the local manifestations of the different modes of community detailed in Chapter 10, by contextualizing all aspects of the Cerro San Antonio dataset within broader regional and even supra-regional datasets that have been used to define the Middle Horizon Period (ca. AD 500-1100) in the South-Central Andes (see 2.3).

11.1 Situating the Locumba Node in the Tiwanaku Network: some initial considerations on space and time.

Before exploring how the specific Middle Horizon community networks delineated at Cerro San Antonio (see Chapter 10) interlinked within the broader Tiwanaku multimodal community network, it is important to highlight some primary macroscale constraints as they pertain to space and time. Regarding space, this means denoting some basic elements about the regional geography and the different subregional areas and settlements (spatial nodes) being discussed. Specifically, I will identify some major constraints in respect to distance and travel corridors between Tiwanaku and various areas of influence (spatial links). In regard to time, I will use the limited absolute dates collected from Middle Horizon contexts at L1 to establish broad chronological parameters for the Locumba-based settlement in accordance with other dated contexts in the region. Of course, the remainder of this chapter will provide support, nuance, and even exceptions to some of the following trends, but these are essential constraints that inform the rest of the macroscale analysis.

<u>Macroscale Spatial Constraints of the South-Central Andes</u>

While some L1 connections may have stretched even further afield, most network links identified in this data set are likely contained within the nearly 4000 square kilometers that comprise the South-Central Andes. In Chapter 2 (see 2.3) I provided a description of the defining environmental features of this rugged region, and in Chapter 3 (see 3.1) I described the same defining features specifically for the Locumba drainage. However, here it is necessary to elaborate and specifically highlight how the topography of the South-Central Andes shaped, or at the very least limited, the topology of Tiwanaku's network of influence.

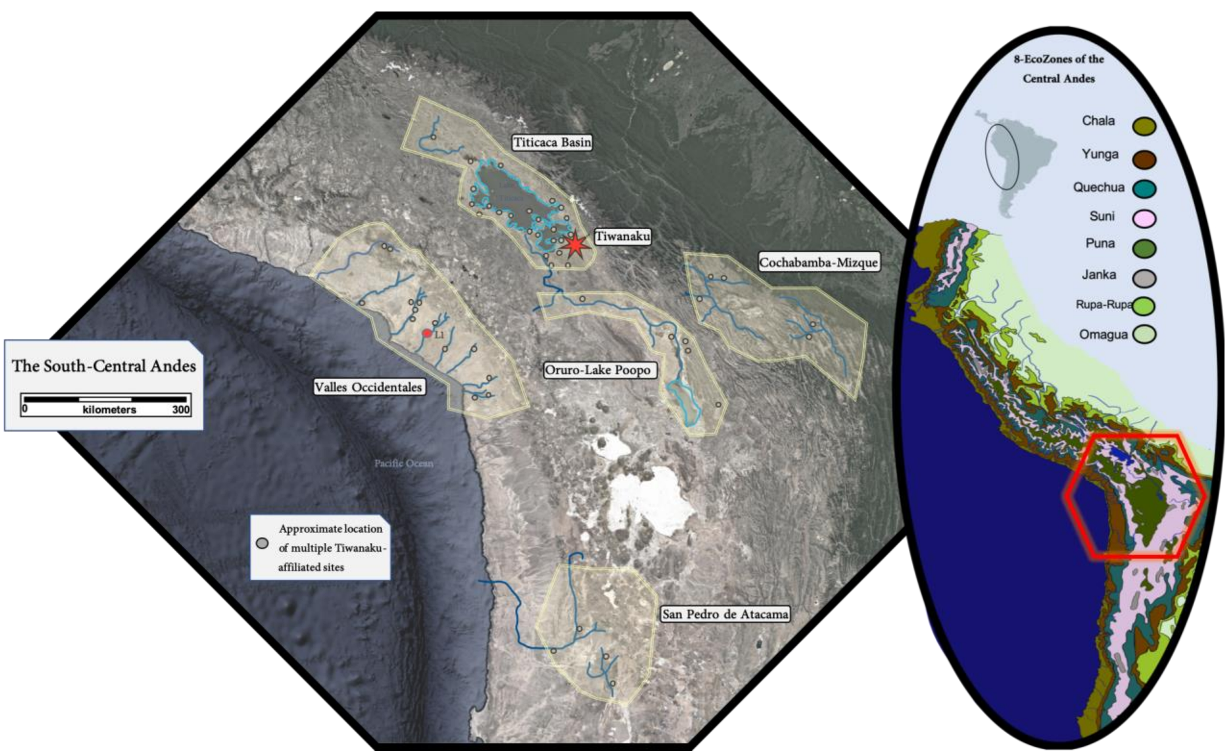
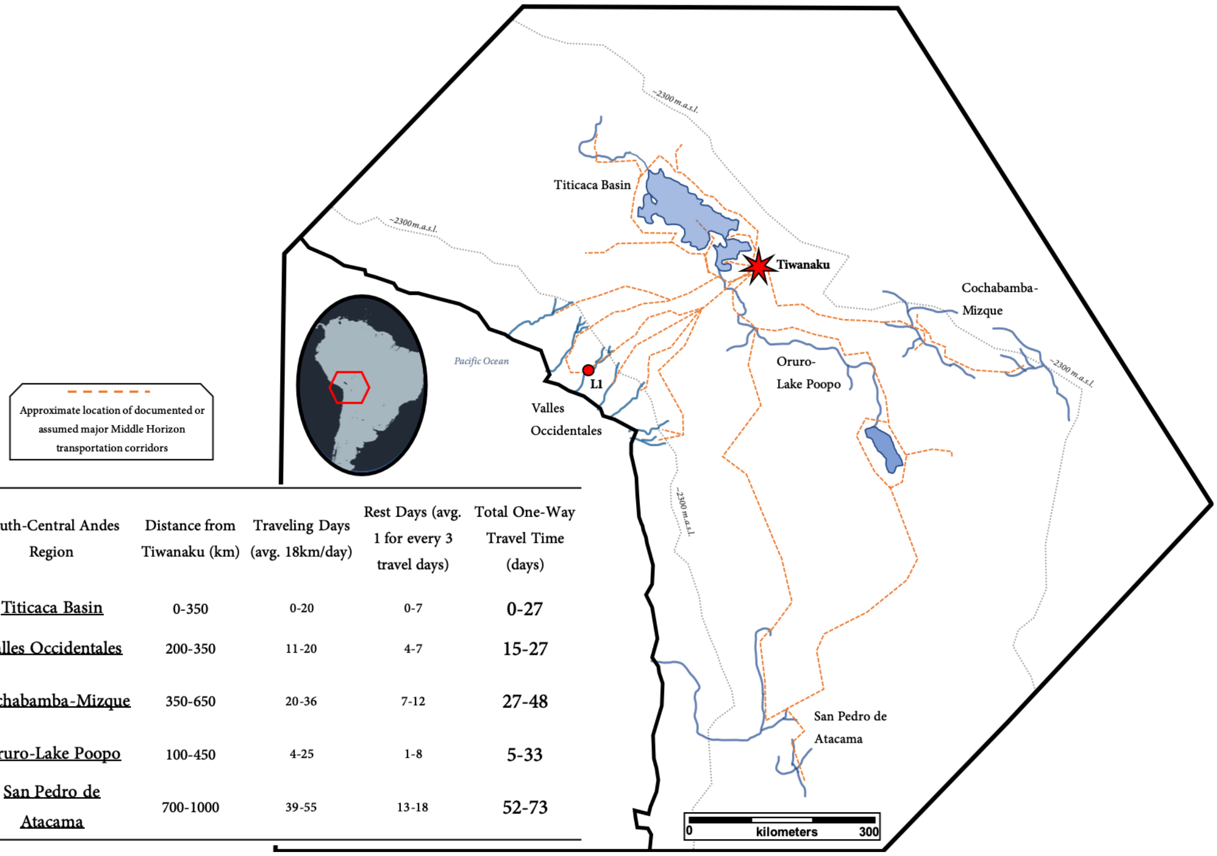


Figure 241. Map of the South-Central Andes with major areas or subregions of Tiwanaku-affiliation during the Middle Horizon.

The South-Central Andes is effectively centered on the *altiplano*, Lake Titicaca, and the associated drainage systems throughout the western and eastern foothills of the cordillera. As defined in Chapter 2, this effectively encompasses the south-central highlands, the south-central coast, and the southern highland subregions of the broader Central Andes as defined in this study (see 2.3). Except for the south-central coast, the majority of this area is composed of the truly sierra-based ecozones of the *quechua*, *suni*, and *puna* (Figure 241). In addition to affecting the breadth of available resources, both domesticated and wild, the general ecology of these ecozones greatly limited how people, goods, and even ideas could move across the landscape. Making transportation particularly challenging in the South-Central Andes was the fact that a number of areas, particularly in the south-central coast and southern highlands subregions, were marked by extensive hyperarid dessert, salt flats, and significant geothermal activity, with some areas even falling within the *janka* ecozone, largely defined by impassible snow-capped peaks and glaciers.

As was emphasized in Chapter 2, based on all available archaeological evidence, the influence of Tiwanaku was certainly not uniform across the region and was likely limited to five (5) subregions within the South-Central Andes. Here I follow most other studies in labelling these as: the Titicaca Basin subregion, the Valles Occidentales subregion, the Oruro-Lake Poopó subregion, the Cochabamba-Mizque subregion, and the San Pedro de Atacama subregion (see Browman 1997). In addition to indicating the general parameters of these subregions, the map in Figure 241 also indicates the approximate locations of some of the settlements that show substantiated evidence for affiliation with the broader Tiwanaku network during the Middle Horizon. Again, while I will not repeat descriptions of each of these subregions (see 2.3), an immediately discernable pattern is the centrality of rivers and their associated tributaries. These represent some of the principle habitable areas within this rugged landscape, and it is important to reiterate that due to the alpine terrain, these areas are connected by limited, but well-established transportation routes.



South-Central Andes Region	Distance from Tiwanaku (km)	Traveling Days (avg. 18km/day)	Rest Days (avg. 1 for every 3 travel days)	Total One-Way Travel Time (days)
Titicaca Basin	0-350	0-20	0-7	0-27
Valles Occidentales	200-350	11-20	4-7	15-27
Cochabamba-Mizque	350-650	20-36	7-12	27-48
Oruro-Lake Poopo	100-450	4-25	1-8	5-33
San Pedro de Atacama	700-1000	39-55	13-18	52-73

Figure 242. Map of the South-Central Andes indicating documented transportation corridors that were believed to be utilized during the Middle Horizon, with associated table indicating distance and approximated llama caravan travel time between Tiwanaku and major areas of influence.

Beyond the particulars of the environmental difficulties presented by the region, are the overall distances between these subregions. Specifically, important here is the distance between the epicenter of the Tiwanaku phenomenon, the site of Tiahuanaco, and each individual area of influence. Situated just 20 kilometers from the southern shores of Lake Titicaca, Tiwanaku had closest access to the remainder of the Titicaca Basin. However, as indicated in the table included in Figure 242, the furthest reaches of the northern Titicaca Basin were about as distant as the furthest areas of the Valles Occidentales. That is, many areas in the south-central coastal Valles Occidentales were nearly as close or closer as areas within the Titicaca Basin. Likewise, while some contexts in the Oruro-Lake Poopó were just 100 kilometers from Tiahuanaco, some of the more distant contexts in this subregion were just as far as those in the more temperate Cochabamaba-Mizque subregion in the eastern *yungas*. Easily the most distant area of interest, San Pedro de Atacama in the southern highlands, was nearly 1000 kilometers from Lake Titicaca and involved crossing some of the more inhospitable stretches of the South-Central Andes.

As detailed in Chapter 1 (see 1.3), while always a major factor, the distance between cores and peripheries is of particular relevance to the intensity and overall nature of influence in contexts where foot-travel is the primary mode of transportation and communication (e.g., Spencer 2010; Stein 1999). Significantly, while foot-travel was indeed the only mode of human transportation in the Middle Horizon, the movement of goods was aided by the employment of llamas as draft animals (Browman 1974; Capriles and Tripcevich 2016). As touched on in Chapter 2, caravans, composed of dozens, hundreds, and even thousands of individual llamas, are well documented sustainable community-based institutions in ethnographic and archaeological contexts throughout the Central Andes (see 2.1 and 2.2), and particularly in the South-Central Andes (see 2.3). Again, based on detailed camelid caravan-based studies (Nielsen 2000; Tripcevich 2010), here (Figure 242) I use an average estimate of 18 kilometers for a typical single day of caravan travel, with a full day of rest needed for every three days of travel. Finally, again following other studies (Vining and Williams 2020), here it is assumed that most caravan traffic would take place between June and November, during lulls in the typical agriculture cycle, though this does not preclude the possibility of year-round caravan traffic.

While just approximations, the travel times listed in Figure 242 align relatively well with available studies that have taken far more detailed ecological considerations and utilized more sensitive least-cost techniques (see Stanish, et al. 2010; Vining and Williams 2020). Importantly, despite some locations in the southern Titicaca Basin being significantly closer, the majority of areas in which Tiwanaku influence has been detected would require over two (2) weeks of caravan travel to complete a one-way journey and a minimum of four (4) weeks, or about one (1) month, to make the round-trip journey. However, still more of the areas of influence, even those in the closest Valles Occidentales and Cochabamba-Mizque areas, would have required almost double that, with almost two (2) months needed to complete a round-trip caravan journey. At the extreme end of travel times, trips to San Pedro de Atacama could have taken Tiahuanaco-based caravans upwards of four (4) months, or a third of a year, to complete a full two-way trip. Of course, central for this study, at just about 200 kilometers from the center of Tiahuanaco, Cerro San Antonio in the middle Locumba Valley represents one of the closest affiliated site complexes, and likely could have been reached in just about two (2) full weeks of caravan travel from the highland center. Again, these spatial constraints, particularly as they pertain to travel, set the stage for some of the macroscale dynamics discussed in the analysis below.

Macroscale Temporal Constraints of the Middle Horizon

This dissertation centers on a period in history in the Central Andes that has become known as the Middle Horizon. Chapter 2 described the cultural trends that define this period in the context of the history of the broader region (see 2.1) as well as how it pertains specifically to Tiwanaku in the South-Central Andes (see 2.3). A few of the defining temporal parameters of this period are worth highlighting again. Traditionally, the Middle Horizon Period for the Central Andes writ large has been assigned the calendrical years AD 500 through AD 1000. Again, the shifts in multi-modal community network configurations that have been used in defining this period are reviewed in Chapter 2 (2.1), but ultimately the Middle Horizon is defined the by formation, spread, and collapse of the peer-polities Tiwanaku and Wari. Of course, one of the primary goals of this particular study is delineating the timing of Tiwanaku's influence in the South-Central Andes, but specifically in the Valles Occidentales area.

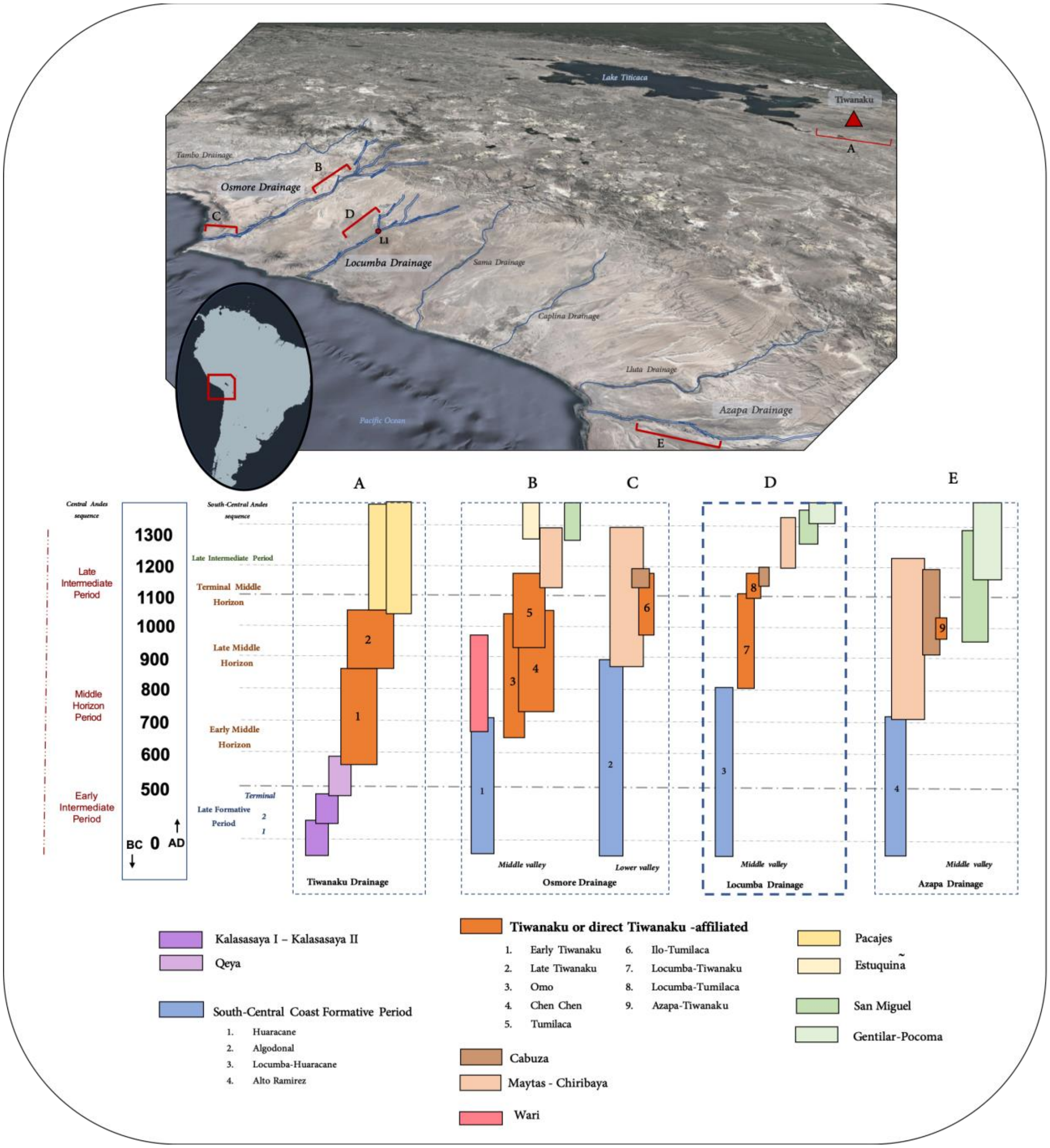


Figure 243. Basic culture sequences for the Tiwanaku drainage in the south-central highlands and the middle and lower Osmore, middle Locumba, and middle Azapa drainages in the south-central coast (Valles Occidentales).

Figure 243 helps to illustrate some of the temporal limits of various cultural traditions that have been used to define the Middle Horizon and adjacent periods at Tiahuanaco and in various locations throughout the Valles Occidentales (see Augustyniak 2004; Goldstein 2005:136-145;

Korpisaari, et al. 2014; Marsh, et al. 2019:811; Muñoz Ovalle 2004; Owen 2005:52; Sutter and Sharratt 2010:68-72). Again, a breakdown of available archaeological evidence defining these time spans is presented in Chapter 2 (2.3), but this graphic is useful for visualizing the macroscale temporal dimensions of that data. More than anything, this timeline graphic is meant to illustrate that the impact of Tiwanaku, occurred at different times and for different durations, even just within the Valle Occidentales area. Parsing out how this played out at the site of Cerro San Antonio and what implications that has for understanding the timing of the Tiwanaku phenomena more broadly is a primary focus of this macroscale analysis.

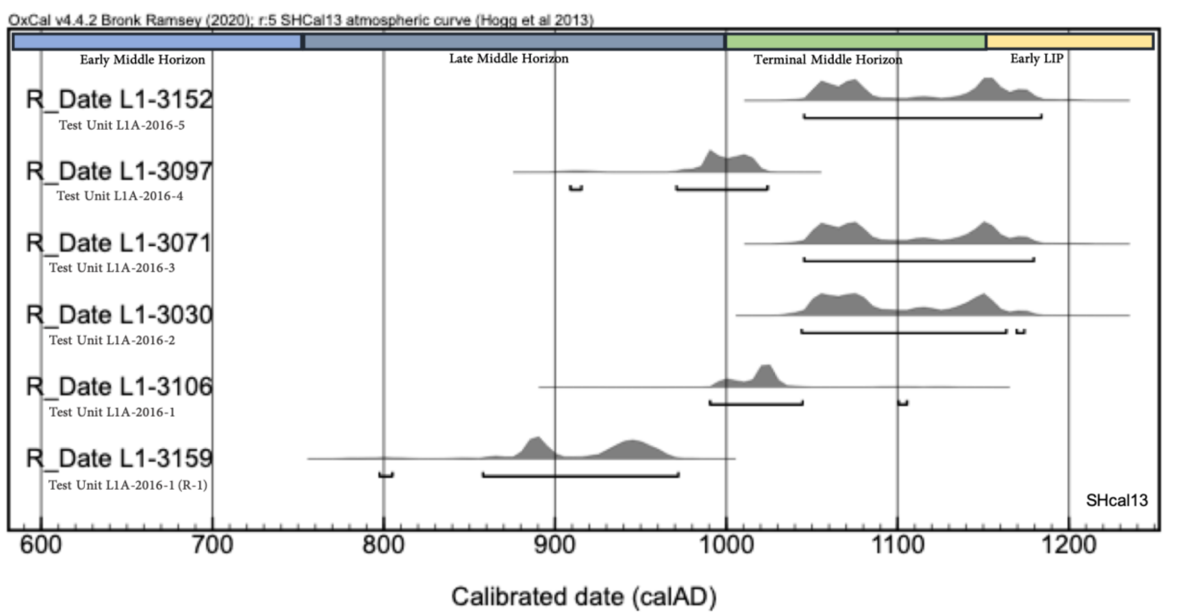


Figure 244. The results of the radiocarbon dates samples from six (6) contexts excavated in 2016, with the SHcal13 calibrated dates plotted, including their 2-sigma ranges.

To that point, the six (6) radiocarbon dates processed thus far for L1 are revealing (see also 8.11) and worth reviewing here at the onset. I used the central tendencies of these dates to roughly estimate the Locumba Valley Tiwanaku-affiliated presence as lasting from approximately ca. AD 850 to AD 1150, or potentially as short as only around AD 950 to a bit after AD 1050, givien the multimodal probability distribtuions. While a Bayesian analysis will refine this inferred period, I have postponed a rigorous analysis of the dates until the remaining radiocarbon samples have been exported and processed as the contexts from which these dated samples were taken were limited and exclusively from Sector A. That said, a few points regarding these dates and the contexts they were drawn from are important to note here.

Notably, the three latest dates overlap, almost exactly, with only a few years separating their early or late ranges. Two of these dates come from maize cobs recovered in similar rockpile-midden deposits, one in Test Unit L1A-2016-2 in Sector A's Neighborhood V and the other from the midden deposits just adjacent to the adobe platform and the central plaza excavated in Test Unit L1A-2016-3. The third overlapping later date is from a large piece of charcoal recovered from the looted context within Special Structure L1A-1 in Test Unit L1A-2016-5. The near identical ranges of these three dated contexts provide a relatively stable end date range for the Tiwanaku-affiliated occupation at L1, at least as it pertains to Sector A. Significantly, this end date of ca. AD1150 falls at the extreme late end of what is referred to here as the Terminal Middle Horizon.

The two earliest dates both came from Test Unit L1A-2016-1, which sampled a rockpile midden deposit and associated clearing in Neighborhood I of Sector A, just southwest of the central plaza. Significantly, the earliest date range (ca. AD 850-950) was derived from a maize cob recovered from the only subsurface storage feature excavated in the 2016 test excavations - Rasgo 1 in Test Unit L1A-2016-1. The second date from the same test unit was also derived from a maize cob, this one collected in the rockpile-midden deposit which directly superimposed the subsurface feature. This second date yielded an early-end date of AD 990-1050, suggesting a 50-150-year gap between when the cob was deposited in the feature and the cob in the superimposed midden deposit. An additional date, this one from Test Unit L1A-2016-4, located on the far western periphery of Sector A at the edge of Neighborhood III, also produced a date that fell within the Late Middle Horizon (ca. AD 900-1050). These dates suggest that the Tiwanaku-affiliated occupation of Cerro San Antonio was initiated sometime in the Late Middle

Horizon and lasted at least through the final years of the Terminal Middle Horizon.

11.2 Home on the Range: defining Tiwanaku residential communities on the western frontier

The residential mode of community in the community ecology approach reflects the inescapable fact that individuals require shelter. Of course, these residential modes of community are intimately entangled with the other modes, forming other emergent socio-spatial institutions detectable in the archaeological record. These socio-spatial institutions, based around residence, almost always form nested sets of agglomerations manifested in the built environment. These nested agglomerations can be as small and hyper-localized as a house or as broad as an articulated system of settlements in a subregion.

As for Cerro San Antonio, in Chapter 10 (see 10.1) I identified four (4) nested sets of intra-settlement residential community manifestations: single domestic structures or houses, house clusters or neighborhoods, discrete domestic sectors, and sector groups or districts. Here I compare and contrast these multi-scalar residential communities with those investigated at other Tiwanaku sites: namely those excavated at the highland center of Tiahuanaco (Escalante 2003; Janusek 1994, 2005c, 2009; Marsh 2012; Rivera Casanovas 1994) and the well-documented Middle Horizon era domestic contexts found throughout the neighboring midde Osmore drainage in the Valle Occidentales (Goldstein 1989, 1993a, 2005). Relying particularly on the intensively studied middle Osmore drainage, I work to add to the increasingly detailed view of how residence was established in the Valles Occidentales during the Middle Horizon and what this implies about Tiwanaku influence along its western frontier.

Interregional Residential Comparisons: microscale socio-spatial institutions in their macroscale context

The quotidian spaces of the domestic sphere have long been identified as particularly sensitive archaeological contexts for investigating some of the more intimate affiliations held by communities and their constituent members (e.g., Carballo 2011; Hirth 1993; Nash 2009; Stanish 1989; Steadman 2016). Whereas public spaces tend to be utilized for the projection of more globally-oriented and explicit affiliations, truly residential spaces, particularly interiors, tend to reflect more pervasive habits and beliefs. Here I focus on architecture and other formal elements of the built environment as my primary line of evidence in relating the various scales of residential community detected at L1 with several other contexts in Tiwanaku's orbit.

Table 15. The four scales of intra-settlement residential community as identified at Cerro San Antonio and their equivalents at the center of Tiwanaku and at the Tiwanaku enclaves in the middle Osmore drainage.

Residential Community equivalent of…	**BASIC DOMESTIC STRUCTURE (HOUSE)**	**NEIGHBORHOOD**	**SECTOR**	**DISTRICT**
Settlement area				
middle **Locumba** drainage	stand-alone *quincha* structure	house clusters separated by walking paths	neighborhood clusters, sometimes centered on a plaza	sector cluster sharing same geological landform w/ associated cemeteries
middle **Osmore** drainage	stand-alone *quincha* structure	house clusters centered on small domestic plazas	plaza-neighborhood cluster sharing same landform	sector cluster sharing same geological landform w/ associated cemeteries
Tiahuanaco & Lukurmata	intracompound adobe/field stone structure	walled-compound with interior courtyard	walled compound cluster – sharing infrastructure like drainage canals	designated by moat and other built features or natural landforms, gradient from monumental core (Tiahuanaco)

Table 15 provides a brief generalized description[203] of residential community manifestations from the three specified settlement areas, sorted into four scalar categories. It is no surprise that at the smallest scale, basic domestic architecture, or house design, was most similar between the two contexts situated in similar environments in the Valles Occidentales. In both Locumba and the Osmore contexts, locally sourced cane would be the primary construction material (*quincha*) as opposed to the field stone foundation and adobe brick superstructure architecture that defined the highland Tiwanaku contexts (Tiahuanaco and Lukurmata) (e.g., Bermann 1997; Janusek 2004b, 2005c). However, that is not to say there was not variation in the *yunga*-based valley contexts.

As noted in Chapter 2 (see 2.3), three different modes of ephemeral domestic architecture have been identified in the middle Osmore, each associated with one of the three primary Tiwanaku-affiliated groups in the valley (Omo, Chen Chen, Tumilaca) (Goldstein 2005:195-197, 212-214, 229-232). While I will not repeat their descriptions here, the L1 examples, specifically the Sector L domestic structures, are most similar in overall architectural style and layout to those associated with the Tumilaca styles in the Middle Osmore context (Goldstein 2005:229-232), with free-standing quincha walls and wooden posts only used to support roofing where necessary.

More prominent differences between the three contexts appear when looking at how multi-structure residential communities were configured. At Tiahuanaco and other highland settlements like Lukurmata, the typical adobe domestic structure was contained within a walled compound that would include multiple other domestic structures and center on a small patio. This is juxtaposed to the completely un-walled neighborhoods that define both the Osmore and Locumba settlements. However, most of the Tiwanaku-affiliated settlements in the middle Osmore, neighborhoods were frequently, though not always, centered on relatively small plazas

[203] Most of these have more detailed descriptions in Chapter 2 (see 2.3).

(Goldstein and Sitek 2018:457-459), and even sometimes separated by natural features in the landscape (e.g. shallow quebradas) (i.e., Goldstein 2005:156). On the other hand, in Locumba, neighborhoods were more informally clustered, with no clear individual neighborhood plazas, and often only separated arbitrarily by footpaths.

Scaling up still, broader sectors were defined in all three contexts as major spatially discrete agglomerations of house clusters, whether bounded compounds at Tiahuanaco or un-walled neighborhoods in the Osmore and Locumba drainages. In both Locumba and Osmore contexts, these sectors would often occupy the entirety of a blufftop or planar surface sitting above the fertile river valley floor (Goldstein 2005:134-164). For the most part, the only difference in the sector and district designations in these Valle Occidentales settlements is that districts also incorporate the frequently associated mortuary components as well as guarantee that the neighborhood agglomerations in question occupied different geological features (e.g. separate but adjacent blufftops). At the highland center, sectors and districts also largely aligned and were defined by their relation to the monumental core of the city (e.g., Janusek 2008:156-157; Kolata and Ponce 1992). However, multiple districts within the settlement of Tiahuanaco were clearly separated by artificial features on the landscape such as platforms, mounds, or moats (e.g., Vella et al 2019).

While more will be said below regarding shared spaces and their role in symbolic community dimensions of these settlements (see 11.4), the residential plaza spaces provide a useful key in relating the three neighborhood-based residential configurations discussed here. At Cerro San Antonio, the central plaza in Sector A appears to have acted as the primary shared domestic space for occupants of all neighborhoods in all three sectors (i.e. both districts). Conversely, most sufficiently preserved Omo- and Chen Chen-affiliated settlements in the middle Osmore drainage include multiple domestic plazas, which again, tend to center individual neighborhoods. Significantly, this is not true of the later Tumilaca settlements, which tend not to have any identifiable plaza spaces (Goldstein 2005:172-174). Finally, an even more atomized arrangement was the residential plaza equivalent at Tiahuanaco, the compound patio, which sequestered behind walls, provided an even more segregated residential configuration.

Broadly speaking then, the Osmore and Locumba residential arrangements were quite similar, with both deviating sharply from the open domestic spaces observed at Tiahuanaco itself. This is most clear at the most microscale level where, architecturally, houses were almost the same in the Valles Occidentales, and likely represent the base of family-based household units. That said, many daily tasks were likely shared with neighbors across the sector and even across the entire settlement. Where at Tiahuanaco, while some broader sustainable community specialization may have been shared at the sector level (see 11.3), most daily activities were undertaken within the privacy of the walled compound (e.g., Janusek 1999).

Ranking Residence: settlement hierarchy and population on the western frontier

Residential community configurations add insight into how these settlements may have related in regard to the broader Tiwanaku settlement hierarchy and population distribution in the Valles Occidentales. First, to review general population estimates, it was estimated in Chapter 10 (see 10.1) that roughly 1042 individuals may have occupied the Cerro San Antonio sectors during the Middle Horizon. Here I round that estimate up to 1200 individuals to account for other smaller Tiwanaku-affiliated settlements in the middle Locumba Valley. Even with this slight bump, the Locumba population is dwarfed by the estimated 10,000 individuals that may have occupied the Tiwanaku-affiliated enclaves in the middle Osmore drainage (Goldstein 2013b:480; 2015:9204). Likewise, it is estimated that upwards of 65,000 individuals may have occupied the Titicaca Basin during the Middle Horizon with as many as 20,000 living at the center of Tiwanaku itself (La Favre 2016:39; Stanish 2013:153). Finally, while the residential contexts have not been confirmed through excavations like the rest of the contexts above, based on systematic survey (Goldstein 1995), the Azapa drainage at the southern edge of the

Valles Occidentales area likely contained fewer than 400 individuals with direct Tiwanaku-affiliation.

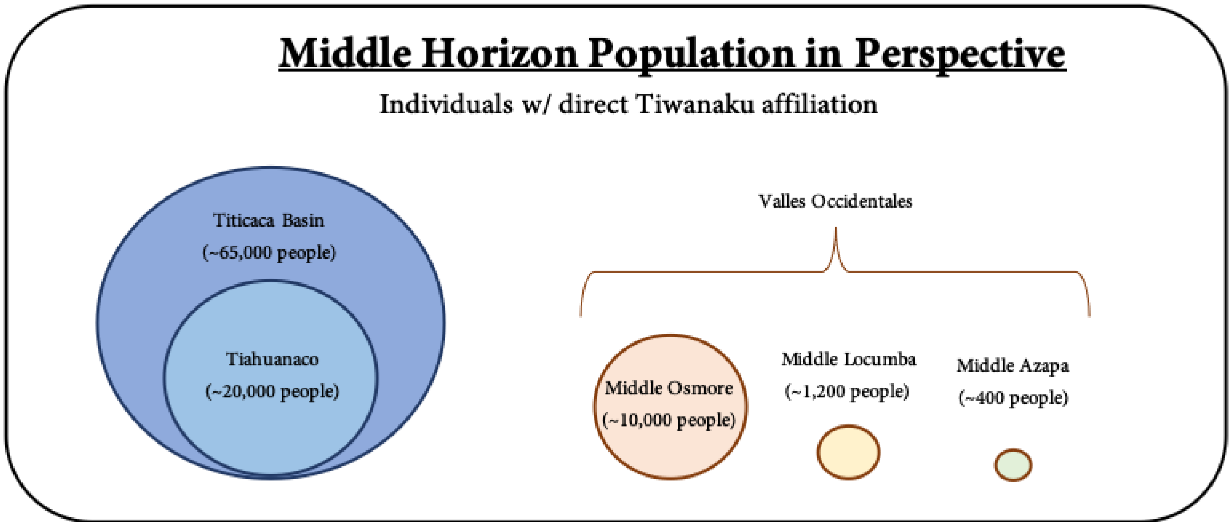


Figure 245. Graphic representation of total estimated Tiwanaku-affiliated individuals living in each listed region.

The populations as visualized in Figure 245 help to put some of these Middle Horizon residential community configurations into a macroscale perspective. One glaring factor is that, as estimated here, the number of Tiwanaku-affiliated individuals living throughout the Valles Occidentales approached the number of those occupying the single center of Tiahuanaco (see Stanish 2003:178). This emphasizes, in relative population terms, just how substantially different the primate, urban center was. In addition, while the different architectural styles in the highland center and the more lowland villages can be explained by the radically different climates and available construction materials, the difference in configurations at the neighborhood and even house level was also the result of a radically different mode of settlement that had emerged in the highland contexts, the urbanized center.

That said, the walled multi-house, patio-centered compounds at Tiahuanaco likely acted to retain elements of smaller village-based residential life in an urban setting by providing privacy even in novel, cramped urban conditions (Jennings, et al. 2016:478-482). In fact, despite their very different built environment manifestations, the fact that neighborhood-level residential communities at Tiahuanaco in the walled patio compounds and un-walled house cluster plaza groups that defined the Osmore enclaves, were all centered on open shared spaces, set them apart from the Cerro San Antonio settlement configurations in which all neighborhoods appear to have relied on a single shared plaza.

Of course, population numbers and distributions were not static throughout the half-millennium-long Middle Horizon. Significantly, estimates for the Titicaca Basin suggest that population levels likely peaked during the early Late Middle Horizon and fell steadily throughout the Late and Terminal Middle Horizon (La Favre 2016:39). Without delving into the catalyst for this population decline, it is important to highlight that this coincides with the closing of a number of the more peripheral domestic sectors at Tiahuanaco and a general reconfiguration of the monumental core and associated monuments (e.g., Janusek 2003a, 2004b). What's more, as highlighted in the timeline figure in Figure 243 (see 11.1), the available absolute dating in the Valles Occidentales suggests that while the major enclaves had been established in the Osmore during the Early Middle Horizon, the accelerated spread of Tiwanaku-affiliated residential communities into other areas of the region coincides with this drop in highland population during the Terminal Middle Horizon.

11.3 Self-Dependent with Connections: delineating Tiwanaku's interregional sustainable communities

This section compares and contrasts different sustainable community practices identified at Cerro San Antonio with those of other Tiwanaku-affiliated settlements to discuss some of the modes of production, exchange, and consumption that underwrote the broader Tiwanaku economy. As in Chapter 10 (see 10.2), here I focus on two broad categories of generally economic activity: those based in basic subsistence and those involved in the production and exchange of various craft goods.

Easy Living in the *Yungas*: diversified subsistence in the Valles Occidentales

As noted a number of times in this dissertation, at almost 3,000 meters lower elevation, the western *yungas* ecozone that defines the majority of the Valles Occidentales represents a radically different environment than the mixed *suni*-*puna* highland ecozones that define the Titicaca Basin. While largely defined by expansive stretches of hyperarid desert, the narrow river valleys of the south-central coast rewarded residents with a number of wild edible plant and tree species as well as year-round growing capability for most available domesticated crops. Likewise, this mid-elevation ecosystem would naturally host migrating quadrupeds, like wild deer and camelids, as well as birds, like ibis and flamingo, at various times of the year and serve as more-than sufficient pasturage for large herds of domesticated camelids. Finally, while still more than a day's travel away from the Pacific Ocean, the resources of the *chala* ecozone were far more available to those settled here in the *yunga* compared to the highland *puna*. Here I compare how these various resources appear to have been accessed and consumed at L1 (see 10.2) and other locales within the Tiwanaku sphere. As always, I focus most acutely on the robust data sets from the neighboring Valles Occidentales contexts in the Osmore and the urban center of Tiahuanaco in the highlands.

Farm-to-Table: local agricultural production in perspective

As emphasized above, there were few consumable plant species that could not be grown in the mid-elevation zones in the *yunga*-based Valles Occidentales. In fact, no species were identified in the L1 consumable macrobotanic assemblage that could not have been grown in the adjacent valley bottoms. As will be raised below (see 11.4), some botanic remains, like those believed to belong to tubers and a variety of chenopod species that were present, are traditionally associated more with the *suni*, *quechua*, and *puna* ecozones of the highlands. However, even these highland crops could possibly have been grown in the *yunga* valleys. The vast majority of the identified botanic-based diet of Cerro San Antonio inhabitants was in all likelihood produced directly by their sustainable communities locally in the middle Locumba drainage.

Local production and procurement of the plant-based dietary needs of local residential communities also appears to have been the status quo for the neighboring enclaves in the Osmore drainage. In fact, it has been convincingly argued that particularly the Chen Chen affiliated communities in the Osmore were likely producing a relatively large surplus of agricultural goods, particularly maize, for export to the highlands (Goldstein 1989, 2005). This is indicated by the presence of large storage facilities and high densities of agricultural implements, like hoes (Goldstein 1993a). While Cerro San Antonio does share similar features, like centralized storage facilities, they appear to be considerably smaller in the Locumba contexts and have been interpreted more as centralized storage for neighborhood or sector use. Likewise, while Tiwanaku-style stone hoes were relatively common at L1, the 0.001 hoe/m2 average surface density of these implements was only a fraction of the 0.0078-0.01 hoe/m2 average surface density that was identified at Chen Chen style settlements in the Osmore (Goldstein 2005:219).

This situation of agricultural self-dependency in the Valles Occidentales was juxtaposed with a far more dependent situation in the highlands, particularly at Tiahuanaco itself. While more details regarding trends in dietary preference and more articulated cuisine will be discussed later (see 11.4), here it is worth noting that 25% of the recovered consumable botanic remains from excavated contexts at Tiahuanaco derived from maize (Wright, et al. 2003:393). What is more, stable isotope analysis of human remains from Tiahuanaco and other southern Titicaca Basin sites suggests at least 50% and as much as 70% of highland diets came from maize, particularly during the Late Middle Horizon (Berryman 2010:278). There is of course great variability in the amount of maize that different residential communities consumed (Berryman 2010; Wright, et al. 2003), a point that will be raised later, but the high proportion of maize is notable considering the difficulty of growing this cereal in the south-central highlands generally. Kernel-to-cupule ratios as well as comparative measurements of preserved cobs further support that maize was imported to the highland center, with the Chen Chen-affiliated sustainable communities in the Osmore as likely producers of this critical crop (Hastorf, et al. 2006; Wright, et al. 2003:393). Based on the environmental constraints of the "mixed" water composition of the Locumba drainage (see 3.1), extreme excess yields, like those seen in the entirely "sweet" water Osmore drainage would likely not have been possible. However, that is not to say that agricultural yields, from maize to peppers, to the variety of local fruits, were not valuable items in caravan and other exchange based sustainable community ventures based in Locumba.

Surf & Turf: contextualizing differences in protein procurement

The diversified options in consumable plants weren't the only perk of living in the south-central coast subregion. Aquatic resources, both riverine and marine, made up portions of the Valles Occidentales diet during most of the Middle Horizon. In the Osmore enclaves, in excavations at Chen Chen-affiliated residential communities remains of marine protein sources (marine shell and fish bone) made up approximately 3.14% of all faunal remains (by weight) (Goldstein 2005:217), which is consistent with more recent stable isotope analysis which suggests only supplemental marine-based protein into Osmore diets (Somerville, et al. 2015). On the other hand, it should be noted that marine resources from generally later established Tumilaca-affiliated sites only totaled 0.92% of faunal assemblages (by weight) and marine resource don't appear to have been a part of Omo-affiliated sustainable communities at all (Goldstein 2005:233). An additional aquatic protein source present at settlements in all three affiliations were freshwater crayfish, which could have been procured locally in the middle valley

(Goldstein 2005:216).

While the Tiwanaku sustainable communities of the middle Osmore drainage may have incorporated only modest amounts of marine resources into their diet, those based in Cerro San Antonio relied quite heavily on them. As noted in Chapter 8 (see 8.7), over 65% of excavated contexts at L1 yielded marine shell and/or fish bone, which represented 14.05% of all faunal remains (by weight). This dramatic difference in the reliance on marine resources between these two mid-*yunga* settlement complexes can be, at least partially, explained due to proximity to the *chala* and the coast. The Osmore inhabitants would need to travel anywhere between 65-95 kilometers, or 2-3 days travel, to reach the coast. Whereas from Cerro San Antonio to the coast is only about 40 kilometers or about two days travel. Also, importantly, due to an incised canyon at the *yunga-chala* ecozone boundary in the Osmore, transportation corridors led travelers out of the fertile and more hospitable valley and into the desert, where those coming from Cerro San Antonio could follow the Locumba valley all the way to the coastline.

Figure 246. Map showing caravan routes and distances between Omo, Cerro San Antonio, and the coastal access points.

With only 50-60 kilometers of travel distance (about two days travel[204]) between the middle Osmore and middle Locumba drainages, it may have been easier for the burgeoning sustainable communities at locations, like Omo, to get their marine resources through the sustainable communities operating from Cerro San Antonio who would have had a much easier time accessing these marine resources. This is supported by the presence of at least one residential community at L1, those occupying Domestic Structures L1L-2 and L1L-3 in Neighborhood IV of Sector L, that appear to have served as fishing specialists in the local sustainable community network.

[204] I have spoken with multiple sources in both Locumba and Moquegua who have personally made the intervalley journey from the Osmore to the Locumba on foot. They all agree that the trip can be completed in just over a day, with most saying they made the journey at night, during clear, full-moon conditions to avoid the harsh desert heat.

Significantly, to date, no marine species have been identified at Tiahuanaco (Vallières 2012:296-297). That is not to say that those in the Titicaca Basin were stuck with only terrestrial fare, as lake fish as well as aquatic birds (ducks, ibis, flamingo) have been identified in faunal assemblages at Tiahuanaco and neighboring settlements (Vallières 2012:296; Webster and Janusek 2003). It is possible in the Middle Horizon, like later periods, residential communities located near the lake shore would have also been specialized sustainable communities, targeting the lacustrine resources of Lake Titicaca (Janusek 2008:176-182). However, the fact that no marine resources, shellfish or boney fish, were being sent from the coast is significant as it indicates that these items did not play a role in sustainable community exchange between the south-central highlands and the south-central coast.

While the sustainable communities of the Valles Occidentales may have ensured more varied protein procurement via marine exploitation, those in the highlands appear to have enjoyed a more varied set of protein inputs deriving from non-camelid mammals. Domesticated guinea pigs made up between 14-15% of recovered animal bone at Tiahuanaco (by weight), with an additional 1-3.5% coming from the wild rodent, vizcacha, and at least 3-3.5 coming from wild deer (Webster and Janusek 2003:345-346). This is far more than in the Locumba assemblage in which less than 1% of animal bone came from non-camelid mammals, like guinea pig, wild rodent, and bird. This is roughly the same pattern for the Omo and Chen Chen-affiliated Osmore faunal assemblages, though there was a marked increase in guinea pig bone to over 3% at the Tumilaca-affiliated settlements in the middle valley contexts (Goldstein 1989:350).

While the above-mentioned differences are notable, overall protein procurement seems more similar among Tiwanaku-affiliated sustainable communities than different. Camelid bone, almost entirely deriving from domesticated llamas (and possibly alpacas), is the most ubiquitous faunal remain recovered at every documented Tiwanaku-affiliated site, making it safe to say that camelid meat served as the primary source of animal protein for all Tiwanaku-affiliated communities. Excavations at various residential contexts at the center of Tiahuanaco reveal anywhere from 74-76% of all recovered animal bone came from camelids, with over 99% of animal bone recovered at L1 coming from these domesticated quadrupeds as well. While llamas and alpacas were first domesticated and most intensively utilized in the highland ecozones, as noted above, the south-central coastal river valleys also were quite suitable for pasturing camelids, meaning they may have been raised and pastured locally. That said, there is no doubt that these narrow valley systems could not have held nearly the numbers that the expansive *suni* and *puna* grasslands that defined the southern Titicaca Basin.

Highland Stews & Lowland Brews: culinary practices in the Middle Horizon

As has been discussed (see 10.4), the way in which sustainable community food choice and preparation preference is undergirded by symbolic community affiliations is generally referred to as cuisine. Yet the foodstuffs procured in the Valles Occidentales versus highland Tiahuanaco were often quite different. I will pursue these divergences in cuisine more below (see 11.4), but here I want to highlight similarities in culinary equipment between these contexts. Like cuisine, culinary equipment and associated practices are greatly affected by implicit symbolic community knowledge and explicit symbolic community affiliation (e.g., Bray 2003; Hastorf 2016; Weismantel 1989), but here I want to target the similarities in the suite of implements used in cooking and serving food and beverages as well as the overall surrounding built environment for these quotidian sustainable community tasks.

Most Tiwanaku-affiliated residential communities that have been sufficiently investigated via excavation reveal relatively well-defined kitchen spaces at the level of the house (see Goldstein 2005:196; Janusek 2003a, 2004b; Sitek 2010:24-25). Most frequently these spaces are found in designated rooms (i.e., walled spaces), though sometimes they simply represent a designated area within a broader central room. The defining feature of these spaces is a hearth used for cooking. Hearths could range greatly, with some being carefully dug and lined with adobe bricks or small cobbles and others being relatively crudely dug shallow pits. While these features would range greatly within major settlements, generally speaking those found at Tiahuanaco tended to be better established, with adobe or plaster lined hearths being relatively common (Janusek 1994, 2004b, 2005c:150). Conversely, in the Valles Occidentales contexts, hearths tended to be more informal, though a number of Chen Chen affiliated contexts utilized cobbles or even broken pieces of ceramic to reinforce hearth walls (Goldstein 2005:212-214). High densities of fuel remnants, most often smaller wood fragments and animal dung, as well as the remains of charred foodstuff, from botanics to animal bone, signified these spaces centered on food preparation.

While the presence of kitchen spaces is of course ubiquitous in cross-cultural contexts and therefore not necessarily indicative of shared affiliation between the highland Tiahuanaco city and the lowland settlements in question, their shared use of culinary equipment is. In kitchen spaces, sherds of plainware ceramic ollas are the most ubiquitous material type in Tiwanaku-affiliated domestic spaces (Goldstein 1985, 1993a; Janusek 2005a). While they could vary in certain stylistic elements (a point that will be raised below) the forms of these vessels were remarkably similar across the Tiwanaku sphere. In both the highlands and the *yunga* settlements, ollas generally came in two basic forms: a stout, wide-mouth form and a taller, pear-shaped variant, though these could be found in varying sizes (Janusek 2003b). Likewise, overall technological approaches, from paste to surface treatment, are extremely similar in the Osmore, Locumba, and the southern Titicaca Basin contexts, to the point where more detailed compositional analysis would be necessary to determine whether these vessels came from the same or different points of origin.

The primary use of this vessel type was cooking, though as will be noted below, for the Locumba context they seem to have also served as the primary storage vessel as well. That said, like most other kitchen-associated olla remains, the vast majority of sherds recovered at L1 show at least some signs of exterior burning. Globular, wide-mouthed ollas, such as those that define the Tiwanaku assemblage are generally viewed as facilitating stewing of meats, grain-based porridges, and other relatively liquid-based food dishes[205] (Bray 2003:9). Most ollas from Tiahuanaco had rim diameters of at least 10cm and more generally closer to 20cm in diameter (Janusek 2003b:57-58). This has been interpreted as facilitating the stewing of bone-on chunks of meat with supplemental starches like tubers (Janusek 2003b:58; Vallières 2012:308). Again, with an average rim diameter of 17cm, the olla assemblage recovered from Cerro San Antonio (see 8.1 for full breakdown), was very similar to the pattern at Tiahuanaco.

Reiterating this similarity in cooking-based culinary equipment is the general similarity in the suite of ceramic serving wares and associated paraphernalia used in eating and drinking. The kero and tazón dominate the serving wares of all documented Tiwanaku-affiliated sites, suggesting they were likely the exclusive implements for everyday consumption. As a stout, flared rim bowl, the tazón would have been ideal for eating and sipping stews and other liquid-based dishes (Janusek 2003b:63-65; Vallières 2012:309-312). While less ubiquitous, wooden spoons appear to have been the only utensils used in eating. This again attests to the prevalence of liquid-based dishes, like soups and stews, and fits well with the functionality of the above-noted olla cooking wares. Finally, as has been extensively documented in the ethnographic record (e.g., Cummins 1988), the taller flared rim goblets, or keros, were designed for consuming beverages (Janusek 2003b:60-63). Keros are most closely associated with the consumption of chicha (maize beer) (Goldstein 2003), but considering the botanic remains recovered at L1 (i.e. the prevalence of both molle berries and algarroba seeds - used primarily in beverages), could have been used to consume a variety of drinks made using lowland-based botanics. While some of the broader symbolic community implications of these trends will be reserved for a later discussion, here it is clear that Tiwanaku-affiliated sustainable communities situated in radically different environmental zones, using a different suite of ingredients, would

[205] This is opposed to frying or dry roasting-based dishes which require shallow and open-based vessels. (Bray 2003:9).

still maintain a remarkably similar suite of culinary practices in their everyday subsistence.

Making & Moving in a Low-Gravity World-System: craft and trade during the Middle Horizon

In addition to producing goods for basic subsistence, sustainable communities were also responsible for the crafting of various goods, including acquiring raw materials for their manufacture and ultimate trading of some finished products. This section works to contextualize the crafting documented at Cerro San Antonio with that cited for other Tiwanaku affiliated sites. Here I also attempt to trace any verifiable imports to the middle Locumba Valley during the Middle Horizon and, conversely, where Cerro San Antonio's imprint might be visible elsewhere in the South-Central Andes.

Different Strokes for Different Folks: everyday crafting in the South-Central Andes

As discussed in Chapter 10 (see 10.2), sustainable communities at Cerro San Antonio appear to have done most crafting of implements for everyday activities internally. There is good evidence that sustainable communities completed most basic textile maintenance and lithic tool production household settings. There is also evidence for some more limited ceramic production and stone bead manufacture in the documented L1 contexts.

While more sourcing of materials is necessary to confirm, most raw materials needed for these crafts could have been procured locally as well. Some materials, like clay and temper materials for ceramics, water worn granite cobbles and basalts, used in most flaked agricultural implements and ground stone tools, could literally be gathered within the bounds of the site. Other materials, like wool and cotton for textiles, were available from herds of camelids and stands of cotton in the adjacent valley bottom. Similarly, even the blue stone (likely chrysocolla) used in beads could have been found locally[206]. In sum, utilizing mostly generalized strategies,

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[206] I have personally observed what appear to be naturally occuring nodules of blue and greenstone as part of the

supplemented with limited specialization where needed, sustainable communities at Cerro San Antonio, appear to have been able to generate most of the items needed for day-to-day activities.

Similar patterns of local crafting were also identified in the Osmore communities. As with the evidence from L1, Omo, Chen Chen, and particularly Tumilaca affiliated sustainable communities appear to have been geared largely towards self-sufficiency (Goldstein 2005:221-225, 232-234). Basic textile and lithic manufacture appear to have been completed in most household-level contexts in the middle Osmore (Goldstein 2005:221). Also, like Cerro San Antonio, some crafting tasks like bead manufacture and other stonework appear to have been relegated to specialized locations. Importantly, whereas specialized bead manufacture at L1 was completed within a single household (Domestic Structure L1L-1), in the Osmore settlements this craft was conducted in a specialized workshop. This lapidary workshop was adjacent to the associated residential settlement but showed little evidence for in situ residence (Goldstein 2005:221-222). This pattern suggests that both Locumba and Osmore-based sustainable communities employed specialists for this crafting activity, but the scaled-up size of the sustainable community networks based in the Osmore required an equally scaled-up space to facilitate this activity, bringing it out of the household and to its own location.

Finally, in the highlands centers in the southern Titicaca Basin like Lukurmata and Tiahuanaco, there appear to have been both similarities as well as stark differences with the sustainable community crafting configurations of the Valles Occidentales. On one hand, most of the walled compounds at major highland settlements showed some evidence for basic crafting, from weaving to other quotidian tool manufacture and repair (Bermann 1996:114-115; Janusek 1999:113). These compounds likely ranged greatly in size, with most representing multi-house, neighborhood-level residential configurations, but some were also much smaller, representing a

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natural geological surface litter

single house unit. As in the settlements in Locumba and Osmore, many basic crafting needs were completed in-house for immediate use in the south-central highlands.

However, some patterns in production refuse in compounds at Tiahuanaco, for instance lithic debitage, suggests that some household-based sustainable units may have specialized in the production of stone tools, and particularly chert projectile points. Refuse indicates production beyond the need of the compound, and possibly for use by higher-status residential communities residing in the settlements monumental core), in what could be considered a dispersed corvée arrangement (Giesso 2003:375-380; see also Costin 1991). It is also possible that these points produced at Tiahuanaco were exported to the south-central coast. Projectile point forms are remarkably similar, in not just form[207], but preference for white or light grey cherts, throughout both the south-central highlands and south-central coast during the Middle Horizon (see 8.2 for L1 examples; see also Goldstein 1989:381-382; 2005:105,). In addition, while lithic debitage was common to find in L1 contexts, flakes or other debitage of the white/grey that most projectile points are knapped from, is almost absent. Despite this, while microscale residential community manifestations at the level of house and neighborhood would differ greatly between the highland and lowland contexts, many daily responsibilities of microscale sustainable communities remained the same.

However, in addition to the more generalized extra-household or neighborhood-level production, like the aforementioned projectile points, even more pronounced sustainable community specialization was also present in the highland centers (Janusek 1999). In a sense, this focused craft specialization combines the in-house specialization documented for crafts like bead manufacture at Cerro San Antonio and the small workshop attached to a sector-level settlement arrangement documented for lapidary work in the Osmore. Instead, at Tiahuanaco and neighboring Lukurmata, a number of entire residential communities appear to have taken

[207] This is form 4E in Klink and Aldenderfer’s projectile point chronology for the south-central highlands

up specialized crafting roles in Tiwanaku's central sustainable community network. One of the best documented examples of this sector-level sustainable community specialization was uncovered in Ch'iji Jawira, a aperipheral residential sector outsideof Tiahuanaco's monumental core (Janusek 1999; Kolata 1993:170-172; Rivera Casanovas 1994, 2003). Here, several contexts show evidence for the manufacture of a variety of ceramic wares, but particularly tazónes (Janusek 1999:113-115; Rivera Casanovas 2003).

Similarly, the district of Misitón at the neighboring major settlement of Lukurmata, shows long-term specialization in the manufacture of camelid bone panpipes (Janusek 1999:119-121). Both sectors in these examples hosted standard sustainable community activities, suggesting these remained, first-and-foremost residential areas (Bermann 1994, 1997). This residentially-based specialization in broader sustainable community craft production has been referred to as embedded specialization, falling between top-down elite- or state-sponsored specialists and bottom-up independent production (see Janusek 1999). Despite major differences in the built environment and overall setting, the local residentially-based crafting at Tiahuanaco seems to differ from those in the Valles Occidentales more in scale than in kind.

From Chala to Omagua: access to the global during the Middle Horizon

While many subsistence- and crafting-based sustainable community activities may have been locally based, both in lowland and highland settings, there is also clear evidence that sustainable communities were engaged in the movement of goods across the landscape at this time. In fact, while trade, manifesting most strikingly in the South-Central Andes as llama-based caravans (see 11.1), had played a significant role in the culture-history of the region for millennia (Bandy 2004; Browman 1974; Capriles and Tripcevich 2016), during the Middle Horizon this sustainable community-oriented institution would take on new prominence (Vallières 2016). One of the primary functions of the symbolic communities that would come to form the core of the centralized institutions at Tiahuanaco and the basis for the Tiwanaku state was scheduling the caravans that served as the sustainable community links between the nodal residential community networks of the broader South-Central Andes (Browman 1978, 1984; Janusek 2013; Kolata 1993, 2003a).

While limited to certain sustainable community needs, nowhere is this increased regional interconnection clearer than at the center of Tiahuanaco itself. For instance, some non-local materials, like obsidian and copper alloys were likely brought in from all over the south-central highlands and from regions as distant as San Pedro de Atacama (Cifuentes, et al. 2018; Giesso 2003:364-369; Lechtman 2003:408-409; Salazar, et al. 2011; Schultze 2008; Tripcevich 2010), but most materials needed for crafting were available in the broader southern Titicaca Basin (Janusek 1999). Likewise, as noted just above, many craft goods were largely manufactured in specialized residential sectors at Tiahuanaco and neighboring sites like Lukurmata.

Indeed, even much of the subsistence base could have been provided in the local hinterland (Janusek and Kolata 2004), using raised fields and other highland agricultural strategies to cultivate a whole variety of tubers and chenopods, as well as hosting huge herds of domesticated camelids in the surrounding altiplano (see 2.3) (Stanish 2002). However, the fact that at least 35% and likely upwards of 75% of the caloric intake of many individuals living at the highland center came from maize (Berryman 2010:278), suggests major bulk subsistence good imports from lower-elevation sustainable communities. While more portable trade goods could be facilitated by small caravans, the transportation of large quantities of grain, even would require much more substantial investment in caravan-based exchange due to bulk transport logistics (Browman 1984). As has already been noted, analysis of consumed maize remains at Tiahuanaco and maize processing/storage facilities identified at Chen Chen-affiliated settlements in the Osmore(Goldstein 2005:216-221; Hastorf et al. 2006; Wright, et al. 2003), point to sustainable communities operating in Moquegua as one of the primary producers of this import. However, it is also likely that other sustainable communities in the Valles Occidentales, like those based at Cerro San Antonio, as well as the temperate eastern *yunga* valley systems in the Cochabamba-Mizque area (Anderson 2009), would also have contributed to this lowland-to-highland bulk-good exchange.

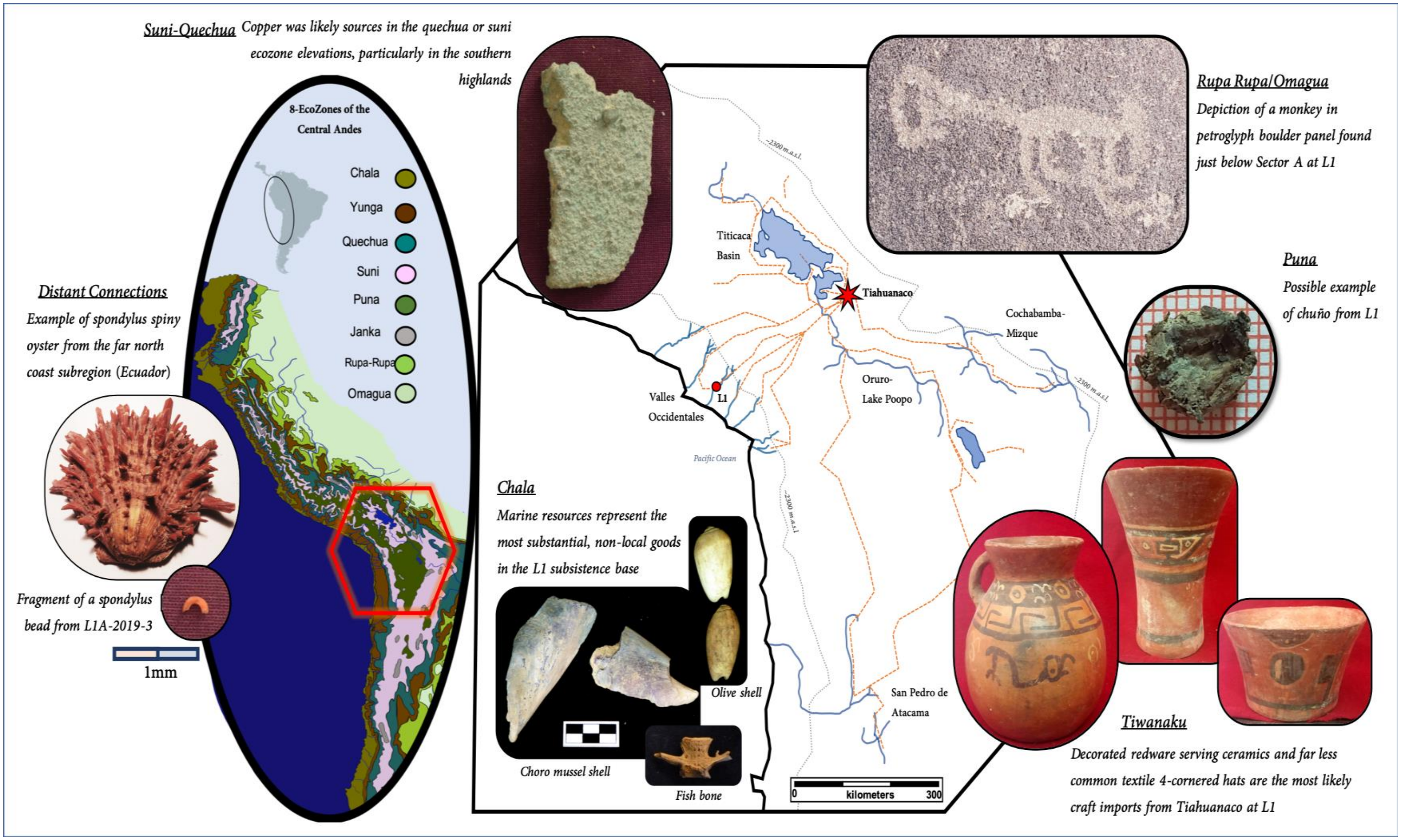


Figure 247. Some of the examples of non-local materials recovered from Middle Horizon contexts at Cerro San Antonio (L1) in the middle Locumba Valley.

Long-distance connections, and processes of sustainable community exchange more generally, would occur much differently from a Locumba-centric point-of-view. As noted above, unlike those situated in the highlands, the sustainable communities based in the Valles Occidentales needed very few bulk good imports. The primary crop, maize, could be grown year-round and a suite of other crops as well as wild arboreal fruits could be cultivated and exploited locally. While traditionally associated with highland ecozones (Bruno 2014), staples like quinoa (and related domesticated and wild chenopods) and a variety of tubers that were present in the L1 assemblage, could have been cultivated locally as well. However, multiple examples of parenchyma in the L1 macrobotanic assemblage appear to be fragments of *chuño,* or freeze-dried potato (Figure 247), that due to preparation would necessarily be imported from the higher elevation *puna* or *suni*.

However, the only basic subsistence goods that were confirmed to be non-local were the marine resources. Choromytilus mussel was the most common edible good obtained from the *chala*, but other clams and mussels, sea snails, urchin, as well as boney fish were also regular imports from the coastal ecozone. As discussed above, there is evidence to suggest that the sustainable communities housed in Neighborhood IV in Sector L were exploiting these marine resources directly, as opposed to more exchange-based acquisition strategies.

Similarly, many raw materials used in on-site crafting appear to have been acquired more-or-less locally, though a few materials suggest more distant connections for the middle Locumba settlement complex. For instance, copper alloys could have been mined from semi-local sources in the upper Locumba drainage in the *suni* and *quechua* ecozones. Similarly, most marine shells used in beads, such as whole olive shells and worked choro, were collected from the local *chala*. However, a single bead fragment, recovered in the Neighborhood I storage complex in Sector A (Block L1A-2019-3), was worked from spondylus shell (Figure 247). In addition to holding special symbolic community significance in a number of premodern Central Andean societies, particularly the Wari and later Inca (Blower 2000; Glowacki 2005; Paulsen

1974), this brightly colored spiny oyster could only be found in the coastal waters of the far northern coast subregion, some 1800 kilometers north of the Locumba drainage.

This is important, not only in that it suggests down-the-line sustainable community network connections that reach impressive distances, but also in the fact that, to date, no spondylus has been recovered at Tiahuanaco or other major Tiwanaku-affiliated settlements in the highlands (Janusek 2008:287). The one exception is small amounts recovered in Chen Chen-affiliated contexts in the Osmore (Goldstein 2005:298; Goldstein and Sitek 2018:457), again suggesting sustainable community links between the two Valles Occidentales networks that excluded their highland connections. What is more, as noted above, while most sustainable community networks affiliated with Tiwanaku appear not to have trafficked in spondylus, those centered on Wari did (Glowacki and Malpass 2003); possibly suggesting a tertiary connection with Tiwanaku's peer-polity in the Middle Horizon. A final distant connection, that is at least signaled at Cerro San Antonio, is an unambiguous depiction of a monkey (Figure 247) in one of the petroglyph panels on a boulder just below Sector A. While no non-human primate remans have been identified in the L1 assemblage, this image suggests a resident of L1 had a clear visual knowledge of fauna from the tropical forests of the *rupa rupa* or even *omagua* on the other side of the cordillera.

A final important note is that, while still to be confirmed though compositional sourcing analyses, the only non-locally produced, completed craft goods recovered at Cerro San Antonio are likely to have originated from specialized sustainable communities centered in the southern Titicaca Basin. One of the most likely candidates for imports from the Tiwanaku core are at least some redware serving ceramics. Following a well-documented trend for Tiwanaku-affiliated settlements in the Osmore, the vast majority of vessels and sherds from L1, including those belonging to redware serving forms (Figure 247), appear identical to defining assemblages at Tiahuanaco and neighboring centers in the south-central highlands (Alconini 1995; Goldstein 2005:223-224; Janusek 2003b). Nonetheless, recent compositional analysis of sherds from

Tiwanaku-affiliated contexts in the Osmore suggest that up to 90% of redware vessels were composed of locally-sourced clays (Sharratt, et al. 2015:408), suggesting in situ communities of practice with near identical production strategies to those centered at Tiahuanaco and elsewhere in the highlands. However, considering that redware serving forms were truly ubiquitous in the Osmore as well as at L1 (Goldstein 1985), if even a small percentage of them were imported, the importation would represent a sizable sustainable community task.

The other likely craft imports were some complete textile garments or their raw material components, notably polychrome tunics and 4-cornered hats. As noted above, these polychrome textiles required a range of wools and dyes and specialist expertise, as well as significant sustainable community sponsorship to complete such labor-intensive crafts (Goldstein 2005:224; J. Jones 1990). As will be highlighted more below, in both tunics and hats and the more common redware serving wares, standardization, in not just forms but decorative motifs, suggests that the symbolic community knowledge underlying these sustainable community crafts were quite well defined and likely centered in more focused workshops; a possible example of the embedded crafting pattern at Tiahuanaco described above (Janusek 1999). Finally, it is also no coincidence that redware serving wares and 4-cornered hats bear complex iconography and represent the most explicitly symbolically charged items recovered at L1, again a point that will be raised below.

I discuss political economy further below, however, it is worth noting here that despite the relatively decentralized nature of exchange in the Tiwanaku-affiliated sustainable community network, there are signs of the dendritic configurations resembling the economic format of world-systems (Hall, et al. 2011; Peregrine 2000; Santley and Alexander 1992; Wallerstein 1993). In the case of Tiwanaku, there is clear evidence of bulk goods coming into the Tiahuanaco center, in the form of large quantities of maize. Conversely, while much of the crafting needed for everyday life was done in situ, particularly in ecologically well-endowed contexts like the Valles Occidentales, symbolically charged craft goods, especially textiles and some redware ceramic wares were essential components of consumption and more broadly served as definitional elements in being Tiwanaku.

11.4 Oriented Hearts & Minds: diagnosing Tiwanaku's globally-oriented symbolic communities as ethnicity

Here in the final subsection of the macroscale analysis I hope to contextualize the traces of symbolic community described at Cerro San Antonio with those detailed elsewhere in the Tiwanaku sphere. As formulated here, symbolic communities are the most pervasive modes of community (see 1.2). These communities develop to grapple with retaining and transforming hierarchies of value through a suite of behavioral mechanisms that center on maintaining information over space and through time. From creative play and rigid ritual to a propensity for drama and storytelling, symbolic communities are arenas of meaning-making and the venues of teaching and learning. Needless to say, knowledge retained in these community formations delimit what is truly normal, what is definitively extraordinary, and everything in-between. This framing of lived experience in turn informs both implicit habit and explicit performance.

As with the mesoscale analysis of symbolic community manifestations at L1 (see 10.3), here at the macroscale I attempt to parse out two categories of symbolic community affiliation. I situate these historically, particularly looking for how institutions centered at Tiahuanaco and the surrounding Titicaca Basin impacted those in the middle Locumba Valley over the course of the Middle Horizon. First, I attempt to highlight what evidence there might be for highland-centered symbolic community practice implicitly informing, constraining, or even determining daily practice at Cerro San Antonio. Next, I identify different ways in which Tiwanaku affiliation was explicitly pursued through performance and other outward signaling.

Internalizing Tiwanaku: ethnic habitus & provincial ethnogenesis at the end of the Middle Horizon

In this subsection I work to explain how the most ubiquitous sustainable community activities delineated at Cerro San Antonio reflect both deep-set highland-originating tastes as well as new emergent preferences in how these basic tasks were carried out. The suite of what I would term implicit symbolic community habits that form the basis of everyday tastes and preference are what is referred to in practice theory as habitus (Bourdieu 1977). Shared habitus among residential communities, across a certain space, is often viewed as the key sign of shared ethnicity (see Barth 1998; S. Jones 1997; Reycraft 2005; Stovel 2013). As with the mesoscale discussion of these basic themes, here I concentrate most intensively on how these symbolic-sustainable community intersections can be observed in cuisine and crafting in Locumba and elsewhere in the South-Central Andes during the Middle Horizon.

Some Like It Hot: understanding a new regional Tiwanaku cuisine

Some of the essential similarities and differences in dietary preference and associated culinary practices across Tiwanaku-affiliated contexts have already been described above. Here I want to synthesize these discussions and specifically highlight how highland culinary techniques, from cooking to serving methods, as well as a few basic highland food staples defined the cuisine of Tiwanaku-affiliated communities wherever they settled. For instance, without exception, cooking ollas, in the same exact forms that emerged in the southern Titicaca Basin at the onset of the Middle Horizon, particularly at Tiahuanaco (Alconini 1995:51; Janusek 2003b:57-58), characterize every Tiwanaku domestic assemblage in the Valles Occidentales (e.g., Boswell 2009; Goldstein 1985, 1995, 1996; Uribe 1999). Highland style stews were apparently still the essential culinary approach for these *yunga*-based communities.

Likewise, the way in which people ate and drank in the Valles Occidentales would essentially match what was delineated for communities in the highlands. Like the olla for cooking, the tazón is essentially the only serving dish that was likely used in any frequency for eating (Janusek 2003b:63-65). The flared-rim forms of these vessels also corroborate the eating of liquid-based stews, likely eating larger starches (potato, maize on the cob) as well as small packages of protein with spoons or fingers (Vallières 2012:309-311). Again, drinking was also defined by a single overall vessel form, the kero (Janusek 2003b:60-63). Below I will delve into the explicit symbolic community potency these serving vessels likely carried, but in spite of their role in more conspicuous forms of consumption, it is important to emphasize that they also defined the truly quotidian consumption of everyday life. Finally, the fact that this basic culinary equipment remained relatively unchanged in form both in highland and valley represents a stable macroscale symbolic community, or an element of shared ethnicity.

Like the vessels used to cook and serve, ingredients of the cuisine itself would also be consistent across these distinct South-Central Andean contexts. Probably the most significant area of overlap was the clear centrality of camelid meat as the primary protein source (Vallières 2016; Webster and Janusek 2003). Domesticated camelids, particularly llamas, became an increasingly important resource to south-central highland sustainable community practices during the Late Formative, and a truly central dietary resource during the onset of the Middle Horizon, with at least one district at Tiahuanaco likely geared specifically towards tending herds for local consumption at the major center (Vallières 2016). Again, this major dietary focus of camelid meat appears to have been carried down to the Valles Occidentales contexts. As noted above, a number of lines of evidence suggest that the Omo-affiliated groups in the Osmore were focused pastoralists (Goldstein 2005:311-314), and, as with L1, the faunal assemblage of every major context of all affiliations was dominated by camelid remains. Notably, most domestic units would also include at least some amount of guinea pig (*cuy*), though as noted below, these domesticated mammals would vary greatly in overall frequency between contexts at L1.

Another significant overlap in overall cuisine between highland and lowland contexts was a focus on maize (Hastorf, et al. 2006). The significance of the heavy reliance of this largely lowland crop in the context of the urban population at Tiahuanaco has already been noted above, but it is important to reiterate that this was the most dominant crop in all Tiwanaku-affiliated contexts, both in highland and lowland areas. Significantly, the consumption of this cereal was both in the form of a standard food as well as in fermented beverages. Again, more will be said later about the role of maize, particularly in liquid fermented form and the role it played in Tiwanaku ritual. Other staples of the pan-Tiwanaku cuisine included a variety of tubers, legumes, and chenopods, all of which appear in every appropriately sampled Tiwanaku-affiliated context (Wright, et al. 2003).

However, as noted above, the ecological constraints of each region do appear to have greatly influenced what was consumed. This effectively formed regional variants of this broader ethnically Tiwanaku cuisine. For instance, diets at Tiahuanaco appear to have relied on significant amount of tubers and chenopods as well as a variety of resources, from fish to algae, from nearby Lake Titicaca (Vallières 2012; Wright, et al. 2003). As for the Valles Occidentales, the closely related dietary assemblages from Cerro San Antonio with those affiliated with the Chen Chen style occupation in the Osmore suggest a new regional variant of the traditional Tiwanaku cuisine had solidified sometime during the Late Middle Horizon. This diet relied particularly on maize, more than their highland counterparts, as well as incorporating the whole suite of domesticates available in the *yungas*, particularly squash/gourd, chili peppers and peanut (Goldstein 2005:216). Late Middle Horizon Valles Occidentales cuisine, and particularly that of the Locumba settlement, would also supplement with a variety of protein from marine resources as well as fresh-water crayfish from the nearby rivers (Goldstein 2005:232; Stanish 1991:115). Even the beverages would be updated in this new cuisine. Algarroba, known for being used as a drink sweetener and molle berries, known for adding spice to beverages, were both found almost ubiquitously at L1 as well as Chen Chen affiliated contexts in the Osmore (Goldstein 2005:216), suggesting these botanic items may have been used for spicing up the local fare.

Finally, even within subregions, cuisine was far from uniform. Tiwanaku cuisine would be quite flexible and no two residential contexts have revealed identical dietary composition. This is particularly true when zooming in to the microscale. From compounds at Tiahuanaco to individual houses at Cerro San Antonio, households and even individual families appear to have each had their preferences in cuisine. Ultimately, there were three basic tiers to Tiwanaku cuisine: 1) at the broadest level there was a Tiwanaku ethnic cuisine, largely based on highland cooking methods and food staples, 2) In different communities, supplements would be added to the standard Tiwanaku cuisine, forming regional variants, and, at the smallest scale 3) households and even individual families would select from the regional cuisine and develop their own family preferences.

When Things Fall Apart: crafting communities of practice in the Terminal Middle Horizon

Crafts can be some of the clearest ways in which symbolic community expression takes place. Indeed maintaining, implementing, and ultimately disseminating the know-how in manipulating material goods was likely one of the principal catalysts for the evolution of symbolic communities in the deep past. Both raw materials and finalized craft goods may be loaded symbolic community value and their procurement and exchange drive a significant amount of sustainable community activity (Schneider 1977). The symbolic community importance of crafts is amplified through stylistic choices and specifically through the incorporation of iconographic elements, which can signal the affiliations of the craft producers or consumers (Conkey and Hastorf 1993; Hegmon 1992). While often less visible in finalized products, the technological strategies employed in production can also tell a lot about craft producers and the more implicit symbolic community undercurrents in this sustainable community activity. Relating symbolic community knowledge and sustainable community practice to not just making, but learning and teaching, has have become known as the archaeology of communities of practice (Dorland and Ionico 2020; Lave and Wenger 1998; Roddick and Stahl 2016).

As with all areas where the different modes of community reliably or consistently overlap, communities of practice effectively represent institutions in my community ecology formula here and can emerge in multitudes of ways. Of course, the making of food and drink as described above in the context of cuisine is a good example of this institutional emergence, rooted in making. However, unlike cuisine, in which regional variants appear to have formed relatively quickly in the Valles Occidentales, the products created by crafting communities of practice in many Tiwanaku-affiliated settlements abroad would show remarkable consistency with those in the highland centers of the southern Titicaca Basin. For instance, in terms of some of the most quotidian crafts, from basic textile repair to stone hoe production, the basic Tiwanaku ethnic crafting routine was situated in households (Goldstein 2005:221-225; Janusek 1999). As with cuisine, households appear to have had preferences for the way in which crafts were completed. No doubt raw material availability played a role, but overall, these household crafting communities of practice appear to have followed similar rhythms in carrying out these tasks.

In communities of practice, shared knowledge and practices, like those defining the everyday crafting of households described above, is accessed individually and informally through observation and some basic corrective instruction from more experienced individuals in the household (see Roddick and Stahl 2016 for numerous archaeological examples). As with cooking, this learning is likely a drawn-out practice, with younger generations obtaining skills from older generations throughout childhood. More complicated crafts required more explicit and punctuated instruction and much more carefully curated symbolic community knowledge (see Costin 1991 for a full range of these arrangments). This was particularly true when crafts, as suggested above, also incorporated more elaborate stylistic elements or explicit iconographic messaging. Logically, standardization in crafts over distance and through time, particularly in more symbolically explicit media, suggests some form of strong coherence in the symbolic community network structure underwriting their production.

While a number of different crafts from Cerro San Antonio would fit this description, particularly textile manufacture, by far the most ubiquitous and symbolically rich preserved craft items were redware ceramic serving wares. Ceramic serving vessels were almost always decorated with at least some form of iconography (see 8.1) (Goldstein 1985; 1989:72-74). As with the Omo- and Chen Chen-affiliated contexts in the Osmore (Goldstein 2005:223-224), in Locumba Middle Horizon contexts, almost all serving wares match in form and style to those that define ceramic assemblages at Tiahuanaco and neighboring highland sites. To the naked eye, even in cross-section, ceramic pastes and firing techniques appear identical. However, as noted above, initial compositional studies of ceramics recovered in the Osmore suggest that likely around 90% of these vessels were produced using locally harvested clays (Sharratt, et al. 2009; Sharratt, et al. 2015). While this does still leave open likelihood, that Tiahuanaco (or at least Tiahuanaco's source for ceramics) exported some serving wares to other locations, it appears much of the production occurred locally. However, the consistency of Tiwanaku-style serving wares produced over such long distances, not to mention over the course of generations, suggest well-maintained communities of practice with a clear set of explicitly taught skills.

However, it should be noted here that this clear connection in communities of practice would not be static through the Middle Horizon. Again, compositional sourcing studies will help definitively delineate how redware ceramics moved around the landscape, but two previously delineated style-based trends regarding redware vessels during the Terminal Middle Horizon are worth repeating here (see 2.3 for full review).

One trend was initiated in the middle Osmore at the tail-end of the Late Middle Horizon with the emergence of Tumilaca style of Tiwanaku-derived pottery. A true case of ethnogenesis, Tumilaca-affiliated communities were initially established in the middle Osmore, after fissioning of Chen Chen-affiliated groups. Initial Tumilaca-contemporary settlement is defined by a continuation of the community configurations that defined their Tiwanaku-affiliated counterparts in the valley, including the production of redware serving wares. Tumilaca redware, while still defined by carefully sorted, fine-grained pastes and significant burnishing, would nonetheless begin to diverge from the central Tiwanaku style (Goldstein 2005:232-235; Sharratt 2016, 2019). For example, the size of keros would lose their standardization, generally increasing in size.

Likewise, vessel decoration, while still drawing on central Tiwanaku motifs, would also lose its standardization, often with decoration appearing to have been done quite quickly and often restricted to geometric elements (Sharratt 2011, 2016). Whether through intentional choices or not, there was a clear disconnect in the communities of practice that now crafted these vessels for Tumilaca sustainable communities from those that produced for other Tiwanaku-affiliated groups (Sharratt 2020). This disconnect would become total during the Terminal Middle Horizon as Tiwanaku experienced institutional collapse in the highlands and the Chen Chen-affiliated settlements in the Osmore were largely abandoned. Tumilaca would spread to the upper Osmore, all the way to the *quechua* ecozone, and down into the lower Osmore in the *chala*, bringing with them these remnant Tiwanaku-influenced communities of practice (Owen 2005; Owen and Goldstein 2001).

The second trend occurred in the middle Azapa drainage, south of Locumba. Here, there was very little direct Tiwanaku-affiliated community interference until the end of the Late Middle Horizon (Goldstein 1995; Korpisaari, et al. 2014; Muñoz Ovalle 2019). However, since the late Early Middle Horizon, local symbolic communities in Azapa had begun to incorporate Tiwanaku inspired media into their sustainable community crafting activities, particularly in ceramic serving wares (Dauelsberg 1972; Uribe Rodríguez 1999). This emulative style, called Cabuza, would be defined by forms that roughly fit the Tiwanaku assemblage, including keros and tazónes, but were much less standardized and often roughly formed (Uribe Rodríguez 1999:197-201). Iconographic design elements would still be ubiquitous features to these vessels, but often would be rudimentary geometric elements or simply squiggly lines. Again, it is clear from these ceramics that the communities of practice that generated the Cabuza ceramics were never directly informed by the broader symbolic community that underwrote Tiwanaku redware crafting and were merely emulating a valued style. Significantly though, throughout the Terminal Middle Horizon and even into the Late Intermediate Period, this emulative style would spread throughout the Valles Occidentales and represent one of the last true vestiges of communities of practice that had been inspired by Tiwanaku.

I review Tumilaca and Cabuza styles here as they are both found at Cerro San Antonio, albeit in very small numbers. Pending compositional sourcing, initial attribute analysis suggests the majority of redware at the site were produced under the strict Tiwanaku rubric that define Chen Chen style Tiwanaku assemblages in the Osmore. Even pastes of Locumba examples look indistinguishable from those described for Osmore contexts as well as those in the southern Titicaca Basin. This visual assessment holds true for all by five redware sherds recovered from excavations in Sector A, Sector L, and Sector U, and the majority for those recovered in the systematic surface collection. Relatively few sherds, most collected as special spot finds, clearly fit the parameters of these divergent Tiwanaku-affiliated styles. Most of these sherds are defined by iconographic elements that are considered Tumilaca, wand are from well-made vessels that are lacking in standardization, including in the execution of decorative elements. There were also example sherds that appear to be more aligned with the emulative Cabuza redwares, both in form and decoration.

Without elemental sourcing, it is yet unknown if vessels of these Tiwanaku derivative redware styles were produced by sustainable communities at L1 or imported. As noted in Chapter 10 (see 10.2), there is even good evidence for local ceramic production at L1, in the form of raw clay processing, ceramic firing refuse, and polishers and other finishing tools, all clustered in the southern half of Sector L.

Figure 248. Examples of corporate versus possibly later derived variants – all collected from Cerro San Antonio.

Interestingly, also located in this same area of Sector L as the evidence of ceramic production, were sherds, representing some of the clearest examples of serving wares that fell outside the general Tiwanaku redware standards. First, all of these sherds came from vessels that appear to have fit the general banded-kero form, but much larger variants than what define the rest of the assemblage. All these sherds indicate much thicker vessel walls than a typical Tiwanaku kero and burnishing was always minimal or absent. Most visibly detracting from the normal style was that a wiped layer of white pigment, applied over the red slip pre-firing.

These features fit the general Cabuza redware description. However, more in-line with Tumilaca modes of redware, these vessels all appear to have utilized classic Tiwanaku iconographic elements, particularly a thick chunky version of a typical step-stair and most significantly an anti-cephalic head element, that was restricted, even in the standard Tiwanaku assemblage. Finally, break-edges of these sherds revealed an unusual grey paste, that at times appeared to have bubbled, likely due to poor temper mixing or over-firing. Thus a number of lines of evidence suggest that the potters that made these vessels on-site were not as well practiced in the Tiwanaku tradition and likely not connected to the same communities of practice that produced most of the other vessels of the L1 assemblage.

This case from Cerro San Antonio is significant for a number of reasons. The fact that the Cerro San Antonio assemblage shows evidence for standard Tiwanaku, Tumilaca, and Cabuza style pottery at a single site makes sense. As noted at the onset of this chapter (see 11.1), the limited dates from contexts at L1 suggest a continuous occupation from the Late Middle Horizon through the end of the Terminal Middle Horizon. The presence of these derivative redware vessels and evidence for their local production suggest that *in situ* shifts in communities of practice likely occurred at Cerro San Antonio as the broader symbolic community network and emergent institutions that defined Tiwanaku began detaching from the highland center. Importantly though, even as some of the basic symbolic community knowledge structures that defined Tiwanaku crafting communities of practice clearly faded, higher-order symbolic community representations engaging the Tiwanaku cermic canon were still pursued.

<u>Externalizing Tiwanaku: performance & power in an early globalized world</u>

In this final subsection I work to compare and contrast more explicit projections of symbolic community affiliation as found throughout the Tiwanaku sphere. This involves how symbolic community strategies directly played out in the distribution of sustainable community resources, wealth accumulation, and power in defining the broader Tiwanaku political economy. Ultimately, I hope to show that it was the consumption-focused articulated worldview of religion, that formed the primary thrust of Tiwanaku's sway over symbolic community formations for half a millennium. However, despite Tiwanaku's globally-oriented macrosymbolic community formation, the logistical constraints of the South-Central Andes (see 11.1) would result in fundamentally localized manifestations of what we call Tiwanaku civilization.

Who's Running the Show?: evidence of rank and role in Tiwanaku society

As has been said several times, symbolic communities are the essential social formations that grapple with the negotiation of value. Said another way, symbolic communities are inherently the community configurations through which individual attention, respect, and general affective energy is channeled. The affective energy of symbolic communities is ultimately hierarchically arranged in suites of cognitive structures that can be translated into goal-oriented human action (and visa-versa). Individuals embodying these values who can most competently negotiate thesehierarchies are those who inherently occupy positions of power. Of course, these positions can come in any number of forms Some positions of power represent ephemeral responsibilities in punctuated moments, others can be enduring and disseminated to a successful individual's symbolic and residential communities and descendants. When these more enduring or generational positions come with wealth, whether in physical or symbolic media, elites can be said to exist.

A significant portion of Chapter 1 was devoted to delineating how both individual aggrandizing strategies of elites as well as unavoidable results of symbolic-sustainable community interaction led to increasingly centralized emergent institutions such as the state (see 1.3). Likewise, in Chapter 2, I explained how some of these processes appear to have occurred in the South-Central Andes with the emergence of Tiwanaku (see 2.3). While I will not repeat that discussion here, Janusek synthesized the most comprehensive list of what I would term primary symbolic community pathways to institutional power during the Middle Horizon (see Janusek 2004c, 2008, 2013). Following Janusek (Janusek 2013:207), these include:

1) Generating novel ways to incorporate diverse regional markers of symbolic community affiliation into a synthetic and easy to translate suite of iconography, including new ways to imprint this on mobile and largely individualistic media, like ceramic serving vessels and woven clothing items (e.g., Augustine 2019; Conklin 2009; Isbell 2008; Isbell, et al. 2018; Janusek 2002).

2) Advancing a new celestial-based calendar used to orchestrate seasonal ritual events, used to draw-in and coordinate macroscale sustainable community networks (e.g., Browman 1981, 1984; Janusek 2012; Kolata 2003a; Zuidema 2009).

3) Instituting a new order to the built environment; one that could be applied to quotidian residential community manifestations as well as sacred monumental precincts, but which fundamentally emphasized public versus private space and particularly the transition between the two (e.g., Goldstein 1993b; Janusek, et al. 2013; Kolata 2003b; Kolata and Ponce Sanginés 1992; Vranich 2010).

4) Expanding a preexisting consumption-based ritual mode of production, centered on provisioning and hosting punctuated feasting holidays as well as defining the basic consumption of everyday life (e.g., Bandy 2013; Goldstein 2003).

5) Maintaining a fundamentally globalized political style, that is influencing to the point of defining the global zeitgeist (via 1 - 4), without direct control of most local sustainable and symbolic community modes of production (e.g., Goldstein 2015; Seddon 2013) .

These were not mutually exclusive pathways, nor were they ever likely all dominated by a single individual or even a single community constituency in the Tiwanaku case study (Goldstein 2015;

Janusek 2004c). That said, each of these points would, broadly speaking, form into institutions that were likely readily identifiable to most individuals living in the South-Central Andes during the Middle Horizon. I delve into at least some of the ways in which these hierarchies of value were actively negotiated during the Middle Horizon below, however first I want to discuss some of the concrete results of these negotiations. That is, I want to identify evidence for symbolic community roles that were particularly powerful within Tiwanaku and specifically how these roles may have manifested in emergence of elites in different contexts in different times, and markers of status in the Cerro San Antonio dataset.

While the five avenues to institutionalized leadership listed above may have had precedent in the Late Formative Period, it was not until sometime after ca. AD 500 at Tiahuanaco in the southern Titicaca Basin that they appear to have converged (Kolata 1993a). The formalization of a Tiwanaku institutional elite was a slow process, with most initial positions of prestige likely granted to individuals with access to important symbolic community knowledge, particularly dealing with the celestial-calendar (see below). However, after ca. AD 850, that is by the Late Middle Horizon, a more permanent elite presence within the city of Tiahuanaco is clear.

As discussed at length in Chapter 2 (see 2.3), the Late Middle Horizon is signaled at Tiahuanaco in a fundamental restructuring of residential community configurations as well as monumental spaces in the city center. For generations, the central precinct of the city had acted as a sacred, but fundamentally open, venue for performance and ritual, designed to harmonize, at least temporarily, regional networks of both symbolic and sustainable communities (e.g., Janusek 2008; Jennings and Earle 2016; Kolata 2003b; Vranich 2009). While Tiahuanaco's monumental core would still host large gatherings, the major renovations to the city center would render the monuments, at least partially, subordinated to a new court of individual elites and their closest constituencies. The most extensive renovations to the city center, and clearest indication of true elites, would be in the establishment of a number of residential palaces (Couture and Sampeck 2003), architecturally articulated with the central monuments, such as the Kalasasaya complex. While I will not repeat their description here (see 2.3), these palaces represent true institutionalized power, with elites literally establishing residential communities within the institutions themselves (Couture 2003, 2004; Janusek 2004c; 2008:144-148).

Additionally, while Tiwanaku lacks any explicit iconographic indication of individual leaders (i.e., a king list) or truly royal tombs yet known, Tiwanaku's individual elite were clearly manifested in stone with the commissioning of often massive human-like monoliths (Janusek 2008:138-140; 2019). These explicitly human-like monoliths were adorned with representations of textile tapestry tunics, belts, and hats and were almost always holding keros and snuff trays, all documented items of personal adornment in the Middle Horizon (Kolata 2003b:194-195; Makowski 2009). These stone figures appear to have played a variety of roles in the built environment in and surrounding Tiahuanaco (Janusek and Bowen 2018:229-231), but almost certainly represented individuals, living or ancestral, of Tiwanaku's elite communities (Stone-Miller 2004:130-131).

The most iconic example of this elite claiming of symbolic space and overall reconfiguration in Tiwanaku's broader institutions would be in the oldest architectural element of Tiahuanaco, the semi-subterranean temple. By the Late Middle Horizon this sunken court space would have been ancient and had long ago been adorned with the dozens of unique tenon heads and sculptures depicting specific individuals (living or ancestral) of the local symbolic communities that formed the core of Tiwanaku. However, the Late Middle Horizon addition of a massively tall monolith in the center of the sunken court, would redefine this space (Kolata 2003b:198). from a place of forced intimacy, where crowds faced inwards, to a space dominated by a single central set of eyes gazing outward and down (Janusek 2005b).

Significantly, there are no signs of these types of material indicators of elites anywhere else Tiwanaku's presence has been observed. For instance, a number of locations in the Titicaca Basin show evidence for new Tiwanaku built elements and even residential communities being established adjacent to preexisting settlements (Stanish et al 2005).

However, preexisting sociopolitical hierarchies do not seem to have been directly captured by Tiwanaku elites. Similarly, in the Osmore drainage at the most substantial Tiwanaku imprint outside the highlands, monumental architecture (more on that below), did not show clear signs of elite permanent palatial residential (e.g., Goldstein 1993a). This trend has held true for the Cerro San Antonio settlements, as thus far no example of clear elite residence has been detected in any Tiwanaku context at L1. That said, both in the Osmore and Locumba, signs of individual roles, prestige, and even wealth is more subtly indicated, particularly in the realm of mortuary contexts and feasting practices, the topics of the next two subsections.

The Grateful Dead: mortuary symbolic communities

As has been noted several times, this dissertation focused almost exclusively on contexts deemed to be primarily domestic in function. However, mortuary contexts are an essential dimension to understanding community life in any era, and the ten (10) Tiwanaku-affiliated cemeteries defined at Cerro San Antonio clearly played a critical role in defining life for individuals at L1 during the Middle Horizon. Here I will briefly contextualize some of the broader patterns and specific finds in the Cerro San Antonio cemeteries with those observed elsewhere during the Middle Horizon in the South-Central Andes. As noted at various times throughout Chapter 2 (see 2.3), in the later Formative Period, mortuary practices were variable, even within specific subregions. In the south-central highlands, practices varied greatly, ranging from charnel house style cremation to individual burials. Similarly, in the south-central coast valleys, Formative Period communities frequently employed group burial mounds or *tumulos* but would utilize individual subsurface burials as well (Goldstein 2000b; Muñoz 1989). As will be emphasized below, a general shift towards conformity in treatment of the dead during the Middle Horizon appears to have been a major element in the globally-oriented symbolic community norms that underwrote Tiwanaku.

What has been referred to as the normative Tiwanaku mortuary practice almost always emphasized the individual. That is, the typical microscale mortuary context was an individual tomb, most frequently containing just a single body and generally a number of items that may have belonged to that individual in life or were given to them in death (Korpisaari 2006:144). The normative mortuary context was created as a three-phase process. Phase I involved the preparation of the deceased individual's body, including funerary dress (Baitzel 2016:285-291). Individuals were always dressed in at least one tunic and often wrapped with other cloth items as well as dressed in various other items of personal adornment. The body itself was almost always placed into a seated-flexed position for final interment.

Phase II revolved around tomb construction (Baitzel 2016:291-294). Tiwanaku tombs were almost exclusively circular, subsurface pits ot cists with relatively flat bottoms. Construction method and overall quality could vary greatly, with at least six varieties identified thus far (Baitzel 2016:296; Goldstein 2005:246). These could range from relatively unassuming and unsupported pits (*fosas*) to full stone-line cists (*cistas*) (Goldstein 2005:245-247). Likewise, while most tombs would be capped, these could range from large flat stones to re-used ground stone implements, or timbers, and many (both stone-lined and simple pits) would include a super-surface collar made from locally sources cobbles.

The final phase, Phase III, centered on the interment of the individual and the related offerings (Baitzel 2016:295-298). The individuals were seated most frequently facing east, though northeast and southeast were also common. Finally, as will be discussed more below, despite these burials being inherently individual, they were never found isolated. Generally, Tiwanaku tombs would cluster into spatially discrete cemeteries, often found closely associated with domestic sectors.

It is worth noting first that few of these normative Tiwanaku burials have been identified at the center of Tiahuanaco itself. In fact, most documented instances of human remains found within the city and surrounding residential districts, appear not to have followed the three phase normative pattern described above at all. For instance, one of the most common sources for human remains at Tiahuanaco were associated with monumental architecture in the city center (Blom and Janusek 2004). In the most deviating trends, evidence for unhealed trauma, cut marks, and other pre- and post-mortem taphonomy indicators suggest that many of the individuals found, particularly associated with the Akapana Pyramid and Mollo Kontu Mound residential district, were sacrificed and interred in ritual performance (Alconini 1995; Blom, et al. 2003; Blom and Janusek 2004; Couture and Sampeck 2003:218-224).

In more mundane but similarly aberrant fashion, the most commonly recovered human remains at Tiahuanaco were found in what were otherwise fundamentally domestic contexts, particularly within walled compounds and inside house structures (see Blom 2005). Most of these burials were relatively informal ad hoc[208] interments that did not follow the normative pattern. Finally, also within the monumental core, mostly associated with the later Putuni Palace, is the only designated mortuary component identified thus far at Tiahuanaco (Couture 2004). The Putuni tombs were far more elaborate than the normative mortuary style that define Tiwanaku burial contexts elsewhere (Couture and Sampeck 2003:238-243; Kolata 1993:162-165). Of course, this is likely as they were tombs constructed for the later elites that increasingly came to occupy the institutional core of Tiwanaku. However, these mortuary styles do not appear to be the standard, even within Tiahuanaco and are limited in number. It has been hypothesized that many designated mortuary contexts may lie under the modern town of Tiahuanaco and have not yet been uncovered.

Despite the lack of Tiwanaku normative internments at Tiahuanaco itself, the ubiquity of this mortuary style everywhere else that Tiwanaku's symbolic community imprint could be found, supports its classification as normative (Baitzel 2016; Korpisaari 2006). For instance, most Middle Horizon burials found throughout the southern and broader Titicaca Basin display the individual cist style (Korpisaari 2006), with these tombs always found in clusters forming

[208] However, some would be lined with adobe bricks (Janusek 2003a).

clear cemeteries. These cemeteries were frequently adjacent to, but separate from, domestic and more public oriented contexts. However, multiple instances at different sites in the basin suggest that some symbolic community leaders would be buried in or near public architecture, particularly platforms and previously used mound features (Janusek and Kolata 2003:150-151).

Grave goods could vary widely, but most were modest utilitarian implements or serving ceramics and many tombs appear to have had no offerings. While affected by local symbolic community norms and customs, the mortuary patterns in areas such as the Cochabamba-Mizque valleys and even the distant San Pedro de Atacama highland oases would largely shift to the individual subsurface cist cemeteries during the Middle Horizon as well (Anderson 2013:100-104; Le Paige 1964; McAndrews 2007; Rivera Casanovas 2016; Torres-Rouff 2008). Of course, in places like San Pedro de Atacama these burials are some of the only contexts in which Tiwanaku material goods have been found (Berenguer 1998; Berenguer and Dauelsberg 1989). There is no doubt that, in a typical materialist sense, these Tiwanaku goods restricted to burials suggest symbolic community expression of sustainable community prowess (i.e., a classic display of wealth via access to exotic goods). However, from tapestry textiles to carved wooden snuff tablets, most items appear to have been utilized and clearly represent a genuine subscription of the deceased individual to the broader Tiwanaku symbolic community network.

All Tiwanaku-affiliated settlements in the Valles Occidentales conform to the Tiwanaku normative mortuary style. For example, all documented major domestic components in the Osmore drainage associated with Omo, Chen Chen, and Tumilaca settlements in the middle, upper and lower Osmore would be associated with discrete cemetery sectors (Baitzel 2016:291-295; Goldstein 2005:238-268; Owen 1993:279-281; Sharratt 2011). These cemeteries could range in size, but all were composed of individual pit and cist tombs. Here all six (6) varieties of cists have been identified as well as most other attribute variables, from collar to capstone techniques. Mortuary context also comfortably falling into the Tiwanaku normative style can be found in almost all Tiwanaku-occupied drainage systems of the Valles Occidentales, from the

Tambo system in the north to the Azapa drainage in the south (Focacci 1990; Szykulski and Wanot 2021). The middle Locumba Tiwanaku-affiliated cemeteries and particularly those exposed by looting in the Cerro San Antonio (L1) site complex would also fall comfortably within the Tiwanaku normative mortuary style. While excavation will be necessary to formally compare L1 mortuary contexts to those documented elsewhere, the L1 tombs appear to align most closely with those observed in the middle Osmore.

Finally, the items accompanying the individuals within tombs provide clues regarding how symbolic communities of the living viewed fellow community members who had passed on. First, clothing of the dead was ubiquitous. So, at a minimum all interred individuals were given a single, course-weave wool tunic; likely one of their primary clothing garments in life. More elaborate burials, would include multiple textile garments, often signaling multiple scales of symbolic community affiliation (Baitzel and Goldstein 2014). Importantly, after clothing, consumption-relation materials would be interred with the dead (Goldstein 2005:250-253). This included ceramic utilitarian and serving wares, with decorated redware vessels like keros and tazónes being the most common. In addition, burials would include carved wooden spoons and a variety of foodstuffs as well. As will be expanded on below, it is not surprising that the Tiwanaku mortuary practice emphasized consumption as that was one of the most preeminent thrusts of the broader Tiwanaku symbolic community.

A Comestible Cosmology: the apogee & legacy of Tiwanaku's religion of consumption

Consumption is a ubiquitous category of behavior, not just in humans, but in most life on earth[209]. Like most organisms, individual humans need to consume a certain number of calories each day in order to sustain themselves and as such a significant portion of their energy is

[209] In fact, the *adaptive* dimension of complex adaptive systems is frequently motivated by what is properly categorized as consumption, as taking in new energy is the paramount way to stave of entropy (*a la* the 2nd law of thermodynamics (Hartonen and Annila 2012)).

expended to procure those calories. Under the community ecology model, the central function of sustainable communities is producing (from procurement to cooking) various edible goods for consumption. A significant number of symbolic communities can be traced directly to practices fulfilling these basic sustainable community needs. As such, ultimately, consumption, the actual eating and drinking of foods, is the climax or pay-off in a series of activities that dominate most individual's lived experience. From the simple sugars found in fresh fruit to the mind-altering qualities evoked after fermenting certain grains, few things stimulate humans more than consumption at this most basic level. I raise this general issue here, as it helps explain why consumption is so frequently the primary avenue through which complex societies from around the world have evolved (Dietler 2001; Dietler and Hayden 2010). More specifically, it helps to appreciate the gravity of Tiwanaku coming to fundamentally transform *how* consumption could be conducted, from intimate everyday meals with family, to the feasting festivities that punctuated public life.

Hosting & Holidays. While I previously discussedthe role consumption, particularly feasting, played in the formation and expansion of Tiwanaku (see 2.3), here I want to parse two ways in which Tiwanaku fundamentally changed the worldview of most people living throughout the South-Central Andes, and specifically in the middle Locumba drainage, through revolutionizing consumption. The first point is that punctuated points of consumption, from truly public feasts to intimate household drinking rituals, came to reformat the dynamics of social hierarchies, and as noted above, opened clear avenues to positions of institutional leadership. The second point is that his transformation was centered on an ontological refocusing on the individual person and their agentive potential and responsibilities in broader society. While these changes to consumption likely had their initial impetus in the preceding Late Formative, it would be during the Middle Horizon, under Tiwanaku, that these changes would come to transform the entire South-Central Andes.

As with many case studies explored throughout the ancient world (e.g., Hayden 2001;

Liu 2021), punctuated events based around conspicuous consumption, generally categorized as feasting, played a central role in the formation of the nascent Tiwanaku political economy. Provisioning and hosting feasting events was likely one of the roles pursued by aggrandizing individuals and their constituent communities at Tiahuanaco itself. Again, as detailed in Chapter 2 (see 2.3), while feasting was not new in the Titicaca Basin it appears that by strategically investing in the new agricultural technology of raised fields (Kolata and Ortloff 1989), sustainable communities operating from Tiahuanaco were able to offset harvests and other labor investments and be provisioned for feasting when other local communities were not (see Bandy 2005, 2013).

This novel off-set agricultural-feasting cycle would have required particularly careful annual planning, providing symbolic community leadership positions for those individuals who could competently maintain and disseminate an increasingly complicated calendar (Benitez 2009; Janusek 2012). As will be elaborated below, changes to the built environment likely facilitated a suite of rituals which would punctuate this annual calendar (Kolata 2004). Within a few generations of the onset of the Early Middle Horizon, it appears that symbolic communities at Tiahuanaco went from hosting a few dozen individuals, likely from just a handful of family-based residential communities, to hosting thousands in extended festivities, responsible for regulating sustainable and symbolic community networks across the entire southern Titicaca Basin and likely beyond (Browman 1981; Kolata and Ponce Sanginés 1992; Stanish 2002). These institutionalized or globally-oriented festivities, recognized in specific times of the year, are best seen as the emergence of recognized regional holidays.

However, it was not simply the conspicuous nature of the consumption at Tiahuanaco that drew in communities from around the south-central highlands, but what was being consumed. While chicha drinking was first developed as early as the Middle Formative (Logan, et al. 2012), it was at Tiahuanaco at the onset of the Middle Horizon that an entire institution emerged around the production and consumption of alcoholic beverages (Bandy 2013;

Goldstein 2003). The ascendance of maize-based chicha as a central consumable at Tiahuanaco and other highland settlements necessitated the intensifying of sustainable community connections to more temperate regions where maize could be grown in significant amounts. In fact, I would argue that it is likely that, while surplus from the altiplano raised fields would feed permanent as well as supplemental residential communities during important holidays, much of the off-set surplus was likely used to provision caravans to the Valles Occidentales and Cochabamba-Mizque regions to acquire maize, specifically for chicha production in the highlands (Browman 1984; Hastorf, et al. 2006). It is likely during this initial ramping up of caravan exchange that the Omo-affiliated settlements were initially established in the middle Osmore drainage in the Valles Occidentales (Goldstein 2013a). Managing the timing of these caravans likely also played a major role in the structuring of the seasonal holidays that came to dominate the highland center.

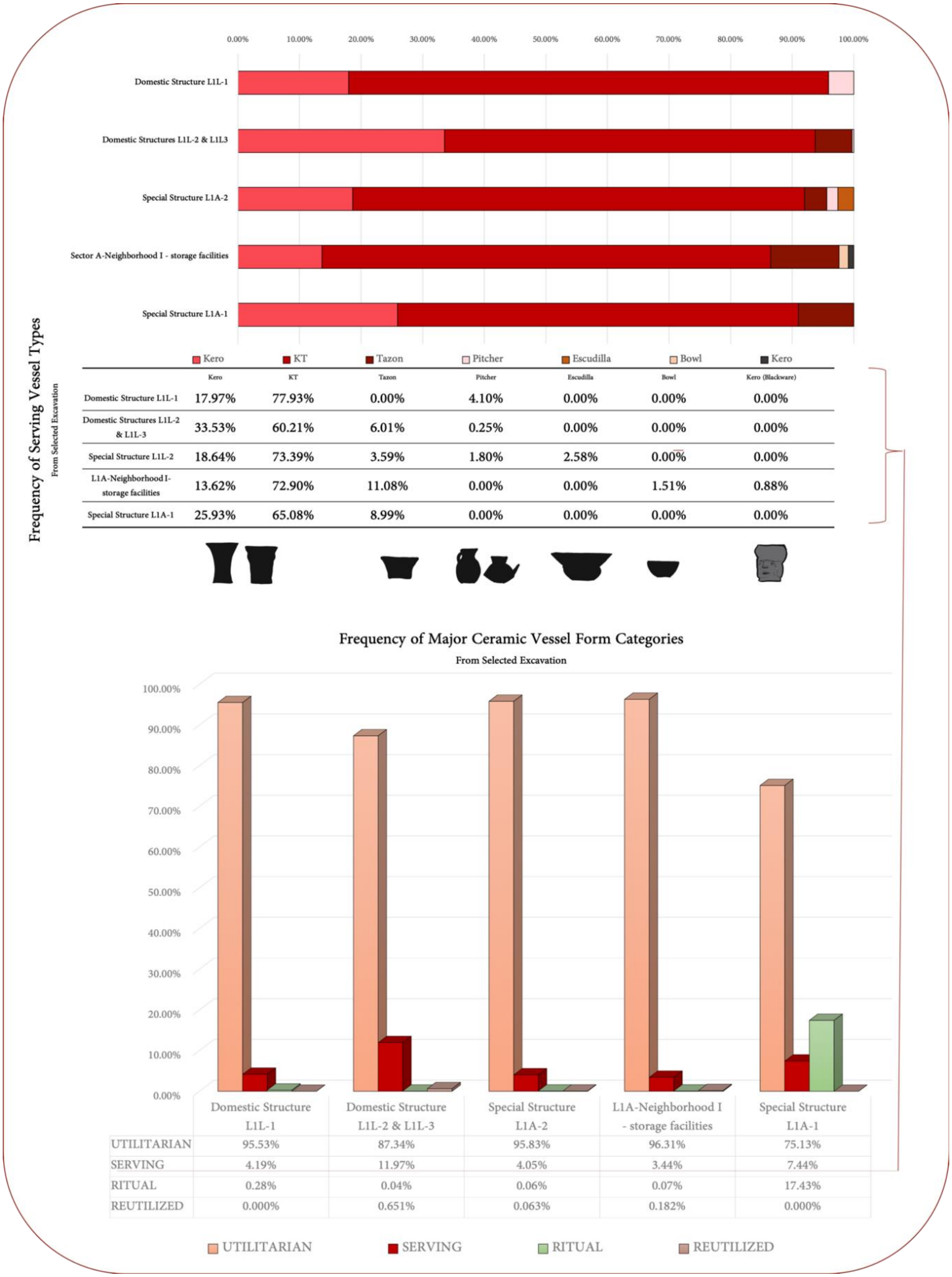
As noted above and (see 2.3), this chicha-focused feasting and supporting ritual mode of production resulted in a growth-spiral that would culminate with true social stratification (Bandy 2013), epitomized in the establishment of elite residential palaces in Tiahuanaco's city center as institutions n the Late Middle Horizon. Outside of Tiahuanaco, the chicha-based economy clearly provided an avenue to community leadership for aggrandizers elsewhere as well (Goldstein 2003). This is indicated by the inclusion of keros, and other serving implements tied explicitly to Tiwanaku chicha consumption in elite burials as far away as San Pedro de Atacama (Berenguer and Dauelsberg 1989).

It is worth noting here, that burial contexts also reveal evidence for the use of other mind-altering substances as well. Grave goods of carved wooden snuff tablets and worked bone tubes, make clear that inhaling of substances was also a ritual practice that came with Tiwanaku's new religion of consumption. While actual drug paraphernalia was more commonly preserved in places like San Pedro de Atacama and the Valles Occidentales (Niemeyer, et al. 2015), the depiction of snuff tablets and imagery of known psychedelics, like vilca and san pedro cactus, in central monoliths at Tiahuanaco show that drug consumption was important in the highlands as well (Kolata 2003b:194-195).

While isotopic analysis of human remains suggests that elites at Tiahuanaco and neighboring highland centers likely did drink more chicha than did commoners (Berryman 2010), results from the Osmore suggest suggest that chicha was consumed quite broadly (Somerville, et al. 2015), and keros were found in residential settings of almost every scale. That is not to say that there were not punctuated points of consumption, as some households appear to have gained prominence, even if just in their own neighborhoods, for brewing. This is illustrated in neighborhood dynamics in the Osmore colonies where multiple neighborhood *chicherias*, or residence-based chicha brewpubs, have been identified (Goldstein 1993a). These house contexts would be equipped with modest but specialized chicha production spaces as well as sets of high-quality ceramic serving wares. Clearly these residential *chicherias* were important places of production and consumption but they lacked any other signs of wealth-based privilege within their communities (Goldstein 2005:204-210).

Figure 249. (left) concentration of flakey maize kernels recovered from soil sample collected at base of the central plaza adobe platform (Special Structure L1A-2) (Garvin 2020:149).., (right) Modern example of sprouted maize kernels in process of chicha production.

At Cerro San Antonio no specialized loci of chicha production have yet been identified. What's more, serving wares were ubiquitous, making up at least 3% of ceramics recovered everywhere (and often much more). However, this does not mean that specialized consumption took place evenly. For example, as noted above (see 10.3), systematic surface collection revealed density spikes in redware serving vessels in Neighborhood I and Neighborhood II in Sector A. These neighborhoods are both directly adjacent to the central plaza andmay have been sites of increased drinking during activities in the plaza. Additionally, in one of the soil samples associated with the central plaza adobe platform (Special Structure L1A-2), microbotanic analysis revealed a large deposit of maize kernels that look very similar to maize in the sprouting stage of chicha production (Figure 249) (Garvin 2020:149). The platform and plaza area also revealed the most serving ware diversity of all excavated contexts, including some of the only examples of the escudilla serving vessel type in the L1 assemblage. This elaborate flaring bowl is a vessel type that is rare in the Valles Occidentales and most often associated with Tiahuanaco's monumental precinct (Alconini 1995; Janusek 2002:43).



	Kero	KT	Tazon	Pitcher	Escudilla	Bowl	Kero (Blackware)
Domestic Structure L1L-1	17.97%	77.93%	0.00%	4.10%	0.00%	0.00%	0.00%
Domestic Structures L1L-2 & L1L-3	33.53%	60.21%	6.01%	0.25%	0.00%	0.00%	0.00%
Special Structure L1L-2	18.64%	73.39%	3.59%	1.80%	2.58%	0.00%	0.00%
L1A-Neighborhood I-storage facilities	13.62%	72.90%	11.08%	0.00%	0.00%	1.51%	0.88%
Special Structure L1A-1	25.93%	65.08%	8.99%	0.00%	0.00%	0.00%	0.00%

	Domestic Structure L1L-1	Domestic Structure L1L-2 & L1L-3	Special Structure L1A-2	L1A-Neighborhood I - storage facilities	Special Structure L1A-1
UTILITARIAN	95.53%	87.34%	95.83%	96.31%	75.13%
SERVING	4.19%	11.97%	4.05%	3.44%	7.44%
RITUAL	0.28%	0.04%	0.06%	0.07%	17.43%
REUTILIZED	0.000%	0.651%	0.063%	0.182%	0.000%

Figure 250. (top) Frequency of serving vessel sherds from selected excavated contexts at L1 (n = 374) and (bottom) frequencies of sherds grouped by major ceramic socio-functional category from the same selected excavation units/blocks (n=10,406).

Additionally, while showing no real evidence for on-site brewing of chicha, Domestic Structure L1L-2 and associated Domestic Structure L1L-3 show the strongest association with chicha consumption. In the rockpile-midden deposit directly associated with these structures, many serving wares were recovered. Overall, the ceramic sherd assemblage for these structures was almost 12% redware sherds, substantially higher than in other contexts. What's more, of the serving ware diagnostic sherds, over a third belonged specifically to keros, suggesting concerted drinking activities took place here. Again, little else in these structures showed evidence for wealth differentiation, other than an over=representation of these decorated serving wares.

So in the end, while feasting and chicha-based consumption certainly represented a mechanism for individual aggrandizement, inequality, and institutionalized positions of power, the allure of the Tiwanaku takeover of consumption was that it came equipped with: 1) a comprehensive set of tools, 2) fashionable style, and 3) an underlying ethic that allowed for it to be performed in contexts ranging from punctuated points of public performance, to everyday negotiation in the privacy of the home, and most social venues in-between. The first two points are readily identifiable in the archaeological record in material technology and stylistic trends. The third point regarding an emergent ethic of consumption can be inferred using the data at hand, as I discuss below.

Fashionable Finewares. The primary material manifestation of Tiwanaku consumption was the development, rapid proliferation, and longevity of the Tiwanaku ceramic vessels, the kero and tazón, and to a lesser degree, ceramic pitchers and wooden spoons.These items were truly ubiquitous in Tiwanaku domestic as well as mortuary contexts, and represent the exclusive items for eating and drinking in the vast majority of documented contexts of Tiwanaku affiliation across the South-Central Andes (Goldstein 2003; Janusek 2003b). Tiwanaku's characteristic tools of consumption illustrate two major innovations. One was creating a fashionable set of culinary equipment for consumption practices. One key element here was standardization and overall quality, which would have been attractive for both practical and aesthetic reasons. Most keros and tazónes would be standardized in dimensions. Likewise, while overall quality could vary, the majority of Tiwanaku redware ceramics were carefully constructed, with evenly shaped, leveled rims, and well-burnished exteriors.This standardization in vessel construction and finishing techniques was strongly shared in Tiwanaku's crafting communities of practice, and only allowed to slip during the Terminal Middle Horizon (Sharratt 2016). Nonetheless, some aspects ofvessel forms that comprised the Tiwanaku serving vessel set, particularly the kero, would remain standards in the culinary equipment of communities throughout the Central Andes all the way into the historic Colonial Period.

The second key element to the new fashionable consumption style that emanated from Tiwanaku was in its synthetic artistic decorative style (Isbell, et al. 2018). I do not think it is coincidence that material classes that center on serving and consumption are those that most consistently carried the most symbolically explicit signals of Tiwanaku affiliation. This inserted the Tiwanaku symbolic community into every home and was referenced at every meal. Highlighting a few major diachronic trends in these decorative elements will help situate the Cerro San Antonio node in Tiwanaku's broader regional network - both in space and time.

In the broadest of strokes, Tiwanaku's iconographic corpus and overall style would shift from largely idiosyncratic takes on common themes to a true corporate style with more standardized iconic symbolic based motifs (Janusek 2003b:81-82). As with most of the trends described above, this Tiwanaku corporate tradition has clear roots in the preceding Formative Period, particularly in the Terminal Late Formative when the Qeya style emerged (Marsh, et al. 2019). The Qeya style was truly idiosyncratic, drawing on iconographic elements from a number of locally situated styles throughout the south-central highlands, such as Pukara[210] (Roddick

[210] Including translating many of the motifs that adorned low relief stonework at the recently collapsed Pukara to the mobile media of ceramics.

2018). The Tiwanaku iconographic suite would rely on a number of largely geometric motifs, like the step-stair and circle-dot which would become the principal elements in the later style. However, in the Early Middle Horizon (ca. AD 600-850) Tiwanaku motifs would often center on full figural representations of felines, camelids, avian figures, and even humans. There were standards upheld in how these figures were rendered but artistic liberties were often taken with exactly how these figures were drawn and certainly how they were combined into scenes (Janusek 2003b). However, recent systematic studies of ceramic serving ware decoration at Tiahuanaco shows evidence that more standardized design elements were already being favored in the public contexts of the monumental core, like the Akapana Pyramid, suggesting the early foundations of the later corporate style (Augustine 2019:103-106).

This emergent style, what has most consistently been called Tiwanaku IV (Ponce Sanjinés 1976), is rarely found outside the south-central highlands and was even restricted in distribution in many areas within the Titicaca Basin (Burkholder 2001; Isbell and Burkholder 2002). The exception in the Valles Occidentales, was in the middle Osmore, where, along with polished blackware serving vessels, the Omo-affiliated contexts would be largely defined by redware with this Early Middle Horizon style from Tiahuanaco (Goldstein 1985; 2009:285) . The Omo style in particular was defined by relatively fine-line figural work, which often incorporated full-figure feline images, and incorporated a continuous volute geometric motif (Goldstein 1985:87-90) also observed at Tiahuanaco, but particularly at Lukurmata in the southern Titicaca Basin (Janusek 2002:52). Five such sherds have been identified at Cerro San Antonio, particularly in Sector A but the volute motif and others design elements that fall most comfortably in this initial early stylistic trend may appear in multiple mortuary contexts as well. This may suggest initial settlement of the middle Locumba by the end of the Early Middle Horizon. However, it is also important to note that while the major settlements in the highlands would transition away from some of these early trends during the Late Middle Horizon, the Omo-affiliated communities of practice may have maintained these serving ware decoration preferences well into the Late Middle Horizon. Given the proximity to the Osmore enclaves, and the late dates for Cerro San Antonio Tiwanaku thus far, it is likely that a connection with Omo-affiliated communities is responsible for the limited examples from L1 as opposed to a truly early occupation.

The majority of identified motifs and design elements from samples at Cerro San Antonio, and the middle Locumba drainage more broadly, would fall within the Late and Terminal Middle Horizon Tiwanaku styles. As noted above, at Tiahuanaco and neighboring sites in the Titicaca Basin the Late Middle Horizon (ca. AD ca. 850-1000) or Tiwanaku V (Tiwanaku 2) is largely defined by a whittling down of the idiosyncrasies and much more emphasis places on geometric elements that could easily be repeated and combined in panel-based motifs. Figural elements were still included, but most major feline and human representations became more abstracted and generally presented as isolated profiles of the head. This later corporate style of Tiwanaku on keros and tazónes would ultimately be Tiwanaku's widest reaching media. The extensive Chen Chen affiliated settlements in the Osmore were clearly defined by these stylistic restrictions as were vessels following the Central Valley Cochabamaba Tiwanaku (CVCT) style that defined Tiwanaku serving wares in the Cochabamba-Mizque subarea as well (Anderson 2013:92-95; Goldstein 2009:288). As noted above, while highland communities in and around Tiahuanaco likely did export these ready-made vessels of consumption, based on data from the Osmore, most keros appear to have been crafted locally by well-trained sustainable community members. The geometric motifs of this corporate style facilitated the often-long distance networks of communities of practice that must have underwritten this sharing and maintenance of artistic knowledge. As noted above in reference to ceramic production, as Tiwanaku networks disarticulated during the Terminal Middle Horizon (ca. AD 1000-1100), the communities of practice in the Valles Occidentales maintained the broader Tiwanaku corporate style, but with a more limited selection of Tiwanaku design elements. Significantly, the one figural element that was maintained and even became quite prominent in this time were representations of flamingo and to a lesser degree ibis. In fact, figural representations of these birds are quite numerous, and some of the only full-figure figural elements found with any consistency in Chen Chen-affiliated ceramics as well (Goldstein 1985:124-126).

I believe the popularity of flamingos and ibises as the dominant zoomorphic emblem of the Terminal Middle Horizon was not by chance. These birds seasonally migrate across the western cordillera, spending winters in the temperate Valles Occidentales, but spending much of their time in the highland lakes that mark the *suni*, *quechua*, and *puna* of the south-central highlands (Caziani, et al. 2007). It is reasonable to interpret the flamingo-ibis motif as being directly associated with the journey between the southern Titicaca Basin and the Valles Occidentales as far back as the early Late Middle Horizon. As the network connections between the south-central highlands and south-central coast became more tenuous and likely severed during the Terminal Middle Horizon, depictions of these birds came to represent a connection that were no longer being made; one of the clearest symbolic representations of the post-Tiwanaku diaspora.

By sometime in the Late Middle Horizon, the Tumilaca style would emerge as a new variant of the Tiwanaku corporate style. In a stylistic development that reflects a clear case of ethnogenesis, Tumilaca style ceramic users would first fission off from Chen Chen-affiliated groups in in the middle Osmore, but during the Terminal Middle Horizon would spread to the upper and lower Osmore (Owen and Goldstein 2001; Sharratt 2019; Stanish 1991), the middle Locumba drainage, and likely as far south as the Lluta and Azapa[211] drainages and as far north as the lower Tambo (Goldstein 1995; Owen 1993, 2005; Szykulski and Wanot 2021; Uribe Rodríguez and Agüero Piwonka 2004) . Tumilaca style ceramics would drop a number of the remaining figural elements still found in the Chen Chen style, particularly eliminating the rare

[211] Like Tumilaca, a number of examples classified as the Loreto Viejo style locally in Azapa also seem to have utilized Tiwanaku design elements in idiosyncratic ways (Dauelsberg 1972).

front-face god motif, which has been interpreted as one of the chief design elements associated with Tiwanaku authority (Goldstein 1989:51). More generally, idiosyncratic art style would return, as potters appear to take liberties with previously well-defined elements. One interesting trend would be to combine figural and geometric motifs (Sharratt 2020). For instance, at Cerro San Antonio (L1) one spot find of a large portion of a motif from a Tumilaca kero shows clear elements from the flamingo motif, which was normally found alone and in full figure form, added on to a more geometric-based panel, to create a unique flamingo profile motif.

Finally, first developing in the Azapa drainage and ultimately spreading north along along the coast in the Terminal Middle Horizon, the Cabuza style would represent anemulative, copying of the Tiwanaku corporate style (Muñoz Ovalle 2019; Uribe Rodríguez 1999). Cabuza design elements suggest that the communities that manufactured Cabuza redwares were not directly informed by those that informed potters in the middle Osmore and Locumba drainages. In general, Cabuza designs would be rudimentary versions of Tiwanaku geometric elements, often limited to simple vertical or horizontal wavy lines (Dauelsberg 1972; Uribe Rodríguez 1999:199-201). With Cabuza, there was an arbitrariness in this imagery, as these serving wares appear to have just been symbolically linked to a fashion that Tiwanaku had become. That said, vessel forms like keros, while now far outside the norms of Tiwanaku quality, would imply that these vessels were still attached to a similar suite of consumption-based behaviors both in public and private that defined Tiwanaku affiliation of some sort. Some vestiges of Tiwanaku corporate style could also be found in the later Pacajes style in the southern Titicaca Basin (Janusek 2004a) and Maytas-Chiribaya style in the Valles Occidentales (Jessup 1991), but Cabuza would represent the final push of the fashionable finewares of Tiwanaku.

Semiotically speaking the Tiwanaku consumption style, as it played out in terms of redware serving decoration, would go through major symbolic transformation over the course of the Middle Horizon. Beginning with the early iconic imagery, Tiwanaku consumption was sacralized with commissioned vessels, often adorned with truly idiosyncratic, personalized elements. The later Tiwanaku corporate style would be more generic, acting as an indexical citation to a much more developed and pervasive Tiwanaku culture of consumption. Finally, the later Tumilaca and Cabuza redware designs were just arbitrary attributes of the vessel; symbols attempting to reference a longstanding fashion in the broader region. As alluded to earlier in this chapter (see 11.1), these changes did not occur evenly. Compared to other settlements in the Valles Occidentales, it is unusual that the communities occupying Cerro San Antonio during the Middle Horizon appear to have gone through these iconographic changes within a continuous occupation.

As has been noted, the majority of the archaeological remains at Cerro San Antonio, like many sites throughout the Valles Occidentales, are defined by horizontal stratigraphy. That is, those establishing new settlements tend to seek out fresh ground, not previously occupied, leaving abandoned settlements relatively undisturbed (see Chapter 7), with no evidence for significant reoccupation in any of the sampled structures. Most decorated serving wares recovered in excavated contexts fall comfortably in the corporate and later more limited Terminal Middle Horizon Tiwanaku styles. Thus, the excavated contexts at Cerro San Antonio align with the Chen Chen affiliated settlements in the middle Osmore.

Yet, as noted just above, more temporal-based variation was identified in ceramics from the surface, with several sheds of apparently earlier styles noted. Unfortunately (see 8.1), the diagnostic attribute analysis of ceramic sherds collected via systematic surface collection has not been completed, so a spatial association for these different earlier stylistic variants cannot be generated yet. However, collected spot finds from the surface, hint at some possible trends in terms of the rough seriation of the occupations. Of the 175-individual decorated redware sherds collected as spot finds[212] 127 were complete enough to be tentatively designated to one of the four temporally-sensitive Tiwanaku variants described above. Just six (6) sherds

[212] These 175 sherds were collected in 95 spot find contexts (see Appendix XX for listing).

contained decorative motifs that were likely representations of the early idiosyncratic style that is associated with Tiwanaku IV style in the highlands and Omo style in the Osmore. The vast majority (108) of spot find sherds were comfortably within the Tiwanaku (V) corporate style. While it is difficult to parse Terminal Middle Horizon variants,Tumilaca related designs defined just eleven (11) of the sherds, with Cabuza designs only found on two (2) collected spot finds.

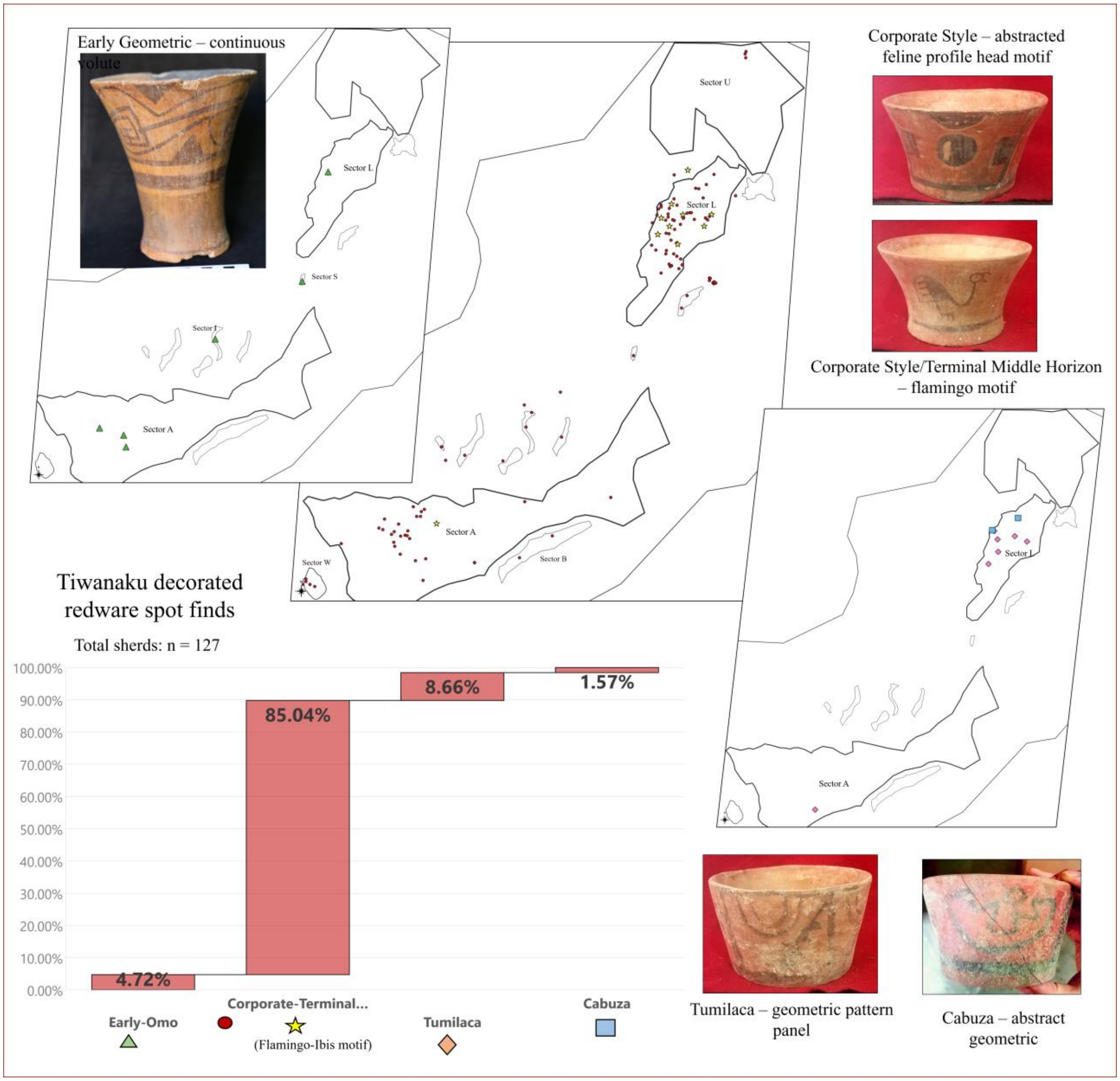


Figure 251. Maps displaying "spot finds" of decorated redware sherds by temporal variants in Tiwanaku-affiliated sectors at L1 (whole vessels recovered from looters are for illustration only).

While we await confirmation from analysis of the systematic sample, when plotted, the pattern revealed by these spot finds is telling. The limited examples of sherds of the earlier idiosyncratic Tiwanaku style, related to Omo-affiliated serving ware decorations in the Osmore, were found associated with the Southern District and particularly Sector A. The standard Tiwanaku corporate style, that also defines the Chen Chen stylistic trends in the middle Osmore, would dominate the spot find assemblage, and was widely distributed throughout the site. Conversely, the limited examples of clear Tumilaca style variants or Cabuza emulation style motifs were almost exclusively found in Sector L in the Northern District. Additionally, sherds with the flamingo motif, that proliferated during the Terminal Middle Horizon, were found almost exclusively in Sector L. At least based on these stylistic trends in the spot finds, it would appear that residential communities were initially established in Sector A, expanded sitewide, and emphasis shifted to the northern Sector L as time went on. Again, analysis of the larger systematic collection and more absolute dating will be necessary to delineate the exact timing of these diachronic trends in style, and "horizontal stratigraphy" (Moseley 2013), however the presence of these styles does suggest some continuity in the residential community configurations at Cerro San Antonio.

This is actually a relatively unique case for the Tiwanaku case study. Again, as reviewed in Chapter 2 (see 2.3), during the Terminal Middle Horizon when Tiahuanaco and neighboring centers like Lukurmata were largely abandoned, and even communities in the Osmore enclaves largely picked-up and moved up or down valley, the middle Locumba populations appear to have stayed in place. As noted above, this residential continuity did not spare the Cerro San Antonio communities from the disintegrating sustainable and symbolic community networks of Tiwanaku. As noted above, crafting, particularly regarding these culinary tools of consumption, would fall apart as they did everywhere else in the Valles Occidentales during the final years of the transitional Terminal Middle Horizon.

An Individual Ethic. As I stated at the onset of this subsection, changes to consumption appear to have been part of deeper axiomatic changes to the basic conceptualizing of the individual and their role in communities and emergent institutions during the Middle Horizon. Here I do not wish to get lost in the philosophical debate surrounding individuals, individualism, and individuality as it existed in the past (Hodder 2014; Knapp 2016; Knapp and Van Dommelen 2008; Wilkinson 2013). That said, the social, at whatever scale it is being analyzed, is ultimately the emergent result of individual human action. Yet, as I outlined in Chapter 1 (see 1.2), under the community ecology model, what is often glossed as individual identity is a dense suite of affiliations, both explicit and implicit, to different communities. Through shared community affiliations, all individuals are linked to other individuals in multi-modal community networks. However, despite being inexorably linked to a suite of historically situated and constantly evolving set of community networks, individuals have always developed salient identities (Schortman 1989:54-55), parts of which they consciously act on more than others. Definitionally, any given individual's salient identities overlap with those of fellow community members, but no two individuals are or were ever perceived of as exactly alike. Here I want to argue that Tiwanaku's novel and ultimately longstanding appeal was in emphasizing the agentive potential of individuals, particularly in terms of assigning moral responsibility within the venue of consumption, again, both in public as well as in private.

One of the primary lines of evidence supporting an increased importance of the individual, particularly regarding consumption, was the development of the Tiwanaku serving-ware set described above. As others have argued (Bandy 2013; Goldstein 2003), the transformation of serving wares, from the large communal vessels that defined Late Formative consumption implements to the kero and tazón, suggests a shift in how commensality was configured, from relatively equitable exchange events among the broader symbolic community, to events which were hierarchical or at the very least based on exchanges that were fundamentally unequal (Bandy 2013; Goldstein 2003). Of course, these vessels could be passed around, and based on ethnographic accounts (e.g., Abercrombie 1998:346-351), there is good reason to believe keros in particular may have been shared, particularly during private or at least household level events. However, the fact that these serving-wares are one of the most frequent grave-goods in Tiwanaku burials, suggests that many individuals likely possessed their own set of these vessels. To that point, as noted above, the widespread shift to individual cist-based burials during the Middle Horizon also suggests that individuals would receive their own internment ritual, and even after death individuals were at least partially recognized.

The depiction of individuals in media also would increase greatly between the Formative and Tiwanaku. In the Early Tiwanaku style, idiosyncratic design elements on ceramic serving wares often included the figural depiction of individuals in a variety of actions (Janusek 2003b). However, this connection between the individual and consumption was literally materialized in the emergence of the portrait head kero as an important kero variant. These modelled vessels could come in a variety of forms and range in detail and overall quality, but most clearly represent distinct individuals (Goldstein 2018:249-250). Like the Tiwanaku monoliths and tenon heads that adorned the walls of the semi-subterranean temple in Tiahuanaco's symbolic core, many of these individual representations were almost certainly actual people.

Some of the clearest representations of actual Tiwanaku people come from a remarkable ceramic cache recovered on Pariti Island in Lake Waynamarka in the southern Titicaca Basin (Korpisaari and Pärssinen 2011). Clearly representing a sustainable community specialist hub, this cache included dozens of ceramic vessels illustrating the true extent of Tiwanaku artistry. Important for the discussion here, many of these vessels were extremely detailed and depicted humans both as portraits and full figures (Korpisaari 2014). However, portrait head keros of more common types are found in most investigated Tiwanaku contexts. This includes Cerro San Antonio, where at least nine[213] portrait head fragments were identified in both Sector A and Sector L. Whether the individuals modelled on these vessels were living or

[213] This includes spot finds (n=4), systematic surface collection (n=3), and axcavation (n=2) contexts.

ancestral, they clearly connect the individual to consumption and particularly the consumption of beverages like chicha.

While individual-oriented consumption was widespread in Tiwanaku, some individuals enjoyed accesss to more material and symbolic wealth that drove the consumption-based ritual mode of economy (Bandy 2013). These individuals were recognized i in the massive and finely carved Tiwanaku monoliths. While facial features of these monoliths may have been more abstracted than many of the renderings in ceramic portrait head vessels, they too appear to depict individual people. The elaborate low-relief depictions of these individuals almost always depicts the individual holding a kero and a snuff tablet (Janusek 2005b:177-179). In this way, these monoliths not only reiterate the general connection between individuals and consumption, but by enshrining them in the built environment of the monumental precinct, they emphasize just how central these consumption practices were to elite individuals occupying the institutional core of the Tiwanaku polity (Guengerich and Janusek 2021; Janusek 2013; Kolata 2003a). It is also no coincidence that these monolithic individuals were explicitly targeted during Tiahuanaco's ultimate dismantling, with some carefully toppled and interred and others outright destroyed (Janusek 2004a).

Every Step You Take; Every Move You Make: maintaining world order with the built environment

As discussed earlier (see 10.3), the built environment plays a significant role in all modes of community, and architecture in particular can represent some of the more resource-intensive manifestations of collaborative action of individuals, communities, and institutions. Architecture of any kind requires planning and a suite of knowledge sets that are maintained in a variety of symbolic community formations. As with most behaviors, choices in architectural forms and construction techniques are informed by all manner of implicit tastes and preferences, likely largely unacknowledged, as well as availability of raw materials and other environmental constraints. Here I want to focus on what were likely more explicit and intentional aspects of the Tiwanaku built environment, to contextualize the patterns exposed at Cerro San Antonio. This discussion targets two main aspects of the built environment emphasized under the Tiwanaku transformations during the Middle Horizon. One is the distinction between public and private spaces and its sociopolitical implications. The second issue surrounds the directional orientation of structures and other elements of the built environment and what that might suggest about symbolic community connections in the Valles Occidentales and beyond.

Public vs Private. As I discussed above (see 2.3), one element of the Tiwanaku phenomenon that has been universally recognized is the entrality of the monumental architectural precinct that formed the core of the sprawling Tiahuanaco settlement (Cieza de Leon 1976[1553]; Kolata and Ponce Sanginés 2003; Posnansky 1945). However, monumentality was not new. From the complex platform-labyrinth complex at Chavín de Huántar to the massive adobe pyramids of the southern Moche, public architecture, even impressive monumental constructions, had already acted as symbolic community focal points in the Central Andes for millennia. Even within the south-central highlands, impressive mounds and sunken courts had been constructed by communities for generations before the onset of the Middle Horizon (e.g., A. B. Cohen 2010; Hastorf 2008; Janusek 2015). As with many of the other trends described above, it appears that what was new was the ability of Tiahuanaco's symbolic communities to synthesize these earlier uses of the built environment into a style in which deeply entrenched ideas were combined to form new venues for ritual action and performance (Janusek 2012; Vranich 2009, 2010).

While grand scale and sheer monumentality are clearly represented in structures like the massive Akapana Pyramid, the monumental core at Tiahuanaco also included exclusive and private spaces (Alconini 1995; Vranich 2001). For instance, Tiwanaku public architecture would increase use of large open plaza spaces, but also continue to utilize the inherently more private sunken court (Vranich 2009). One of the key emphases of the Tiwanaku style was accentuating the transitions between these more open and private spaces (Goldstein 1993b). Some of the most iconic representations of this emphasis on built liminality is in the artistry applied to crafting intricate stone portals (Protzen and Nair 2002), which include some of the most detailed low-relief stonework in the ancient Andes (Nair and Protzen 2013). Transition between spaces would also be emphasized by the use of stepped-platforms; literally elevating important spaces above others (Goldstein 1993b; Vranich 2010) asexemplified in the stepped pyramid of the Akapana and the Kalasasaya and Pumapunku complexes. This general pattern of sequestration was underscored at the settlement level as the entire monumental core and some of the residential sectors were framed by a massive moat, and while this was likely also a functional feature, it almost certainly had a symbolic effect as well (Janusek and Bowen 2018; Kolata 2003b; Ortloff 2014; Ortloff and Kolata 1989).

Tiwanaku-style monumentality is seldom found elsewhere in the South-Central Andes. There are a number of examples of artificial mounds, often adorned with relatively modest sunken court features that appear to have been installed at various settlements throughout the Titicaca Basin during the Middle Horizon (Stanish. et al. 2005); though many of these may have been in use earlier as well (see A. B. Cohen 2010). These are often associated with Tiwanaku style serving wares and other features suggesting they may have been punctuated points of contact with the symbolic communities centered at Tiahuanaco.

However, outside of the south-central highlands there is only one unambiguous example of Tiwanaku monumental architecture. The Omo Temple is a three-tier platform structure adjacent to one of the larger Chen Chen affiliated settlements in the middle Osmore drainage (Goldstein 1993b; 2005:282-299). Not only is the Omo Temple the only Tiwanaku monumental architecture constructed outside the highlands, but unlike the major structures at Tiahuanaco, which underwent substantial renovations over their centuries of use, the Omo structure, was carefully planned and constructed and saw little remodeling, and offers a synchronic snapshot of Tiwanaku architecture.

All three tiers or courts were quite different, with the Lower Court being a simple large plaza space and the Upper Court including a sunken court feature as well as several small, roofed structures (Goldstein and Palacios 2015). Almost all formal elements in the Omo Temple appear to have emphasized a processional path from the large public lower court to the private and more architecturally complicated upper court (Goldstein 1993b; 2005:289-293). The intermediary Middle Court of the structure, in particular, seems to have been designed specifically to function as a liminal space including architectural features such as platforms accentuating the doors between the middle and lower court and an elaborate staircase between the middle and upper court (Goldstein and Sitek 2018:462-465). What is more, the Omo Temple appears to have been one of the few locations in which the Omo and Chen Chen affiliated Osmore communities would come together (Goldstein and Sitek 2018; Sitek 2013). It is likely that similar procession-based community rituals, ofgrander scale and complexity, were channeled through Tiahuanaco's monumental precinct as well.

Cerro San Antonio lacks any form of large-scale monumental architecture, and within the Middle Horizon-affiliated sectors described here, there is only a single architectural feature that could have hosted a large number of people in what could be considered public activities. This public feature at L1 is the central plaza in Sector A in the Southern District of the settlement. I describe this architectural feature in detail in Chapter 10 and won't repeat that description here, but it is important to note that a number of features of this plaza would relate to those observed in other, even monumental forms of Tiwanaku architecture.

First, despite being open and unrestricted by formal walls, the plaza had clear, well-worn access points, as it falls directly on the primary east-west pathway that cuts through the sector. However, for about 25 meters on either side of the plaza the path bifurcates, creating two paths. While this is a unique access pattern for Tiwanaku plazas, the dual nature of access has been observed in a number of Tiwanaku monumental structures, from the Akapana Pyramid at Tiahuanco (Isbell and Vranich 2004) to the Omo Temple in the middle Osmore (Goldstein and

Sitek 2018). A third access point to the plaza may have been the adobe platform (Special Structure L1A-2), excavated in Block L1A-2019-2. The remnants of this adobe platform are almost exactly the same in construction and overall form to the portal platforms that adorned the Middle Court entry ways in the Omo Temple (Sitek 2013:75-80). In the Omo Temple, these features are believed to have privileged the transition between spaces, literally exaggerating the act of crossing the threshold of an architectural entry point.

In addition to these specific features that the L1A central plaza shares with others in the Tiwanaku sphere, the central role of the plaza space fits the general mode of Tiwanaku built space as well. While sunken courts and elevated platforms may have been more iconic elements of the Tiwanaku built environment, plazas were the most ubiquitous and central elements for public-oriented community action. Plazas or un-roofed courtyards represented critical junctures in the built environment that facilitated gatherings and thrust individuals into public life at the center of most neighborhood-level residential communities. The open courtyards of compoundsat Tiahuanaco and the plazas surrounded by house clusters in the Osmore settlements were places where community responsibilities could not be avoided, and punctuated symbolic community behaviors could take place (Goldstein and Sitek 2018:457-459). Larger plazas, particularly those at Tiahuanaco, appear to have been the locations of major feasting events as well. Even in monumental architecture, plazas and un-roofed courtyards acted as poles of convergence, inflection points in the built environment where decisions had to be made (Goldstein and Sitek 2018:467-470).

In most ways the Sector A central plaza at L1 fits most closely with the residential plaza spaces, particularly those identified in the Osmore settlements. However, the dual lateral access pattern, plus the additional adobe platform as a possible third entry point, suggests more formal use, again particularly relating to the construction techniques identified at the Omo Temple (Goldstein and Palacios 2015; Sitek 2013). Likewise, some of the material finds found in investigating the adobe platform and plaza space also highlight its special use. As described several times, these finds would include some of the most dense and diverse arrays of redware serving ceramics. The decorated redwares appear to have favored the figural elements of the corporate style more than other excavated contexts (see Figure 236). The most significant find in this respect however was the large portion of a 4-cornered hat. This is a rare example of these hats being found in a non-mortuary and non-midden context. The fact that it was recovered directly between the platform and plaza edge does suggest that its wearer played a role in the plaza proceedings.

Orientation. While the architectural features and general use of space show some categorical similarities between the central plaza at Cerro San Antonio and other Tiwanaku plazas and courtyards, the orientation of a number of formal architectural elements at L1 show even more direct connections to important settlements like Omo in the Osmore and even Tiahuanaco itself. The directional orientation of structures cannot always be taken to imply explicit symbolic community significance, as practical concerns must be considered and environmental constraints often impact how a structure is situated on the landscape. That said, the orientation of public forms of architecture, particularly meticulously planned monumental structures, has often been interpreted to hold particular significance, and sightlines to important features on the landscape and celestial alignments are some of the most frequent motivations for specifically selected alignments in the ancient world.

This is certainly the case with Tiwanaku monumental architecture, particularly at Tiahuanaco itself. The long and varied construction sequence in Tiahuanaco's ceremonial core indicate complex palimpsest of alignments that I don't have space to comprehensively review here (see Vranich 2006, 2009), but it is worth noting that there are alignments to the solar cycle, constellational alignments, as well as clear sightlines to important mountain peaks, like Illimani, to the northeast (Janusek 2004c; Kolata 2003b; Kolata and Ponce Sanginés 1992; Vranich 2010). Most of the earliest public constructions at Tiahuanaco orient tocardinal directions with North-South (N-S) access pattern. For instance, the semi-subterranean temple, the earliest public architecture at the settlement, was cardinally-oriented, andaccessed from the south (Callisaya Medina 2010). However, early in the Early Middle Horizon with the initiation of the substantial Pumapunku complex and the massive Akapana Pyramid, the guiding orientation of the site would take a turn, or at least a twist (Vranich 2009).

The Akapana and the Pumapunku architectural complexes were constructed to be oriented roughly 5-8° NNE. Access tothese major structures appears to have been from major plazas on the western side and would have allowed for an eastern exit (Isbell and Vranich 2004). With Pumapunku considered the access point to the settlement, the dual architectural complexes would promote a SW-NE axis of monumentality (Kolata 2003b; Vranich 1999, 2010). However, this orientation was not restricted to the monumental architecture. Most domestic compounds and associated architectural elements at the settlement would also take on an 8° east of north orientation. This was particularly true of the walls (Janusek 2002:41) of major residential compounds. Due to its visual prominence from anywhere at the settlement, the Akapana likely acted as the guide for the establishment of this residential orientation. The fact that the imposing Akapana, neighboring Pumapunku complex, and all surrounding residential compounds aligned would have projected a global symbolic community affiliation that articulated the entire built environment of the sprawling settlement.

Just one structure at Cerro San Antonio shares this general SW-NE or 8° east of north orientation of Tiahuanaco. This would be Special Structure L1A-1 or the small booth-like structure at the southern edge of Sector A (see 7.1 and 9.2). While badly looted in prehistory, the roughly square field stone foundation of the Special Structure L1A-1 would be left largely intact. A concentration of miniature plainware vessels, ritually destroyed bronze tupu pins, and large chunks of charcoal were some of the only materials recovered in an otherwise culturally sparse matrix. At just under two-meters-square, it is difficult to discern if this was a structure to be entered or if it contained an idol, or had some other function, but its square foundation was oriented at roughly 12° east of, close to the typical highland Tiwanaku orientation.

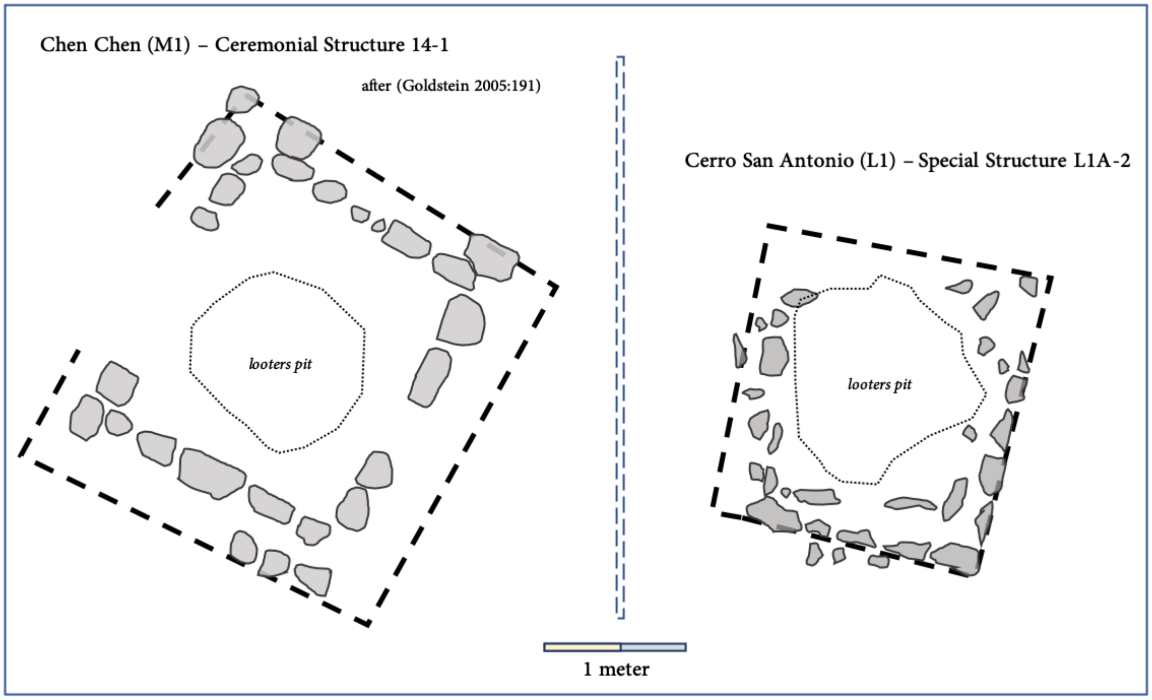


Figure 252. Booth-like structures from (left) the site of Chen Chen in the middle Osmore and (right) from Cerro San Antonio in the middle Locumba.

Special Structure L1A-1 shares orientation with a nearly identical structure in the Osmore at the settlement of Chen Chen (M1) (Goldstein 2005:191). Just slightly larger and oriented at 28° East of North, Ceremonial Structure 14-1 at M1 was also looted in prehistory, so its primary use is also unclear, but it too was defined by miniature plainware vessels, bronze tupu pins, and little domestic refuse (Goldstein 2005:300-301). Chen Chen Structure 14-1 also aligns with the only other structure in the Osmore to take the general Tiwanaku NNE orientation,Ceremonial Structure 15-1 (Goldstein 2005:301). Taken together these structures produce a general NW-SE or north-by-northwest axis. This is significant, as is described below, this NNW orientation would define the built environment of all Tiwanaku-affiliated settlements in the Valles Occidentales.

The most conspicuous Tiwanaku-affiliated structure to take the general northwestern orientation would be the Omo Temple (Goldstein 1993b). Built using the natural hillside, this orientation of the Omo Temple could be said to be opportunistic, if it weren't for the fact that other Chen Chen- and Tumilaca-affiliated domestic structures in the middle Osmore would mirror this orientation. Like the Akapana and Pumapunku, the Omo Temple would be entered generally from the northwest. At Cerro San Antonio, all excavated domestic architecture shares this same orientation. Likewise, the Sector A central plaza also shares this northwestern orientation with its primary access route along its roughly SW-NE axis. Thus, if the adobe platform (Special Structure L1A-2) was used as a portal platform or access point, it would have shared its roughly similar access from the NW with the Omo Temple.

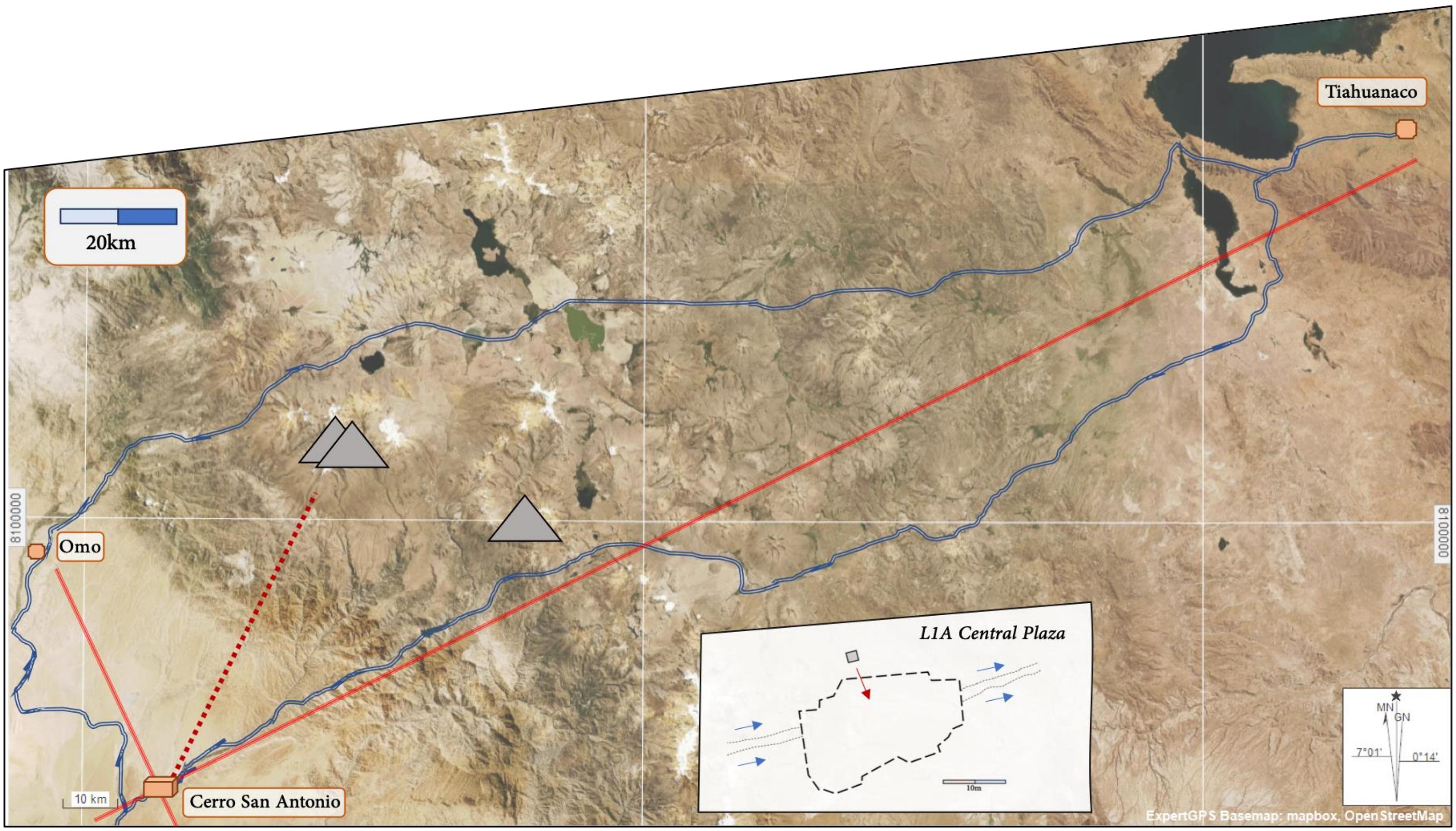


Figure 253. Comparison of alignments of Omo in the Osmore drainage, Tiahuanaco in the highlands, and the Sector A central plaza at Cerro San Antonio (insert).

The central axis of the Sector A central plaza at Cerro San Antonio reveals an even more direct connection to important points in the Tiwanaku symbolic community landscape. Following the primary path through the central plaza along the southwest-northeast axis would bring into focus the view of the distant snowcapped peak of Tutupaca. However, as illustrated in Figure 253, the axial lines of the L1A central plaza remarkably point rather directly at the Omo settlement complex (generally to the NW) and to Tiahuanaco in the highlands (generally to the NE). Of course, this isn't precise, but may indicate yet another direct connection between Cerro San Antonio and the Tiwanaku symbolic network.

11.5 Chapter Summary

In Chapter 11 I presented the discussion chapter of this dissertation, my analysis in the macroscale. Here I contextualize the Cerro San Antonio dataset in theregional context of the South-Central Andes and the Middle Horizon Period. This chapter brings Tiwanaku back to the discussion, as I compare and contrast   Middle Horizon occupations at L1 (see Chapter 9 and Chapter 10) with other archaeological datasets from throughout the region, particularly those from the neighboring middle Osmore drainage in the Valles Occidentales as well as from Tiahuanaco itself in the south-central highlands.

11.1: I begin Chapter 11 with a brief discussion that highlights some of the macroscale constraints in the spatial-temporal period of the Middle Horizon in the South-Central Andes. This includes some unavoidable logistical constraints from distance and the rough terrain of the Andes. I also present the absolute dates from L1 to help provide context regarding time.

11.2: In this subsection I compareCerro San Antonio domestic architecture and settlement patterns with those observed elsewhere in Tiwanaku-affiliated settlements. Here I also covered some aspects of population during the Middle Horizon.

11.3: This discussion focuses on sustainable modes of community and what basic subsistence and crafting at Cerro San Antonio might suggest about the broader Tiwanaku political economy.

11.4: This final subsection works to explore the connections between symbolic modes of community traced at Cerro San Antonio to those that appear to have been emanating from Tiahuanaco during the Middle Horizon.

Next: I present my final Conclusion. Here I summarize this synthesis by returning briefly to my primary hypotheses as well as providing some implications and future directions for this research.

CONCLUSION

Here in the Conclusion I attempt to provide a brief synopsis of this dissertation. This is not meant to be a comprehensive summary, but merely a coda, a few final thoughts regarding the nature of community life at Cerro San Antonio in the middle Locumba drainage during the Middle Horizon and what it implies about the interlinking institutions we now call Tiwanaku. I return to my hypotheses to outline a diachronic and largely macroscale breakdown of Tiwanaku influence on the configuration of multi-modal community networks of the South-Central Andes, particularly in the Valles Occidentales, during the Middle Horizon. I also highlight some of the broader implications of the research presented in this dissertation, including the community ecology framework first outlined in Chapter 1. Finally, I outline some avenues for future research at Cerro San Antonio (L1) and in studies of ancient individuals, communities, and institutions.

Hypotheses Tested: Cerro San Antonio (L1) and Tiwanaku in perspective

Here I want to briefly return to my formal hypotheses, first presented in the Introduction and Chapter 4 (see 4.3), to present a final network-orientedinterpretation of the multi-modal community networks that defined the Valles Occidentales during the Middle Horizon. Of course, the perspective taken here is centered on the node of Cerro San Antonio (L1); ultimately providing a viewpoint of Tiwanaku from the outside, looking in.

The data derived from archaeological investigations at Cerro San Antonio revealed a dynamic pattern, that cannot be easily summarized by just one of the simplified network models I used in my hypotheses (Figure 31). However, one thing does appear clear, and answers some of the base-level questions first posed in my Introduction - the individuals who generated the communities that occupied Sector A, Sector L, and Sector U at Cerro San Antonio (L1) in the middle Locumba Valley were directly affiliated with the highland populations of the southern Titicaca Basin. Said another way, the communities centered at Cerro San Antonio during the

Middle Horizon were fundamentally Tiwanaku. In fact, outside of the middle Osmore enclaves, there are few other settlements outside of the southern Titicaca Basin in the South-Central Andes that show more substantial community affiliation with Tiwanaku than those centered at Cerro San Antonio in Locumba. As indicated by the limited radiocarbon dates from L1, it is likely that this settlement was occupied over as many as ten generations of community action and interaction with the highland polity. In spite of a complicated material legacy, a number of preliminary diachronic patterns can be observed regarding this Middle Horizon, Tiwanaku-affiliated occupation of L1.

First, it is important to remember that the Middle Horizon occupants were not the first to occupy this confluence in the Locumba drainage. Formative Period burial mounds (*tumulos*) define one of the westernmost sectors at L1 (Sector H) and Formative Period ceramic sherds have been identified on the surface in a number of locations across the site. This suggests at least the punctuated presence of the earliest agriculturalists to occupy the drainage. However, there is little evidence suggesting that the later Tiwanaku occupants displaced or otherwise came to co-occupy the site with these earlier inhabitants. More investigations, particularly absolute dating of materials from these Formative Period-associated contexts will be necessary to delineate the timing of this prior occupation. While not all features and materials investigated at L1 would match those identified at Tiahuanaco itself, no investigated contexts in Sector A, Sector L, or Sector U suggest that Tiwanaku style materials are the result of hybridity or emulation of an elite Tiwanaku residential presence by local populations. In sum, this observation effectively disqualifies either variant of Hypothesis 3 (H3a or H3b), which presupposed a preexisting community structure at the site that transformed when engaged in the Tiwanaku Valles Occidentales network.

The exact timing of the arrival of initial Tiwanaku communities to Cerro San Antonio and the middle Locumba drainage is still unclear. The earliest recorded absolute date from L1 suggests that the occupation of Sector A was initiated by approximately ca. AD 850-900 or the transitional period between the Early and Late Middle Horizon. At this point, Tiwanaku-affiliated caravans had hubbed out of the middle Osmore drainage for generations, with seasonal camps having transformed into permanent settlements in Moquegua at least a century earlier (see Goldstein 2005; 2009). Again, these caravan-oriented communities are known as the Omo-style settlements in the Osmore drainage. It is difficult to determine at this time whether the initial Locumba Tiwanaku populations originated from the Omo enclaves in the Osmore or were directly tied to their own southern Titicaca Basin communities in the highlands. However, all decorated ceramics that appear to align with the Early Middle Horizon iconographic suite and decorative style fit well with those found frequently in the Osmore. In particular, the continuous volute motif appears to have been one of the primary decoration choices in the early Tiwanaku ceramic examples in both the Osmore and Locumba. In sum, this early occupation could have fit with either Hypothesis 1 (H1 - Primary Enclave) or the first variant of Hypothesis 2 (H2a - Seconday Enclave) (see 4.3).

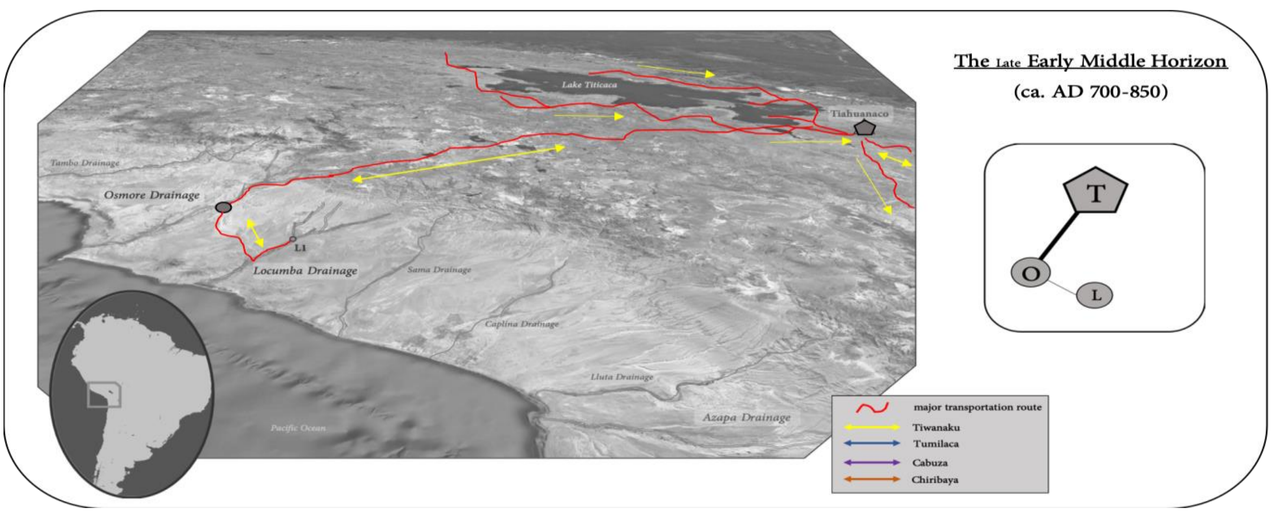


Figure 254. Map illustrating Tiwanaku connections in the Valles Occidentales during the late Early Middle Horizon and basic network representation of these connections.

Of the six (6) ceramic spot finds that fall within this early Tiwanaku style, three (3) were found in Neighborhood I of Sector A, just to the southwest of the central plaza and an additional two (2) were found in cemeteries also associated with Sector A (see Figure 251). Importantly, the western half of Sector A is also where the only polished blackware sherds, again heavily associated with the Osmore Omo style, were recovered at L1. Combined with the fact that the context that produced the earliest date yet recovered at L1 is also located in Neighborhood I in Sector A, suggests that this neighborhood is likely to have been the locus for the initial Tiwanaku settlement at Cerro San Antonio. The limited distribution of these early ceramic styles suggests that this initial occupation was likely a small settlement, possibly centered on the Sector A central plaza from the start. Whether deriving from the Omo populations in the Osmore or a separate origin in the highlands, Cerro San Antonio represents one of only a few locations in the Valles Occidentales, and south-central coast more generally, where Tiwanaku communities settled at this time in the Middle Horizion. By as early as the end of the Early Middle Horizon, the major Omo-style enclaves in the middle Osmore were joined by additional settlers (the Chen Chen style colonists) and possibly, at least a nominal, settlement in Locumba. Thus, a true Tiwanaku residential community network had formed in the Valles Occidentales (Figure 254).

The Tiwanaku-affiliated settlement at Cerro San Antonio appears to have remained relatively small until sometime in the second half of the Late Middle Horizon (post ca. AD 900). This is indicated by most diagnostic materials, particularly decorated ceramics, recovered in the Tiwanaku-affiliated sectors aligning with the Late Middle Horizon styles observed at Tiahuanaco and throughout the south-central highlands. All three domestic sectors at L1 are dominated by sherds from vessels decorated under this stylistic rubric, suggesting that by the later part of the Late Middle Horizon the settlement reached its maximal extent. It is not yet definitive whether this influx of Tiwanaku people simply grew in situ from locally rooted populations or whether new migrant groups arrived from the highlands, the Osmore drainage, or other parts of the Tiwanaku sphere. It is important to note here that it was during this same time that the Osmore Tiwanaku populations swelled with the influx of the Chen Chen-affiliated communities, and it is quite possible these populations spilled over into the neighboring Locumba drainage. As noted in Chapter 11, some trends in the L1 ceramics, such as the absence of the *escudilla* vessel forms and the predominance of iconographic motifs like the flamingo/ibis, suggest connections to the Chen Chen Tiwanaku colonists in the middle Osmore drainage. However, other commonly occurring motifs in the L1 assemblage, such as the cross design, are quite prevalent in Tiwanaku-affiliated contexts in the Central Valley of Chochabamba (CVCT) Tiwanaku style that defined the Cochabamba-Mizque area, hinting at connections further afield as well.

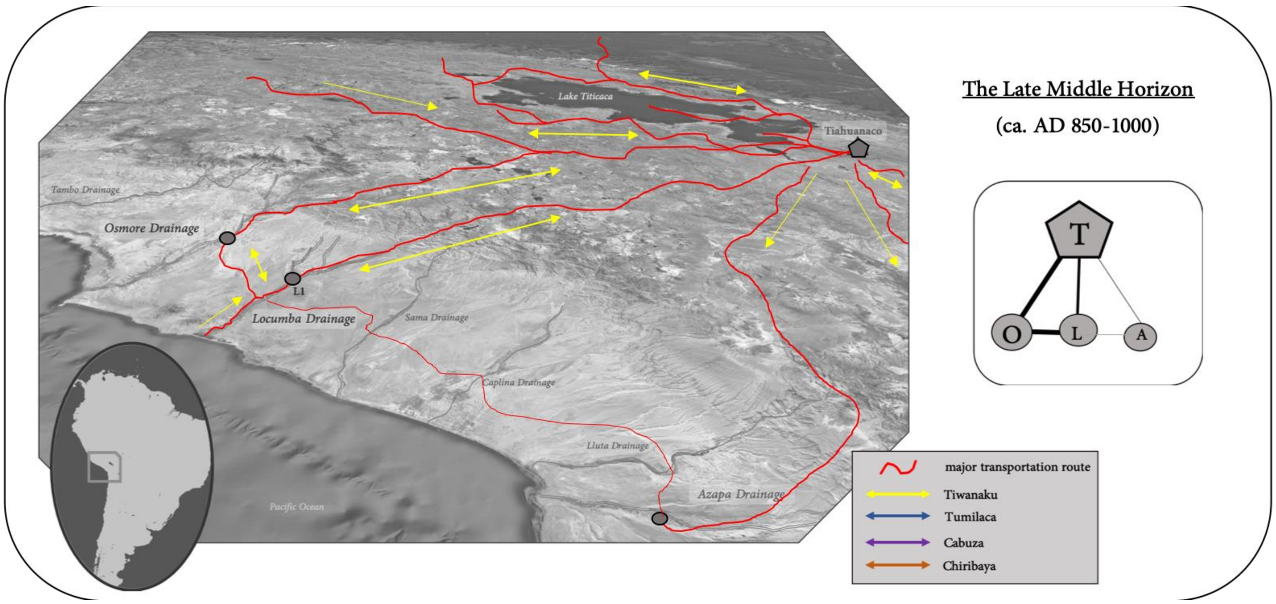


Figure 255. Map illustrating Tiwanaku connections in the Valles Occidentales during the Late Middle Horizon and basic network representation of these connections.

It was at this time in the Late Middle Horizon that the Tiwanaku network, throughout the South-Central Andes, likely reached its most integrated configuration (Figure 255). With a booming Tiwanaku enclave in the middle Osmore, a sizable secondary enclave in the neighboring middle Locumba, as well as smaller settlements as far south as the Azapa drainage, a robust Tiwanaku multimodal community was well-established in the Valles Occidentales. Here the ethnoreligious lifestyle that underwrote all Tiwanaku-oriented communities was well-recognized over an area of over 20,000km^2. Instead of Tiwanaku being limitedto a symbolic production zone that would be seasonally activated for major holiday events in the center of Tiahuanaco itself, as it had been in the Early Middle Horizon, Tiwanaku had become a lifestyle that could be identifiedin certain community manifestations across the known landscape. So even as the foundational institutions based at Tiahuanaco became more centralized, as aggrandizing core communities occupied the monumental precinct, the Tiwanaku network in the Valles Occidentales appears to have become more distributed. This is also the point at which the Tiwanaku network could be said to be globalized, with the various settlements across the South-Central Andes forming a culturally coherent and interconnected version of an interregional multimodal community network. The Late Middle Horizon thus likely represents some hybrid of my Hypothesis 1 (H1 - Primary Enclave) and the primary variant of Hypothesis 2 (H2a - Secondary Enclave) (see 4.3).

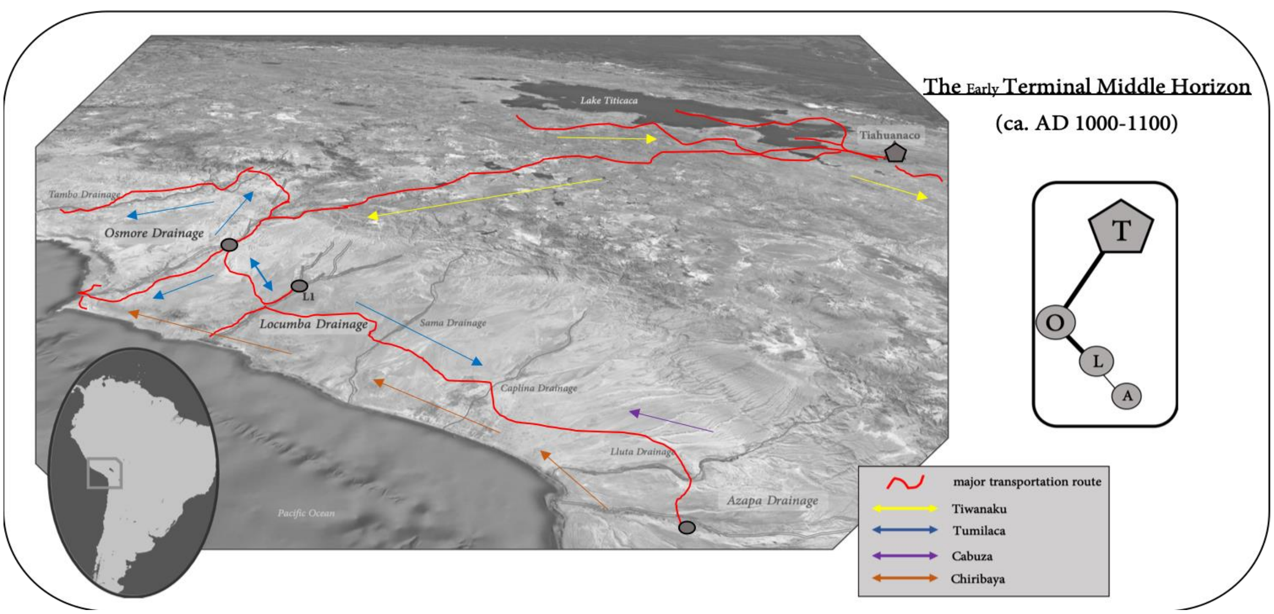


Figure 256. Map illustrating Tiwanaku connections in the Valles Occidentales during the early Terminal Middle Horizon and basic network representation of these connections.

By ca. AD 1000, evidence suggests that Tiahuanaco and other larger population centers in the southern Titicaca Basin had begun to dissipate. Major compound neighborhoods and even entire domestic sectors at Tiahuanaco had likely been abandoned for over a generation. Many of the major Tiwanaku institutions and more elaborate symbolic community formations centered at Tiahuanaco had likely already begun to fail beginning in the Late Middle Horizon, but finally reached a state of self-organized criticality and collapse after prolonged drought would continue to further tax an already top-heavy community network. While the site of Tiahuanaco, particularly the most iconic representations of these central Tiwanaku institutions, were destroyed in punctuated events, it is possible that some of the long-standing transportation corridors between the highlands and coast, namely the road between Tiahuanaco and the Osmore drainage remained active for a time in the Terminal Middle Horizon. That said, the most iconic installation of Tiwanaku institutional power, the Omo Temple in the middle Osmore was largely destroyed around this time as well.

Well before the collapse of the central Tiwanaku institutions in the highlands, the Tiwanaku-affiliated community networks had already begun to diversify in the Valles Occidentales. In the middle Osmore, the Tumilaca cultural affiliation designates this local ethnogenesis, as formerly south-central highland migrants transitioned into true locals of the south-central coast. First spreading into the upper and lower Osmore drainage, these Tumilaca groups appear to have reached neighboring drainages like the Tambo to the north and the middle Locumba to the south. While certainly a minority presence when compared to the Late Middle Horizon Tiwanaku representation, several sherds at Cerro San Antonio show clear affiliation with the motifs and overall vessel construction that define the Tumilaca ceramic style in the Osmore. The spread of Tumilaca was likely accelerated as the final network connections to the highlands were severed and the remaining Tiwanaku communities were set adrift; communities living in diaspora. Overall, this scenario aligns with the second variant of my Hypothesis 2 (H2b - Secondary Enclave) (see 4.3).

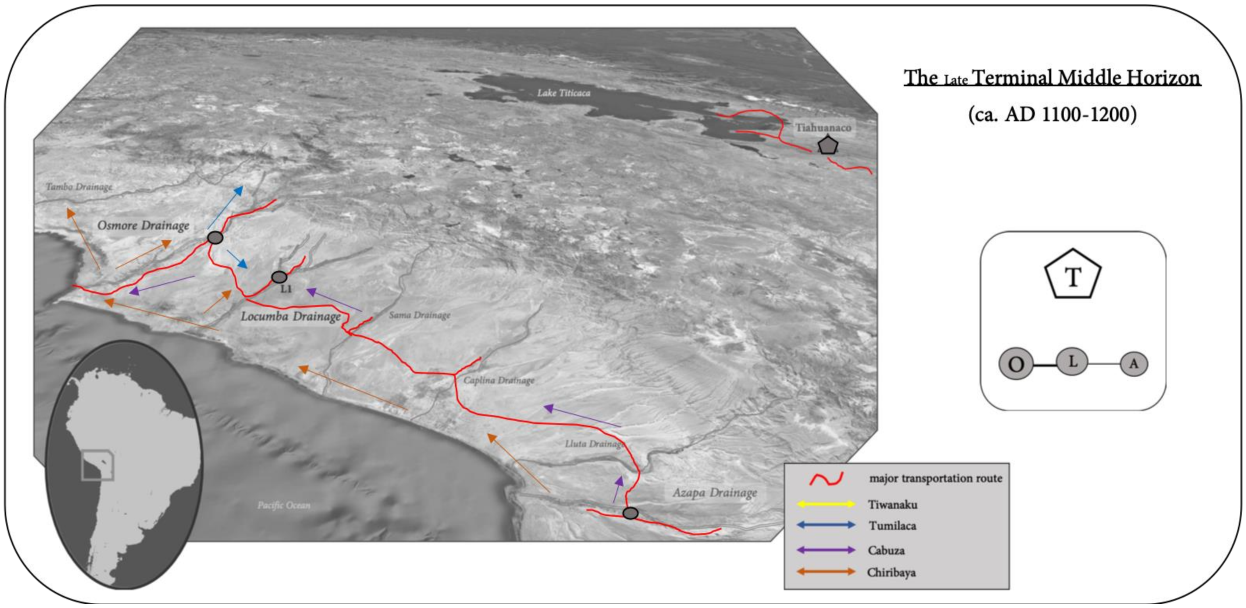


Figure 257. Map illustrating Tiwanaku connections in the Valles Occidentales during the late Terminal Middle Horizon and basic network representation of these connections.

Despite the resilience of several Tiwanaku community manifestations in the Pacific drainages, after just a few generations their lingering signs of Tiwanaku heritage began to fade. The multimodal community network flows that had long been channeled through the middle Osmore appear to have largely reversed. Cerro San Antonio, which had long been in close orbit with the enclaves of the middle Osmore, began showing evidence for influence from the south. First, the last lingering vestiges of Tiwanaku influence can be seen in limited Cabuza style ceramics found at L1. This brings my Hypothesis 3 into play, specifically its secondary variant (H3b - Exchange & Emulation) (see 4.3). Ultimately it would be the Chiribaya that would make a major impression at Cerro San Antonio. By ca. AD 1200 Chiribaya-affiliated communities had colonized the entire *chala* ecozone of the south-central coast and began progressing up to the lower *yunga* zones of the drainages of the Valles Occidentales. By the time the Chiribaya were establishing their major mortuary complex in Sector C of L1, the Tiwanaku-affiliated residential communities of Sector A, Sector L, and Sector U, had likely been abandoned for at least a generation.

From the Inside, Looking Out: Cerro San Antonio (L1) in perspective

All evidence of this present study indicates that the initial Middle Horizon occupants of Cerro San Antonio were indeed Tiwanaku, and their descendants continued a commitment to Tiwanaku lifeways until the settlement was ultimately abandoned upwards of ten generations later. It is likely that this initial settlement was formed around a plaza, which would become the Sector A central plaza as the settlement expanded. It would take multiple generations for the L1 population to fill two major sectors (Sector A and Sector L), with an auxiliary domestic sector forming at the end of this period of expansion (Sector U). While Tiwanaku domestic refuse would come to cover over 13 hectares of area, as noted in Chapter 11, it is likely that no more than 1100 individuals likely occupied the village at any one time.

These domestic sectors were composed of multiple neighborhoods, which were complete domestic structures, including houses but also a number of neighborhood processing facilities. While these cane-based *quincha* structures were radically different than the field stone and adobe brick structures of their highland relatives, the built space facilitated a similar suite of domestic activities. Many of these activities do not appear to have been geared towards production for some centralized elite political or religious institution, but rather were defined by the daily ebbs and flows of sustainable community subsistence production, servicing family-based households and supra-family-based neighborhoods. Most families likely focused on farming and harvesting local crops and plant life in the sweet water Cinto tributary as well as herding flocks of llamas in the Salado tributary. More specialized sustainable community tasks were taken on by certain families, with some showing evidence for crafting locally-circulated goods and others making ventures to the coast for fish and other marine resources. All things considered, Cerro San Antonio was likely a relatively quiet, self-sustaining settlement, with even the dead kept close, in adjacent cemetery complexes.

Nonetheless, there is also evidence suggesting consistent connection with the rest of the Tiwanaku sphere. While no materials from L1 have yet been geochemically sourced to

Tiahuanaco, a number of subsistence remains and finished goods at Cerro San Antonio could certainly have had a highland origin. That said, there is even stronger evidence to suggest that the occupants at Cerro San Antonio maintained close contacts with the major Tiwanaku enclaves in the middle Osmore. Again, it is quite possible that the original founders of the Tiwanaku settlement in the middle Locumba came from the Osmore. But whether this was the case or not, at a distance of less than two days travel, even with a heavily laden caravan in tow, it is likely that residents of these two valleys would maintain close communication. It is possible, with their closer and far easier route to the seaside, that L1 specialists also supplied the Chen Chen colonists in the Osmore with their fish, mussels, and additional marine resources. It is also likely that the Cerro San Antonio inhabitants would travel to the Omo Temple in the Osmore or even to the monuments at Tiahuanaco for certain seasonal holidays and other points of celebration, renewing their sense of Tiwanaku identity in their small town, tucked away in the lowest reaches of the *yungas* of the Valles Occidentales.

From the Outside, Looking In: Tiwanaku in perspective

Taking a macro-to-micro or top-down perspective, Tiwanaku was in some ways a first-generation expansive state. It certainly had regional precedent in the competing polities that crowded the shores of Lake Titicaca during the Late Formative. However, even the most centralized of these, Pukara, would not reach the institutional complexity, not to mention longevity, of the polities that formed the basis of Tiwanaku. Of course, over the 500 years that Tiwanaku would hold sway over the macroscale mechanisms of social reproduction in the South-Central Andes, the multimodal community and the institutional configurations at the core of the Tiwanaku polity would evolve. In the first half of the Middle Horizon, Tiwanaku was likely based around strong network strategies of aggrandizers who formed system-serving institutions. At this stage, Tiwanaku was effectively a theater state, in which the growing economic and political clout of institutions and the elites that directed them were expressed through integrating holiday festivities and increasing regional influence - a true ritual mode of production. However, the second half of the Middle Horizon would see the formation of true elites, usurping institutional power and leading to increasingly fragile institutions and even lower-level community configurations.

Taking a more micro-to-macro or bottom-up perspective it is easy to get lost in the complexity of such complicated social configurations andsee only segmentation and heterogeneity. No ancient (or modern) polity ever look exactly the same across space and time, and we shouldn't have such expectations for Tiwanaku contexts in order to prove the institutional complexity of statehood was present. That said, at no point does it appear that Tiwanaku pursued an aggressive territorially expansive program in the Valles Occidentales, and aggrandizing strategies did not rely on the most extreme exclusionary policies, namely warfare and military-based institutions. As such, Tiwanaku can be largely seen as a percolating ethnoreligious influence in the region as opposed to an imposed political one. The community-centered approach employed in this dissertation took this more bottom-up perspective on Tiwanaku during analysis and interpretation, and I will not repeat that discussion here. However, I do want to briefly tie together my synthesis of the multimodal community model I developed in Chapter 1 (see 1.2), the indigenous Andean concept of *ayllu* from Chapter 2 (see 2.2), and how this has and will continue to help understand Tiwanaku.

Others have long used the concept of *ayllu* to help understand the political structure and broader social mechanism underlying Tiwanaku. I will not detail those arguments here, but I concur that this concept is critical for understating this ancient polity. The central claim regarding *ayllus* made in Chapter 2.2 was not just that the community ecology model could help to understand *ayllus* anthropologically, but rather that the *ayllu* is the Central Andean equivalent of multimodal communities, as I have defined them here. Like the multiple modes in which community can emerge from individual interaction, for the Aymara and Quechua-speaking populations of the Andes, the *ayllu* acts as the primary social organizing concept that encompasses residence, all modes of sustainability, and acts as a primary symbolic framing for understanding all relations a person may face. *Ayllu* is the middle range social category that allows individuals to scale between individual or microscale relations and those of more institutional or macroscale realms. So, while, in the analysis presented in this dissertation, I exclusively utilize the term community, ultimately *ayllu* is a more ontologically-grounded and truly essential term for understanding past and present middle range sociality in the Central Andes.

Broader Impact: understanding emergent sociality through community ecology

It is my sincere hope that this dissertation has provided a clear presentation of the results garnered from field work and subsequent material analysis I had the distinct pleasure of conducting at Cerro San Antonio (L1) in the middle Locumba Valley of Peru. The site, often simply referred to as *La Huaca*, has long been valued as a local source of pride and a direct connection to the past for the town of Villa Locumba and I hope an immediate broader impact of this dissertation is in adding a dimension of understanding to this important cultural landmark. Below, I more explicitly lay out how I hope this work will continue to assist directly in the protection and promotion of the Peruvian cultural patrimony at Cerro San Antonio. Here I want to briefly highlight three ways in which I hope this dissertation will have an impact on our understanding of Tiwanaku, the archaeological understanding of past societies, and the field of anthropology more generally.

1) Better understanding the Middle Horizon occupation at Cerro San Antonio (L1) enriches the broader understanding of Tiwanaku.

As I hope to have conveyed, Cerro San Antonio likely represented a modest, but nonetheless important node in the broader Tiwanaku network, particularly in the Valles

Occidentales region. The western *yungas* and the Pacific drainages that punctuated the desert foothills that otherwise define this region were Tiwanaku's western frontier; an ecological setting vastly different than the windswept highland lakeshore and plains of the *altiplano* from which Tiwanaku emerged, and well outside its direct control. The pattern at Cerro San Antonio, complments prominent interpretations of the neighboring Osmore enclaves (e.g., Goldstein 2005, 2009, 2015), as less colonial outposts, implanted by a centralized state elite bent on territorial control, and more extensions of preexisting multimodal community networks boosted by integrating activities like important regional holiday festivities hosted at Tiahuanaco. This study of Cerro San Antonio also confirms that Tiwanaku, like all such complex and long-standing institutional configurations, was dynamic, differing across space and certainly evolving, and changing over time.

2) Better understanding Tiwanaku contributes to the broader understanding of the globalization of ancient multi-modal community networks and the emergence of states.

Today nation-states cover most of the habitable areas of Earth's terrestrial surface, and with the exception of some expanses of open ocean, claim most of the remaining land and sea. The term globalization has become synonymous with the 21st century, in which the various disparate networks of nation-states that formed between the 16th and 20th centuries coalesced into a truly globalized network. Delineating network flows in this planetary-scaled globalized network is difficult enough in the macroscale, when comparing nation-states, let alone when attempting to dig into the complexities of the mesoscale where multitudes of multimodal community networks of interacting individuals continue to generate even the most complicated seeming nation-states of our post-modern world. Looking to the remote past, as fragmented as the remaining material record might be, can help to strip away f layers of complexity. Case studies like Tiwanaku are particularly important, because as early expansive states, their definition can make subsequent state development and network flows be easier to isolate.

Through my discussion above I hope to have illustrated how from a macroscale perspective, in both space and time, Tiwanaku presents a case of a segmented, but none-the-less state-level polity. Tiwanaku institutions, whether born from sustainable community-oriented bureaucracy, regulating fields and flocks, or more symbolic community-oriented systems of sacred and profane knowledge, were segmented and specialized enough to cross most any threshold of statehood for ancient societies (see Stanish 2013). However, this case study has also shown that even the first iterations of state formation and the development of areas that might be considered frontiers were far from standardized. Even relatively modest settlements like Cerro San Antonio show complicated community configurations that changed over time. I believe one the most significant things the Tiwanaku case study helps illustrate is how, under the right conditions, even institutional centers of a relatively segmented configuration, like Tiwanaku, can come to act as a globalizing force in regional multimodal community networks. In particular, the Tiwanaku case study shows how this can be done with a particularly attractive ethic, truly inclusive strategies of community cohesion, as opposed to the exclusionary, and often militaristic routes often assumed traveled in nascent state development.

3) The study of community ecology, and complexity more generally, enhances our broader understanding of human sociality.

Finally, I hope that through this dissertation I have taken at least a few modest steps in the right direction in terms of further understanding what it means to be human. As noted in Chapter 1, we have only just begun to explore the parameters of what I have termed the Community Ecology approach to middle-range sociality. Informed by complexity theory and built on both quantitative and qualitative methods and techniques of network science, I hope this new synthesis of the concept of *community* represents a useful tool in investigations of the social, both local and global, and particularly the bridging of the two. One of my hopes is that this theory of middle-range sociality can help avoid the often-fruitless dichotomies of top-down vs.

bottom-up, hierarchy vs. heterarchy, power vs. agency. All these organizing principles and forces of action can coexist in complex systems. Human societies, past and present, are nothing if not complex.

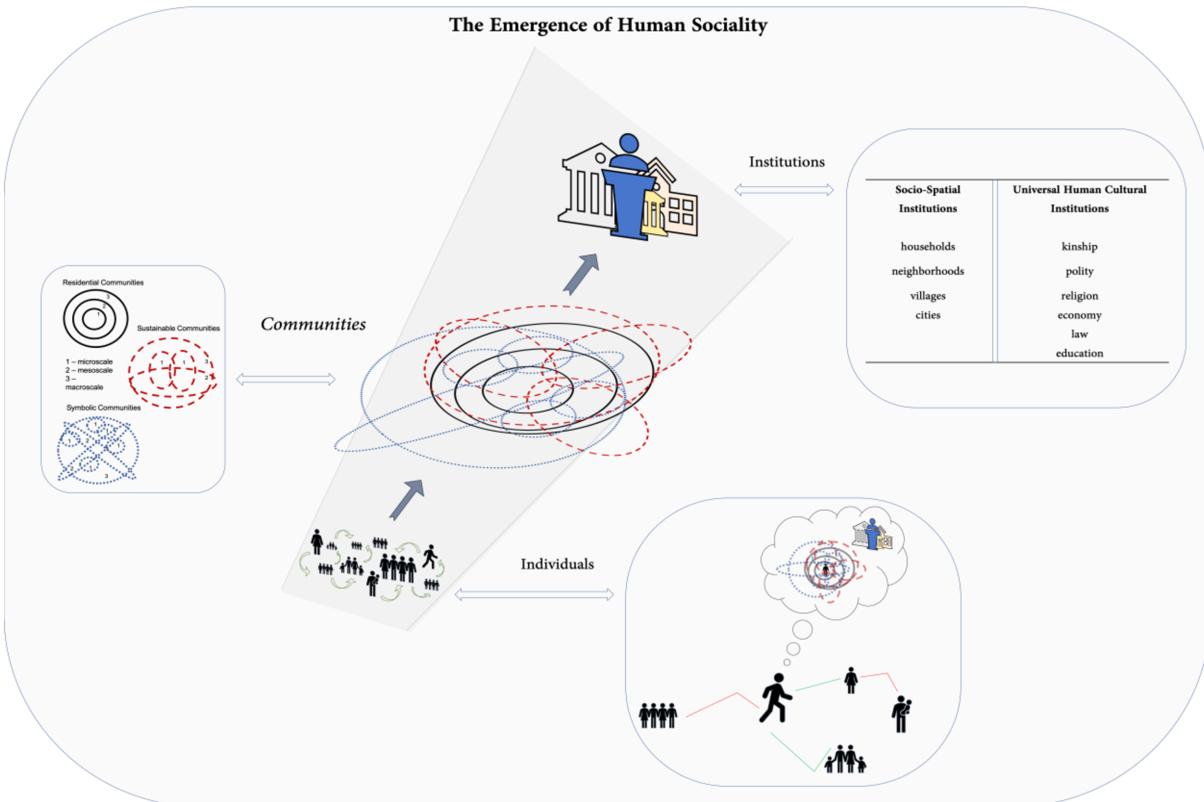


Figure 258. Schematic representation of the Community Ecology framework developed in this thesis and a complexity-inspired understanding of human sociality more generally.

My further hope is that through developing a robust framework for understanding communities, the complexities of human sociality can be better understood, by starting in the middle and working outwards. Institutions, whether the grounded socio-spatial institutions of households, neighborhoods, villages, and cities or the more abstracted institutional realms, ubiquitous in human societies, like kinship, economy, politics, and education, must be understood as the emergent result of interacting modes of communities. Viewing human sociality through the lens of the middle-range community also helps to keep in focus the acting agents in all systems of human organization, that is individuals. Institutions and communities who may constrain the very reaches of individual human perception. Only individuals act, think, and suffer, and while it may go without saying, without living, breathing human individuals, there would be no communities and even the most durable and long-lasting institutions would be gone in an instant.

Future Directions: community collaborations in sharing the past of Cerro San Antonio (L1) with the present and preserving it for the future

I want to end by briefly highlighting some of the ways in which I plan to expand the research presented in this dissertation as well as how I hope to contribute to preserving the site of Cerro San Antonio (L1) for the future.

There are several avenues of data collection and analysis initiated in this dissertation that I would like to continue. First, dozens of samples were collected from the 2018-19 excavations that were designated for radiocarbon dating. Receiving more absolute dates from these contexts will help anchor my interpretation regarding the timing of the L1 occupations. In this vein, more chemical and compositional analyses and sourcing of a variety of materials from these contexts would greatly aid in interpretation. LA-ICP-MS analysis is planned for a number of ceramic sherds from various L1 contexts investigated in 2016. This sourcing technique will assist in delineating where ceramics were produced and contribute to a growing database of this type of data in the region. In terms of continued field work, more subsurface investigations via both test excavations and larger area excavations will help further identify and delineate important features and articulated contexts, ranging from more domestic structures to tombs and mortuary areas. I hope to continue remote sensing work, from low-altitude documentation via UAVs, and to test new techniques of infrared sensing of *quincha* cane walls and other features unique to this site complex. In sum, there is significantly more archaeological data collection to be done at Cerro San Antonio (L1).

Of course, beyond my own research, Cerro San Antonio is an incredibly important archaeological complex. As noted, this importance has long been recognized by the local community, and many there have invested great time and energy over the years in fending off illegal looting and working to promote and preserve the remains there. Recently the Ministerio de Cultura of Peru has formally recognized the site as endangered due to the particularly extreme looting that took place that the site in the last decade. I have been actively working with local community members in developing strategies for protecting the site. These strategies range from developing education programs and school curricula that involve visits to the site and learning more about the prehistory and history of the local area. Other plans look to developing permanent research facilities at or near the site to act as a space for these educational programs and further dissemination through a museum component. I hope to continue to play whatever modest part I can in protecting this site's remarkable past for the future.

Appendix 1: L1 Surface Collection Unit Inventory

This appendix includes data derived from systematic surface collections at Cerro San Antonio (L1). The systematic surface collections and many of the results garnered from that work are presented in Chapter 6. This appendix includes several data tables of the raw results, particularly focused on material counts that formed the base dataset for the heat maps and other data visualizations in Chapter 6 and throughout Section 3. Additional data tables, derived from systematic surface collection, including the table used to estimate population (Figure 204), are also included here.

Table 16. Table with counts of Tiwanaku-affiliated ceramics (Plainware and Redware) in all systematic surface collection units.

UNIT	*northing*	*easting*	SECTOR	PLAINWARE DIAGNOSTIC	PLAINWARE NON-DAIAGNOSTIC	PLAINWARE TOTAL	REDWARE DIAGNOSTIC	REDWARE NON-DIAGNOSTIC	REDWARE TOTAL
4P	*8051300*	*314050*	A	0	1	***1***	0	0	***0***
5O	*8051350*	*314000*	A	2	18	***20***	0	0	***0***
5P	*8051350*	*314050*	A	0	69	***69***	0	1	***1***
5Q	*8051350*	*314050*	A	2	65	***67***	1	0	***1***
5R	*8051350*	*314150*	A	0	21	***21***	0	0	***0***
6O	*8051400*	*314000*	A	12	217	***229***	4	32	***36***
6P	*8051400*	*314050*	A	18	654	***672***	3	3	***6***
6Q	*8051400*	*314100*	A	5	141	***146***	2	2	***4***
6R	*8051400*	*314150*	A	12	148	***160***	12	0	***12***
6S	*8051400*	*314200*	A	15	481	***496***	4	7	***11***
6T	*8051400*	*314251*	A	0	22	***22***	7	34	***41***
7N	*8051450*	*313950*	A	3	131	***134***	0	4	***4***
7O	*8051450*	*314000*	A	9	580	***589***	7	44	***51***
7P	*8051450*	*314050*	A	46	1510	***1556***	57	0	***57***
7Q	*8051450*	*314100*	A	129	2675	***2804***	79	0	***79***
7R	*8051450*	*314150*	A	16	460	***476***	22	0	***22***
7S	*8051450*	*314200*	A	15	520	***535***	15	0	***15***
7T	*8051450*	*314250*	A	1	38	***39***	1	0	***1***
7U	*8051450*	*314300*	A	0	28	***28***	0	0	***0***

Table 16. Table with counts of Tiwanaku-affiliated ceramics (Plainware and Redware) in all systematic surface collection units (continued).

UNIT	*northing*	*easting*	SECTOR	PLAINWARE DIAGNOSTIC	PLAINWARE NON-DAIAGNOSTIC	PLAINWARE TOTAL	REDWARE DIAGNOSTIC	REDWARE NON-DIAGNOSTIC	REDWARE TOTAL
7V	*8051450*	*314350*	A	0	0	***0***	0	0	***0***
8M	*8051500*	*313900*	A	5	116	***121***	2	0	***2***
8N	*8051500*	*313950*	A	6	163	***169***	1	0	***1***
8O	*8051500*	*314000*	A	43	1115	***1158***	23	0	***23***
8P	*8051500*	*314050*	A	48	1550	***1598***	20	22	***42***
8Q	*8051500*	*314100*	A	37	570	***607***	4	22	***26***
8R	*8051500*	*314150*	A	4	80	***84***	2	22	***24***
8S	*8051500*	*314200*	A	6	157	***163***	3	20	***23***
8T	*8051500*	*314250*	A	0	10	***10***	0	0	***0***
8U	*8051500*	*314300*	A	0	10	***10***	5	0	***5***
8V	*8051500*	*314350*	A	1	66	***67***	9	0	***9***
8W	*8051500*	*314400*	A	6	141	***147***	1	0	***0***
8X	*8051500*	*314450*	A	0	1	***1***	0	0	***0***
8Y	*8051500*	*314500*	A	1	20	***21***	2	0	***2***
8Z	*8051500*	*314550*	A	1	16	***17***	1	0	***1***
8AA	*8051500*	*314600*	A	0	8	***8***	0	0	***0***
9M	*8051550*	*313900*	A	0	136	***136***	1	0	***1***
9N	*8051550*	*313950*	A	9	315	***324***	1	0	***1***
9O	*8051550*	*314000*	A	26	560	***586***	6	0	***6***
9P	*8051550*	*314050*	A	5	322	***327***	7	0	***7***
9Q	*8051550*	*314100*	A	4	57	***61***	3	0	***3***
9R	*8051550*	*314150*	A	7	70	***77***	4	0	***4***
9S	*8051550*	*314200*	A	5	47	***52***	8	0	***8***
9T	*8051550*	*314250*	A	0	3	***3***	0	0	***0***
9U	*8051550*	*314300*	A	0	8	***8***	1	5	***6***
9V	*8051550*	*314350*	A	3	27	***30***	0	5	***5***
9W	*8051550*	*314400*	A	4	121	***125***	1	3	***4***
9X	*8051550*	*314450*	A	3	162	***165***	0	1	***1***
9Y	*8051550*	*314500*	A	41	0	***41***	0	0	***0***
9Z	*8051550*	*314550*	A	3	21	***24***	2	0	***2***
9AA	*8051550*	*314600*	A	7	176	***183***	2	1	***3***

Table 16. Table with counts of Tiwanaku-affiliated ceramics (Plainware and Redware) in all systematic surface collection units (continued).

UNIT	*northing*	*easting*	SECTOR	PLAINWARE DIAGNOSTIC	PLAINWARE NON-DAIAGNOSTIC	PLAINWARE TOTAL	REDWARE DIAGNOSTIC	REDWARE NON-DIAGNOSTIC	REDWARE TOTAL
9BB	*8051550*	*314650*	A	1	50	***51***	0	0	***0***
10X	*8051600*	*314450*	A	2	61	***63***	0	0	***0***
10Y	*8051600*	*314500*	A	1	98	***99***	2	0	***2***
10Z	*8051600*	*314550*	A	1	50	***51***	1	0	***1***
10AA	*8051600*	*314600*	A	1	22	***23***	1	0	***1***
10BB	*8051600*	*314650*	A	0	0	***0***	0	0	***0***
11Z	*8051650*	*314550*	A	1	104	***105***	0	0	***0***
11AA	*8051650*	*314600*	A	1	33	***34***	1	0	***1***
11BB	*8051650*	*314650*	A	0	35	***35***	0	0	***0***
12Z	*8051700*	*314550*	A	1	33	***34***	1	0	***1***
12AA	*8051700*	*314600*	A	0	5	***5***	0	0	***0***
12BB	*8051700*	*314650*	A	0	11	***11***	0	0	***0***
13Z	*8051750*	*314550*	A	1	11	***12***	0	0	***0***
13AA	*8051750*	*314600*	A	0	31	***31***	0	0	***0***
13BB	*8051750*	*314650*	A	3	48	***51***	0	0	***0***
19EE	*8052050*	*314800*	Q	0	0	***0***	0	0	***0***
19FF	*8052050*	*314850*	Q	0	0	***0***	0	0	***0***
20EE	*8052100*	*314800*	L	0	0	***0***	0	0	***0***
20FF	*8052100*	*314850*	L	0	1	***1***	0	0	***0***
21EE	*8052150*	*314800*	L	0	2	***2***	0	0	***0***
21FF	*8052050*	*314850*	L	0	0	***0***	0	0	***0***
21HH	*8052150*	*314950*	L	0	0	***0***	0	0	***0***
22EE	*8052200*	*314800*	L	6	89	***95***	3	15	***18***
22FF	*8052200*	*314850*	L	0	4	***4***	4	5	***9***
22HH	*8052200*	*314950*	M	0	0	***0***	0	0	***0***
23DD	*8052250*	*314750*	L	14	229	***243***	25	0	***25***
24Y	*8052300*	*314500*	L	0	3	***3***	0	0	***0***
24Z	*8052300*	*314550*	L	2	42	***44***	0	11	***11***
24AA	*8052300*	*314600*	L	1	28	***29***	1	1	***2***
24GG	*8052300*	*314900*	M	0	2	***2***	0	0	***0***
25Y	*8052350*	*314500*	L	0	2	***2***	0	0	***0***
25Z	*8052350*	*314550*	L	0	4	***4***	1	1	***2***

Table 16. Table with counts of Tiwanaku-affiliated ceramics (Plainware and Redware) in all systematic surface collection units (continued).

UNIT	*northing*	*easting*	SECTOR	PLAINWARE DIAGNOSTIC	PLAINWARE NON-DAIAGNOSTIC	PLAINWARE TOTAL	REDWARE DIAGNOSTIC	REDWARE NON-DIAGNOSTIC	REDWARE TOTAL
25AA	*8052350*	*314600*	L	2	69	***71***	1	13	***14***
25BB	*8052350*	*314650*	L	0	0	***0***	1	1	***2***
25CC	*8052350*	*314700*	L	0	8	***8***	1	0	***1***
25DD	*8052350*	*314750*	L	0	9	***9***	2	0	***2***
25EE	*8052350*	*314800*	L	0	0	***0***	0	0	***0***
25FF	*8052350*	*314850*	L	0	8	***8***	4	0	***4***
25GG	*8052350*	*314900*	U	0	1	***1***	0	0	***0***
26AA	*8052400*	*314600*	U	0	0	***0***	0	0	***0***
26BB	*8052400*	*314650*	U	0	0	***0***	0	0	***0***
26CC	*8052400*	*314700*	U	0	15	***15***	0	0	***0***
26EE	*8052400*	*314800*	U	0	0	***0***	0	0	***0***
26FF	*8052400*	*314850*	U	0	0	***0***	0	0	***0***
26GG	*8052400*	*314900*	U	0	7	***7***	0	0	***0***
26HH	*8052400*	*314950*	U	0	33	***33***	0	0	***0***
27BB	*8052450*	*314650*	U	0	5	***5***	0	0	***0***
27CC	*8052450*	*314700*	U	0	7	***7***	0	0	***0***
27DD	*8052450*	*314750*	U	0	3	***3***	0	0	***0***
27EE	*8052450*	*314800*	U	0	0	***0***	0	0	***0***
27FF	*8052450*	*314850*	U	0	0	***0***	0	0	***0***
27GG	*8052450*	*314900*	U	1	27	***28***	0	0	***0***
27HH	*8052450*	*314950*	U	0	1	***1***	0	0	***0***
27II	*8052450*	*315000*	U	0	0	***0***	0	0	***0***
28BB	*8052500*	*314650*	U	4	40	***44***	0	0	***0***
28CC	*8052500*	*314700*	U	2	61	***63***	2	0	***2***
28DD	*8052500*	*314750*	U	2	23	***25***	4	0	***4***
28EE	*8052500*	*314800*	U	0	2	***2***	0	0	***0***
28FF	*8052500*	*314850*	U	0	0	***0***	0	0	***0***
28GG	*8052500*	*314900*	U	0	4	***4***	0	0	***0***
28HH	*8052500*	*314950*	U	0	1	***1***	0	0	***0***
28II	*8052500*	*315000*	U	0	57	***57***	0	0	***0***
28JJ	*8052500*	*315050*	U	0	0	***0***	0	0	***0***
29CC	*8052550*	*314700*	U	1	6	***7***	0	0	***0***

Table 16. Table with counts of Tiwanaku-affiliated ceramics (Plainware and Redware) in all systematic surface collection units (continued).

UNIT	*northing*	*easting*	SECTOR	PLAINWARE DIAGNOSTIC	PLAINWARE NON-DAIAGNOSTIC	PLAINWARE TOTAL	REDWARE DIAGNOSTIC	REDWARE NON-DIAGNOSTIC	REDWARE TOTAL
29DD	*8052550*	*314750*	U	0	13	***13***	0	0	***0***
29EE	*8052550*	*314800*	U	1	4	***5***	0	0	***0***
29FF	*8052550*	*314850*	U	1	8	***9***	0	0	***0***
29GG	*8052550*	*314900*	U	0	0	***0***	0	0	***0***
29HH	*8052550*	*314950*	U	0	1	***1***	0	0	***0***
29II	*8052550*	*315000*	U	0	0	***0***	0	0	***0***
30CC	*8052600*	*314700*	U	2	19	***21***	1	0	***1***
30DD	*8052600*	*314750*	U	0	0	***0***	0	0	***0***
30EE	*8052600*	*314800*	U	0	3	***3***	0	0	***0***
30FF	*8052600*	*314850*	U	0	2	***2***	0	0	***0***
30GG	*8052600*	*314900*	U	0	2	***2***	1	0	***1***
17AA	*8051950*	*314600*	L	2	10	***12***	0	0	***0***
18AA	*8052000*	*314600*	L	8	71	***79***	2	0	***2***
18BB	*8052000*	*314650*	L	2	51	***53***	1	0	***1***
19BB	*8052050*	*314650*	L	2	206	***208***	21	0	***21***
20BB	*8052100*	*314650*	L	10	191	***201***	27	0	***27***
20CC	*8052100*	*314700*	L	2	130	***132***	55	0	***55***
21BB	*8052150*	*314650*	L	25	432	***457***	23	0	***23***
21CC	*8052150*	*314700*	L	0	81	***81***	5	0	***5***
21DD	*8052150*	*314750*	L	0	17	***17***	2	0	***2***
22CC	*8052200*	*314700*	L	5	153	***158***	3	0	***3***
22DD	*8052200*	*314750*	L	13	365	***378***	24	0	***24***
23CC	*8052250*	*314700*	L	17	397	***414***	31	0	***31***
23EE	*8052250*	*314800*	L	30	537	***567***	53	0	***53***
24EE	*8052300*	*314800*	L	15	537	***552***	18	0	***18***
24FF	*8052300*	*314850*	L	5	100	***105***	1	0	***1***

Table 17. Table with counts of fauna-related materials collected during systematic surface collections.

UNIT	*northing*	*easting*	SECTOR	Animal Bone	count	Marine/Terrestrial Shell	count
4P	*8051300*	*314050*	A				
5O	*8051350*	*314000*	A			maine shell (no i.d.)	4
5P	*8051350*	*314050*	A			maine shell (no i.d.)	3
5Q	*8051350*	*314050*	A			maine shell (no i.d.)	5
5R	*8051350*	*314150*	A				
6O	*8051400*	*314000*	A			choro, land snail, other	10
6P	*8051400*	*314050*	A	quadraped	2	maine shell (no i.d.)	5
6Q	*8051400*	*314100*	A				
6R	*8051400*	*314150*	A				
6S	*8051400*	*314200*	A			maine shell (no i.d.)	2
6T	*8051400*	*314251*	A			oliva, choro	5
7N	*8051450*	*313950*	A			maine shell (no i.d.)	3
7O	*8051450*	*314000*	A	bone (no i.d.)	6	maine shell (no i.d.), choro	9
7P	*8051450*	*314050*	A	quadraped	10	maine shell (no i.d.)	20
7Q	*8051450*	*314100*	A	quadraped	40	choro, coral	36
7R	*8051450*	*314150*	A	quadraped	2	maine shell (no i.d.)	6
7S	*8051450*	*314200*	A			maine shell (no i.d.)	5
7T	*8051450*	*314250*	A			oliva	2
7U	*8051450*	*314300*	A				
7V	*8051450*	*314350*	A				
8M	*8051500*	*313900*	A			maine shell (no i.d.)	4
8N	*8051500*	*313950*	A			maine shell (no i.d.)	11
8O	*8051500*	*314000*	A	bone (no i.d.)	16	choro, oliva, coral, other	26
8P	*8051500*	*314050*	A	quadraped	22	maine shell (no i.d.)	12
8Q	*8051500*	*314100*	A	bone (no i.d.)	1		

Table 17. Table with counts of fauna-related materials collected during systematic surface collections (continued).

UNIT	*northing*	*easting*	SECTOR	Animal Bone	count	Marine/Terrestrial Shell	count
8R	*8051500*	*314150*	A	bone (no i.d.)	2	choro, oliva	3
8S	*8051500*	*314200*	A			choro	3
8T	*8051500*	*314250*	A				
8U	*8051500*	*314300*	A				
8V	*8051500*	*314350*	A			maine shell (no i.d.)	2
8W	*8051500*	*314400*	A			choro	1
8X	*8051500*	*314450*	A			maine shell (no i.d.)	1
8Y	*8051500*	*314500*	A	bone (no i.d.)	3		
8Z	*8051500*	*314550*	A			choro	1
8AA	*8051500*	*314600*	A				
9M	*8051550*	*313900*	A			maine shell (no i.d.)	5
9N	*8051550*	*313950*	A			maine shell (no i.d.)	14
9O	*8051550*	*314000*	A			maine shell (no i.d.), coral	3
9P	*8051550*	*314050*	A			maine shell (no i.d.)	2
9Q	*8051550*	*314100*	A			maine shell (no i.d.)	1
9R	*8051550*	*314150*	A				
9S	*8051550*	*314200*	A			maine shell (no i.d.)	1
9T	*8051550*	*314250*	A				
9U	*8051550*	*314300*	A				
9V	*8051550*	*314350*	A				
9W	*8051550*	*314400*	A				
9X	*8051550*	*314450*	A	bone (no i.d.)	1		
9Y	*8051550*	*314500*	A			oliva	2
9Z	*8051550*	*314550*	A			maine shell (no i.d.)	5
9AA	*8051550*	*314600*	A			choro, oliva	9
9BB	*8051550*	*314650*	A	bone (no i.d.)	12	choro	1
10X	*8051600*	*314450*	A			maine shell (no i.d.)	2
10Y	*8051600*	*314500*	A				

Table 17. Table with counts of fauna-related materials collected during systematic surface collections (continued).

UNIT	*northing*	*easting*	SECTOR	Animal Bone	count	Marine/Terrestrial Shell	count
10Z	*8051600*	*314550*	A			oliva	1
10AA	*8051600*	*314600*	A	bone (no i.d.)	3	oliva, choro	6
10BB	*8051600*	*314650*	A			choro	1
11Z	*8051650*	*314550*	A	bone (no i.d.)	28		
11AA	*8051650*	*314600*	A			choro	1
11BB	*8051650*	*314650*	A				
12Z	*8051700*	*314550*	A				
12AA	*8051700*	*314600*	A				
12BB	*8051700*	*314650*	A				
13Z	*8051750*	*314550*	A				
13AA	*8051750*	*314600*	A			choro	1
13BB	*8051750*	*314650*	A				
19EE	*8052050*	*314800*	Q				
19FF	*8052050*	*314850*	Q				
20EE	*8052100*	*314800*	L				
20FF	*8052100*	*314850*	L	bone (no i.d.)			
21EE	*8052150*	*314800*	L				
21FF	*8052050*	*314850*	L				
21HH	*8052150*	*314950*	L				
22EE	*8052200*	*314800*	L			maine shell (no i.d.)	1
22FF	*8052200*	*314850*	L				
22HH	*8052200*	*314950*	M				
23DD	*8052250*	*314750*	L			choro, land snail	11
24Y	*8052300*	*314500*	L				
24Z	*8052300*	*314550*	L	bone (no i.d.)	1		
24AA	*8052300*	*314600*	L	bone (no i.d.)	4		
24GG	*8052300*	*314900*	M			maine shell (no i.d.)	4
25Y	*8052350*	*314500*	L				
25Z	*8052350*	*314550*	L				
25AA	*8052350*	*314600*	L	bone (no i.d.)	1	maine shell (no i.d.)	2
25BB	*8052350*	*314650*	L				

Table 17. Table with counts of fauna-related materials collected during systematic surface collections (continued).

UNIT	*northing*	*easting*	SECTOR	Animal Bone	count	Marine/Terrestrial Shell	count
25CC	*8052350*	*314700*	L			land snail	7
25DD	*8052350*	*314750*	L	bone (no i.d.)	4	land snail	24
25EE	*8052350*	*314800*	L				
25FF	*8052350*	*314850*	L			maine shell (no i.d.)	5
25GG	*8052350*	*314900*	U				
26AA	*8052400*	*314600*	U				
26BB	*8052400*	*314650*	U				
26CC	*8052400*	*314700*	U			oliva	1
26EE	*8052400*	*314800*	U	bone (no i.d.)	7		
26FF	*8052400*	*314850*	U			land snail	1
26GG	*8052400*	*314900*	U	quadraped	1	maine shell (no i.d.)	7
26HH	*8052400*	*314950*	U				
27BB	*8052450*	*314650*	U				
27CC	*8052450*	*314700*	U				
27DD	*8052450*	*314750*	U	bone (no i.d.)	1		
27EE	*8052450*	*314800*	U				
27FF	*8052450*	*314850*	U				
27GG	*8052450*	*314900*	U	bone (no i.d.)	1		
27HH	*8052450*	*314950*	U			land snail	2
27II	*8052450*	*315000*	U				
28BB	*8052500*	*314650*	U	bone (no i.d.)	1		
28CC	*8052500*	*314700*	U	bone (no i.d.)	2	choro, land snail, other	7
28DD	*8052500*	*314750*	U	bone (no i.d.)	2	land snail	3
28EE	*8052500*	*314800*	U	bone (no i.d.)	1	land snail	2
28FF	*8052500*	*314850*	U				
28GG	*8052500*	*314900*	U				
28HH	*8052500*	*314950*	U			land snail	3
28II	*8052500*	*315000*	U				

Table 17. Table with counts of fauna-related materials collected during systematic surface collections (continued).

UNIT	*northing*	*easting*	SECTOR	Animal Bone	count	Marine/Terrestrial Shell	count
28JJ	*8052500*	*315050*	U				
29CC	*8052550*	*314700*	U				
29DD	*8052550*	*314750*	U				
29EE	*8052550*	*314800*	U				
29FF	*8052550*	*314850*	U				
29GG	*8052550*	*314900*	U				
29HH	*8052550*	*314950*	U	bone (no i.d.)	1		
29II	*8052550*	*315000*	U			choro	1
30CC	*8052600*	*314700*	U				
30DD	*8052600*	*314750*	U				
30EE	*8052600*	*314800*	U				
30FF	*8052600*	*314850*	U			land snail	1
30GG	*8052600*	*314900*	U			maine shell (no i.d.)	1
17AA	*8051950*	*314600*	L				
18AA	*8052000*	*314600*	L				
18BB	*8052000*	*314650*	L				
19BB	*8052050*	*314650*	L				
20BB	*8052100*	*314650*	L				
20CC	*8052100*	*314700*	L			oliva	2
21BB	*8052150*	*314650*	L			choro	8
21CC	*8052150*	*314700*	L			choro, oliva	6
21DD	*8052150*	*314750*	L	quadraped	7	choro	1
22CC	*8052200*	*314700*	L			choro	1
22DD	*8052200*	*314750*	L			choro	2
23CC	*8052250*	*314700*	L	quadraped	3	choro	2
23EE	*8052250*	*314800*	L			choro, oliva, land snail	105
24EE	*8052300*	*314800*	L			maine shell (no i.d.), land snail, other	17
24FF	*8052300*	*314850*	L			land snail	2

Table 18. Table with counts of lithic-related materials collected during systematic surface collections.

UNIT	*northing*	*easting*	SECTOR	debitage	cores & bifaces	projectile points	hoes	manos	matate fragments (collected)
4P	*8051300*	*314050*	A						
5O	*8051350*	*314000*	A						
5P	*8051350*	*314050*	A						
5Q	*8051350*	*314050*	A						
5R	*8051350*	*314150*	A						
6O	*8051400*	*314000*	A						
6P	*8051400*	*314050*	A	2		1		2	
6Q	*8051400*	*314100*	A						
6R	*8051400*	*314150*	A	2					
6S	*8051400*	*314200*	A						
6T	*8051400*	*314251*	A						
7N	*8051450*	*313950*	A						
7O	*8051450*	*314000*	A			1			
7P	*8051450*	*314050*	A				1	1	
7Q	*8051450*	*314100*	A	5				3	
7R	*8051450*	*314150*	A	1				1	
7S	*8051450*	*314200*	A	1					1
7T	*8051450*	*314250*	A						
7U	*8051450*	*314300*	A						
7V	*8051450*	*314350*	A						
8M	*8051500*	*313900*	A						
8N	*8051500*	*313950*	A						
8O	*8051500*	*314000*	A	4		1		2	
8P	*8051500*	*314050*	A	1	1				
8Q	*8051500*	*314100*	A	1					
8R	*8051500*	*314150*	A						
8S	*8051500*	*314200*	A						
8T	*8051500*	*314250*	A						
	8051500	*314300*	A						

Table 18. Table with counts of lithic-related materials collected during systematic surface collections (continued).

UNIT	*northing*	*easting*	SECTOR	debitage	cores & bifaces	projectile points	hoes	manos	matate fragments (collected)
8V	*8051500*	*314350*	A						
8W	*8051500*	*314400*	A						
8X	*8051500*	*314450*	A						
8Y	*8051500*	*314500*	A						
8Z	*8051500*	*314550*	A						
8AA	*8051500*	*314600*	A						
9M	*8051550*	*313900*	A	1	1				
9N	*8051550*	*313950*	A						
9O	*8051550*	*314000*	A	1					
9P	*8051550*	*314050*	A						
9Q	*8051550*	*314100*	A						
9R	*8051550*	*314150*	A						
9S	*8051550*	*314200*	A						
9T	*8051550*	*314250*	A						
9U	*8051550*	*314300*	A						
9V	*8051550*	*314350*	A						
9W	*8051550*	*314400*	A						
9X	*8051550*	*314450*	A						
9Y	*8051550*	*314500*	A						
9Z	*8051550*	*314550*	A	1		1	1		
9AA	*8051550*	*314600*	A						
9BB	*8051550*	*314650*	A						
10X	*8051600*	*314450*	A						
10Y	*8051600*	*314500*	A						
10Z	*8051600*	*314550*	A	2					
10AA	*8051600*	*314600*	A	2					
10BB	*8051600*	*314650*	A						
11Z	*8051650*	*314550*	A						
11AA	*8051650*	*314600*	A						
11BB	*8051650*	*314650*	A	1					
12Z	*8051700*	*314550*	A						

Table 18. Table with counts of lithic-related materials collected during systematic surface collections (continued).

UNIT	*northing*	*easting*	SECTOR	debitage	cores & bifaces	projectile points	hoes	manos	matate fragments (collected)
12AA	*8051700*	*314600*	A						
12BB	*8051700*	*314650*	A						
13Z	*8051750*	*314550*	A						
13AA	*8051750*	*314600*	A						
13BB	*8051750*	*314650*	A						
19EE	*8052050*	*314800*	Q						
19FF	*8052050*	*314850*	Q						
20EE	*8052100*	*314800*	L						
20FF	*8052100*	*314850*	L						
21EE	*8052150*	*314800*	L						
21FF	*8052050*	*314850*	L						
21HH	*8052150*	*314950*	L	3					
22EE	*8052200*	*314800*	L	4			1		
22FF	*8052200*	*314850*	L	4					
22HH	*8052200*	*314950*	M						
23DD	*8052250*	*314750*	L	5	2			2	
24Y	*8052300*	*314500*	L	1					
24Z	*8052300*	*314550*	L	5					
24AA	*8052300*	*314600*	L						
24GG	*8052300*	*314900*	M	3					
25Y	*8052350*	*314500*	L						
25Z	*8052350*	*314550*	L						
25AA	*8052350*	*314600*	L	2					
25BB	*8052350*	*314650*	L						
25CC	*8052350*	*314700*	L	4				1	
25DD	*8052350*	*314750*	L						
25EE	*8052350*	*314800*	L						
25FF	*8052350*	*314850*	L	1					
25GG	*8052350*	*314900*	U	4	1				
26AA	*8052400*	*314600*	U						

Table 18. Table with counts of lithic-related materials collected during systematic surface collections (continued).

UNIT	*northing*	*easting*	SECTOR	debitage	cores & bifaces	projectile points	hoes	manos	matate fragments (collected)
29II	*8052550*	*315000*	U	1					
30CC	*8052600*	*314700*	U						
30DD	*8052600*	*314750*	U						
30EE	*8052600*	*314800*	U	5					
30FF	*8052600*	*314850*	U		1				
30GG	*8052600*	*314900*	U	11					
17AA	*8051950*	*314600*	L						
18AA	*8052000*	*314600*	L						
18BB	*8052000*	*314650*	L						
19BB	*8052050*	*314650*	L						
20BB	*8052100*	*314650*	L						
20CC	*8052100*	*314700*	L					1	
21BB	*8052150*	*314650*	L	1					
21CC	*8052150*	*314700*	L						
21DD	*8052150*	*314750*	L						
22CC	*8052200*	*314700*	L						
22DD	*8052200*	*314750*	L						
23CC	*8052250*	*314700*	L						
23EE	*8052250*	*314800*	L						
24EE	*8052300*	*314800*	L	2					
24FF	*8052300*	*314850*	L						

Systematic Surface Collection data was also used as a proxy for population (see 9.1). Here 0-25 sherds per 100m^2 was considered low density, 25-200 was considered average, and 200-2000 was considere high density.

Table 19. Systematic Surface Collection Unit toal ceramic counts - used as proxy for overall surface material density for population estimate.

UNIT	*northing*	*easting*	SECTOR	TOTAL SHERDS
4P	*8051300*	*314050*	A	1
5O	*8051350*	*314000*	A	20
5P	*8051350*	*314050*	A	70
5Q	*8051350*	*314050*	A	68
5R	*8051350*	*314150*	A	21
6O	*8051400*	*314000*	A	265
6P	*8051400*	*314050*	A	678
6Q	*8051400*	*314100*	A	150
6R	*8051400*	*314150*	A	172
6S	*8051400*	*314200*	A	507
6T	*8051400*	*314251*	A	63
7N	*8051450*	*313950*	A	138
7O	*8051450*	*314000*	A	640
7P	*8051450*	*314050*	A	1613
7Q	*8051450*	*314100*	A	2883
7R	*8051450*	*314150*	A	498
7S	*8051450*	*314200*	A	550
7T	*8051450*	*314250*	A	40
7U	*8051450*	*314300*	A	28
7V	*8051450*	*314350*	A	0
8M	*8051500*	*313900*	A	123
8N	*8051500*	*313950*	A	170
8O	*8051500*	*314000*	A	1181
8P	*8051500*	*314050*	A	1640
8Q	*8051500*	*314100*	A	633
8R	*8051500*	*314150*	A	108

Table 19. Systematic Surface Collection Unit toal ceramic counts - used as proxy for overall surface material density for population estimate (continued).

UNIT	*northing*	*easting*	SECTOR	TOTAL SHERDS
8S	*8051500*	*314200*	A	186
8T	*8051500*	*314250*	A	10
8U	*8051500*	*314300*	A	15
8V	*8051500*	*314350*	A	76
8W	*8051500*	*314400*	A	147
8X	*8051500*	*314450*	A	1
8Y	*8051500*	*314500*	A	23
8Z	*8051500*	*314550*	A	18
8AA	*8051500*	*314600*	A	8
9M	*8051550*	*313900*	A	137
9N	*8051550*	*313950*	A	325
9O	*8051550*	*314000*	A	592
9P	*8051550*	*314050*	A	334
9Q	*8051550*	*314100*	A	64
9R	*8051550*	*314150*	A	81
9S	*8051550*	*314200*	A	60
9T	*8051550*	*314250*	A	3
9U	*8051550*	*314300*	A	14
9V	*8051550*	*314350*	A	35
9W	*8051550*	*314400*	A	129
9X	*8051550*	*314450*	A	166
9Y	*8051550*	*314500*	A	41
9Z	*8051550*	*314550*	A	26
9AA	*8051550*	*314600*	A	186
9BB	*8051550*	*314650*	A	51
10X	*8051600*	*314450*	A	63
10Y	*8051600*	*314500*	A	101
10Z	*8051600*	*314550*	A	52
10AA	*8051600*	*314600*	A	24
10BB	*8051600*	*314650*	A	0
11Z	*8051650*	*314550*	A	105
11AA	*8051650*	*314600*	A	35

Table 19. Systematic Surface Collection Unit toal ceramic counts - used as proxy for overall surface material density for population estimate (continued).

UNIT	*northing*	*easting*	SECTOR	TOTAL SHERDS
11BB	*8051650*	*314650*	A	35
12Z	*8051700*	*314550*	A	35
12AA	*8051700*	*314600*	A	5
12BB	*8051700*	*314650*	A	11
13Z	*8051750*	*314550*	A	12
13AA	*8051750*	*314600*	A	31
13BB	*8051750*	*314650*	A	51
19EE	*8052050*	*314800*	Q	0
19FF	*8052050*	*314850*	Q	0
20EE	*8052100*	*314800*	L	0
20FF	*8052100*	*314850*	L	1
21EE	*8052150*	*314800*	L	2
21FF	*8052050*	*314850*	L	0
21HH	*8052150*	*314950*	L	0
22EE	*8052200*	*314800*	L	113
22FF	*8052200*	*314850*	L	13
22HH	*8052200*	*314950*	M	0
23DD	*8052250*	*314750*	L	268
24Y	*8052300*	*314500*	L	3
24Z	*8052300*	*314550*	L	55
24AA	*8052300*	*314600*	L	31
24GG	*8052300*	*314900*	M	2
25Y	*8052350*	*314500*	L	2
25Z	*8052350*	*314550*	L	6
25AA	*8052350*	*314600*	L	85
25BB	*8052350*	*314650*	L	2
25CC	*8052350*	*314700*	L	9
25DD	*8052350*	*314750*	L	11
25EE	*8052350*	*314800*	L	0
25FF	*8052350*	*314850*	L	12
25GG	*8052350*	*314900*	U	1
26AA	*8052400*	*314600*	U	0

Table 19. Systematic Surface Collection Unit toal ceramic counts - used as proxy for overall surface material density for population estimate (continued).

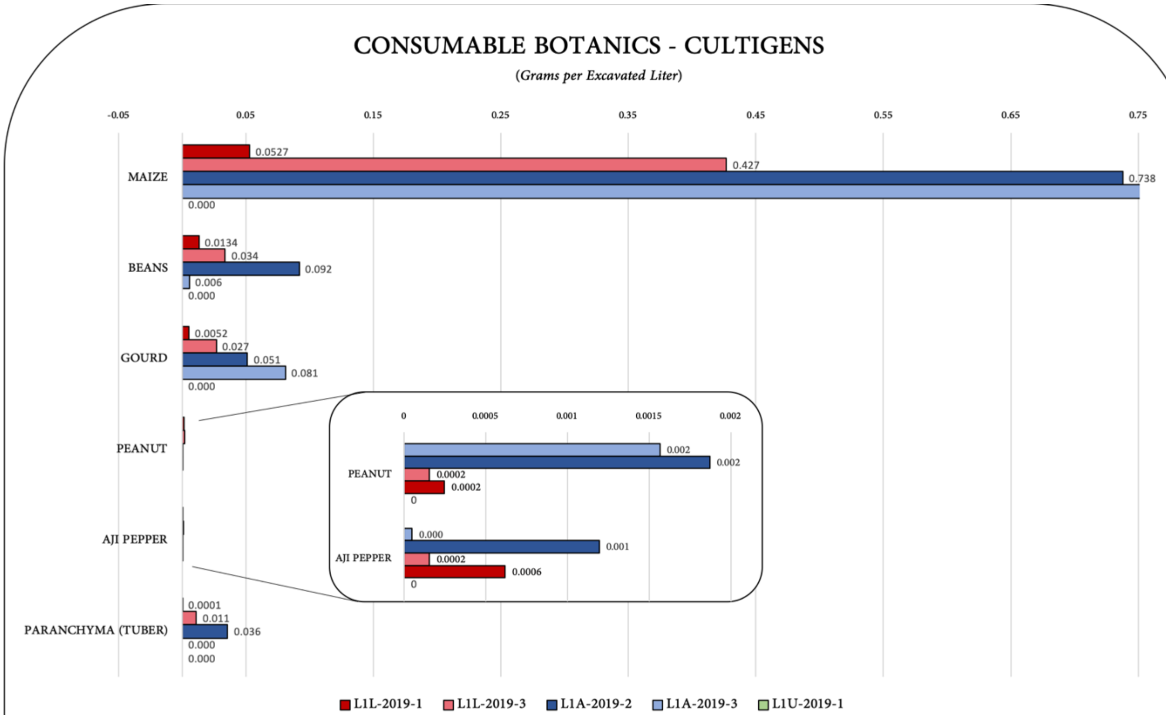
UNIT	*northing*	*easting*	SECTOR	TOTAL SHERDS
30EE	*8052600*	*314800*	U	3
30FF	*8052600*	*314850*	U	2
30GG	*8052600*	*314900*	U	3
17AA	*8051950*	*314600*	L	12
18AA	*8052000*	*314600*	L	81
18BB	*8052000*	*314650*	L	54
19BB	*8052050*	*314650*	L	229
20BB	*8052100*	*314650*	L	228
20CC	*8052100*	*314700*	L	187
21BB	*8052150*	*314650*	L	480
21CC	*8052150*	*314700*	L	86
21DD	*8052150*	*314750*	L	19
22CC	*8052200*	*314700*	L	161
22DD	*8052200*	*314750*	L	402
23CC	*8052250*	*314700*	L	445
23EE	*8052250*	*314800*	L	620
24EE	*8052300*	*314800*	L	570
24FF	*8052300*	*314850*	L	106

Appendix 2 – Material Densities in Excavated Contexts (2018-19)

This appendix provides a number of summary tables and related graphics relating to material densities as recovered in the 2018-19 excavation blocks. A detailed discussion of these contexts can be found in Chapter 7 (see 7.2) and references to these density figures can be found throughout Section 3 (Chapters 8, 9, 10).

Table 20. Table with material densities of selected material categories as recovered in the five (5) major 2018-19 excavation blocks. Densities are grams of material per excavated and screened liter (1) of sediment.

selected material categories	L1L-2019-1	L1L-2019-3	L1A-2019-2	L1A-2019-3	L1U-2019-1
BOTANICS - MAIZE (all)	0.05274	0.42695	0.73769	0.75957	X
BOTANICS - BEANS (all)	0.01340	0.03380	0.09213	0.00590	X
BOTANICS - GOURD (husk)	0.00516	0.02706	0.05117	0.08123	X
BOTANICS - PEANUT (all)	0.00157	0.00187	0.00016	0.00025	X
BOTANICS - AJI PEPPER (all)	0.00005	0.00120	0.00016	0.00062	X
BOTANICS - PARANCHYMA (TUBER)	0.00005	0.01117	0.03575	X	X
BOTANICS - ALGARROBA (all)	0.02923	0.08820	0.35857	0.20256	0.06706
BOTANICS - MOLLE (fruit)	0.04096	0.02453	0.06457	0.02149	0.00172
BOTANICS - PACAE (pods)	X	0.00180	0.00109	0.00206	X
BOTANICS - COCA (all)	0.00010	0.00005	0.00003	0.00004	X
BOTANICS - COTTON (seeds)	0.01072	0.02860	0.04548	0.00177	X
BOTANICS - CACTUS (spines)	0.00010	0.00086	0.00142	X	0.00022
BOTANICS - WOOD (fragments)	0.22903	0.85456	1.61071	2.26898	0.02000
BOTANICS - CANE (fragments)	0.08314	0.36330	0.50850	0.34200	X
BOTANICS - CARBON (fragments)	0.42503	0.88673	0.29655	1.29538	0.65444
CERAMICS - UTILITARIAN CERAMICS	12.38635	33.72858	49.75181	84.04950	27.54444
CERAMICS - SERVING CERAMICS	0.54301	4.62090	2.10142	3.00619	X
CERAMICS - RITUAL CERAMICS	0.03681	0.01565	0.03323	0.05899	X
CERAMICS - RE-UTILIZED SHERDS	X	0.25122	0.03291	0.15924	X
FAUNA - LARGE MAMMAL	1.04146	2.25217	5.90961	8.30528	0.07522
FAUNA - SMALL MAMMAL	0.00478	0.00722	0.01917	0.01159	X
FAUNA - MARINE SHELL	0.20986	0.76760	0.69323	0.63874	0.01528
ORGANIC - CAMELID COPROLITES	1.38225	0.10652	0.31976	0.42224	0.05111
ORGANIC - CUY COPROLITES	0.00484	0.02095	0.00646	0.12727	X
TEXTILE - WOOL	0.08192	0.17601	0.12157	0.31848	X
TEXTILE - COTTON	0.00142	0.01714	0.04227	0.11716	X



	MAIZE	BEANS	GOURD	PEANUT	AJI PEPPER	PARANCHYMA (TUBER)
L1L-2019-1	0.05274336	0.01340076	0.00515803	0.00156764	5.0569E-05	5.0569E-05
L1L-2019-3	0.42695155	0.03379522	0.02705733	0.00187222	0.00119526	0.01116988
L1A-2019-2	0.73768504	0.09212598	0.05116535	0.00015748	0.00015748	0.03574803
L1A-2019-3	0.75957096	0.00589934	0.08122937	0.00024752	0.00061881	0
L1U-2019-1	0	0	0	0	0	0

Figure 259. Botanic densities (grams per liter) from the 2018-19 excavation blocks.

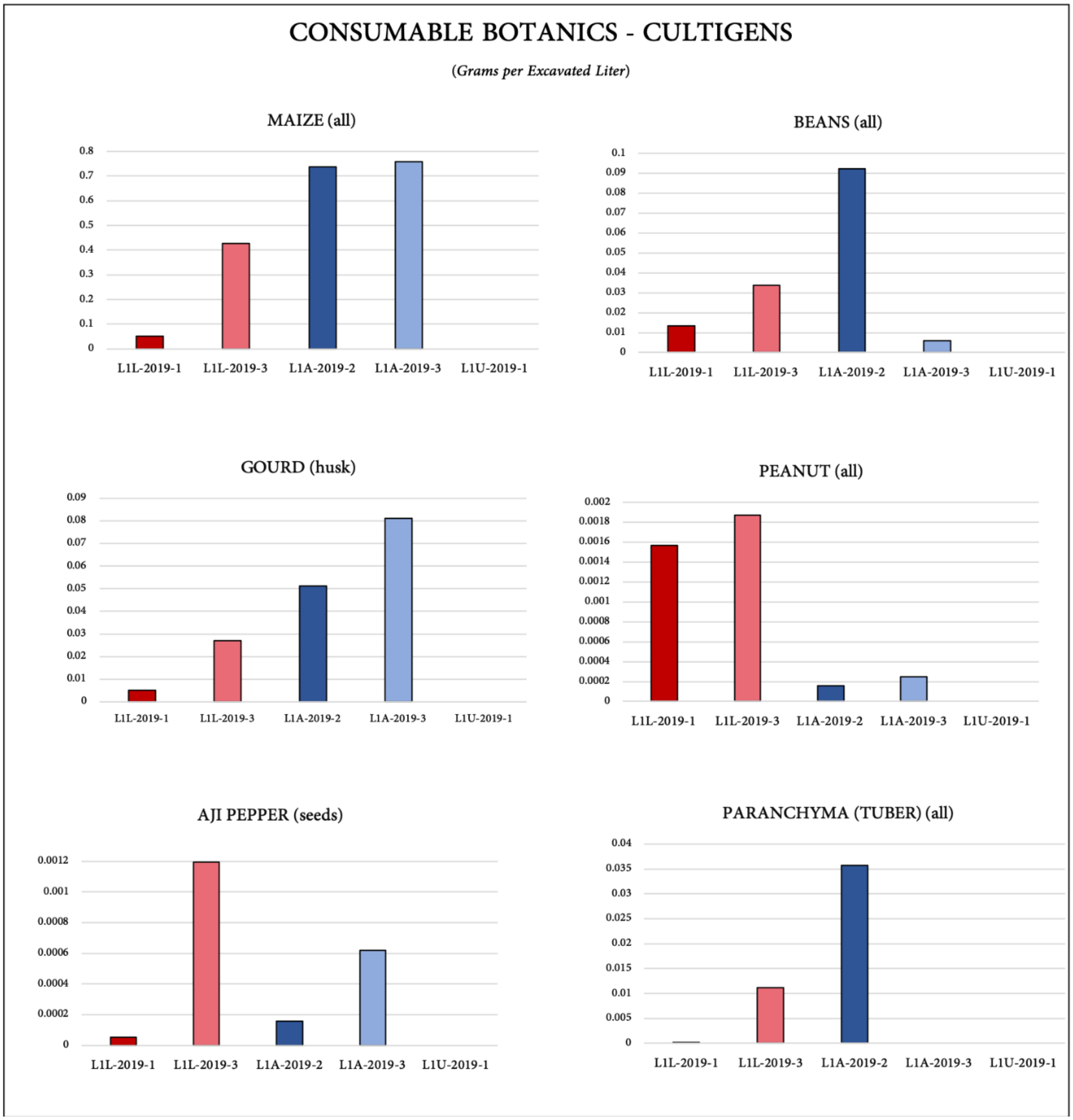


Figure 260. Densities (grams per liter) of selected cultigens from the 2018-19 excavation blocks.

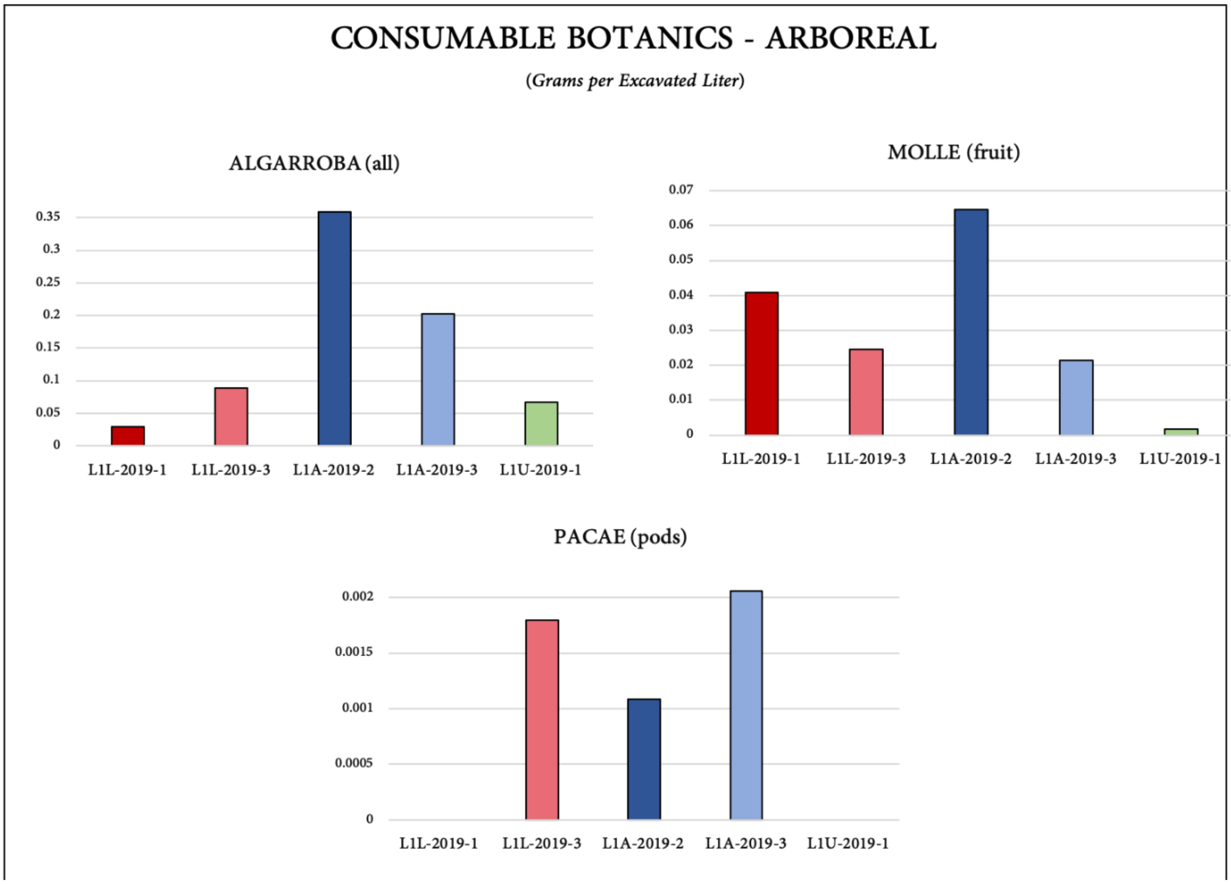


Figure 261. Densities (grams per liter) of selected consumable arboreal species from the 2018-19 excavation blocks.

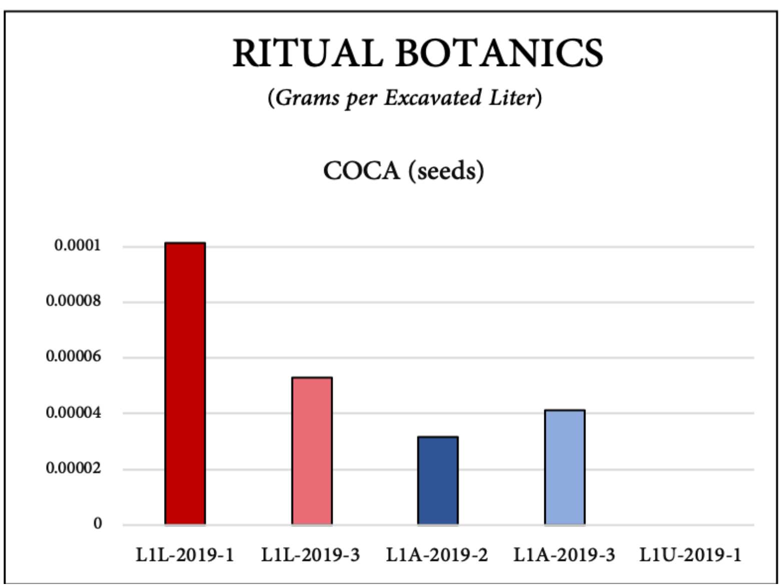


Figure 262. Densities (grams per liter) of coca remains from the 2018-19 excavation blocks.

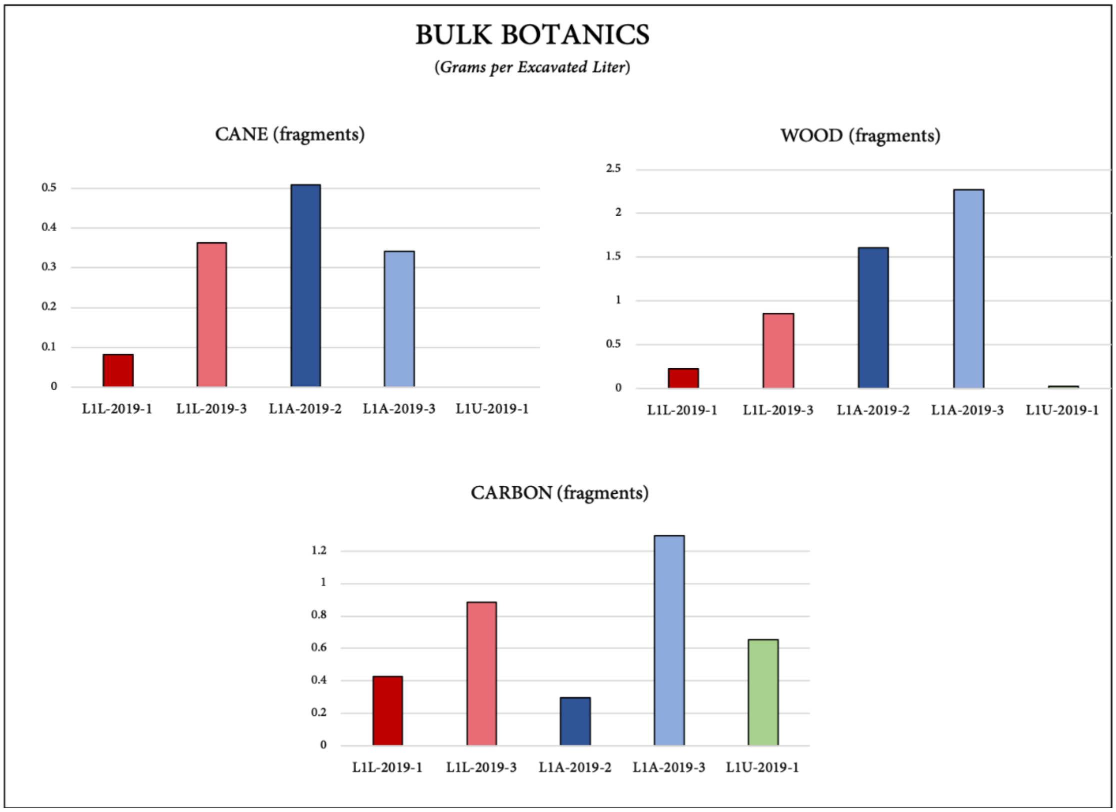


Figure 263. Densities (grams per liter) of Bulk Botanics from the 2018-19 excavation blocks.

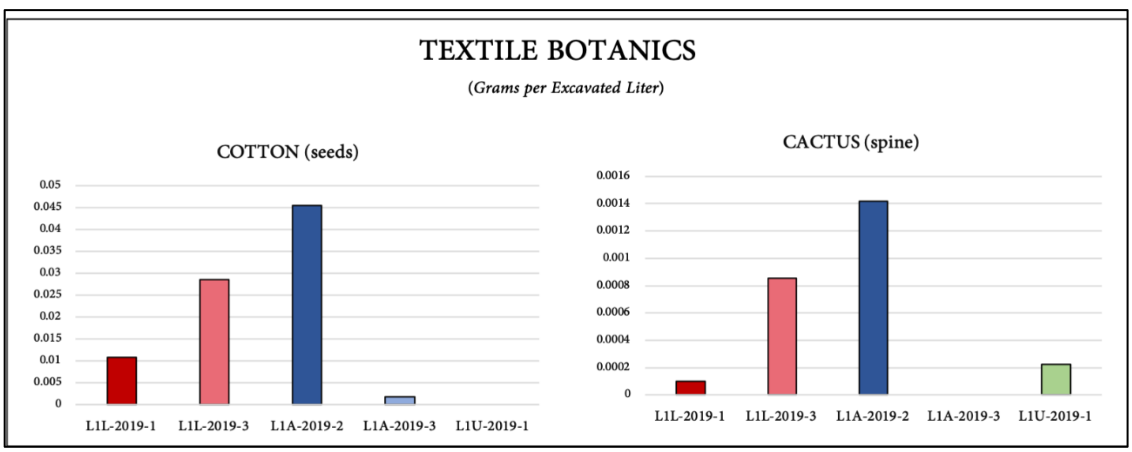
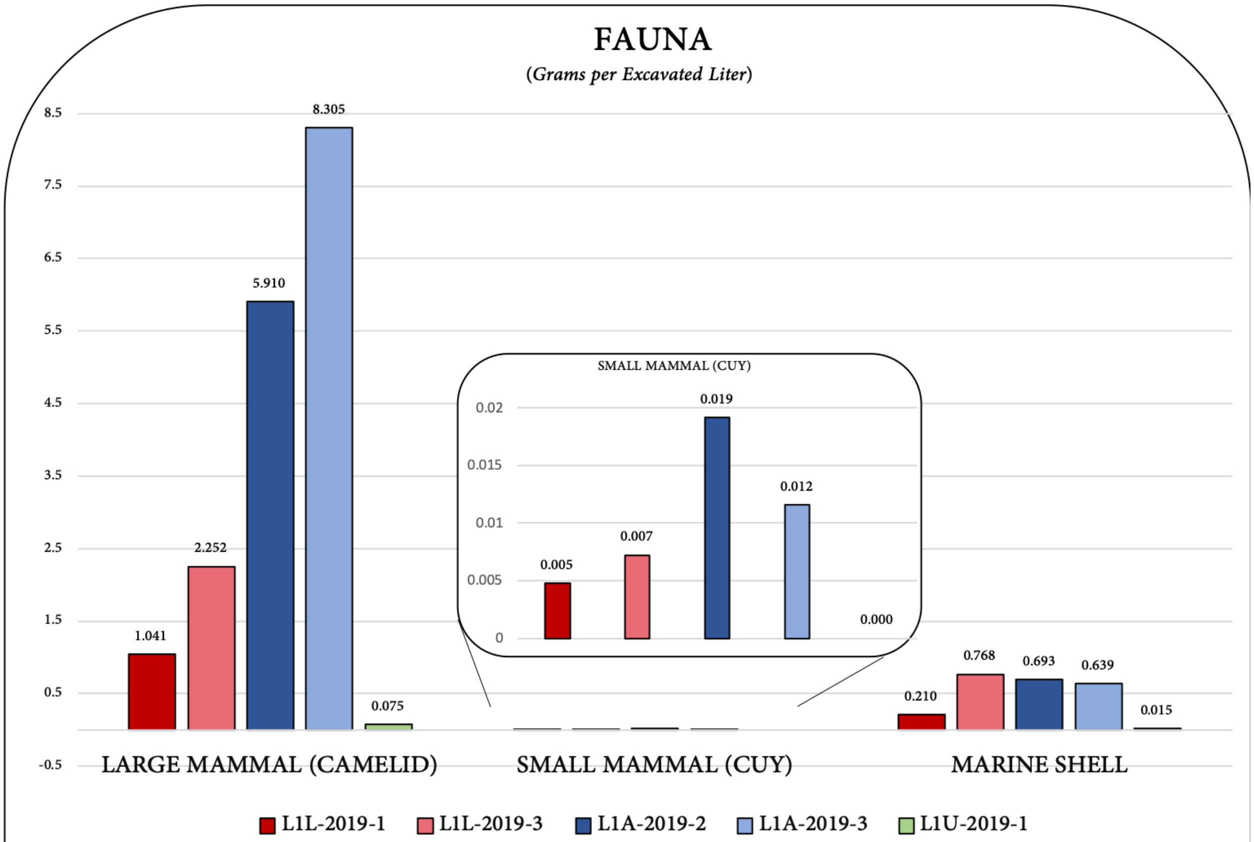
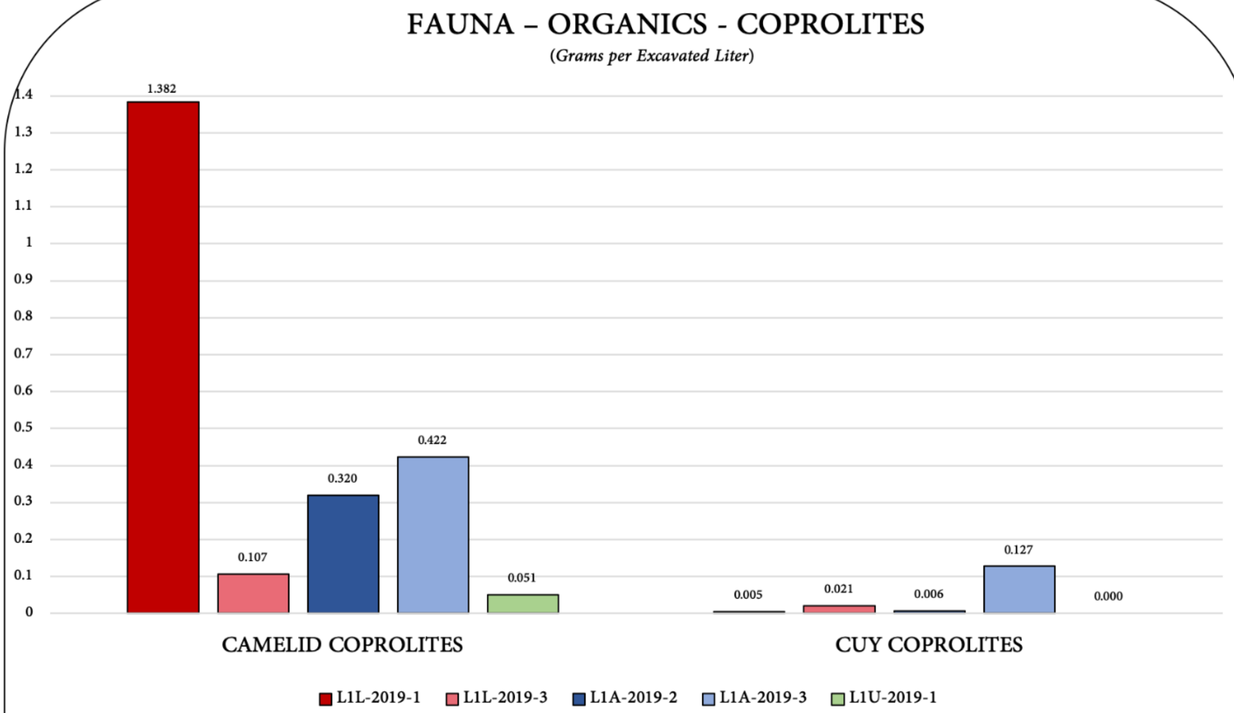


Figure 264. Densities (grams per liter) of textile related botanic remains from the 2018-19 excavation blocks.



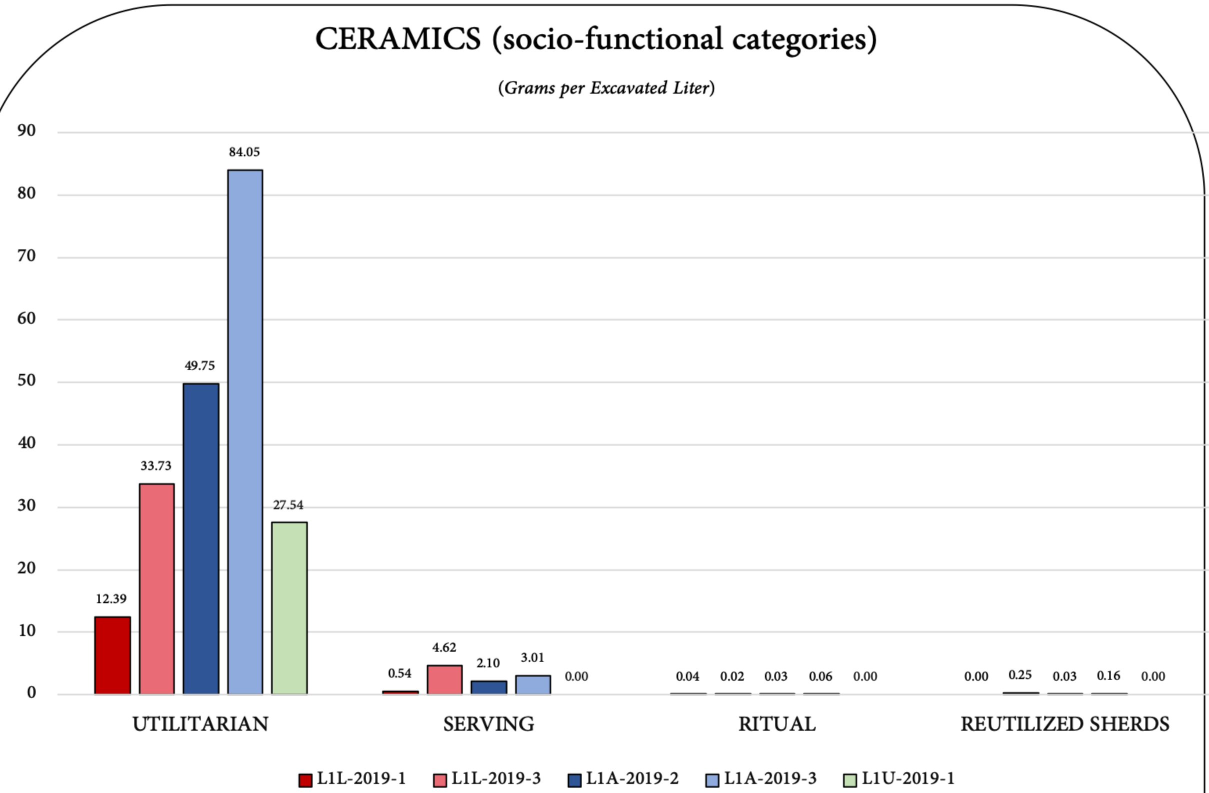
	LARGE MAMMAL (CAMELID)	SMALL MAMMAL (CUY)	MARINE SHELL
L1L-2019-1	1.04145638	0.00478382	0.20986094
L1L-2019-3	2.25216839	0.00722446	0.76760102
L1A-2019-2	5.9096063	0.01916535	0.69322835
L1A-2019-3	8.30528053	0.01159241	0.63873762
L1U-2019-1	0.07522222	0	0.01527778

Figure 265. Densities (grams per liter) of Fauna material and specifically large mammal bone fragments (camelid), small mammal bone fragments (guinea pig), and marine shell.



	CAMELID COPROLITES	CUY COPROLITES
L1L-2019-1	1.38225032	0.0048445
L1L-2019-3	0.10651576	0.02095409
L1A-2019-2	0.31976378	0.00645669
L1A-2019-3	0.42223597	0.12726898
L1U-2019-1	0.05111111	0

Figure 266. Densities (grams per liter) of Organic fauna material and specifically camelid and guinea pig coprolites.



	UTILITARIAN	SERVING	RITUAL	REUTILIZED SHERDS
L1L-2019-1	12.3863464	0.54300885	0.03681416	0
L1L-2019-3	33.7285805	4.62090121	0.01565475	0.25121642
L1A-2019-2	49.751811	2.10141732	0.03322835	0.03291339
L1A-2019-3	84.049505	3.00618812	0.0589934	0.15924092
L1U-2019-1	27.5444444	0	0	0

Figure 267. Densities (grams per liter) of major socio-functional Ceramic categories: Utilitarian Ceramics (ollas, tinajas, etc.), Serving Ceramics (keros, tazónes, pitchers, etc.), Ritual Ceramics (incensarios, miniatures), Re-Utilized sherds (spindle whirls, polishers, etc.).

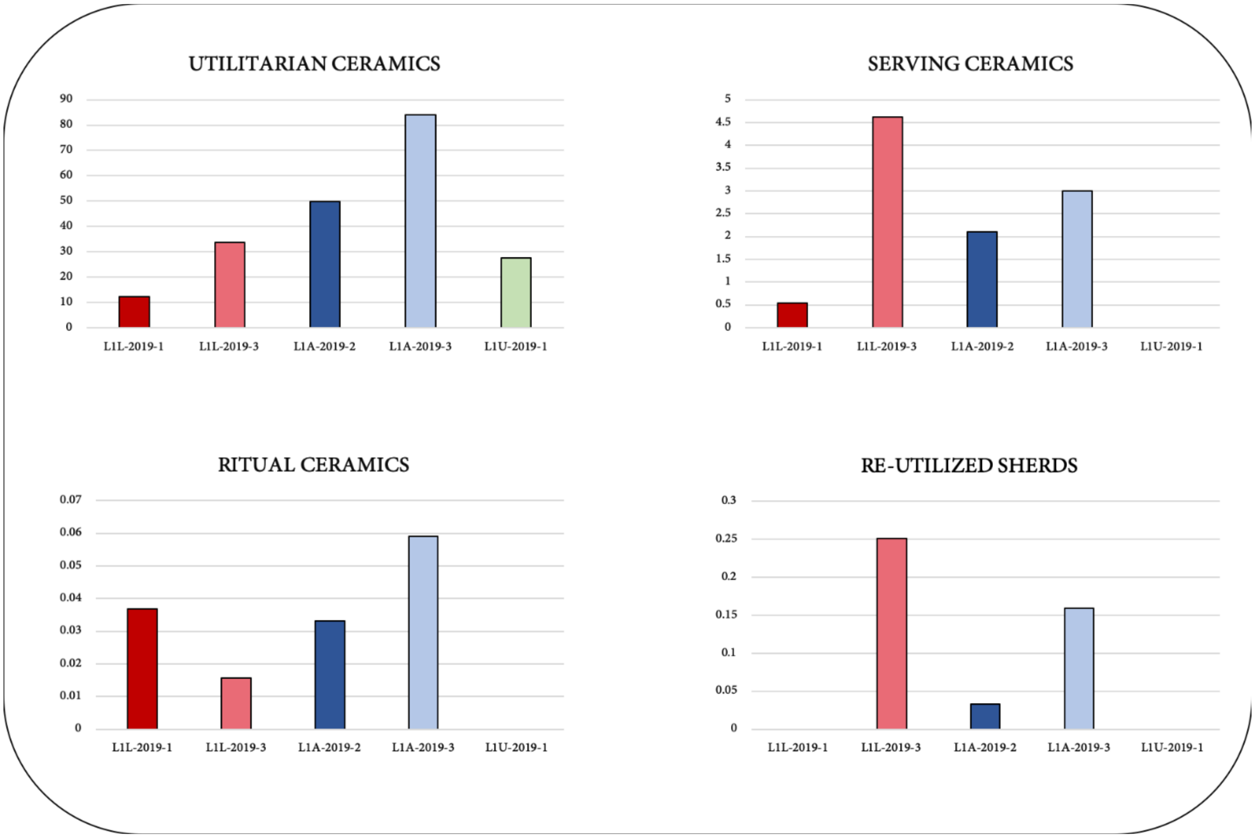


Figure 268. Densities (grams per liter) of individual major Ceramic categories.

Table 21. Material Densities (grams per liter of excavated sediment) for areas within Excavation Block L1L-2019-1.

	DOMESTIC STRUCTURE L1L-1						
	A	B	C	D	E	F	G
CER-UTILITARIAN	11.09775	16.56308	10.0419	8.893878	18.3261	6.198889	3.48
CER-SERVING	0.24142	0.470769	3.512381	0.124898	0.646816	0.365	0
CER-RITUAL	0.144379	0	0	0	0.021166	0	0
CER-RE-USE	0	0	0	0	0	0	0
BOT-CONSUMABLE	0.325207	0.087692	0.001905	0.07102	0.161076	0.086944	0.046667
BOT-BULK	0.758343	0.223077	0.059048	0.87102	1.126457	0.745556	0.333333
BOT-RITUAL	0.000237	0	0	0	0	0.000278	0
BOT-TEXTILE	0.033136	0	0	0	0.005202	0.0125	0
FAU-CAMELID BONE	1.338698	0.973846	0.095238	0.565714	1.486242	1.268889	0.053333
FAU-RODENT BONE	0.014485	0.015385	0	0.005388	0.003013	0.000667	0
FAU-FISH BONE	0	0	0	0	0	0	0
FAU-MOLLUSK	0.326154	0.273846	0.057143	0.074286	0.067803	0.179444	0.742
FAU-CRUSTACEAN	0.016237	0.000615	0	0.001388	0.005381	0.007	0.001333
ORG-CAMELID COPROLITES	1.304142	2.667692	0.735238	3.050612	1.815247	0.555	0.373333
ORG-RODENT COPROLITES	0.006154	0	0	0.00898	0.00104	0.011667	0
LIT-FLAKES	0.581302	13.70154	4.297143	0.617959	2.493274	0.335556	0
TEX-WOOL	0.154793	0.004308	0.001905	0.001061	0.200179	0.004444	0.000667
TEX-COTTON	0	0	0	0.005714	0.004305	0	0

Table 22. Material Densities (grams per liter of excavated sediment) for areas within Excavation Block L1L-2019-3.

	DOMESTIC STRUCTURE L1L-2							ALLEY	DOMESTIC STRUCTURE L1L-3	
	A	B	C	E	F	G	J	D	H	I
CER-UTILITARIAN	18.68754	0	12.1669	5.85	91.005	56.8625	3.032727	10.184	4.411429	9.565
CER-SERVING	4.452707	0	1.183448	0.4425	13.16045	5.6725	0.218182	0.5328	0.445714	0
CER-RITUAL	0	0	0	0	0.067273	0	0	0	0	0
CER-RE-USE	0.273973	0	0	0	0.944545	0	0	0	0	0
BOT-CONSUMABLE	0.316243	1.308235	1.213241	0.0215	1.448955	0.72775	1.482909	0.30608	0.308571	0.743
BOT-BULK	1.539465	0.752941	2.401379	0.1475	5.898182	3.82	1.021818	0.8736	1.988571	1.135
BOT-RITUAL	0.000652	0	0	0	0	0	0	0	0	0
BOT-TEXTILE	0.00013	0.247059	0.263724	0	0.003636	0	0.020364	0.0576	0.045714	0.0175
FAU-CAMELID BONE	1.515982	0.623529	1.052414	0.1625	6.876364	3.9325	0.32	1.976	2.262857	0.425
FAU-RODENT BONE	0.007958	0.003529	0.010483	0	0.0235	0	0	0.00064	0.022857	0
FAU-FISH BONE	0.001305	0.141176	0.037793	0	0.000273	0.00775	0.071636	0.0008	0.003429	0
FAU-MOLLUSK	0.162166	0.011765	1.170897	0.1075	1.964773	0.41525	1.08	1.28592	1.178286	0.0015
FAU-CRUSTACEAN	0.002087	0.070588	0.066897	0	0.024636	0	0.087273	0.00368	0.003429	0.0145
ORG-CAMELID COPROLITES	0.074364	0	0.085517	0.1375	0.211364	0.07	0	0.0272	0	0.01
ORG-RODENT COPROLITES	0.074234	0	0.004138	0	0.047273	0.06	0	0.0016	0.076571	0.0025
LIT-FLAKES	0	0	0.68069	3.265	0.702727	0	0	0	0	0
TEX-WOOL	0.034573	0	0.044414	0.03	0.695909	0.15625	0	0.0896	0.001143	0.001
TEX-COTTON	0.024788	0	0	0	0	0.2075	0	0.0032	0	0

Table 23. Material Densities (grams per liter of excavated sediment) key used in bipartite nework visualizations.

	ABSENT	SCARCE	AVERAGE	ABUNDANT	EXTREME
CER-UTILITARIAN	0	5.020952	10.0419	50.5234524	91.005
CER-SERVING	0	0.925576	1.851152	7.50580346	13.16045
CER-RITUAL	0	0.006848	0.013695	0.07903692	0.144379
CER-RE-USE	0	0.035839	0.071678	0.50811149	0.944545
BOT-CONSUMABLE	0	0.254618	0.509235	0.99607208	1.482909
BOT-BULK	0	0.69692	1.393841	3.64601125	5.898182
BOT-RITUAL	0	3.43E-05	6.86E-05	0.00036047	0.000652
BOT-TEXTILE	0	0.020781	0.041563	0.15264341	0.263724
FAU-CAMELID BONE	0	0.733209	1.466418	4.17139084	6.876364
FAU-RODENT BONE	0	0.003174	0.006347	0.01492368	0.0235
FAU-FISH BONE	0	0.007769	0.015539	0.0783577	0.141176
FAU-MOLLUSK	0	0.26761	0.535219	1.2499961	1.964773
FAU-CRUSTACEAN	0	0.008972	0.017944	0.05260825	0.087273
ORG-CAMELID COPROLITES	0	0.326977	0.653953	1.85228287	3.050612
ORG-RODENT COPROLITES	0	0.008652	0.017303	0.04693736	0.076571
LIT-FLAKES	0	0.784564	1.569129	7.63533359	13.70154
TEX-WOOL	0	0.041772	0.083544	0.38972647	0.695909
TEX-COTTON	0	0.007221	0.014442	0.1109708	0.2075

Appendix 3 – Example Field Forms Used for Data Collection at Cerro San Antonio (L1)

This appendix includes examples of field forms and other data collection forms utilized in the field and laboratory work described in this dissertation. Chapter 4, which centers on describing methods, has the most pertinent discussion referencing these forms.

Sitio: L1
Sector: L
Locus: 1282

Unit: L1L-2019-3
Nivel: 4 - SUPERPISO
Rasgo:
Area: C - C
Tipo de Rasgo:
N: 8052178.03
E: 314682.74

Tamaño: 2 x 4
Tipo de Nivel: Área
Datum: L1L-3
Elevación bajo Datum (superior de nivel):
Debajo de: Niv. 3 - Area C EXT C
Elevación bajo Datum (base de nivel): 5 - 27
Asociado con: Niv. 4, superpiso - Areas B, C-N, C-S
Datum-donde?: todo

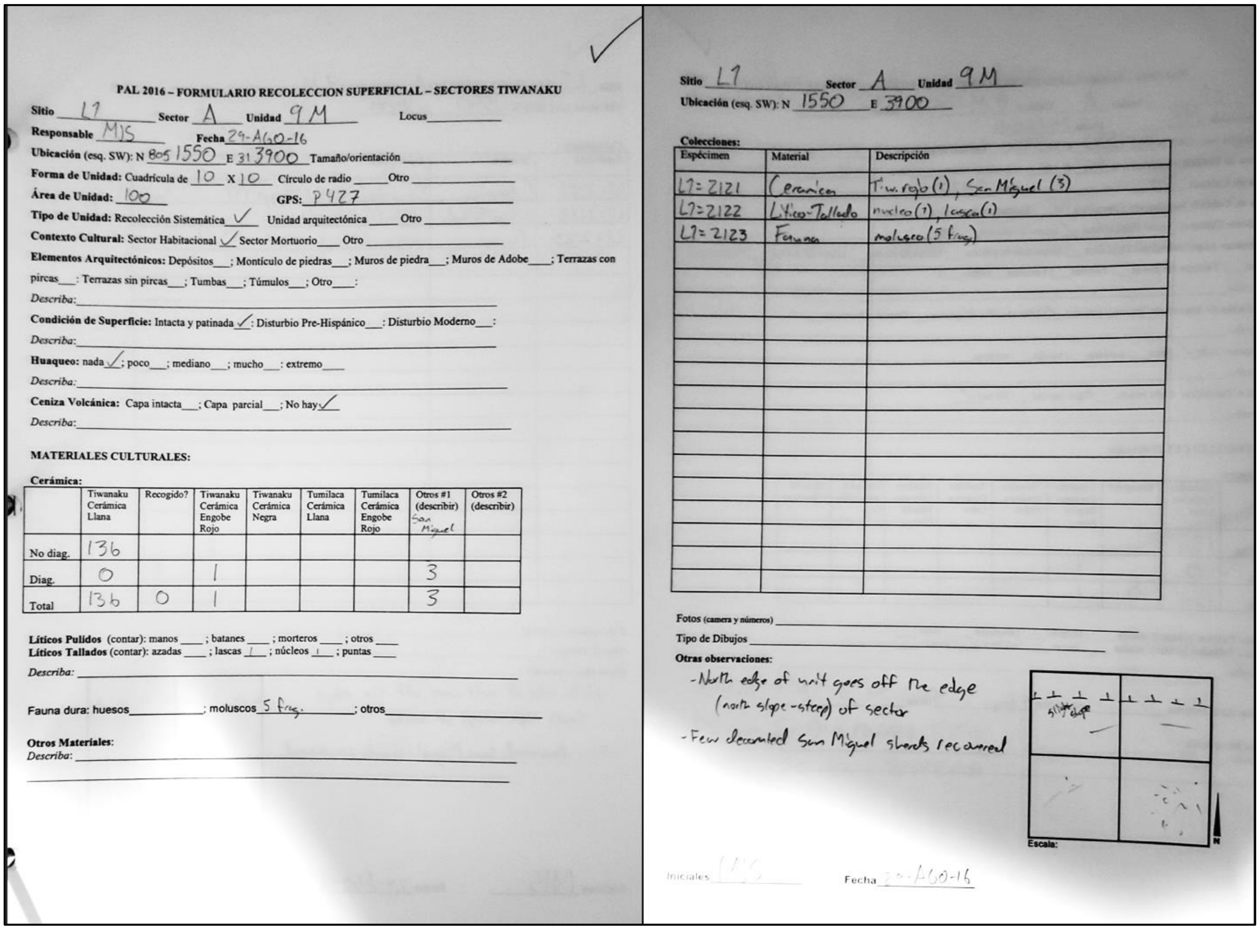
Cernido: Malla Fina
Volumen - Tierra: 8.00
Volumen - Piedras: 0.00
Volumen - Adobes: 0.00
Suelo - textura de matriz: limo con arena
Suelo - color Munsell: 7.5YR 7/2 con 10YR 8/4
Inclusiones: Cascajo, Ceniza, Botánicos, Carbón
inclusiones describa: Cascajo-poco, Ceniza-poca, Botánicos-poco, Carbón-poco
Categoría de Relleno: Super Piso
describa relleno:

OTRO OBSERVACIONES: Área C - Central es una zona relativamente grande a lo largo del lado oeste de la unidad. Esto incluía limpieza de baulk alrededor de dato. Manchas de Ashy encontradas primero en Niv. 3 parecen ser hogares informales (probablemente solo uso individual) - incluye tierra quemada. Recogido muestras de tierra de 0.5 litros (N2177 E682).

Espécimen	Material	Material Descripción	Peso (g)	Caja
3665	Cerámica	Tiwanaku llana no diag. (7), diag. (1)	82.6	4
3666	Textiles	lana, cuerda	1.5	8
3667	Fauna	hueso - roedor, camélido, pez, molusco - choro, crustáceo	1.5	9
3668	Botánico	semillas - varios, maíz marlo, carbón, madera, algodón	92.1	12
3669	Orgánico	coprolito - camélido, cuy	0.4	14
3670	Otro	tierra vitrificado	18.8	15
3671	Cuenta	litico (1)	0.03	15
4120	Tierra	0.5 litro	638.1	18
4127	Tierra	0.5 litro	612.3	18
4153	Tierra	0.5 litro	630.9	19

INICIALES: MJS
FECHA: 04-Mar-19

Figure 269. Example output from Locus #-based database used to correlate major context and material driven data collection in the field and lab.



PAL 2016 – FORMULARIO RECOLECCION SUPERFICIAL – SECTORES TIWANAKU

Sitio L7 Sector A Unidad 9M Locus ____

Responsable MJS Fecha 29-AGO-16

Ubicación (esq. SW): N 805 1550 E 31 3900 Tamaño/orientación ____

Forma de Unidad: Cuadrícula de 10 X 10 Círculo de radio ____ Otro ____

Área de Unidad: 100 GPS: P427

Tipo de Unidad: Recolección Sistemática ✓ Unidad arquitectónica ____ Otro ____

Contexto Cultural: Sector Habitacional ✓ Sector Mortuorio ____ Otro ____

Elementos Arquitectónicos: Depósitos__; Montículo de piedras__; Muros de piedra__; Muros de Adobe__; Terrazas con pircas__; Terrazas sin pircas__; Tumbas__; Túmulos__; Otro__:

Describa:

Condición de Superficie: Intacta y patinada ✓; Disturbio Pre-Hispánico__; Disturbio Moderno__:

Describa:

Huaqueo: nada ✓; poco__; mediano__; mucho__; extremo__

Describa:

Ceniza Volcánica: Capa intacta__; Capa parcial__; No hay ✓

Describa:

MATERIALES CULTURALES:

Cerámica:

	Tiwanaku Cerámica Llana	Recogido?	Tiwanaku Cerámica Engobe Rojo	Tiwanaku Cerámica Negra	Tumilaca Cerámica Llana	Tumilaca Cerámica Engobe Rojo	Otros #1 (describir) San Miguel	Otros #2 (describir)
No diag.	136							
Diag.	0		1				3	
Total	136	0	1				3	

Líticos Pulidos (contar): manos ____; batanes ____; morteros ____; otros ____

Líticos Tallados (contar): azadas ____; lascas 1; núcleos 1; puntas ____

Describa:

Fauna dura: huesos ____; moluscos 5 frag.; otros ____

Otros Materiales:

Describa:

Sitio L7 Sector A Unidad 9M

Ubicación (esq. SW): N 1550 E 3900

Colecciones:

Espécimen	Material	Descripción
L7=2121	Cerámica	Tiw. rojo (1), San Miguel (3)
L7=2122	Lítico Tallado	nucleo (1), lasca (1)
L7=2123	Fauna	molusco (5 frag.)

Fotos (camera y números)

Tipo de Dibujos

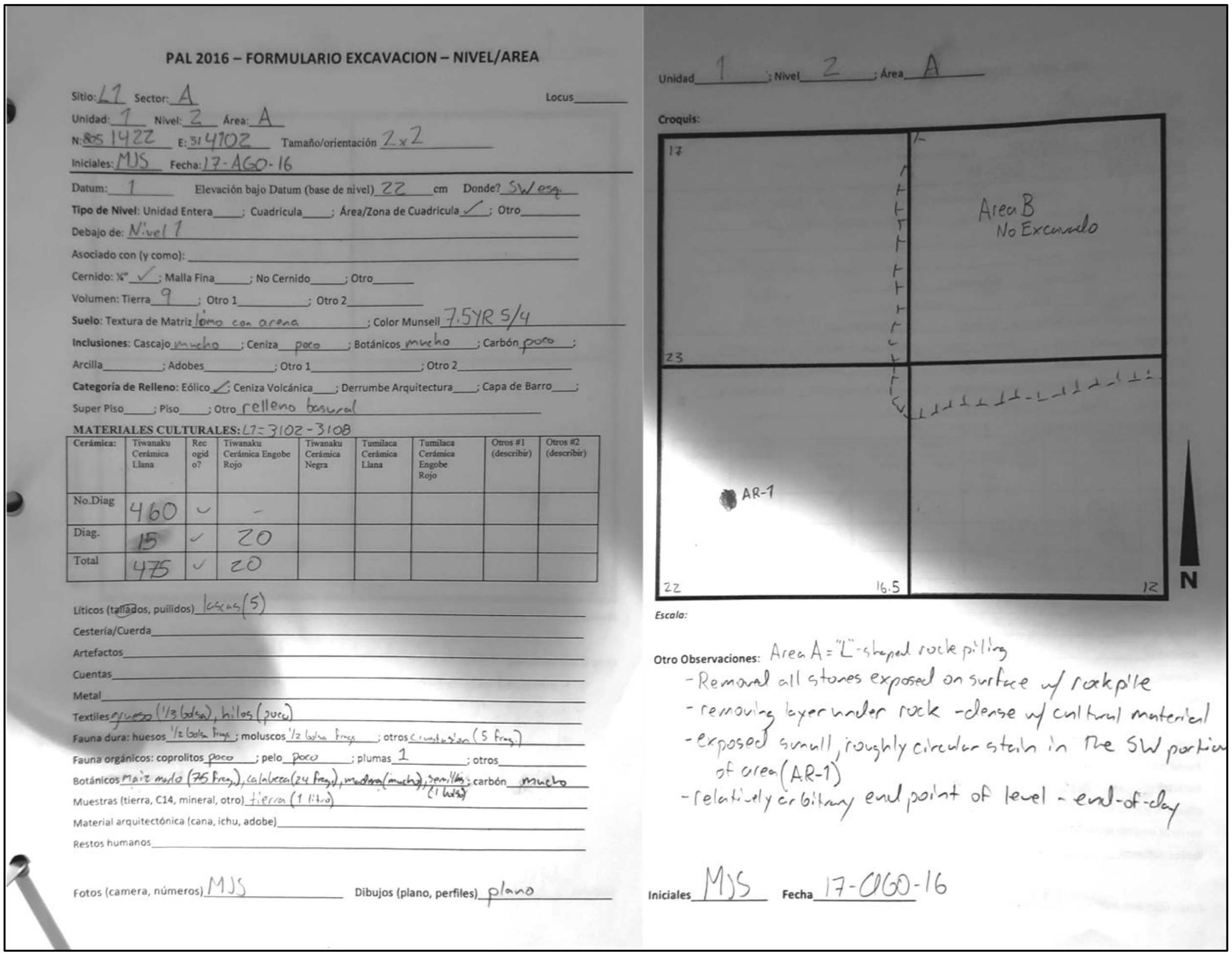
Otras observaciones:

- North edge of unit goes off the edge (north slope - steep) of sector
- Few decorated San Miguel sherds recovered

Escala:

Iniciales MJS Fecha 29-AGO-16

Figure 270. Example Systematic Surface Collection field form used in 2015, 2016, and 2018-19 field seasons.



PAL 2016 – FORMULARIO EXCAVACION – NIVEL/AREA

Sitio: L1 Sector: A Locus____

Unidad: 1 Nivel: 2 Área: A

N: 805 1422 E: 314102 Tamaño/orientación 2x2

Iniciales: MJS Fecha: 17-AGO-16

Datum: 1 Elevación bajo Datum (base de nivel) 22 cm Donde? SW esq.

Tipo de Nivel: Unidad Entera____; Cuadricula____; Área/Zona de Cuadricula ✓; Otro____

Debajo de: Nivel 1

Asociado con (y como): ____

Cernido: ¼" ✓; Malla Fina____; No Cernido____; Otro____

Volumen: Tierra 9; Otro 1____; Otro 2____

Suelo: Textura de Matriz lomo con arena; Color Munsell 7.5YR 5/4

Inclusiones: Cascajo mucho; Ceniza poco; Botánicos mucho; Carbón poco;

Arcilla____; Adobes____; Otro 1____; Otro 2____

Categoría de Relleno: Eólico ✓; Ceniza Volcánica____; Derrumbe Arquitectura____; Capa de Barro____;

Super Piso____; Piso____; Otro relleno basural

MATERIALES CULTURALES: L1=3102-3108

Cerámica:	Tiwanaku Cerámica Llana	Recogido?	Tiwanaku Cerámica Engobe Rojo	Tiwanaku Cerámica Negra	Tumilaca Cerámica Llana	Tumilaca Cerámica Engobe Rojo	Otros #1 (describir)	Otros #2 (describir)
No.Diag	460	✓	–					
Diag.	15	✓	20					
Total	475	✓	20					

Líticos (tallados, pulidos) lascas (5)

Cestería/Cuerda____

Artefactos____

Cuentas____

Metal____

Textiles yueso (1/3 bolsa), hilos (poco)

Fauna dura: huesos 1/2 bolsa frags; moluscos 1/2 bolsa frags; otros crustacian (5 frags)

Fauna orgánicos: coprolitos poco; pelo poco; plumas 1; otros____

Botánicos maiz mazlo (75 frags), calabeza (24 frags), madera (mucho), semillas (1 bolsa); carbón mucho

Muestras (tierra, C14, mineral, otro) tierra (1 litro)

Material arquitectónica (cana, ichu, adobe)____

Restos humanos____

Fotos (camera, números) MJS Dibujos (plano, perfiles) plano

Unidad 1; Nivel 2; Área A

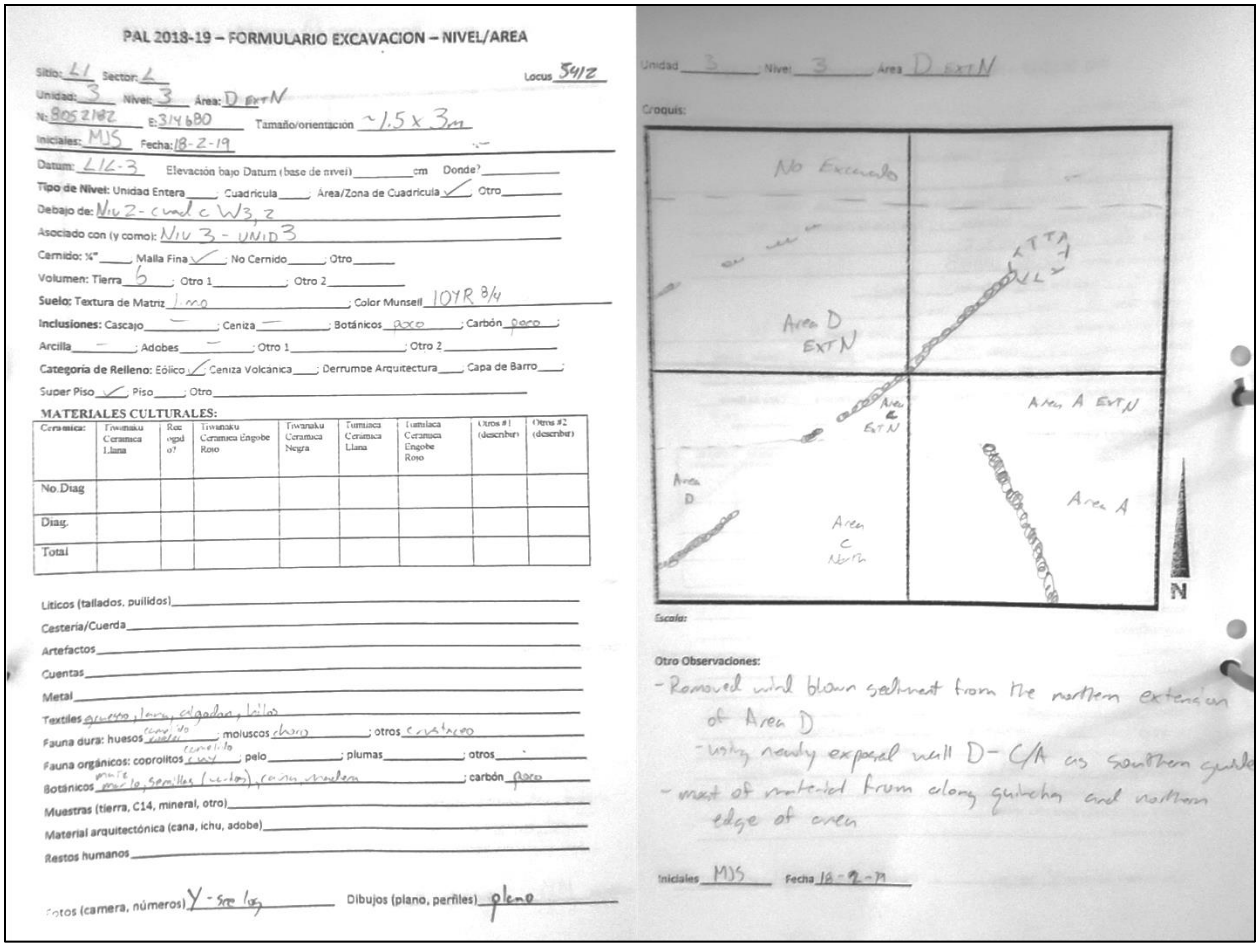
Croquis:

Escala:

Otro Observaciones: Area A = "L"-shaped rock piling
- Removal all stones exposed on surface w/ rockpile
- removing layer under rock - dense w/ cultural material
- exposed small, roughly circular stain in the SW portion of area (AR-1)
- relatively arbitrary end point of level - end-of-day

Iniciales MJS Fecha 17-AGO-16

Figure 271. Example Excavation – Level/Area form used in 2016 test excavation.



PAL 2018-19 – FORMULARIO EXCAVACION – NIVEL/AREA

Sitio: L1 Sector: L Locus 5412
Unidad: 3 Nivel: 3 Área: D ExtN
N: 8052182 E: 314680 Tamaño/orientación ~1.5 x 3m
Iniciales: MJS Fecha: 18-2-19

Datum: L1L-3 Elevación bajo Datum (base de nivel) ____ cm Donde? ____
Tipo de Nivel: Unidad Entera ____; Cuadricula ____; Área/Zona de Cuadricula ✓; Otro ____
Debajo de: Niv 2 - cuad c W3, 2
Asociado con (y como): Niv 3 - UNID 3
Cernido: ¼" ____; Malla Fina ✓; No Cernido ____; Otro ____
Volumen: Tierra 6; Otro 1 ____; Otro 2 ____
Suelo: Textura de Matriz limo; Color Munsell 10YR 8/4
Inclusiones: Cascajo —; Ceniza —; Botánicos poco; Carbón poco;
Arcilla —; Adobes —; Otro 1 ____; Otro 2 ____
Categoría de Relleno: Eólico ✓; Ceniza Volcánica ____; Derrumbe Arquitectura ____; Capa de Barro ____;
Super Piso ✓; Piso ____; Otro ____

MATERIALES CULTURALES:

Ceramica:	Tiwanaku Ceramica Llana	Recogdo?	Tiwanaku Ceramica Engobe Rojo	Tiwanaku Ceramica Negra	Tumilaca Ceramica Llana	Tumilaca Ceramica Engobe Rojo	Otros #1 (describir)	Otros #2 (describir)
No.Diag								
Diag.								
Total								

Liticos (tallados, pulidos) ____
Cesteria/Cuerda ____
Artefactos ____
Cuentas ____
Metal ____
Textiles grueso, lana, algodon, hilos
Fauna dura: huesos camelido; moluscos choro; otros crustaceo
Fauna orgánicos: coprolitos camelido cuy; pelo ____; plumas ____; otros ____
Botánicos maiz marlo, semillas (varios), caña, madera; carbón poco
Muestras (tierra, C14, mineral, otro) ____
Material arquitectónica (cana, ichu, adobe) ____
Restos humanos ____

Fotos (camera, números) Y - see log Dibujos (plano, perfiles) plano

Unidad 3 Nivel 3 Area D ExtN

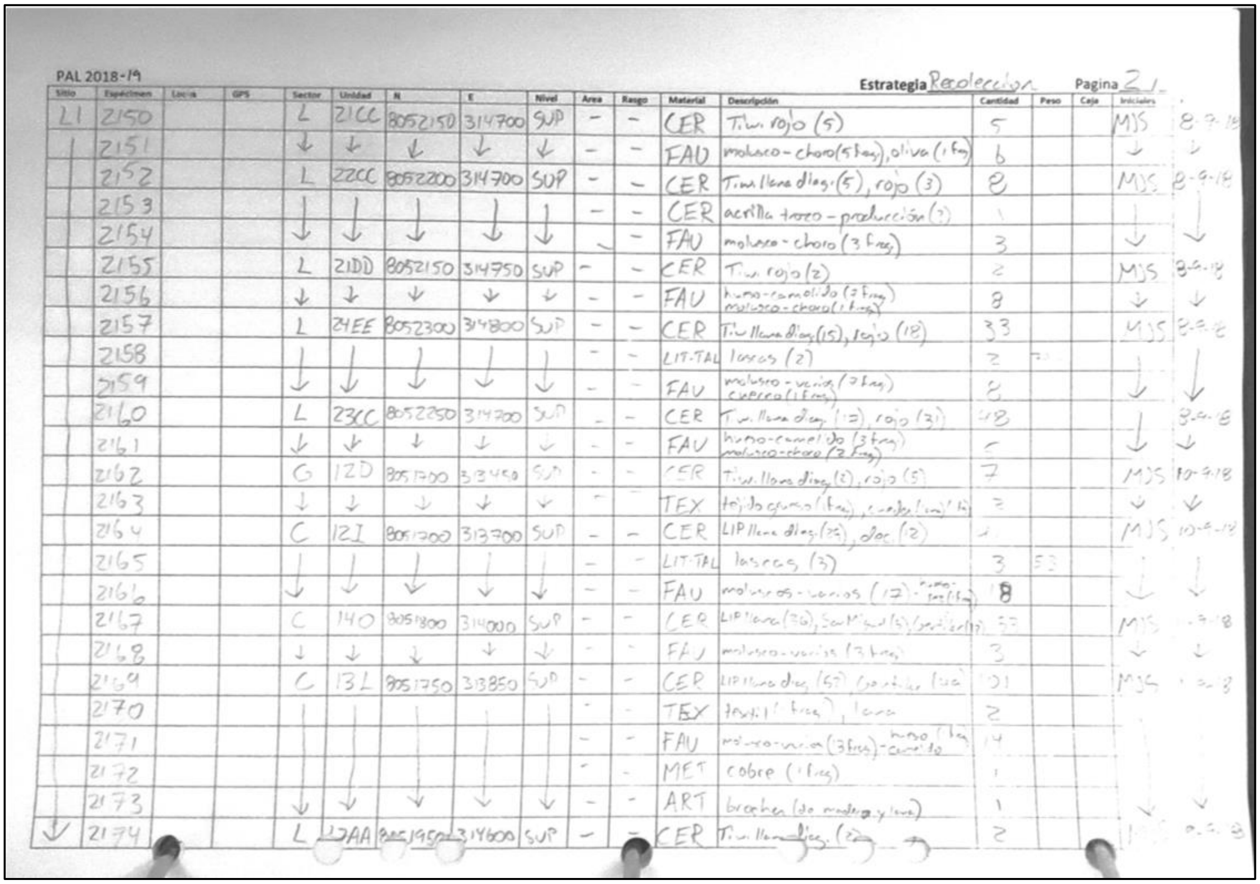
Croquis:

Escala:

Otro Observaciones:
- Removed wind blown sediment from the northern extension of Area D
- using newly exposed wall D-C/A as southern guide
- most of material from along guincha and northern edge of area

Iniciales MJS Fecha 18-2-19

Figure 272. Example Excavation – Level/Area form used in 2018-19 excavations.



PAL 2018-19 Estrategia Recolección Pagina 21

Sitio	Espécimen	Locus	GPS	Sector	Unidad	N	E	Nivel	Area	Rasgo	Material	Descripción	Cantidad	Peso	Caja	Iniciales	
L1	2150			L	21CC	8052150	314700	SUP	–	–	CER	Tiw. rojo (5)	5			MJS	8-9-18
↓	2151			↓	↓	↓	↓	↓	–	–	FAU	molusco - choro (5 frag), oliva (1 frag)	6			↓	↓
	2152			L	22CC	8052200	314700	SUP	–	–	CER	Tiw. llano dieg. (5), rojo (3)	8			MJS	8-9-18
	2153			↓	↓	↓	↓	↓	–	–	CER	arcilla trozo - producción (?)	1			↓	↓
	2154			↓	↓	↓	↓	↓	–	–	FAU	molusco - choro (3 frag)	3			↓	↓
	2155			L	21DD	8052150	314750	SUP	–	–	CER	Tiw. rojo (2)	2			MJS	8-9-18
	2156			↓	↓	↓	↓	↓	–	–	FAU	hueso - camelido (7 frag), molusco - choro (1 frag)	8			↓	↓
	2157			L	24EE	8052300	314800	SUP	–	–	CER	Tiw. llano dieg. (15), rojo (18)	33			MJS	8-9-18
	2158			↓	↓	↓	↓	↓	–	–	LIT-TAL	lascas (2)	2			↓	↓
	2159			↓	↓	↓	↓	↓	–	–	FAU	molusco - varios (7 frag), cuerpo (1 frag)	8			↓	↓
	2160			L	23CC	8052250	314700	SUP	–	–	CER	Tiw. llano dieg. (17), rojo (31)	48			↓	8-9-18
	2161			↓	↓	↓	↓	↓	–	–	FAU	hueso - camelido (3 frag), molusco - choro (2 frag)	5			↓	↓
	2162			G	12D	8051700	313450	SUP	–	–	CER	Tiw. llano dieg. (2), rojo (5)	7			MJS	10-9-18
	2163			↓	↓	↓	↓	↓	–	–	TEX	tejido grueso (1 frag), cuerda [illegible]	2			↓	↓
	2164			C	12I	8051700	313700	SUP	–	–	CER	LIP llano dieg. (?), dec. (2)	[illegible]			MJS	10-9-18
	2165			↓	↓	↓	↓	↓	–	–	LIT-TAL	lascas (3)	3	[illegible]		↓	↓
	2166			↓	↓	↓	↓	↓	–	–	FAU	moluscos - varios (17) [illegible]	18			↓	↓
	2167			C	14O	8051800	314000	SUP	–	–	CER	LIP llano (36), San Miguel (?), [illegible]	[illegible]			MJS	[illegible]-9-18
	2168			↓	↓	↓	↓	↓	–	–	FAU	molusco - varios (3 frag)	3			↓	↓
	2169			C	13L	8051750	313850	SUP	–	–	CER	LIP llano dieg. (57), [illegible]	[illegible]			MJS	[illegible]-9-18
	2170			↓	↓	↓	↓	↓	–	–	TEX	textil (1 frag), lana	2			↓	↓
	2171			↓	↓	↓	↓	↓	–	–	FAU	molusco - varios (3 frag) - hueso (1 frag) camelido	4			↓	↓
	2172			↓	↓	↓	↓	↓	–	–	MET	cobre (1 frag)	1			↓	↓
↓	2173			↓	↓	↓	↓	↓	–	–	ART	brochas (de madera y lana)	1			↓	↓
↓	2174			L	27AA	8051950	314600	SUP	–	–	CER	Tiw. llano dieg. (2)	2			[illegible]	[illegible]-9-18

Figure 273. Sample page from the master Specimen Log, used to record materials collected at Cerro San Antonio (L1) in all collection methods.

Appendix 4 – Supplemental Site (L1 – Cerro San Antonio) Maps & Field Photos

This appendix provides supplemental figures pertaining to Cerro San Antonio (L1). These are primarily in the form of various maps and any number of field photos[214] taken while visiting and working at the site between 2012 and 2019. These supplemental figures are particularly pertinent for sector and other site feature descriptions in Chapter 3.

Figure 274. Photo of Cerro San Antonio as viewed from the north, looking south.

[214] These photos are my own unless otherwise noted.

Formative Period

Remains associated with the Formative Period were relatively limited at Cerro San Antonio.

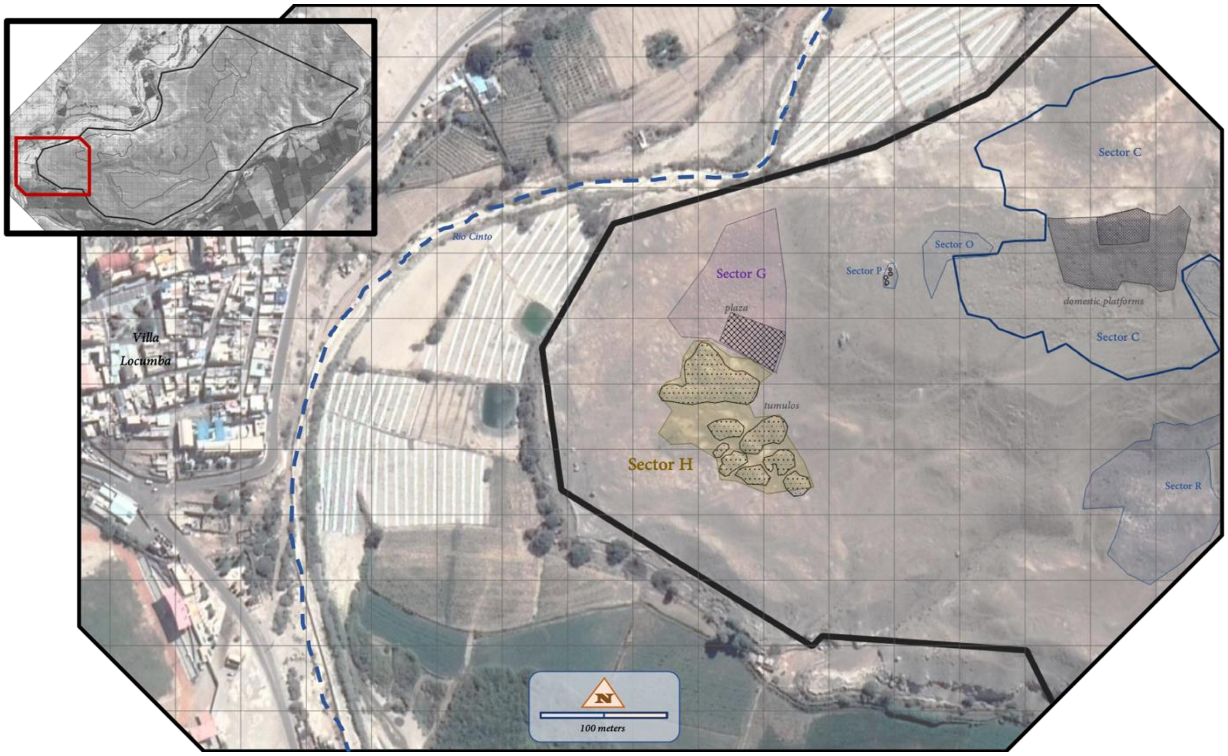


Figure 275. Map of western edge of Cerro San Antonio (L1), centered on Sector H (L1H), the only sector dating exclusively to the Formative Period – a mortuary sector composed of burial mounds (*tumulos*).

Figure 276. Photo of Formative-style *tumulos* at the western edge of Cerro San Antonio (L1G) – view facing north-northwest.

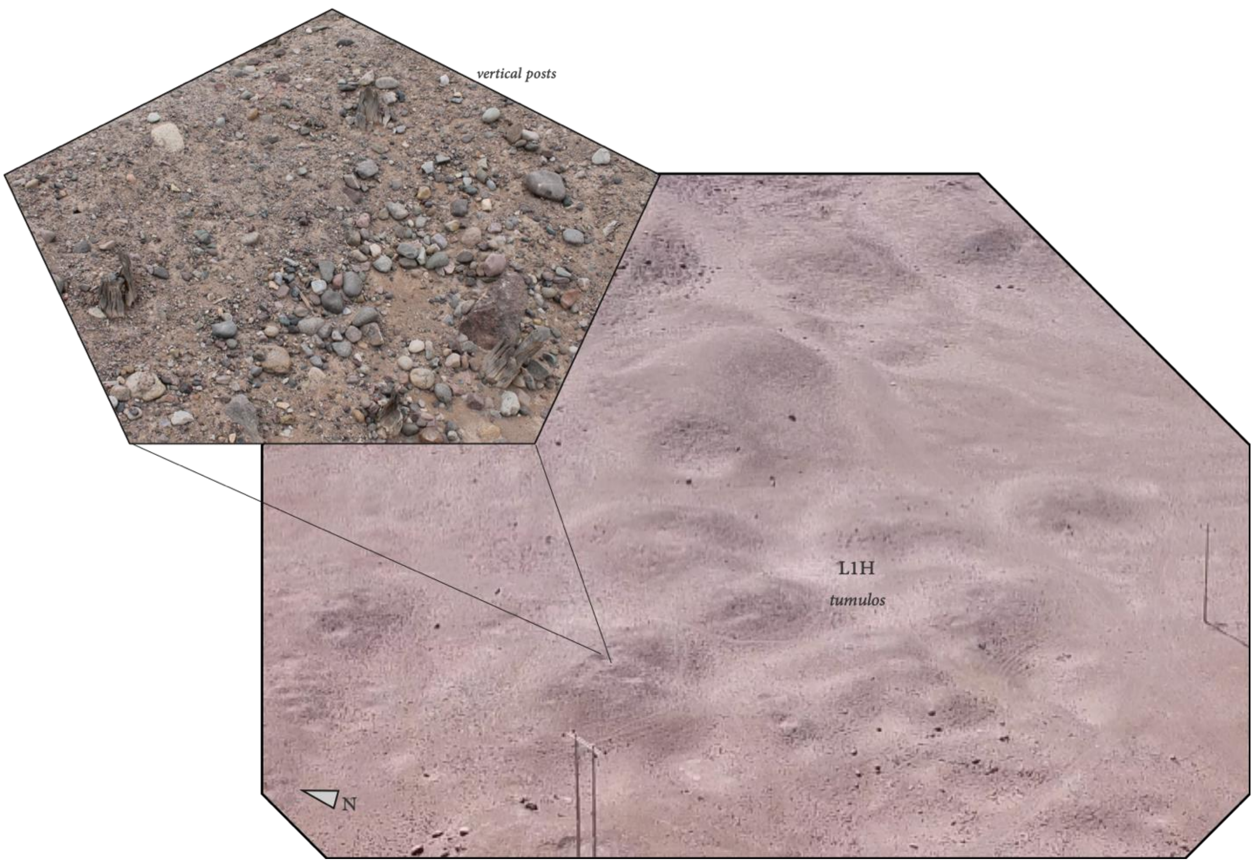


Figure 277. Low-altitude photo of the *tumulos* (burial mounds) which are definitive features of the Formative Period in the Valles Occidentales. Insert: vertical posts protruding from one of the mounds, suggesting an interior structure.

Middle Horizon

Remains associated with the Middle Horizon Period, and specifically Tiwanaku, are the focus of this dissertation and are discussed extensively in the text. As such, supplemental images are limited here.

Figure 278. Low-altitude UAV photo centered on Sector A and including several of the surrounding cemetery sectors – view facing due east.

Figure 279. Photo of typical quebrada rock pile-midden deposits that define Tiwanaku domestic Sector L - view facing west by southwest.

Figure 280. Photo of Tiwanaku cemetery, Sector B – view facing east, standing at southern edge of Sector A - view looking roughly southeast.

Figure 281. Photos of typical examples of Tiwanaku-style collared tombs as encountered at Cerro San Antonio (L1).

Figure 282. Tiwanaku-associated major pathways and walking paths.

Late Intermediate Period

Some of the most extensive archaeological remains at Cerro San Antonio are associated with various cultures (or at least stylistic trends) that comprise the Late Intermediate Period. The LIP cultures represented at Cerro San Antonio include the Chiribaya, San Miguel, and Gentilar styles (see Chapter 3).

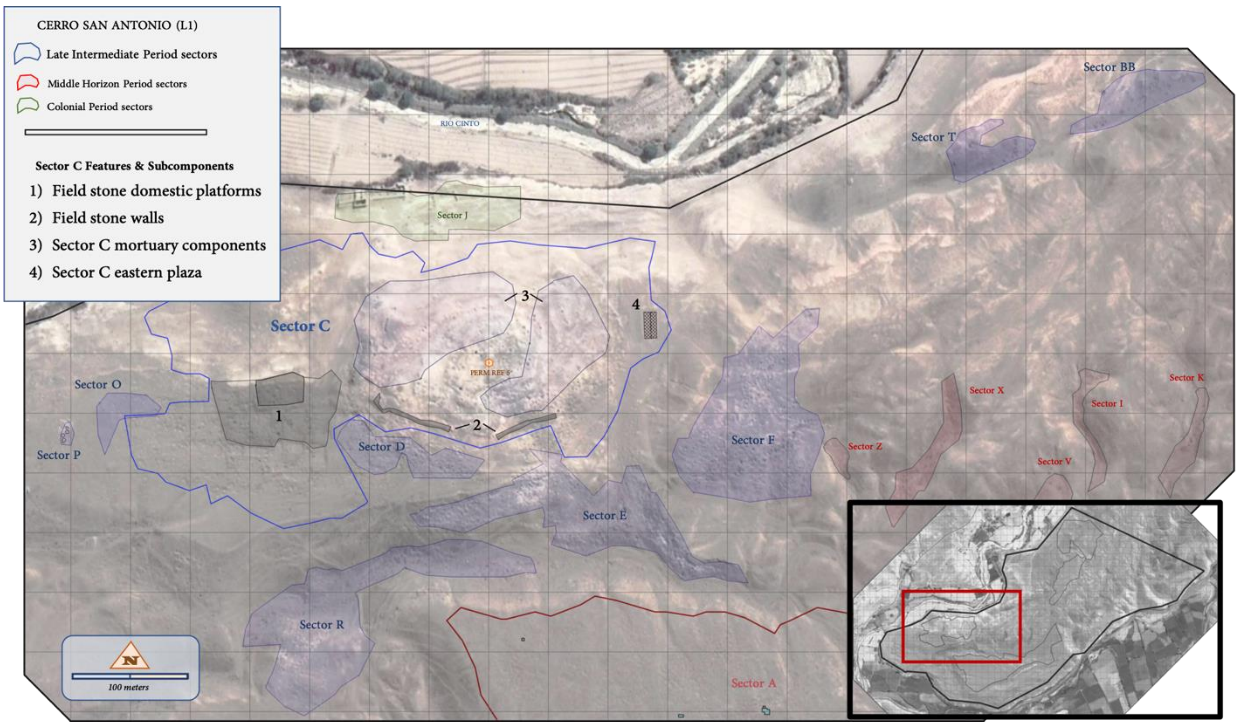


Figure 283. Map displaying the primary Late Intermediate Period era occupation and use of the site, centered on Sector C, and eight (8) associated mortuary sectors.

Figure 284. UAV photo of eastern half of Sector C; including the peak occupation sector, the eastern plaza, and eastern wall with LIP-era cemeteries indicated - view looking east by southeast.

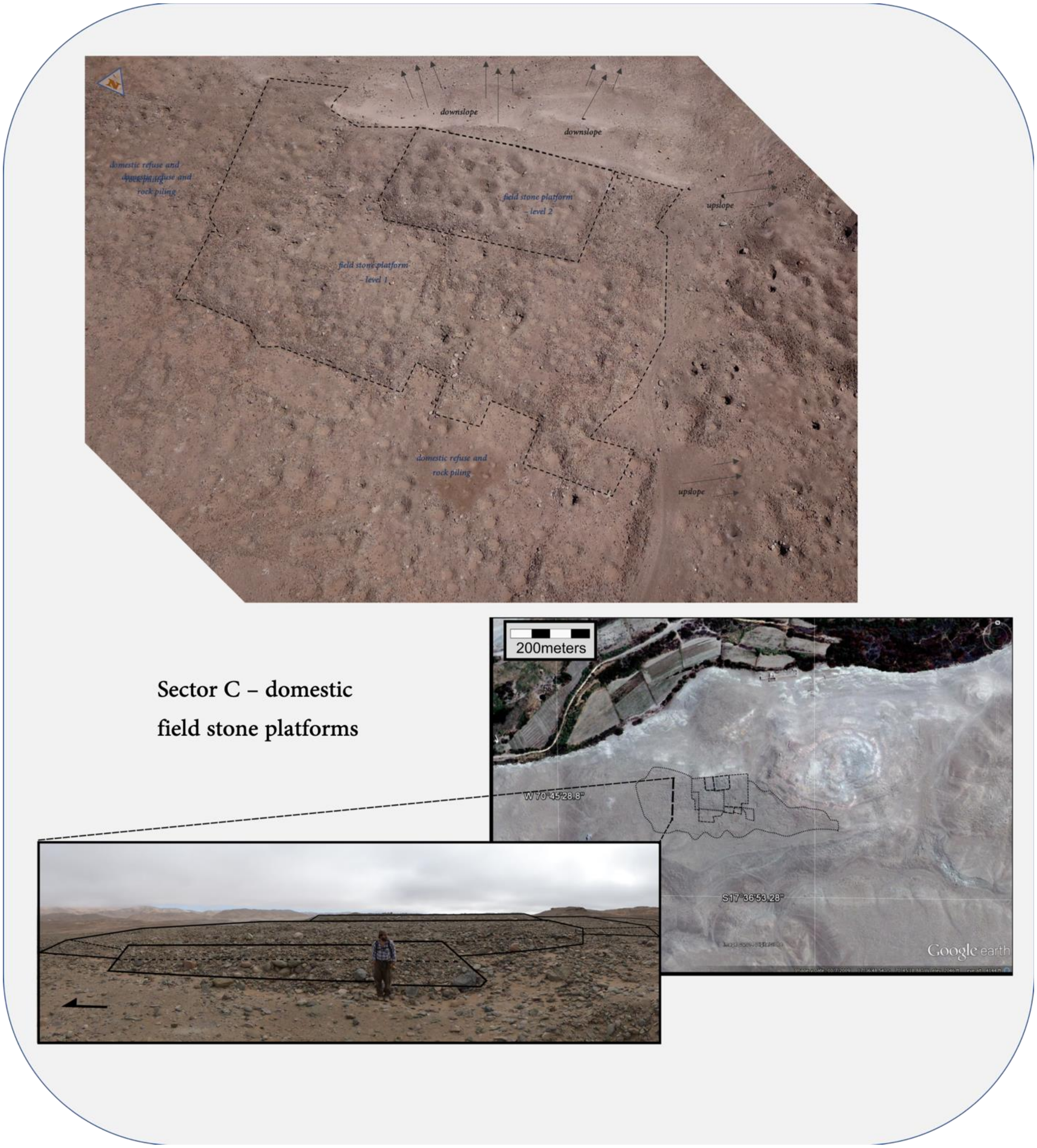


Figure 285. Field stone domestic platforms in the primary LIP domestic area of Sector C.

Figure 286. View (looking east) of eastern field stone wall that protects the southern flank of the Sector C hilltop settlement.

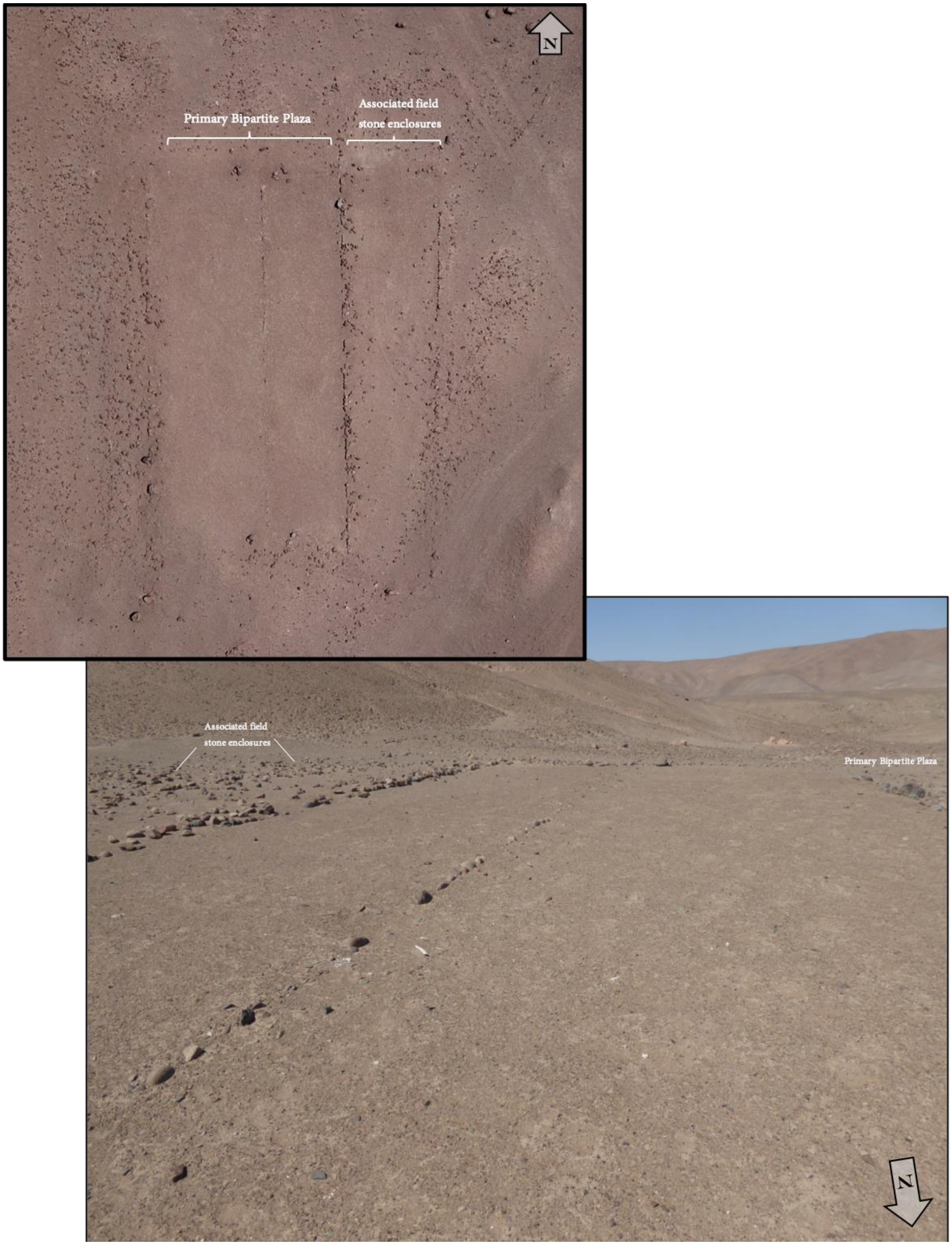


Figure 287. Sector C (L1C) eastern plaza, viewed from the ground (looking south) as well as a low altitude UAV photo.

Figure 288. Examples of subsurface tomb types found in Sector C: including non-Tiwanaku fine-masonry rectangular tombs as well as deep (2-4 meters) circular cist tombs.

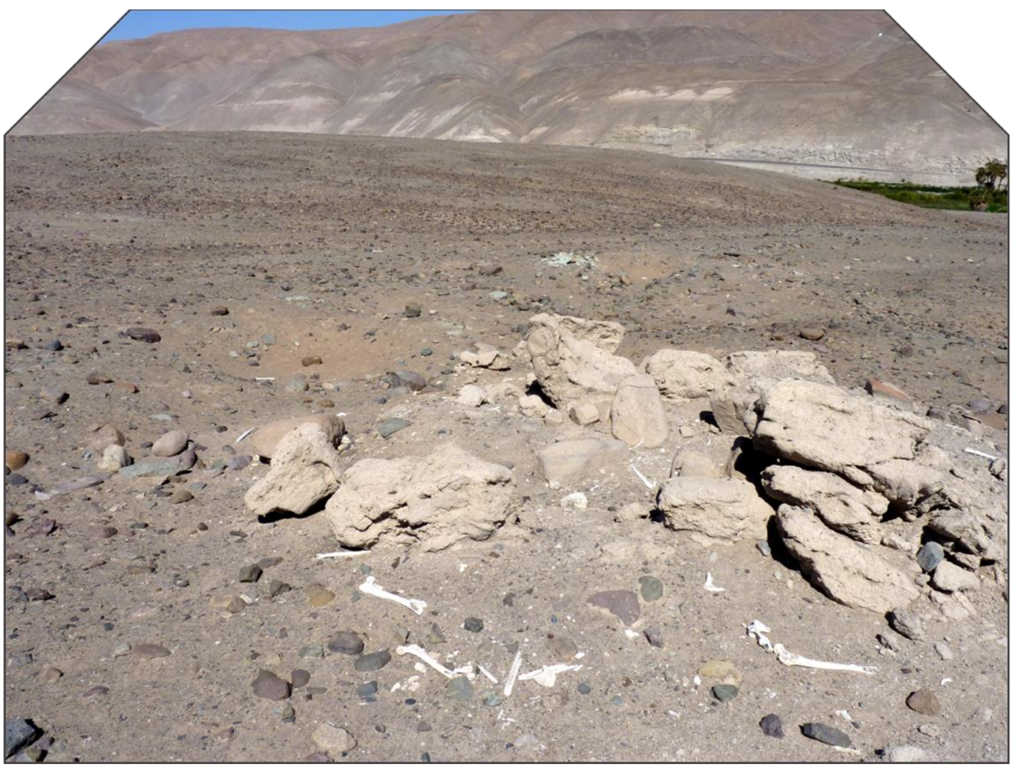


Figure 289. Remains of *chulpas* (and looted human remains) Sector P at Cerro San Antonio (L1P).

Colonial and Historic Periods

The site of Cerro San Antonio contains formal sectors that date to Colonial (post- ca. AD 1532) and early Historic (pre- ca. AD 1800) contexts as well.

Figure 290. UAV photo of the Colonial-era bodega and surrounding structures that comprise Sector J at Cerro San Antonio (L1J).

Figure 291. The Sector J (L1J) bodega.

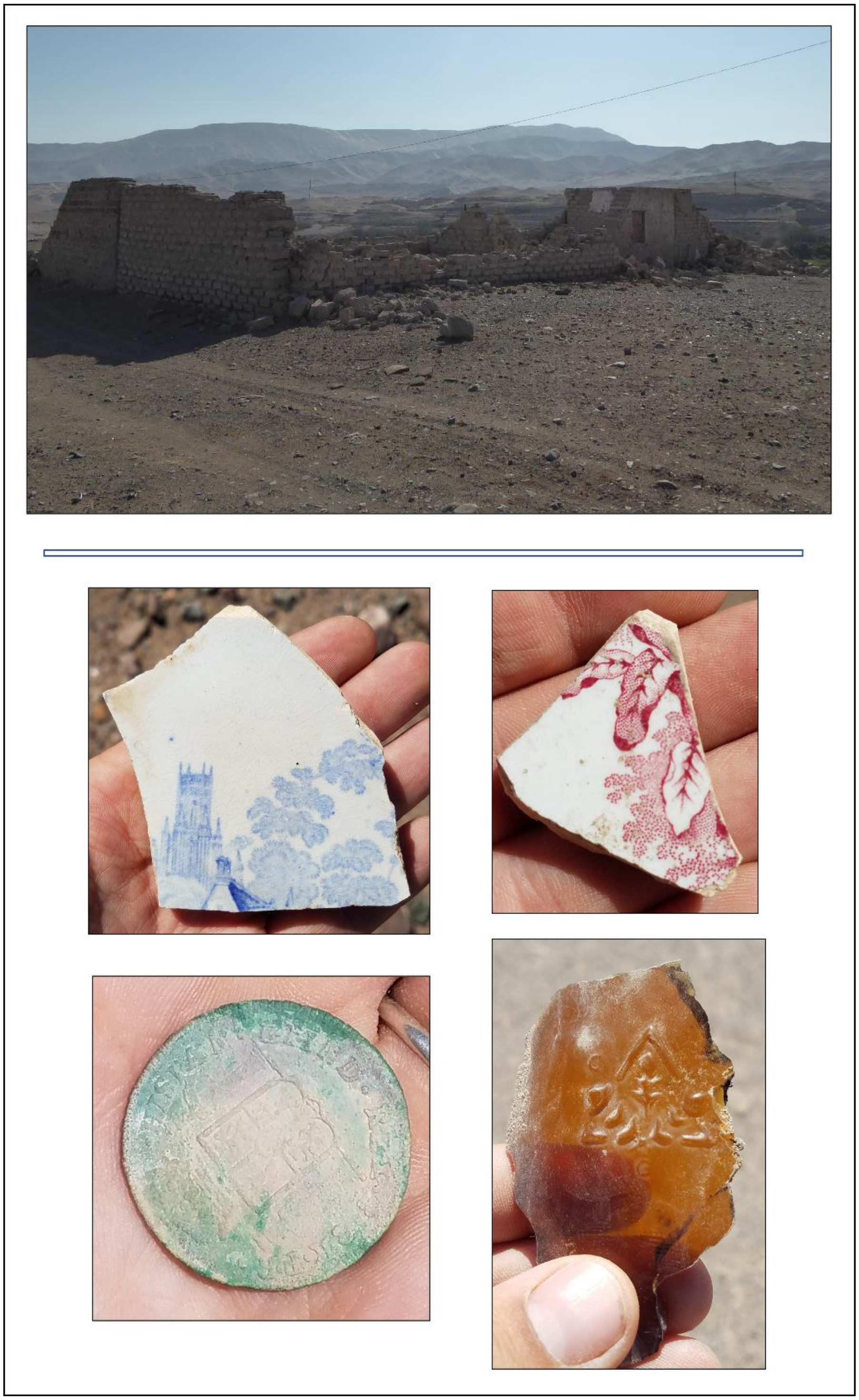


Figure 292. Colonial/Historic-era features and materials from L1: including the historic structure in Sector N (L1N) and decorated porcelain, glass, and a late Colonial coin recovered on the surface.

Looting and Modern Disturbances

As discussed in Chapter 3 the site of Cerro San Antonio has been subject to major disturbances and specifically targeted looting events, both recently and in the past (see 3.2). This subsection provides some additional maps and images which document some of the most pronounced disturbance and looting events.

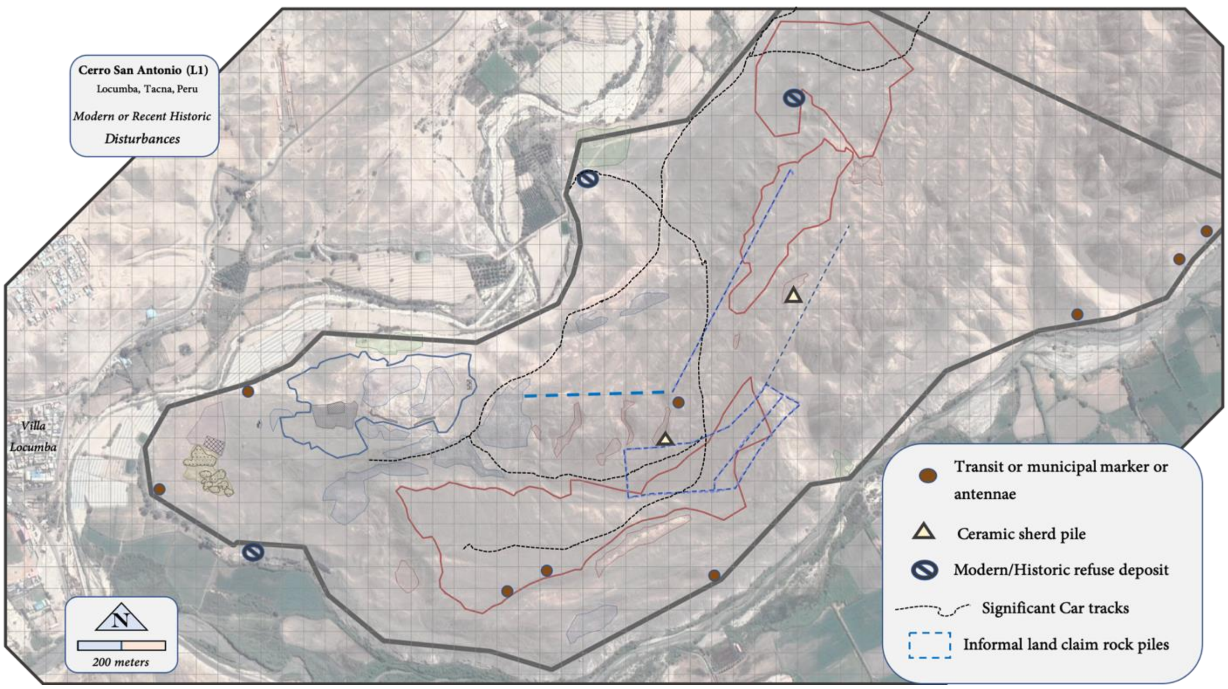


Figure 293. Map showing locations of various modern (and recent historic) disturbances as discussed in the text.

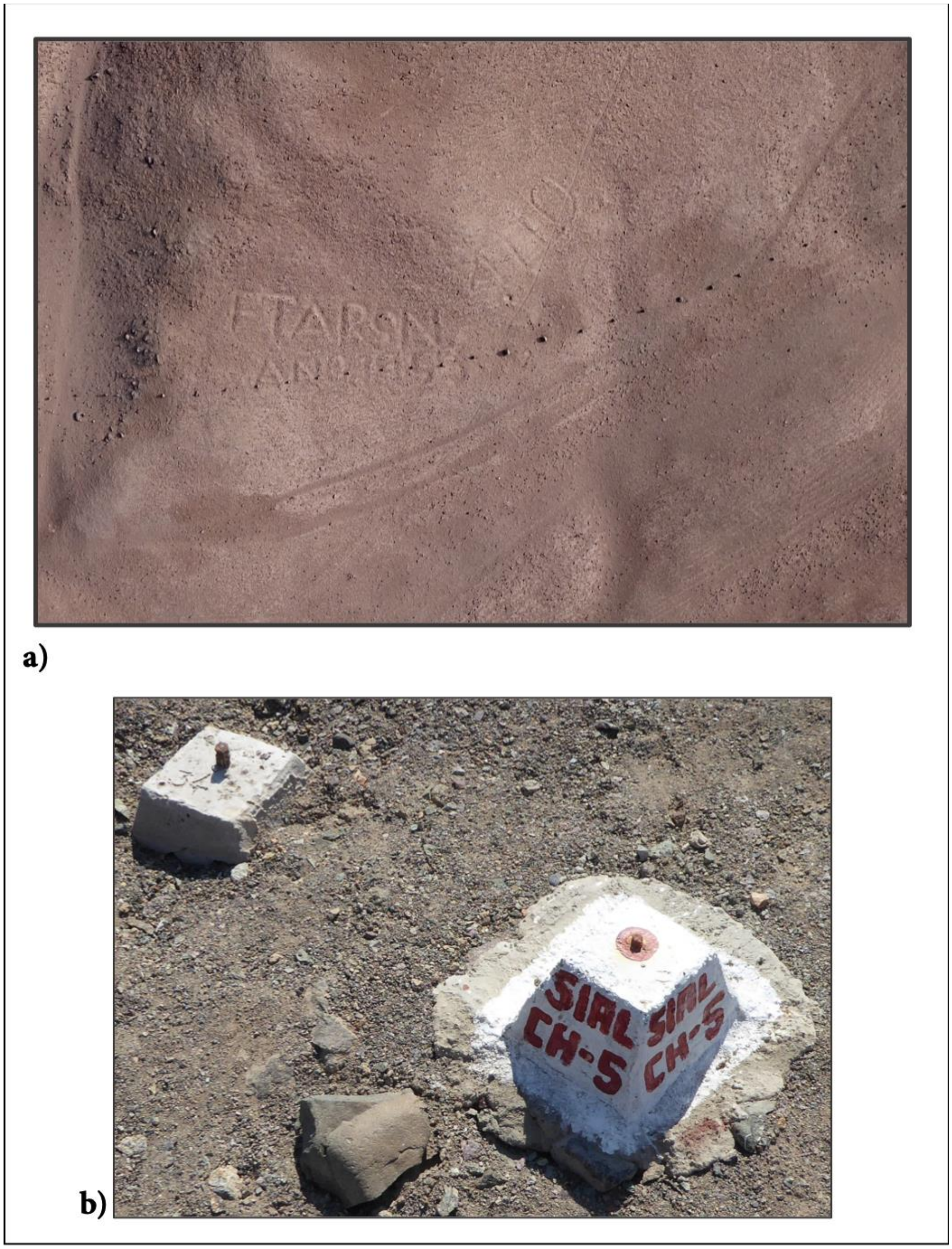


Figure 294. Examples of formal disturbances made to the site (L1), over the last 100 years include a) a relic hillside geoglyph made in 1955, still visible in low altitude drone photos, and (b)b permanent survey markers.

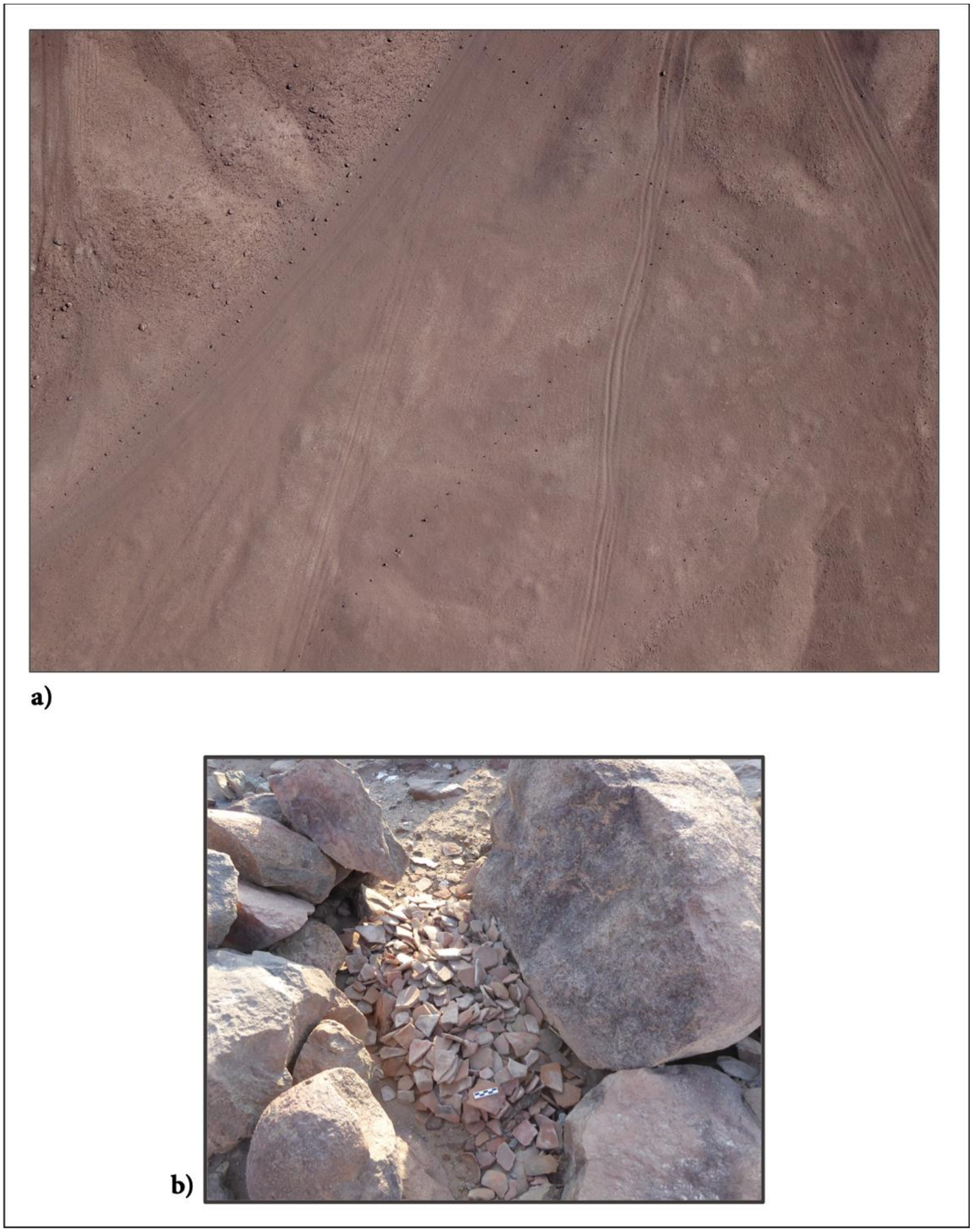


Figure 295. isturbances to the site include remnants from informal land claims, often demarcated by linear arrangements of rock cairns (a) or systematic clearing of sherds and other remains (b).

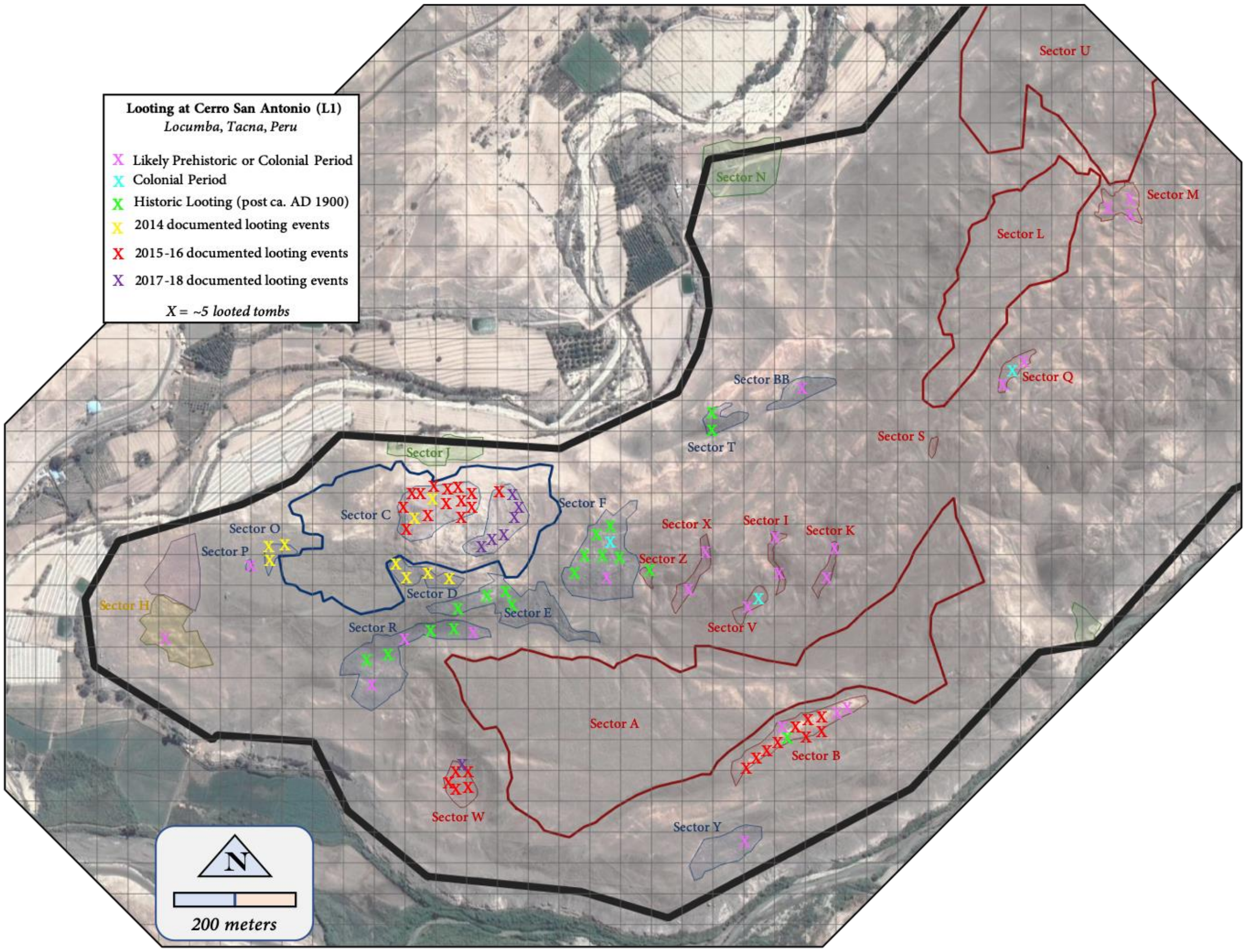


Figure 296. Map of Cerro San Antonio (L1) illustrating the mortuary sectors that have been looted, including estimated and documented periods in which the looting took place.

Figure 297. Images illustrating sthe extent of the 2015-16 looting events, including (bottom) materials abandoned or not yet collected by looters and (top) PAL 2016 field school members working to map the disturbances for MNC.

Figures 298. Extent of looting from 2014 and 2015-16 l events), including: (from top to bottom) San Miguel ceramics and basketry, wooden kero with pan pipe and basket, textile bag (chuspa) with coca , and collection of materials piled up by looters (including a pile of human teeth).

Figure 299. Photos of animal remains found in looted Late Intermediate Period mortuary contexts (primarily Chiribaya), including (top) multiple mummified dog remains as well as (bottom) collections of camelid feet.

Figure 300. Photo of the materials recovered from major arrest of Cerro San Antonio (L1) looters in 2016 (photo courtesy J. Ortega).

Figure 301. Examples from ceramics recovered from 2016 looter arrest, ceramics are primary from Tiwanaku, Chiribaya, San Miguel, and Gentilar styles (photos courtesy of J. Ortega).

Figure 302. Basketry recovered from 2016 looter arrest at Cerro San Antonio, likely mixed non-Tiwanaku and some Tiwanaku contexts (photos courtesy of J. Ortega).

Figure 304. Textile-realated items recovered during the 2016 looter arrestat Cerro San Antonio, including various non-Tiwanaku decorated tunics and mantas, bags, and belts (photos courtesy of J. Ortega).

Figure 305. Implements recovered from the 2016 looter arrest at Cerro San Antonio (L1). , including musical instruments (including a full drum), weaving and agricultural implements, and dozens of wooden spoons of non-Tiwanaku style (photos courtesy of J. Ortega).

Petroglyphs

As noted in the text, one of the most widely known archaeological features included in the Cerro San Antonio (L1) complex are the petroglyph covered boulders which clutter the sites valley-side margins. While I am still working to systematically document and analyze these features, included below are some selected images.

Figure 306. Selected photos of petroglyphs at Cerro San Antonio (L1).

Figure 307. Additional selected photos of petroglyphs at Cerro San Antonio (L1).

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