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The archaeological search for *Nüümü* (Paiute) agriculture in *Payahuunadü* (Owens Valley), California

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ABSTRACT This paper summarizes the findings of two recent archaeological studies that identified remnant *Nüümü* (Paiute) irrigation systems emanating from Horton and Pine Creeks in *Kwinaba* (Round Valley), California.

INTRODUCTION

During the Department of Interior's Public Land Survey of 1855-56, Alexey Waldemar von Schmidt surveyed land in the *Payahuunadü* (Owens Valley, CA) to identify the arable lands of the west. As a result, von Schmidt (1855; 1856) recognized the existence of "Indian" [sic] water conveyance systems and irrigated fields prior to any European American settlement. He documented these agricultural features in his field notes and survey plats when the features intersected his transects, detailing an extensive agricultural practice that had altered much of the surrounding landscape and turned large sections of the desert green. Von Schmidt noted, "I found many Indians in this fractional township, who live in the deep mountain ravines, and come down here for grass to eat, also to dig roots, called by them '*sabouse*', which forms their principal article of food." After completing a survey transect near Round Valley in the northern *Payahuunadü*, he offered, "Land level, soils first rate with fine grass, *mostly all irrigated by the Indians*" [emphasis von Schmidt, 1855.]

The von Schmidt (1856) survey plats became the official land record of the United States, providing an efficient means of documenting ownership and facilitating land transfers. His observations of arable lands became public record, while the published accounts of military expeditions and prospectors further advertised the existence of prime farmland (Haverstock et al., 2022; Lawton et al., 1976:27; Wasson, 1863:227; Wilke and Lawton, 1976:19-21). European Americans soon established settlements in the region, resulting in conflicts over natural resources between the newly arrived settlers and indigenous population, culminating with the 1863 expatriation of the *Nüümü* people to Fort Tejon, 240-miles to the southwest, by the United States Army Cavalry (Cragen, 1975:61, 62).

Seventy-five years later, anthropologist Julian Steward (1930, 1933) sought to document the traditional lifeways of the *Nüümü* people in the *Payahuunadü* after colonization, attempted genocide, and assimilation. Agricultural and irrigation systems near present day Bishop, (*Pitana Patü*), Big Pine (*Towowah Matü*), Freeman Creek (*Utü Utü Witü*) and Round Valley (*Kwina Patü*) were described by indigenous consultants (Steward 1930, 1933:326, Map 1). The main irrigated

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plants included *náhavita* (bluedick, *Dichelostemma capitatum)* (Benth.) Alph. Wood (USDA 2005) and *tüpüs* (yellow nutsedge, *Cyperus esculentus L.*) (Jepson, 2010) (Steward 1933:247,327, Map 2; Lawton et al., 1976:18).

Despite the historical observations of von Schmidt (1856), and the ethnographic documentation and attempt to relocate by Steward (1933), no irrigation features have been archaeologically identified since their abandonment circa-1860. This prompted a team composed of two researchers associated with the White Mountain Research Center (WMRC), a member of the Bishop Paiute Tribe, and a federal agency archaeologist to conduct an archaeological investigation focused on *Nüümü* irrigation. This multi-disciplinary team successfully completed the initial phase of research in 2021 with the identification and radiocarbon dating of an extant irrigation system along Horton Creek (Haverstock et al., 2022). A secondary study focused on the adjacent Pine Creek drainage and resulted in similar findings (Haverstock, 2024). This manuscript summarizes the findings from the combined study area (Fig. 1).

METHODS

Differentiating *Nüümü* ditches from the many created by early settlers, or by the Los Angeles Department of Water and Power presents several challenges. Even when locational information is available from von Schmidt or ethnohistoric sources, in most cases, post-contact manipulations, or natural erosion and redeposition have destroyed the ancient ditch systems (Wickstrom, et al., 1994:125). With this challenge in mind, the study collaborators set out to map geomorphic remnants of historic and pre-colonial irrigation systems by conducting geomorphological and archaeological studies at von Schmidt's observation points.

On his survey notes for Sections 27 and 28 of Township 6 South, Range 31 East (T6S, R31E), von Schmidt remarks that the area adjacent to Horton Creek contained an Indigenous ditch and irrigated land, portions of which were drawn onto the survey plats. The team identified the cadastral marker for this section line and retraced the von Schmidt survey route with a tape measure and laser rangefinder to approximate von Schmidt's chain lengths and transects. These methods were used to verify GPS data derived from the von Schmidt survey plats, and to identify additional ditch locations.

Archaeological survey was then conducted in an area north of the Horton Creek study area along a corridor encompassing Pine Creek. Identified irrigation features were photographed, spatially located, and documented. Care was taken to note the superposition of intersecting ditch sections during the documentation effort to assist in dating the features relative to each other.

To supplement the archaeological survey, several sources of historical documentation were used to ascertain and verify the age and function of the various ditch features. The Bureau of Land Management General Land Office (BLM-GLO) public land survey records were searched to correlate the identified archaeological deposits with the respective allotees (BLM-GLO Records, accessed 2021). Land Use and Ownership maps created by the Los Angeles Department of Water and Power (LADWP) in 1930 were also accessed (Ritch, 1931). These maps include scaled drawings of structural improvements made to lands purchased by LADWP, agricultural crops

grown, the respective acreages, the previous owner's identity, and the price paid for the land. Additional historical documents related to water use by Paiute allottees were accessed from the Los Angeles Department of Water and Power Archives.

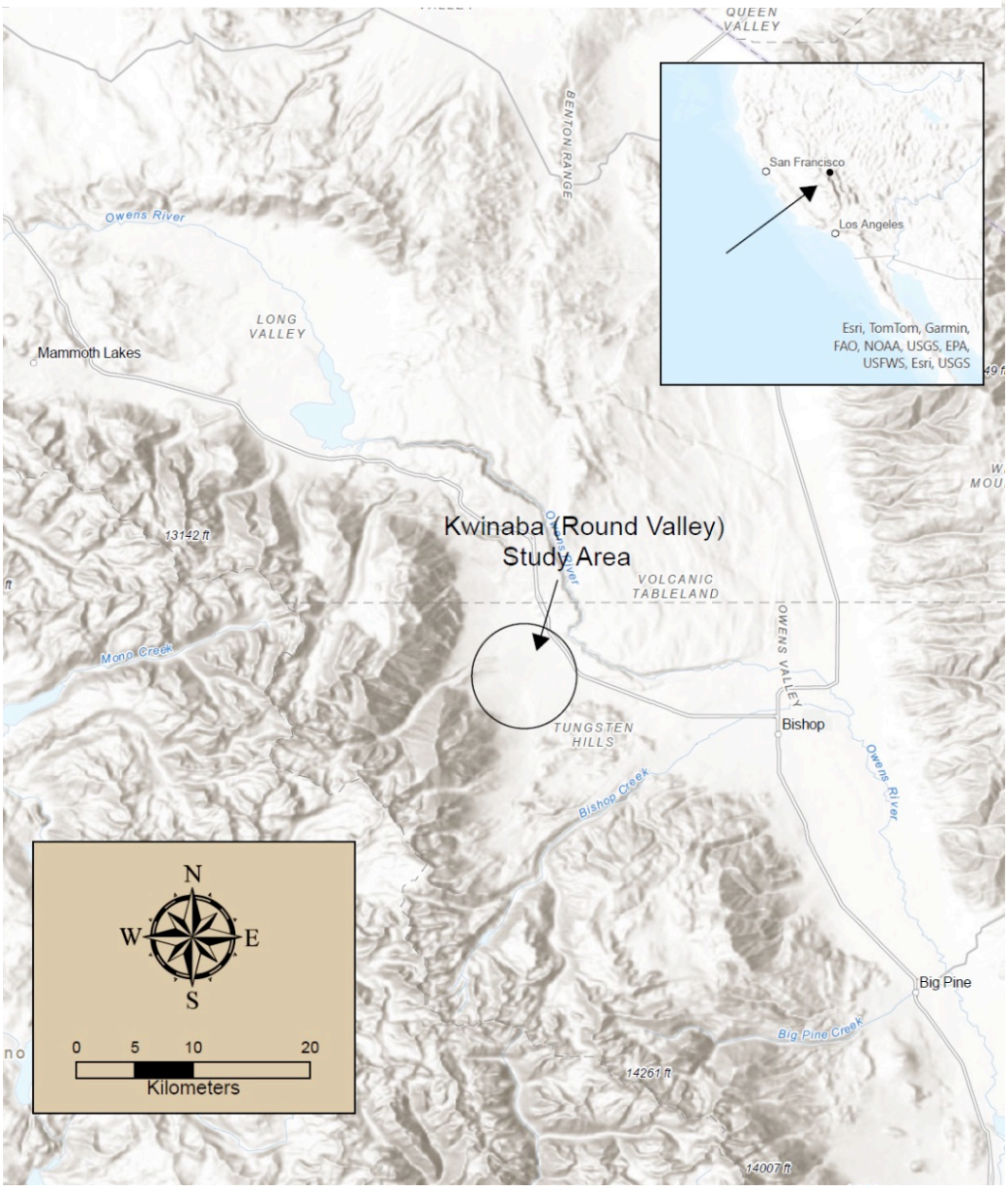

Fig. 1. Kwinaba (Round Valley) study area.

RESULTS AND DISCUSSION

Intensive pedestrian survey along Horton Creek identified remnant water features that had been documented by von Schmidt as "creeks" in 1856. These features, identified as the *Kwina Patü* channel, were examined and found to lack natural connectivity to Horton Creek or any other active water source. They are not natural waterways but anthropogenically modified dry washes that were utilized in conjunction with constructed ditches to create an irrigation system (Fig. 2). A hand-constructed cobble and small boulder diversion was identified near the head of *Kwina Patü* channel. This diversion enabled the transfer of water from Horton Creek into the previously dry wash via a meter-scale water diversion channel. The diversion occurs at a narrow section of the creek where a small step in the stream bed is located. Water was diverted below this point at a high angle of discordance before being directed northwest across the nose of a large boulder bar towards a north-westward sloping lobe of the alluvial fan, before cascading into a fluvially abandoned, early mid-Holocene dry wash (Haverstock et al., 2022).

Below the diversion, the anthropogenically diverted flow generally occupied shallow inset flow-channels within the larger dry wash. Once water from Horton Creek was redirected into the abandoned channel, the water flow rate was subsequently controlled and redirected across the fan surface by several classes of constructed feature. These features, made from dry-stacked cobbles and small boulders, include berms, weirs, and dams. These features are large and occur within the main dry wash. Additional, but smaller-scale cobble and boulder features were employed to direct water into branches of the system or to flood fields, identified as surfaces which were cleared of rock.

Terraces were formed from the deposition of fine-grained sediment that settled-out of suspension as the diverted water was slowed by the water control features. Over time, areas upstream of these structures infilled with sediment enabling the establishment of willow stands. While no longer alive, these stands of dead willow thickets line the channel, evidencing the earlier presence of perennial water. The very fine-grained deposits that underlie the terrace surfaces accumulated over several centuries and are not representative of an active wash deposit. These anthropogenic features are not found elsewhere in this alluvial fan system outside of the *Kwina Patü* channel. Remarkably, auger samples excavated to approximately one meter below ground surface within the impoundments consist almost exclusively of very fine-grained sediment including grit, coarse sand, sand, fine sand, and silt, with some dark colored sandy silt containing micro-organics. This is in stark contrast to the overlying and adjacent poorly sorted sandy deposits dominated by pebbles, gravels, and cobbles which are characteristic of an active wash. Radiocarbon analyses conducted on six samples of rootlets retrieved from the anthropogenically created terraces in the upper channel of the *Kwina Patü* system support a pre-Columbian timeframe for the inception of agriculture in the Horton drainage (Haverstock et al., 2022). These results extend the known existence of Nüümü agriculture back at least another 408 years from the time of von Schmidt's observations in 1856, demonstrating that the irrigation system was continuously used for hundreds of years.

Portions of at least three Nüümü irrigation systems were likewise identified within the Pine Creek area. The most intact example was identified on the north side of the creek immediately outside the walled canyon at the head of an alluvial fan. Archaeological survey identified evidence of

several anthropogenic water diversions consisting of cobble-lined ditch and stone water control features, upstream from where the creek leaves the main canyon. These features diverted water from the creek channel northeast to a highpoint outside of the riparian corridor to a network of branched conveyance channels that served to spread water across the alluvial fan. Specifically, water was directed out of the incised creek bottom and up onto an inset terrace, gradually

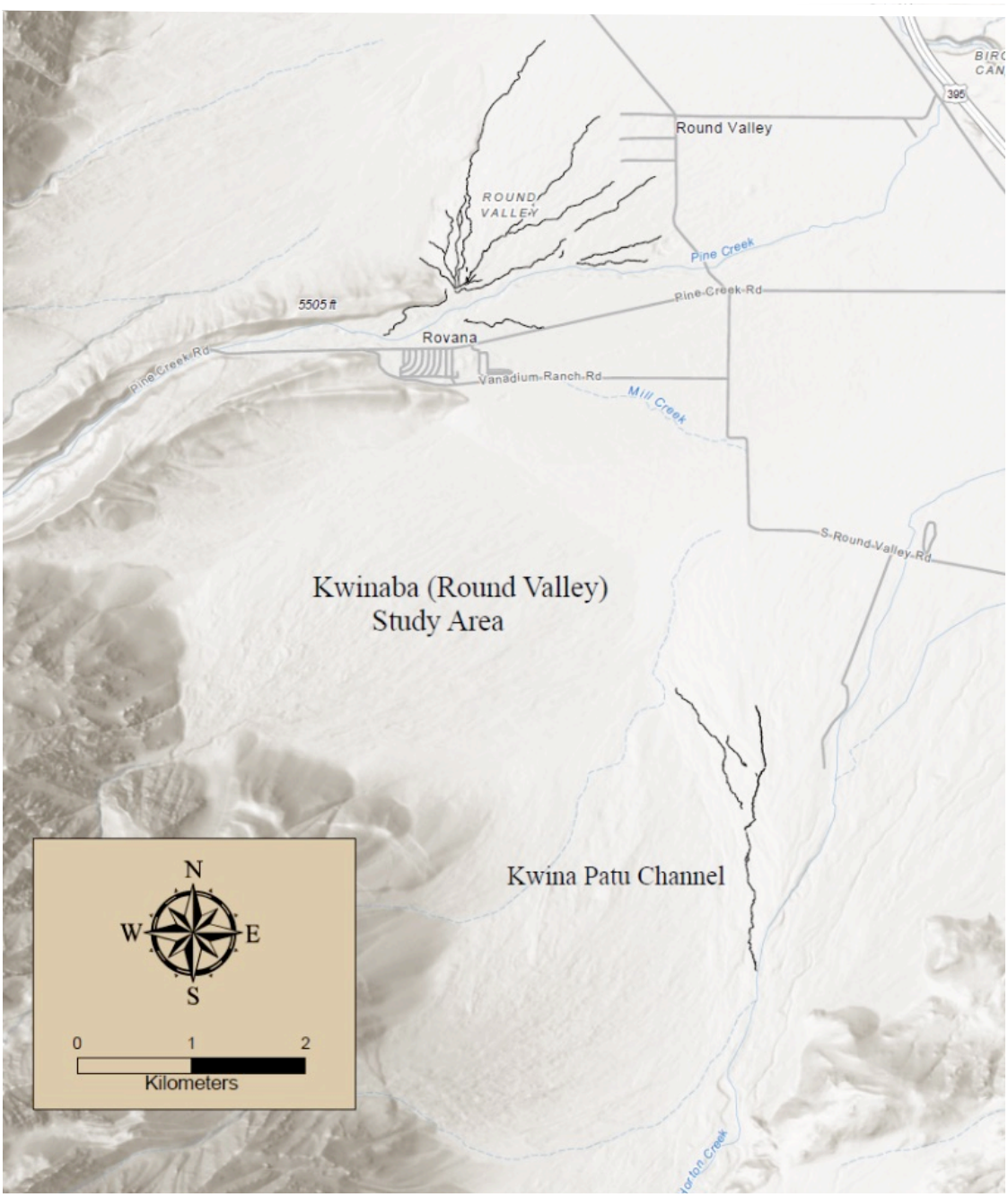

Fig. 2. The black lines depict precontact irrigation features adjacent to Paiute Allotments near Horton and Pine Creeks in the southern Kwinaba (Round Valley).

contouring around the northern side and exiting the canyon. This was accomplished by diverting water higher in the canyon, using gravity to propel water along a very gradual downhill gradient. The remnants of three modified diversion channels were observed, including the system still currently in use. Two of these were intact enough to warrant the collection of meaningful measurements, while other channels are substantially less intact. The more extant diversions are approximately 700-meters and 1,030-meters in length and lose between 131- and 222-meters in elevation while contouring the terrace and canyon wall before exiting the canyon. This is a steep gradient averaging approximately 18- to 21-percent. At the highpoint, near the head of the alluvial fan, the system forked into distinct branches allowing water to be directed into modified natural gullies that were arrayed in a dendritic pattern.

At least seven branches of linked channels were used for water distribution. The inset channels and modified ditch sections range from 35 to 60 centimeters in width, which appear to have been determined by the physical constraints of the landscape. Sometimes these features were positioned along small ridgelines to facilitate local distribution, while in other circumstances the inset channels are positioned within larger natural gully systems. Together, these features functioned to distribute water across the alluvial fan and eventually to flatter ground downhill. Adjacent to these modified channels and on the alluvial fans, downed large cottonwood trees are frequently encountered (Fig. 3). These evidence the regular and enduring presence of water in these now dry features. In several locations, linear arrays of abnormally large and old bitterbrush or strips of dense bunch grasses, also speak to the persistent environmental consequences of *Nüümü* water conveyance. Where the ditch features encountered flatter gradients, cleared fields were observed. These fields are constrained by natural topography and immovable rocks and were utilized for plant production prior to contact. These are surrounded by distinct rock piles (Fig. 4), tangible byproducts of field clearing.

Fig. 3. Image of downed cottonwood tree adjacent to Nüümü irrigation feature and well-removed from a natural water source (image Haverstock).

Fig. 4. Image of a rock pile adjacent to irrigated land, a remnant of field clearing (image Haverstock).

The targeted documentation of remnant Indigenous irrigation features and their associated archaeological deposits, located adjacent to portions of Horton and Pine Creeks, resulted in a discontinuous survey area of approximately 400-acres. The findings are indicative of two disparate periods of use: a distinct precolonial manifestation that was designed to spread water across the landscape, and more recently constructed features designed and operated to deliver water directly to the seven Paiute allotments. Although distinct in their function, older *Nüümü* irrigation systems were often incorporated into more recent historical features. Historical records identified seven Paiute allotments within the study area belonging to Dick Mallory, Jack Newland, George Williams, Joe Wright, Jack Wright, Flora Cornwell, and B. Tom Longley. While not addressed here, the archaeological remnants of these allotment era irrigation features, homesteads, and associated historic artifacts tell a story of long-term resilience of Paiute farmers, who managed to persist in their agricultural pursuits, despite numerous institutional and economic barriers post-colonization.

CONCLUSIONS

Archaeological investigations conducted in *Payahuunadü* of central eastern California, have identified remnant water conveyance systems indicative of *Nüümü* irrigation. The archaeological assemblages located along these creeks document a long-enduring irrigation practice that persisted post-contact after beginning circa 631 - 512 Cal BP (Haverstock et al., 2022). Paiute allottees continued traditional irrigation practices after their attempted expatriation and subsequent return post-1863.

Outside of *Payahuunadü*, indigenous irrigation practices are unreported in California, except for the agriculturalists living adjacent to the Colorado River corridor. Similarly, agricultural pursuits in the Great Basin appear limited to the Fremont Culture of Utah and Nevada, who grow maize and other domesticates in addition to engaging in hunting and foraging, before abandoning such approaches circa-1000 years BP. The unique selection of targeted wild crops and the cultivation methods employed, suggest that Nüümü agricultural enterprises originated in *Payahuunadü,* rather

than being the product of cultural transmission. That agricultural practices independently developed among hunter-gatherers within Payahuunadü is exceptional, adding to a short list of locations around the world where such innovations occurred.

Nüümü water conveyance systems appear to have been designed to spread water across a wide swath of land. This approach to irrigation increased the yield of targeted plants through supplemental water and habitat enhancement. The design of these systems suggest that the intended goal was to deliver water to as much of the adjacent soil surface as possible. In Western irrigation systems water is moved from storage location to point of use. Water lost during conveyance is considered waste. In *Nüümü* irrigation systems there is no water waste, since escaped water would benefit targeted plant species along the route. In fact, this was likely one of the intended goals of water diversion. Within *Kwinaba* (Round Valley) the combined archaeological and cadastral survey data suggest this irrigated area exceeded 9,000-acres. While this seems like an astounding figure, von Schmidt physically mapped approximately 3,600-acres of irrigated fields in 1856, making the larger figure seem less outlandish, since von Schmidt only mapped those features that physically crossed his survey transect.

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