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Establishing a Baseline Surveying of Ackerman Creek (Ya-mo-bida) at Pinoleville Pomo Nation

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Publication Date

2023-10-01

Establishing a Baseline Surveying of Ackerman Creek (*Ya-mo-bida)* at Pinoleville Pomo Nation

Fall 2023

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Abstract:

We researched indigenous-led river restoration in order to understand how this approach promotes long-term stewardship, a common challenge in the river restoration field. We were connected through the UC Berkeley community to the Pinoleville Pomo Nation in Mendocino County. We visited the Pinoleville Pomo Nation (PPN) to learn more about the restoration work they are conducting around Ackerman Creek, a tributary of the Russian River. They are incorporating cultural practices, long term monitoring, continuous maintenance, community outreach, invasive species mitigation, and native plantings into the restoration process. We then conducted a baseline survey of cross-sections and sketches, which may serve as a point of reference for gauging the impacts of future restoration activities. We learned that constraints to this stewardship approach come from limited jurisdiction of the tribe throughout the watershed, resulting in impacts from off-site factors such as dams and runoff. Even with built-in community engagement and synthesis of social connectivity and ecological health, the current on-site practices can not address upstream and downstream disturbances.

Problem Statement & Introduction

River restoration is a multidisciplinary process with ecological and social dimensions. It is a fallacy to assume we can use river restoration to perfectly reverse the negative ecological impacts of industry and extraction. Indigenous peoples have been living, and continue to live around rivers, practicing intergenerational natural resource management for food harvest, basketry and cultural ceremonies.[1] In fact, the ecological conditions that restoration seeks to re-invent, are likely the result of indigenous stewardship practices.

Indigenous involvement in river restoration, particularly through stewardship and leadership, positively impacts both the health of the river and the health of indigenous communities.[2] Expanding on concepts of governance at the river basin scale, indigenous river restoration "not only restore ecosystems processes and services, but to repair and transform human relationships with rivers and create space politically for decolonizing river governance."[3] Through this, river restoration can "become a 'transformative project' (Salmond et al. 2014, 50), which both repairs human relationships with rivers and serves to resist the colonizing and capitalistic forces that ruptured human–river relations in the first place (Collard et al. 2015; Whyte 2016)".[4] As part of this healing process, a crucial guiding practice in fieldwork and collaborative research is ceremony and protocol both to set intention and as an exchange of Indigenous knowledge. Additionally, "...indigenous knowledge is best understood as a process, rather than just the incorporation of traditional ecological knowledge into a restoration plan."[5]

The process of indigenous stewardship can resolve many of the challenges in successful river restoration. For example, site selection and species selection for habitat restoration are improved when indigenous community members are active leaders in the design phase.[6] One of the biggest challenges in river restoration is long-term monitoring, and by restoring plants and habitat for animals that are already part of a local culture's food harvest, the local community automatically practices ongoing management by continuing cultural practices.[7] This is not to say that planners and designers should intensively pursue restoration on sacred sites for the sake of achieving successful restoration. Sovereign indigenous nations and tribal members may want to keep resources, restored habitat, and cultural practices confidential for data privacy and autonomy.[8] While a river restoration project should ensure direct benefits to the tribe, the application of restoration practices from external groups or governments can also damage

[1] Anderson, "Tending the Wild : Native American Knowledge and the Management of California's Natural Resources."
[2] Fox et al., "'The River Is Us; the River Is in Our Veins': Re-Defining River Restoration in Three Indigenous Communities."
[3] Ibid, 521.
[4] Ibid, 523.
[5] Ibid, 529.
[6] Reyes-Garcia et al., "The Contributions of Indigenous Peoples and Local Communities to Ecological Restoration." 3-8.
[7] Ibid, 3-8.
[8] Nelson, "Refusing Settler Epistemologies and Maintaining an Indigenous Future for Tolay Lake, Sonoma County, California."

cultural resources.[9] This means the community engagement must be on the terms of the existing and ancestral stewards of cultural landscapes.

It is also important to understand that indigenous-led restoration may have different metrics of success and evaluation processes. For example, in a study conducted in the South Island of New Zealand, Māori standards for water quality were more strict than the western scientific ones. From Māori evaluations, all waters that contained contaminants were considered degraded, regardless of the level to which the contaminants were present.[10]

After engaging with the literature referenced above, we then asked ourselves, how is indigenous-led river restoration occuring on the ground in our region, and how can a landscape architecture professional support these efforts? To explore this question we focused on the Pinoleville Pomo Rancheria in Mendocino County. The Pinoleville Pomo Nation (PPN) is a federally-recognized tribe located just north of Ukiah, California. Ya-mo-bida, commonly known as Ackerman Creek, runs along the North edge of the Rancheria. Ackerman Creek is a tributary of the Russian River's upper reach, downriver of the East fork. It runs roughly from west to east, North of Ukiah. The PPN's Environmental Department, also referred to as their EPA, leads ongoing restoration practices for this stretch of Ackerman Creek.

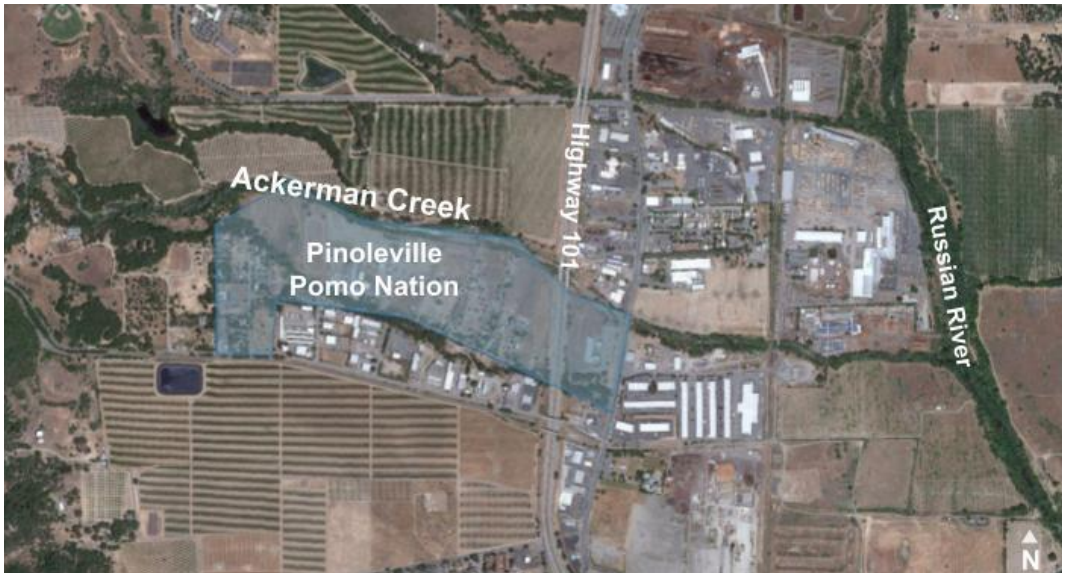

Figure 1. Ackerman Creek at Pinoleville Rancheria

A baseline study, primarily of channel characteristics, was conducted for PPN along the downstream reach of their Rancheria. A single point-in-time survey was conducted which included: discussions with community members, three cross-sections, site sketches, and photographic documentation.

[9] Ibid.
[10] Tipa, "Exploring Indigenous Understandings of River Dynamics and River Flows: A Case from New Zealand."

Background Information

"Pomo" is an ethnographic term applied to those that speak the seven distinct languages of the Pomoan language family (Northern Pomo, Kashaya, Central Pomo, etc.).[11] The Pinoleville Pomo Nation are part of the Northern Pomo speaking tribes and are ancestrally connected to Be-lo-kai, lands further North in what is today known as Potter Valley.[12] Traditional foods included acorns, pepperwood and buckeye nuts, fish, deer, and yuhu (pinole made from seeds).[13] Willow, tule, sedges and grasses were essential materials for home construction, basketry, and more.[14] Today, the use of pesticides threatens such traditional practices, as basketweavers can be exposed to these toxins while gathering or using materials harvested from the landscape.[15]

In the 1850's, European colonists began to occupy Potter Valley and push the Pomos off of their traditional lands.[16] In 1871, the Potter Valley Pomos were forcibly removed and marched to Round Valley Reservation, in an event referred to as the Bloody Run. Seven years later, in 1878, many Potter Valley Pomo left Round Valley Reservation due to poor living conditions and settled in Northern Ukiah.[17] After a series of relocations and land transfers, the Pinoleville Rancheria was established in 1911. In 1966, the Pinoleville Rancheria was terminated. In 1983, the Rancheria was restored thanks to the class-action suit Hardwick, et al vs. US, which was filed and won by Pomo woman Tillie Hardwick and others.[18] The Pinoleville Pomo Nation today is approximately 100 acres large and governed by the tribal council.[19]

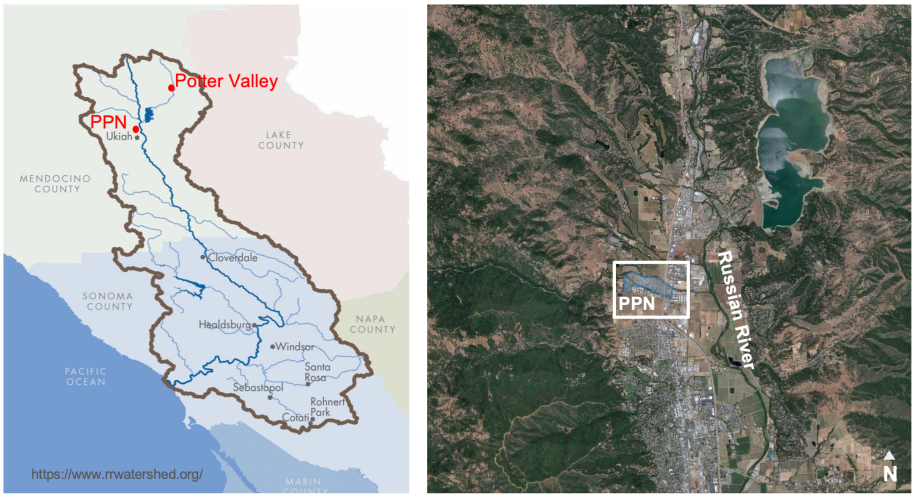

Figure 2. Russian River Watershed and Ukiah Valley

[11] "Northern Pomo."
[12] Pinoleville Pomo Nation, "Our History."
[13] Ibid.
[14] Ibid.
[15] California Indian Basketweavers' Association, "Pesticides & Basketweavers."
[16] Pinoleville Pomo Nation, "Recent History."
[17] Ibid.
[18] Pinoleville Pomo Nation, "Indian Affairs Timeline."
[19] Mendocino County Resource Conservation District, "Russian River Integrated Coastal Watershed Management Plan." 2:25.

Methods

Preliminary Process and Research

We first conducted a literature review focusing on indigenous-led river restoration. This led us to a desire to survey a river for a local tribe, in the hope that our project work may support their restoration work. As such, our process attempted to practice community respect, with consideration given to common issues of research extraction and data privacy. Due to the duration, timeline, and scope of the project, this process was quite oversimplified.

Identifying a site and community was the first step in the process. We first met with Yael Perez, Director of DevEng Programs at UC Berkeley's Blum Center for Developing Economies, and Alan Waxman, Landscape Architecture PhD candidate at UC Berkeley, to discuss the scope of our project, and determine potential collaboration opportunities. Yael and Alan then proposed working with the Pinoleville Pomo Nation (PPN), as they have an ongoing relationship with them.

Ahead of the introductory meeting with PPN representatives, site and community research was conducted from available online resources. This research was focused on understanding the history, culture and ongoing work of the PPN, in addition to studying the creek itself.

Visiting with the PPN

Our first visit with the PPN was intended to get to know one another, and better understand both the place and PPN's ongoing stewardship. We were greeted by PPN Environmental team members, who then spoke of their practices and perspectives, and took us along the creek.

A main focus of this visit was to understand if there was an opportunity for work within our project scope to be conducted, if so, to ask permission to do so. Another goal of the visit was outside of this specific project's scope, and focused on understanding how a longer-term relationship of support could be established between the project team and PPN, under the guidance of Yael Perez and Alan Waxman. The scope and site of the surveying was determined, and a plan for PPN's review of research was established.

Watershed Analysis

We drove around the Ackerman Creek watershed to briefly study and document the conditions. We followed Orr Springs Road upstream into the mountains. Downstream, we attempted to reach the confluence with the Russian River, but were unable to due to limited public access. We were also taken to the check dam and fish ladder just downstream of the N. State St. crossing.

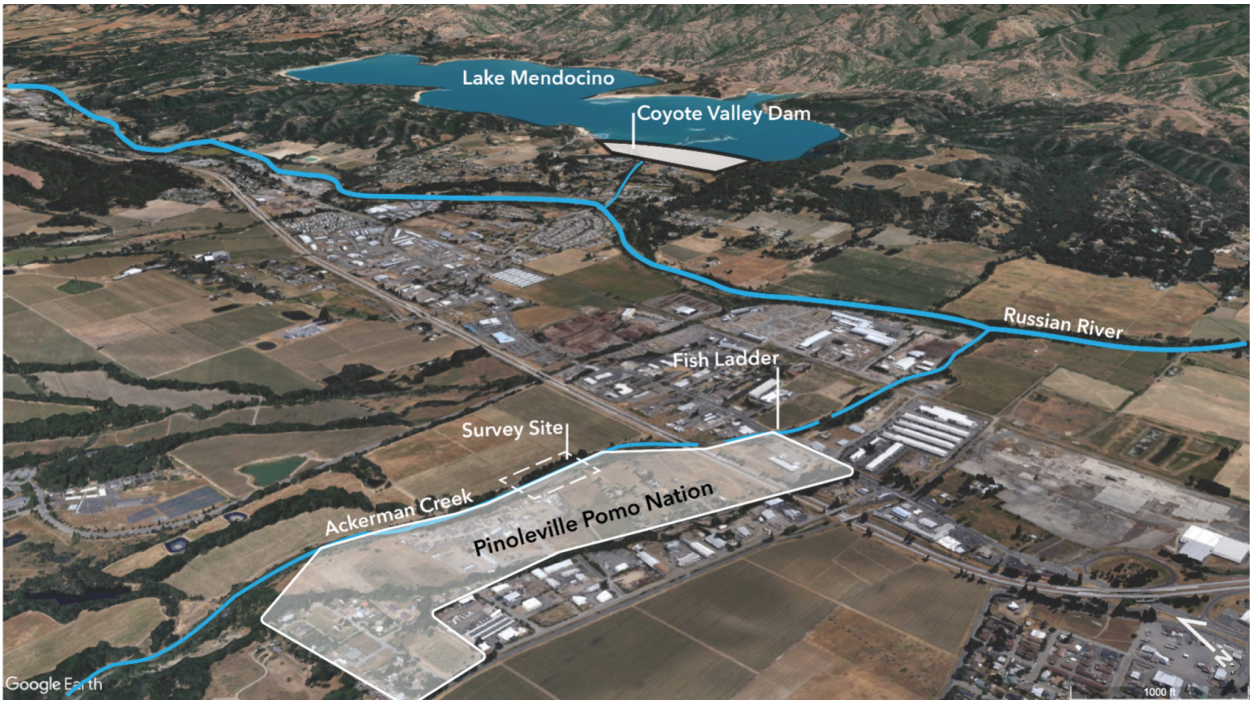

Figure 3. PPN boundary, survey site, and immediate context.

Site Survey

Site selection for the survey was chosen based on PPN interest and physical accessibility of the creek. The exact cross-sections were chosen to demonstrate varying channel characteristics, but the extents were limited by vegetation and property ownership. We did not remove any vegetation, so it was important to select areas with clear sightlines. Specific instructions were given to stay within the streambed on the North side of the creek, and within the South side of the bank when outside of their property.

Section locations within the survey area were chosen based on variation in creek characteristics. Three cross-sections were conducted using a dome-head tripod and level, 100-ft tape measure, and a telescoping survey rod with 0.1' graduations. It was decided that GPS points, rather than permanent stakes, were to be used to record the ends of the cross-sections. GPS Tracks was used to pinpoint key locations.

In all three cross-sections, the instrument was located on the south side of the creek, as far up the berm as feasible for a clear line of sight across the creek. On the North end, the cross-sections were forced to stop once met with dense vegetation or the property edge. The cross-sections do not go up the North bank. Once the creek bed was surveyed, the instrument was rotated approx. 180 degrees to survey up the South bank. In Sections 1 & 2, the survey was conducted to the top of the berm on the South bank. In Section 3, the survey was stopped before the top of the berm due to dense vegetation. Additionally, channel features maps and annotated sections were also sketched. Photographs were taken.

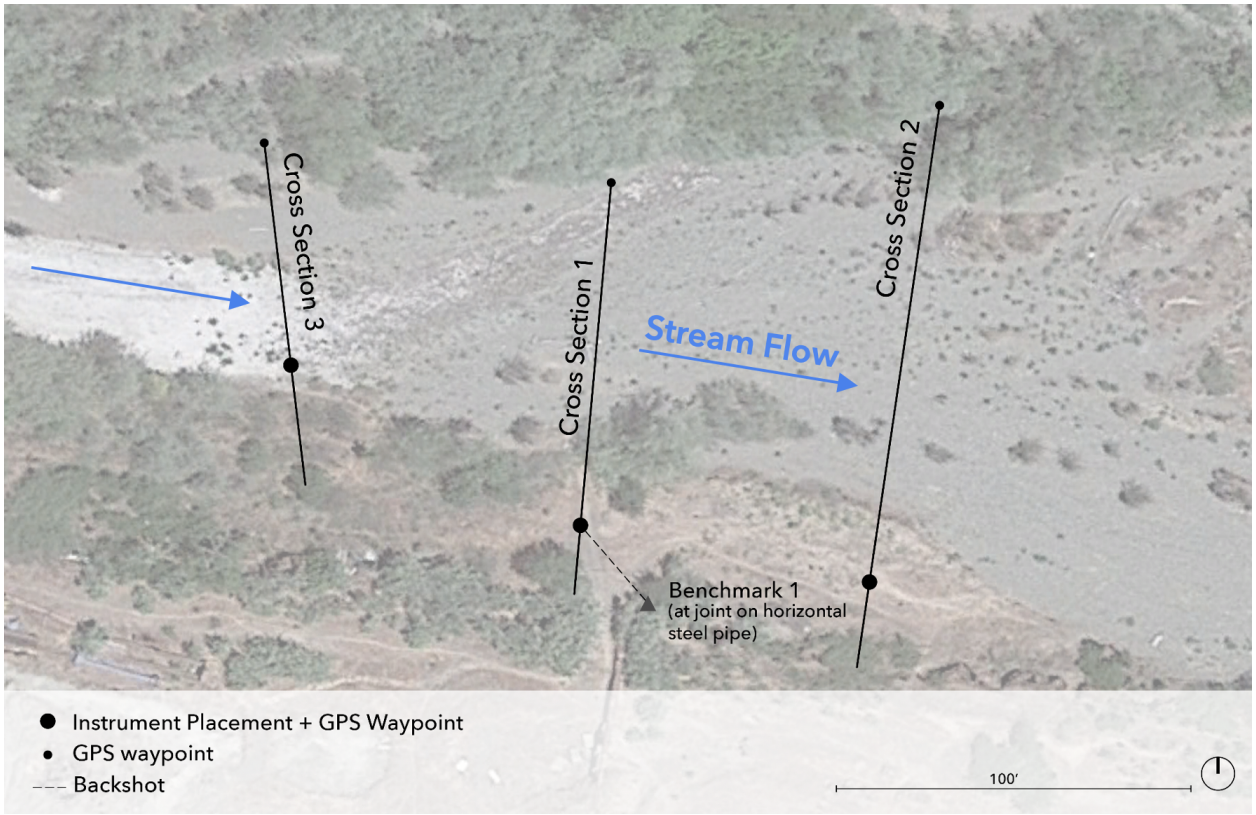

Figure 4. Survey lines, backshots, and station locations.

Data Analysis

Surveying data from a field notebook was transcribed and organized in Microsoft Excel. GPS data was extracted to Microsoft Excel, and refined. Section cut lines were drawn in Rhino based on the station point locations, heights, and relative distances. A presentation summarizing the work was made in Google Slides. All data (surveying data, gps points, images, etc.) and reports were uploaded to Google Drive to be shared with the PPN.

Results

Site & Community Information

The Pinoleville Pomo Nation is located approximately 5 miles north of Ukiah, in Mendocino County. The Nation is located in the low-lying adjacent flatlands south of Ackerman Creek, which runs along the north edge of their property. The Northern Pomo name for the creek is Ya-mo-bida (wind hole creek), which refers to the persistent winds coming out of the canyon. In this reach, a large ditch and constructed berm line the south side of the creek. The berm is

reinforced with jack lines and wrecked cars, which was a recommended practice by the US Department of Agriculture in the mid-20th century.[20]

Figure 5. Wrecked cars as reinforcement on south bank

Ackerman Creek is approximately 14 miles long with a drainage basin of 22 square miles. It starts in the Redwood and Douglas fir forests at about 2,200 ft in elevation. The confluence with the Russian River is at 595 feet in elevation. The creek was mined for gravel upriver of our site, at Masonite Road, and downriver of our site, at the confluence with the Russian River.[21]

[20] Kondolf, "Overview and History of the Russian River Watershed."
[21] Miller and Christian-Smith, "Ackerman Creek Channel Enhancement Post Project Appraisal: Channel Response to High Winter Flows."

Figure 6. View of the North side of Rancheria. This is the site of the former auto wrecking yard. Ackerman creek lies beyond the constructed berm seen in the background.

Figure 7. View looking upstream (west) from south berm. Ackerman creek on right and PPN on left.

After passing through the current Rancheria property boundaries, the creek is bordered by mostly industrial activities, with some agricultural and commercial as well. Around 1,000 ft downriver of the studied site, Highway 101 crosses the creek. Two additional road crossings, N State St. and Hollow Tree Rd., as well as one potentially decommissioned railroad crossing,

adjacent to Hollow Tree Rd., pass over Ackerman Creek before its confluence with the Russian River.

Watershed-scale factors

The Russian River watershed has been impacted by over a century of channelization, damming, diversion, and gravel mining. In-channel sand and gravel mining began in 1940, focused mostly between Healdsurg and Ukiah,[22] just downstream of the Ackerman Creek confluence. In 1981-1990, ten million tons of gravel was mined from the river, causing in-channel erosion and headcuts, which continue to migrate upstream, and has lowered the riverbed 20 to 50 feet in some areas.[23] In 1958 the Coyote Valley Dam was completed, damming the East Fork of the Russian River,[24] which is upstream of the Ackerman Creek confluence. The dam blocks the transport of sediment, compounding the impacts of gravel mining.[25] The removal of gravel, sediment starvation, and resulting incision further reduces base flows in the tributaries by lowering the water table.[26] There isn't necessarily less water, but a greater portion flows underground instead of on the surface. Small scale diversions also have a cumulative effect on reducing summer flows. A collective effort to plan and coordinate a strategic diversion of higher, winter flows would be necessary to regulate the surface water diversion, and more effective than channel enhancements.[27]

The Russian River watershed, which includes several alluvial valleys, is managed by a disconnected patchwork of conflicting responsibilities and priorities.[28] While the entire watershed is the ancestral homelands of many tribes, federally-recognized tribal lands make up just 0.078% of the watershed's total area.[29] There is only so much land that any tribe can physically access and restore.

Within the Ackerman Creek watershed, there is a check dam and fish ladder on the downstream edge of the PPN's property. When the North State St. Bridge was constructed in 1965, a check dam was built on the downstream side of the support structures. This was installed to reinforce the bridge because of a head cut propagated by the lowered stream bed in the Russian River.[30] Even though the Russian River is downstream of the PPN, the lowered channel elevation caused by gravel mining, damming, and diversions in the Russian River propagate upstream. Because the check dam is an obstruction to fish passage, a Denil-type fish ladder was

[22] Mendocino County Resource Conservation District, "Russian River Integrated Coastal Watershed Management Plan." 27.
[23] Kondolf, "Overview and History of the Russian River Watershed."
[24] US Army Corps of Engineers, "Coyote Valley Dam Lake Mendocino CA (O&M)."
[25] Mendocino County Resource Conservation District, "Russian River Integrated Coastal Watershed Management Plan." 16:57.
[26] Kondolf, "Overview and History of the Russian River Watershed."
[27] Deitch et al., "Surface Water Balance to Evaluate the Hydrological Impacts of Small Instream Diversions and Application to the Russian River Basin, California, USA."
[28] Grantham et al., "A Fresh Perspective for Managing Water in California."
[29] Mendocino County Resource Conservation District, "Russian River Integrated Coastal Watershed Management Plan."
[30] North State Resources, Inc., "Ackerman Creek Bridge (No. 10C-0065) on North State Street Replacement Project." 2-3.

constructed in 1983. But this type of fish ladder is still considered a partial obstruction to fish passage. At high flows fish can not find the outlet, at low flows there is not enough volume for adult fish to swim through, and it is easily clogged by debris.[31] The PPN is also concerned about the current state of the fish ladder, which is in disrepair.[32]

Ongoing restoration

The PPN's stewardship of Ackerman Creek centers around restoring the riparian area as a thriving space that supports both wildlife and cultural practice. The PPN EPA's efforts currently prioritize invasive species removal, water quality monitoring, and native species propagation and planting.[33] In 2009, the first pilot projects for in-stream restoration were installed upstream of our study area, and focused on Steelhead trout and Chinook salmon habitat creation with log and boulder structures.[34] Additional restoration utilized over 1,500 feet of bioengineered willow and log and boulder structures.[35] These efforts intended to "create scouring pools, increase depth, catch and remove sediment from the channel, improve bank stabilization and ultimately increase the amount of suitable spawning habitat for [PPN's] yo-sha (fish) relatives."[36]

Figure 8. Willow wall installed in December 2017 for streambank stabilization[37]

Ongoing restoration efforts emphasize the removal of invasive *Arundo donax* (Giant Reed) and *Rubus armeniacus* (Himalayan Blackberry). *Arundo* forms dense stands along riparian and wetland areas where it outcompetes willow and other native riparian species for water.[38] In the Russian River watershed, Ackerman creek has one of the largest *Arundo* infestations.[39] The PPN currently uses mechanical removal, burning, and tarping tactics to eradicate *Arundo.* Many

[31] Ibid, 2-3.
[32] Pinoleville Pomo Nation, "Fieldwork Day 1: Site and Community Visit"
[33] Pinoleville Pomo Nation, "Restoration."
[34] Ibid.
[35] Ibid.
[36] Ibid.
[37] Pinoleville Pomo Nation, "Ackerman Creek Restoration Project."
[38] California Invasive Plant Council, "Arundo Donax."
[39] Pinoleville Pomo Nation, "Restoration."

PPN EPA members we spoke to shared that they are trained and certified type 2 wildland firefighters and plan to expand the use of burning in their river restoration efforts.[40] After clearing invasive species, they then plant native species propagated on the Rancheria grounds. Native plant species identified by PPN as restoration priorities included both riparian species and plants that support traditional foods and practices. These included snowberry, sedges and redbud.[41]

Figure 9. *Arundo* removal upstream of surveyed site, on south bank.

The PPN EPA's two main concerns for Ackerman Creek are water quality and volume. Members recalled much larger and more regular base flows in their lifetime, with notable salmon and steelhead presence. Today, the stream is seasonal, only flowing to connect to the Russian River during the winter and spring. However, the water table beneath the stream is still high, as evident through willow establishment.[42] Water is diverted from Ackerman Creek for agriculture. A neighboring vineyard is entitled to 300 acre feet per year, and draws surface water from Ackerman Creek across from the rancheria. Runoff from agricultural properties is a contributing factor to low water quality, though the exact composition of fertilizer, pesticides and herbicides is unknown. A auto wrecking yard used to exist along the creek, adjacent to the PPN buildings.[43] This was a site of major contamination of both the soil and the creek and an abatement order was issued by the state to the wrecking yard owners in 2006,[44] and water quality monitoring (total petroleum hydrocarbons, volatile organic compounds and heavy metals) on PPN lands and

[40] Pinoleville Pomo Nation, "Fieldwork Day 1: Site and Community Visit"
[41] Ibid.
[42] Ibid.
[43] Ibid.
[44] California Regional Water Quality Control Board North Coast Region, "Cleanup and Abatement -7- Order No. R1-2006-0036."

Ackerman Creek began in 2008.[45] As of 2021 the wrecking yard was cleaned up, with the physical debris and cars cleared from the site between the Rancheria offices and the creek.

Figure 10. Wrecking yard within PPN rancheria in 2018, with noted survey site.

Survey Results

The cross sections reveal interesting properties of this reach of Ackerman Creek. The creekbed is wide and shallow with a few subtle channels which become more apparent downstream. Cross section 3, the most upstream of the surveyed reach, is the flattest, narrowest, and least topographically diverse section of the reach. There is a subtle mound at the south bank before dropping into a consistent channel. It is only about 50' wide, although there is distinct channel formation inside the short bank on the north side. This is in stark contrast to Cross Section 2, the most downstream cross-section, which features two distinct channels and a vegetation island within the banks. The south bank itself is also slightly undercut, although this is not obvious in the survey data. Cross Section 1, between the two other cross sections is a snapshot of the geomorphological middle-ground. It shows a slight channel continuing along the north bank, and an additional channel forming towards the south bank. Cross Section 1 is about 20' wider than Cross Section 3, and Cross Section 2 is an additional 40 feet wider than Cross Section 1. All three cross sections include the creek-side of the berm reinforced by wrecked cars

[45] United States Environmental Protection Agency Region IX, "Sampling and Analysis Plan for Monitoring Surface and Ground Waters of the Pinoleville Pomo Nation."

along the south bank. Each section shows where the bank below the top of the berm, which is mounded in Cross Section 3, leveled in Cross Section 1, and eroding Cross Section 2.

The creek was dry during our first day of fieldwork and tour of the site with the PPN EPA. During our second day of fieldwork, after approximately 24 hours of light rain, water very slowly moved downstream towards our survey location. We marked two GPS points for the edge of the water at different times, and calculated that the water was filling the creek at a rate of 1.8 feet per minute. We also observed a variety of pebble sizes, though we did not conduct a pebble count. We also observed a few small frogs though exact species were not identified.

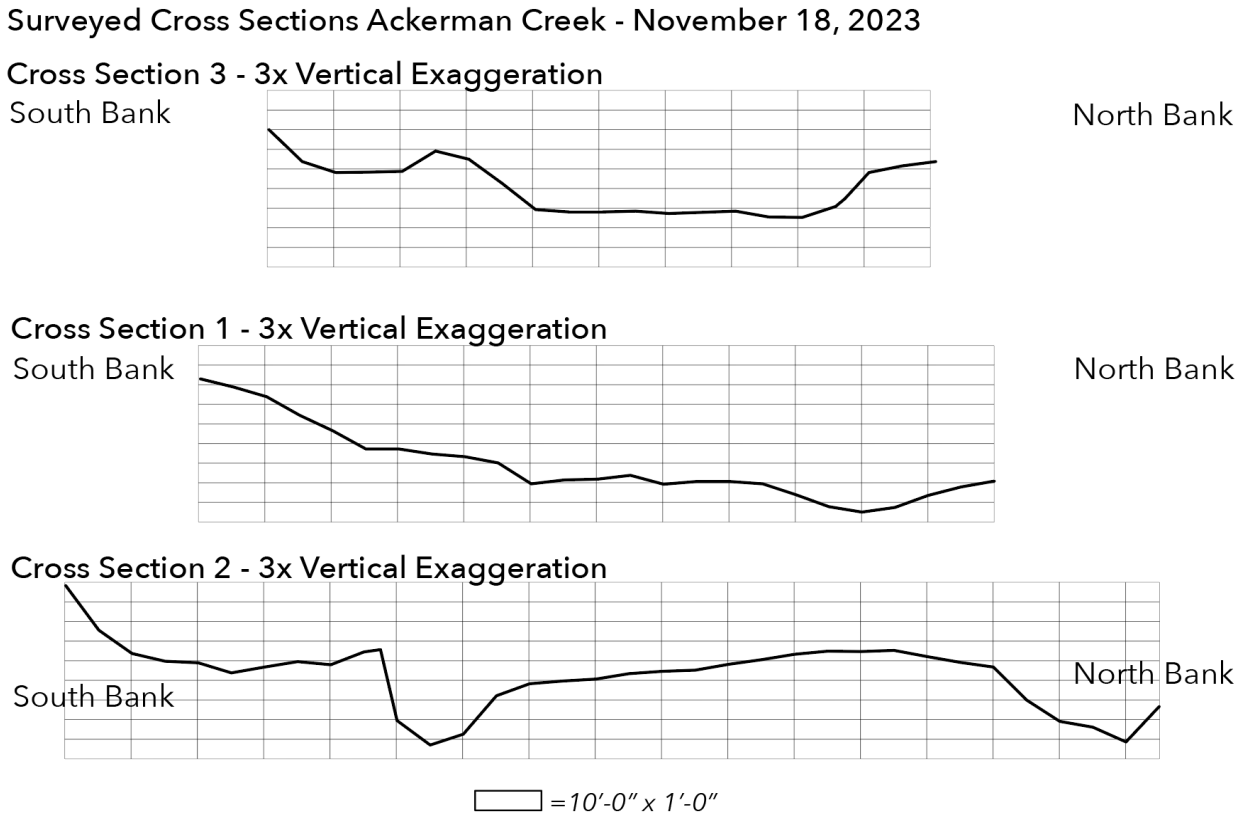

Figure 11. Vertically Exaggerated Cross Sections of Ackerman Creek, November 18, 2023. See Appendix B. for non-exaggerated sections.

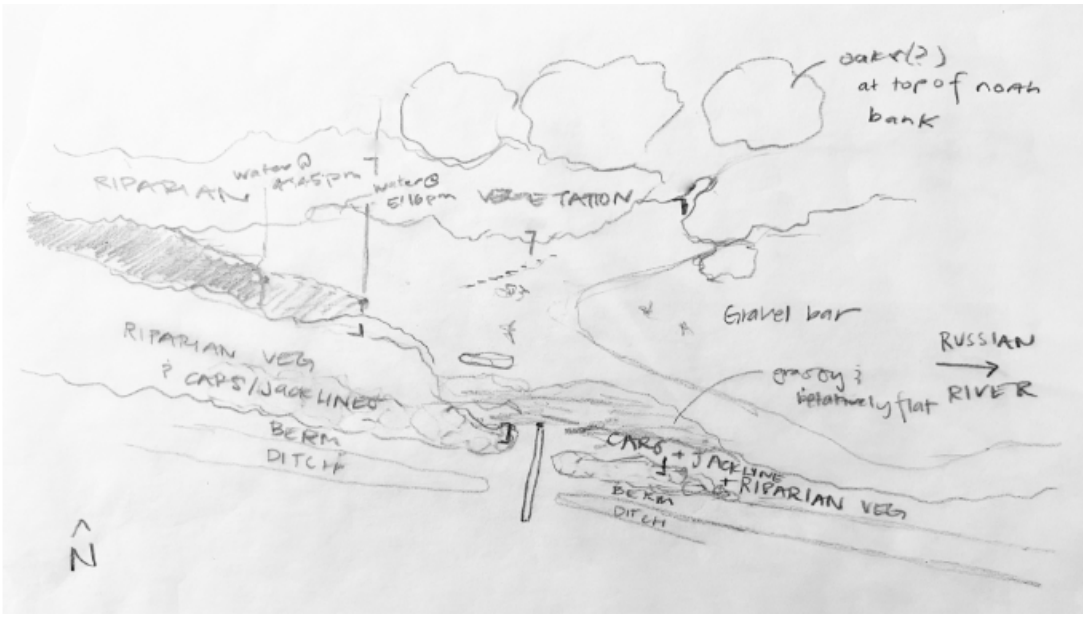

Figure 12. Plan-view sketch of survey area of Ackerman Creek, November 18, 2023

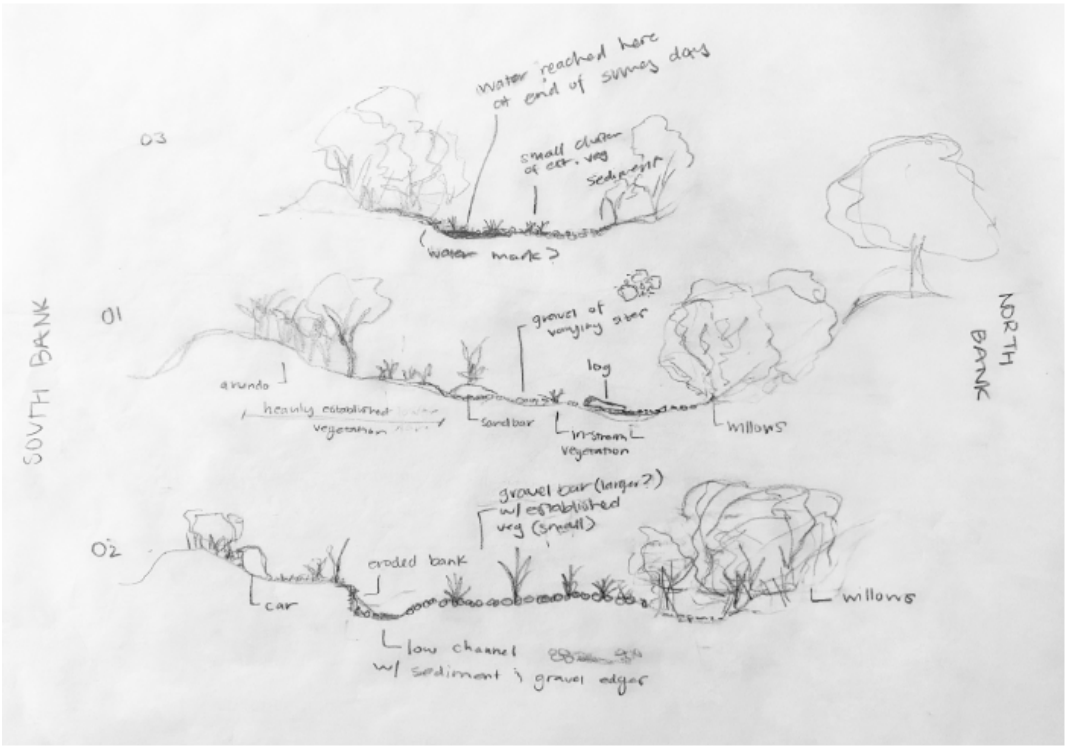

Figure 13. Cross-section sketches of survey area of Ackerman Creek, November 18, 2023

Discussion & Conclusion

According to the survey, combined with qualitative observations, it ultimately appears that this is where the creek opens up into a braided channel. As the channel widens, there is an increase in incision. The incision does not increase across the entire channel, which is relatively flat and consistent further upstream, but instead increases in narrow channels within the creekbed. The channel morphology of this reach will provide a reference point to measure (for confidential, internal use) and/or demonstrate (communicate to government organizations, or the public) how the reach of Ackerman Creek within the rancheria is impacted by activities outside of their control.

The ongoing restoration efforts done by the PPN are exemplary of many of the best practices in the river restoration field. This includes long-term monitoring, ongoing maintenance, and continuous community engagement.[46] Rather than just remove invasive species in one massive effort then replant the extents of the project phase, the PPN is continuously and incrementally managing invasive species. The restoration success is partly limited by broader watershed power structures and history, and indigenous stewardship can only go so far as the lands to which they have sovereignty. In other words, on-site improvements to salmonid habitat will not be successful without sufficient summer base flows in the Russian River, which is impacted by several diversions of surface water, damming and gravel mining.

This process inspires a number of future research opportunities. A larger scale study of the Ackerman Creek watershed would be useful, including creek and surface runoff flow and water quality monitoring, a detailed study of agricultural use, water rights, and diversions (both upstream and downstream). It might also be beneficial to quantify the volume and timing of water needed for successful riparian corridor restoration. This could also include a smaller-scale stormwater management plan, examining how the local-scale topography and reinforced berm affect stormwater flows into the creek and groundwater. It's possible that the undercutting of the bank seen in Section 2 could eventually undermine the berm, and increase flood risk. A more in-depth assessment of floodplain morphology and flood risk would be helpful, especially as climate change causes increasingly fluctuated precipitation patterns. A pebble count is another opportunity for future research, especially in measuring the suitability of salmonid spawning and potential changes to sediment flow. Documenting oral history along with additional mapping could help inform a historical ecology that would necessarily include intergenerational stewardship. The PPN is also interested in creating a scaled physical model of the creek to design and communicate restoration projects.[47]

[46] Pinoleville Pomo Nation, "Fieldwork Day 1: Site and Community Visit."
[47] Ibid.

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Figure Captions

Appendices

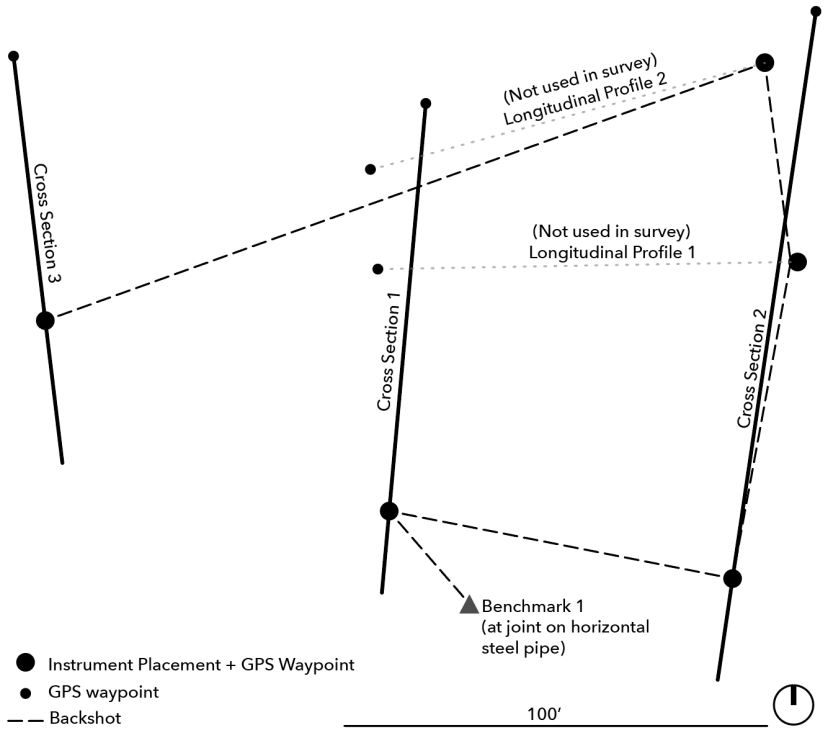
Appendix A: Cross-Section Station Coordinates
Appendix B: Cross-Sections

Appendix A: Cross-Section Station Coordinates

Cross-Section 1: Station 1A (39.18162 °N, -123.216533 °W), Station 1B (39.181891°N, -123.216501°W)

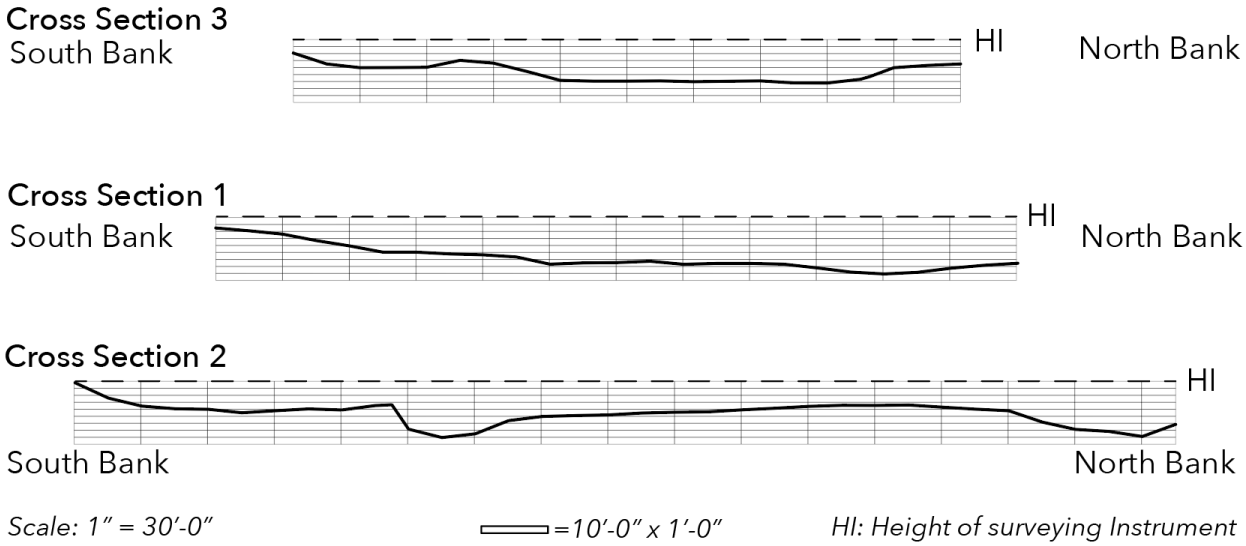
Cross-Section 2: Station 2A (39.181573 °N, -123.216231 °W), Station 2B (39.1819251°N, -123.216172 °W)

Cross-Section 3: Station 3A (39.181747 °N, -123.216827 °W), Section 3B (39.181896°N, -123.216851 °W)



Appendix B: Cross-Sections

Surveyed Cross Sections Ackerman Creek - November 18, 2023



Scale: 1" = 30'-0" *=10'-0" x 1'-0"* *HI: Height of surveying Instrument*