KARUK DEPARTMENT OF NATURAL RESOURCES
Píkyav Field Institute

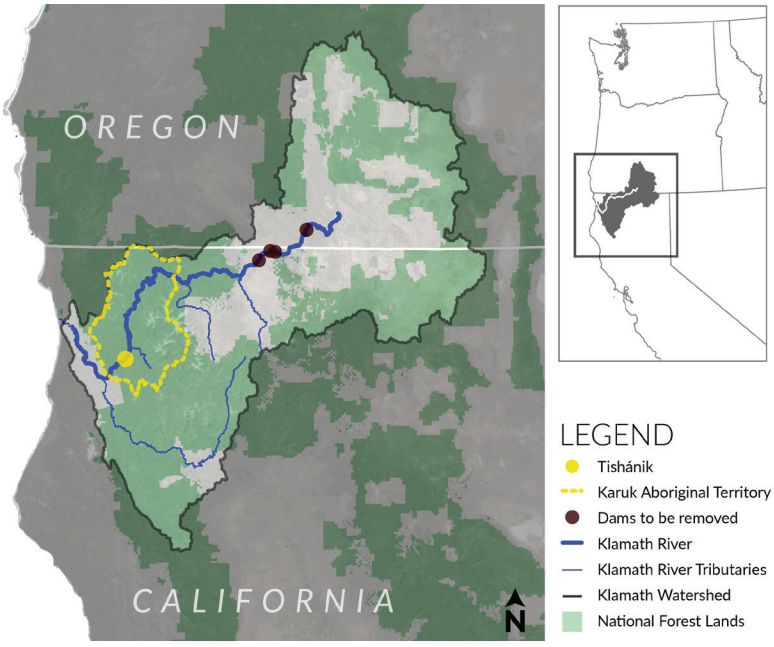
Tishánik Ecocultural Revitalization Briefing Document
December 2021

SITE OF KARUK IMPORTANCE

Tishánik is a ceremonial site, a prominent Karuk traditional village, and a gathering and fishing site that Karuk tribal people have actively inhabited, used and stewarded since time immemorial. Even during the height of the Gold Rush and its associated threatening provocations, Karuk people continued to live at the village and conduct píkyavish (World Renewal) ceremonies. Over the past three decades, Karuk families have fought to reclaim its unceded land rights and revitalize Tishánik, an area severely impacted by mining and subsequent decades of settler abandonment, all the while performing its annual place-based traditional ceremonies. The Karuk Tribe ultimately succeeded in purchasing the sacred site in 2015. Karuk families continue to tend and harvest its resources throughout the year, as well as hold **píkyavish** there each year. Basketweavers, fishers, fire practitioners, youth, and other Karuk community members have distinct visions for its future. Nevertheless, all converge around the goal of revitalizing the area in order to exercise traditional land management practices. Reconnecting the floodplain is a shared goal and will support Karuk resurgence by increasing opportunities for the intergenerational transfer of knowledge surrounding cultural burns, coppicing, and other traditional management practices.

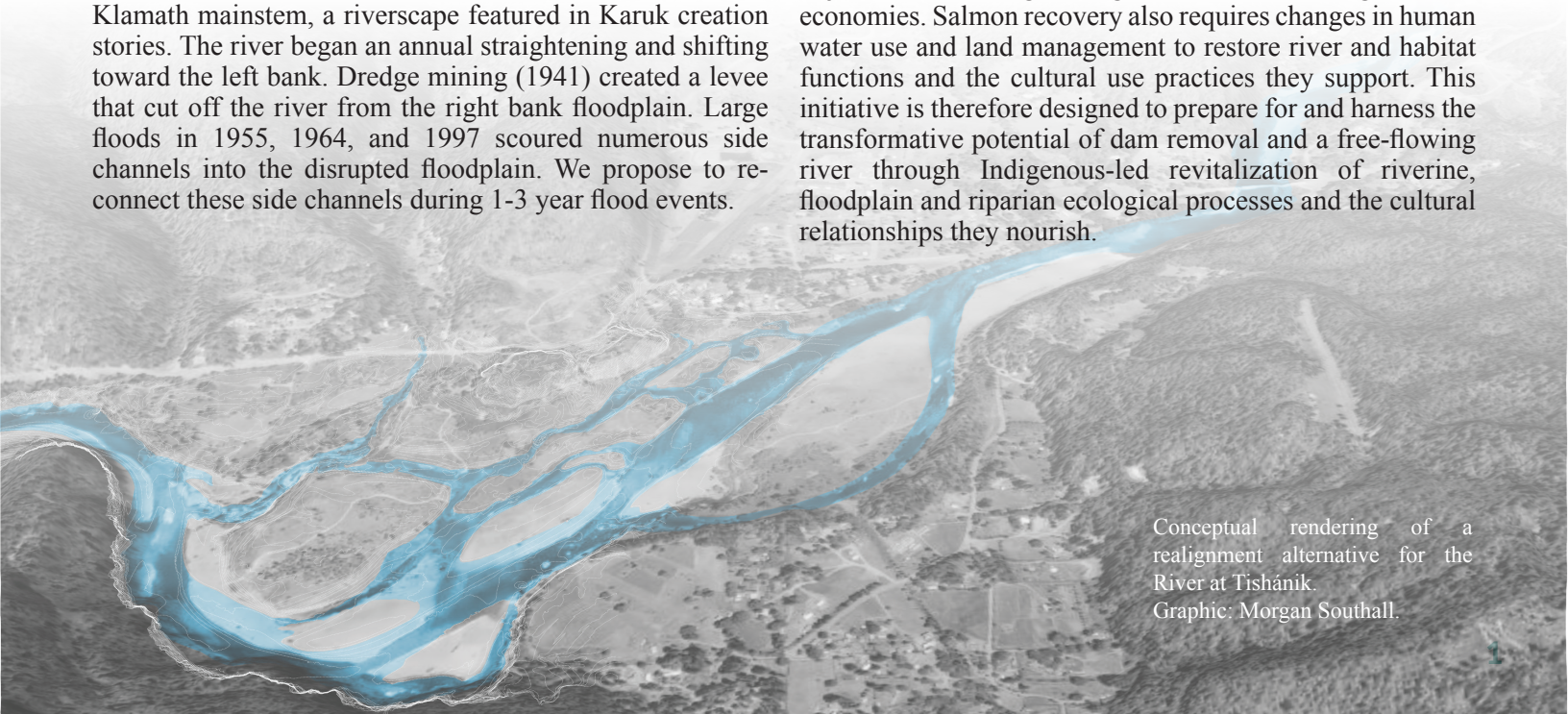
SITE CONTEXT AND TIMELINE

After the discovery of gold in the Salmon River in 1851, extensive placer deposits near Orleans attracted a large population of miners/colonizers by 1852. Hydraulic mining at Tishánik (~1887-1912) removed a hillslope and bedrock formation that had previously created an S-bend in the Klamath mainstem, a riverscape featured in Karuk creation stories. The river began an annual straightening and shifting toward the left bank. Dredge mining (1941) created a levee that cut off the river from the right bank floodplain. Large floods in 1955, 1964, and 1997 scoured numerous side channels into the disrupted floodplain. We propose to re-connect these side channels during 1-3 year flood events.



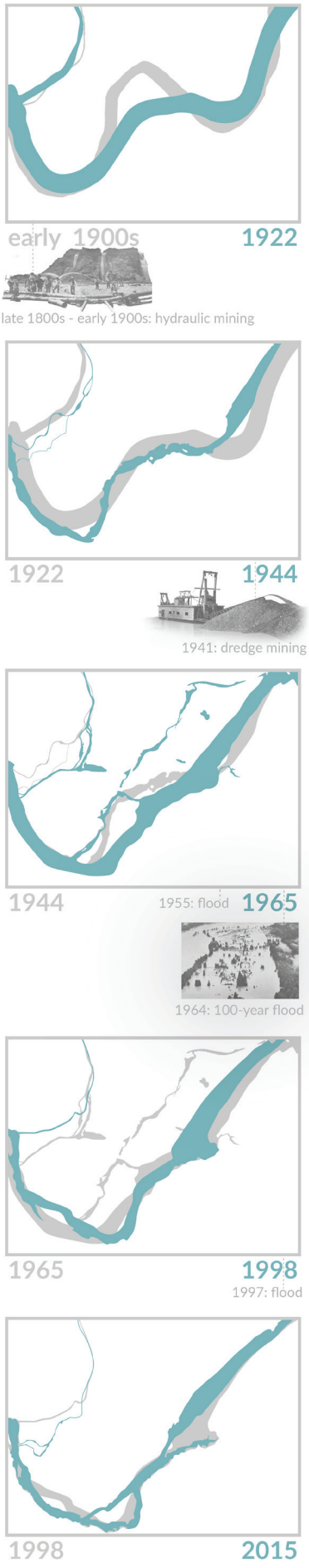
Graphic: Ry Yahn

The planned removal of four dams on the Klamath in 2023 will potentially catalyze one of the largest-scale river restoration projects ever undertaken. However, without Tribal-led research and restoration of floodplains and riparian areas along the mainstem corridor, or the right collaborative networks in place to coordinate studies and connect researchers to Tribal community leaders, this restoration effort will not adequately support Karuk research priorities or local economies, much less benefit Tribal youth and elders. Dam removal alone is rarely sufficient to reverse trajectories of ecological degradation and build regenerative economies. Salmon recovery also requires changes in human water use and land management to restore river and habitat functions and the cultural use practices they support. This initiative is therefore designed to prepare for and harness the transformative potential of dam removal and a free-flowing river through Indigenous-led revitalization of riverine, floodplain and riparian ecological processes and the cultural relationships they nourish.



Conceptual rendering of a realignment alternative for the River at Tishánik.
Graphic: Morgan Southall.

A CENTURY OF DISTURBANCE: MINING IMPACTS



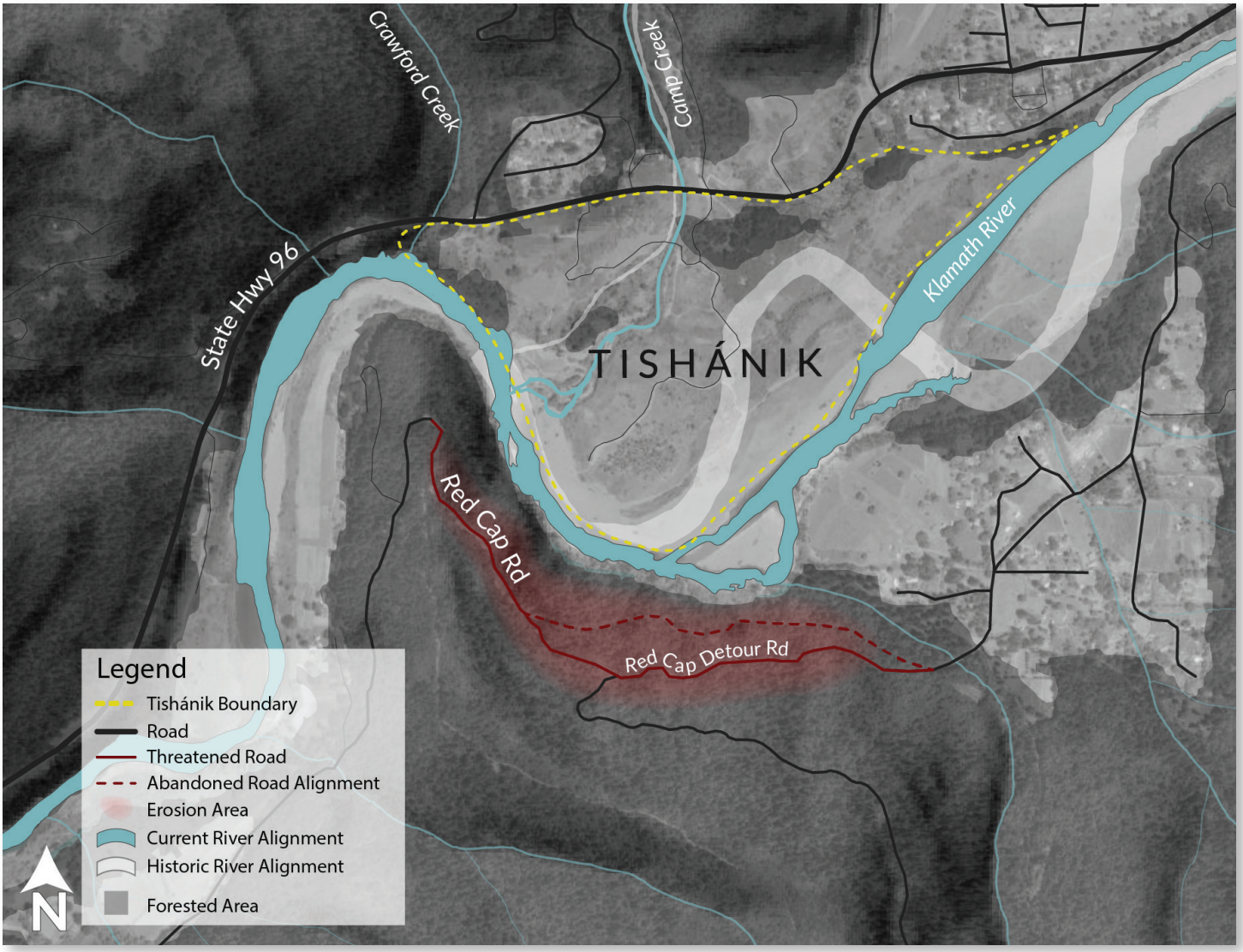
Left: Timeline showing changes on river. Above: Proposed restoration would reconnect the 3-5 year floodplain so that it is active during a 1-2 year flood. Source: ESRI, Karuk DNR, Leaf Hillman. Graphics: Ry Yahn.

ECOLOGICAL AND SOCIAL IMPACTS FROM MINING

Dredge mining disrupted hydrologic and sediment transport processes, turning a boggy, heterogeneous wetland floodplain supporting complex riverine, riparian and floodplain habitats into dry, rocky and barren mounds. Between these mounds, high-water side channels flood every 3 to 5 years, but never experience the scouring flows needed to renew willow growth. A levee constructed on the right bank during the dredge-mining era has further restricted the floodplain from the main river channel. Mining impacts compounded floodplain and stream desiccation, exacerbated by cultural fire suppression and the extirpation of ecosystem engineers such as beavers. As the water table dropped, cottonwood, alder, and other gallery forest species died, reducing beaver forage and needed summer shade to maintain thermal refugia. In addition, warming river temperatures and reductions in overall water quantity and quality threaten the river's geomorphology and the healthy livelihood of riverine species. This has resulted in the degradation of ecocultural functions related to the floodplain. Riverine species, e.g. salmon, benefit from complex habitat, which provide food, shelter, and thermal refugia, as well as refuge from high flows. Riparian species, such as *Salix spp.* (**kufipnára** or willow) and *Castor canadensis* (**sahpihnîich** or beaver), also benefit from complex habitats, particularly those with dynamic flooding regimes. These species play important roles within the riverine ecological system, as well as within the Karuk Tribe's ongoing cultural practices and oral traditions.

Reconnecting the Klamath River side channels and increasing connection between **tishaníhthuuf**, or Camp Creek, and its floodplain is the first step in reversing this process of degradation. Once side channels flow seasonally and floodwaters can spread out across the river bar, water tables will rise, gallery forest species will recruit, and native riparian species such as beavers will be able to return, creating dams that store yet more water and provide critical rearing habitat for endangered coho, chinook and steelhead.

A HUNGRY RIVER: EROSION, PUBLIC SAFETY AND LAND LOSS



Erosion on Red Cap Road. Source: ESRI, Karuk DNR. Graphic: Ry Yahn.

PUBLIC SAFETY

Due to mining impacts, the full force of the current river flow is directed squarely at the left bank, destabilizing Red Cap Road. Red Cap Road is the sole critical ingress/egress road for approximately 60 households on the left bank of the Klamath River, as well as access to the high country and alternative route to Highway 96 and beyond. The roadbed has failed on three previous occasions requiring realignment. Between Mile Marker 1.6 and 2.7 the force of the river is undermining the toe of the slope increasing the extent of the slope failure. The confined river channel is also meandering eastward, and eroding tribal housing land.

By creating side channels and reconnecting the floodplain along the right bank of this section of the river, we expect to redirect some of the river's energy, potentially relieving some pressure from the bank and hillslope below the road and tribal housing.

MODELING APPROACH

One approach to model hillside erosion is to use historical flow data and depth data to calibrate a hydrodynamic model of the river-bend flow patterns to estimate the shear stress on the hillside during high-flow events. We can then compare this to modeled shear stress under floodplain reconnection during those same flow events. To estimate erosion frequency and the mass of eroded sediment during erosion events, we can compare modeled shear stress with critical-shear-stress numbers calculated elsewhere along the Klamath. This will be combined with local knowledge of when visible erosion events have occurred to calibrate the erosion model with historical flow data.

ECOLOGICAL RESTORATION OPPORTUNITIES

RESTORATION OBJECTIVES

- Deconstruct the levee currently preventing river channel migration
- Increase frequency of lesser intensity flooding through the floodplain
- Encourage complex riparian habitat and dynamic processes
- Create year-round refugia for riverine species
- Encourage conditions which promote growth habits of Karuk focal species
- Encourage the repopulation of native species

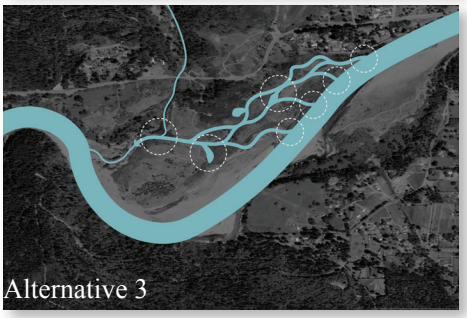
Meetings and workshops with project collaborators and community members guided the development of several alternative floodplain reconnection designs. These design recommendations will be further explored using hydrodynamic modeling methods to better determine their effects on the floodplain and riverscape.

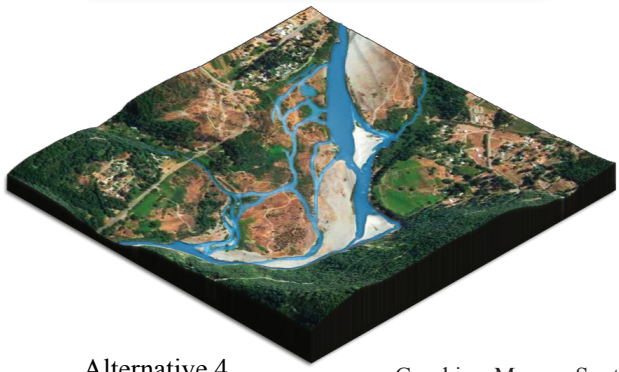
Alternative 1: This design alternative focuses on creating a single side channel connected to the river's main channel at the upriver end of Tishanik's floodplain. The proposed side channel is identified based on an existing high-water channel, available data, and local anecdotes. The existing levee currently cuts off the high-water channel from receiving channel flow, only receiving water as backflooding or during extreme flooding events. The design interventions include lowering the channel by excavating mine tailings, adding alcoves, woody debris, and riparian plantings, and removing a single section of the levee in order to encourage more frequent flooding and scouring.

Alternative 2: This design alternative focuses on the river bar along the left bank of the riverscape. Anecdotal stories relay that there was a previously existing side channel along this bank, where salmon were commonly found. Recreating this side channel, and adding woody debris and riparian vegetation, may reduce the energy and channelization of the main river channel and encourage the (re)establishment of riparian species.

Alternative 3: Similar to Alternative 1, Design Alternative 3 leverages existing high-water channels within Tishanik's floodplain. However, for this alternative, multiple side channels would be excavated out, and multiple sections of the levee would be removed to provide multiple access points for channel flow and encourage more complex habitat development and riparian function. Design interventions would include lowering the existing side channels by excavating mine tailings, adding apex log jams, boulder weirs, woody debris, alcoves, and riparian vegetation before removing several strategically located sections of the right bank's levee.

Alternative 4: Alternative 4 is the preferred alternative and was developed from workshopping the initial three design alternatives. This design alternative includes many of the same interventions as Alternative 3, however additional design interventions were added based on discussions from a July 2021 workshop. The additional design interventions for Alternative 4 include adding an off-channel pond, excavating additional connective side channels, strategically locating beaver dam analogs, and removing the entire levee. These additional design interventions would encourage a more complex habitat development, as well as encourage the reestablishment of *Castor canadensis* (**sahpihnîich** or beaver). With these interventions, the floodplain would receive more frequent flooding and scouring, offer year-round riverine and riparian refuge, encourage the revitalization of native species, raise the floodplain's water table, and reduce erosive energy within the main channel.

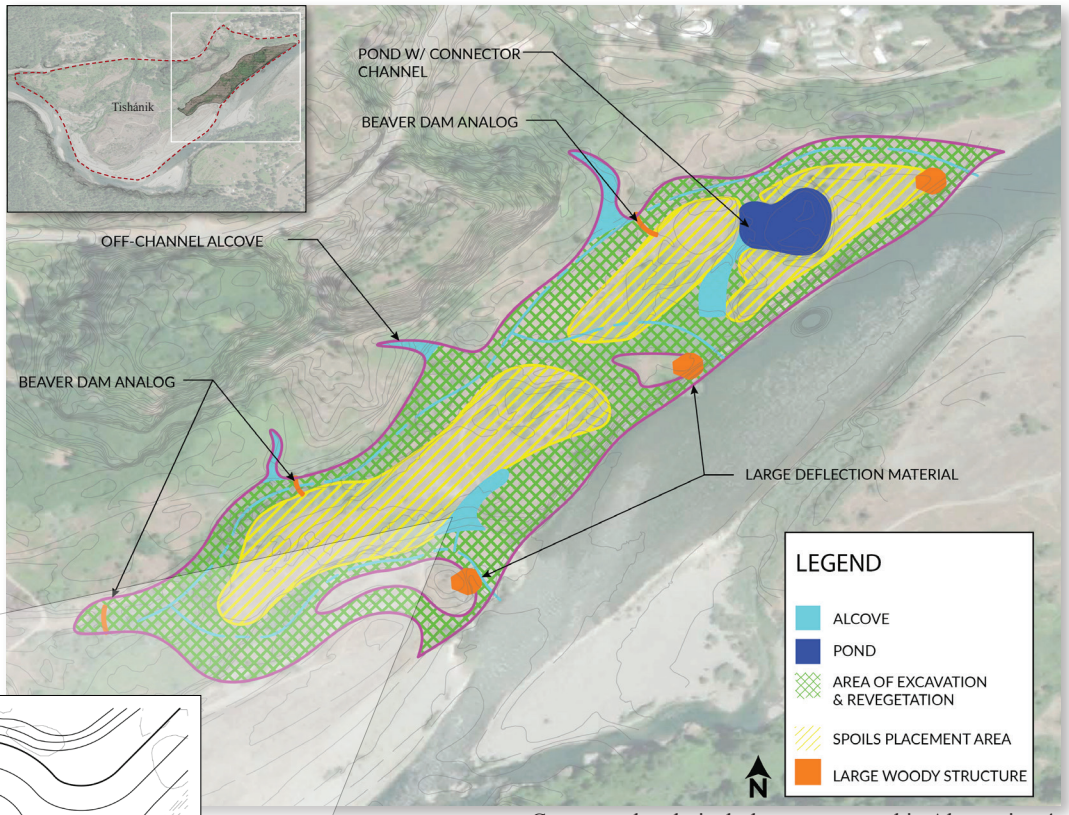




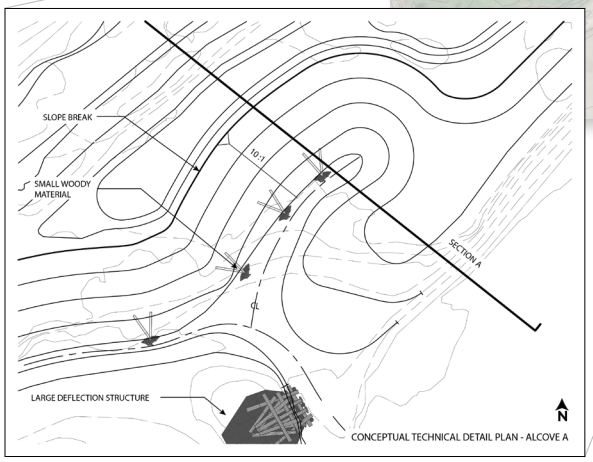
Alternative 4

Graphics: Morgan Southall.

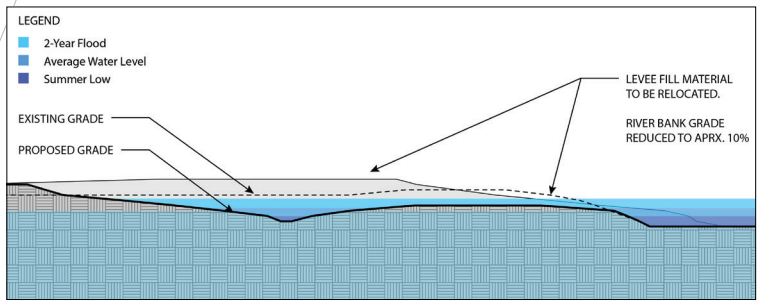
ECOLOGICAL RESTORATION OPPORTUNITIES



Conceptual technical plan as proposed in Alternative 4.



Alcove detail grading in plan view.



A section view of the alcove detail. Graphics: Morgan Southall

PHASING

Several locations have been identified as points to initially break through the reinforced bank, with the goal to completely remove the constructed levee and reallocate the tailing material in the future. The process of deconstructing the reinforced bank would likely need to be done in phases. These phases can also be used to monitor the river's changing condition and health, including aspects such as plant communities, animal communities, and human use.

PREPARATORY EXPLORATIONS

Before deconstruction of the levee can begin, it will be necessary to assess hydro-geological conditions during an exploratory phase. Strategically placed groundwater wells across the floodplain will measure and confirm groundwater levels throughout the water year. Surface water levels will also be monitored along the right bank of the Klamath River to identify specific water levels throughout the year.

Several geological formations also exist within the floodplain; these may be useful for the purpose of anchoring large woody structures and may need to be investigated further. It should be explicitly noted that critical to this preparatory exploration is communicating and working with property owners on both sides of the river on potential restoration plans as well as performing the appropriate erosion modeling mentioned above.

SITE ACCESS & MONITORING

Throughout the levee deconstruction and floodplain restoration process, the floodplain and adjacent river will need to be monitored for physical and biological conditions such as sediment load, nutrients load, oxygen, vegetation health, fisheries health, and available use by the Karuk Tribe.

The project site is an active place of cultural practice, and therefore timing of restoration phasing will need to be determined by the Karuk Tribe as described below. Priorities and restoration actions must be respectful of ongoing cultural activities, as well as the health and ongoing needs of species currently occupying the floodplain.

KARUK ECOCULTURAL REVITALIZATION INITIATIVES

FLOODPLAIN RECONNECTION

By removing the levee, the floodplain can once again be accessed by the Klamath River's main channel. This would encourage side channel and complex habitat development by allowing dynamic processes such as scouring, deposition, and sedimentation to occur throughout the floodplain. The current conceptual design breaks though the existing levee and features multiple side-channels and alcoves, BDAs, and culturally appropriate plantings.

STRATEGIC PLANNING

Tishánik, purchased by the Karuk Tribe in 2015, is a focal area for the Karuk Tribe's strategic planning, which involves purchasing riverine and upland properties of ceremonial and eco-cultural significance, developing eco-cultural restoration strategies, testing and implementing these strategies, and developing workforce training programs and permanent jobs for tribal members in ongoing stewardship projects. This work aligns with the goals and priorities the Karuk Tribe's Eco-cultural Resource Management Plan (2011) and Climate Adaptation Plan (2019) for revitalizing riverine and riparian habitats within Karuk Aboriginal Territory through Karuk-led planning and design to support ecological functions and cultural resource uses for the Karuk People. This restoration work also aligns with federal and state strategies such as the North Coast Climate Plan, Southern Oregon/Northern California Coho Strategy and the USFS Land & Resource Management Plan/Northwest Forest Plan.

INTERGENERATIONAL KNOWLEDGE SHARING

As part of the adaptive co-management eco-cultural restoration process, the Píkyav Field Institute, Karuk cultural practitioners, and the University of Washington F.R.E.S.H. Water Relations Lab will continue to develop a high school internship and college-credit field curriculum that integrates Karuk ecocultural knowledge and Western science methods in fisheries ecology, fire ecology, wetland and aquatic habitat restoration, and spatial analysis. Key to this program is training youth in audio and video production and supporting them in applying those skills to interview elders and cultural practitioners about eco-cultural practices and goals. Youth then process and share these interviews by developing films and story maps, writing scripts, narrating, and integrating their own analysis and vision into the stories. To support this program, P.I. Morehead-Hillman is leading the development of a curriculum for local K-12 students to monitor *Salix spp.* (**kufipnára** or willow), *Berberis aquifolium* (**thithunán'aay** or Oregon grape), and *Brodiaea spp.* (**tayiith** or Indian potato); conduct stewardship activities and exchange knowledge; and harvest at cultural focal patches at Tishánik.

KARUK & WESTERN SCIENCE CO-PRODUCTION

Each summer, we will convene community workshops, featuring a community meal and presentations by Karuk experts, to tend food, fiber, and medicinal plants and build seating, water, and storage infrastructure to support Karuk community use of Tishánik. At these workshops, our team will present iterative designs and monitoring results and solicit community input on stewardship and restoration goals (e.g. increasing intergenerational knowledge exchange and food security). The finalized designs and/or plans will then be submitted to the Karuk Resources Advisory Board who makes recommendations on Karuk cultural resource issues to the larger Karuk Tribal Council.