

RESTORING RIVERS

AN INDIGENOUS-LED TOOLKIT FOR PROCESS-BASED RESTORATION
EXECUTIVE SUMMARY



ENVISIONING A RESILIENT UPPER SNAKE RIVER

It's March, and the rain has just stopped in the mountains across the Upper Snake River Basin. The early spring rain had fallen on the melting snowpack, causing it to lose its grip, thereby turning rivulets of water into streams that gather together quickly in the headwaters. In watersheds where floodplains are disconnected and beaver complexes are absent, flows like this would surge downstream unchecked, ripping out young willows, carving into streambanks, and scouring streambeds before depositing fine sediments into critical trout and salmon habitat. But, this year the water takes a different path.

Water bounces down the boulder-strewn creek into a lush meadow of grasses and a small beaver pond, before seeping into soils that have held moisture through the winter. As low-tech process-based restoration structures slow the water, the land begins to absorb it like a sponge, holding moisture on the landscape for longer periods of time. Years of investments in process based riparian restoration have paid off and as the water moves slowly downstream it sustains willows, waterfowl, trout, and the people who rely on these rivers across the reservations.



South Fork Trail Creek, Burns Paiute land, Mock Orange shrubs with willow, heavily impacted by grazing, but a good place for Beaver Dam Analogues placement. Photo taken August 12, 2025 (credit: Boyd Bouwes, Watershed Solutions, Inc.)

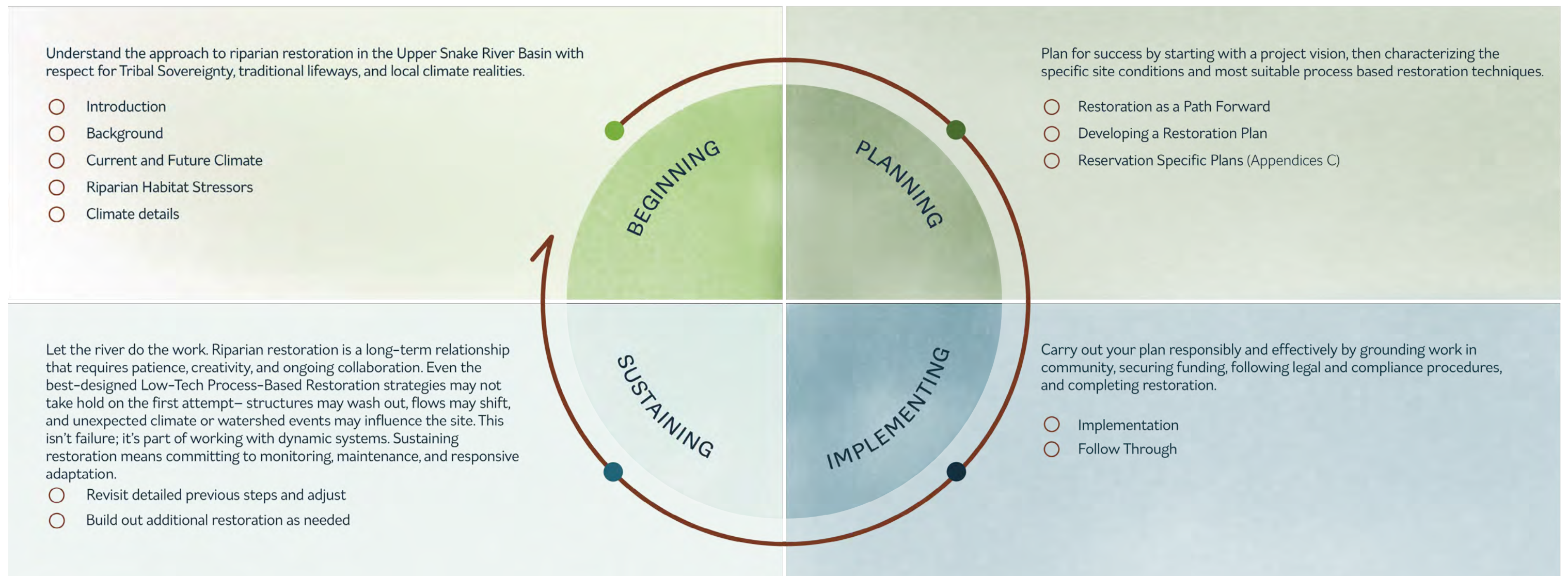
The Toolkit

The rivers, streams, springs, seeps, wet meadows, and riparian areas of the Upper Snake River Basin have sustained the Burns Paiute Tribe, Fort McDermitt Paiute-Shoshone Tribe, Shoshone-Bannock Tribes of the Fort Hall Reservation, and Shoshone-Paiute Tribes of the Duck Valley Reservation since time immemorial. These lands and waters support traditional foods, medicines, materials, cultural practices, and intergenerational knowledge sharing. Colonization, land conversion, dams, water diversion, and other development have disrupted these systems, and climate change now adds further stress by altering streamflows, raising temperatures, and increasing disturbance.

This toolkit is designed to support river, stream, and riparian restoration in the Upper Snake River Basin. It is intended as a practical, living resource for Tribal managers – whether they are stewarding lands on the reservation, on ancestral territories, or on purchased and controlled lands – to revitalize rivers and the land surrounding them in ways that align with Indigenous values, Indigenous Knowledge, and ecological science.

Whether your community is just beginning to explore the use of Low-tech Process-based Riparian Restoration or already leading projects on the ground, this guide can provide support at every stage of the process, from understanding the ecology of riparian areas to planning, funding, implementing, and sustaining restoration efforts.

The figure below highlights the four main phases of restoration as described in the toolkit: Beginning (cultural grounding, getting started, identifying climate and other stressors); Planning (identifying and planning process-based riparian investments); Implementing (carrying out the plan by securing funding and complying with laws and regulations); and Sustaining (monitoring, evaluating, and improving over time). To access the digital version, visit: <http://uppersnakerivertribes.org/projects/Restoring-Rivers>.



The Value of Process-Based Restoration

The waterways of the Snake River region have sustained Indigenous Peoples since time immemorial, providing not only food and materials for daily life but also serving as sites for ceremonies, storytelling, and intergenerational knowledge sharing. Riparian and stream restoration are most successful when rooted in an understanding of place — both ecological and cultural. This guide approaches restoration not as a fixed formula but as a process of reactivating natural functions in the watersheds that sustain Tribal lifeways.

Process-based restoration reestablishes the natural processes that shape ecosystems and reestablishes the fluvial geomorphic processes, moderating flows, and supporting plant and animal relatives. In riparian systems, it builds climate resilience by enhancing climate resilience by increasing carbon storage, improving connectivity, and expanding thermal refugia, while integrating Indigenous Knowledge to support culturally grounded adaptation.

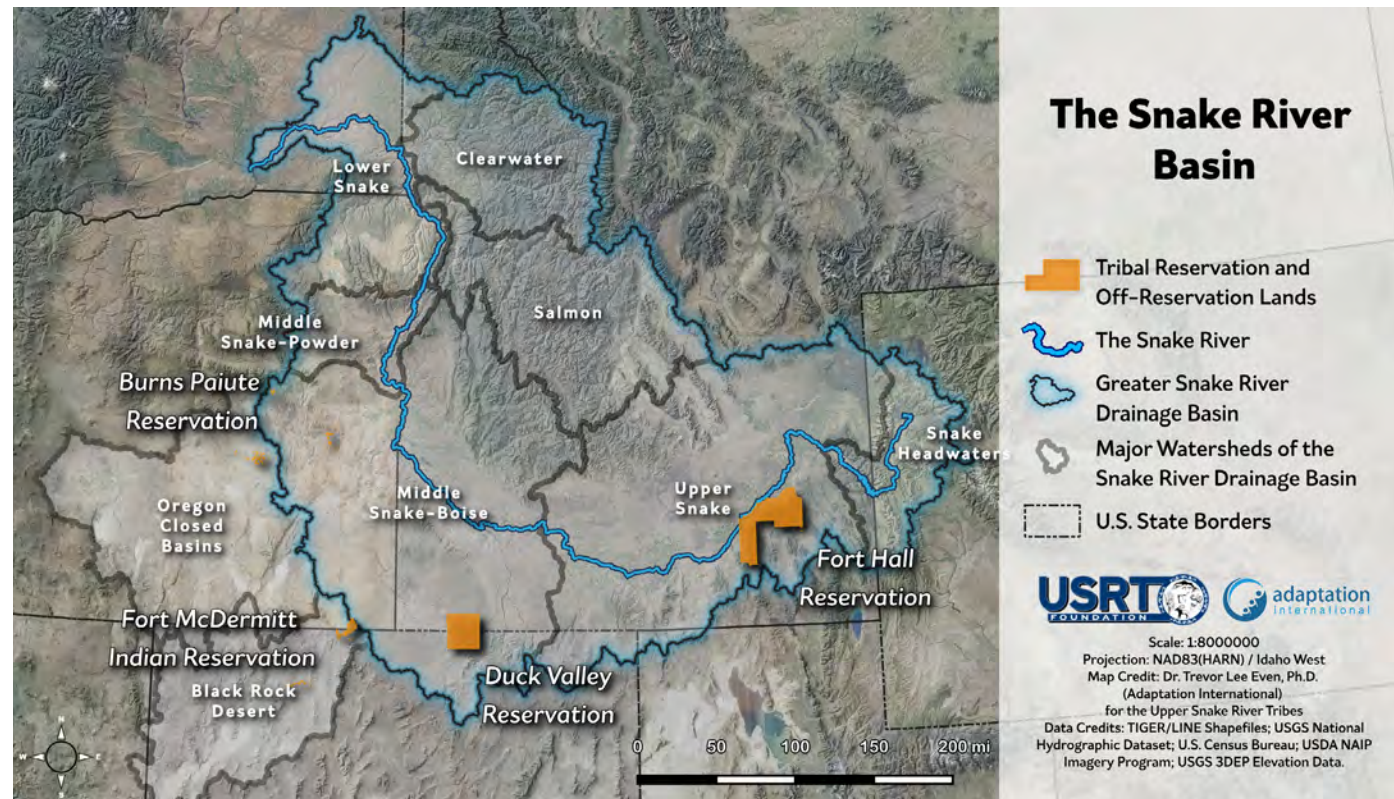


E.F. Quinn River, above the confluence of the E.F. and W.F. Quinn outside the Fort McDermitt Reservation, Photo taken July 9, 2025 (credit: Boyd Bouwes, Watershed Solutions, Inc.)

The Setting and Challenges

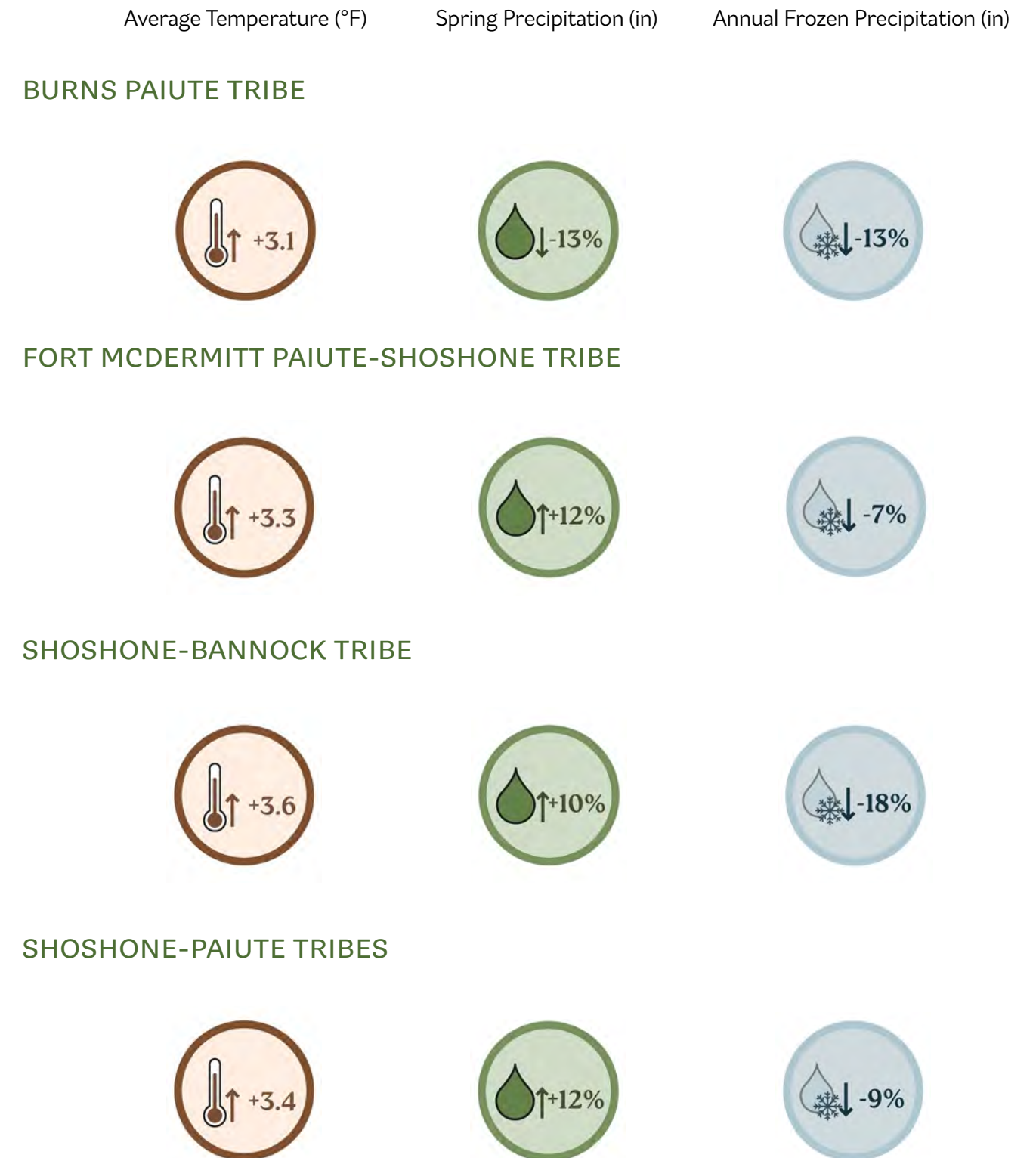
The reservations of the Upper Snake River Tribes are distributed across the states of Idaho, Nevada, and Oregon, with traditional homelands encompassing a much larger area. Each of the four reservations is generally characterized by lowland semi-arid zones, heavily human-modified landscapes primarily due to agriculture and ranching, and a distinct cold semi-arid climate with river systems relying on rainfall and snow in nearby mountainous areas.

In addition to the effects of current land use near riparian areas and streams, these ecological and culturally critical areas are being affected by a changing climate. Temperatures are projected to rise significantly in all seasons. By the 2050s (2041-2070) when today's youth are adults, average annual temperatures are expected to increase by 3.5°F to 8°F across the region. Warming temperatures will also change the water cycle in and around the reservations. Warmer winters will bring more rain and less snow, especially at lower elevations. Snowmelt will happen earlier in the year, shifting peak streamflow earlier, and reducing streamflow in areas with less snow overall. This, and enhanced evaporation, will mean less water will be available in riparian areas during the hot, dry summer months, when it's needed most.



The Upper Snake River watersheds (outlined in black with blue highlights) and the locations of the reservations for the four Upper Snake River Tribes (shown in orange), along with the Snake River (blue).

Projected Climate Trends 2041-2070



The Low-Tech Process-Based Restoration Approach

The Low-Tech Process-Based Restoration (LTPBR) approach uses simple, low-cost interventions to initiate or accelerate natural processes. The goal is to support habitat diversity and native species by using techniques that mirror natural processes and allow rivers to reestablish water flow patterns and reconnect streams. The guide also introduces Zeedyk structures as a complementary LTPBR

BEAVER DAM ANALOGUES



West Fork Bannock Creek, Fort Hall Reservation. Photo taken October 15, 2024 (credit: Boyd Bouwes, Watershed Solutions, Inc.)

POST-ASSISTED LOG STRUCTURES



Panther Creek, example of a Post Assisted Log Structure. Photo taken July 15, 2022 (credit: Boyd Bouwes, Watershed Solutions, Inc.)

technique for wet meadows, springs, and seeps. These structures help retain water, which in turn supports meadow recovery and climate resilience. Examples of key LTPBR and Zeedyk techniques are shown below.

LARGE WOODY DEBRIS



Panther Creek, example of an Large Woody Debris addition. Photo taken July 15, 2022 (credit: Boyd Bouwes, Watershed Solutions, Inc.)

ZEEDYK STRUCTURES

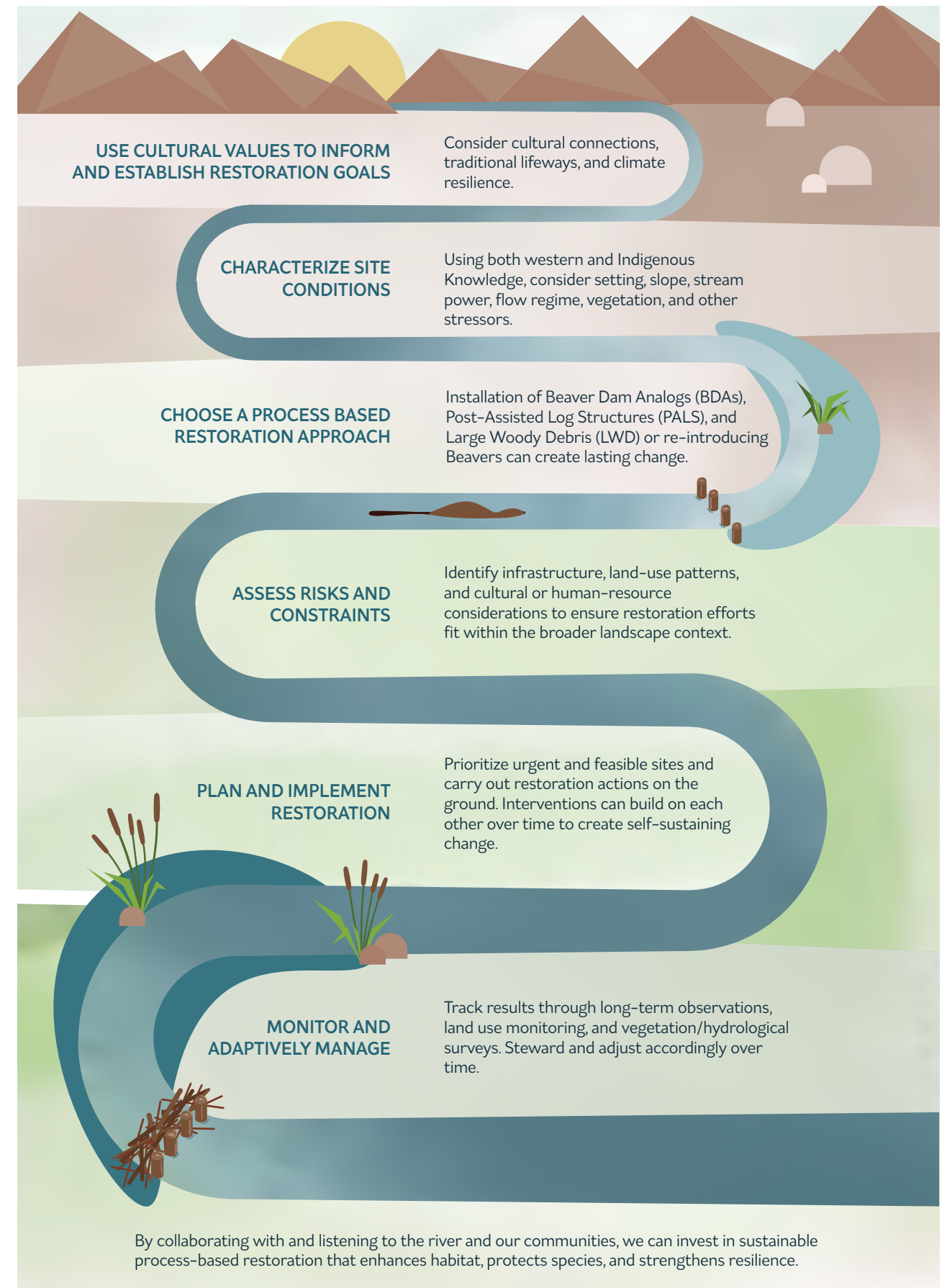


Upper Gunnison River Basin, Colorado, Zeedyk rock structures restoring an incised channel. Photo taken 2018 (credit: Nathan Seward, Colorado Parks and Wildlife).

Developing a Restoration Plan

Creating a restoration plan for riparian areas within the Upper Snake River Basin involves balancing ecological science, cultural priorities, and the realities of local land management. No two riverscapes are alike: each reflects a unique interplay of geology, hydrology, vegetation, land use, and cultural context. Restoration planning, therefore, is not about prescribing a one-size-fits-all solution but rather about equipping decision-makers with tools to assess local conditions and choose strategies that allow natural processes to function better. These investments will enhance the resilience of the river, streams, creek systems and the plants, animals, and people who depend on them.

Riparian vegetation is thick along the steep and channelized banks of the Owhyee River running through the lower portion of the Duck Valley reservation near Chinatown. Photo taken October 8, 2025 (credit: Sascha Petersen, Adaptation International)



A VISION FOR THE FUTURE

This toolkit is intended to be a living resource that grows and evolves alongside Tribal restoration work, continually adapting to local conditions, community priorities, and changing climate realities. Riparian restoration is a long-term commitment that requires patience, creativity, and collaboration. By blending Indigenous Knowledge with process-based restoration techniques, the Upper Snake River Tribes are charting a path toward ecological and cultural resilience.

Papoose Creek, Duck Valley Reservation. Photo taken July 15, 2025 (credit: Boyd Bouwes, Watershed Solutions, Inc.)



The Upper Snake River Tribes Foundation (USRT) would like to acknowledge and thank all of the Tribal staff and Tribal members who contributed to the development of the toolkit through site visits and sharing knowledge about their reservations. USRT would also like to thank Adaptation International, Watershed Solutions, and Mizuna Creative for their contributions to the project and the Bureau of Indian Affairs for its generous funding of this project. Access the full digital version of the toolkit at <https://uppersnakerivertribes.org/projects/Restoring-Rivers>.

Cover page: Big Creek, Logan Valley in the Burns Paiute Reservation. August 13, 2025. Photo: Boyd Bouwes, Watershed Solutions, Inc.

