



Aerial of the Cle Elum River in Washington.

Welcome to the Yakima Basin Integrated Plan 2019 Highlights

Celebrating 10 years of working together for a reliable water future

In 2019, the Yakima Basin Integrated Plan celebrated 10 years of work on resolving conflicts in the Yakima basin and is moving forward from inspiration to implementation.

The projects highlighted address the complex issues of the Yakima River basin, including drought, declining snowpack, fishery restoration and ecosystem health.

The Integrated Plan's strategies proved effective in responding to this year's drought. Prior investment in conservation and efficiency reduced economic impacts on agriculture and helped sustain the basin's fishery.

Early this year, Congress approved the Integrated Plan's approach and authorized projects of the 10-year Initial

Development Phase, rewarding more than six years of effort to gain federal support. The Integrated Plan now has the state and federal authority needed to proceed with both program and projects.

Since 2009, the Integrated Plan's dedicated work group, including government at all levels from federal to local, the Confederated Tribes and Bands of the Yakama Nation, irrigation districts and conservation groups, has pursued a robust vision for water and natural resource resiliency in Washington's fertile Yakima River basin. What follows are results of that effort.



New Legislation Supports Integrated Plan Actions

In 2019, Congress enacted the John D. Dingell, Jr. Conservation, Management, and Recreation Act, authorizing the Integrated Plan.

This is a significant milestone because both state and federal government have now endorsed the Integrated Plan, ensuring future progress.

The Dingell Act authorizes the following:

- Implementing the first 10-year Initial Development Phase of the Integrated Plan as well as planning for subsequent phases.
- Constructing the first major water supply project, Kachess Drought Relief Pumping Plant, using an innovative financing mechanism that allows irrigation districts to finance, construct and operate the project as part of Reclamation's Yakima Project.

- Expanding water conservation to areas not supported in prior federal laws, including tributaries and the upper basin, with a target of 85,000 acre-feet (half of the overall 30-year conservation target to be achieved in the first 10 years of the Integrated Plan).
- Supporting groundwater recharge and voluntary water transfers.
- Expanding Yakima Project purposes, including municipal and domestic water supply and fish and wildlife recovery.
- \$75 million of system improvements for Pacific Northwest Indian irrigation projects, including the Wapato Irrigation Project on the Yakama Reservation.

With state and federal authorization now in hand, the Integrated Plan can move forward. After environmental and other review is complete, projects laid out in the Initial Development Phase may be implemented. ■



Momentous legislation included new water supply authorizing Kachess Drought Relief Pumping Plant (KDRPP) project. Reclamation and Ecology continue to coordinate with partners to complete environmental compliance for KDRPP, in addition to evaluating storage options to meet the 450,000 acre-feet goal of the Integrated Plan.

Drought Response Benefits Fish and Farms

Responding to drought is a primary driver for the Integrated Plan.

Water shortages result in the loss of valuable crops, and low water levels and increased temperatures impact fisheries.

In 2019, the region faced another serious drought, with the third driest June through August since 1895. In April, Governor Inslee declared a drought emergency in the Upper Yakima basin, and in May, the drought declaration was extended to include the entire basin.

A key goal of the Integrated Plan is assuring that junior irrigation districts receive 70% of their normal allocation, even in drought years, while also meeting the needs of fish.

Preparing to use those reduced supplies effectively by lining and piping canals, switching to more efficient irrigation practices, and having mechanisms in place to transfer water among users are also important parts of the Integrated Plan. Innovative use of irrigation canals to supplement stream flows in upper basin tributaries, as well as using conserved water for fish flows, helps fisheries during drought.



Fortunately, Integrated Plan actions coupled with a cool summer and late summer rain averted economic disaster. While earlier in the summer, the proration level looked like it would be below 70%, it ended the year at 72%. The 2019 drought reinforced the Integrated Plan's strategy of making the best use of existing water supplies for farmers and fish through conservation, efficiency, water marketing and operational flexibility, while pursuing additional ground and surface water storage. ■

Yakima River Basin Water Enhancement Project Workgroup 10-Year Anniversary.



Nighttime capture

Armed with flashlights, fish nets and gritty determination, Bull Trout fry rescue crews search for fry among pools adjacent to Gold Creek and the Kachess River this summer.



Recovering species
Captive Bull Trout will be transported back to the upper basin and set free into their natural habitat to establish larger populations in spring 2020.

Bull Trout Population, Restoration and Monitoring

Collaboration is the hallmark of the Yakima Basin Integrated Plan.

The Yakama Nation is partnering with the Washington Departments of Ecology and Fish & Wildlife, U.S. Fish & Wildlife Service, Reclamation, Mid-Columbia Fisheries Enhancement Group, and others implementing Bull Trout recovery efforts in the basin.

The Bull Trout Population, Restoration and Monitoring Project utilizes captive rearing to save the Gold Creek and Upper Kachess River Bull Trout populations from stranding due to seasonal loss of flow.

Managed by WDFW, rescue operations began in July 2019. Many of the young-of-the-year Bull Trout rescued from the dewatered reaches were transported by the Yakama Nation to the LaSalle High School Restoration Facility. These fish, which were destined to die without rescues, will be reared for up to one year and then returned to their natal streams. The project is intended to be an effective short-

term solution to keep these populations viable while longer term restoration projects are implemented in the upper basin. Project success will be monitored and evaluated over time with the use of PIT tag antennas, demographic surveys, and redd surveys.

In spring 2020, the captive Bull Trout will be transported back to the upper basin and set free into their natural habitat to establish larger populations. This project includes long-term monitoring to determine if the rescued fry become viable, reproducing adults, in addition to removing Brook Trout in Gold Creek and Kachess River.

Throughout the project, the Yakama Nation will compile Bull Trout restoration data from other agencies in the Yakima basin, combine it with this most recent study, and develop solid Bull Trout population management strategies for the basin.

Yakima River Gap-to-Gap Ecosystem Restoration

In support of the goals of the Integrated Plan, this unique project will enhance ecosystem functions, protect infrastructure and reduce flood hazards.

The Yakima River has been confined by the construction of numerous levees over the past century. Although providing valuable flood protection, levee confinement interrupted natural riverine processes resulting in reduced channel complexity and degraded habitat conditions.

The Yakima River Gap-to-Gap Ecosystem Restoration Project is a large-scale collaborative effort to reduce flood hazard and restore critical habitat for salmon migration, life history diversity, productivity and survival in the Yakima basin. Project elements include the following: improving channel structure, width and complexity; increasing refuge and rearing habitats for listed salmonids; and enhancing riparian vegetation and wetlands.

To date, \$37.4 million has been spent on various project components, including land acquisition, upgrading channels, bridge expansion, levee setbacks and floodplain restoration.

Yakima County and its partners (Yakima County Flood Control Zone District, Reclamation, the U.S. Army Corps of Engineers, Washington State Department of Transportation, City of Yakima, and many others) are now entering the final phases of the infrastructure reconfiguration. This final work is supported by the Corps' Ecosystem Restoration Project, with local match (primarily from real estate, much of which was purchased with Integrated Plan funds), and a grant from Ecology's Floodplains by Design Program.



65 acres of wastewater utility corridor (top photo) converted to active floodplain and replanted with native vegetation (bottom photo).



Panorama of Cle Elum Dam and Reservoir in Washington.

Cle Elum Fish Passage

Finding collaborative solutions to restoring fish runs in the Yakima basin is a priority. Key elements of the Integrated Plan address fish passage and habitat, and watershed protection and enhancement at reservoirs and important tributaries.

The Cle Elum watershed located in the Yakima River basin historically produced a thriving Sockeye Salmon population along with other anadromous fish species. These fish were blocked from their spawning grounds and nursery lake when Cle Elum Dam was built in 1933. The extirpation of anadromous species above Cle Elum Dam and other locations throughout the basin affected the Confederated Tribes and Bands of the Yakama Nation and others that depended on the fish for their livelihood.

The commitment to restoring fish passage has made great strides with the Cle Elum Fish Passage Facilities and Reintroduction Project. The project has several construction phases that will facilitate upstream and downstream passage. Construction has been moving steadily forward since 2015.

Reclamation is currently focused on building the downstream passage facilities, including

the intake, gate and helix, along with a tunnel bypass. The intake system has six levels; as the reservoir fluctuates (over the top 63 feet), one of the six intake gates can be opened to provide downstream passage. The intake leads juvenile fish into the helix, a downward spiraling waterslide that carries them to a 1,250-foot-long tunnel bypass that delivers the fish to the river below.

The intake and helix designs are uniquely suited to the Cle Elum Dam. Reclamation engineers built several experimental models and created this innovative system to move fish downstream of the dam ([see YouTube video, The Helix: Collaborative, Revolutionary Design](#)).

In support of this project, the Yakama Nation is working cooperatively with Reclamation, Ecology, Washington Department of Fish and Wildlife and others to restore habitat and return Sockeye to their historical home. This reintroduced run of Sockeye will contribute significantly to returning marine-derived nutrients in the watershed by ultimately returning thousands of fish to the Yakima basin.

Construction of the project is expected to be completed by 2024, dependent on funding. When complete, the project will provide access to about 10 miles of lake habitat and 29 miles of stream habitat needed for Sockeye and other anadromous fish to reproduce in the upper Cle Elum watershed.



Cle Elum fish passage project benefits Sockeye Salmon.

Cle Elum Shoreline Protection

An integrated approach to water management is essential for restoring aquatic functions, providing increased reliability of water resources and ensuring long-term ecosystem restoration in the Yakima basin.

Reclamation recently completed modifications to radial gates on the spillway of Cle Elum Dam, which allows the reservoir to be raised by three feet (from 2,240 to 2,243 feet). Raising the pool will provide up to 14,600 acre-feet of water to enhance instream flows for fish rearing, fish habitat and migration downstream from the dam. However, the affected shorelines at Cle Elum Reservoir must be protected before the water level can be raised.

The first shoreline protection project was completed November 2017 for the U.S. Forest Service Cle Elum Campground. In 2019, Reclamation continued focus on shoreline protection at USFS facilities and completed renovations at the USFS Speelyi Day Use Area in May. In addition to providing shoreline protection, Ecology funded a more visually appealing and functional day use area for visitors. The site received new asphalt paving for the parking lot, and an Americans with Disabilities Act-compliant walkway/ramp was created to allow access to the reservoir by all. A new concrete boat ramp and ADA-accessible restrooms also were constructed. In addition, Reclamation placed rock and riprap where needed, and completed native plant seeding.

The Wish Poosh Campground protection project is expected to begin in summer 2020. Completion of all shoreline work and raising the pool is anticipated in 2025, depending on available funding.



Armoring the shoreline
Large trees help protect the shoreline at Cle Elum Reservoir.



Protecting recreation
Speelyi Day Use Area shoreline protection actions.

Toppenish Fan Shallow Aquifer Recharge

The Toppenish Fan Shallow Aquifer Recharge Project will help restore natural function to a degraded creek system.

The Toppenish Creek corridor has traditionally supported high cultural and natural resources for Yakama Nation. However, large-scale development of irrigation projects and flood control levees has changed the hydrology, impacted wetlands and decreased flows to springs and creeks. The Toppenish Fan Shallow Aquifer Recharge Project aims to reestablish Toppenish fan's hydrologic cycle and increase water levels in the aquifer.

Starting in 2015, the Yakama Nation diverted water at times of excess flow from Toppenish Creek and delivered the water to the Toppenish alluvial fan. The process mimics natural processes while protecting existing infrastructure.

During the winter of 2018–19, Yakama Nation recharged the aquifer by an additional 4,000 acre-feet. Groundwater elevations adjacent to the infiltration area increased by as much as 15 feet.

After infiltration, the groundwater elevation slowly recedes as the stored groundwater discharges to seeps, springs and adjacent creeks. The cool, stored groundwater provides thermal refugia for migratory fish during the late summer and fall.

Next year, Yakama Nation Engineering will automate the Toppenish Creek head gate, allowing instantaneous control of diversion quantities and increasing the amount of water delivered to the recharge area.

This project is an important step toward the restoration of fisheries, wetland habitat, and cultural resources of the Toppenish Creek corridor by re-establishing these natural processes.



Restoring an aquifer
The project utilizes existing irrigation infrastructure to convey water to areas with high infiltration capacity.



Monitoring recharge success
Installation of a monitoring well on the Toppenish fan aquifer recharge project.

L672 Pipeline Project

- Total Project Cost: \$1.58 million
- Cost per acre served: \$1,693
- Cost per acre-feet of system efficiency savings: \$1,050

This successful partnership project benefits fish and farms in the Yakima basin.

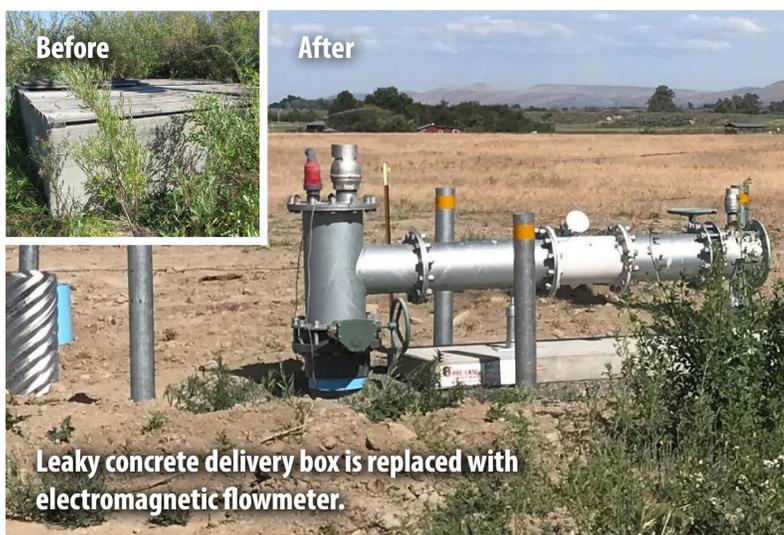
The Wapato Irrigation Project, located on the Yakama Nation Reservation, aims to improve drought resiliency through improving operation efficiency and minimizing losses to seepage and spill.

WIP is the Bureau of Indian Affairs' largest Indian irrigation project in the United States and currently has over \$100 million in deferred maintenance. The degraded irrigation infrastructure leads to difficulty in delivering water to farms and controlling flows. The Yakama Nation and WIP have been working with Cal Poly Irrigation Training and Research Center to develop plans to prioritize future infrastructure upgrades within the project. Improving inefficient, aging irrigation pipelines is a critical component of these plans.

The L672 Pipeline Replacement and Modernization project is an example of ongoing conservation projects within the WIP. Lateral L672 serves 930 acres of irrigated lands. The old leaky concrete pipe required frequent maintenance and repairs.

Recent upgrades include installation of 5 miles of pipe, 19 electromagnetic flowmeters, and an automated trash-rack and intake structure. Project benefits include significant water and power savings, increased reliability for farmers, and flow and water-quality improvements for Toppenish Creek and listed Steelhead.

The project conserves an estimated 1,500 acre-feet of water per year. Funding was provided by Ecology and Wapato Irrigation Project.



Lower River Smolt Study

The study will identify factors affecting smolt survival and help resource managers prioritize actions to improve migration success.

The lower Yakima River can be a perilous reach for juvenile Salmon and Steelhead (smolts) to navigate on their spring and summer migration from the Yakima River to the ocean. Smolts that successfully reach the ocean and grow to adulthood can then return home to the upper Yakima streams to spawn the next generation of fish.

The survival of migrating smolts can significantly influence the abundance of returning adult Salmon—and returning them in higher numbers is a longstanding goal for resource managers.

Smolts are hindered not only by natural predators but by poor water quality, high temperatures, inadequate volumes of water, and structures such as dams. The Lower River Smolt Survival Study will inform project and resource managers about how, when, and where migrating smolts become vulnerable in the river.

In 2019, fish biologists captured and surgically tagged over 1,300 Salmon and Steelhead smolts at Prosser Dam, transported them upstream and released them near the City of Yakima. Fish were implanted with acoustic tags, which last for about 40 days and emit a unique code that can be detected, stored and analyzed to estimate fish survival. The smolts were tracked and monitored as they migrated past Wapato, Sunnyside and Prosser dams and at other key locations in the lower Yakima River.

In addition, Yakama Nation Fisheries surveyed the river weekly to count and locate smolt predators like Smallmouth Bass and American White Pelicans, which also can affect smolt survival.

The study is being conducted from 2018 to 2020 by the U.S. Geological Survey, Yakama Nation Fisheries, Reclamation, and irrigation districts. In 2019, river flow conditions provided a strong contrast to conditions observed in 2018. This will allow researchers an opportunity to compare survival under varying environmental conditions.

Fish will be captured, tagged, released and monitored again in 2020. When completed,

the study will identify factors affecting smolt survival, and help resource managers prioritize actions designed to increase migration success and sustain fishery resources.



Smolt vulnerability
Resource managers are studying how, when, and where migrating smolts become vulnerable in the river.



Tracking their movements
In 2019, fish biologists captured and surgically tagged over 1,300 salmon and steelhead smolts at Prosser Dam.

Yakima Delta Restoration



Bateman Island Causeway

The causeway contributes to water-quality and temperature issues at the confluence of the Yakima and Columbia rivers.

The Yakima Delta Restoration Project is an integral part of the Integrated Plan.

Adult Salmon and Steelhead encounter a critical blockage at Bateman Island, located at the mouth of the Yakima Delta at the confluence of the Yakima and Columbia rivers. A human-made causeway on the south side of the island blocks flows, resulting in very warm water temperatures. The warm water also provides ideal habitat for non-native fish that prey on juvenile Salmon.

In August, the Corps and Washington Department of Fish and Wildlife agreed to evaluate and improve environmental issues in the delta that may include modifying the causeway to restore flows around Bateman Island. The project will enhance Yakima basin fisheries, improve water quality and maintain recreational access.

Partners Work to Improve Water Marketing

Market reallocation moves existing water rights to new uses and improves streamflows in the Yakima basin.

Kittitas Reclamation District and Trout Unlimited continue to research market-based water transfers in the Yakima River basin funded through a Reclamation WaterSMART grant and Ecology. Historically, water in the basin has been over-allocated and competition for existing and new users continues to grow. Water users faced limited water supplies that rely on variable snowpack, with many farmers' water allocations cut short

in drought years. The recent proliferation of rural domestic wells throughout the basin has added to the problem.

Reclamation and Ecology are working with numerous partners to evaluate the steps and devise a more efficient process for transferring water. In 2019, the partners have been researching water rights suitability, water transfer regulation, streamflow needs, outreach and market strategy development.

The partners continue moving forward to help inform the way stakeholders move water in the Yakima basin. A final report on water marketing is anticipated by fall 2020.

Tributary Supplementation

Roza Drought Management Actions

In response to droughts in 2015 and 2019, Roza Irrigation District has taken steps to improve water efficiency and conservation.

- 37+ miles of open lateral canal replaced with pipe funded with \$10 million of Roza grower funds.
- 2.6 miles of concrete-lined canal sealing mostly funded through state capital funds.
- Completion of the Wasteway 5 Re-regulation reservoir.
- Installation of 50+ expansion joints to reduce heat damage to concrete-lined canal sections during future mid-season shut downs due to drought.
- Examination of additional water marketing opportunities.
- Activated pumps to recover seep water from concrete-lined sections of the Main Canal.
- Fostered more intra-District water transfers between growers by extending the pooling deadline twice.
- Advocated for expedited drought well permit issuance by Ecology.
- Ended the irrigation season early.

In the spirit of the Integrated Plan, numerous entities are collaborating to implement a holistic approach to stream restoration in the basin.

The Tributary Supplementation Program is in its fourth year since its inception in the 2015 drought, using the Kittitas Reclamation District canal to augment flows to upper Kittitas County tributaries that are intersected by the main and south branch canals.

Water conservation is a key component of this program. The ability to supplement flow to these creeks depends on increasing canal capacity to deliver irrigation and tributary water. During the 2018–2019 season, KRDLined 4,300 feet of the south branch canal and 2,185 ft of the north branch, which resulted in conserving about 920 acre-feet of water. To date, five canal lining projects (19,156 linear ft) have been completed, resulting in 4,680 acre-feet of conserved water.

Tributaries receiving augmented flow are Tucker, Big, Little, Tillman, Taneum, and Manastash creeks. Evaluation of Nelson and Swauk creeks for potential future flow supplementation is underway.

As part of the Integrated Plan, several entities are working together to address flows, habitat restoration, fish passage (Tucker Creek) and Coho Salmon supplementation. These partners include Reclamation, Ecology, Washington Department of Fish & Wildlife, U.S. Fish & Wildlife Service, National Marine Fisheries Service, Yakama Nation, Trout Unlimited, Kittitas Conservation District, Yakima Tributary Habitat Enhancement Program, and KRDL.

Water-quality and fish monitoring remain important components of the program, with an emphasis on flow, water temperature, dissolved oxygen, pH, and relative fish abundance by species. Installation of additional PIT tag detection arrays this past spring was a key addition to the monitoring program.

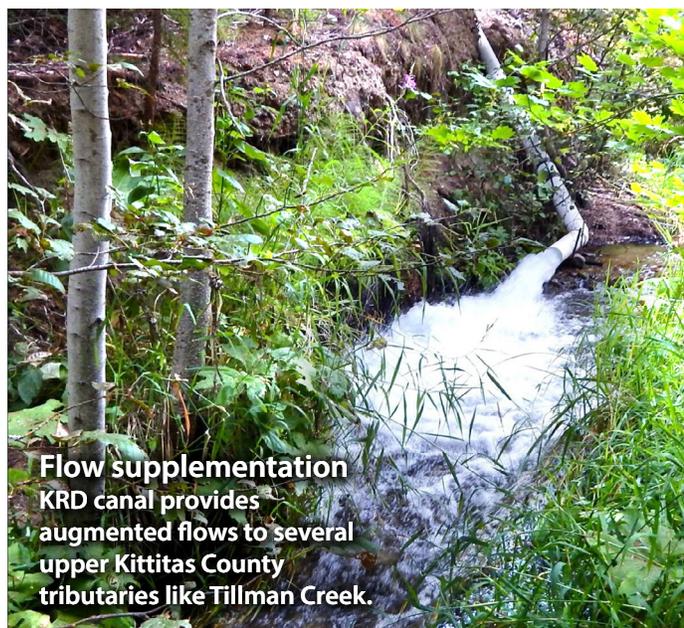
Last October, during a habitat survey of Little Creek, fishery biologists were pleasantly

surprised to find a newly spawned spring Chinook redd located at the Hundley Road bridge. A few days later, the spawned-out female carcass was discovered in a pool immediately downstream of the redd. This was the first documented spring Chinook redd in Little Creek since extensive spawning surveys were initiated by the Yakama Nation in the early 1980s.

Over time, it is anticipated that re-establishment of this habitat will help with recovery of Steelhead in the basin.



Lining saves water
KRD canal lining project completed spring 2019.



Flow supplementation
KRD canal provides augmented flows to several upper Kittitas County tributaries like Tillman Creek.



Low-water-use demonstration gardens in downtown Yakima

Creating a Conservation Ethic in the Heart of Yakima

A critical component of the Integrated Plan is municipal water conservation.

The Integrated Plan designates 50,000 acre-feet specifically for municipal and industrial use for future growth. To access that water, communities must demonstrate that they are efficiently using their water.

The City of Yakima partnered with other municipalities and agencies to identify best management practices and develop basin-wide resources that promote municipal water conservation.

In 2016, the City received funding from Ecology and Reclamation's WaterSMART program to design and install low-water-use demonstration gardens.

The project initially started as a xeriscape, but many people envision xeriscapes as an unattractive expanse of cactus and rocks.

To counter this perception, the City installed four demonstration gardens featuring water-thrifty, native plant species that are pollinator friendly.

Project activities included clearing existing landscaping, adding rock, and retrofitting existing irrigation systems with water-saving technology. Garden sites contain educational interpretive signs, and information and photos are posted on the City's website. This collaborative effort shows that low-water-use gardens can be aesthetically pleasing as well as environmentally friendly.

In 2019, the Heritage Garden Program hosted two free public workshops, sponsored by the North and South Yakima and Benton Conservation Districts. A total of 155 participants learned how to create unique, water-thrifty gardens.



Upper Kittitas County farmland.