Columbia River Inter-Tribal Fish Commission

“Putting fish back in the rivers and restoring watersheds where fish live.”
Our Strength is From the Fish

The Yakama, Umatilla, Warm Springs, and Nez Perce tribes share a common understanding — that our very existence depends on the respectful enjoyment of the Columbia Basin’s vast land and water resources. We believe our very spirits are inextricably tied to the natural world and its many inhabitants. Among these, none are more important than the salmon enriching the basin’s rivers and streams. We have lived in the Columbia Basin since time immemorial and honor salmon as a staple of life and as a foundation of our culture, economy, and religion.

My strength is from the fish; my blood is from the fish, from the roots and berries. The fish and game are the essence of my life.

—Chief Westermak, Yakama, 1915

Over the next twenty years, the tribes proved their skill in effective salmon restoration, playing a significant role in reversing the decline of fish runs throughout the Columbia Basin. Several federal agencies including the Bonneville Power Administration recognized this expertise and funded many of the tribal projects. During this same period, the tribes and federal agencies continued to clash over the effect of dam operations on migrating salmon. A cloud of uncertainty hung over all the parties as to what each new year would bring.

In 2008, a number of tribal, state, and federal partners entered into the Columbia Basin Fish Accords in an effort to bring certainty and stability to fish and wildlife mitigation and hydro operations. This publication is a summary of what the three lower Columbia River tribes have accomplished over the decade-long Accords period.

Working Together to Protect Salmon

Our tribes are brought together by salmon and today we are united in our efforts to save this sacred First Food along with our culture based on them. In 1995, we released our salmon recovery plan Wy-Kon-Ush M Wu Kish Hit (Spirit of the Salmon) which combines traditional and modern knowledge of salmon to form a “gravel-to-gravel” management approach to recovery. We implemented and advocated for the plan to save salmon throughout our ceded lands and usual and accustomed fishing locations. These ceded lands cover 84 percent of the present-day range of salmon above Bonneville Dam. The effects of our restoration and management activities extend well beyond our reservation boundaries, benefiting the region and its residents.

Celilo Falls

For millennia, people caught chinook and other fish that struggled upstream through the tumbling waters and swift, narrow channels of Wy-um or Celilo Falls. What was the site of one of the largest salmon fisheries in the world now lies buried beneath the waters behind The Dalles Dam.

The ancient ones left a record of their lives in the ashes of campfires and buried sanctuaries of their dead here. They left tools and weapons, items of adornment, and samples of their art. Their record of habitation proves Wy-um to be one of the longest occupied sites on the continent.

Nez Perce Tribe

Though the Nez Perce was not a signatory to the Fish Accords, its projects are congruent with those of the other tribes and CRITFC.

Warm Springs

Confederated Tribes of the
Warm Springs Reservation of Oregon

- Headquarters: Warm Springs, Ore.
- Tribal enrollment: 5,216
- Reservation: 640,000 acres
- Ceded territory: 107,514 acres (6.4% of Columbia Basin)
- Total population within ceded area: 41,695
- Salmon-accessible river length in ceded area: 5,992 miles (24% of above-Bonneville Dam total)

Yakama

Confederated Tribes and Bands
of the Yakama Nation

- Headquarters: Toppenish, Wash.
- Tribal enrollment: 10,741
- Reservation: 1.1 million acres
- Ceded territory: 11.9 million acres (7.2% of Columbia Basin)
- Total population within ceded area: 610,699
- Salmon-accessible river length in ceded area: 2,035 miles (35% of above-Bonneville Dam total)

Umatilla

Confederated Tribes of the
Umatilla Indian Reservation

- Headquarters: Mission, Oregon
- Tribal enrollment: 2,900
- Reservation: 172,000 acres
- Ceded territory: 6.6 million acres (4% of Columbia Basin)
- Total population within ceded area: 331,816
- Salmon-accessible river length in ceded area: 2,335 miles (15% of above-Bonneville Dam total)

*2010 United States census
**Columbia Basin Fish Accords**

**Adapt, protect, restore**

In 2008, the Umatilla, Warm Springs, and Yakama tribes (referred to as the lower river tribes or lrt), Columbia River Inter Tribal Fish Commission’s* Bonneville Power Administration, U.S. Army Corps of Engineers, and U.S. Bureau of Reclamation signed the Columbia Basin Fish Accords. The partnership they forged ushered in a new era of regional salmon restoration and financial predictability. The Accords provided secure funding for long-term habitat restoration and fish survival and passage improvement projects at the dams. These projects furthered the tribes’ Wy-Kee-Ush-Mi We-Kish-Wit vision to maintain and enhance salmon populations for future generations. The increase in security and stability that the Accords provided allowed the tribes to implement more complex and larger projects not possible under the previous funding methods. The BPA gained a ten-year period of certainty for hydropower generation during which the tribes agreed to not litigate for additional fish protection at the dams or the breaching of the Snake River dams. By working together, the parties shifted their relationships from adversarial to one based on negotiation and collaboration and the region and salmon benefited as a result.

Although the Nes Perce Tribe was not a signatory to the agreement, its projects are congruent with those of the other tribes and CRITFC.

**Adaptive Management**

Adaptive management is a real-time decision-making process that not only meets current resource management objectives, but also gathers information needed to improve future management and learn more about the system being managed. Adaptive management, coupled with the holistic “gravel-to-gravel” philosophy espoused in the tribe’s salmon recovery plan, have guided the restoration to levels supportive of their unique cultural and ecosystem values.

**Habitat**

On-the-ground projects that restore or protect vital ecosystems upon which salmon and other species depend.

**Propagation**

Construct or modify hatcheries or devise and evaluate fish propagation strategies to maximize conservation and harvest opportunities and direct mitigation efforts for hydropower-related fish losses.

**Lampey & Sturgeon**

Seek to fall Columbia Basin lampey and sturgeon decline with the long-term goal of restoration to levels supportive of their unique cultural and ecosystem values.

**Fish & Wildlife Spending**

During the term of the Fish Accords, BPA spent an average of $63.7 million annually for all fish and wildlife actions.

**Consistent with the Northwest Power Act, each year BPA expended around $261 million for fish and wildlife activities. BPA funds projects consistent with the NPCC’s Fish and Wildlife Program. BPA contracts with state and federal agencies, tribes, universities, local groups, and other private and non-profit organizations to implement the NPCC’s Fish and Wildlife Program.**

**Fish & Wildlife Program Budget (2008-2017)**

**Lower River Tribes Accord Funding (2004-2017)**

**Salmon Returns and Harvest**

Indian fisheries are legally entitled to half the harvestable surplus of fish in the Columbia River. Indian fishing is regulated under the ongoing U.S. District Court litigation known as U.S. v. Oregon. The 2008-2017 U.S. v. Oregon Management Agreement adopted an abundance-based or “sliding scale” harvest management approach so that when returns were larger, a larger percentage of the run was harvested and fishing was restricted when returns were smaller.

As an example, the charts below show the relative size of the returning spring chinook run and the allocation of mainstem harvest in recent years.

**Columbia River Upriver Spring Chinook Run Sizes and Mainstem Harvest Percentage**

**Escapement**

**Indian Harvest**

**Non-Indian Harvest**

**Federal Agencies (58%)**

**State Agencies (18%)**

**BPA Overhead (6%)**

**Lower River Tribes Restoration Efforts (24% of BPA Fish Budget)**

**Other & tribal (23%)**

**Federal Agencies (58%)**

**State Agencies (18%)**

**BPA Overhead (6%)**

**Lower River Tribes Accord Funding (2004-2017)**

Fish Status & Trends

The status of anadromous fish in the Columbia Basin is determined by a myriad of variables such as habitat and water quality, ocean conditions, and passage accessibility. Restoration efforts to undo the damage to the fish runs will take considerable time and effort. The projects made possible by the Fish Accords are just one part of this regional effort. While ten years is too early to determine long-term trends, the stock information presented here gives a current snapshot of how the fish runs are doing.

Chinook Salmon above Bonneville

In the Interior Columbia Basin above Bonneville Dam there are remnants of eight evolutionarily significant units and distinct population segments of Pacific salmon and steelhead listed as threatened or endangered under the Endangered Species Act (ESA). The ESA requires that the National Marine Fisheries Service review the status of listed species under its authority at least every five years and determine whether any species should be removed from the list or have a change in listing status. The most recent review occurred in 2015. At that time, most of the listed stocks were doing well for various reasons including a cycle of favorable ocean conditions. There are some indications that the Accords habitat actions, required spill operations at the dams, and improved hatchery operations contributed to the recent success in abundance and productivity improvements. However, none of the listed populations are doing well enough to be removed from the endangered species list.

There are also several non-listed salmon populations in the Columbia River above Bonneville Dam that support tribal ceremonial, subsistence, and commercial fisheries. These stocks were reviewed and did not merit listing under the ESA. Salmon and steelhead returns are inherently cyclical. While most runs declined in the past three years, this is assumed to be largely due to unfavorable conditions in the ocean compounded with poor in-river conditions in 2015.

Columbia River mouth run sizes for natural-origin Snake River spring/summer chinook averaged just under 26,000 per year for the last 10 years, which is very similar to the average return over the previous 10 years. Columbia River mouth run sizes for natural-origin upper Columbia spring chinook averaged just under 4,000 per year for the last 10 years, which is almost double the average over the 10 years prior.

The Columbia River mouth run size for natural-origin Snake River fall chinook averaged over 18,000 per year from 2008-2017, which is more than double the average of 7,200 for the ten years prior.

Coho & Sockeye Status

Sockeye

Although Columbia Basin sockeye salmon declined substantially from their historic levels, 2014 saw the largest return to the Columbia River since the construction of Bonneville Dam with over 645,000 passing the dam. These fish originate from the Okanagan River in British Columbia, Wenatchee River in Washington, and the Snake River in Idaho. About 85 percent return to the Okanagan. While the Okanagan and Wenatchee stocks are considered healthy populations, the Snake River stock was federally-listed as endangered in 1991. The Snake River run, a mix of hatchery and natural-origin fish, averaged over 1,400 a year from 2008-2017 which is a significant improvement over the average of 78 per year for the 10 years prior. Sockeye are being reintroduced in the Yakima River in Washington and the Deschutes River in Oregon.

Coho

Coho salmon were declared extirpated in the mid- and upper Columbia River above McNary Dam in the 1990s. The CBFPC tribes successfully reintroduced coho into a number of rivers and streams. Returns above Bonneville Dam averaged 117,000 per year from 2008-2017. This is above the average return for the 10 years prior. These counts are a combination of hatchery and natural-origin fish.

Lamprey Status

Today, Pacific lamprey return to the Columbia Basin at a fraction of their historical numbers. Daytime counts of adult Pacific lamprey at Bonneville Dam declined from an estimated 400,000 in the 1960s and 1970s to lows of under 10,000 in 2009 and 2010. Daytime counts at Bonneville Dam increased steadily from 2011 through 2017, but still remain below historic levels. At Willamette Falls, a traditional harvest location on the Willamette River, estimates of commercial harvest declined from about 157,000 adults in the 1940s to about 11,000 in 2001 when the commercial harvest ended. More recently, adult abundance estimates from 2010-2017 at Willamette Falls ranged from 64,988 to 356,605 adults. Regional lamprey restoration efforts, including efforts under the Accords, aim to improve their migration corridor so that a higher percentage of adults are able to migrate successfully throughout their range.

Steelhead above Bonneville

ESA-listed Steelhead above Bonneville

The construction and operation of hydropower dams in the Columbia Basin significantly impacted fish and wildlife populations and forever changed the Columbia River ecosystem. Without mitigation for losses, the dams jeopardize the existence of the tribes’ treaty trust natural resources. As a result, the BPA, USACE, and U.S. Bureau of Reclamation are taking actions to improve dam facilities for fish passage and modify dam operations to support increased upstream and downstream survival of anadromous fish.

Average Annual Juvenile Survival for Snake River Stocks from Lower Granite to Bonneville

**Wild Chinook**

**Wild Steelhead**

**Sockeye**

- **Pre-Accord survival (1999-2007)**
- **Increase during Accord Period (2008-2016)**

47%

48%

50%

4%

The Fish Accords secured funding for the Fish Passage Center, Smolt Monitoring Project, and Comparative Smolt Survival Study. These projects provide critical information necessary to guide day-to-day river operations, evaluate fish benefits and survival through the hydropower system, and develop alternative operation scenarios for discussion in hydro-system operations planning groups.

**Spill**

Spill is considered the safest and most preferred route past the dams. To increase survival, spill has been mandated by court order and guaranteed through the Accords to occur during the juvenile outmigration period from April 10 through August 31 at most of the federal Columbia Basin dams. The tribes continue to seek improved spill regimes during juvenile outmigration periods.

**Travel Time/Surface Velocity**

River flows, along with configuration and operations at dams, are critical elements that influence how quickly juvenile fish migrate to the ocean. Reducing travel time with increased flow improves survival by reducing exposure to predators, warm water, and other stressors. The average travel time has been significantly reduced due to surface spill measures.

**The Dalles Spillway Wall**

Approximately 80 percent of the juvenile salmon and steelhead that migrate past The Dalles Dam pass over the spillway. Concentrations of predatory fish and birds in the tailrace severely limited juvenile survival in this area. In 2010, the USACE built a $52 million guidance wall extending 850 feet downstream from the spillway, guiding juvenile fish into the deepest, fastest, and safest water below the dam and away from predators. With the spillway wall in place, 96 percent of tagged yearling chinook successfully passed The Dalles Dam, a four-percent increase compared to studies in 2004 and 2005. While displacing several tribal fisheries, this project achieved the largest increase in survival of any of the hydropower system improvements implemented during the term of the Accords.

**Flow Augmentation and Spill (2008 operation)**

Flow augmentation (spring-summer operations including spill to speed juvenile migrations and improve survival.)

**Lamprey Passage Improvements**

Initial modifications for improved lamprey passage.

**Predator Control Structure**

Predator control devices (e.g. Sea Lion Exclusion Devices at Bonneville and bird wires and hazing at all mainstem dams.)

**Surface Passage Improvements**

Installation of surface passage structures (e.g. spillway weirs) and modified spill operations to improve juvenile survival.

**Fish Screens & Turbine Bypass Improvements**

Installation and maintenance of fish screens that divert fish away from turbines and into improved fish bypass system.

**Turbine Survival Upgrades**

Improved turbines and turbine operations that reduce harm to fish.

**Adult Passage Improvements**

Modification and maintenance of adult fish ladders and dam operations to improve adult fish passage.
Habitat Projects

Over one-third of the lower river tribes’ Accords funding went to watershed restoration efforts. The certainty of funding allowed the tribes to leverage millions of dollars from additional sources including the Pacific Coastal Salmon Recovery Fund and other federal, state, tribal, public utility district and private foundations. Overcoming 150 years of development and land-use impacts, watershed restoration in the Columbia Basin remains a giant work-in-progress.

The goal for these projects is watershed-scale habitat restoration to increase egg-to-smolt survival of naturally-spawning salmon and steelhead and to help restore these populations to levels where ESA viability criteria or Wy-Kan-Ush-Mi Wa-Kish-Wit goals and objectives are met. Depending on the scope of damage, active habitat restoration is performed at scales ranging from repair of specific stretches of stream channels to broader work on a waterway’s riparian zone, floodplain, or its entire watershed.

CRITFC and others estimate that hundreds of millions more dollars are needed annually for Columbia Basin watershed restoration, land protections, elimination of passage barriers, instream flows, water quality, program operations, monitoring, outreach and education, and regulatory actions. Additional restoration funding is needed to offset rapidly occurring impacts from both climate change and continuing human development which threaten to undo gains already made.

The Great Spirit, in placing men on the earth, desired them to take good care of the ground and to do each other no harm.
—Young Chief, Cayuse, 1855

By the numbers

Over the past ten years, the tribes used Columbia Basin Fish Accords funding to achieve some major accomplishments in protecting the ecosystems that support healthy salmon populations.

- 37.3 BILLION GALLONS water protected and conserved each year (114,544 acre-feet)
- 7,236 MILES stream protected or improved
- 968,621 ACRES OF HABITAT protected, treated, or maintained (an area the size of Rhode Island)
- 10.5 MILES dikes modified or removed
- 81,705 LBS. trash collected
- 192 MILES fence installed
- 31 FISH SCREENS installed or modernized
- 4,195 JOBS CREATED*  
- 397 BARRIERS improved or removed
- Area inaccessible to salmon due to natural blockage
- Area inaccessible to salmon due to human-made blockage
- Yakama Nation habitat work sites
- Confederated Umatilla Tribes habitat work sites
- Confederated Warm Springs Tribes habitat work sites
- CRITFC habitat work sites

*40% of Accords funding
*$214 million from 2008-17

Southern Cross Conservation Property
In 2015, CTUIR purchased the Southern Cross Ranch near Union, Oregon as part of a broader stream restoration effort on Catherine Creek in the Grande Ronde Basin. The CTUIR River Vision concept of providing sustainable First Foods through dynamic river systems was applied to the project. The results transformed a channelized reach into a connected, sinuous floodplain. Today, adult and juvenile Snake River ESA-listed chinook and steelhead are found in the restored stream and chinook spawn here. The CTUIR received a Stream Project Award from the Oregon State Land Board for the project.

Middle Fork John Day River Oxbow Project
The John Day Basin is the only remaining major Columbia River tributary that has not been dammed or stocked with hatchery fish. A restoration highlight is the Warm Springs Tribe’s Oxbow Project, where the tribe purchased property and reconstructed a one-mile reach of the Middle Fork John Day River that had been straightened and confined by extensive mine tailings. The project reconnected tributaries flowing from the Malheur National Forest to the river and restored access to cold-water rearing sites for bull trout, chinook salmon, and steelhead. The Warm Springs Tribe received a US Forest Service Rise to the Future Award for the project.
Tribe and Oregon Department of Fish and Wildlife; the Hood River Production Program provides sustainable tribal and non-tribal harvest of spring chinook and winter steelhead while re-building wild summer and winter steelhead, coho and fall chinook salmon runs through habitat enhancement and protection, and harvest management. Broodstock are collected in the West and East forks of Hood River. Spring chinook are reared primarily in basin at the tribally operated Parkdale Fish Hatchery where winter steelhead are reared at the ODFW operated Oak Springs Hatchery. Spring chinook are acclimated and released into the West Fork Hood River and winter steelhead in the East Fork Hood River.

Yakima Klickitat Fisheries Project

The Yakima Klickitat Fisheries Project was established to restore sustainable and harvestable populations of salmon, steelhead, and other at-risk species in the Yakima and Klickitat subbasins. The project is evaluating all stocks historically present and, using principles of adaptive management, applying a combination of habitat protection, habitat restoration, and hatchery supplementation or reintroduction strategies. The Cle Elum Hatchery integrates its operations with natural fish production to boost wild fish numbers through supplementation techniques and to evaluate the program’s long-term success.

851,900,000 salmon and steelhead smolts were released from the tribal, state, and federal Columbia Basin hatcheries over the 10-year Accord period.
Forgotten Fish

For thousands of years, the Pacific lamprey provided an important source of food for the tribes of the Columbia Basin, who prized them for their rich, fatty meat. They are served alongside salmon at many of their food feasts and celebrations. The tribes maintained their connection to this ancient fish as the numbers of returning lamprey declined throughout the Columbia Basin. This decline was met with significant alarm from the tribes, who consider them a sacred fish. Thanks to tribal efforts, the plight of this little-understood and maligned fish is being addressed, not only in public perception, but also in a better understanding of their life history, a translocation program, habitat restoration projects, and capital improvements in the hydrosystem.

Since the fish is not listed under the Endangered Species Act and does not enjoy the political support of the more economically important salmon, the tribes struggled to obtain funding for restoration work and dam improvements for lamprey. This changed with the Accords, which formalized funding and dam passage improvements for lamprey.

During the Accords period, the tribes developed best management practices and protocols for the artificial propagation of Pacific lamprey; contributed to a better understanding of adult, larval, and juvenile passage issues and solutions in various subbasins; assessed larval/juvenile entrainment issues; completed extensive status, trend, and exploratory surveys for lamprey; collected extensive genetics information on Pacific lamprey and Lampetra species; developed and enhanced larval lamprey identification guides and tagging methods; established strong outreach and education programs; worked to reestablish lamprey in ceded area tributaries through adult translocation; monitored the increased distribution of larval lamprey and out-migration of juvenile lamprey; provided abundance and escapement estimates at Willamette Falls (Willamette River) and Sherars Falls (Deschutes River); developed an improved baseline for water quality and contaminant accumulation in lamprey-improved local and regional perceptions of Pacific lamprey; and provided leadership in the development and implementation of alternative forms of restoration (e.g., translocation and artificial propagation).

Lamprey Passage Improvements

Lamprey have significant life history differences from salmon and steelhead. Unfortunately, the fact that lamprey are less capable swimmers in high velocity flows was not considered when fish passage facilities were built. Velocities associated with fish ladders are often too high for lamprey to navigate without repeated burst swimming, reattaching, and resting. In addition, their swimming behavior makes it difficult to migrate up fish ladders that have sharp corners and turns. Poor passage can also be attributed to turbulence, poor attraction, unnatural flows, and predators. Challenges associated with dam passage is considered a significant reason for the decline of lamprey. To improve adult upriver passage, fish passage facilities have been modified to address the needs of lamprey. This has been made possible through modifications to the ladder entrances, installation of lamprey passage systems at problem areas, and adding velocity reduction structures.

5) Allocate $1.8 million for lamprey projects in 2008, increasing from $2 million to $5 million per year for 10 years to improve hydrosystem passage.

Lamprey Translocation

Translocation of adult Pacific lamprey is a tool for reintroduction and augmentation and an interim measure to prevent local extirpation while passage and degraded habitat are addressed. Translocation is the act of collecting adult lamprey in the lower mainstream Columbia River and releasing them into upstream subbasins where lamprey abundance is declining or extirpated. Adult lamprey are attracted to pheromones excreted by larval lamprey. Therefore, a primary benefit of translocation efforts is to increase production of lamprey in the augmented watershed, “seeding” underutilized rearing habitat, and increasing pheromone cues to attract adults.

BPA and federal lamprey project funding (in $Millions) from 2004 to 2017.

Accords signed

$3.4 million from 2004-17

$4.7 million 2008-16 CRFP

Capital improvements at the dams

Lamprey Translocation Sites

Yakama translocation sites

Umatilla translocation sites

Lamprey Propagation Research

The Yakama, Umatilla, and Nez Perce tribes, with guidance from CRITFC, are developing a plan for Pacific lamprey artificial propagation, translocation, restoration, and research. The overall goal of this plan is to evaluate the feasibility of using artificial propagation and adult translocation techniques to better understand and ultimately restore Pacific lamprey throughout its range, with particular emphasis on the Columbia Basin population segment. To date, lamprey artificial propagation and rearing efforts have been limited to preliminary research conducted in controlled environments. Work has focused on developing the best methods and techniques associated with gamete handling, gamete fertilization, egg incubation and prorlarvae handling, transportation of gametes and larvae, disinfection, and larval culture. As part of this plan, experimental larval outplanting is proposed for the Yakima, Walla Walla, and Tucannon subbasins.

White sturgeon are the largest freshwater fish in the Columbia Basin, capable of growing to more than 1,000 pounds and 10 feet in length. They grow slowly and can live up to a century.

White sturgeon range from northern Mexico to the Aleutian Islands. They historically inhabited the full length of the Columbia River to British Columbia and the Snake River to Shoshone Falls in Idaho. While overfishing decimated the numbers around the turn of the century, construction and operation of hydropower dams and the creation of reservoirs isolated their populations and substantially reduced the ability to rebuild the population. The white sturgeon still inhabit most of their historical range in the Columbia Basin. An estimated 600,000 are in the free-flowing stretch of the Columbia from the mouth to Bonneville Dam; another 300,000 are estimated between Bonneville and McNary dams. Only a few thousand remain above McNary Dam in the Columbia and Snake rivers. Current production remains far below the historical levels.

With Accords funding, CRITFC developed a project to provide guidance for the next phase of sturgeon conservation, management, and restoration in the mid-Columbia and lower Snake reservoirs based on past research, monitoring, and evaluation completed by regional fish managers and partners. The project:

- Completed a collaborative and comprehensive strategic plan for sturgeon conservation, restoration, and management that includes habitat protection and restoration, natural and hatchery production, fishery management, research, monitoring, and evaluation.

- Facilitated, monitored, and evaluated implementation of appropriate hatchery actions in collaboration with other regional sturgeon conservation, management, and restoration projects.
RESEARCH, MONITORING, AND EVALUATION

Some examples of tribal research and monitoring exclusively or partially funded through the Fish Accords:

SUPPLEMENTATION
Basin-wide supplementation evaluation
Evaluate escapement, genetic stock identification, productivity, and relative reproductive success in tribal programs involving reintroduction and supplementation of anadromous fish populations.

KEEP RECIPIRATING
From relative strategies to increase interpority (repeat spawning) in inland steelhead populations as both a safety net and a method for species recovery. Repeat spawning increases lifetime reproductive success and offers a spread-the-risk strategy that can provide potential benefits not possible through any other existing or proposed action.

HARVEST
Enforcement
Implement tribal and intertribal harvest and habitat law enforcement within the Zone 6 of the mainstem Columbia River and treaty fishing areas to reduce the illegal take of salmon, steelhead, and resident fish and aid in the rebuilding of native fish populations.

Expanded tribal catch sampling
Enhance the monitoring and catch sampling for the treaty mainstem fishery and test the feasibility and utility of sampling tribal harvest for PIT tags.

INFORMATION MANAGEMENT
Inter-Tribal Monitoring Data Project
Assists CRITFC and its member tribes in the capture, storage, processing, and dissemination of fish and habitat data for management purposes. The project aims to assist in the production and curation of long-term monitoring data sets.

StreamNet Library
The StreamNet Regional Library serves the Pacific Northwest natural resource community and researchers working in cooperation with the region’s fish and wildlife recovery efforts. The library places particular emphasis on collecting less commonly available “gray” or “black” literature, such as consultant and NGO reports and governmental documents.

GENETICS
CRITFC operates and maintains a state-of-the-art genetics laboratory in Hagerman, Idaho. The tribes, in collaboration with their fellow co-managers, are developing genetic resources (markers and baselines) to enable accurate identification of specific fish stocks as they migrate through the Columbia River and are harvested in various fisheries. These genetic tools offer the ability to enhance our understanding of abundance and run timing of specific stocks to improve fisheries conservation and management in the region. The lab is also developing genetic tools to screen natural populations of salmonids for local adaptation and traits related to long-term persistence (e.g., thermal tolerance, smoltification, disease resistance, adult migration timing), and evaluate potential of populations in the Columbia Basin to adapt to changing environments. These new genetic monitoring tools provide the opportunity to non-lethally sample hatchery- and natural-origin fish, and to estimate the abundance, migration-timing, and harvest composition among specific stocks.

Since 2013, nearly all adults that have been outplanted by three tribal transplantation programs into tributaries of the interior Columbia Basin distributed across Idaho, Oregon, and Washington, have been tissue sampled and genotyped for creation of a regional implementation of Parentage Based Tagging (PBT) database. This powerful PBT technology provides the opportunity for future recaptures of progeny of these translocations at older life stages, possibly even returning adults. Numerous juvenile sampling programs are now in place throughout the streams and rivers receiving translocated adults and at Columbia mainstem dams. The Hagerman Genetics Lab, through its lamprey PBT database, has already documented reproductive success of multiple groups of outplanted adults across release years. Data generated from this ongoing monitoring may be used to adaptively manage restoration efforts being employed for Pacific lamprey, and further characterize their migratory life cycle.

Hydrosystem Operations
Upstream migration timing
Assess migration timing and survival of adult sockeye and chinook salmon and steelhead through the Columbia River hydrosystem. Also assess species stock composition for ESA and harvest management.

Habitat Effectiveness
The tribes are working with other co-managers to develop a quantitative means to evaluate current and potential spring chinook salmon viability factors for selected listed populations, focusing on key limiting habitat factors. Studies are evaluating whether improving trends in spring chinook salmon habitat quality and quantity are occurring in response to restoration actions and whether those improvements are large enough to counter the expected negative impacts of climate change on fish populations.

Production Monitoring
The tribes conduct monitoring to provide relevant data on population status and trends as well as effectiveness of habitat and hatchery actions by conducting spawning ground surveys, adult salmonid migration monitoring, juvenile outmigration monitoring, juvenile and resident salmonid population surveys, habitat surveys, and tagging and monitoring of hatchery fish populations.

Climate Change
See Growing Concerns, pages 20-21.

Sea Lions
See Growing Concerns, pages 18-19.
Along with competition, migration, and immigration, predation is a key factor that affects fish population dynamics. Although predation occurs naturally, management becomes necessary in a highly modified environment such as the Columbia Basin. Since the publication of Wy-Kan-Ush-Mi Wa-Kish-Wi in 1995, an alarming increase in predation of salmon, lamprey, and juvenile sturgeon by birds, marine mammals and other fish has occurred. In the basin, newly created habitat from dredge spoils increased predacious bird populations; a lack of historical change, habitat alterations, and other factors make it highly likely that this problem will grow worse and require even more resources in the future.

**Predators & Invasive Species**

“Invasive” means fish eating. The native northern pikeminnow evolved with salmonoids, however environmental changes resulting from the hydro system led to increased predation on out-migrating juvenile salmonids. Thus, northern pikeminnow was introduced to the region in the 1960s to reduce their impact on juvenile salmon and steelhead. In recent years, the number of sea lions preying on salmon and steelhead between February and June has increased significantly. In addition, seal lions eat a significant number of white sturgeon and have been observed eating lamprey. Predation Research: Prior to the Fish Accords, there were no scientifically valid methods for estimating sea lion abundance and predation rates in the lower Columbia River. Using Accords funding, the tribes developed techniques to accomplish this goal in order to quantify the extent of the impact sea lions are having on the Columbia Basin salmon runs. CRITFC researchers initially evaluated videography for abundance and predation estimations, but this failed to work due to the size of the survey area. The current technique using tandem boat surveys has proven much more promising. CRITFC also studies the effects of its hazing efforts. Short-term responses to hazing indicate positive effects, however long-term impacts are difficult to evaluate.

**Piscivorous Fish**

*Columbia River salmon, steelhead, white sturgeon, and lamprey face threats from sea lions below Bonneville Dam.*

*Sea Lions*

Sea lions annually consume thousands of returning adult fish. In addition, sea lions eat a significant number of white sturgeons and have been observed eating lampreys.

**Predation Research**

To estimate sea lion consumption, CRITFC researchers developed a technique using tandem boat surveys. This technique involves counting sea lions along a predetermined route, estimating their size, and recording the number of pinnipeds in each group, which is correlated to percent consumption.

**Asian Predator**

*Caspari tern and double-crested cormorant populations increased significantly in the last 20 years. Between 2010-2013, the estimated annual smolt consumption by cormorants and terns was 19 million and 5 million, respectively.*

**Eskensky:** Efforts are underway at East Sand Island in the Columbia River estuary to reduce the size of the Caspian tern and double-crested cormorant populations and move portions of those populations out of the Columbia Basin. The Caspian tern population declined substantially, but approximately 2,000,000 spend their summers in the estuary, eating between 3 and 5 million smolts each year.

**Avian Predator**

Caspian tern and double-crested cormorant populations increased significantly in the last 20 years. Between 2010-2013, the estimated annual smolt consumption by cormorants and terns was 19 million and 5 million, respectively. Eskensky: Efforts are underway at East Sand Island in the Columbia River estuary to reduce the size of the Caspian tern and double-crested cormorant populations and move portions of those populations out of the Columbia Basin. The Caspian tern population declined substantially, but approximately 2,000,000 spend their summers in the estuary, eating between 3 and 5 million smolts each year.

**Inland:** Scattered colonies of Caspian terns nest in several locations in the upper basin, the largest colony nesting on the Blakonid Islands complex in John Day reservoir in numbers exceeding 1,000 adults and hundreds of nests. These terns eat approximately 1 million smolts every year. Double-crested cormorants also nest in the inland basin, but pose less of an impact due to smaller numbers, nesting locations, and diversity of prey. Several species of gulls nest throughout the Columbia Basin. In some locations, particularly Miller Island between The Dalles and John Day dams, gulls are a significant source of predation, particularly on juvenile steelhead.

**Dams:** Wires have been installed at most of the mainstem Snake and Columbia dams to dissuade avian predation by making it difficult for the birds to fly over the outflows from the turbines and spillways. Water cannons and other active techniques are used to deter avian predation at or near the projects. Boat-based hazing crews using pyrotechnics may be used in areas not covered by bird wires or water cannons.

**Acoustic Invasive Species**

Currently, the greatest non-native invasive species concern is the potential infestation of zebra and quagga mussels. Entering the Great Lakes in the mid-1980s on commercial vessel traffic, they spread throughout the country except for the Columbia Basin. A network of monitoring efforts, highway check stations, and education and outreach efforts have been in place for over a decade in an effort to keep them from entering the basin on commercial and recreational watercraft. An infestation would create significant permanent impacts to salmon habitat and fish passage structures used by juvenile and adult salmon and steelhead to navigate around the dams. The mussels are also effective filter feeders, capable of substantially altering the food webs that salmon fry and smolts depend on.

Invasive aquatic plants like flowering rush have the potential to colonize shallow areas in the Columbia and its tributaries. Heavy aquatic plant growth slows water currents, alters water chemistry, creates havens for piscivorous fishes, and increases water temperatures. Climate change will accelerate the growth of these aquatic plants.
Climate Change

The First Foods—water, salmon, game, roots, and berries—have been the cornerstone of tribal sustenance and culture for thousands of years. Over time, under relatively stable climatic conditions, the tribes gathered the knowledge to maintain and nurture these resources for each succeeding generation.

With a shifting climate, this ecological balance has been disturbed. Harvest timing, animal migration patterns, and other impacts are being noted throughout the region. Climate change affects ecological systems at broad spatial scales including the First Food resources and habitats.

Climate Change Research

CRITFC has assisted its member tribes in development of adaptive management strategies and tools to help protect their First Foods, including salmon and lamprey, in a changing climate. The research also evaluates efforts designed to mitigate climate change-related effects such as increased water temperatures though projects designed to provide cold water refuge for migrating salmon, lamprey, and sturgeon.

Research efforts focused on modeling future changes to water temperature in certain Columbia River subbasins and assessing impacts on fish species and communities. The CRITFC Information System (CIS) simulation tool was created to analyze the impacts of future climate change scenarios on Columbia Basin river flows and their implication for hydroregulation and fish habitat and survival. The CIS model development was done in collaboration with BPA staff and the 15 Columbia Basin tribes. More information can be found at http://www.critfc.org/climate.

Projected Climate Change Impacts

- Higher summer water temperatures in waterways and reservoirs will stress both juvenile and adult fish, affecting migration timing and survival and may benefit non-native predatory fish evolved to warmer climates.
- Lower summer flows will increase competition for limited water supplies in tributaries and mainstem rivers for different uses (hydropower, irrigation, fish migration).
- Higher peak winter flows will cause erosion of sediment that can damage salmonid spawning areas, scour eggs, and “wash out” the emerging fry of fall-spawning populations.
- Earlier spring runoff will alter smolt migration timing in snowmelt-dominated systems. Migration patterns naturally evolved to move juveniles to the ocean at the same time that ocean upwelling delivers important food sources.
- Fish populations at the greatest risk of extinction will likely be those already in habitats that are near the limits of their thermal tolerance and with less resilience and diversity.
- Changing ocean conditions (warmer and increased acidification) will alter the marine food web, impacting salmonids.
- Sea level rise will likely reduce coastal estuarine habitats used by juvenile salmon.

Benson Glacier

Benson Glacier in the Wallowa Mountains of eastern Oregon. The top image shows the glacier in 1920 while the bottom shows the same location in 2009.

By the 1920s, Benson Glacier was the only remaining glacier in this once heavily glaciated mountain range. Today it is unclear if it is still an active glacier or a perennial snowfield.
During the past 40 years, institutions have been established to manage restoration of anadromous fish in the Columbia Basin as well as to manage fisheries. Using the authorities of their participating governments, these structures are intended to focus personnel and resources on the tasks of restoration in an efficient and effective manner. Participation in the LRT Fish Accords, NPCC Fish and Wildlife Program, regional fish and wildlife programs and processes, and harvest management forums requires significant and extensive coordination and collaboration. Tribal staff participate in over a hundred different workgroups, workshops, and education and outreach opportunities. A few of the most significant collaboration forums are listed below.

**Federal Columbia River Power System Operations**

The CRITFC member tribes participate in many coordination forums related to the operation and maintenance of the Federal Columbia River Power System to support benefits for salmon and steelhead.

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**Regional Implementation Oversight Group**

The Regional Implementation Oversight Group (RIOG) provides sovereign policy review for implementing the NOAA Fisheries and US Fish & Wildlife Service’s Federal Columbia Power System (FCPSS) biological opinions. The RIOG brings together federal, state, and tribal agencies with the common aim of salmon protection as it relates to hydro system operations. The RIOG structure includes decision-making forums where federal, state, and tribal agencies work together. These structures are intended to ensure the success of the restoration and recovery of salmonids in the Columbia River Basin.

The Technical Management Team (TMT) is responsible for coordinating dam and reservoir operations to comply with the FCPSS biological opinions. It meets weekly during the fish passage season to adjust spill and flow levels at the FCPSS dams. The TMT also develops an annual water management plan that addresses runoff forecasts and flood control operations, as well as fish operation requirements in the biological opinions.

**System Configuration Team**

The System Configuration Team (SCT) is responsible for planning and oversight of structural improvements to fish passage facilities and related studies called for in the FCPSS biological opinions. Each fiscal year, the SCT goes through a process of selecting, setting priorities for, and budgeting fish passage projects and related research.

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**Fish Passage Operations and Maintenance**

The Fish Passage Operations and Maintenance (FPOM) workgroup provides a forum for regional coordination, gathering information and development of recommendations on the operation, maintenance and construction procedures or activities which may affect fish passage through eight lower FCPSS dams.

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**Fish Passage Advisory Committee**

The Fish Passage Advisory Committee (FPAC) provides coordinated, technical, fish passage, and hydrological recommendations to assist the salmon managers and regional forums in making management decisions that protect, mitigate, and enhance fish and wildlife. FPAC serves as a technical forum to exchange, review, and analyze fish passage, river operations, mainstream research, and related information. FPAC works collaboratively with all entries within the FCPSS and Columbia basin to coordinate and provide the best possible seasonal management of the available water for the benefit of anadromous and resident fish throughout the basin.

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**United States v Oregon Fisheries Management Agreement**

Fisheries in the Columbia River are managed subject to provisions of United States v. Oregon under the continuing jurisdiction of the federal court. The previous 2008-2010 and the current 2018-2027 United States v. Oregon Management Agreement provides the framework for managing fisheries and hatchery programs in much of the Columbia Basin.

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**Future of Our Salmon Conference**

The Future of Our Salmon workshops and conferences brought together tribal, First Nation, federal, provincial, state, city, and utility representatives, Indian and non-Indian sport and commercial fishers, environmental organizations, NGOs, and the interested public to tackle complex technical and policy issues in the Columbia Basin. As we look at transboundary governance and management issues, these conferences were instrumental in facilitating dialogue, creating a common vision for restoration, and developing a unified strategy among the entire region. Each conference had a theme:

- **2011**: A Vision of Restoration in the Columbia River Basin
- **2012**: A Focus on Hatchery Policy
- **2014**: Restoring Fish to all Historic Locations in the Columbia River Basin (co-hosted by fifteen US tribes and seventeen Canadian First Nations)
- **2016**: Healthy Floodplains, Living Rivers (co-hosted by fifteen US tribes and seventeen Canadian First Nations)

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**Columbia River Fish and Wildlife Program**

The majority of work conducted under the Northwest Power and Council’s Fish and Wildlife Program is focused directly on protecting, mitigating and enhancing salmon and steelhead affected by the development and operation of the hydroelectric dams in the Columbia Basin.

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**NPCC Fish and Wildlife Committee**

The NPCC Fish and Wildlife Committee meets monthly in an effort to strengthen the NPCC’s position as a recognized, credible, and objective hub for regional fish and wildlife planning information and analysis. The CRITFC member tribes send representatives to attend and participate in the monthly meetings of the committee.

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**NPCC Workshops and Workgroups**

The NPCC’s 2014 F&W Program is committed to an adaptive management approach that uses research and monitoring data to understand, at multiple scales, how program projects and measures are performing, and to assess the status of focal species and their habitat. The NPCC hosts numerous workshops and workgroups to coordinate input from the tribes and others into the many facets of developing, implementing, and evaluating the Fish and Wildlife Program.
Looking Forward

Completed in 1995 and updated in 2014, Wy-Kan-Ush-Mi Wa-Kish-Wit: The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes provides a framework for regional fish restoration. Its goal is simple: put the fish back into the rivers. As our tribes continue to make strides in implementing our 25-year plan, the Columbia Basin Fish Accords have been instrumental in providing the resources necessary to not only carry out the restoration work, but also facilitate finding new or expanded solutions to our plan’s institutional, technical, and community development recommendations. The Fish Accords also helped streamline regional decision-making and greatly improved coordination and relationships among the tribes and federal and state governments. As we face increasing uncertainties regarding the future of our salmon, it is now more important than ever that we continue to come together as a region to coordinate our efforts.

Without the Fish Accords, the tribes would have faced significant uncertainty in implementing their vision to maintain and enhance salmon populations outlined in Wy-Kan-Ush-Mi Wa-Kish-Wit. The Fish Accords brought a level of certainty and stability by providing guaranteed funding for ten years for a wide variety of tribal projects benefiting listed and non-listed fish affected by the Federal Columbia River Power System.

The cooperative relationship the Fish Accords fostered allowed all the partners to work together on our mutual commitments and to resolve issues regarding FCRPS compliance with the Northwest Power Act, Endangered Species Act, Clean Water Act, and other applicable laws. The long-term funding commitments called for in the Accords improved project implementation and secured projects that could not have been accomplished otherwise. The tribes established strong working relationships with local partners through implementation of large complex projects that protect habitat for salmon, steelhead, and lamprey. The Accords ensured adequate spill and passage measures for juvenile fish and supported research to improve spill operations in the future.

As the Fish Accords period ends, the tribes are considering the best path forward. The tribes are experts in working in their watersheds. The tribes have expertise understanding physical, biological and cultural resources at stake in protecting and restoring fish and wildlife in their traditional homelands. BPA has expertise in assuring compliance with federal law and policy in bringing projects to fruition. By working together, the tribes and BPA are bringing their respective areas of expertise together for the benefit of all.

In addition to all of this, the BPA is facing a rapidly changing energy market that is challenging its ability to provide power at competitive rates. In January 2018, BPA adopted a Strategic Plan that describes the actions it will take over the next several years to become more competitive and responsive to customer needs, to leverage and enable industry change through modernized assets and system operations, and to deliver on their public responsibilities through a commercially successful business.

The actions described in this summary report must continue. While the FCRPS faces considerable uncertainty, there is no question that the fate of salmon, steelhead, lamprey, and sturgeon in the Columbia River face an even greater uncertainty. The tribes will continue to strongly advocate for adequate funding and certainty of actions. We will to work with our numerous partners through collaborative efforts to ensure benefits to the fish, wildlife, and environment continue for future generations.

Salmon and the rivers they use are part of our sense of place. The Creator put us here where the salmon return. We are obliged to remain and protect this place.

Bobby Begay, Yakama