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Salmon's Journey

Connecting the ocean to the
land, nourishing ecosystems,
and sustaining human
cultures



Returning Home with the Bounty of the Sea

The ecosystem of the Pacific Northwest is built on the epic effort and sacrifice of salmon.

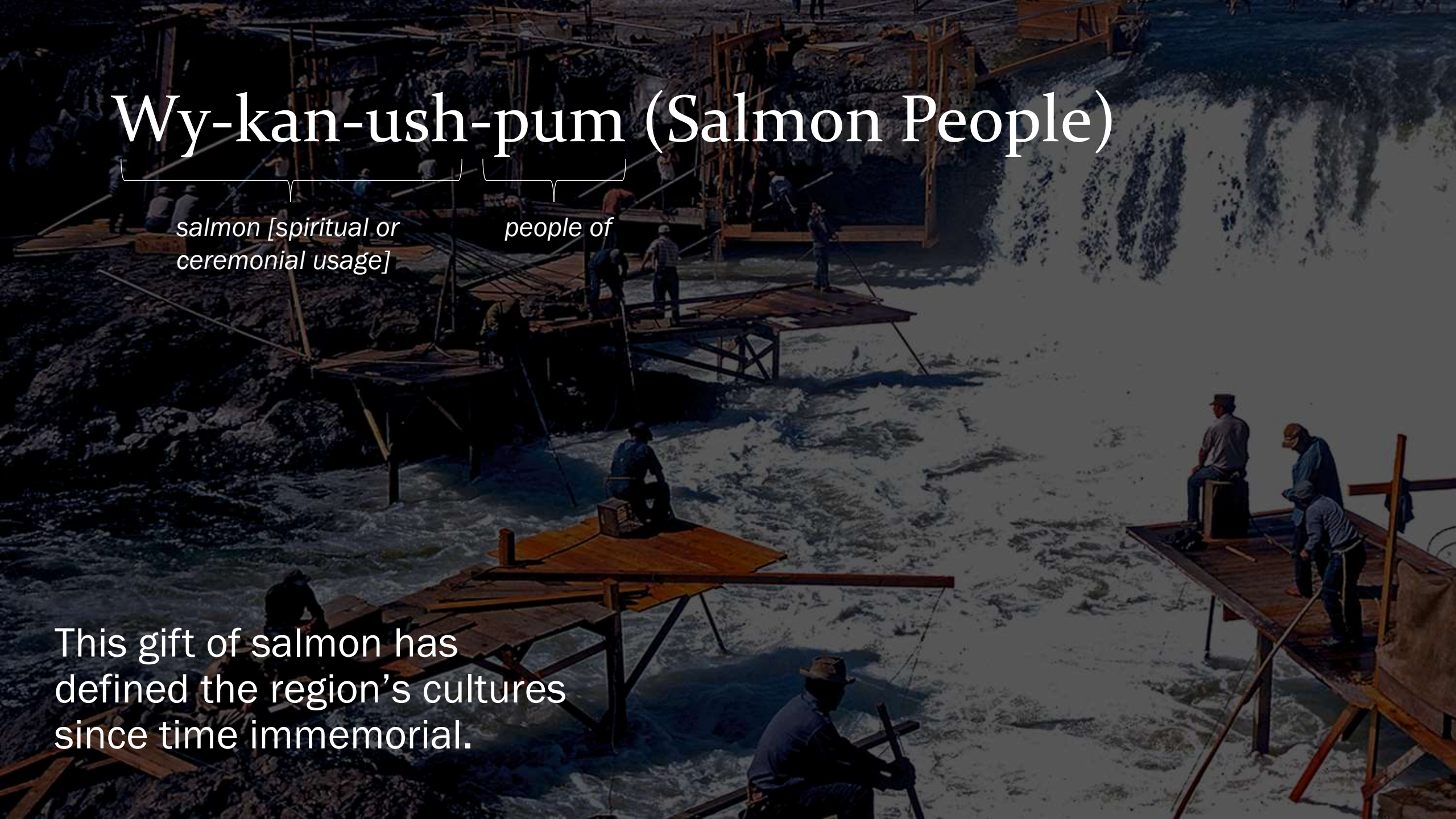
Animals, plants, and people hundreds of miles from the coast partake in the richness that salmon return from the ocean.

Wy-kan-ush-pum (Salmon People)

salmon [spiritual or ceremonial usage]

people of

This gift of salmon has defined the region's cultures since time immemorial.



Wy-kan-ush-pum (Salmon People)

salmon [spiritual or ceremonial usage]

people of

Historically salmon comprised half of the calories consumed and even today, the tribal fish consumption rate is over 10x the US average.



Wy-kan-ush-pum (Salmon People)

salmon [spiritual or ceremonial usage]

people of

The abundance and efficient drying courtesy of constant Columbia Gorge winds allowed salmon to be a significant trade good that drove the region's economy.



Wy-kan-ush-pum (Salmon People)

salmon [spiritual or ceremonial usage]

people of

The return of salmon each spring is a time of celebration, thanksgiving, prayer and feasts in longhouses throughout the Columbia Plateau.



Treaties

“...the exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians, and at all other usual and accustomed stations in common with citizens of the United States, and of erecting suitable buildings for curing the same.”

—Treaty with the Walla Walla, Cayuse, etc., 1855



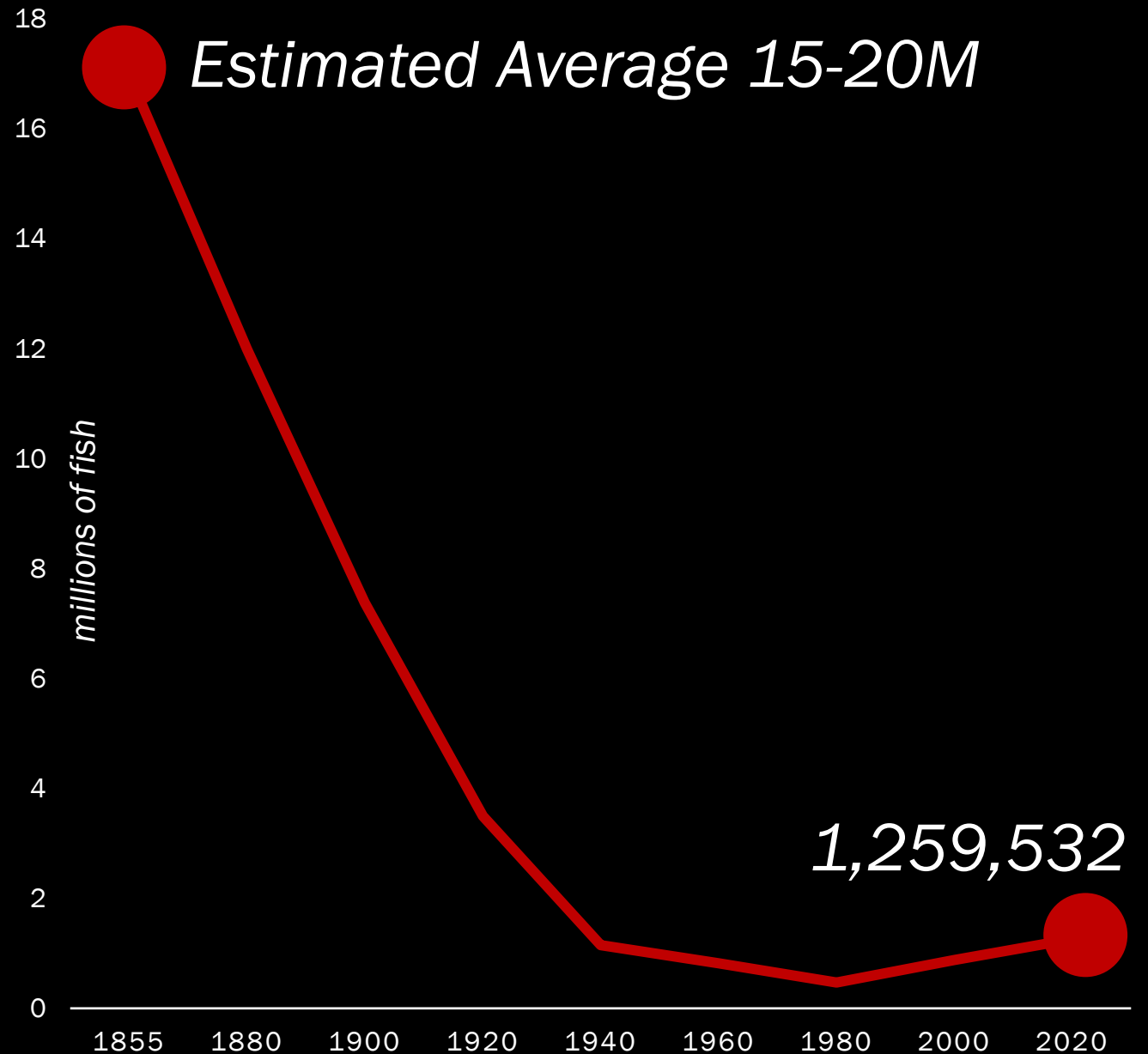
Treaties

The combined area of the four Columbia River treaty fishing tribes' ceded lands covers 25% of the Columbia Basin and is 88% of the basin above Bonneville Dam that is still accessible to salmon.



Salmon Decline

From the signing of the treaties to the present, the numbers of returning salmon have declined by as much as 90 percent, with some runs facing the threat of extinction.



1855: NPCC historical run extrapolation estimate; 1880-1920 data points extrapolated from Columbia River cannery output; 1940-present: dam counts and river mouth estimates

Salmon Decline

Overharvest

The first Columbia Basin commercial salmon cannery opened in 1866.

By 1883, the combined production of 39 Columbia River canneries exceeded 42 million lbs. of salmon annually.



Salmon Decline

Habitat Loss

Clearcutting, in-river timber transport, and placer mining from the 1860s to 1940s decimated stream substrates and increased erosion, negatively impacting salmon spawning, rearing, and migration.



Salmon Decline

Hydropower Development

During the early- to mid-century, 14 Columbia River and 20 Snake River dams were built.

Three of these major dams were built without fish passage, cutting off salmon access to vast areas of the Columbia Basin.

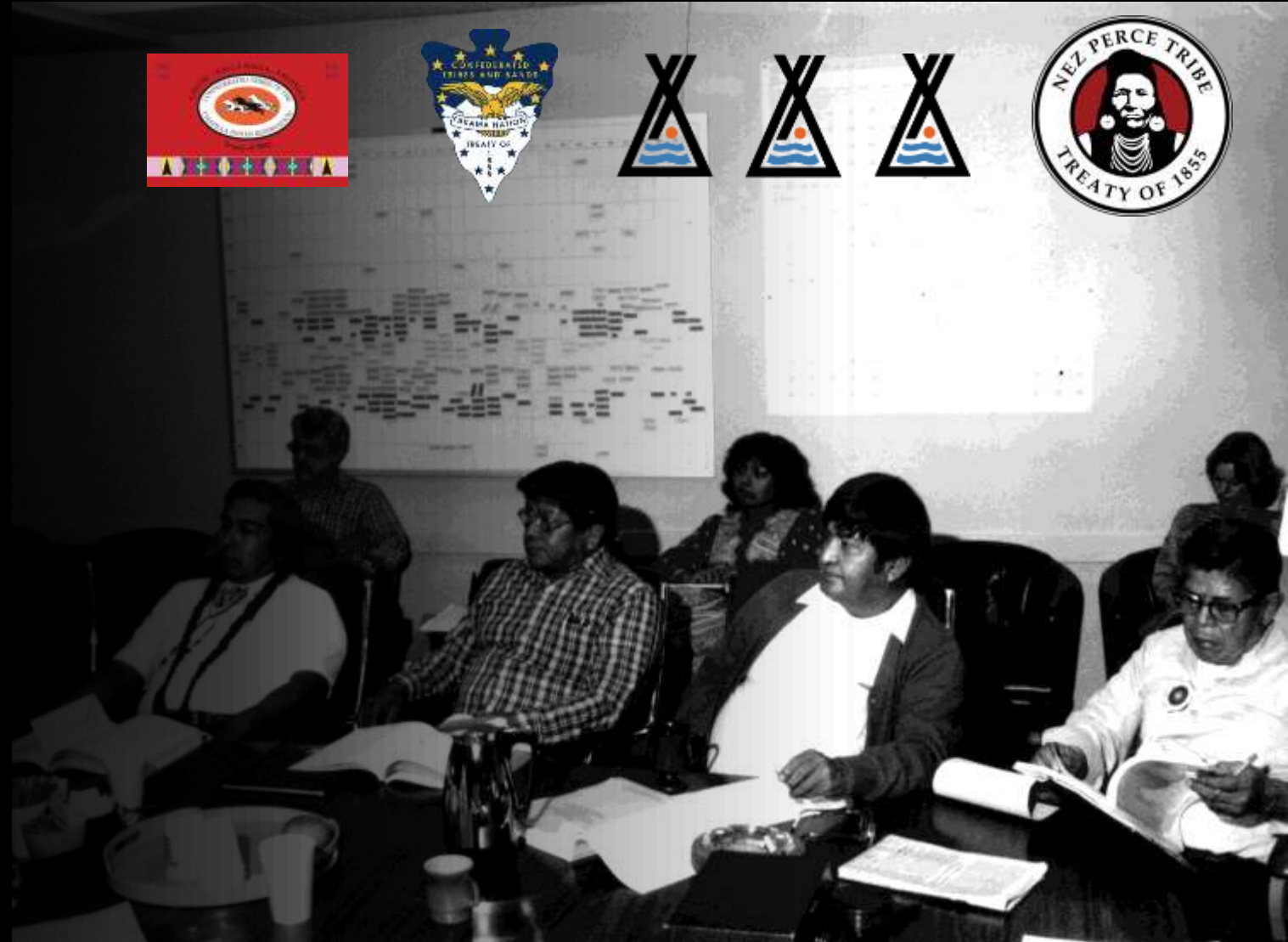


President Franklin D. Roosevelt at the dedication of Bonneville Dam, 1937

Unity of Action

Faced with the prospect of losing salmon, the four Columbia River treaty fishing tribes came together in 1977 to establish the Columbia River Inter-Tribal Fish Commission in order to coordinate their fisheries management responsibilities and work toward reversing this decline.

Their goal: put fish back in the rivers and restore the watersheds where fish live.



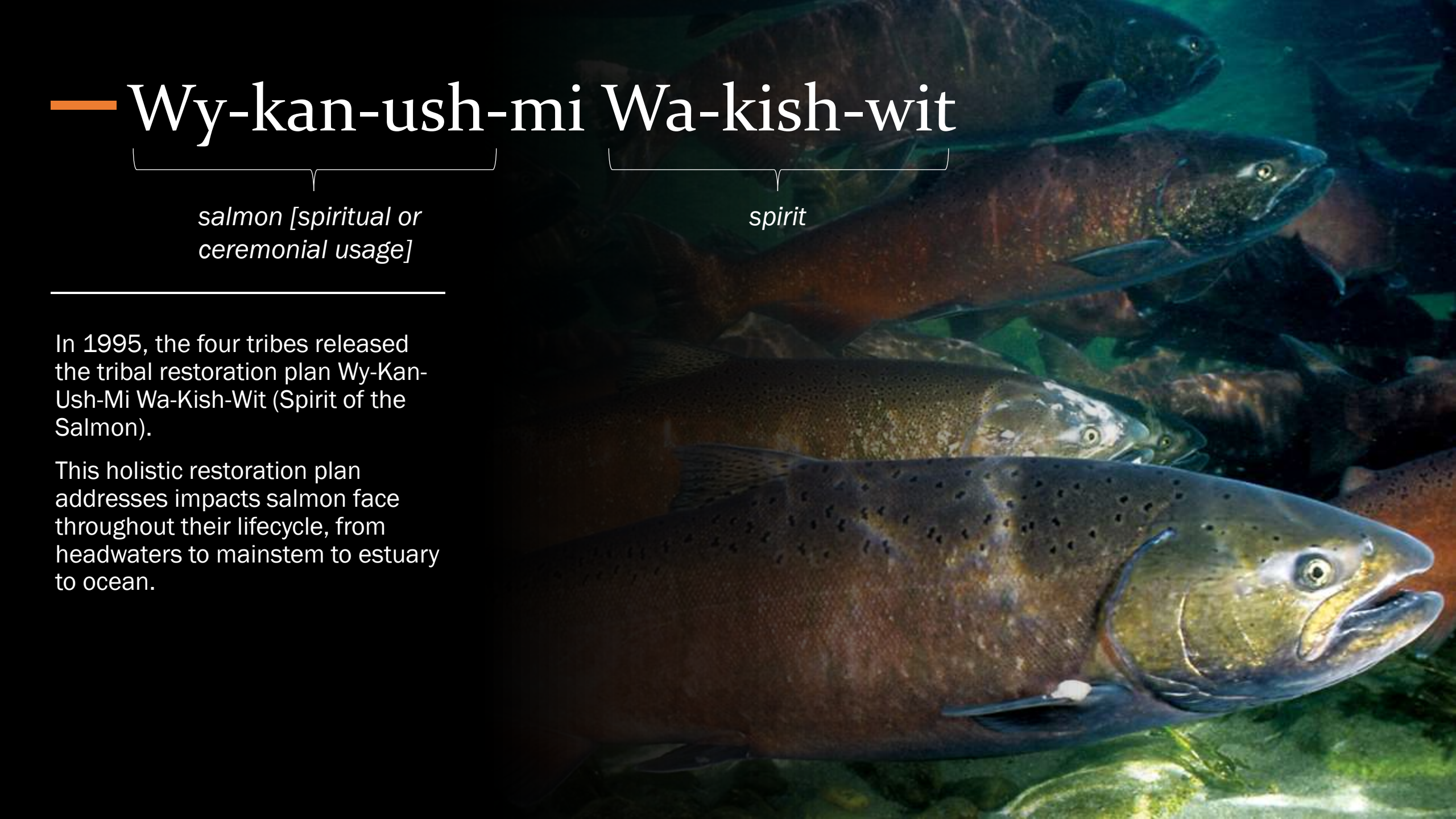
A CRITFC commission meeting in the late 1970s



Unity of Action

CRITFC has grown to operate in locations throughout the Columbia Basin from Hagerman, Idaho all the way to the Pacific Ocean.





— Wy-kan-ush-mi Wa-kish-wit

salmon [spiritual or ceremonial usage]

spirit

In 1995, the four tribes released the tribal restoration plan Wy-Kan-Ush-Mi Wa-Kish-Wit (Spirit of the Salmon).

This holistic restoration plan addresses impacts salmon face throughout their lifecycle, from headwaters to mainstem to estuary to ocean.



Restoration Successes

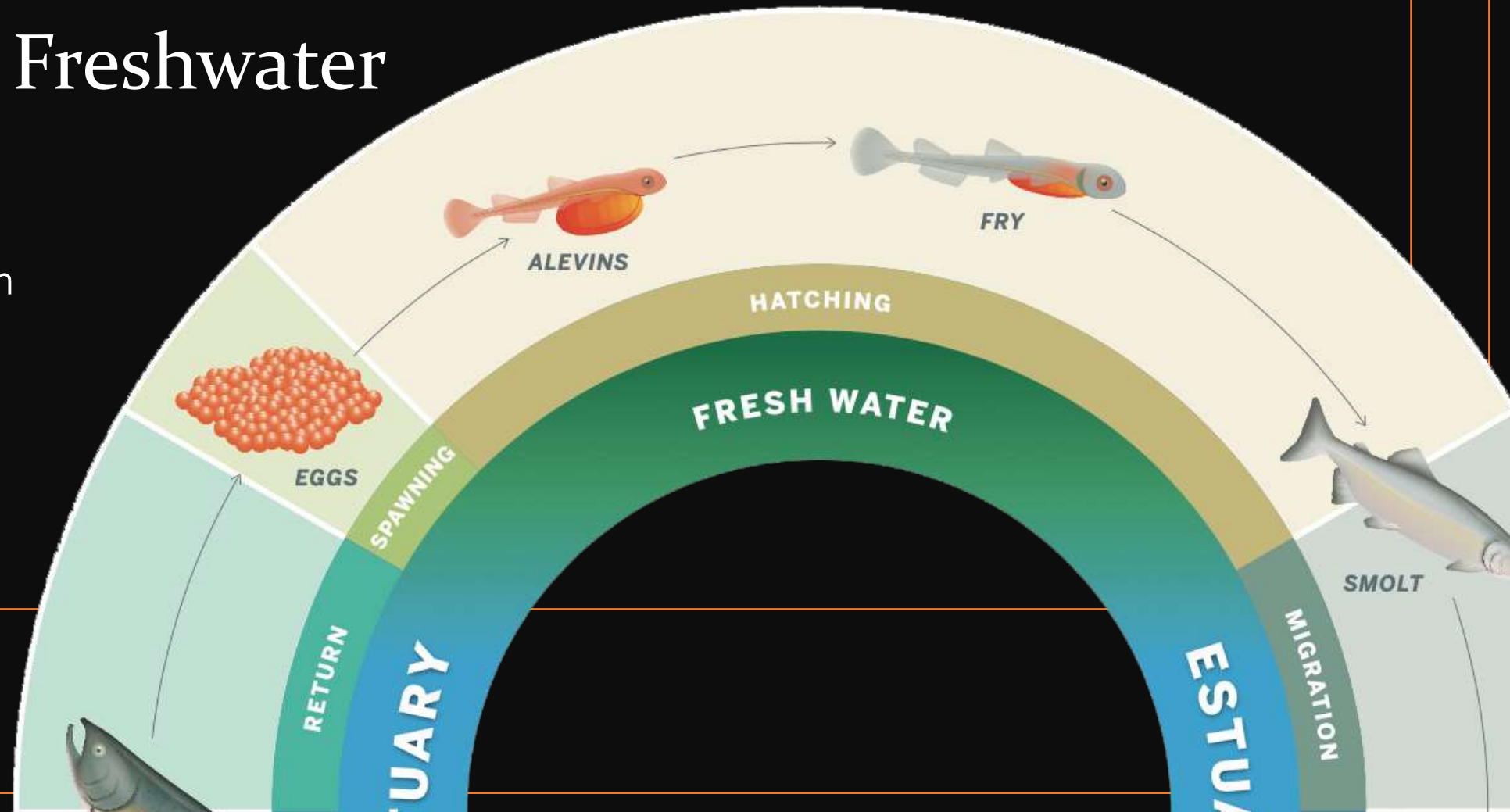
In implementing this plan, CRITFC and its member tribes have gained extensive experience and success in restoring headwaters and fighting for better conditions in the mainstem.

This has resulted in promising reversals of salmon population declines and the repair of damaged habitat throughout the Columbia Basin.

Meacham Creek on the Umatilla Reservation, site of a major CTUIR habitat restoration project

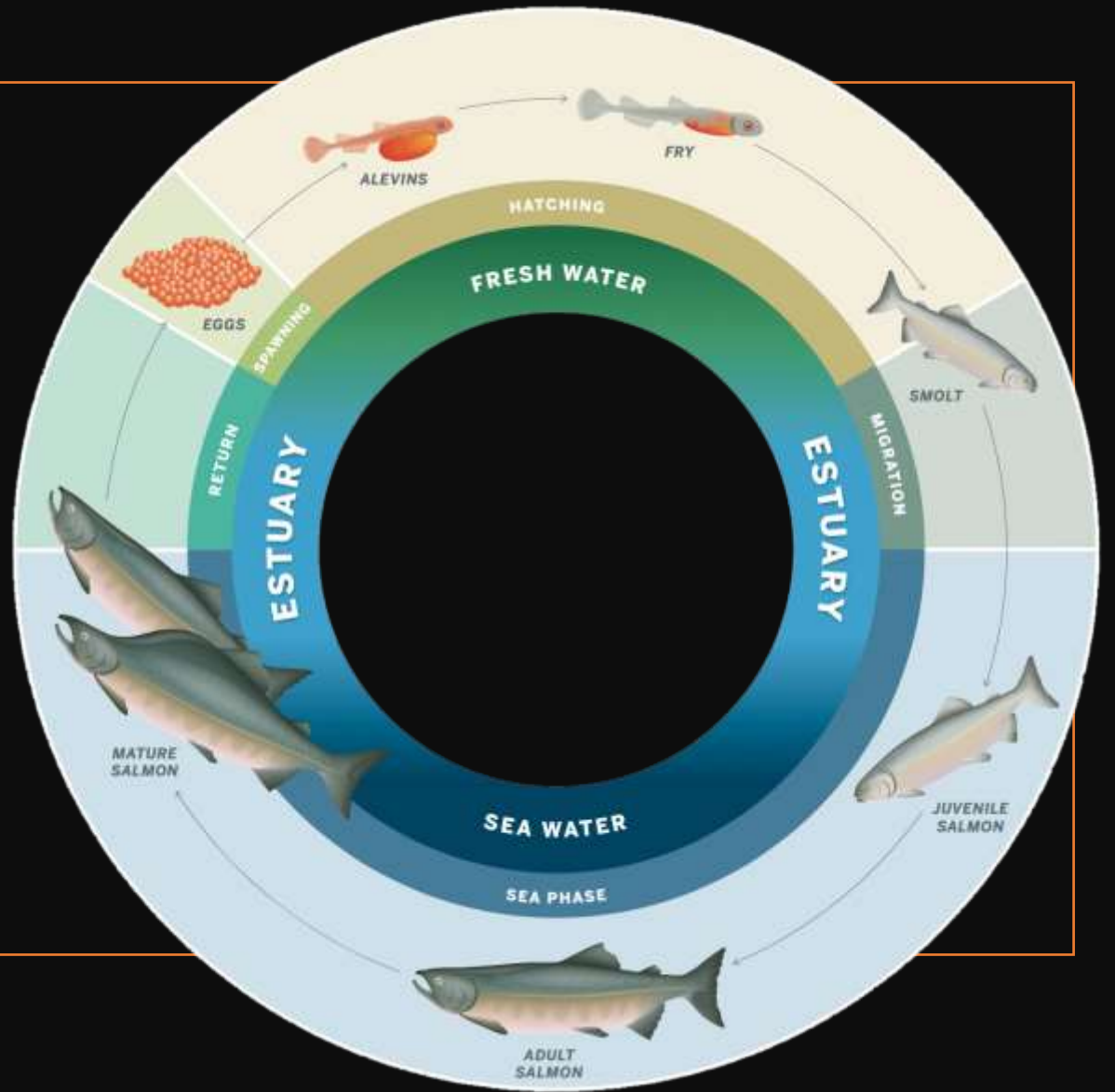
Focus on Freshwater

Most of this work has been in the freshwater portion of the salmon's lifecycle.



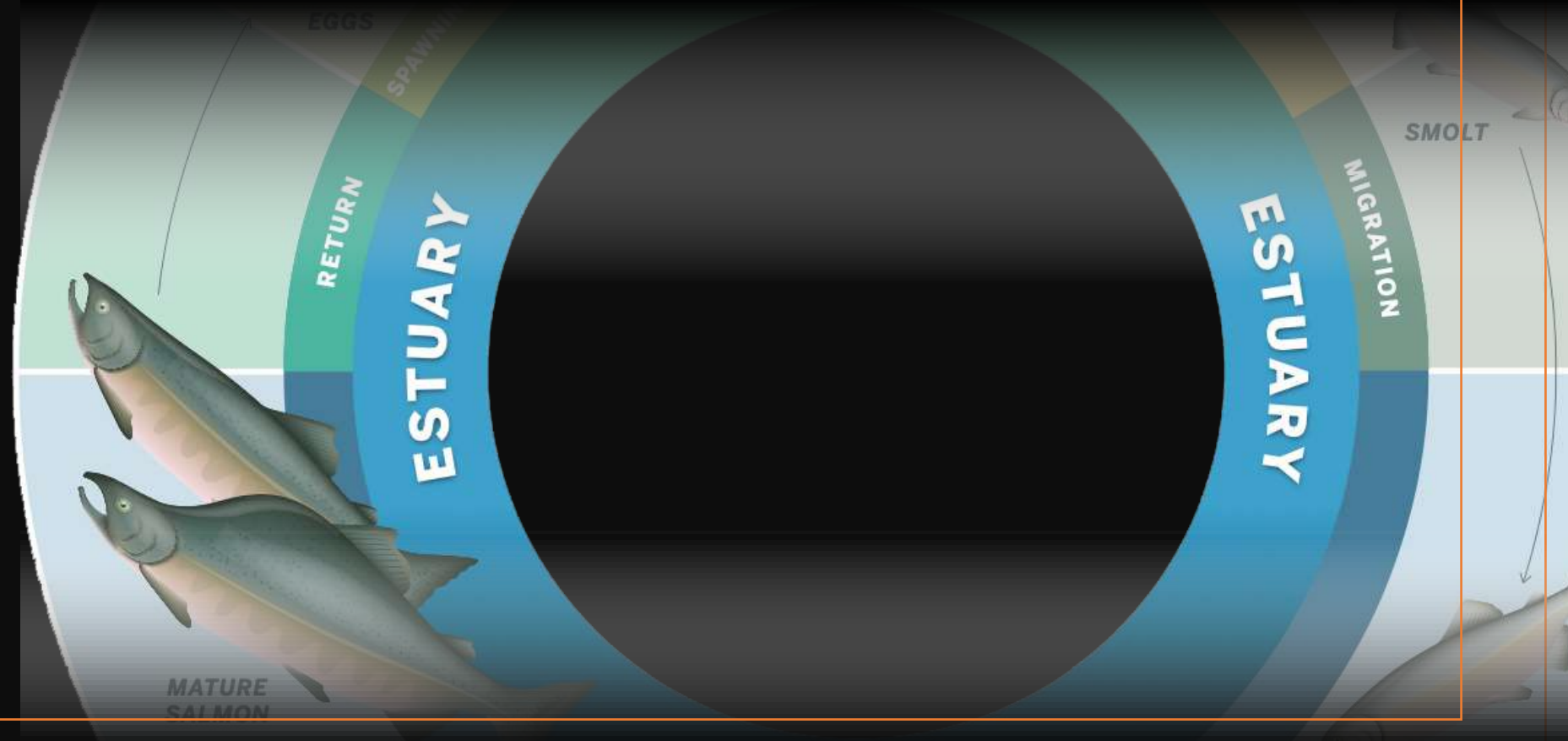
Completing the Circle

However, over the last 30 years of implementation, tribal leaders and professionals have reiterated the importance of addressing the **estuary and ocean connection** that needs to be incorporated into this work.



Estuary

This is especially true in the Columbia River estuary, where salmon make the remarkable transition from freshwater to saltwater and back.



Fate of Salmon is Tied to the Estuary

The time salmon spend in the estuary is one of the most important but also fraught segments of their life cycle.



Fate of Salmon is Tied to the Estuary

Tidal wetlands and estuary floodplains provide important habitat for juvenile salmon, which can spend up to five months here as they transition to living in salt water.



Fate of Salmon is Tied to the Estuary

Arthropods washed out of wetlands are a vital food source for migrating juvenile salmon as they prepare for life in the ocean.



Fate of Salmon is Tied to the Estuary

The varied conditions of the estuary facilitate diverse life histories within salmon populations, which support greater resilience.



Fate of Salmon is Tied to the Estuary

Climate change is creating deadly impacts in the estuary, too.

Incidents of low oxygen levels (hypoxia) in ocean water will likely increase with climate change. If this low oxygen water enters the estuary during high tide, it may have an impact on out-migrating juvenile salmon.



Die-off of Dungeness crabs on the Oregon Coast in 2022 following a hypoxia event



Furthering Our Understanding of the Estuary

For nearly 30 years, the Coastal Margin Observation and Prediction program has been a nationally renowned ocean and estuary research effort dedicated to further our understanding of the linkages between the Columbia River and the Pacific Ocean.



CMOP
Center for Coastal
Margin Observation
& Prediction



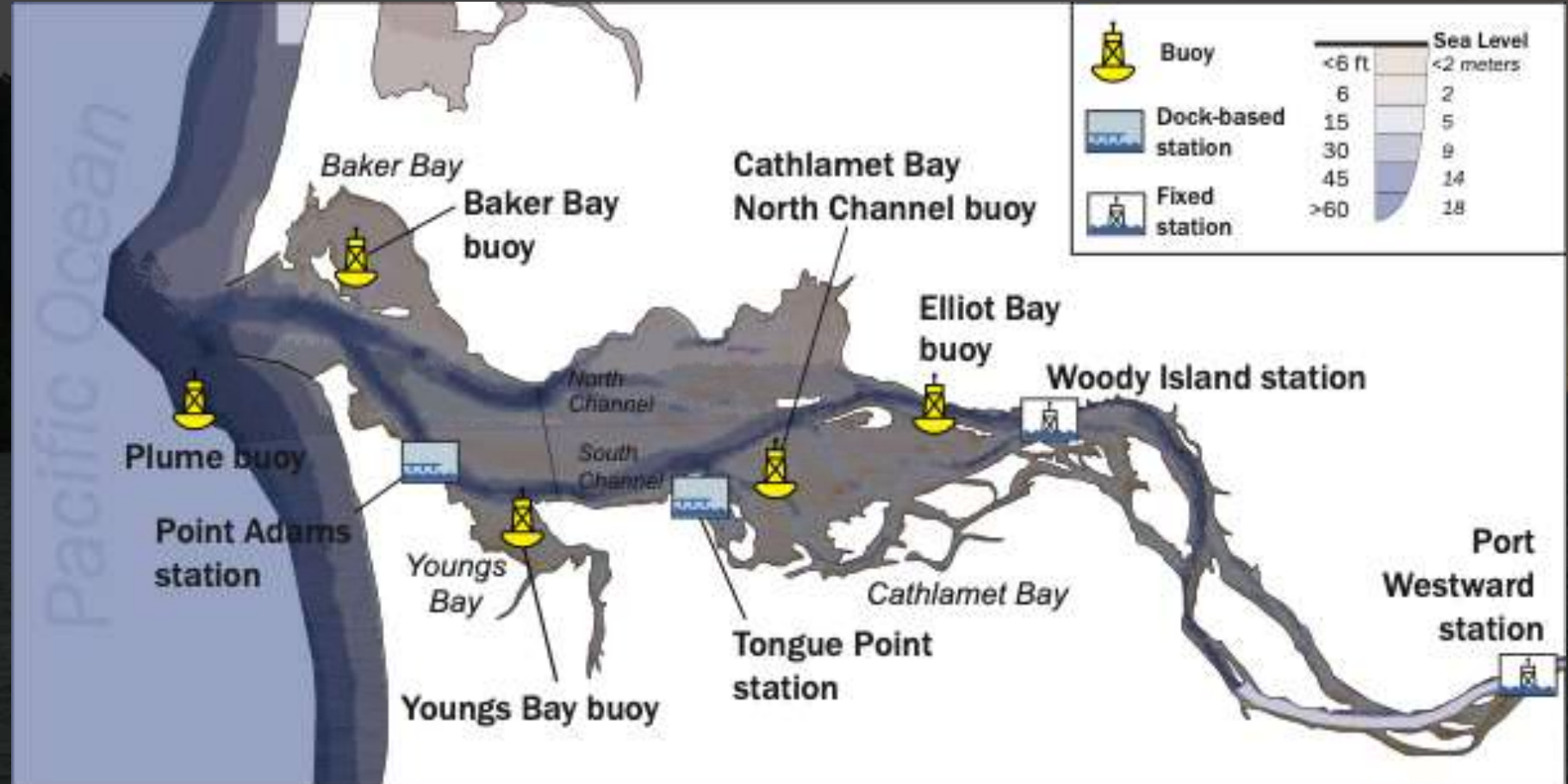
Furthering Our Understanding of the Estuary

CRITFC assumed stewardship of CMOP in 2020 to ensure the continuation of its long-term monitoring work and to provide tribal oversight to its estuary modeling and monitoring efforts.



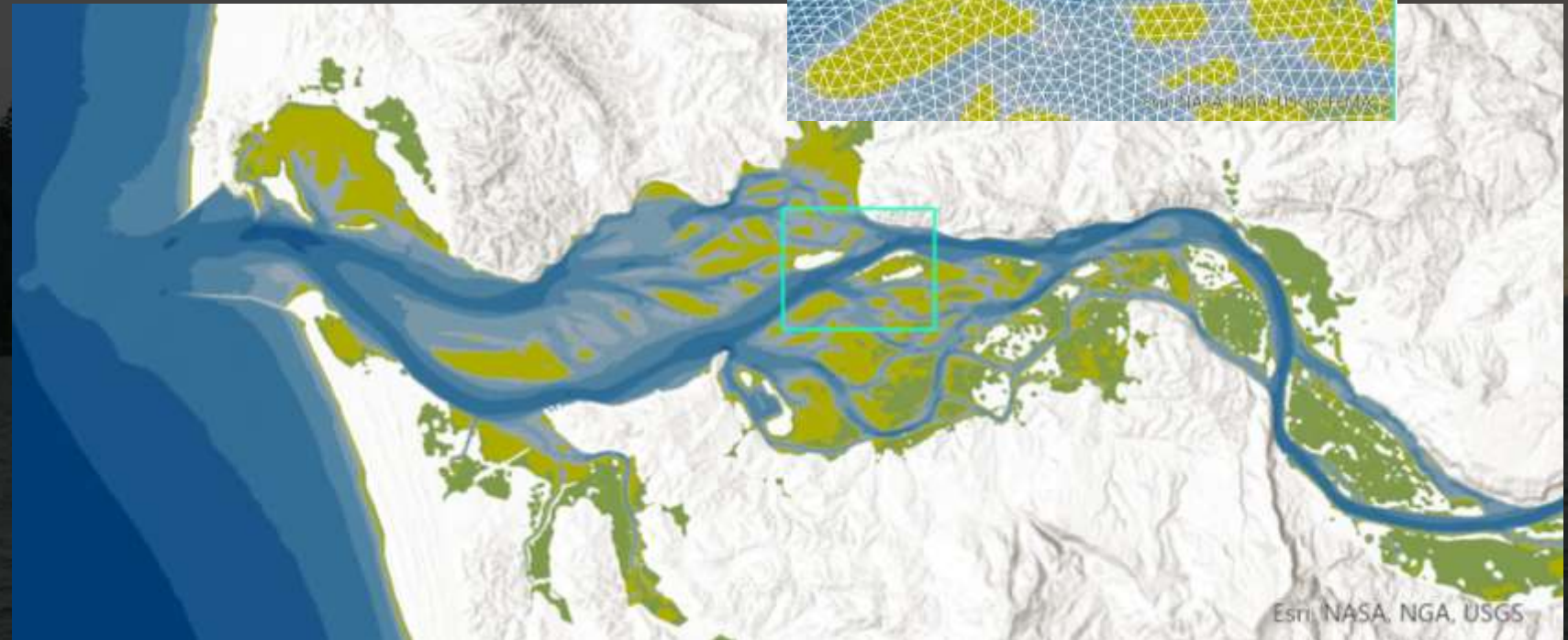
Current Work

Long-term monitoring for potentially harmful changes in estuary and ocean water properties, such as temperature and dissolved oxygen.



Current Work

Predictive modeling
of floodplains and
tidal wetlands in the
face of climate
change





Preparing for Future Changes

Climate change impacts to ocean habitat affect salmon survival.

Ocean survival is falling, and is predicted to fall substantially under climate change (Crozier et al, 2021)

While restoration of rivers and streams may be able to offset increasing losses at sea, we must also look at ways to counteract climate impacts at sea.



Preparing for Future Changes

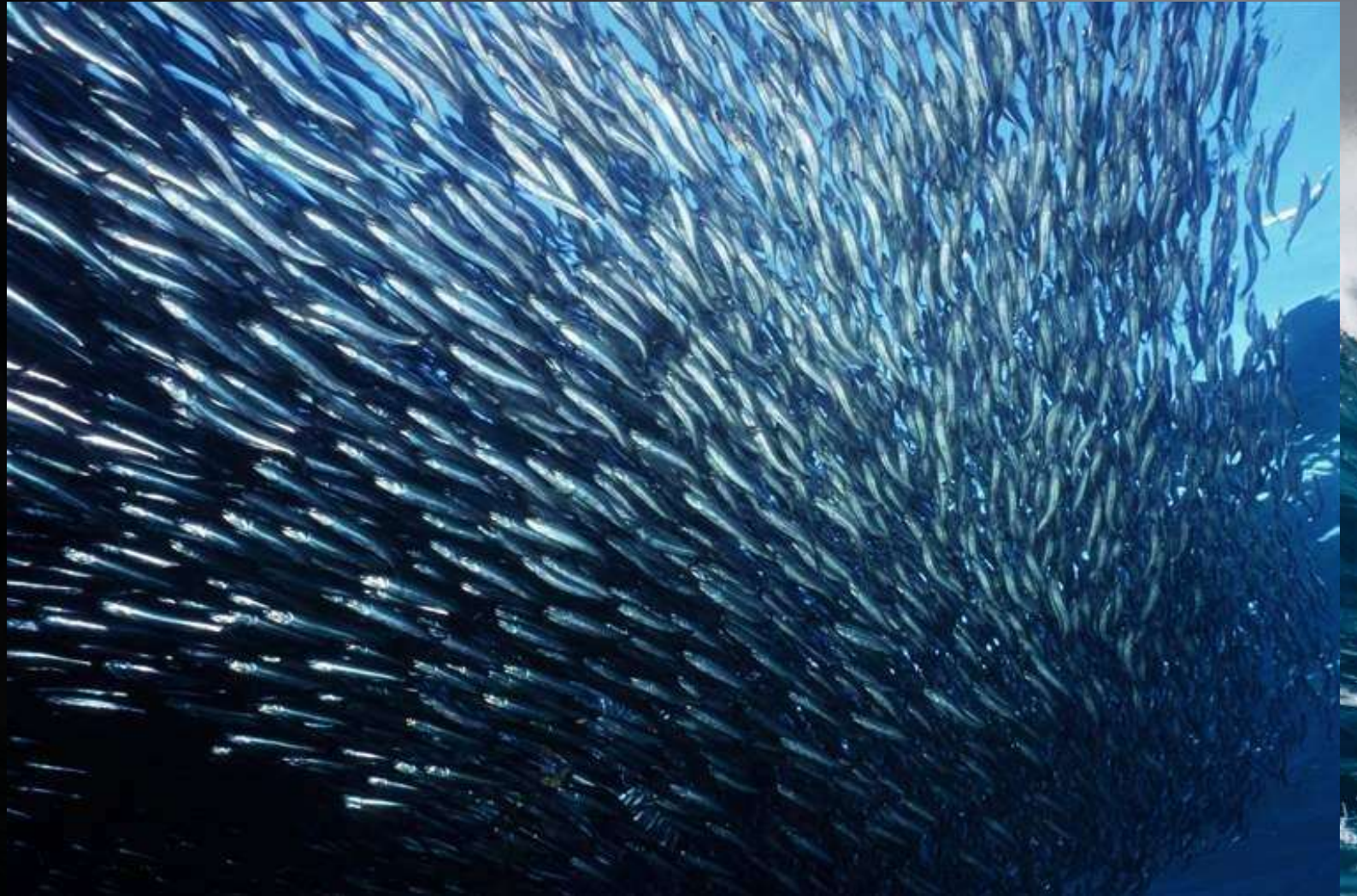
Commitment to gaining a greater understanding of ocean ecology of salmon and developing new ocean indicators of salmon survival.



Preparing for Future Changes

Consider active management of other marine species to benefit salmon (e.g. through increasing other forage fish abundance to decrease avian predation pressure on salmon)

[this is an idea that NOAA/Brian Burke raised in a recent talk to the NPCC].



Using Ocean Tools to Help the Columbia

CMOP's research on ocean/estuary interactions is also benefitting salmon further inland.

The tribes using this research to improve the function of the tributary deltas along the Columbia River mainstem.

White Salmon delta reshaped after Condit dam removal.



An aerial photograph of a river delta. A large dam is visible in the middle ground, with a bridge crossing the river just upstream. The river branches out into several channels, creating a complex delta system. The surrounding landscape is a mix of green fields and brown, eroded hills. The water in the delta is a mix of blue and brown, indicating sediment transport.

Tributary Delta Impacts on Salmon

Like the Columbia River estuary at the Pacific Ocean, the interface between tributaries and the Columbia River mainstem can be both beneficial and dangerous for salmon.





Tributary Delta Impacts on Salmon

Some tributary deltas in the Bonneville pool create cold water refuges for returning adult salmon.



Tributary Delta Impacts on Salmon

Shallows in the deltas created by the slowed river flow have become bottlenecks of birds and fish that prey on out-migrating juveniles



Tributary Delta Impacts on Salmon

Backwaters create hot pools at some deltas



My Strength is From the Fish

Furthering our understanding of the rich, complex, and dynamic Columbia River estuary system has far-reaching impacts and helps us in the goal of protecting and restoring salmon that nourish the entire region.

