



Planning for Climate Change Impacts to the Columbia River Treaty Tribal Resources

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First Foods



Berries

Salmon

Water

Game

Roots



“...the right of taking fish at all usual and accustomed places, in common with the citizens of the Territory, and of erecting temporary buildings for curing them: together with the privilege of hunting, gathering roots and berries....”

—1855 Treaty with the Yakima

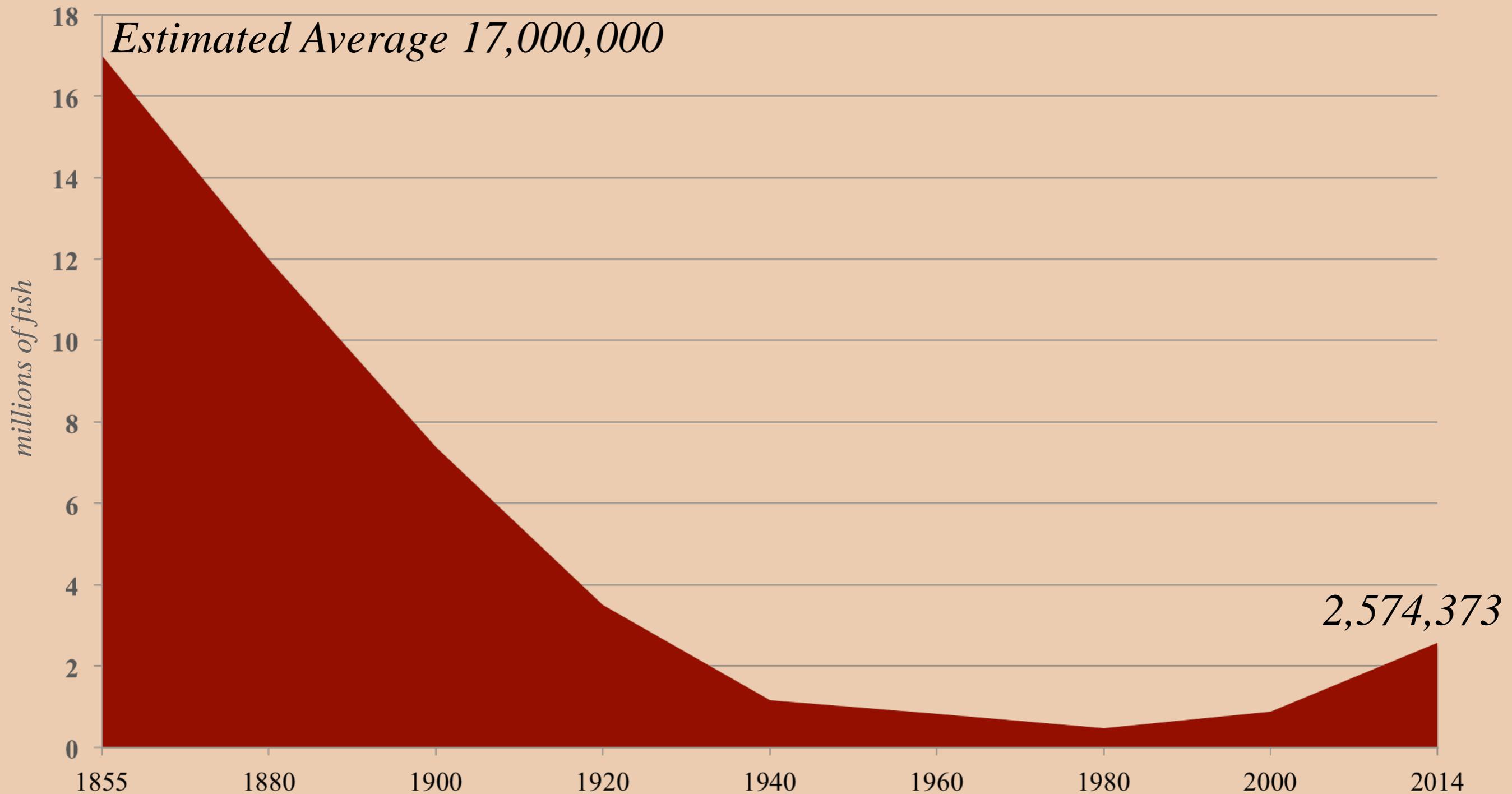


Celilo Falls Tribal Fishery

On the Columbia River near The Dalles, Oregon
(inundated by The Dalles Dam in 1957)

Salmon Decline

Returning Columbia River salmon (chinook, steelhead, sockeye, coho)



CRITFC Formed in 1977

Mission Statement:

To ensure a unified voice in the overall management of the fishery resources, and as managers, to protect reserved treaty rights through the exercise of the inherent sovereign powers of the tribes.



CRITFC Mission



- Put fish back in the rivers
- Protect treaty fishing rights and sovereignty

- Share salmon culture
- Provide fisher services

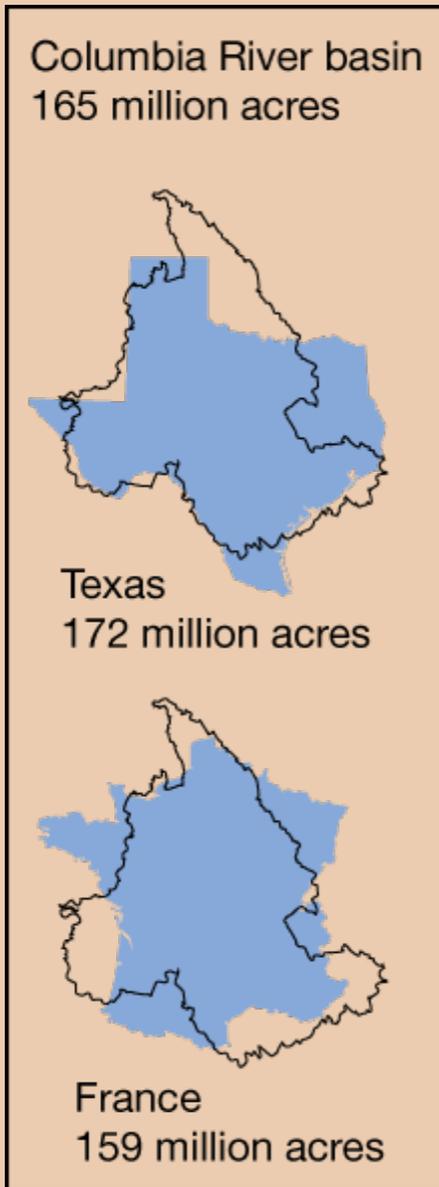


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Indion Boy with Eels, Oregon



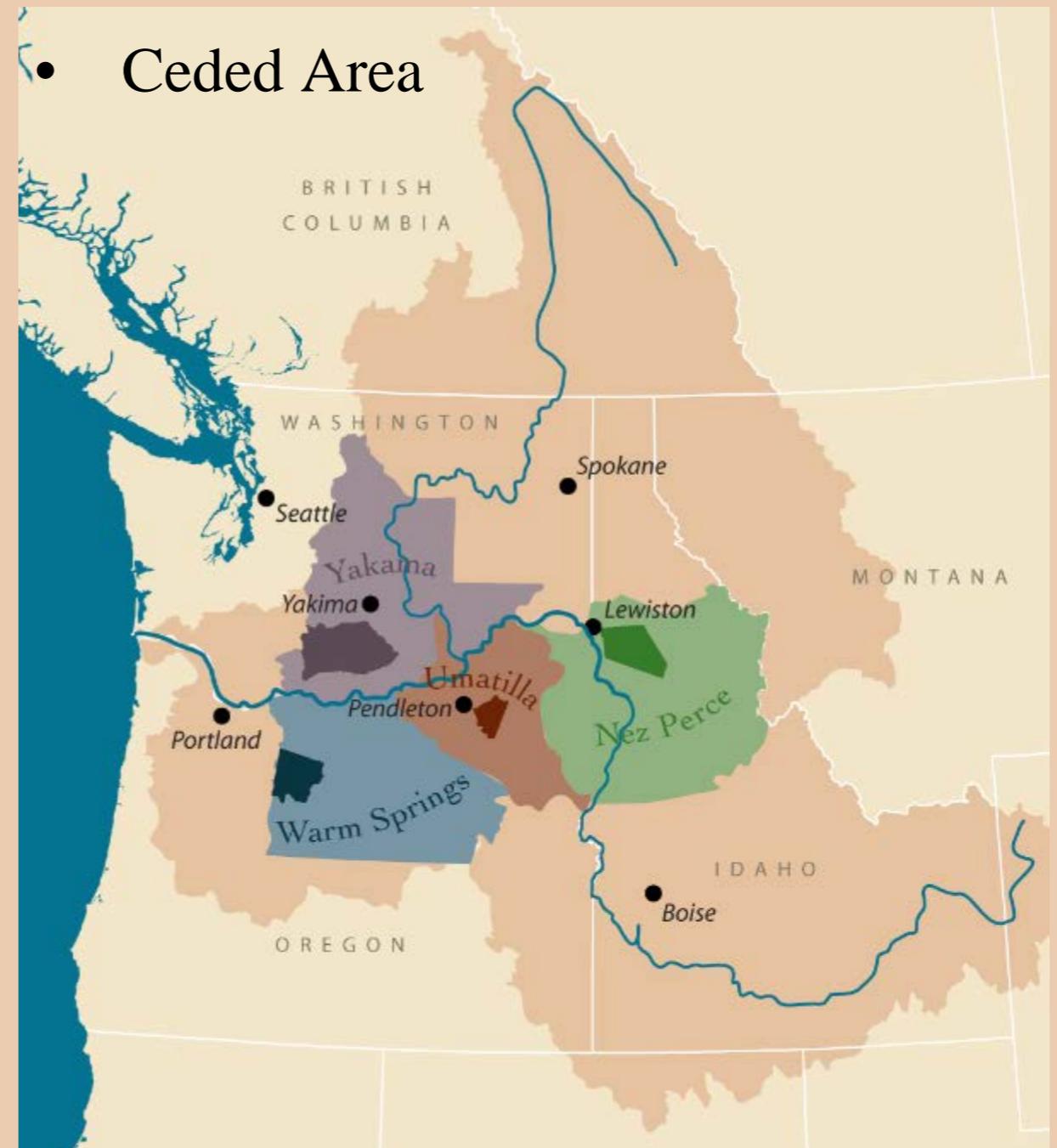
Columbia River Basin



Four Tribes' Ceded Lands

Combined ceded area:

- 66,591 square miles
- More than 25% of the entire Columbia Basin
- 55% of the rivers and streams that are still accessible to salmon
- Includes almost all of the salmon habitat above Bonneville Dam





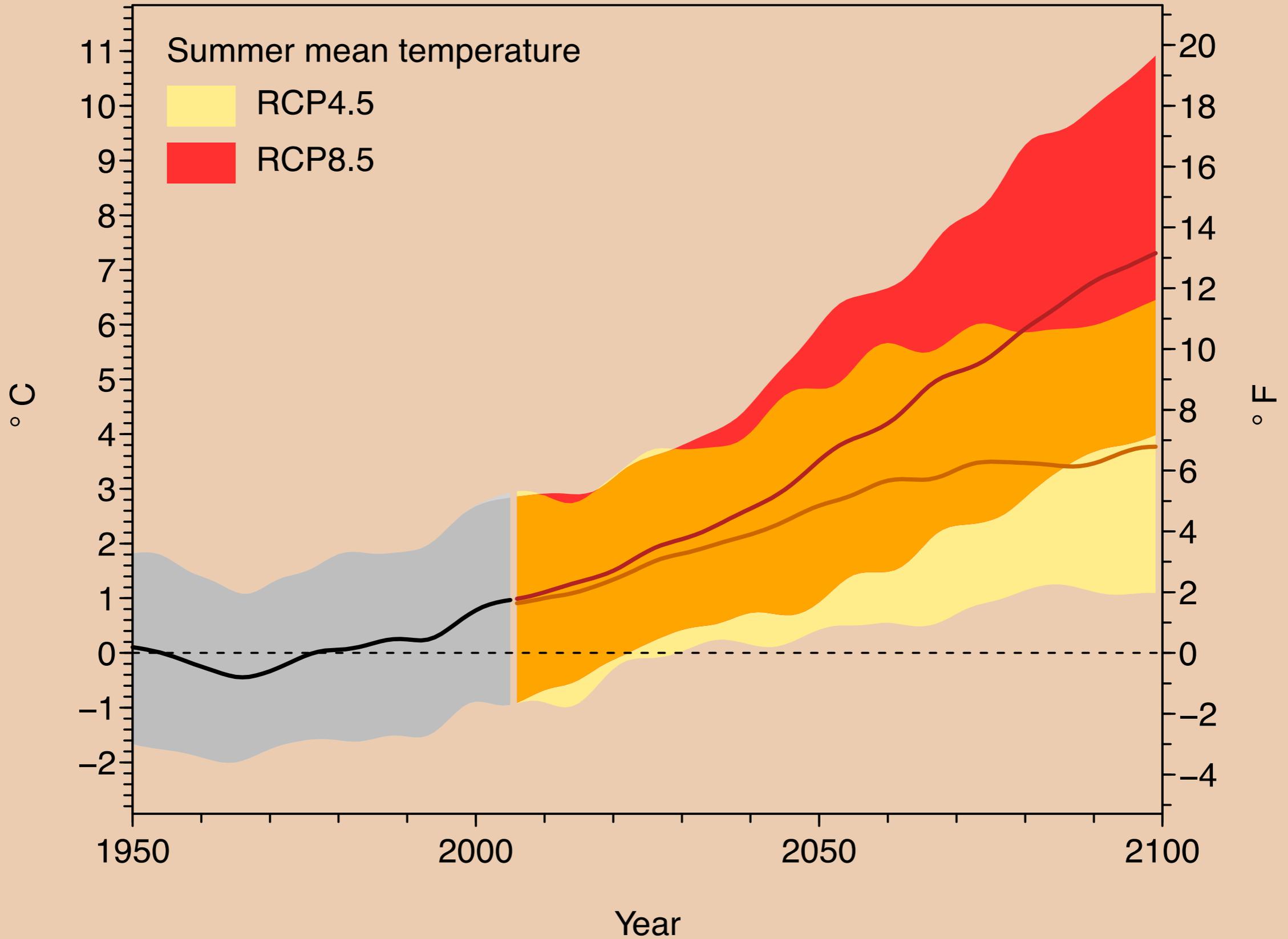
Wy-Kan-Ush-Mi Wa-Kish-Wit

“Spirit of the Salmon” 1995

Goal of 4 million salmon returning by 2020

Updated in 2014, including a Climate Change Section

Temperature Difference from 1950-1999 average (from Rupp 2014)





Expected Climate Change Impacts in the Columbia Basin

- More winter flooding, decreased summer flows
- Summer air and river temperatures increasing and U.S. snow pack continues to decline
- Increased drought frequency, duration and intensity
- Increased sedimentation and erosion



What this may mean

- Warmer winters result in hydro load demand shift from winter to summer
- Late spring refill of reservoirs results in reduced historical spring and early summer peak freshet flows
- This would increase competition for spring and summer water for fish and river ecosystems, hydrogeneration, agriculture and municipal use

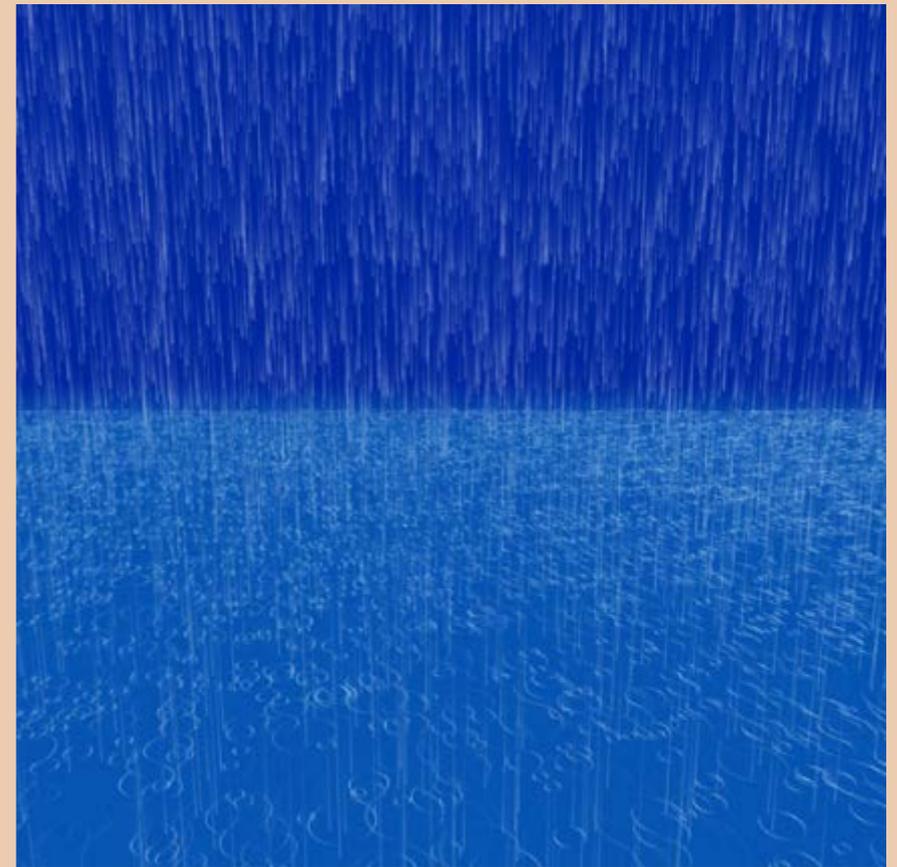
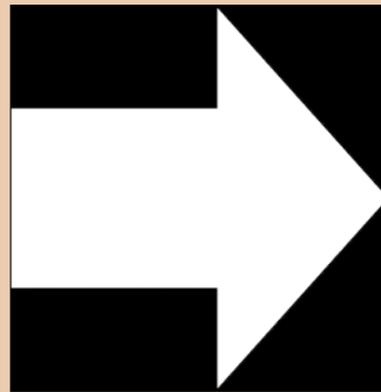
Climate Change, Snowpack, Stream Flow, and Water Temperature on Tribal Lands



Increasing Temperatures mean some areas will change...

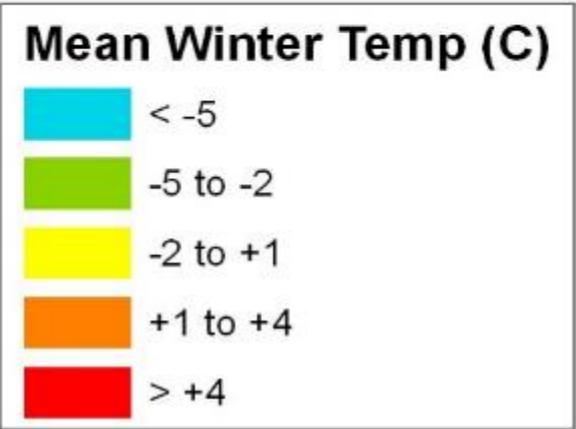


Snowfall Dominated

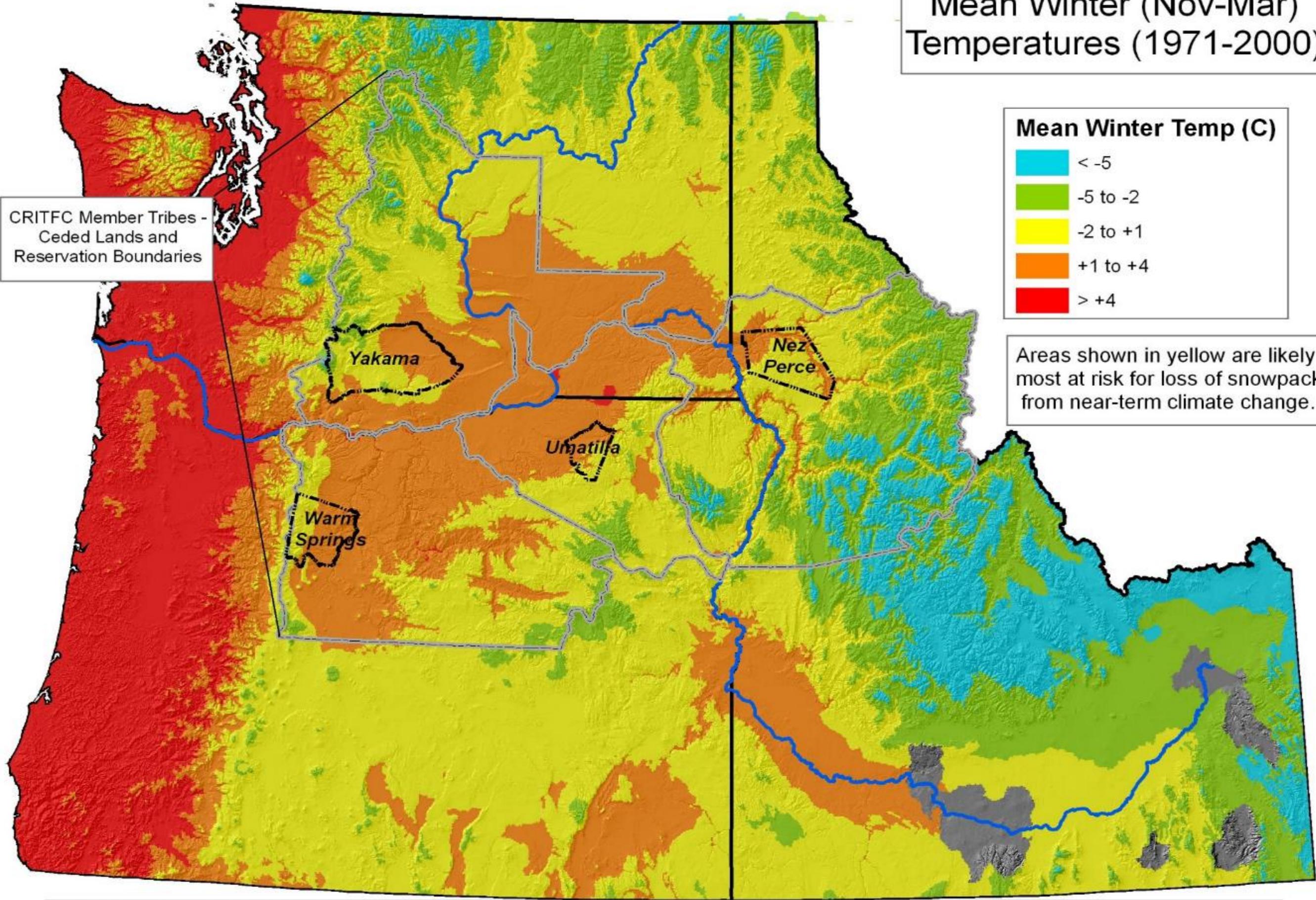


Rainfall Dominated

Mean Winter (Nov-Mar) Temperatures (1971-2000)



Areas shown in yellow are likely most at risk for loss of snowpack from near-term climate change.



CRITFC Member Tribes - Ceded Lands and Reservation Boundaries

Analysis performed at the Columbia River InterTribal Fish Commission (CRITFC) with data obtained from PRISM Group -Oregon Climate Service (2007)

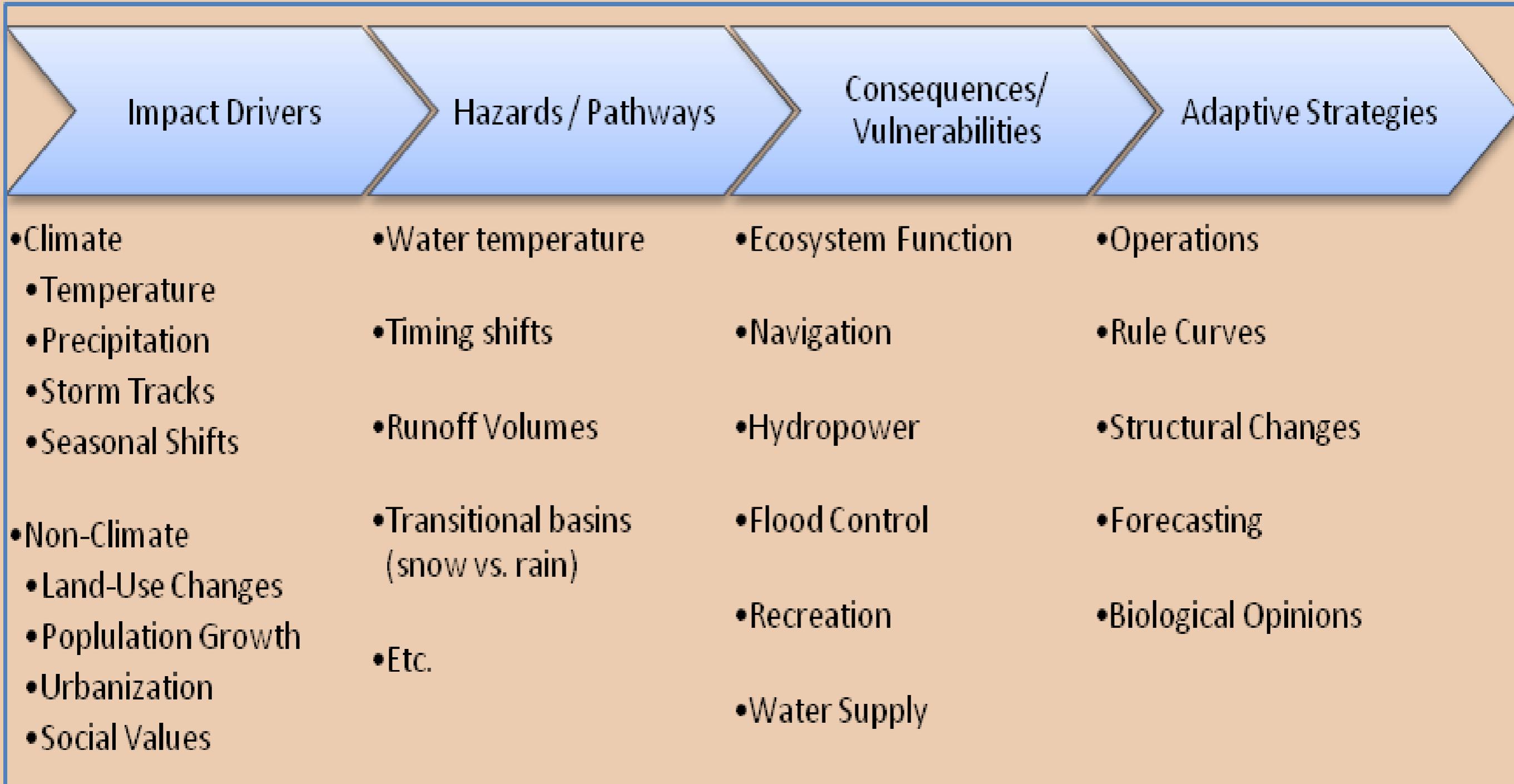
Zone resolution for analysis = 1.44 sq km

Impacts on Fish



- Increasing frequency and severity of winter flooding – eggs and overwintering juveniles
- Summer Low Flows – Migrating/Spawning Adults
- Higher Water Temperatures – will stress migrating adults, and may disrupt growth and downstream migration timing of juveniles

CRITFC Climate Goals: Identify, assess and understand future climate change impacts on First Foods

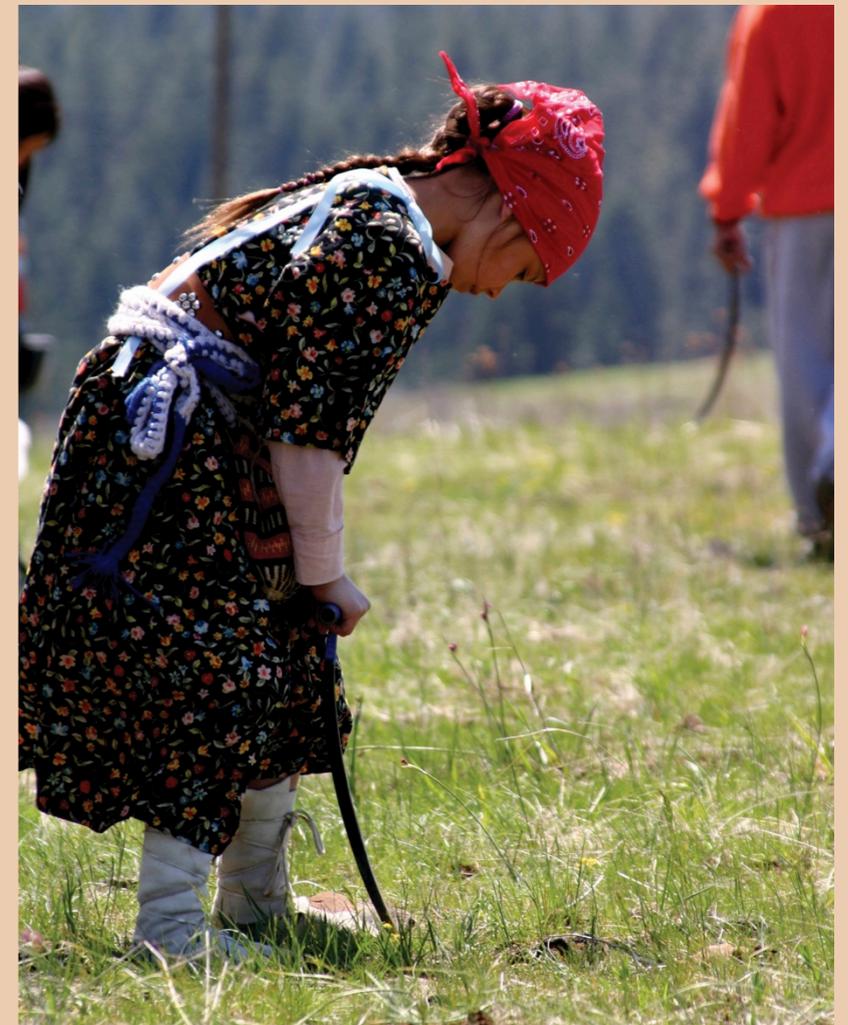


Climate impact and non-impact pathways linking drivers and adaptation solutions

(From Brown et al. 2010 "A New Angle on Adaptive Management - Reducing Plausible Vulnerability in the Upper Great Lakes")

CRITFC Climate Change Work

- Initiated in 2005 due to tribal observations of changes with the First Foods
- CRITFC Commission resolution in July 2009: treaty rights protecting First Foods be given the highest consideration in legislation and policy



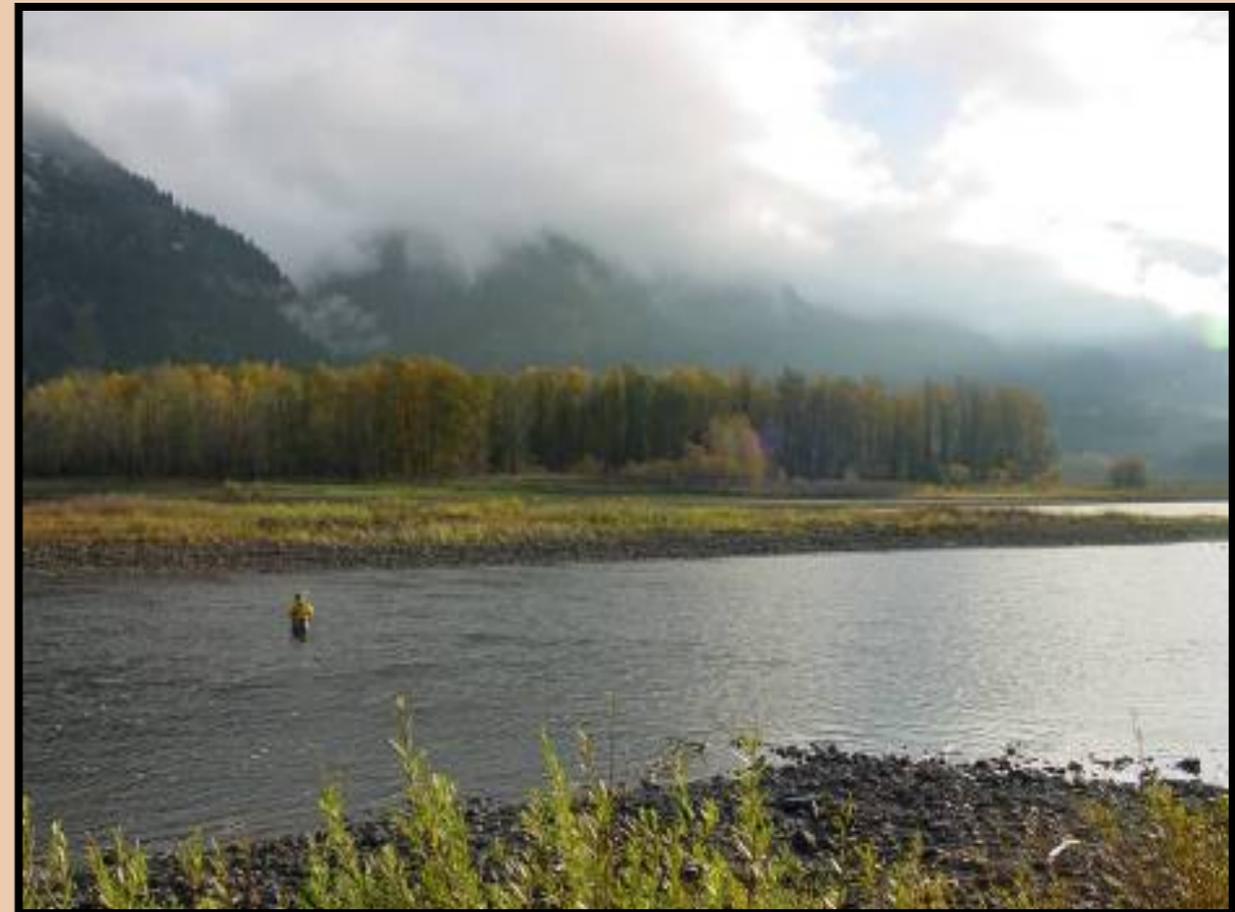


CRITFC Climate Change Work

- Provide technical and legislative support for tribes in climate-related work and make resources available on the CRITFC website
- Work on increasing and sustaining funding opportunities regionally and nationally for tribes for climate related projects
- Conduct tribal workshops, presentations and collaborate with numerous agencies and organizations
- Coordinate the CRITFC Inter-Tribal Climate Change Workgroup

Completed Water Temperature Modeling for Future Climate Change Scenarios

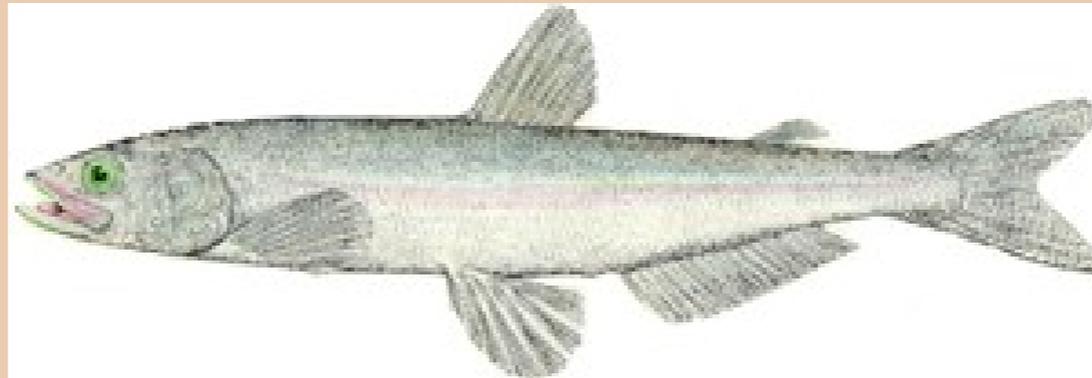
- Satus and Toppenish Watersheds (Tributaries of Yakama Basin)
- Upper Grande Ronde River Basin
- Nez Perce Tribal Ceded Lands



Analyzed physiological
and genetic mechanisms
for thermal adaptation in
salmon and trout in the
PNW

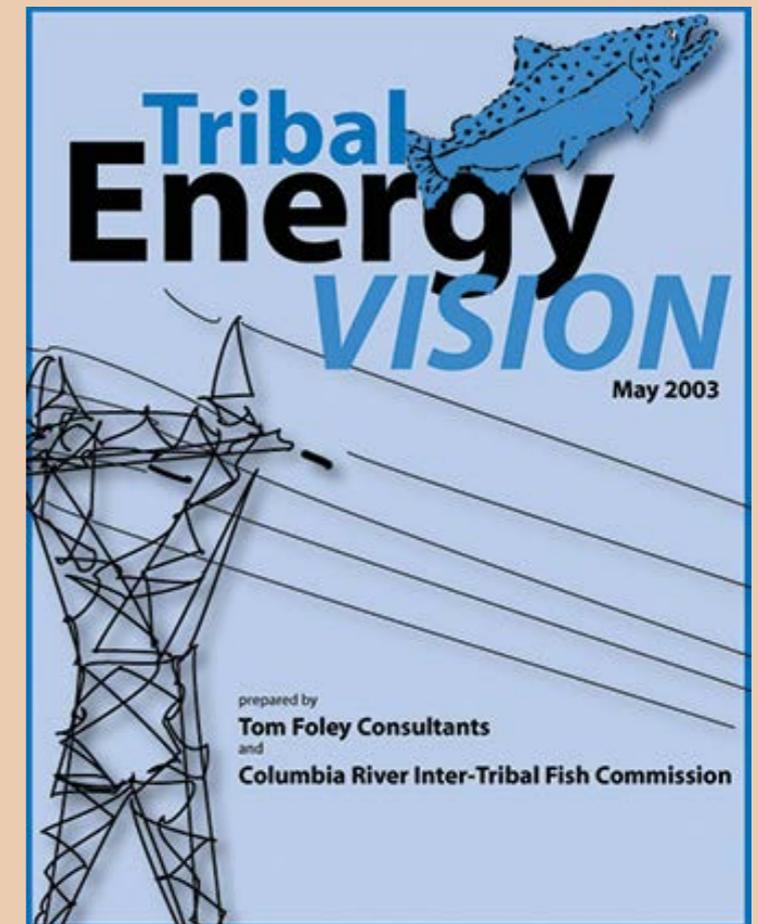


**Evaluated Climate Change Impacts on Pacific Lamprey
and Eulachon**



Evaluating Climate Change Effects and
Ocean/Inriver Connection

- Published climate related articles in Ecological Restoration 2009, Climatic Change Journal 2014, Climate Change and Indigenous Peoples in the United States book 2014, Journal of Environmental Management 2016 and the Elementa Science Journal February 2017
- Updated CRITFC Tribal Energy Vision with a climate impacts section





Climate Change Threats to Salmonid Food Webs: A Tribal Vulnerability Assessment

- Assessing the vulnerability of salmon food webs from projected climate-mediated changes to tributary streamflow and water temperature, with relevance to tribal ceded areas of the Columbia River basin.
- Using benthic macroinvertebrate (BMI) collections to provide insights about food webs (vulnerability, food web structure, energetic potential to food web, etc.).



Developing Information Tools to Assess Climate Change and Other River Use Impacts on First Foods

- Completed a CRITFC Climate Change Survey with tribes on impacts to First Foods (interviewed over 40 tribal leaders and staff) for development of a CRITFC Climate Strategic Plan
- Collaborating with other regional, national and international forums to obtain robust climate change and ecosystem science data
- Enhancing the CRITFC Information System Model (CIS)



CRITFC Information System Model (CIS)

- Simulates ecosystem function, hydrogeneration, flood risk metrics from numerous river operations scenarios quickly from over 100 basin river index sites and integrates climate change meteorology/hydrology with river operations
- Identifies vulnerabilities and ecosystem resilience through alternative modeled scenarios
- Contains or has in development sub models (i.e. water quality, water temperature, water particle travel time, spill, fish survival, daily time steps)

CRITFC Information System Framework (Access Data Base Platform)

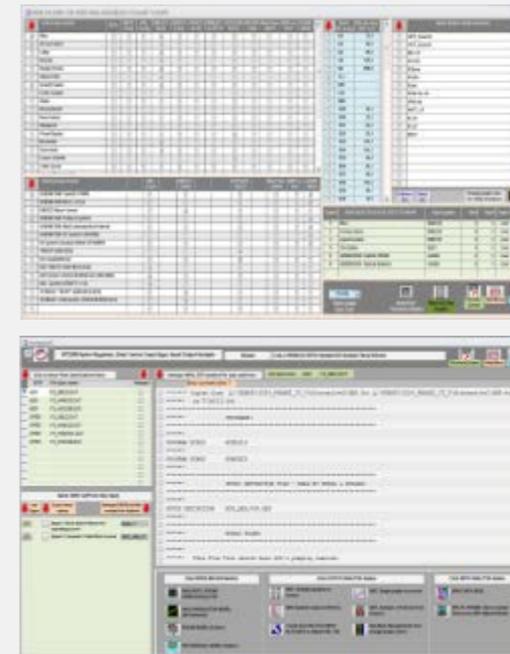
DATA BASE LIBRARIES

Climate Change Flows
Modified Flows
Hydsim input TXT files
Hydsim Master File
Study Results

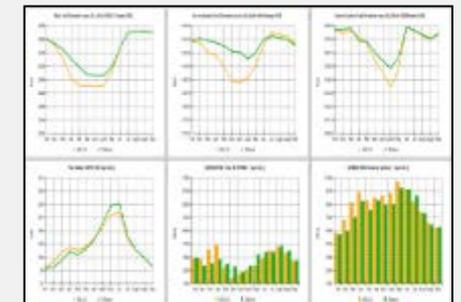
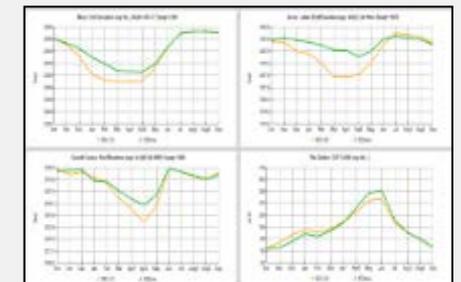
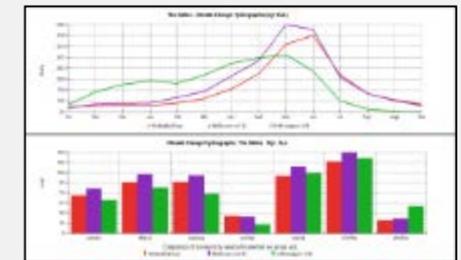
INTEGRATED SOFTWARE TOOLS/MODULES

Climate Change Data Processor
HYDSIM
Daily Modulator
Data Management Tool Graphics
Excel Apps (Ecosystem Rule Curves)
Excel, Notepad
Water Particle Travel Time
Fish Passage, Survival *
Water Temperature*
Daily Hydro-Regulation *
RESSIM, Volume Forecasting

GRAPHICAL USER INTERFACES (Data Management Tool)



ON-SCREEN RECEIPTACLES



*Future

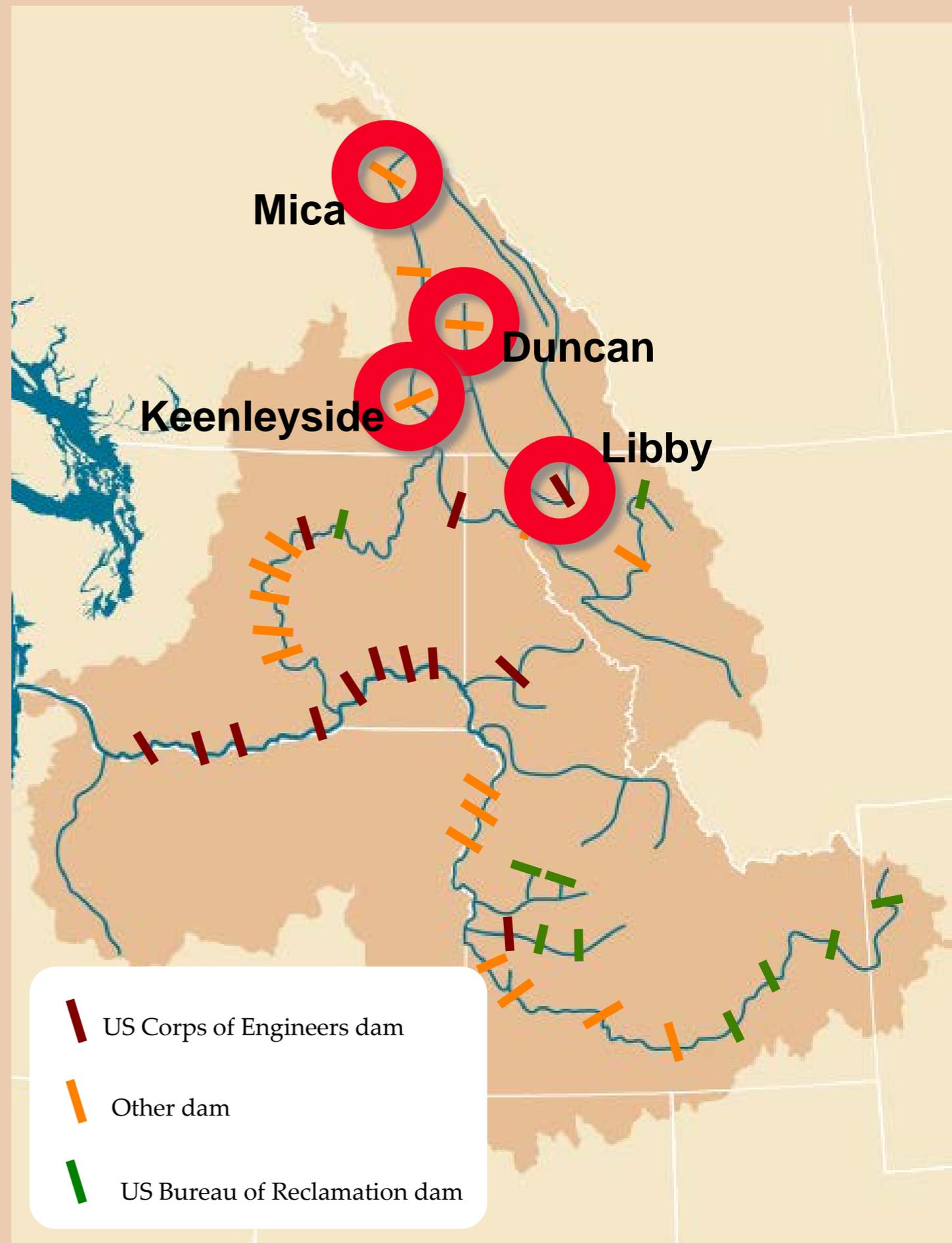


CIS Model Outputs

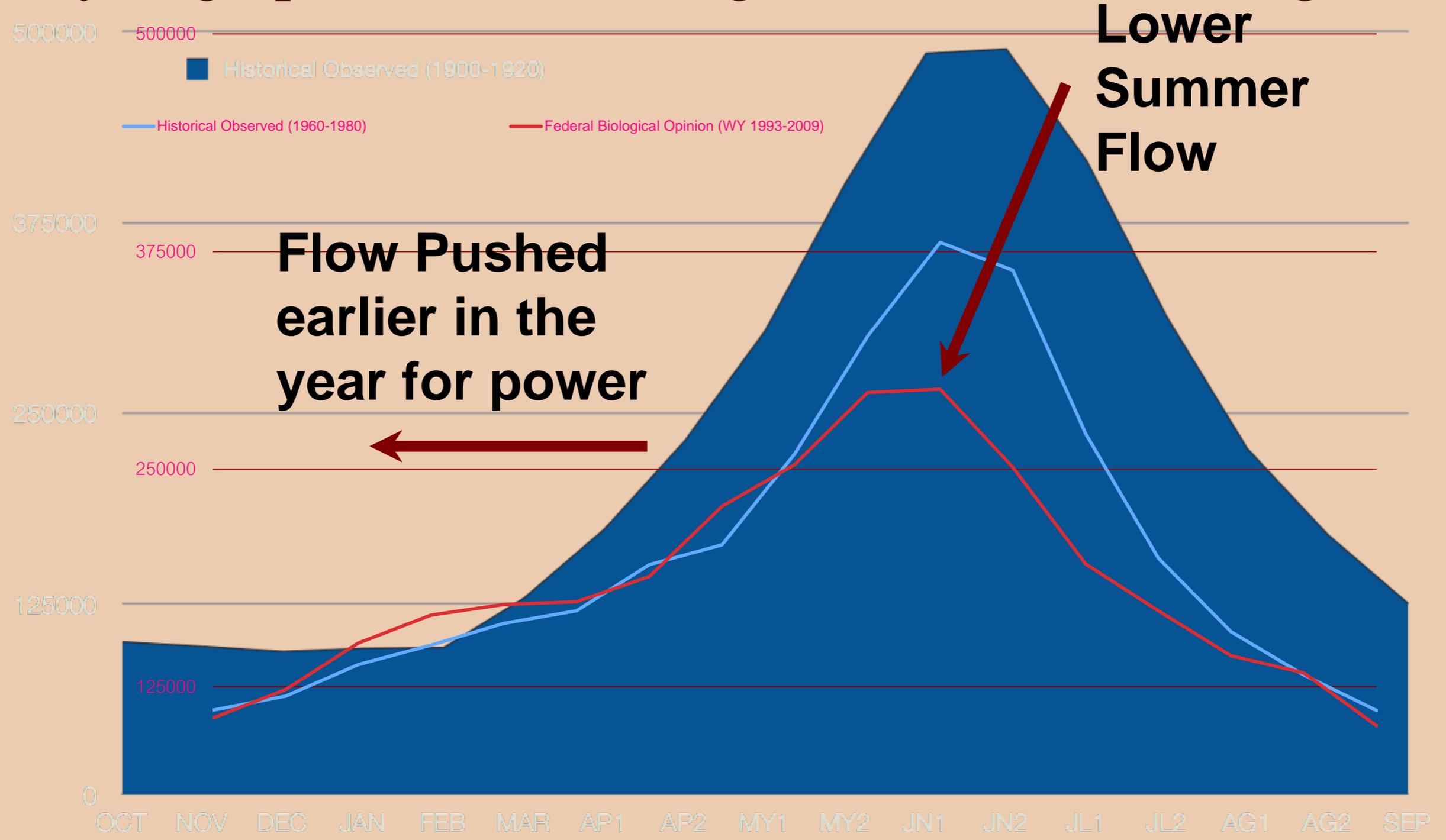
- Hydrographs at numerous basin dams, reservoir elevations, flood risk metrics, hydropower generation and fish impact metrics
- Results are quickly presented in both tabular and graphic form with the integrated Data Management Tool (DMT) for multiple scenario comparison
- Begin to develop adaptive management strategies with member tribes using the CIS

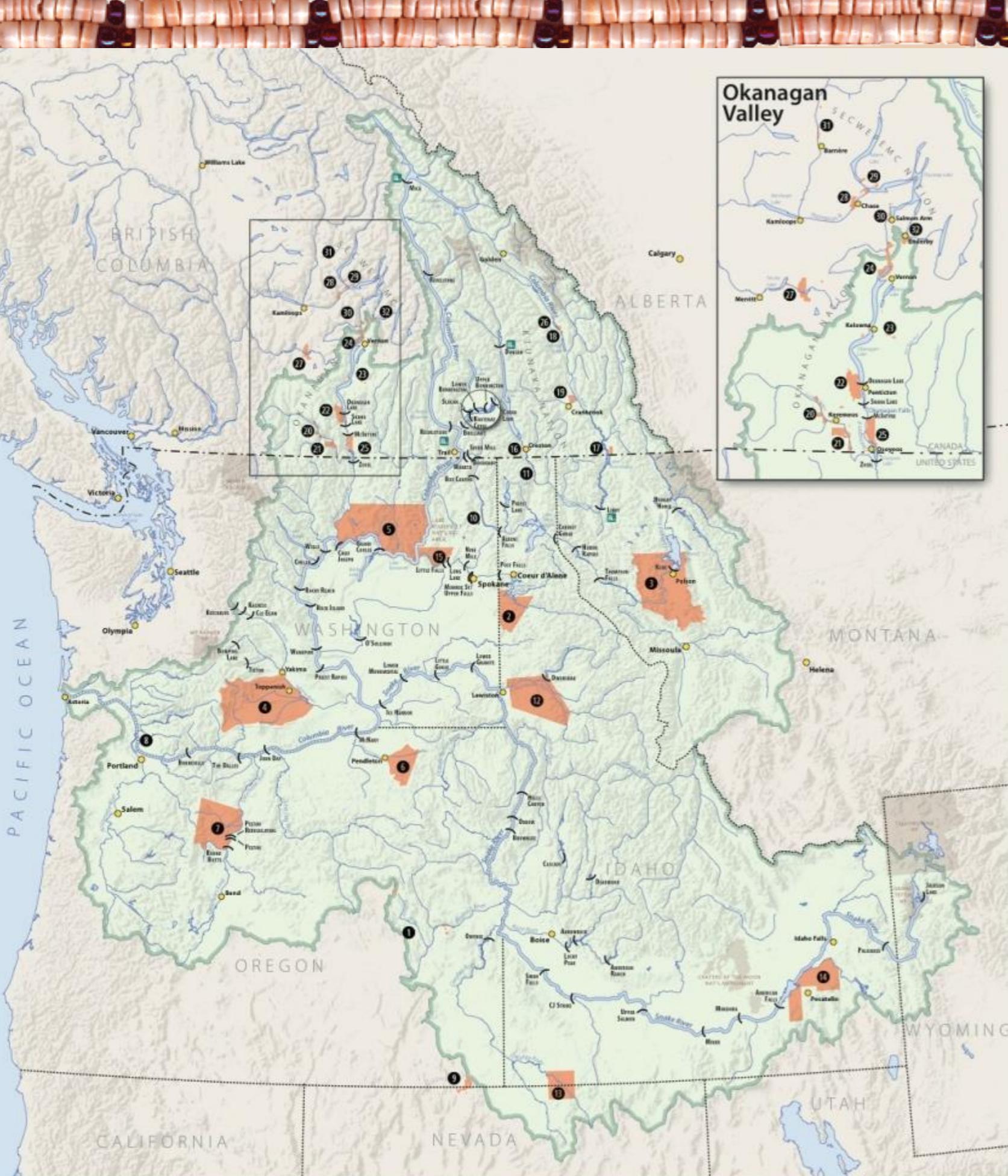
Columbia River Treaty

- Treaty came into force in 1964, no end date
- Canada builds three dams, US builds Libby – no passage
- Twin goals:
 - optimize hydropower
 - coordinate flood control
- With 10 year notice, Treaty may be terminated in 2024
- Tribes not consulted, no fish & wildlife coordination



Col River Treaty Operations Changed Columbia River Hydrograph- Climate Change Will Increase Changes





Columbia Basin Tribes

15 tribes with management authorities and responsibilities affected by the Columbia River Treaty

- 2009 - Formed*
- 2010 - Common Views*
- 2011 - First Nations G2G*

This map was produced by the Columbia River Inter-Tribal Fish Commission. It is meant for informational and display purposes only and was created with the best data available at the time of production. It does not represent any legal boundaries or information. Map date: March 2013

North

0 25 50 100 200 Kilometers

0 25 50 100 200 Miles

Columbia Basin Boundary
 Reservation or Reserve
 Dam authorized by Columbia River Treaty



Broad Regional Consensus Achieved: Modify the Treaty

(U.S. Entity Dec 13, 2013)

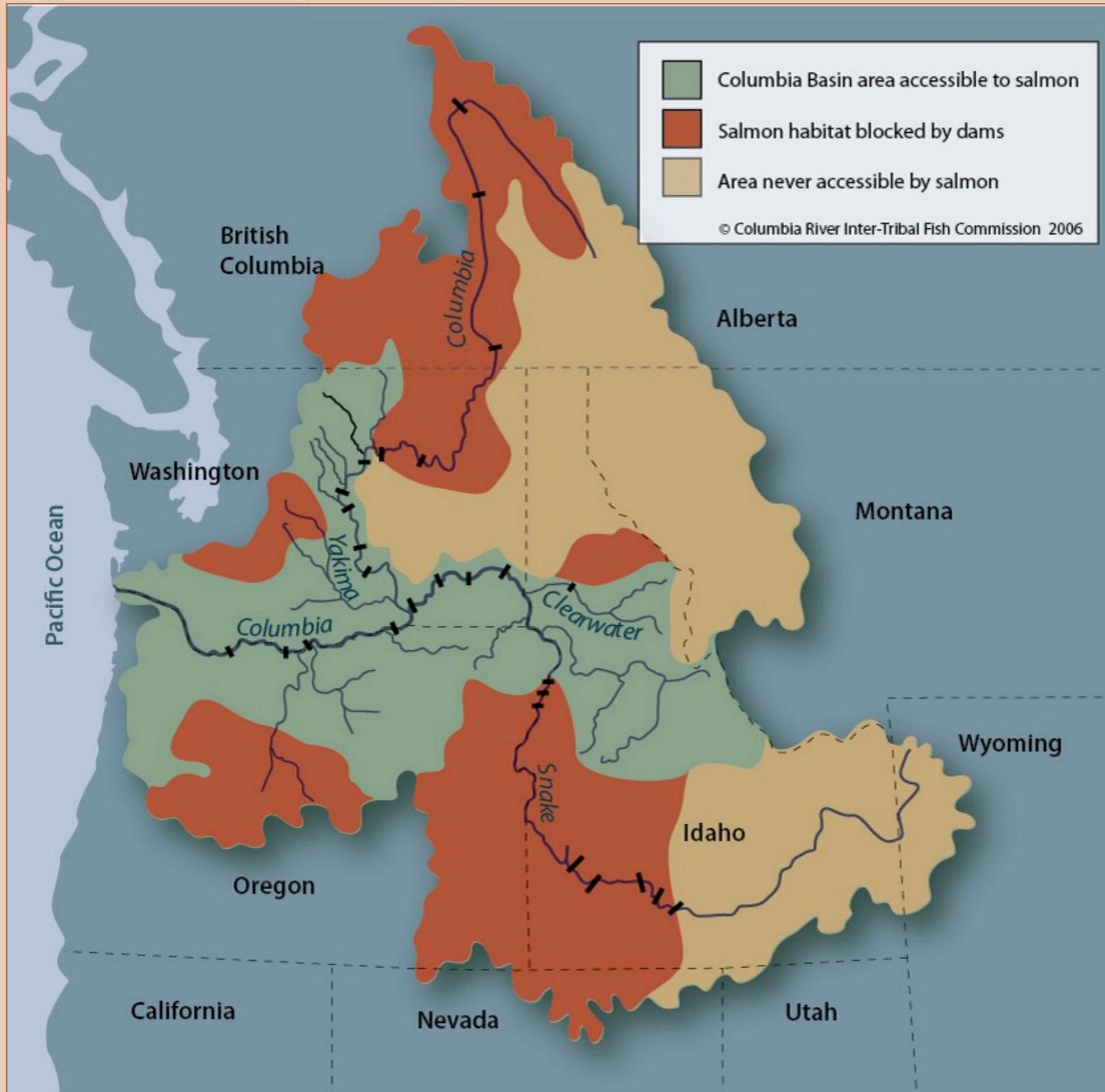
Recommendation Elements:

- Add ecosystem-based functions
 - Restore fish passage to historical locations
- Recalculate Canadian Entitlement (~\$300m)
- Address flood control management post-2024
- Recognize Water Supply Interests
- **Adapt for Climate Change impacts**

Ecosystem-based management approach

- Restore and preserve tribal natural and cultural resources
- Restore spring freshets:
 - Helps to restore estuary
 - Helps move fish
- Restore fish passage to all historic locations.
- Minimize draw downs at upper reservoirs





Fish Passage in Columbia River Basin

Cooler habitat is in the blocked areas.

Restoring fish passage is protection from climate change



Summary

Modernize Columbia River System for Climate Change Resilience

- Modify river operations to reshape available storage: maintain/enhance spring peak- more significant in dry to average runoff years-keep reservoirs full/stable
- Modify flood risk by reestablishing flood plains and improved monitoring/forecasting and modernize reservoir flood rule curves
- Implement structural changes at dams to promote ecosystem function
- Implement fish passage to cooler basin watersheds



CRITFC National Climate Activities

- Tribal co-chair on the Freshwater Section of the National Fish, Wildlife & Plants Climate Adaptation Strategy 2012
- Advisor on the BIA Tribal Climate Liaison Orientation & Recruitment
- Working on the implementation of National Tribal Climate Change Principles and formation of a National Tribal Climate Change Policy Workgroup



CRITFC Regional Climate Activities

- Advisory Board member:
 - 1) Northwest Climate Science Center
 - 2) Climate Impacts Research Consortium
 - 3) Columbia Basin Partnership Forum(GNLCC)
- Tribal Advisory Group member for the “Building Tribal Capacity for Climate Change Vulnerability Assessment” project with the University of Washington
- Working with the Oregon Environmental Council and tribes on Oregon carbon reduction policies and programs

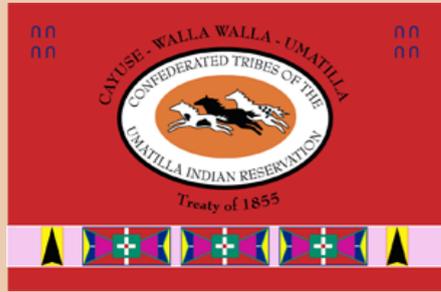


Nez Perce Tribe's Climate Change Work

- Completed a Clearwater River Subbasin Climate Change Adaptation Plan in 2011
- Developed a Carbon Sequestration Program
- Lewiston Orchards Water Exchange Project: Providing cool water thermal refugia in the lower Clearwater River subbasin for fish
- Hired a full-time Climate Change Coordinator

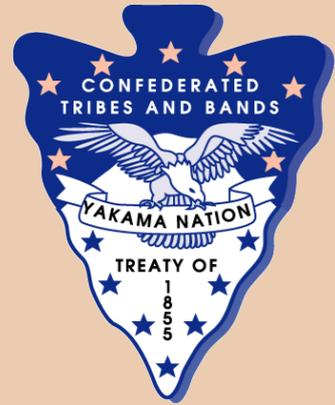


Umatilla Tribe's Climate Change Work



- Department of Natural Resources Mission Statement based on First Foods - Developed the Umatilla River Vision in 2008
- Completed the Umatilla Basin Climate Assessment Study
- Gathered Climate Information for Enhanced Tribal Decision-Making and developed a web portal for outreach and education efforts
- Women's Food and Climate Change: Looking at climate impacts to the physiological plant community responses and interactions, including diversity and distribution
- Modeling groundwater and surface water interactions under different climate change scenarios to help in planning for water rights protection in the Umatilla Basin
- Analyzing future flows in the Umatilla River and floodplain under a changing climate to identify high priority stream and floodplain restoration areas where impacts will have the greatest effect on the First Foods





Yakama Nation's Climate Change Work

- Key partner in the development of the Yakima Basin Integrated Water Resource Management Plan which addresses climate change impacts
- Developed a Climate Change Strategic Plan
- Developing a Vulnerability and Risk Assessment for the ceded lands of the Yakama Nation to implement in all management decisions





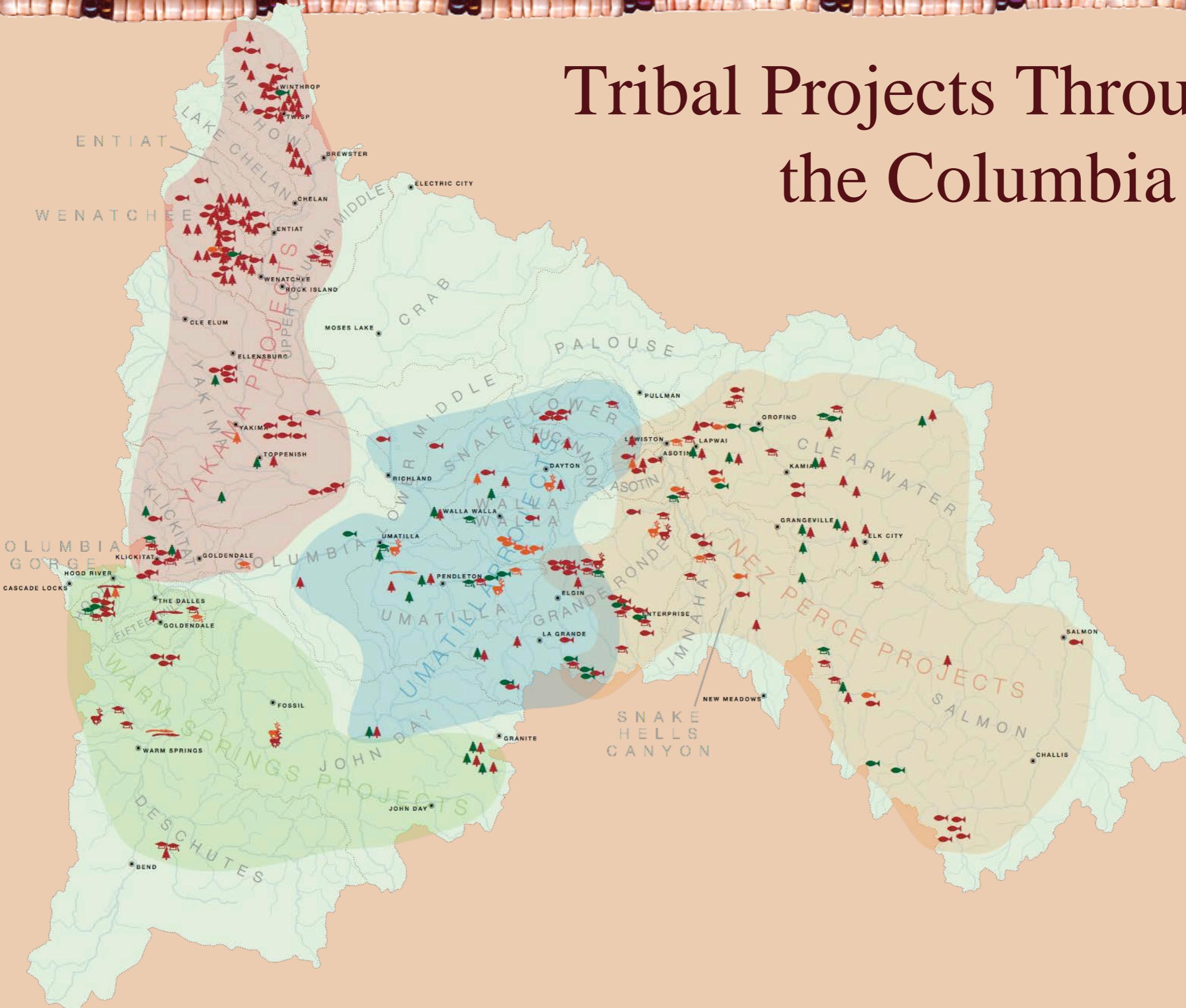
Confederated Tribes of the Warm Springs
Indian Reservation of Oregon

Warm Springs Tribe's Climate Change Work

- Developing a Climate Change Readiness Program that will study the effects of climate change on water quality, forest harvesting practices and create higher education opportunities for tribal members to conduct research on climate related issues
- Finalizing a carbon sequestration program with the California Air Resource Board
- Developing a Vulnerability Assessment for the Warm Springs Reservation



Tribal Projects Throughout the Columbia Basin





Some Recommendations

- Reconnect to groundwater/side channel habitat
- Increase shade/bank stabilization
- Implement agricultural Best Management Practices
- Culvert replacement/setback levees
- Road decommissioning
- Flow augmentation
- Improve irrigation efficiency



Challenges Ahead

- Sustain Tribal Funding Availability
- Lack of Climate Legislation
- Identify Priority Salmon Population Strongholds
 - Including historical areas that are currently blocked
- Expect Extreme Water Conditions in the Future
 - Improve planning and zoning regulations
 - Develop policies to restrict construction/remove levees

Contact Information:

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