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**Chuck Sams**  
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**Ginny Burdick**  
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## Northwest **Power** and **Conservation** Council

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**Doug Grob**  
Montana

**Mike Milburn**  
Montana

November 9, 2021

### **MEMORANDUM**

**TO:** Fish and Wildlife Committee members

**FROM:** Stacy Horton, Washington staff

**SUBJECT:** The Phase 2 Implementation Plan: Testing the Feasibility of Reintroduced Salmon in the Upper Columbia River Basin

### **BACKGROUND:**

**Presenters:** Conor Giorgi, Anadromous Program Manager, Spokane Tribe of Indians; Casey Baldwin, Sr. Research Scientist, Fish & Wildlife Department, Confederated Tribes of the Colville Reservation; Thomas Biladeau, Habitat Restoration Biologist, Coeur d'Alene Tribe Fisheries, Laura Robinson, Policy Analyst, Upper Columbia United Tribes

**Summary:** The 2014 Columbia River Basin Fish and Wildlife Program contains a strategy titled 'Anadromous fish mitigation in blocked areas.' One of the measures under this strategy calls for a science-based and phased approach to investigating the reintroduction of anadromous fish above Chief Joseph and Grand Coulee dams, including juvenile and adult passage at the dams.

Technical representatives of the Upper Columbia United Tribes (UCUT) will be presenting their second report to the Council, [\*The Phase 2 Implementation Plan: Testing the Feasibility of Reintroduced Salmon in the Upper Columbia River Basin\*](#) (P2IP). UCUT presented their Phase 1 report to the full Council in June 2019.

The [UCUT Phase 1 report](#) was reviewed by the Independent Scientific Advisory Board (ISAB) [ISAB 2019-3](#). The ISAB found it reasonable that salmon reintroduction to blocked areas could be successful but noted that there is considerable uncertainty around dam passage and reservoir survival, the resulting number of adult salmon that will return, and the type of management required to sustain them. They suggested that a strategic implementation plan with an adaptive management process is needed to address uncertainties. The P2IP report was developed by UCUT to provide a stepwise and adaptive management framework to acquire the information needed to address both the ISAB critical uncertainties and meet UCUT tribal management objectives.

Relevance: A collective approach is anticipated in the Councils 2014 Columbia River Basin Fish and Wildlife Program, stating, "...the Council, in collaboration with other relevant entities will decide how to proceed." The Council's Program identifies potential activities for Phase 2. Under the heading, "*Reintroductions above Grand Coulee to mainstem reaches and tributaries in the United States*", the Councils 2014 Fish and Wildlife Program states, "Bonneville and the relevant federal action agencies, working in collaboration with state and federal fish and wildlife agencies and tribes, shall investigate and, if warranted, implement passage and reintroduction of anadromous fish into suitable habitats within the United States." This shall include:

- Funding research associated with critical uncertainties at Chief Joseph and Grand Coulee dams required to inform Phase 1  
[NOTE: The Council provided \$100,000 from the Cost Savings Work Group placeholder in 2017 for research to investigate the availability and suitability of habitat above Grand Coulee Dam, a critical uncertainty.]
- Funding work required for Phases 2 and 3 based on Council recommendations."

Background: The Council established anadromous fish losses in two documents adopted by the Council in 1987 (See: "[Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin](#)" and the "[Numerical Estimates of Hydropower-related Losses](#),") A call for an investigation of the feasibility of anadromous fish passage above Chief Joseph and Grand Coulee dams has been included in Council fish and wildlife programs since at least the [2003 Mainstem Amendments to the Columbia River Basin Fish and Wildlife Program](#).

More Info: [Fish Passage and Reintroduction into the U.S. and Canadian Upper Columbia Basin](#)

# Fish Passage and Reintroduction: The Phase 2 Implementation Plan



Input, funding and participation from:  
WDFW, USGS, PNNL, Kevin Malone Consulting,  
State of Washington, Office Columbia River, US  
Fish & Wildlife Service, NOAA Fisheries, Army  
Corps of Engineers, Bureau of Reclamation,  
Avista Corporation

# Outline of Today's Presentation

- Laura Robinson, Upper Columbia United Tribes:
  - Overview of the UCUT Tribes
  - Reintroduction in the Columbia River Basin Fish and Wildlife Program
  - UCUT's collaborative approach
- Tom Biladeau, Coeur d'Alene Tribe:
  - Overview of the Implementation Plan
- Conor Giorgi, Spokane Tribe of Indians:
  - Step 1: Baseline data and infrastructure
  - Step 2: Interim passage and testing
- Casey Baldwin, Confederated Tribes of the Colville Reservation:
  - Adaptive management
  - Timeline and budget
  - Cultural and educational releases



# The Upper Columbia United Tribes



- Coeur d'Alene Tribe
- Confederated Tribes of the Colville Reservation
- Kalispel Tribe of Indians
- Kootenai Tribe of Idaho
- Spokane Tribe of Indians

# 1980 Northwest Power Act

2(6): “To protect, mitigate, and enhance the fish and wildlife, including related spawning grounds and habitat, of the Columbia River and its tributaries, particularly anadromous fish which are of significant importance to the social and economic well-being of the Pacific Northwest and the Nation and which are dependent of suitable environmental conditions substantially obtainable from the management and operation of the Federal Columbia River Power System and other power generating facilities on the Columbia River and its tributaries.”

4(h)(11)(A) and (A)(i): “The Administrator and other Federal agencies responsible for managing, operating, or regulating Federal or non-Federal hydroelectric facilities located on the Columbia River or its tributaries shall exercise such responsibilities...to adequately protect, mitigate, and enhance fish and wildlife...in a manner that provides equitable treatment for such fish and wildlife.”

# 2014 Fish and Wildlife Program

## Anadromous Fish Mitigation in Blocked Areas Strategy

### Phase 1:

Evaluate passage studies at hydroelectric projects, including Chief Joseph & Grand Coulee Dams

Investigate possible cost of upstream and downstream passage options

Investigate habitat availability, suitability and salmon survival potential in habitats above GCD

### Phase 2:


Design and test reintroduction strategies and fish passage facilities at CJD & GCD

Reintroduction pilot projects

Monitoring, evaluation, and adaptive management

### Phase 3:

Review results to determine implementation and permanent inclusion to the Program

The logo for the Columbia River Basin Fish and Wildlife Program 2014. It features a white background with a decorative border of blue fish scales on the right and bottom edges. The text is arranged in four lines: "Columbia", "River Basin", "Fish and Wildlife", and "Program 2014".


Columbia  
River Basin  
Fish and Wildlife  
Program 2014

# 2014 Fish and Wildlife Program

## Investment Strategy: Emerging Program Priorities

*“The Council is providing the following guidance to Bonneville, the other federal agencies, and the region in general as to which of these new measures are emerging priorities for implementation in the next five years. During the course of the next five years, the Council anticipates that Bonneville will take the necessary steps to integrate these priorities into the program and will report annually to the Council on its progress.”*

*“Investigate blocked area mitigation options through reintroduction, passage and habitat improvement, and implement if warranted.”*

The logo features a stylized, light blue fish-like shape composed of many small, overlapping leaf-like or scale-like elements, positioned on the right side of the text. The text is arranged in four lines: "Columbia", "River Basin", "Fish and Wildlife", and "Program 2014".

Columbia  
River Basin  
Fish and Wildlife  
Program 2014



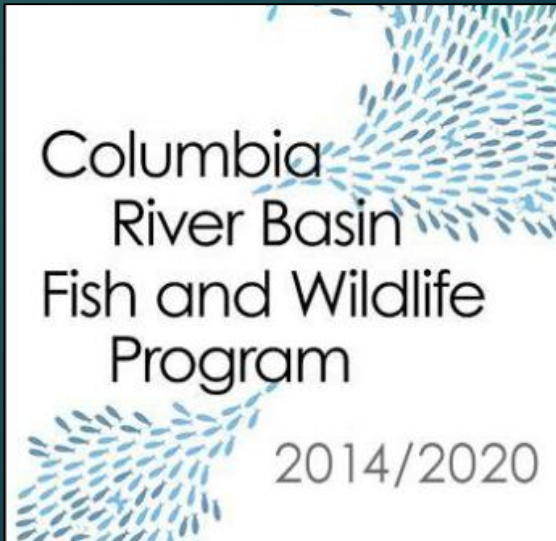
# 2020 Program Addendum

## **Mitigation in Blocked Areas Section**

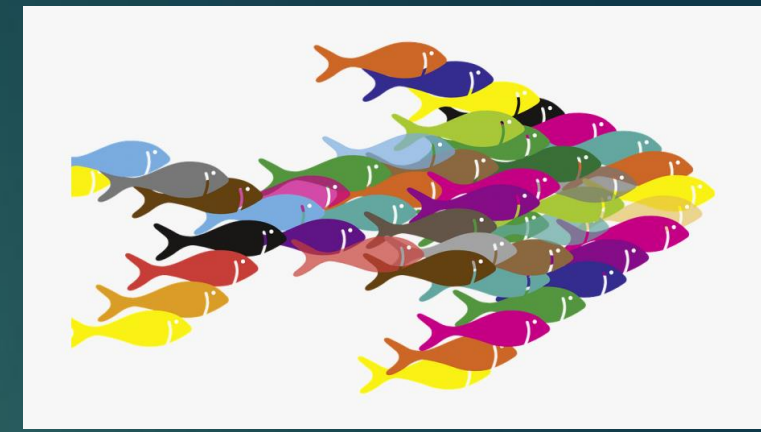
*“Bonneville and others: Continue to make progress on the program’s phased approach to evaluate the possibility of reintroducing anadromous fish above Grand Coulee and Chief Joseph dams. ... Continuing to make progress on this measure received substantial support in the amendment process from many governmental and non-governmental entities.”*

## **How the Program is Implemented: Implement Emerging Priorities**

*“The Council continues to expect Bonneville to implement the emerging priorities described in the 2014 Program, including as sharpened in Part II of this addendum.”*



# Regional Collaboration

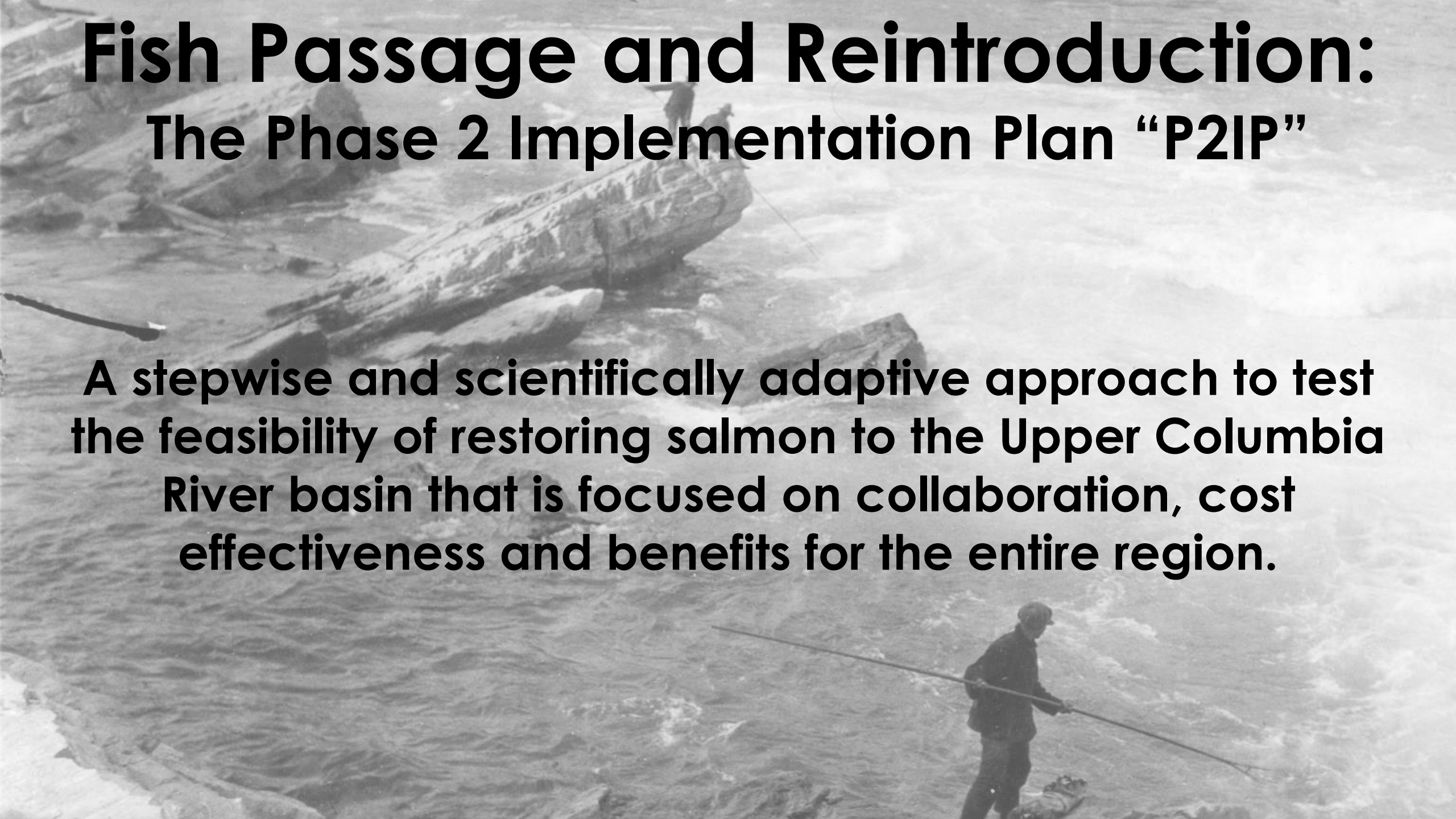


Comment period for the P2IP: August 9 – November 1, 2021

Meetings since August 10	Planned and/or pending meetings
Blocked Areas Anadromous Fish Working Group	Columbia River Policy Advisory Group
Cowlitz Indian Tribe	Eastern Washington Council of Governments
Washington Department of Fish and Wildlife	CRITFC, USRT, and Indigenous Nations
NOAA	Mid-Columbia Public Utility Districts
Bonneville Power Administration	State and federal elected officials
Washington NPCC Council Members	Upper Columbia Salmon Recovery Board
Oregon NPCC Council Members	Pacific Fishery Management Council
Idaho NPCC Council Member	
NPCC FW Division Staff	

# **Fish Passage and Reintroduction: The Phase 2 Implementation Plan “P2IP”**

**A stepwise and scientifically adaptive approach to test the feasibility of restoring salmon to the Upper Columbia River basin that is focused on collaboration, cost effectiveness and benefits for the entire region.**



# P2IP: Test the Feasibility of Passage and Salmon Persistence

- Test the key assumptions used in the Phase 1 Life Cycle Model
  - Migratory survival, passage survival, behavior and productivity
- Establish sources of Chinook and sockeye donor stocks
- Develop interim hatchery facilities to produce fish for feasibility studies
- Develop and test upstream and downstream interim passage facilities
- Provide the data necessary for full-scale reintroduction and permanent passage



# P2IP: Test the Feasibility of Passage and Salmon Persistence

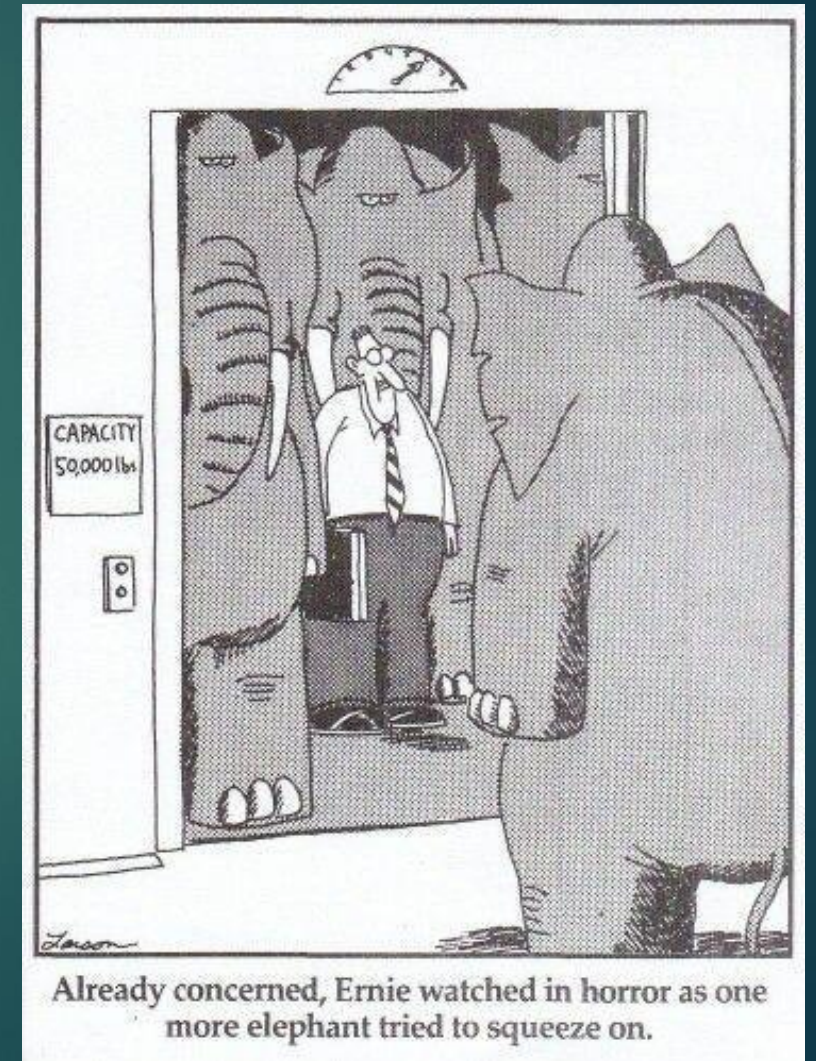


## Coordinated Approach

- **States Agencies, Columbia River Tribes, Federal Agencies**
  - 21 Managing Agencies in BAAFWG
- **Coastal Tribes, Commercial Fisheries, Sport Fisheries, NGOs, Irrigators, River Users, Port Districts, Utilities**
  - >200 Interested Parties Represented in CBC
- **Canadian Governments, First Nations, Provincial Governments, Canadian Hydro, International Fisheries**

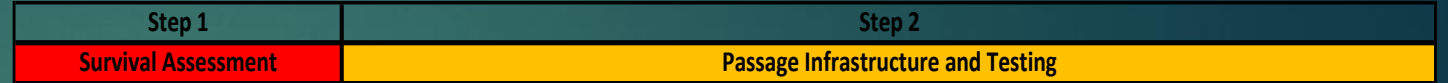
# Regulatory Considerations & Constraints

- Consultation & ESA Impacts
  - *Mention working with USFWS and NOAA*
- Fish Health and Disease Management
  - *Working with WDFW on Pathogen Sampling*
- Access to Preferred Donor Stocks
- Access to Rearing and Adult Collection Facilities
- Lack of Funding/Support



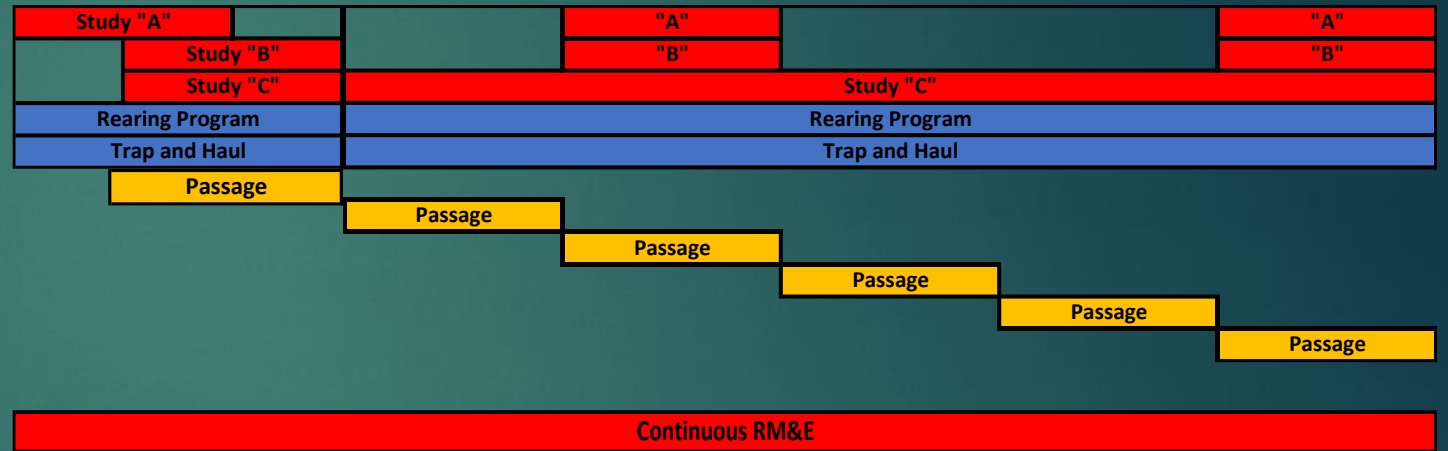
# P2IP: Timeline and Structure

- 20+ Years, 2 Major Steps



- Step 1: Years 1 - 6

- Initial Survival Studies
- Donor Stock Access
- Adult Trap and Haul Program
- Rearing Facility Development
- Passage Investigation Begins



- Step 2: Years 7 – 20+

- Design and Testing of Fish Passage Systems
- Continuation of Survival and Behavior Studies



# Phase 2 Outlook

The Path to Reach the End Gets Hazier the Further Out We Try to See

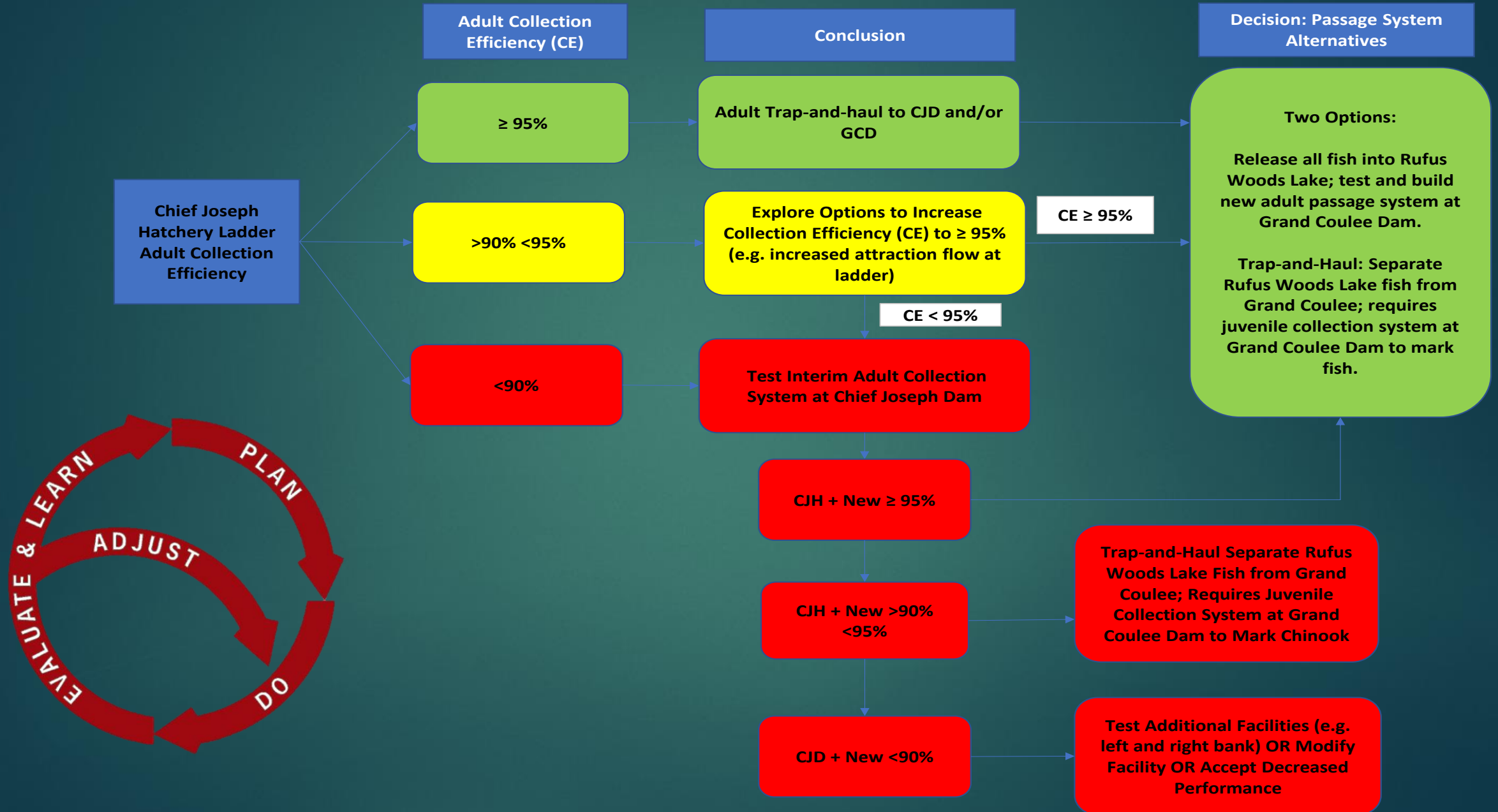
PHASE 3

- 20+ years to implement the P2IP if the path is linear and there are no obstacles
- Multiple forks in the path that adaptive management may require us to take
- Obstructions in the path that could slow the journey
  - Regulatory, etc

## Phase 1



# P2IP: Adaptive Management



# Step 1 – Baseline Data & Infrastructure

## **Interim Fish Production Facilities**

- Review current facilities & programs
- New or expanded early rearing facilities, net pens, acclimation sites

## **Downstream Behavior & Survival Studies**

- Acoustic behavior and survival, yearling Chinook and Sockeye
- PIT tag releases, yearling Chinook and Sockeye

## **Upstream Survival & Behavior Studies**

- Upstream survival using Adults from PIT releases
- Tailrace Behavior

## **Interim Upstream Passage at Chief Joseph Dam**

- Trap-and-haul from Chief Joseph Hatchery ladder
- CJH ladder expansion and additional interim facilities

# Fish Production & Rearing Facilities

- Necessary to support studies
  - 100k+ Chinook and 100k+ sockeye annually
- Adult Brood Collection strategies
  - Preferred donor stocks identified in Phase 1
  - Strategic collection location
- Egg to Sub-yearling rearing
  - Existing vs new facilities
- Sub-Yearling to Yearling rearing
  - Acclimation Facilities
    - Net Pen Rearing
    - Land-based acclimation



Chief Joseph Hatchery, CCT



# Juvenile Salmon Acoustic Survival Study

## JSATS Telemetry

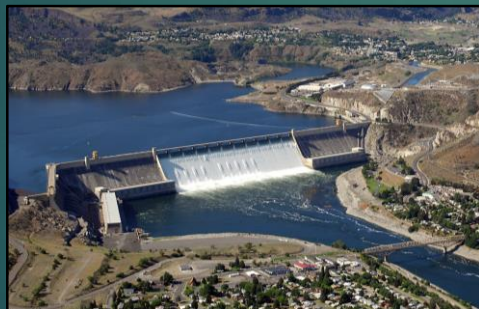
- Passage survival across NMD, LLD, LFD, GCD and CJD
- Passage routing at GCD and CJD
- Reach survival throughout the blocked area
- Travel time from multiple release locations



Photo courtesy of USGS



Chief Joseph Dam, ACOE



Grand Coulee Dam, BOR



Little Falls Dam, Avista Corp.



Long Lake Dam, Avista Corp



Nine Mile Dam, Avista Corp



# PIT Tag Releases

## Juvenile Chinook and Sockeye Survival

- 50k – 160k total of each species
  - Sample sizes refined with data from previous studies
  - Ensure sufficient adults return to meet research needs
- Release site to RRD/McNary Dam
- Smolt-to-Adult Return Rates

## Adult Chinook and Sockeye Survival

- Bonneville Dam to Wells Dam Survival
- Evaluate Collection Efficiency of Returning Adults

## Adult Chinook and Sockeye Behavior – Acoustic

- Evaluate Blocked Area Adult Migration and Homing
- Tailrace Behavior for Upstream Passage Planning



# Trap and Haul from Chief Joseph Dam

## Initial Upstream Passage Option

- Trap-and-Haul from Chief Joseph Hatchery Ladder
- Release in Reservoirs Upstream





# Step 1 Progress - \$1.2 million secured

## **Rearing Facilities:**

- Limited facilities for egg incubation and early rearing
- Surplus net pens available for overwinter rearing

## **Acoustic Survival Study: Implementation Spring 2022**

- Year 1 funding secured, partial funding for years 2-3
  - Equipment being purchased
  - Summer Chinook being reared locally
- Coordinating with dam owners & operators

## **PIT Survival Study: Implementation Spring 2023**

- 50k summer Chinook eggs available
- ~20k PIT tags purchased

## Current Funding Sources

### **Avista Utilities**

### **Individual Tribes**

### **State of Washington**

- Legislature
- Office of Columbia River
- Orca Recovery
- WDFW, in-kind

### **UCUT**

### **USFWS, in-kind**

### **USGS**

# Immediate Needs

## Donor Stocks & Rearing Equipment:

- Access to Preferred Summer Chinook and Sockeye Stocks
- Egg Incubation and Early Rearing
- Streamside Acclimation and Net Pen Facilities

## Acoustic Survival Study: Implementation Spring 2023+

- Additional Telemetry Equipment
- Technical Analysis and Support

## PIT Survival Study: Implementation Spring 2023+

- Additional PIT Tags
- Technical Analysis and Support

Study or Purpose	Equipment need	# needed
Pilot study, Year 2	Model 55400 acoustic transmitters	750
	PIT tags	750
Pilot study, Year 3	Model 55400 acoustic transmitters	750
	PIT tags	750
Sockeye study, Year 1	PIT tags	1200
	JSATS acoustic tags	
Sockeye study, Year 2	JSATS acoustic receivers	
	PIT tags	1200
Sockeye study, Year 3	JSATS acoustic tags	
	PIT tags	1200
PIT tag study, Year 1	JSATS acoustic tags	
	PIT tags	160,000
PIT tag study, Year 2	JSATS acoustic tags	
	Vemco tags	160,000
PIT tag study, Year 3	PIT tags	
	JSATS acoustic tags	160,000
Fish transport/Culture	Net pens	Availability
	*Availability= What ever is available please notify of surplus	
	Circular tanks	3
	Transport trucks	2
	Fry Transport tanks	2
	FSD Complete V detector	1
	8' Fish Pump	4
	16' Circular Fish Accl-Metalite	1
	20' Goose Neck Trailer	1
	Alum.20' Gooseneck Trailer	2
	Head Tank - Alum.	2
	20' Alum. Circular Tanks	2
	4' Electric Fish Pump	12
	16'-20' Fiberglass raceways	10
	6' Semi-circular Fiberglass Tanks	10
	5' Circular Fiberglass Tanks	2
	Van Gaalen Egg Sorter	2
	Jensorter egg counter	20
	Heath Stacks (egg incubation)	Availability
	8' flex hose (ring lock)	Availability
	12' flex hose (ring lock)	Availability
	8' aluminum irrigation pipe	Availability
	12" aluminum irrigation pipe	Availability
	1 Ton, 2 Ton flatbed trucks	2
	Misc. Aluminum Perforated/Slotted Screen	Availability
	Emergency Eye Wash Station (new)	4
	Flyt Ready 4 submersible Pump	4
	Olympian Generator	2
	2' submersible pumps	6
	Caterpillar Diesel Generator	2
Portable Gas Generator	2	
2' Gas Water Pump	4	
Pressure Washer	4	
3" Honda Trash Pump WT30X	2	
Heavy Equipment	John Deere Tractor	2
	John Deere Auger	2
	John Deere Roto Tiller	2
	John Deere Fork Attachment	2
	John Deere Mower Deck	2
	John Deere Plow Blade	2
	John Deere Road Rake	2
	UTV	2
	Utility Cargo Trailers	2
	Toyota Propane Forklift	2
	Park Model Trailer	2
	Reach Forklift	1
Case Backhoe	1	
Front End loader	1	
Misc. Power Tools/Equipment	Pipe Bender Angle Roll	1
	Electromagnetic drill press	2
	14" multicutter/chop saw	2
	Heavy Duty band saw	2
	Orbital super sawzall	2
	Evolution Extreme 230 TCT steel cutting Circular Saw 9"	2
	Orbit Jig Saw	2
	Makita HR 300 OC/ Hammer Drill	2
	Culmaster Air Plasma System 80XL	2
	Gas Chop Saw	2
	Toyota Pallet Jack	2
	Large Air Compressor	4
Small Air Compressor	2	
Ladder (misc. 4', 8', 12', extension)	12	



# Step 2 – Interim Passage & Testing

## **Step 1 Continued Activities:**

- Operation of interim rearing facilities
- Moderate-sized PIT tag releases of Chinook and Sockeye
- Trap-and-Haul from CJD to upstream reservoirs

## **Incremental Installation of Interim Passage Facilities**

*Sequence will be informed by Step 1 survival studies*

- Design & Installation
- Effectiveness Testing
- Operation

## **Research, Monitoring, & Evaluation**

- Parentage-based Tagging (PBT), Adult Recruits per Spawner (AR/S), limiting factors & adaptive management

# Step 2: Interim Downstream Passage Facilities

## Juvenile Passage Options

- Spill and Turbines to Provide Initial Passage
- Minimize Impacts to Dam Operations
- Ability to Collect Juvenile Salmon Efficiently



Potential Collection Location @ GCD





# Step 2: Interim Upstream Passage Facilities

## Adult Passage Options

- *Minimize Impacts to Dam Operations, Leverage Existing Infrastructure*
- Trap-and-Haul Program from Chief Joseph Hatchery Ladder
- Adult Collection Considerations
  - Volitional vs Assisted Passage
  - Adult Sampling and Sorting



Photo Courtesy of Whooshh Innovations

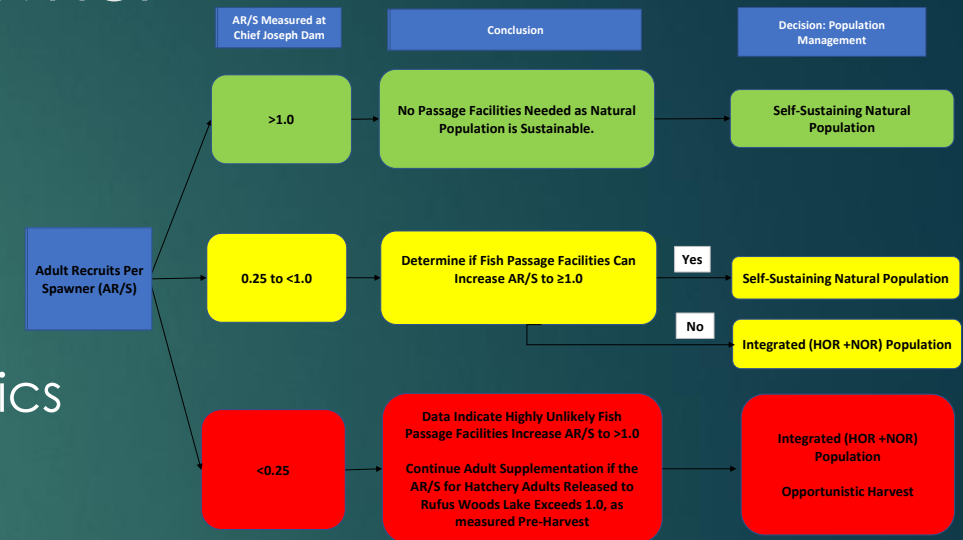




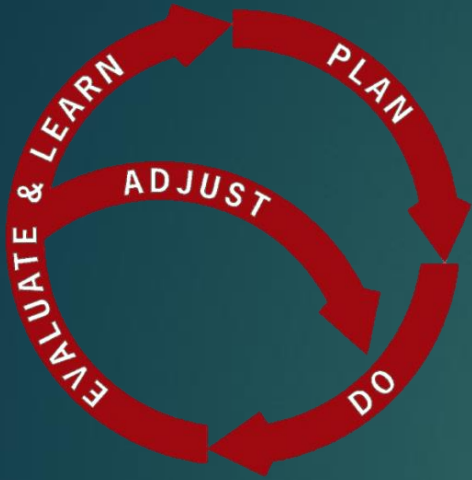
# Informing the Adaptive Management Approach: Adult Recruits/Spawner

## Parentage-based tagging

- All adults released in blocked area sampled for genetics
- Returning natural origin adults collected downstream of Chief Joseph Dam will be sampled for genetics to calculate AR/S values
- AR/S values will help guide the decision making process for juvenile passage, hatchery supplementation and population management



# Informing the Adaptive Management Approach: Life Cycle Modeling (LCM)



Then re-run the LCM to re-assess feasibility  
&  
adaptively manage the approach

Empirical data

LCM

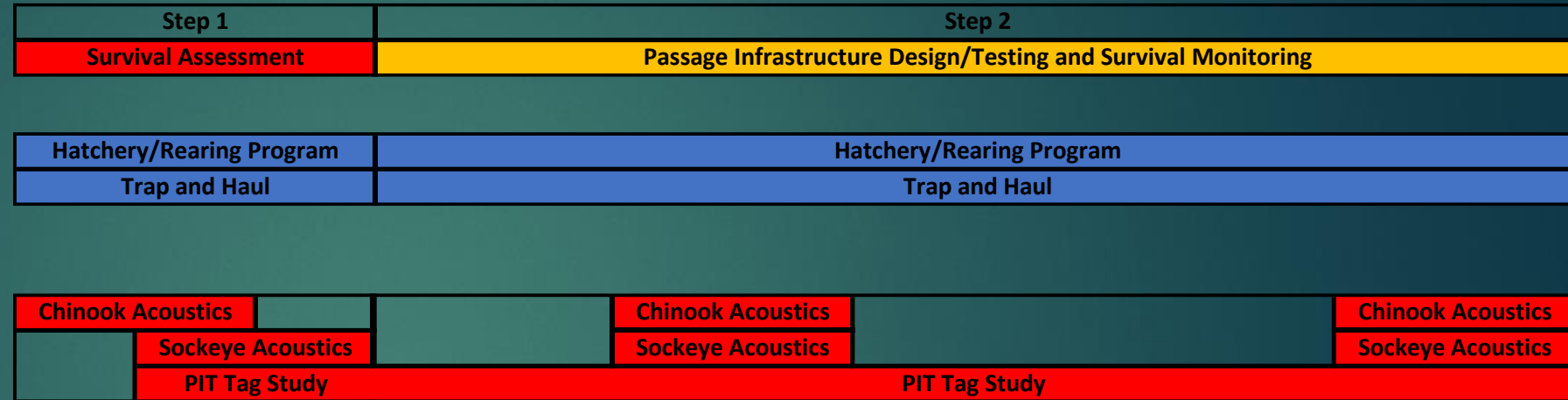
Model input w/assumptions

- ✓ • Passage Survival
- ✓ • Collection Efficiency of Passage Options
- ✓ • Migration Survival
- ✓ • Spawning Capacity
- ✓ • Incubation and Juvenile Life Stages
- ✓ • Reservoir Rearing
- ✓ • Ocean Survival
- ✓ • Juvenile to Adult Survival (CJD to CJD)
- ✓ • Harvest rates

# P2IP: Timeline and Structure

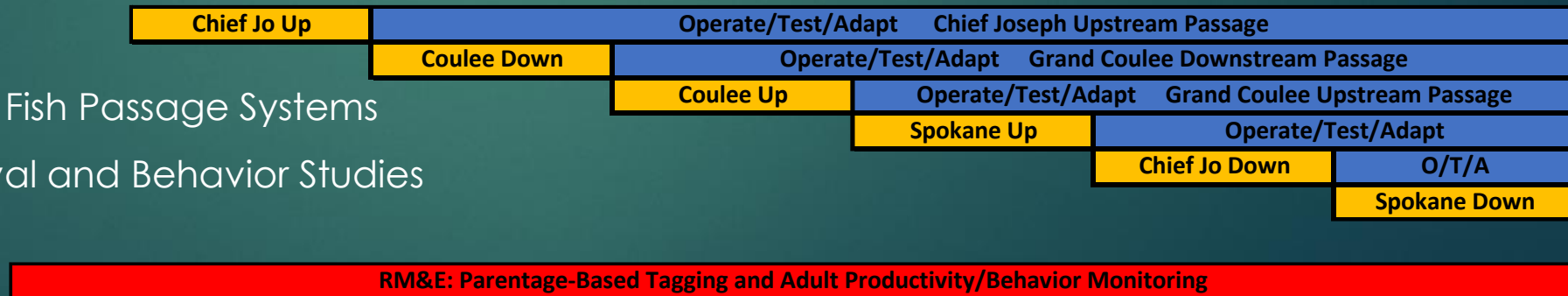
## 20+ Years, 2 Major Steps

- Step 1: Years 1 - 6
  - Donor Stock Access
  - Rearing Facility Development
  - Adult Trap and Haul Program
  - Initial Survival Studies



- Step 2: Years 7 - 20+

- Design and Testing of Fish Passage Systems
- Continuation of Survival and Behavior Studies
- PBT





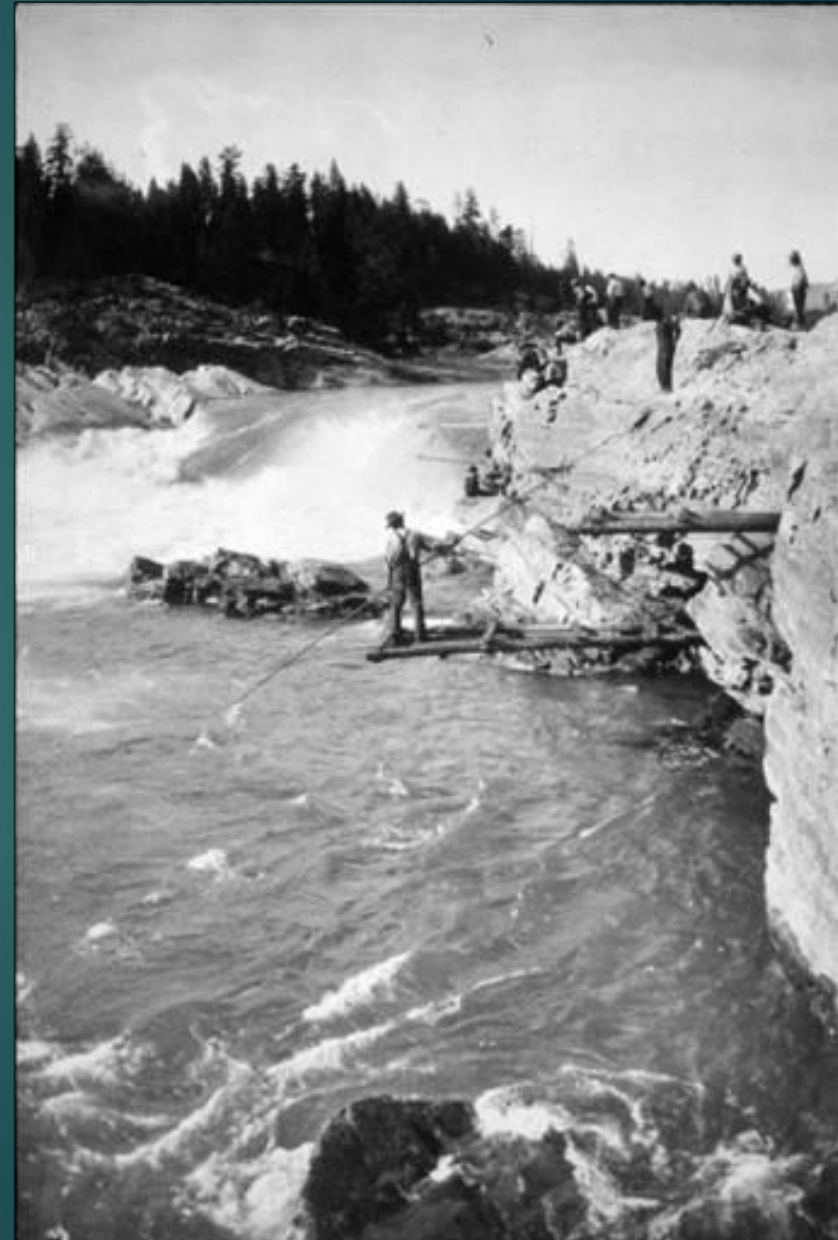
# P2IP Budget Estimates

P2IP Stepwise Implementation (in millions \$)	Step Total	Cumulative Total
1) Year 1-6 (Studies, Hatcheries, Chief Joseph Up)	\$32.6	
2.1) Year 7-9 (Ongoing Studies, Grand Coulee Down)	\$27.2	\$59.82.2
2.2) Year 10-12 (Ongoing Studies, Grand Coulee Up)	\$25.35	\$85.15
2.3) Year 13-15 (Ongoing Studies, Spokane Up)	\$24.9	\$110.05
2.4) Year 16-21 (Ongoing Studies, CJD Down, Spokane Down)	\$65.95	<b>\$176.0</b>

P2IP Totals by Activity	Estimated Cost
Interim Facility Design and Construction	\$75.6 million
Research, Monitoring, and Evaluation	\$69.5 million
Operation and Maintenance	\$30.9 million
<b>Total Estimated Cost</b>	<b>\$176 million</b>

# P2IP Highlights

- Projected costs estimated at \$176 million, ~\$8.5 million/year
- No operational changes to power, flood risk management, or irrigation
- Answers the fundamental feasibility questions around permanent salmon reintroduction
- Interim upstream and downstream passage at five hydroelectric dams
- Increased natural and hatchery-origin salmon throughout the Columbia River system
- More fish available for harvest
- Support for local and marine ecosystems
- Salmon in the UCR will add diversity and resiliency to climate change
- Health and economic benefits to all communities in the Upper Columbia Region
- A step toward restoring the cultural and spiritual heritage for the UCR tribes



# Cultural and Educational Releases UCUT Tribes, 2017-2021





# Cultural and Educational Releases UCUT Tribes, 2017-2021



1,058 adult Chinook  
11,501 juvenile Chinook



# Salmon in the classroom





# Juvenile outmigration evaluation

- PIT tag detections downstream of Chief Joseph Dam





# Trap and haul adult salmon for ceremonial releases



Tshimikain Creek



Kettle Falls



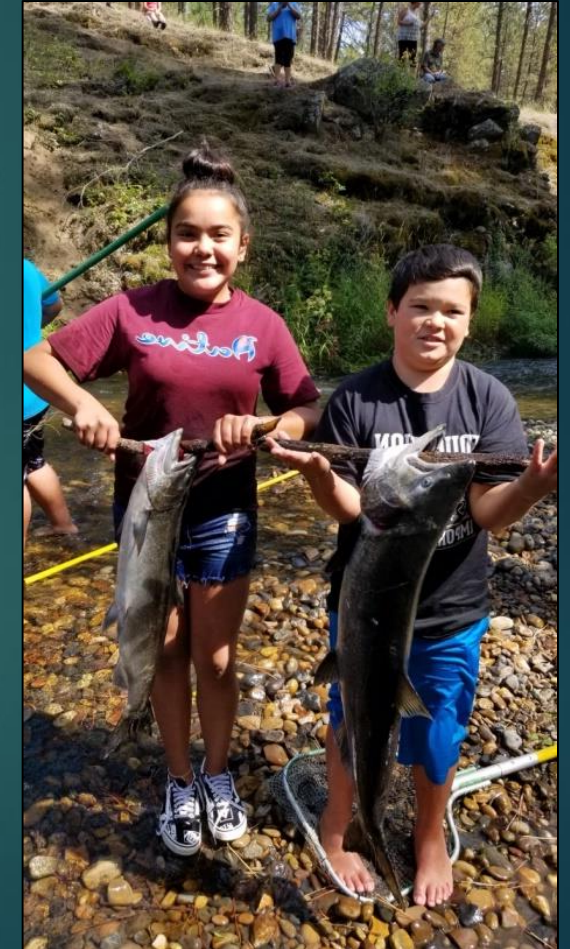
Keller



Hangman Creek

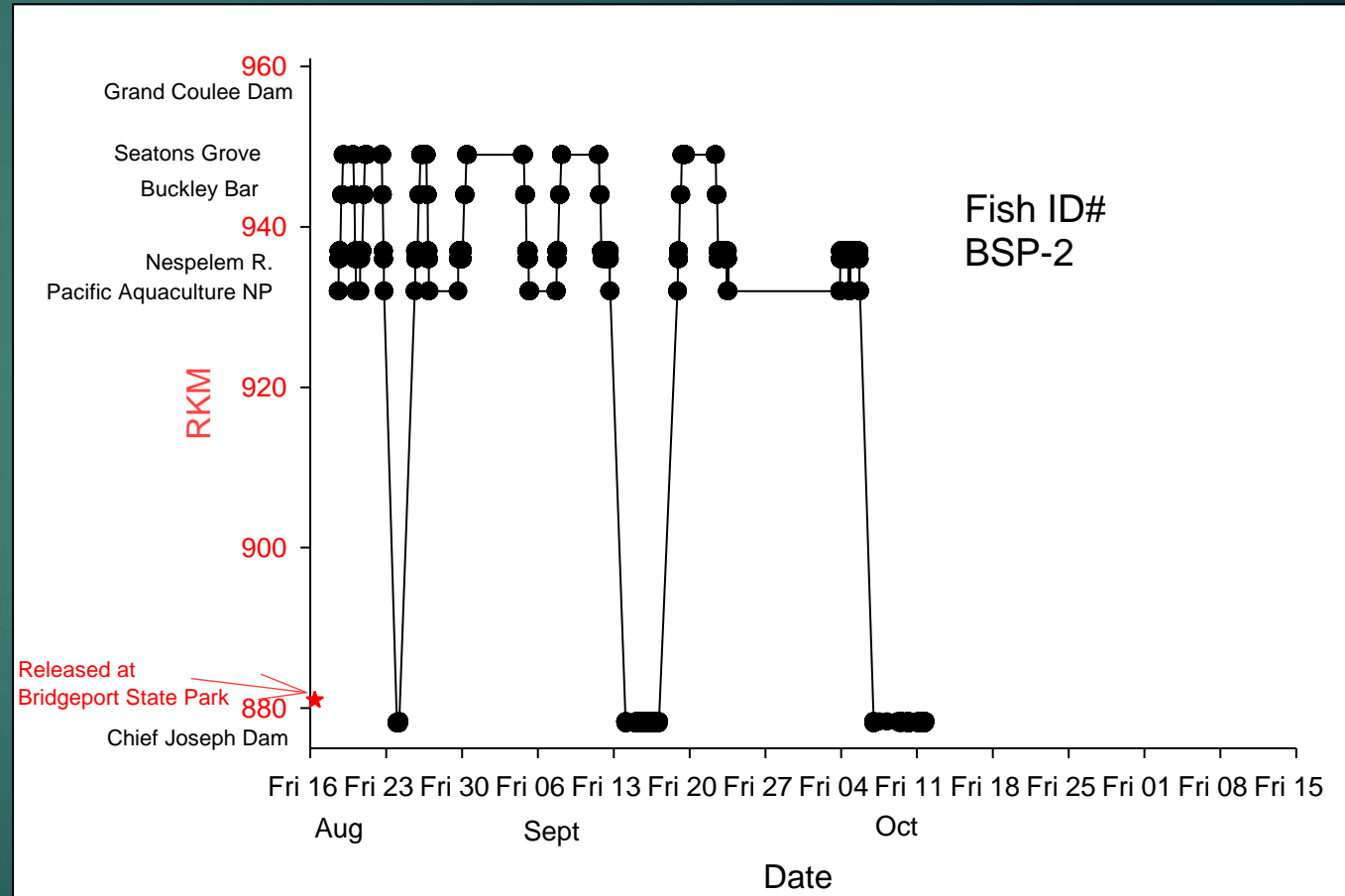
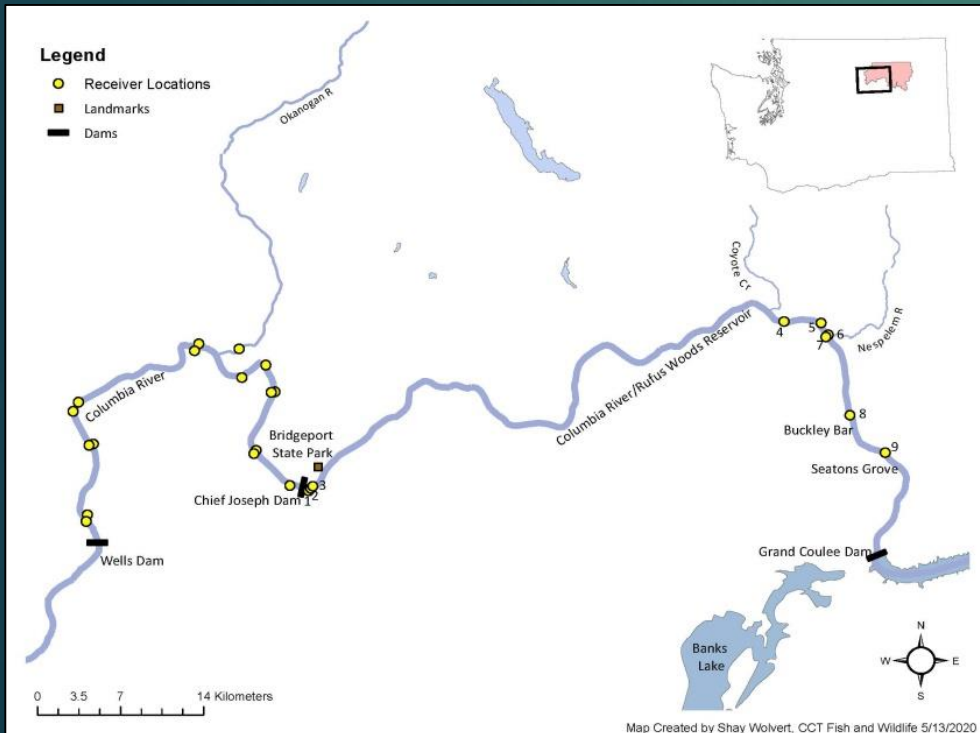


# Ceremonial Harvest on the Spokane and Coeur d' Alene Reservations





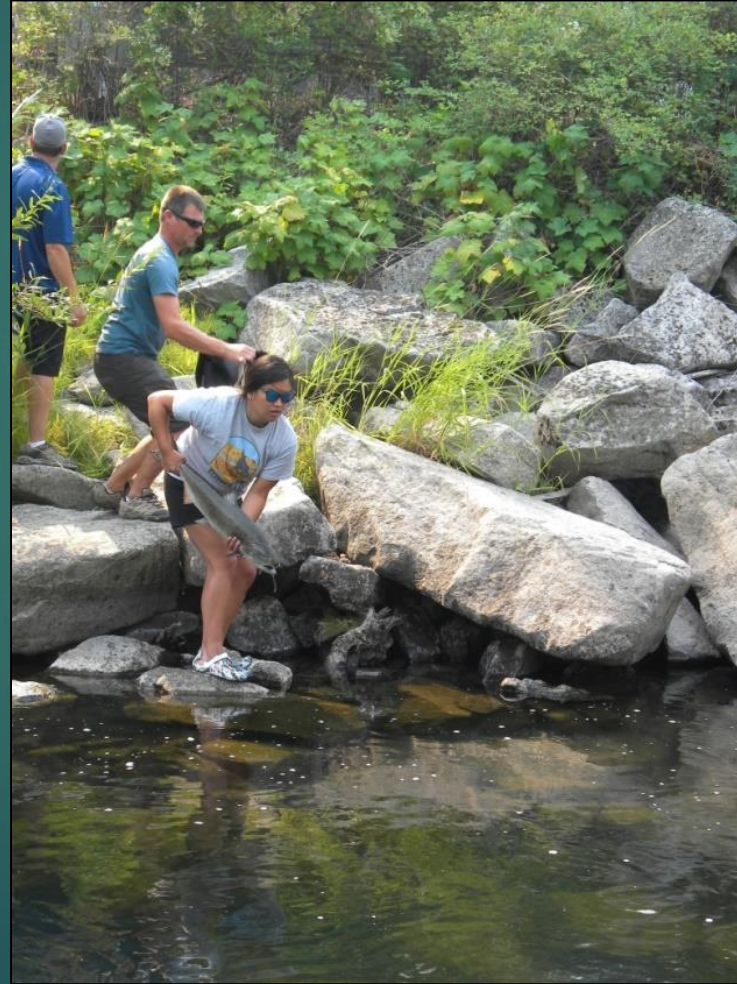
# Adult Behavior (acoustic and PIT studies)





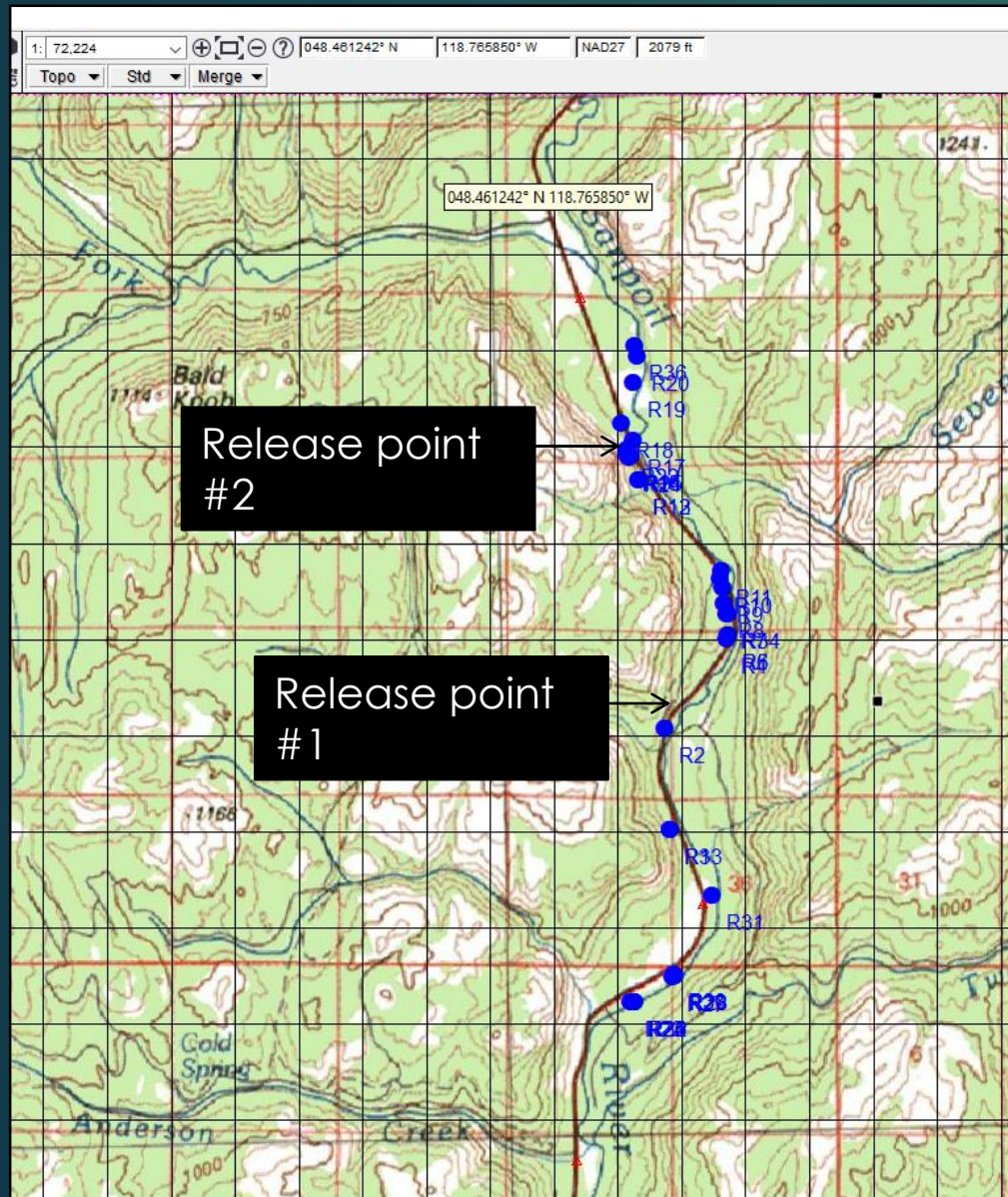
# Ecosystem Restoration (spawning, nutrients)

- Tshimikain Ck.
- Sanpoil R.
- Little Spokane R.
- Rufus Woods Reservoir
- Transboundary reach





# Documented Spawning: Sanpoil R., Tshimikain Ck., Little Spokane R. and Rufus Woods 2019-2021





# Documented production of wild juveniles





# Cultural and Educational Releases

Beginning to address short-term tribal goals for:

- Ceremonies
- Education and outreach
- Harvest in areas deprived of salmon for 60-110 years
- Ecological restoration
- Data to inform the Phased approach
- Proof of concept