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January 4, 2023

### MEMORANDUM

**TO:** Council Members

**FROM:** Erik Merrill, Independent Science Manager, and Leslie Bach, ISAB Ex Officio

**SUBJECT:** ISAB Review of the Upper Columbia United Tribes' Phase 2 Implementation Plan: Testing Feasibility of Reintroduced Salmon in the Upper Columbia River Basin

### **BACKGROUND:**

**Presenters:** Stan Gregory, ISAB Chair, and John Epifanio, ISAB Vice Chair

**Summary:** Gregory and Epifanio will present key findings from the Independent Scientific Advisory Board's (ISAB) review of the *Upper Columbia United Tribes' Phase 2 Implementation Plan: Testing Feasibility of Reintroduced Salmon in the Upper Columbia River Basin*.

**Relevance:** The Upper Columbia United Tribes (UCUT) are using a phased approach to investigate the feasibility of restoring salmon to the upper Columbia River Basin above Chief Joseph, Grand Coulee, and the Spokane River dams. A [phased approach](#) is called for in the Columbia River Basin [2014 Fish and Wildlife Program](#) and was reaffirmed in the [2020 Addendum](#) to the 2014 Program.

**Workplan:** Independent scientific review is an integral part of the Fish and Wildlife Division's workplan.

Background: In July 2022, the Upper Columbia United Tribes (UCUT) requested and the ISAB's Administrative Oversight Panel approved the ISAB to review the UCUT's [Phase 2 Implementation Plan](#). The ISAB found that the Phase 2 Plan clearly expresses the deep importance of reintroducing salmon to the UCUT members and the Upper Columbia River ecosystem. At the same time, it addresses mitigation needs identified in the Fish and Wildlife Program. As the ISAB previously concluded for the Phase 1 Plan, it is reasonable to expect that reintroduction could be successful to some extent, but there is substantial uncertainty about the numbers of adults that will return and the types of management that will be required to maintain them. While some parts of the Plan may be overly optimistic (e.g., uncertainties with survival in the blocked area, passage efficiency and survival, and downstream survival), the UCUT use a cautious stepwise approach to ensure that the goals and management actions are rooted in a firm and attainable foundation of knowledge to restore anadromous salmon to the blocked area above Grand Coulee and Chief Joseph dams.

More Info: The full ISAB report is posted ([ISAB 2022-2](#)).



ISAB Review of the  
Upper Columbia United Tribes'  
Phase 2 Implementation Plan:  
Testing Feasibility of Reintroduced Salmon  
in the Upper Columbia River Basin

INDEPENDENT SCIENTIFIC ADVISORY BOARD

ISAB 2022-2 DECEMBER 8, 2022



## Independent Scientific Advisory Board

for the Northwest Power and Conservation Council,  
Columbia River Basin Indian Tribes,  
and National Marine Fisheries Service

851 SW 6<sup>th</sup> Avenue, Suite 1100  
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**Michael Ford, Ph.D.**, Northwest Fisheries Science Center, Seattle, Washington

**Robert Lessard, Ph.D.**, Columbia River Inter-Tribal Fish Commission, Portland, Oregon

**Erik Merrill, J.D.**, Northwest Power and Conservation Council, Portland, Oregon

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

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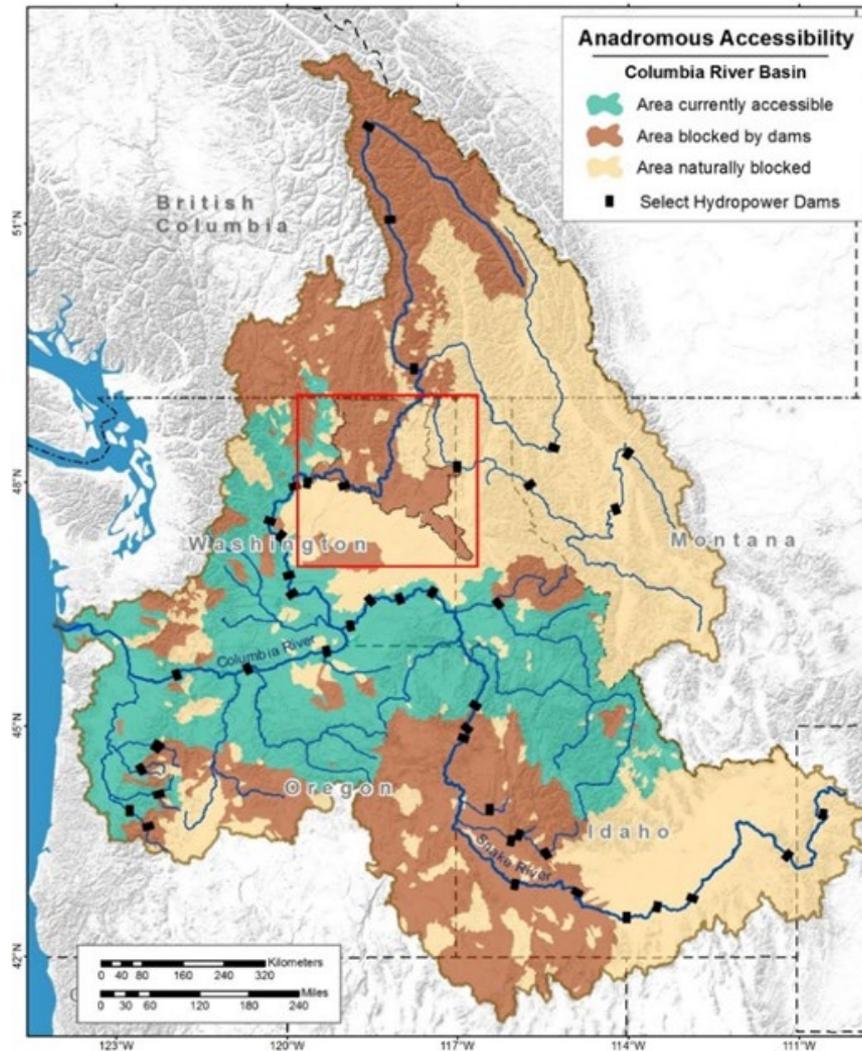
- Request for the Independent Scientific Advisory Board (ISAB) to review the scientific foundation for the Plan
- A phased approach for restoring salmon to the upper Columbia River Basin above the "blocked area"
- Phased approach consistent with the Columbia River Basin 2014 Fish and Wildlife Program (and 2020 Addendum)

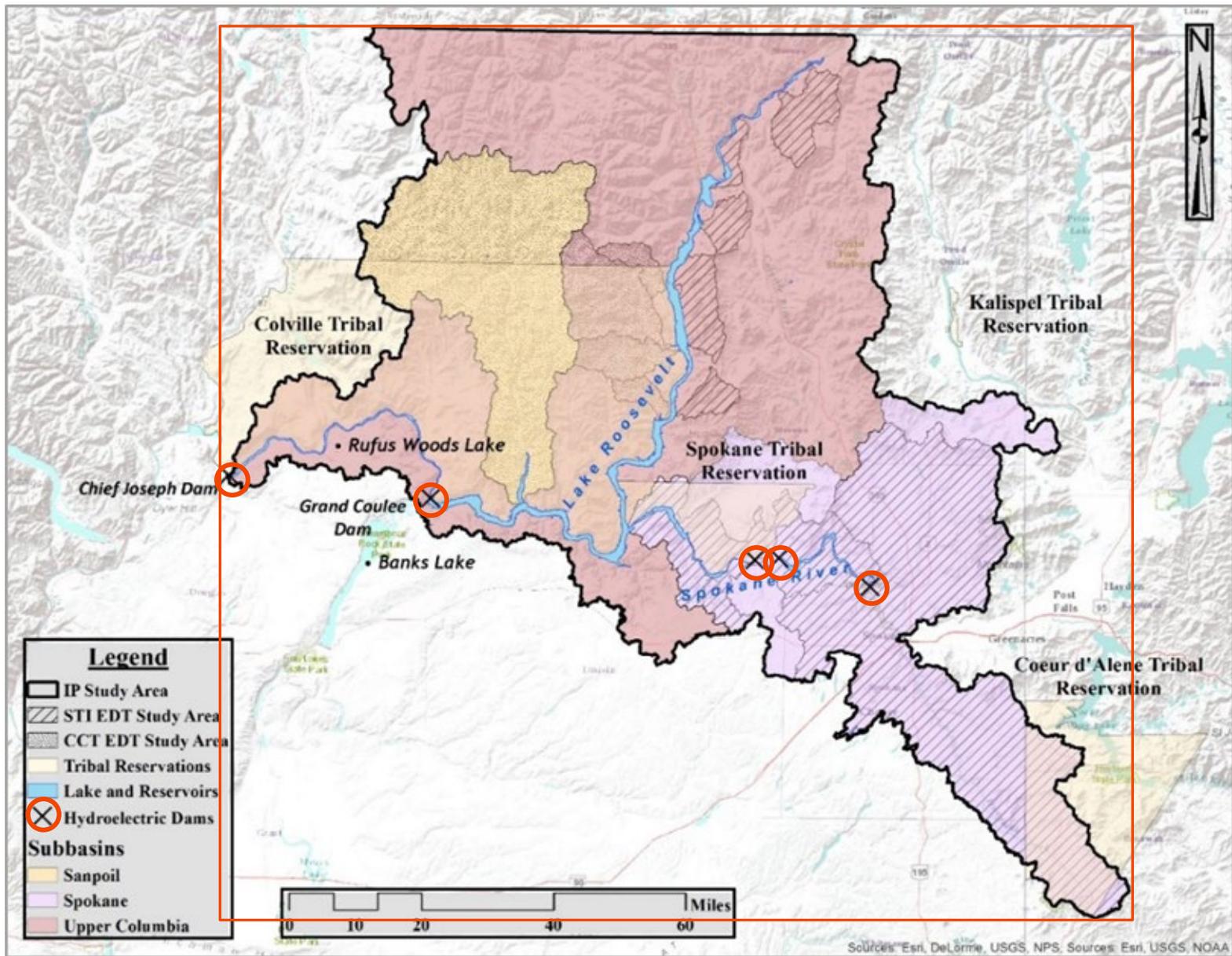


Phase 2 Implementation Plan (P2IP): Testing Feasibility of Reintroduced Salmon in the Upper Columbia River Basin

CULTURE, FISH, HABITAT, WATER

# Project Scope – The "Blocked Area"



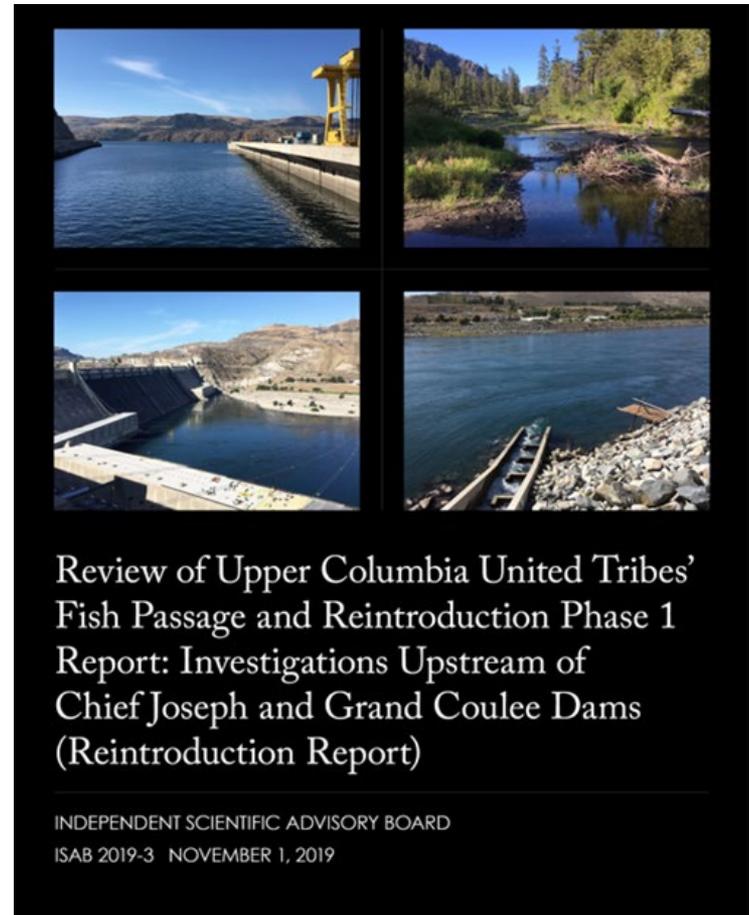


# ISAB Review of UCUT Phase 1 Report

November 2019

## Major Assessments

- Donor stock selection
- Disease risk
- Predation risk
- Habitat
- Life cycle model
- Passage alternatives
- Costs



# Field Tour of Blocked Area

- Organized and led by the UCUT and their collaborators throughout the blocked area



Tour group at Waikiki Springs in Spokane River basin

# A Vision for Reintroduction

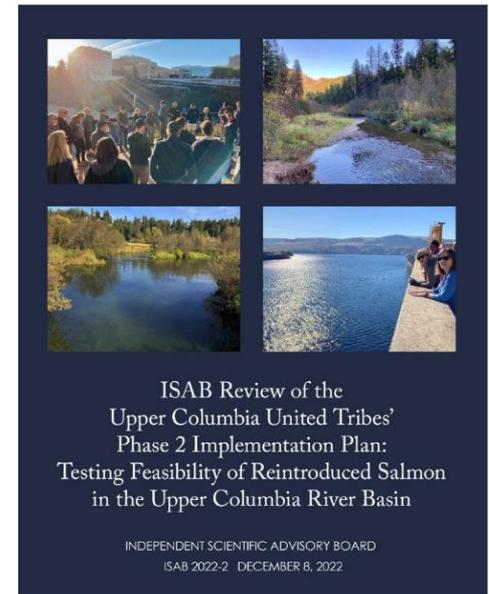
- The meaning of the absence of salmon for 5 generations
- Reconnecting salmon and Indigenous Peoples of these lands
- The healing power of this reintroduction process for the UCUT
- A desire to reconnect for benefit of the entire Columbia River ecosystem to benefit everyone, both Tribal and non-tribal



Carol Evans, Chairwoman of the Spokane Tribes of Indians

# ISAB Report

- Addresses the scientific foundation of the Plan
- Provides advice on methods and management approaches
- The following summary highlights our major findings on five major components:
  - Scientific Framework
  - Production
  - Fish Passage
  - Support Studies
  - Future Steps

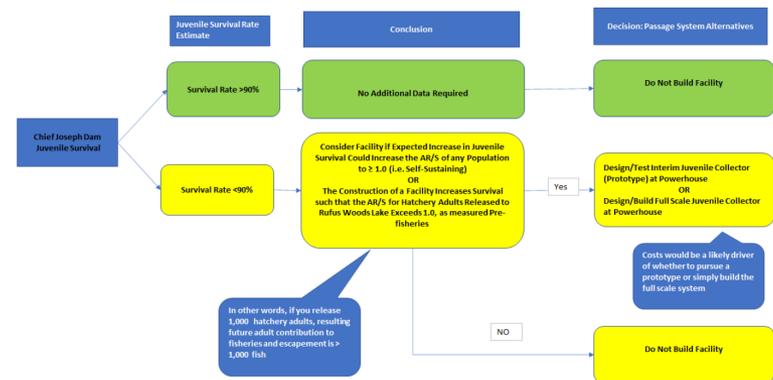


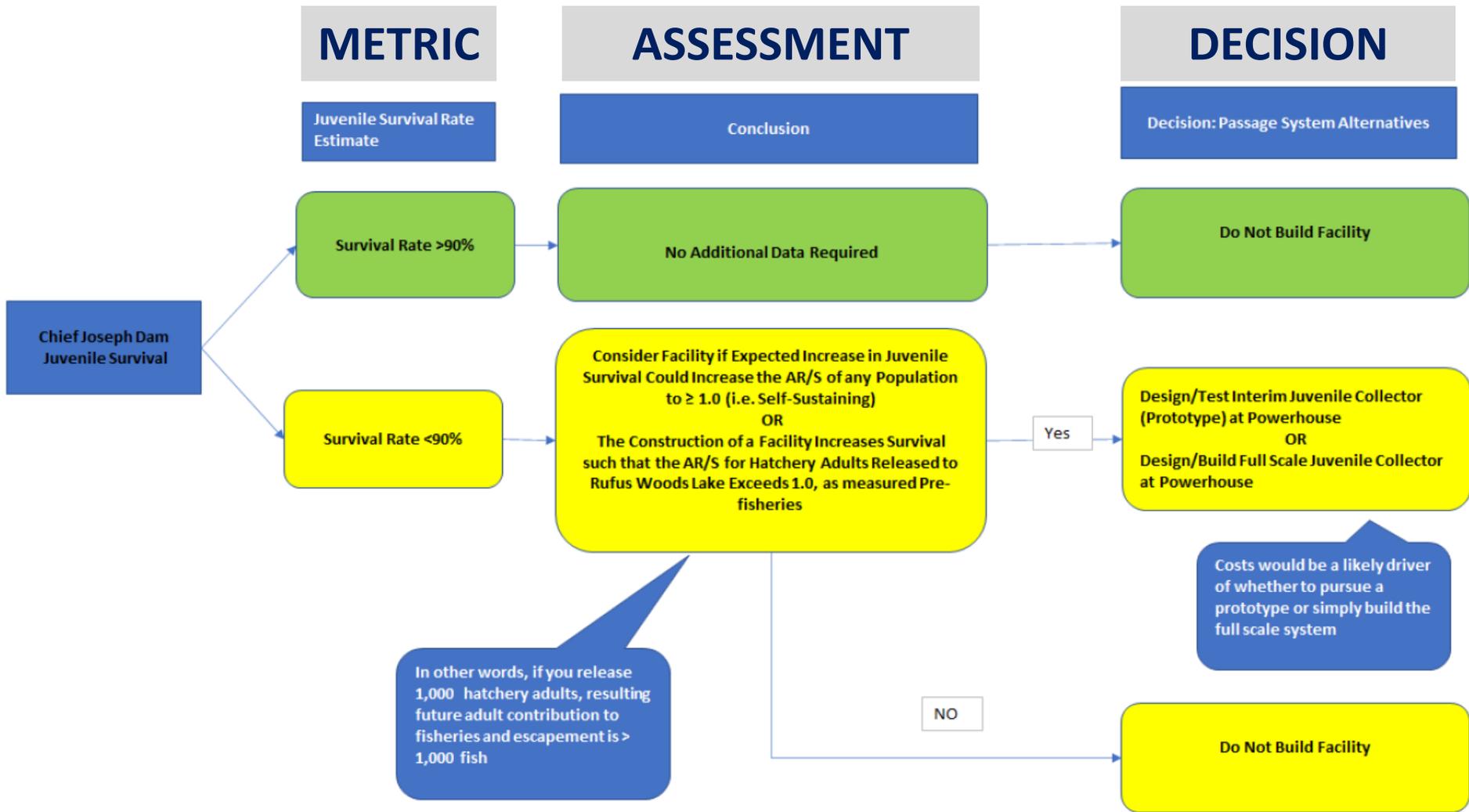
# Scientific Framework

- 80 years of blockage create major uncertainties
- Field studies, modeling, facilities designs, and initial reintroductions integrated in a structured, strategic approach

# Adaptive Management

- A formal process:
  - to obtain information to design and evaluate actions
  - to inform decisions and alternatives
- Flowcharts to help guide decision-making
- Technical and Policy teams for coordination and rapid response



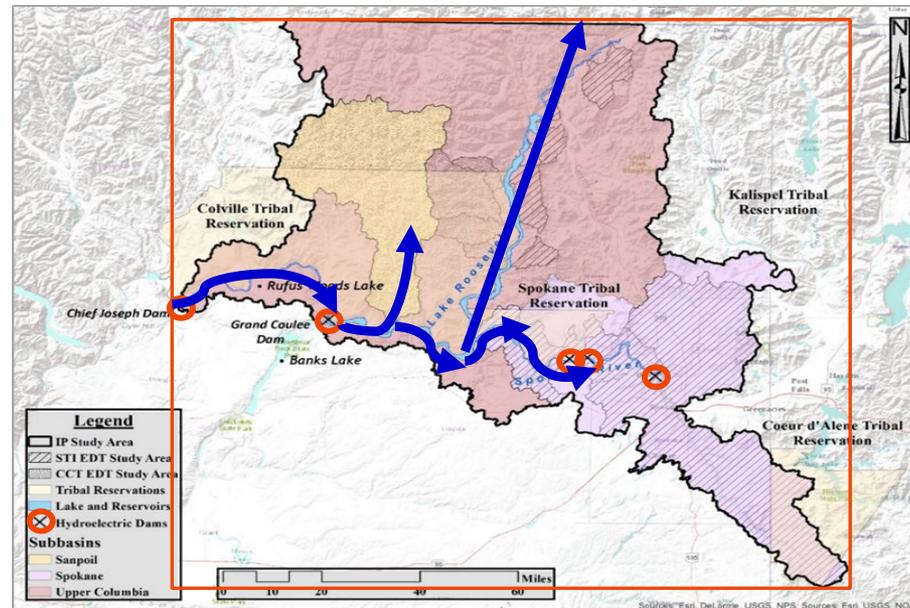


Decision flow chart for selecting the juvenile passage system at Chief Joseph Dam

# Stepwise Approach

A “steppingstone” approach:

- progressive reintroduction from lower to upper regions



- Sequencing studies on strategies for juvenile releases
- Determine next management steps

# Stepwise Approach

- Flexibility for prioritizing the sequence of field studies and development of fish passage facilities
- Appropriate given the uncertainties in reintroducing salmon above these major dams

# Data Analysis and Life Cycle Model

- The Life Cycle Model:
  - A "tool" to predict survival and productivity
  - Replaces assumptions with data and analyses to narrow uncertainties
- The field studies will provide critical data to evaluate possible outcomes for salmon populations and to identify factors that may limit survival and productivity
- The Plan needs to more thoroughly describe how field studies and Life Cycle Model will be integrated to make decisions

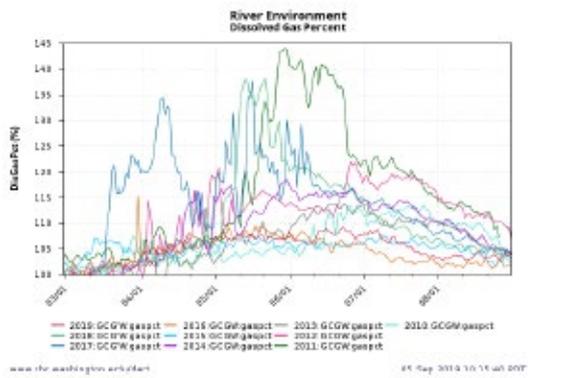
# Data Analysis and Life Cycle Model

- A unified database and clear plan for analyses would improve data integration with the model and strengthen adaptive management and decision making
- The model is in transition and a strategy for its use is needed

**Table 3.** Estimated precision (SE and 95% CI) of release-to-Rocky Reach Dam (RRJ) and release-to-McNary Dam (MCJ) survival estimates for PIT-tagged yearling Chinook salmon released into the Sanpoil River, Spokane River (below River, and below Spokane Falls/Hangman Columbia River (near Northport, WA).

PIT N (Total)	PIT N by Release Location				
	Location	Release-to-RRJ SE			
<b>Below Grand Coulee Dam</b>					
60,000	10,000	0.026			
110,000	10,000	0.026			
160,000	10,000	0.026			
<b>Sanpoil</b>					
60,000	13,150	0.019			
110,000	26,300	0.014			
160,000	39,450	0.011			
<b>Below Little Falls Dam</b>					
60,000	8,100	0.018			
110,000	16,200	0.013			
160,000	24,300	0.011			
<b>Below Nine Mile Dam</b>					
60,000	5,050	0.022			
110,000	10,100	0.016			
160,000	15,150	0.013			
<b>Below Spokane Falls</b>					
60,000	5,050	0.030	0.155-0.232	0.039	0.069-0.120
110,000	10,100	0.014	0.167-0.221	0.027	0.091-0.158
160,000	15,150	0.011	0.171-0.216	0.022	0.101-0.188
<b>Transboundary Reach</b>					
60,000	18,650	0.014	0.200-0.254	0.029	0.114-0.225
110,000	37,300	0.010	0.208-0.246	0.020	0.130-0.209
160,000	55,950	0.008	0.212-0.242	0.017	0.137-0.202

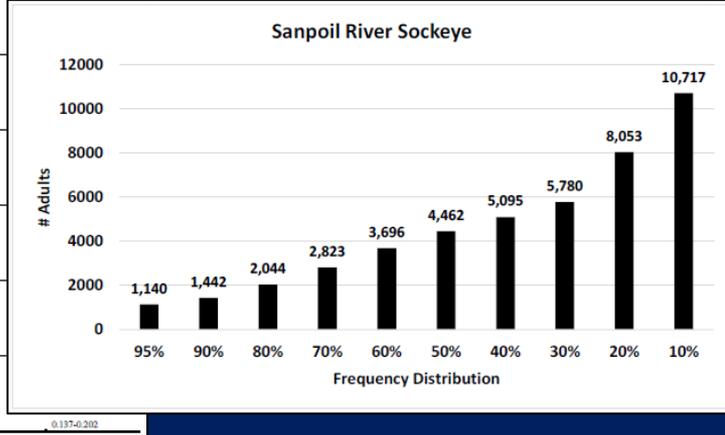
PIT N (Total) = total number of PIT-tagged yearling Chinook salmon released (all release locations combined); SE = standard error; CI = confidence interval.  
 \*In certain years, the proportion released at particular locations may be adjusted to provide more returning adults for behavioral studies at certain dams.



Estimated precision (SE and 95% CI) of release-to-Rocky Reach Dam (RRJ) and release-to-McNary Dam (MCJ) survival estimates for PIT tagged yearling Chinook salmon released into River (below Little Falls, Below Nine Mile Dam/Little Spokane River, Hangman Creek), and the Transboundary Reach of the Columbia River (Total) = total number of PIT tagged yearling Chinook salmon as combined; SE = standard error; CI = confidence interval.

	Release-to-RRJ		Release-to-MCJ	
	SE	CI	SE	CI
Woods Lake	0.026	0.653-0.755	0.052	
0.026	0.653-0.755	0.052		
0.026	0.653-0.755	0.052		
0.019	0.285-0.360	0.041		
0.014	0.296-0.349	0.029		
0.011	0.301-0.344	0.023		
0.018	0.245-0.318	0.037		
0.013	0.256-0.307	0.026		
0.011	0.260-0.303	0.021		
<b>Below Nine Mile Dam / Little Spokane River</b>				
60,000	5,050	0.022	0.203-0.290	0.044
110,000	10,100	0.016	0.216-0.277	0.031
160,000	15,150	0.013	0.221-0.272	0.025
<b>Below Spokane Falls / Hangman Creek</b>				
60,000	5,050	0.020	0.155-0.232	0.039
110,000	10,100	0.014	0.167-0.221	0.027
160,000	15,150	0.011	0.171-0.216	0.022
<b>Transboundary Reach</b>				
60,000	18,650	0.014	0.200-0.254	0.029
110,000	37,300	0.010	0.208-0.246	0.020
160,000	55,950	0.008	0.212-0.242	0.017

Model Results (after 100 Generations)					
Summer/Fall Chinook Juvenile Production	Refus	Sanpoil	Spokane	Transboundary	Total
NOR Fry Production (before passage)	3,751,969	223,747	595,497	4,833,094	9,404,307
Hatchery Releases - Subyearlings	0	500,000	1,000,000	1,000,000	2,500,000
Hatchery Releases - Yearlings	0	0	0	0	0
NOR Subyearling - Spring/Summer Migrants Below CID	2,678,861	60,289	123,048	2,716,514	5,573,712
NOR Subyearling - Fall Migrants Below CID	200,090	9,451	22,019	249,104	480,664
NOR Yearling - Spring Migrants Below CID	17,026	3,301	7,867	21,162	49,356
Hatchery Subyearlings Below CID	0	486,750	243,607	925,539	1,655,896
Hatchery Yearlings Below CID	0	0	15,211	1,429	14,640
Total Juveniles Below CID	2,890,980	559,791	409,752	5,913,753	7,774,276
Total Juveniles below BON	802,340	152,637	120,040	1,088,450	2,163,467
Summer/Fall Chinook Adult Production					
	Refus	Sanpoil	Spokane	Transboundary	Total
Adult Runsize (before Harvest and Passage)	16,329	3,049	2,547	22,199	44,124
Adult Runsize (before Harvest and Passage) - NORs	16,329	447	951	17,054	34,781
Adult Runsize (before Harvest and Passage) - HORs	0	2,602	1,597	5,145	9,344
Adult Runsize to below CID	6,451	1,195	1,000	8,751	17,397



# Production

- A collaborative expert-based process prioritized potential donor stocks
- Available habitat and potential production were estimated with scientifically sound, but relatively simple, assumptions and limited information



Chinook on a redd, Sanpoil River

# Production

- The survival and migration studies are critical for improving estimates of production potential and reducing uncertainty
- The supporting studies will provide important information on factors that influence the production of reintroduced Chinook and sockeye salmon



Chinook on a redd, Sanpoil River

# Fish Passage

- The overall approach is scientifically sound
- Anticipated performance metrics for juvenile and adult passage have been developed for all major dams



# Fish Passage

- Estimates about fish passage are based on reasonable assumptions and the best available data
- May be overly optimistic given uncertainties about survival in the blocked area, passage efficiency and survival, and downstream survival
- The supporting studies will be essential for refining decision thresholds for passage performance and transitions to permanent facilities



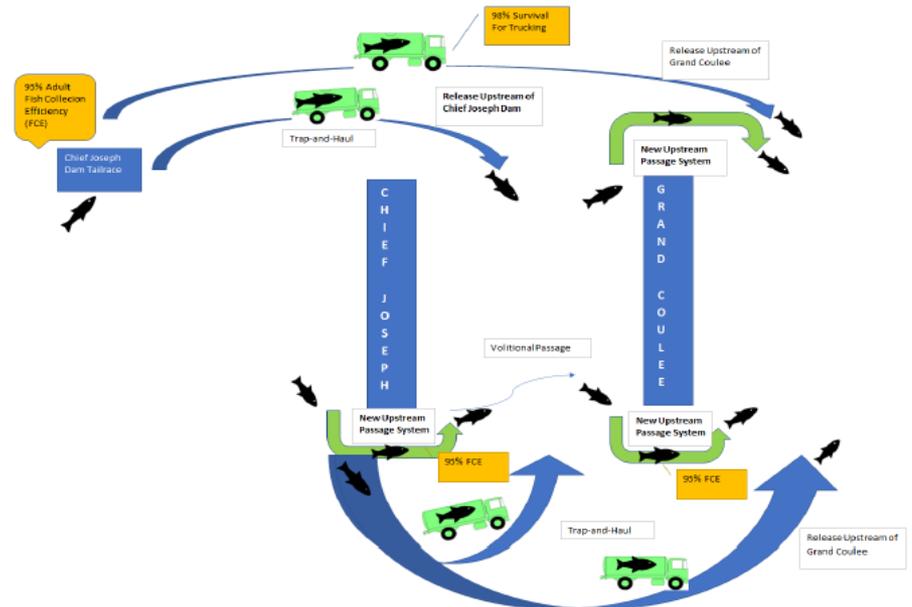
# Fish Passage

- Essential to consider benefits and risks of passage designs for other taxa, both beneficial and potentially detrimental ones



# Support Studies

- Overall, the study designs are well-conceived and should reduce uncertainties
- The ISAB commends the essential collaboration between the UCUT and their cooperating agencies and institutions



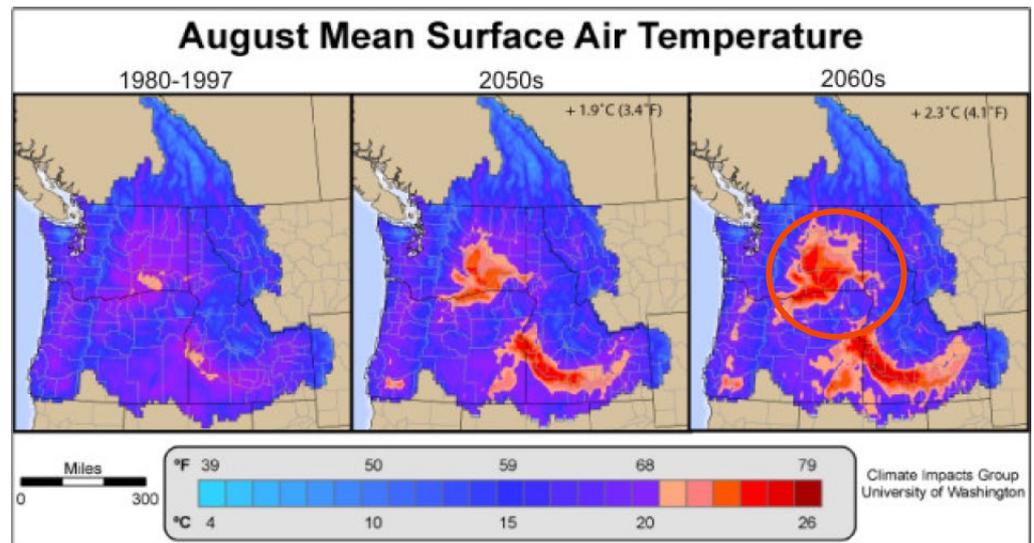
# Support Studies

- Improved reliability of sources, numbers, and conditions of experimental fish is essential to address the assumptions and uncertainties
- Continued review of sample sizes and study design is needed to reduce uncertainty
- Frequent reports on study results should inform adaptive management and create a long-term record of the findings



# Support Studies

- Climate change and hydrological uncertainty may affect the success of reintroduction of salmon
- Existing monitoring should be leveraged to gain more information over a longer period of time that reflects climate and hydrologic variability



# Responses to ISAB Recommendations on Phase 1 Report

- Implementing a "stepping stone" approach
- Refinement of Adaptive Management
- Juvenile & adult passage metrics formulated
- Total Dissolved Gas monitoring
  
- Life Cycle Model will benefit from further refinement
- Questions about the WHOOSH alternative for interim passage



Kettle Falls



Hangman Creek

# Conclusions

- The Phase 2 Plan expresses the deep importance of reintroducing salmon to the UCUT members and the Upper Columbia River ecosystem
- It addresses a need identified in the Fish and Wildlife Program to mitigate for the complete loss of anadromous fish in the blocked area



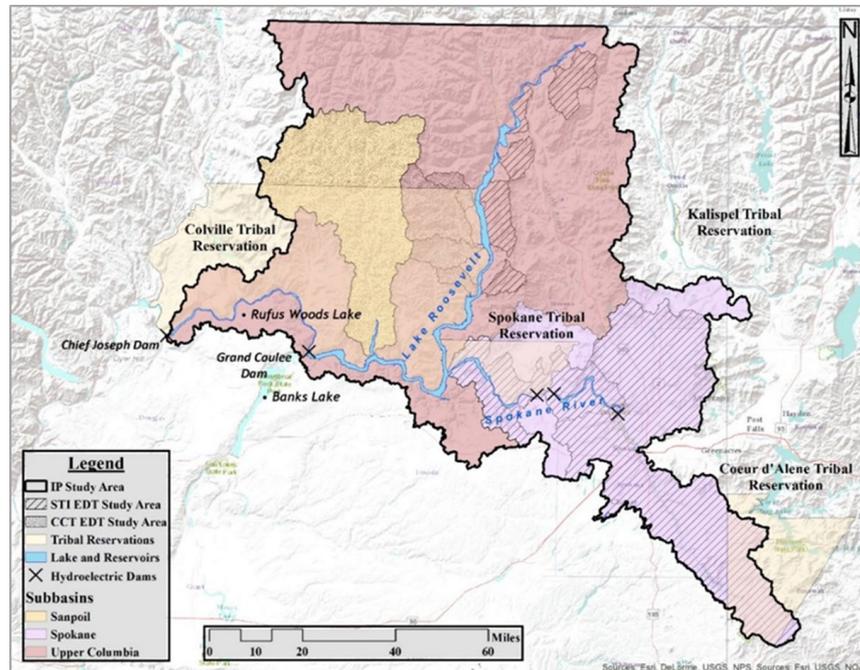
# Conclusions

- It is reasonable to expect that reintroduction could be successful to some extent, but there is substantial uncertainty about the numbers of adults that will return and the kinds of management that will be required to maintain them



# Conclusions

- While some parts of the Plan may be optimistic, the UCUT use a cautious stepwise approach to ensure that the goals and management actions are rooted in a firm and attainable foundation of knowledge



# Conclusions

- The UCUT have created a strategic plan to obtain information needed to address these uncertainties and have developed an adaptive management process to guide their decisions

