Please May I Get Upstream? Reintroducing Extirpated Salmon Runs Upstream of Dams

A Concurrent Session at the 40th Annual Salmonid Restoration Conference held in Fortuna, California from April 25–28, 2023

Session Coordinators:

- Eric Ginney, Environmental Science Associates
- Randy Beckwith, Department of Water Resources

Climate change, aging water infrastructure, outdated water management schemes, successive years of drought, and increasing demand for water resources have precipitated strong declines in salmonid populations throughout California. Compounding this, longitudinal and lateral disconnections from historical spawning and rearing habitat has triggered a loss of salmonid life history diversity, making species less resilient to change. As a result, reintroductions of salmonids to historical habitat upstream of dams has occurred or is proposed as a recovery strategy. While dam removal may be a viable option in some watersheds, for the large, Central Valley “rim dams” such as Oroville and Shasta dams, removal is not presently contemplated. Rather, trap and haul projects and technologies are being considered and piloted upstream of these large dams and reservoirs. Novel methods are being proposed to enable key runs of salmonids to complete their life history and this session seeks abstracts that describe critical efforts now underway, as well as abstracts that examine the methods, science, and policy implications of salmonid reintroductions to historical habitat.

Presentations

- Slide 4, **Yes, You May: Fighting Extinction in the Central Valley with Salmon Reintroductions at Rim Dams,** Brian Ellrott, *NOAA Fisheries, West Coast Region, California Central Valley Office*
- Slide 42, **Considerations for Assisted and Non-assisted Passage at Large Dams,** Jon Mann, P.E., *California Department of Fish and Wildlife*
- Slide 61, **Pilot Efforts Supporting Reintroduction: The Juvenile Salmonid Collection System,** Randy Beckwith, *DWR*, and Matthew Silva, *ESA*
- Slide 92, **Winter-Run Chinook Salmon Swim the McCloud River for First Time Since Construction of Shasta Dam: Drought Action Returns Endangered Salmon to Their Historical Habitat**, Matthew R. Johnson, *CDFW*
- Slide 119, **A Release Study Assessing the Survival of Juvenile Spring-Run Chinook Salmon in the Upper Klamath River Basin to Inform Reintroduction**, Rachelle Tallman, *University of California, Davis*
- Slide 142, **Klamath Basin Fisheries Collaborative: Data Integration for Monitoring Dam Removal, Project Effectiveness Monitoring, and Species Management**, Betsy Stapleton, *Scott River Watershed Council*

- No slides, video available online: **Winnemem Wintu Tribe Perspectives on Co-Stewardship of the McCloud River Nur***,* Honorable Chief Sisk*, Winnemem Wintu Tribe*

Yes, you may: Fighting Extinction in the Central Valley with Salmon Reintroductions at Rim Dams

Salmonid Restoration Federation
April 28, 2023
Brian Ellrott, Stacie Smith, and Rachel Johnson

Winter-run back in the McCloud in 2022

ENVIRONMENT ›

Blocked for decades, Chinook salmon are once again swimming in Shasta County tribe's ancestral river

Partners Return Winter-Run Chinook Salmon Eggs To McCloud River: Drought Action Moves Endangered Salmon Back Into Their Historical Habitat For First Time Since Construction Of Shasta Dam

July 12, 2022

Endangered salmon will swim in California river for first time in 80 years

Winter-Run Chinook Salmon's journey to the Pacific from McCloud River

ENVIRONMENT

by

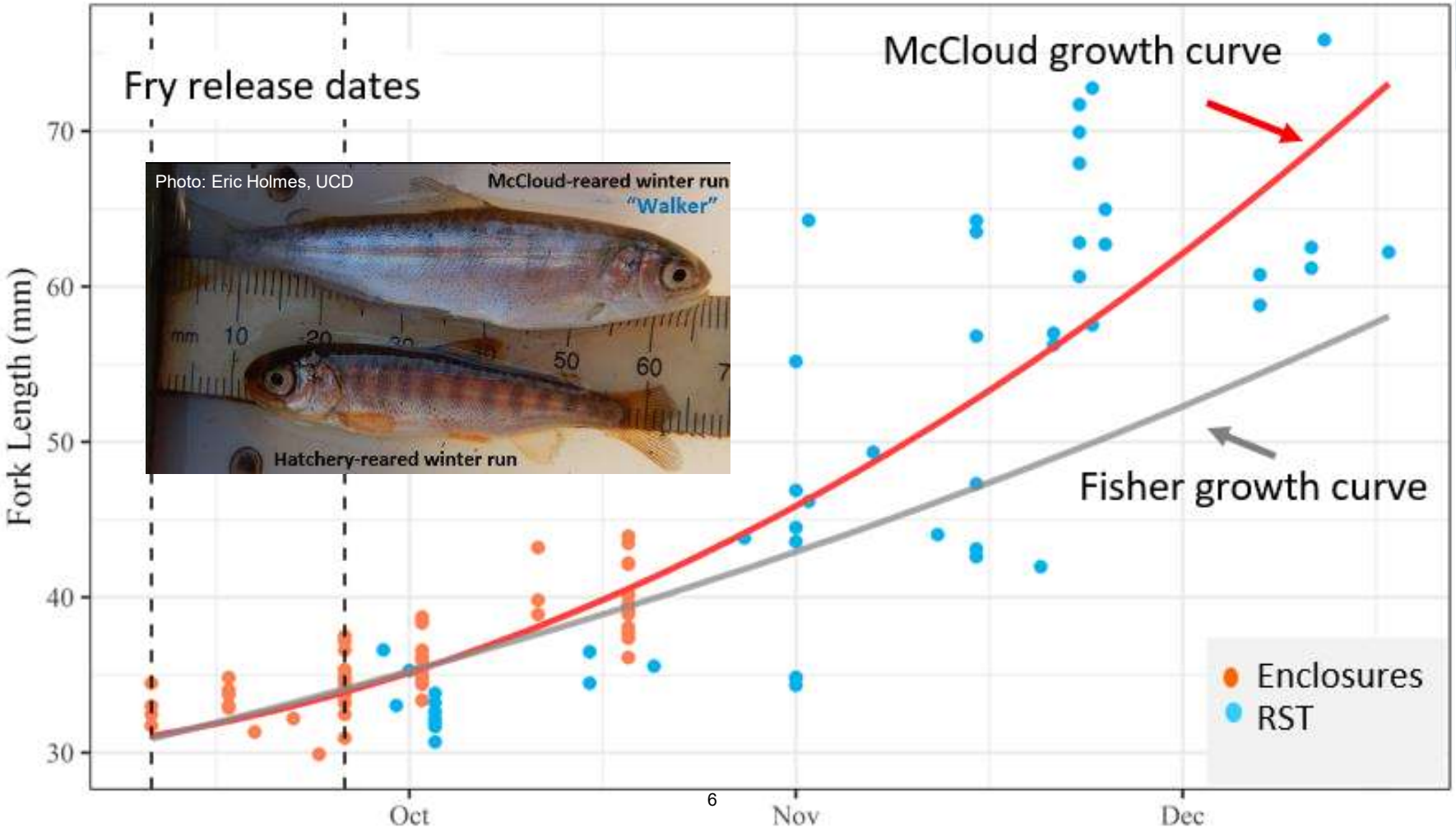
Saving salmon: Chinook return to California's far north — with a lot of human help

BY ALASTAIR BLAND
DECEMBER 19, 2022

Winter-run back in the McCloud in 2022

Exponential growth

Slide courtesy of Rachel Johnson, SWFSC



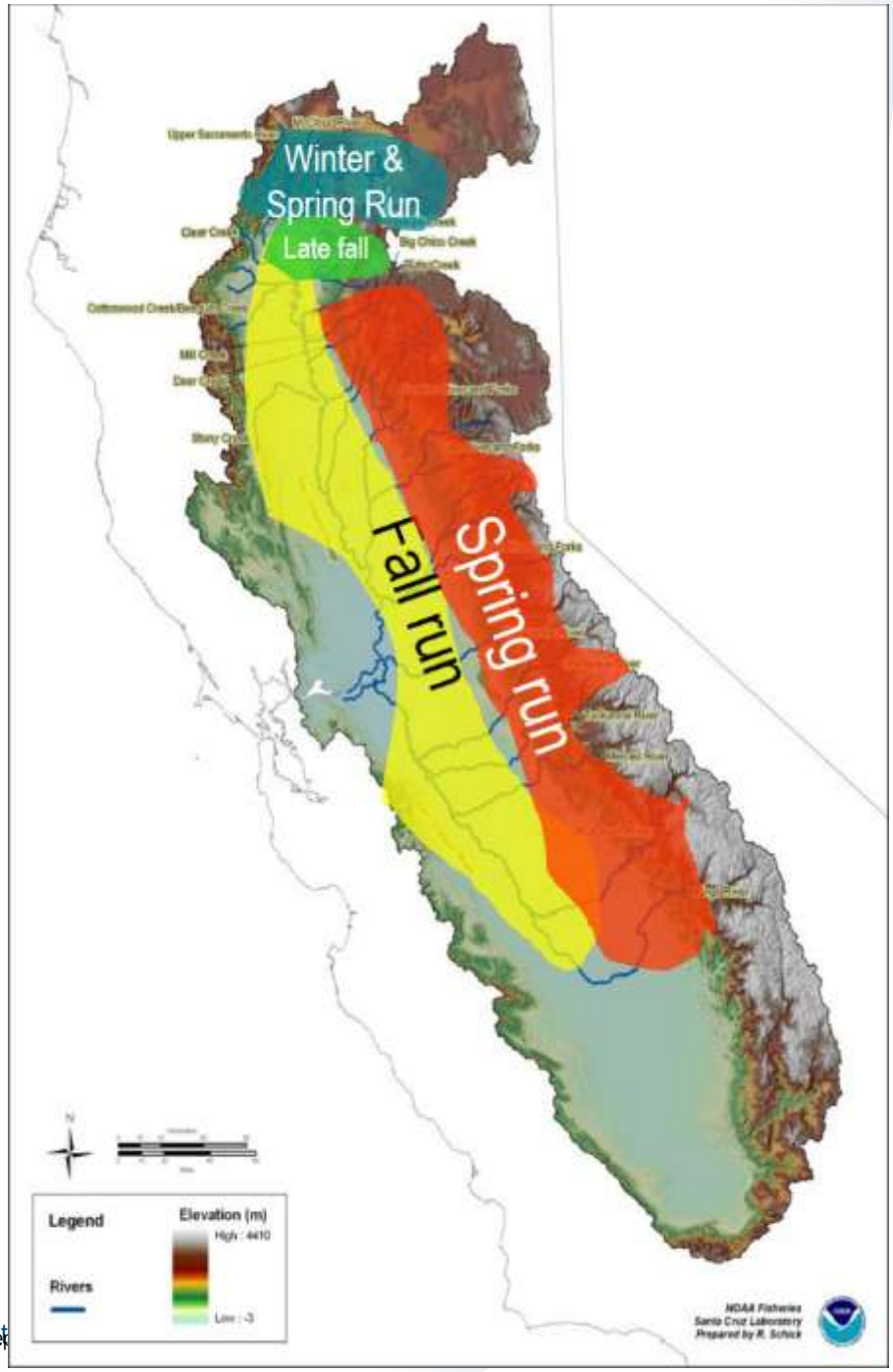
Central Valley Chinook Salmon

Historically

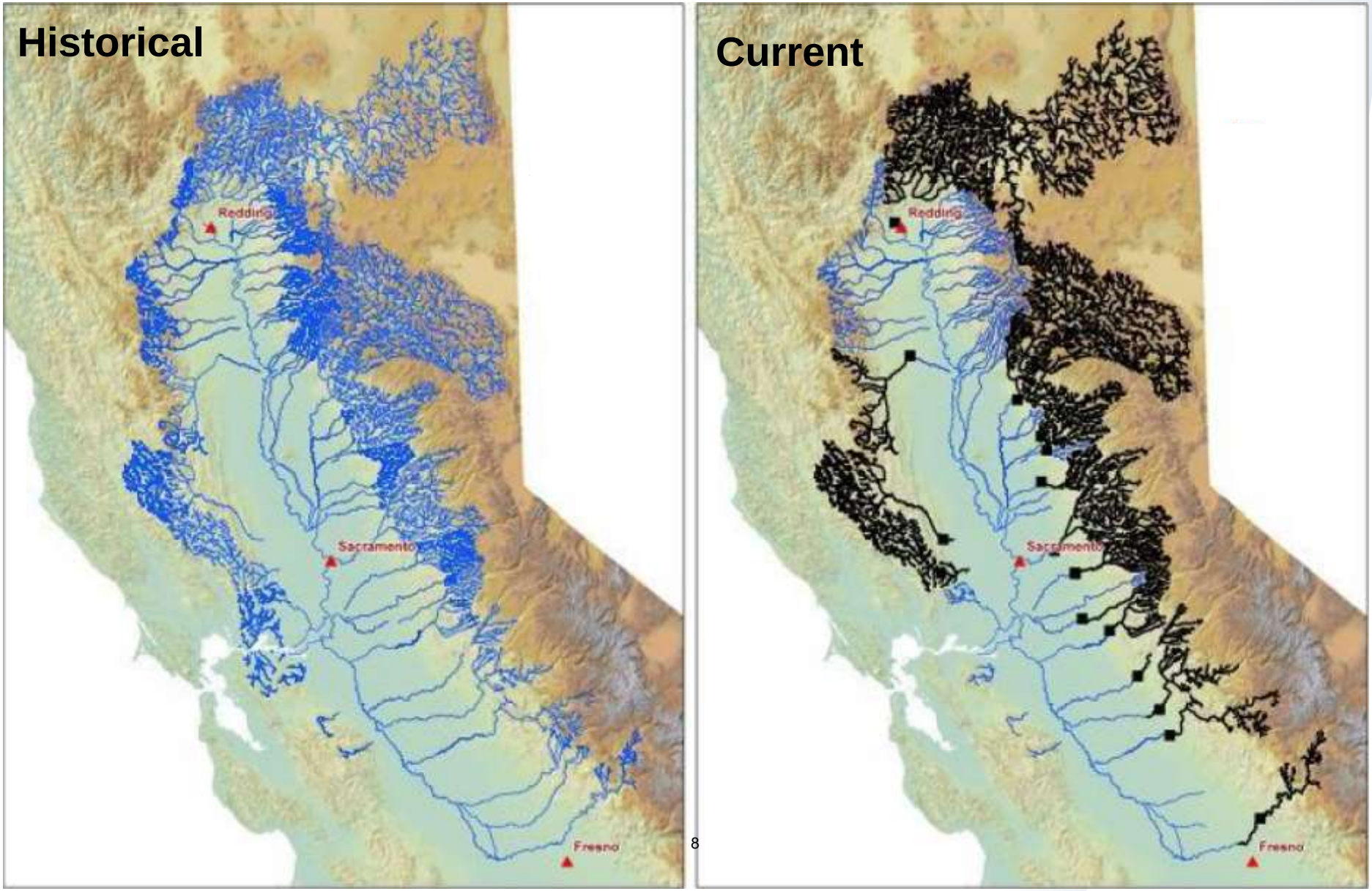
- Unmatched diversity
- Millions of wild salmon returned to spawn each year

Today

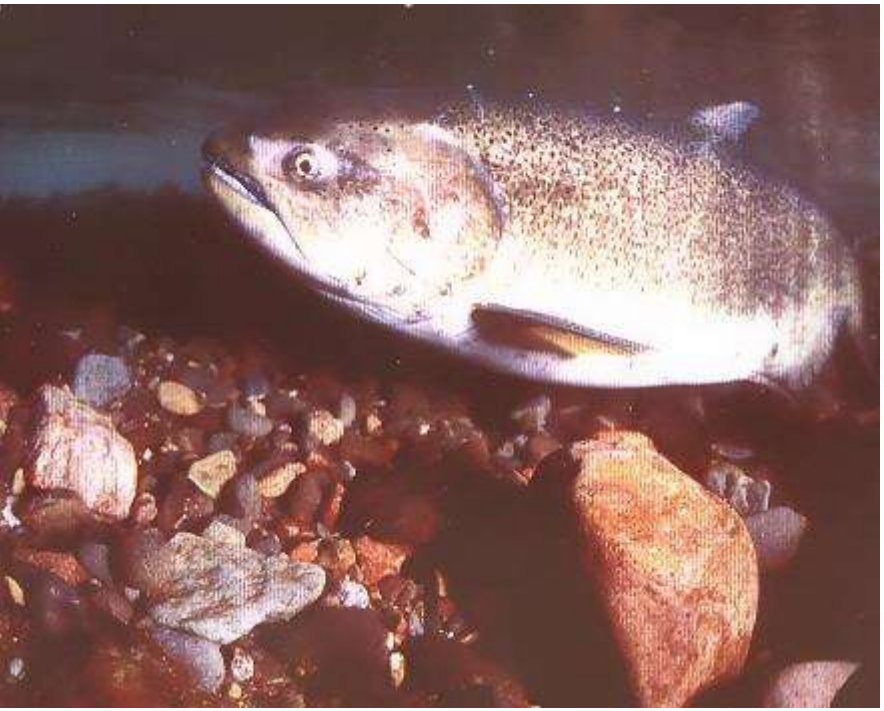
- Diminished diversity
- ~100,000-200,000 salmon/year
- ~90% are hatchery produced

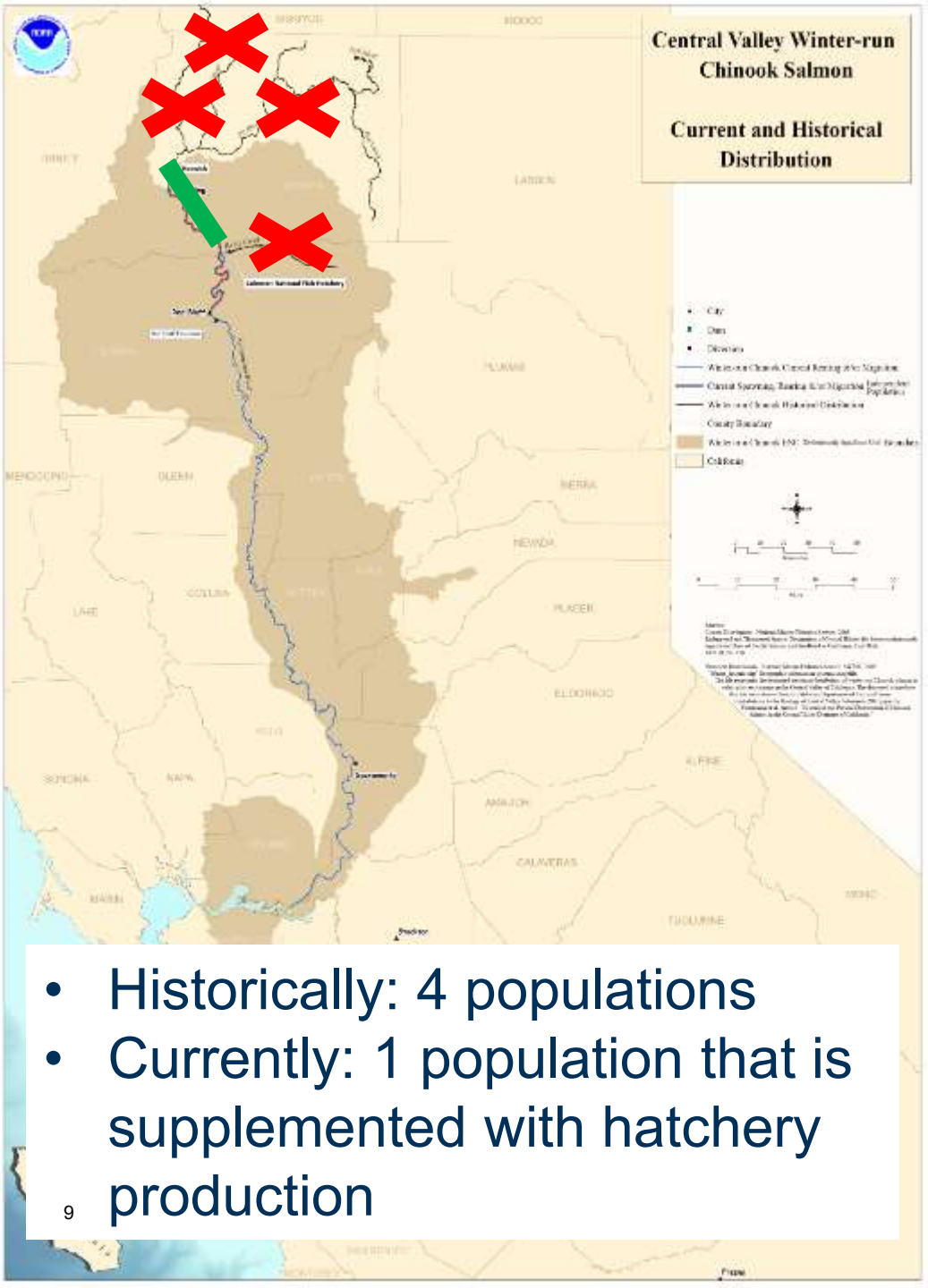


Spawning habitat loss: 90% (Cummins et al. 2008)



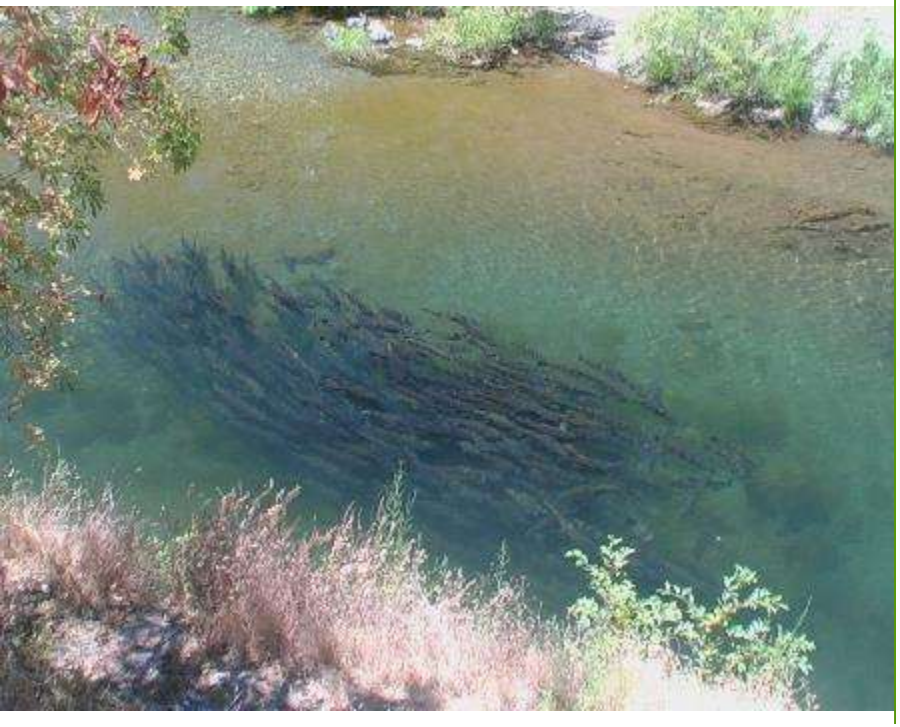
Winter-run Chinook salmon (Threatened 1989-1994; Endangered since 1994)

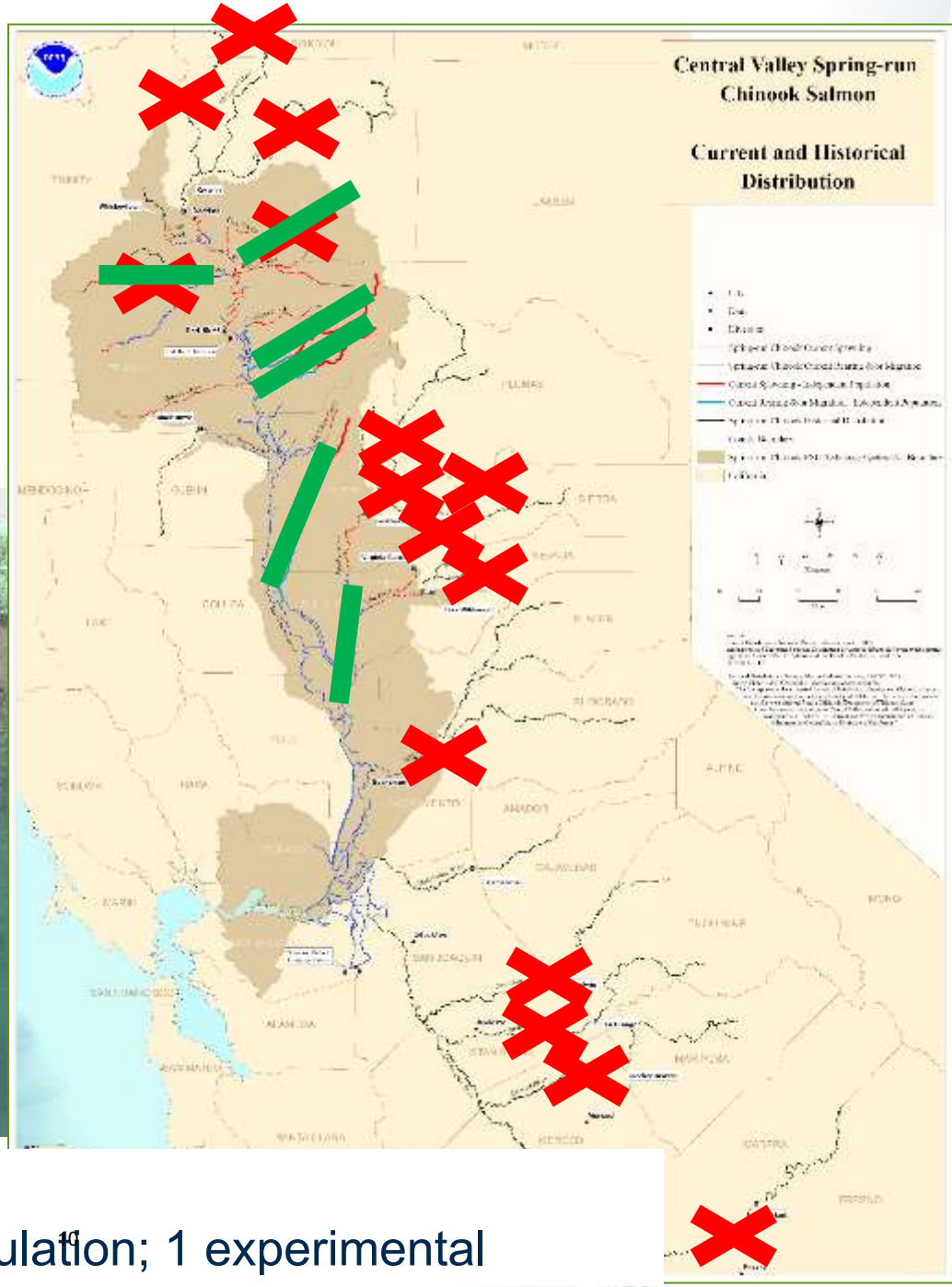




- Historically: 4 populations
- Currently: 1 population that is supplemented with hatchery production

Central Valley Spring-run Chinook salmon (Threatened since 1999)





- Historically: ~18 populations
- Currently: 5 wild; 1 hatchery population; 1 experimental

Timeline of Central Valley Salmon Reintroduction Efforts

Early 2000s
Feather River, Oroville Dam FERC Relicensing

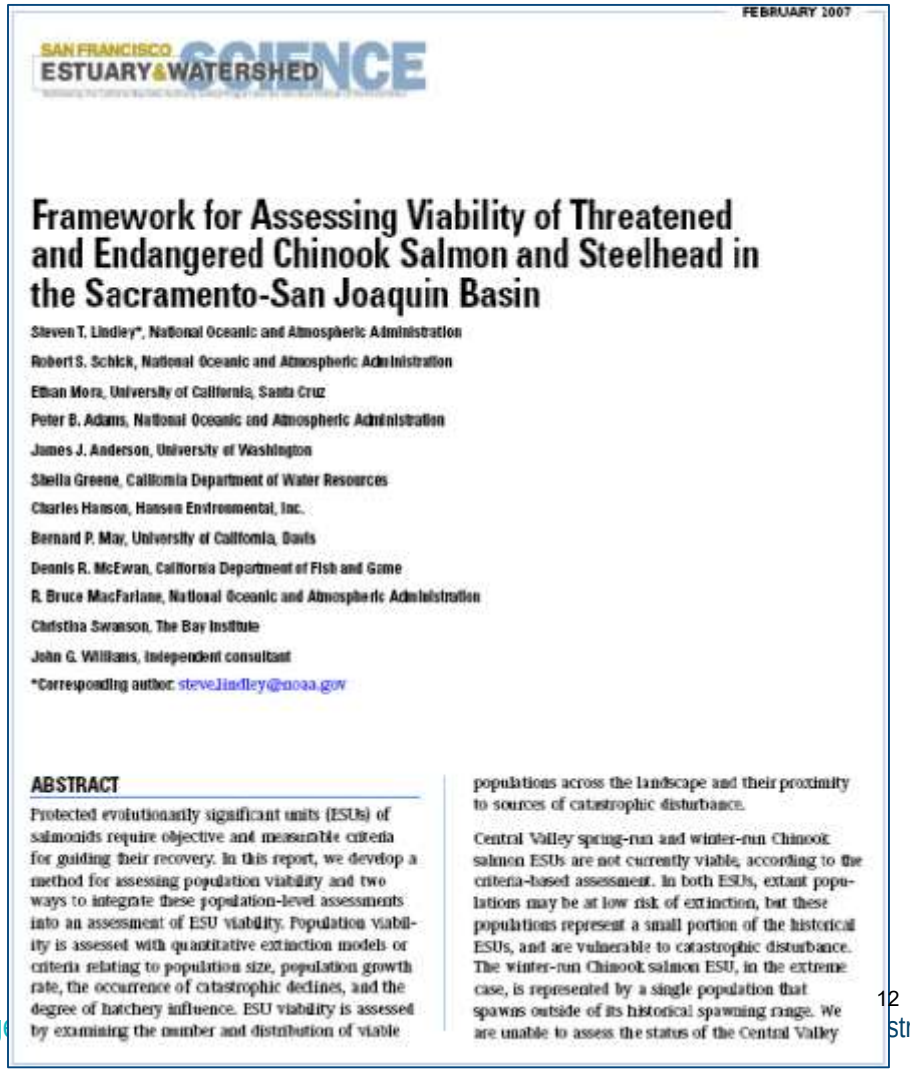
4 independent spring-run Chinook salmon populations extirpated

- West Branch
- North Fork
- Middle Fork
- South Fork

Outcome: No upstream passage

Timeline of Central Valley Salmon Reintroduction Efforts

2007
Technical Recovery Team



FEBRUARY 2007

SAN FRANCISCO ESTUARY & WATERSHED SCIENCE

Framework for Assessing Viability of Threatened and Endangered Chinook Salmon and Steelhead in the Sacramento-San Joaquin Basin

Steven T. Lindley*, National Oceanic and Atmospheric Administration
Robert S. Schick, National Oceanic and Atmospheric Administration
Ethan Mora, University of California, Santa Cruz
Peter B. Adams, National Oceanic and Atmospheric Administration
James J. Anderson, University of Washington
Sheila Greene, California Department of Water Resources
Charles Hanson, Hanson Environmental, Inc.
Bernard P. May, University of California, Davis
Dennis R. McEwan, California Department of Fish and Game
R. Bruce MacFarlane, National Oceanic and Atmospheric Administration
Christina Swanson, The Bay Institute
John G. Williams, Independent consultant
*Corresponding author: steve.lindley@noaa.gov

ABSTRACT

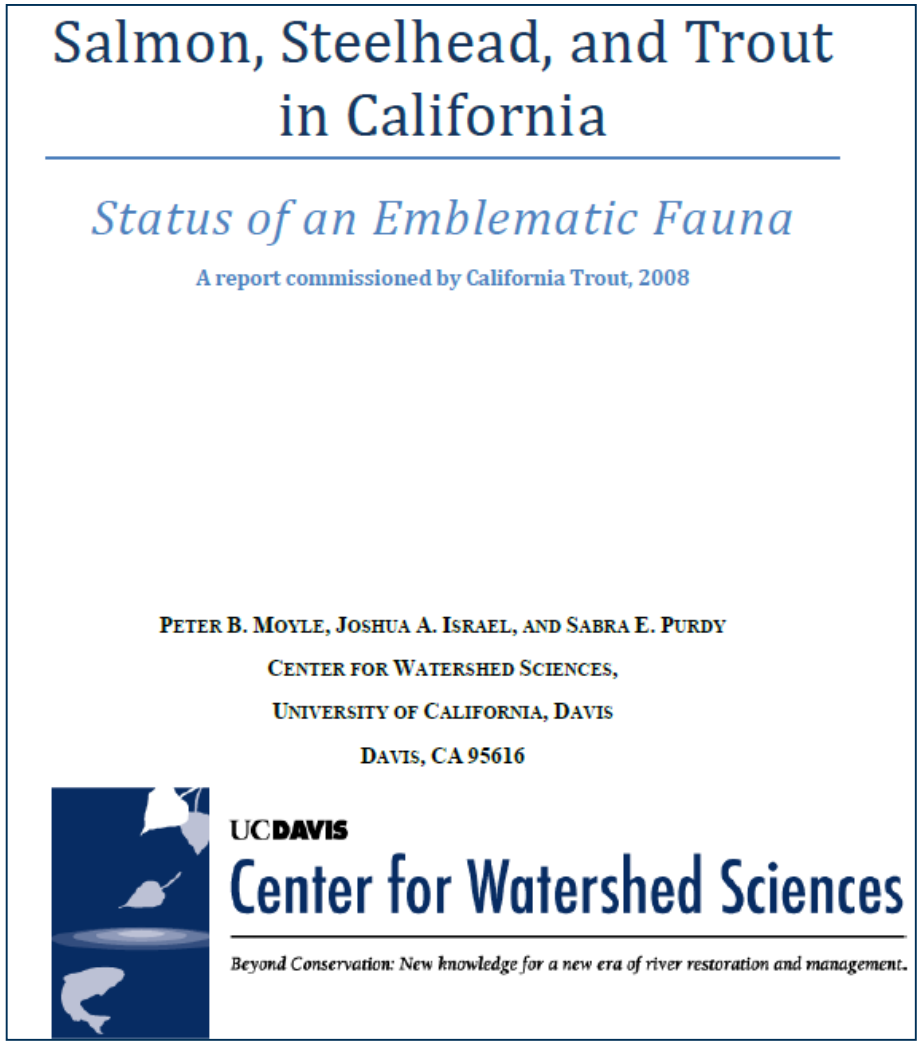
Protected evolutionarily significant units (ESUs) of salmonids require objective and measurable criteria for guiding their recovery. In this report, we develop a method for assessing population viability and two ways to integrate these population-level assessments into an assessment of ESU viability. Population viability is assessed with quantitative extinction models or criteria relating to population size, population growth rate, the occurrence of catastrophic declines, and the degree of hatchery influence. ESU viability is assessed by examining the number and distribution of viable populations across the landscape and their proximity to sources of catastrophic disturbance.

Central Valley spring-run and winter-run Chinook salmon ESUs are not currently viable, according to the criteria-based assessment. In both ESUs, extant populations may be at low risk of extinction, but these populations represent a small portion of the historical ESUs, and are vulnerable to catastrophic disturbance. The winter-run Chinook salmon ESU, in the extreme case, is represented by a single population that spawns outside of its historical spawning range. We are unable to assess the status of the Central Valley

"*To recover Central Valley salmon and steelhead ESUs, some populations will need to be established in areas now blocked by dams or insufficient flows. Assuming that most of these dams will remain in place for the foreseeable future, it will be necessary to move fish around the dams.*"
Lindley et al. 2007

Timeline of Central Valley Salmon Reintroduction Efforts

2008


Salmon, Steelhead, and Trout in California

Status of an Emblematic Fauna

A report commissioned by California Trout, 2008

PETER B. MOYLE, JOSHUA A. ISRAEL, AND SABRA E. PURDY
CENTER FOR WATERSHED SCIENCES,
UNIVERSITY OF CALIFORNIA, DAVIS
DAVIS, CA 95616

UCDAVIS
Center for Watershed Sciences

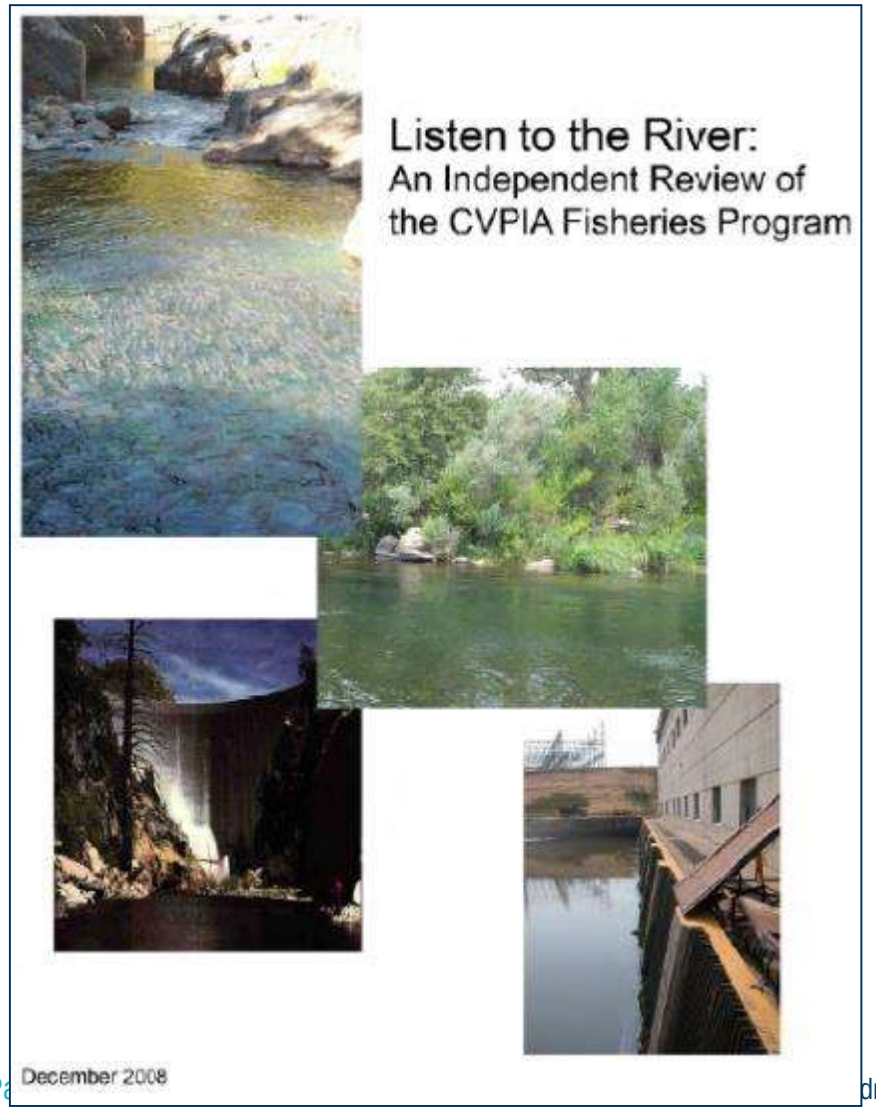
Beyond Conservation: New knowledge for a new era of river restoration and management.

"*Barrier removal or some kind of trap and truck operation will thus likely be a major part of spring Chinook conservation in the next century*."
Moyle et al. 2008

NOAA FISHERIES

Timeline of Central Valley Salmon Reintroduction Efforts

2008



"*It seems unlikely that these populations can be restored without providing access to at least some of that unutilized habitat.*"

"*…they [USBR&USFWS] will need to investigate the feasibility, benefits, costs and risks of investing in passage to spawning and rearing habitat upstream of the dams*."
Cummins et al. 2008

Timeline of Central Valley Salmon Reintroduction Efforts

2009-
CVP/SWP biological opinion salmon reintroduction program


Shasta Dam

Required Reclamation to reintroduce winter-run, spring-run, and steelhead to the McCloud River

Ultimately Reclamation pulled the funding;
DWR steps up

Trump administration threatens jail time for California officials over river project

BY DALE KASLER AND RYAN SABALOW

UPDATED SEPTEMBER 17, 2019 10:31 AM

Outcome: Habitat assessment, no upstream passage;
2019 biological opinion does not include passage.

Timeline of Central Valley Salmon Reintroduction Efforts

2010-
Yuba Salmon Forum, Yuba Salmon Partnership, term sheets

Collaborative initiatives to return spring-run Chinook salmon and steelhead to the Upper Yuba River

Outcome: no upstream passage, yet

Timeline of Central Valley Salmon Reintroduction Efforts

2010
Recovery Planning Workshops
Discussions begin with the Winnemem Wintu Tribe

(Photo by Christopher McLeod, Sacred Land Film Project)

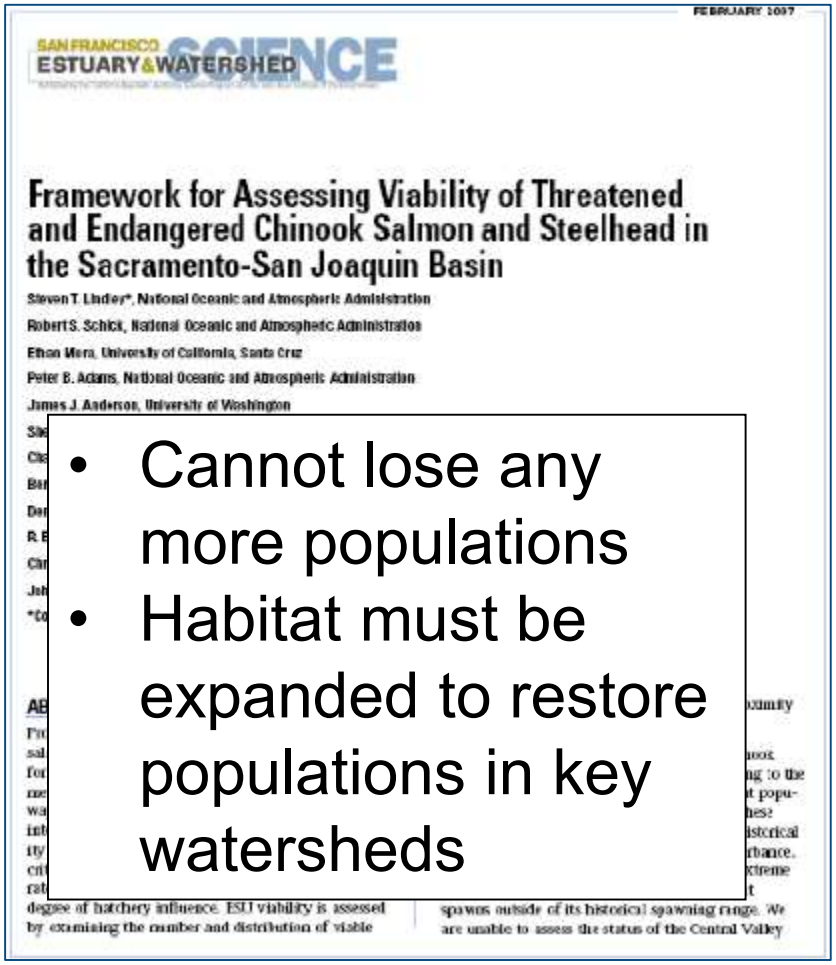
2011
Tribe welcomes Federal government to their salmon ceremony and to their village

Different goals:
Tribe (New Zealand Nur)
NMFS (winter-run Chinook salmon)

Outcome: No fish passage

Timeline of Central Valley Salmon Reintroduction Efforts

2014
NOAA Fisheries Recovery Plan



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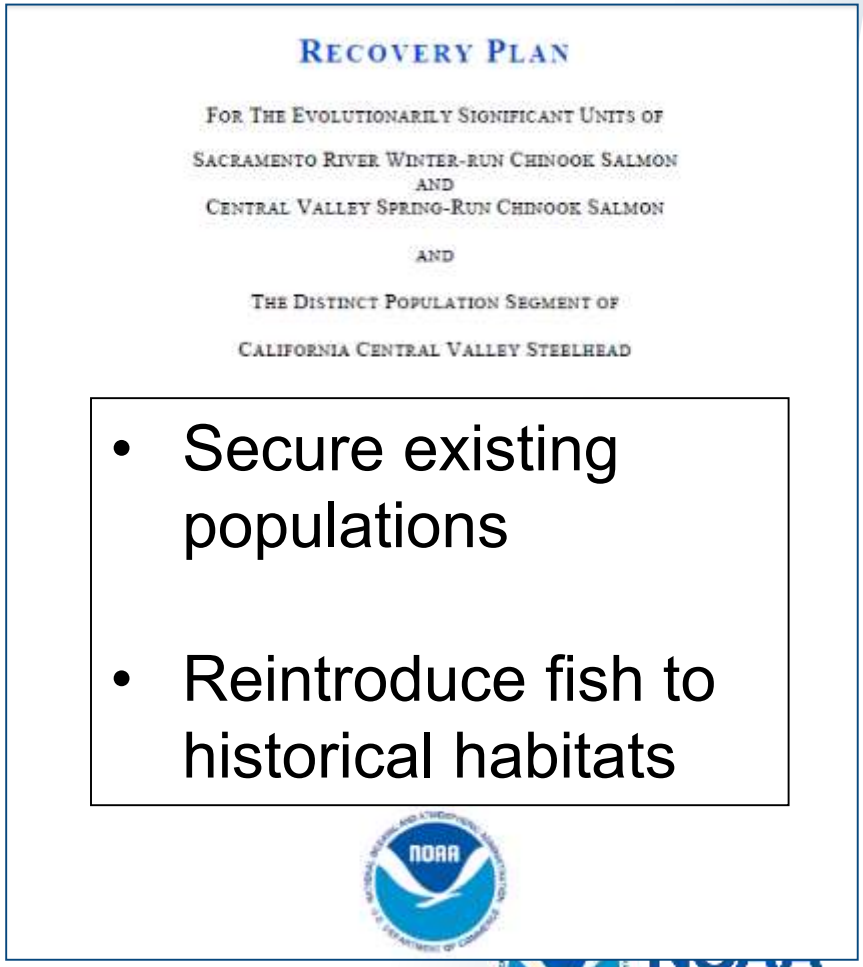
- Cannot lose any more populations
- Habitat must be expanded to restore populations in key watersheds



RECOVERY PLAN

FOR THE EVOLUTIONARILY SIGNIFICANT UNITS OF

SACRAMENTO RIVER WINTER-RUN CHINOOK SALMON
AND
CENTRAL VALLEY SPRING-RUN CHINOOK SALMON

AND

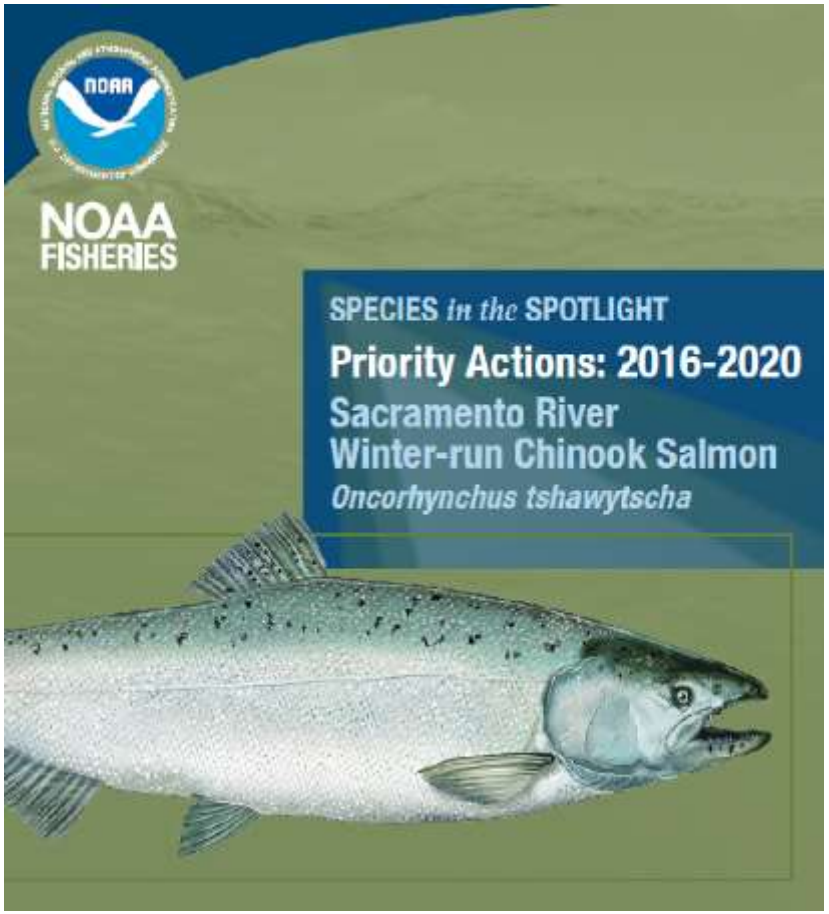
THE DISTINCT POPULATION SEGMENT OF

CALIFORNIA CENTRAL VALLEY STEELHEAD

- Secure existing populations
- Reintroduce fish to historical habitats

Timeline of Central Valley Salmon Reintroduction Efforts

2015/2016
NOAA Fisheries Species in the Spotlight



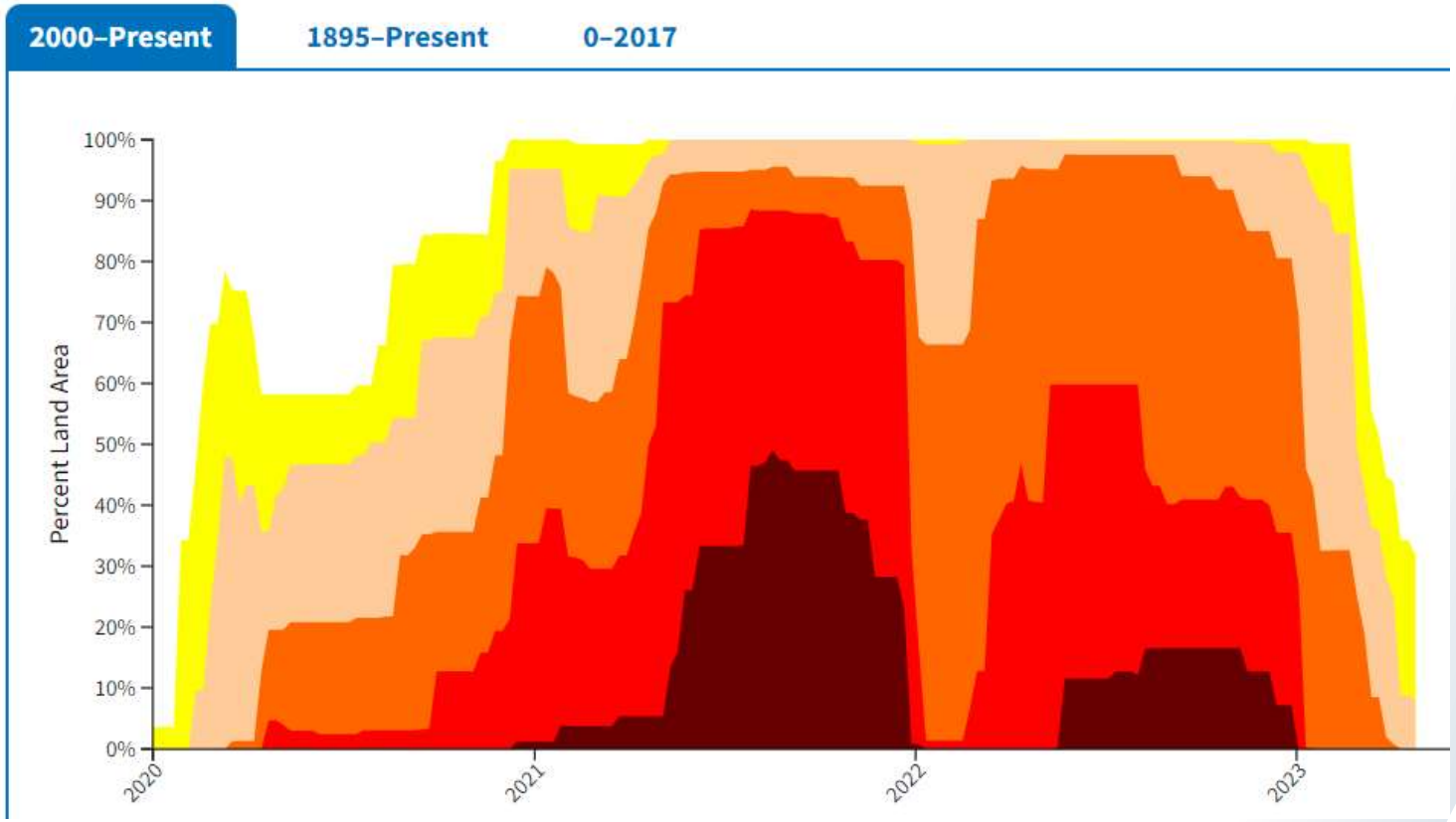
Initiated at the highest levels of NOAA Fisheries to take action to prevent the extinction of the most at risk species

Staffing support:
2015 - Jon Ambrose started working as the NOAA Fisheries Reintroduction Coordinator;
2019 - Stacie Smith, FERC branch

Timeline of Central Valley Salmon Reintroduction Efforts

2020-2022: Drought

"*Never let a good crisis go to waste*" –Winston Churchill



Winter-run temperature-dependent egg mortality

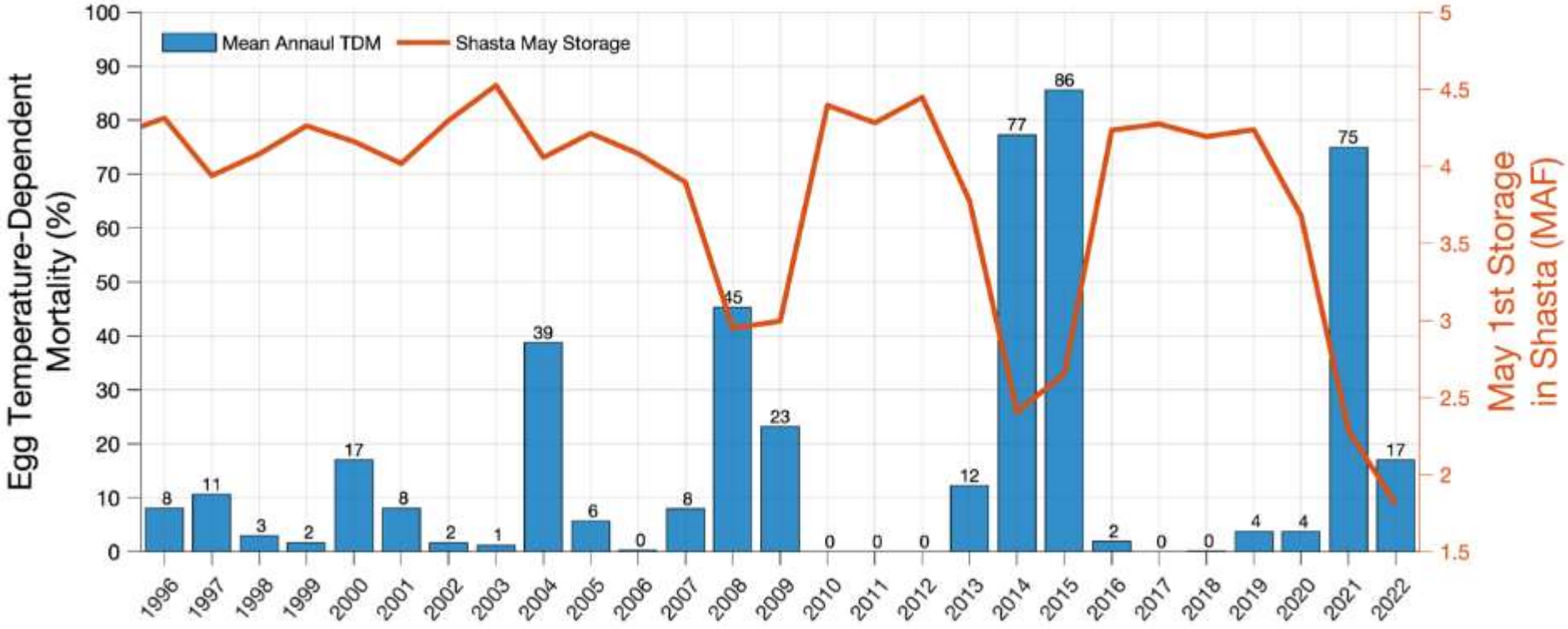


Figure courtesy of M. Daniels

Egg to fry mortality

88 percent in 2020
97 percent in 2021
Projected to be >90 percent in 2022

NOAA FISHERIES

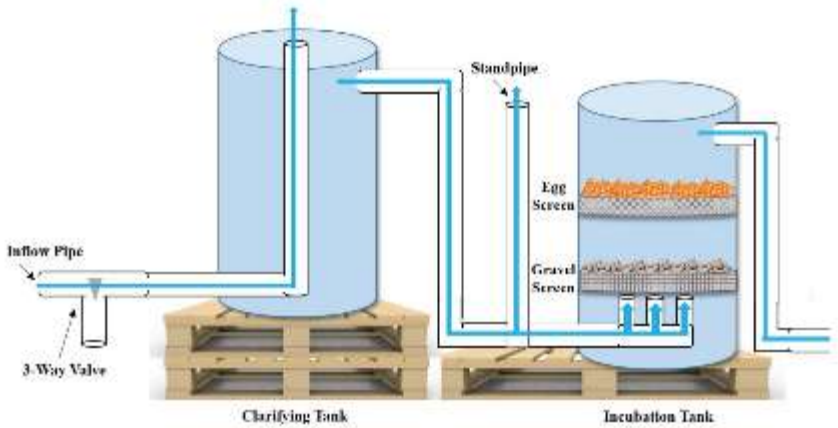
2022 Urgent Salmon Actions

NOAA FISHERIES

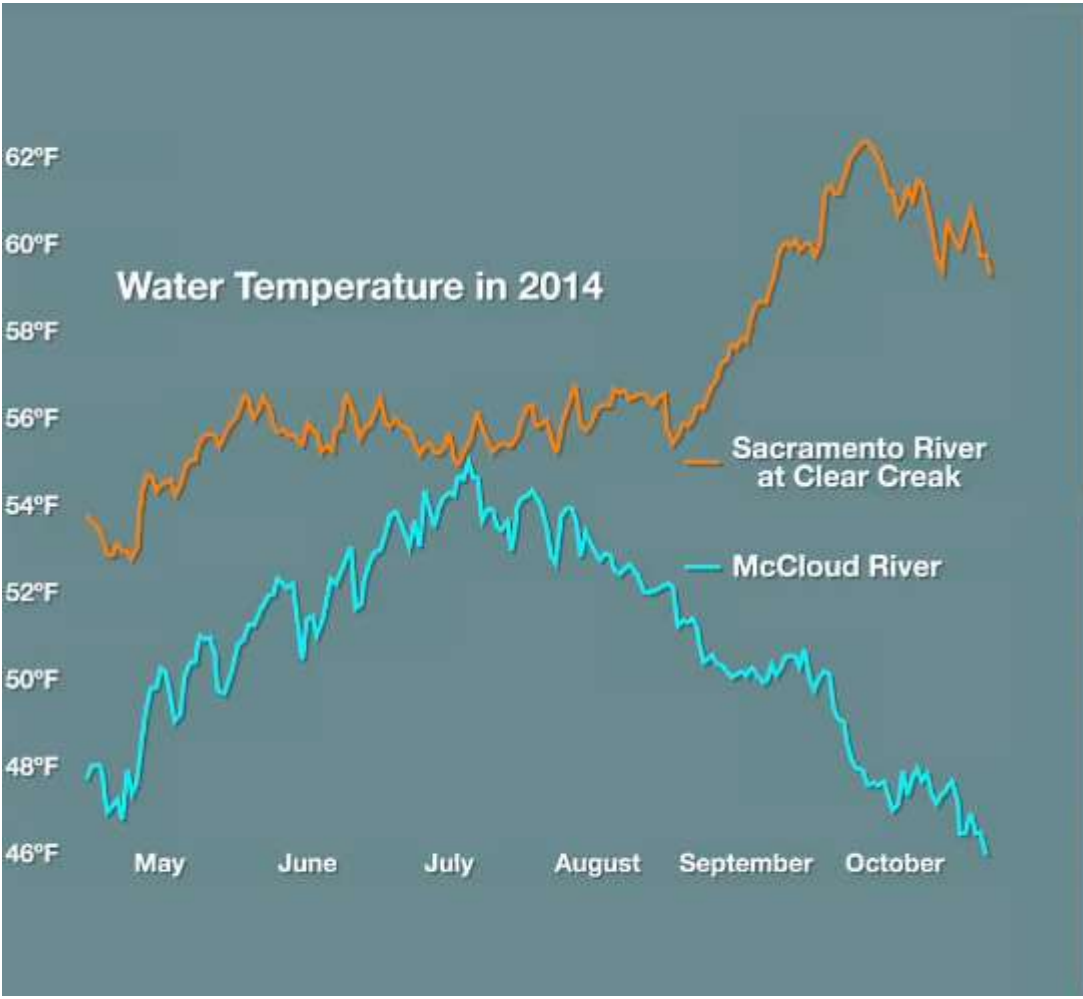
2022 Winter-run eggs to the McCloud

- Objective: Spread risk to winter-run by incubating hatchery eggs on-site at the McCloud River and gain knowledge on fish behavior in historical habitat
- Number of eggs: 40,000
- Number of juveniles transported: 1,600


Remote Site Incubators



McCloud River stays cold during drought



NOAA FISHERIES

Reintroductions or extinctions

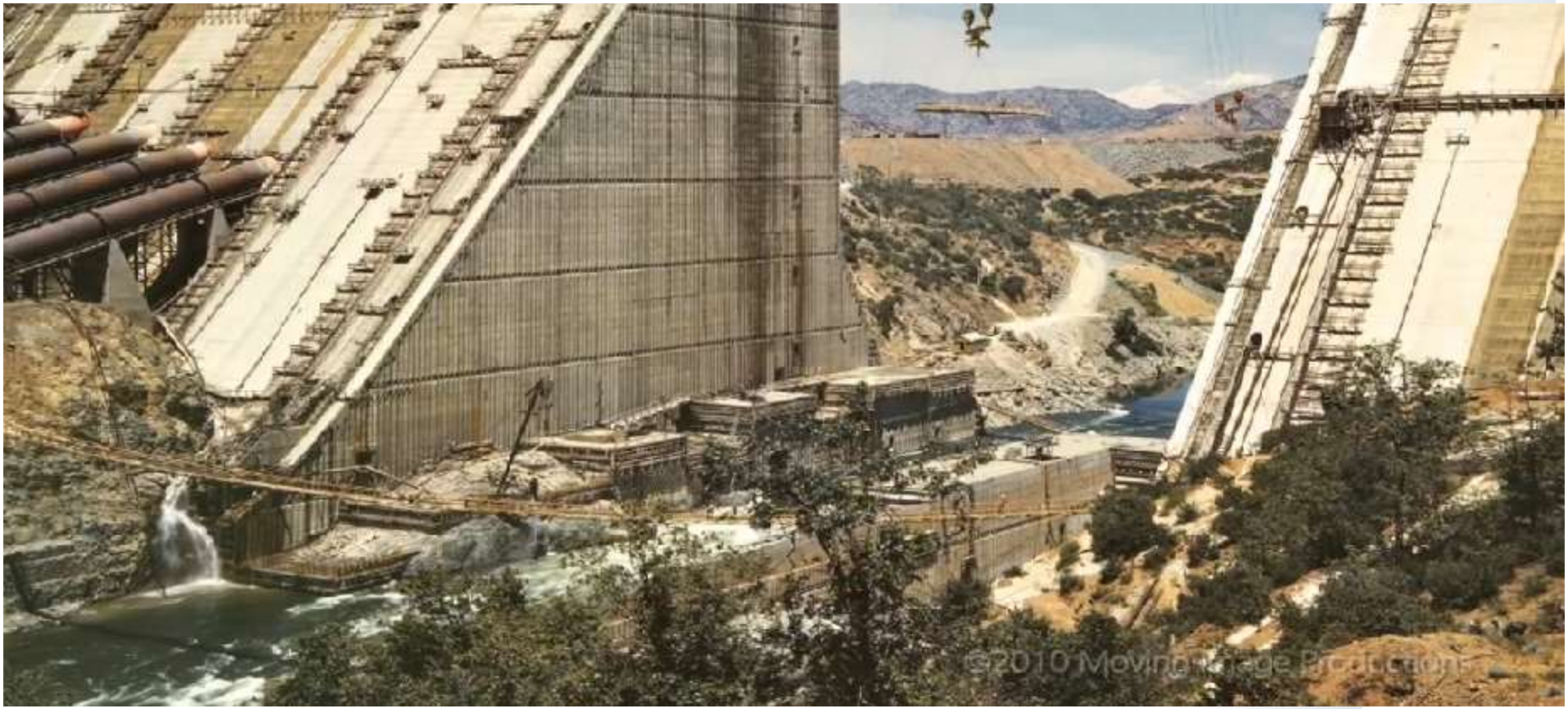
Winter-run Chinook salmon endangered for 33 years

Spring-run Chinook salmon threatened for 23 years

Extinction risk is increasing as climate change impacts continue

Access to historical, high elevation, cold water habitat is necessary to prevent winter-run Chinook salmon and spring-run Chinook salmon extinction

Dam Displaces Winnemem Wintu Tribe and their *Nur* (salmon)



Dancing Salmon Home

Dam Displaces Winnemem Wintu Tribe and their *Nur* (salmon)

Dancing Salmon Home

NOAA FISHERIES

Starting a journey with the Winnemem Wintu Tribe and CDFW to bring salmon home to the McCloud River

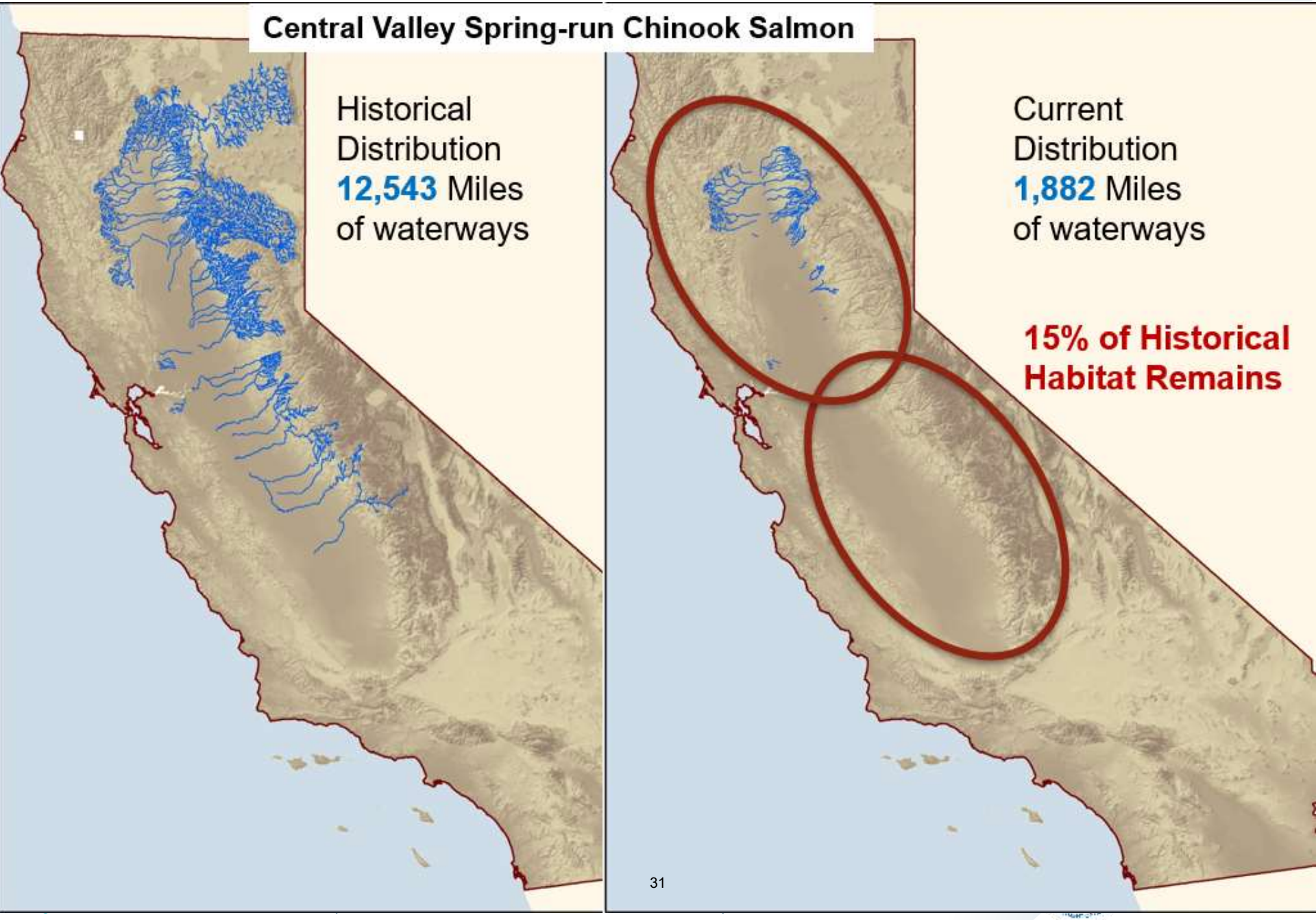
@winnememwintu

Winnemem Wintu Tribe, CDFW and NOAA Fisheries to Sign Salmon Agreement May 1

The California Department of Fish and Wildlife (CDFW), NOAA Fisheries and the Winnemem Wintu Tribe will formally sign a Co-Management Agreement for Chinook salmon in the mountains north of Redding, Calif., on May 1, 2023. The agreement supports a joint effort to return Chinook salmon to their original spawning areas in the cold mountain rivers now blocked by the Shasta Dam Reservoir in northern California. The unprecedented and historic agreement gives the Tribe a seat at the table for decisions affecting salmon that have great value for all Californians.

Art by Blane Bellerud (NOAA Fisheries West Coast Region) based on a story from Chief Sisk of the Winnemem Wintu Tribe

Thank You!


Central Valley Spring-run Chinook Salmon
Historical Distribution
12,543 Miles of waterways
Current Distribution
1,882 Miles of waterways
15% of Historical Habitat Remains

Historical spawning, rearing, and holding habitat = 347 miles. Four Independent populations

Current spawning, rearing, and holding habitat ≈ 10-25 miles (100% outside of historical range). One Independent population

Central Valley Chinook Salmon

"I have never seen anything like it anywhere, not even on the tributaries of the Columbia. On the afternoon of the 15th of August there was a space in the river below the rack about 50 foot wide and 80 feet long where, if a person could have balanced himself, he could actually have walked anywhere on the backs of the salmon, they were so thick. I have often heard travelers make this remark about salmon in small streams, so I know that it is not an uncommon thing in streams below a certain size, but to see salmon as thick as this in a river of so great volume as the McCloud must, I think, be a rare sight."

-Livingston Stone, U.S. Commission of Fish and Fisheries 1878

Outline

Central Valley salmon status then and now

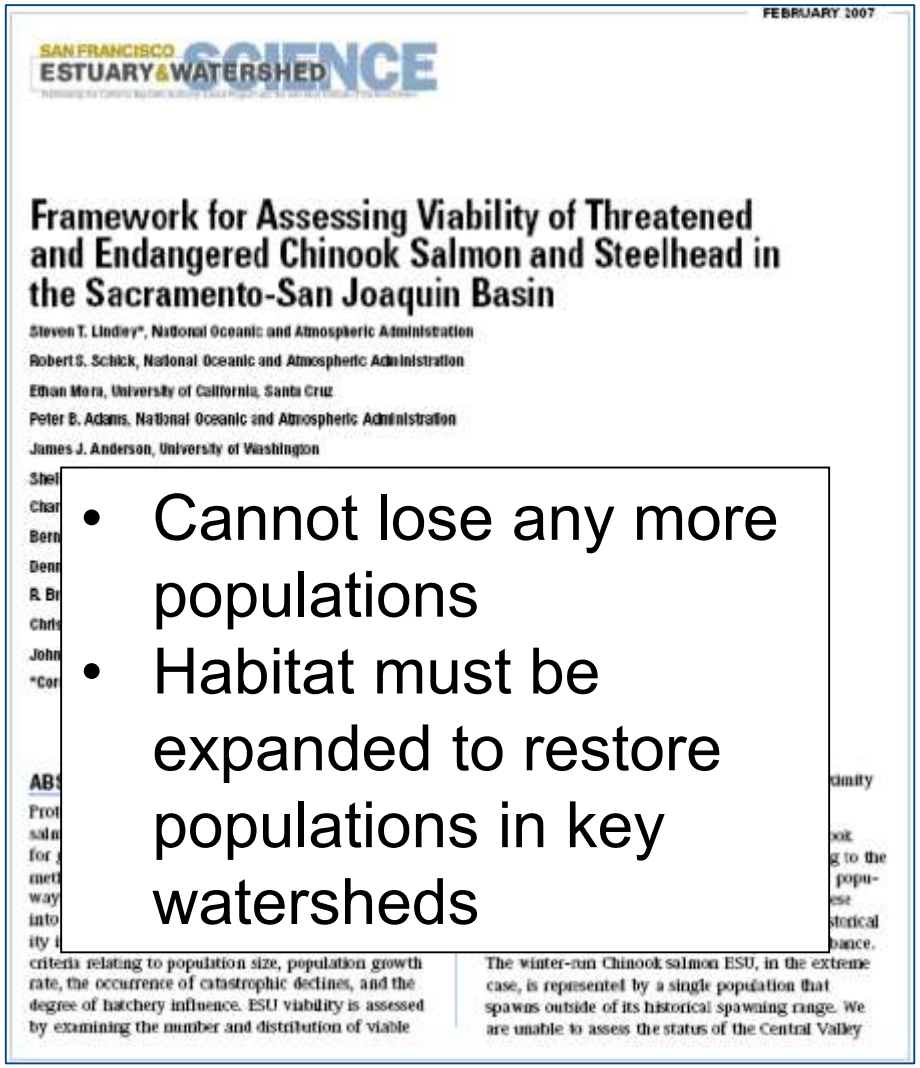
Recovery Plan

NMFS reintroduction priorities

Focus on winter-run Chinook salmon and the McCloud River

Recap

Cannot recover winter-run and spring-run without reintroductions



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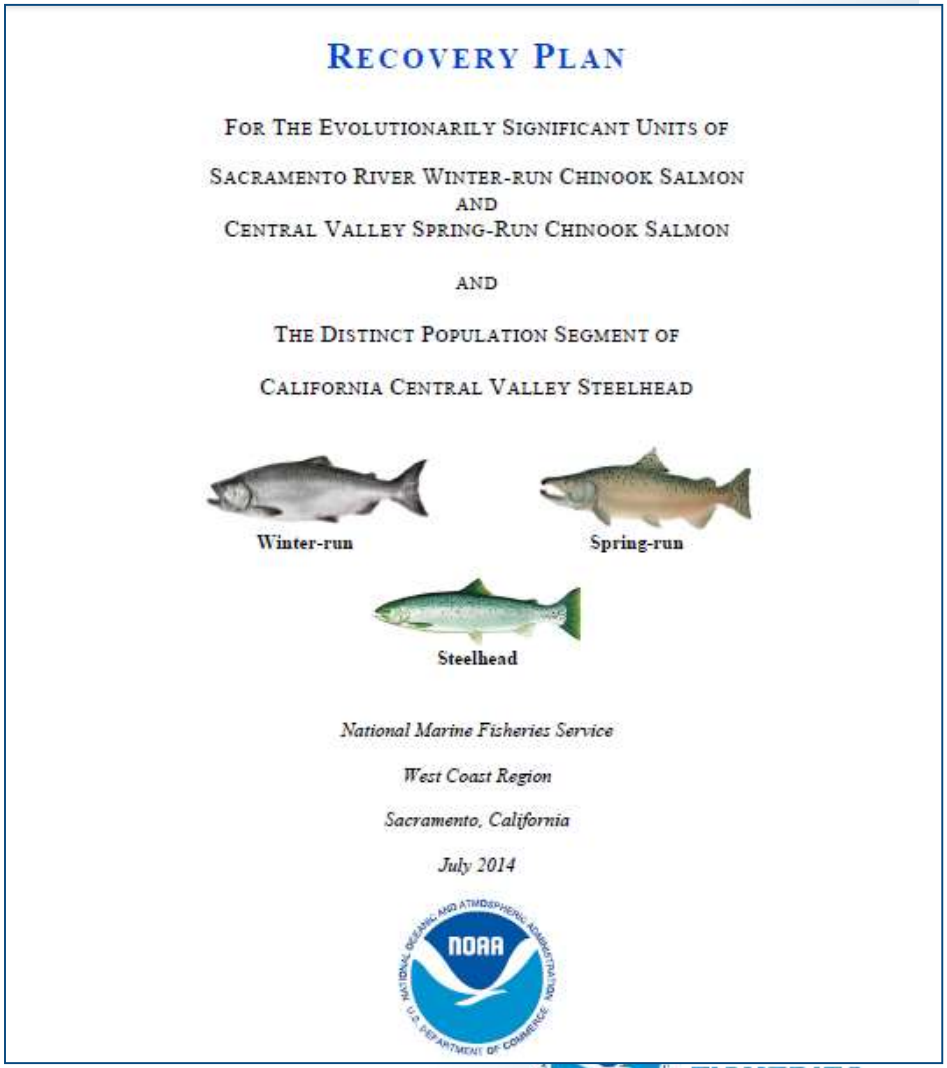

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THE DISTINCT POPULATION SEGMENT OF

CALIFORNIA CENTRAL VALLEY STEELHEAD

National Marine Fisheries Service

West Coast Region

Sacramento, California

July 2014

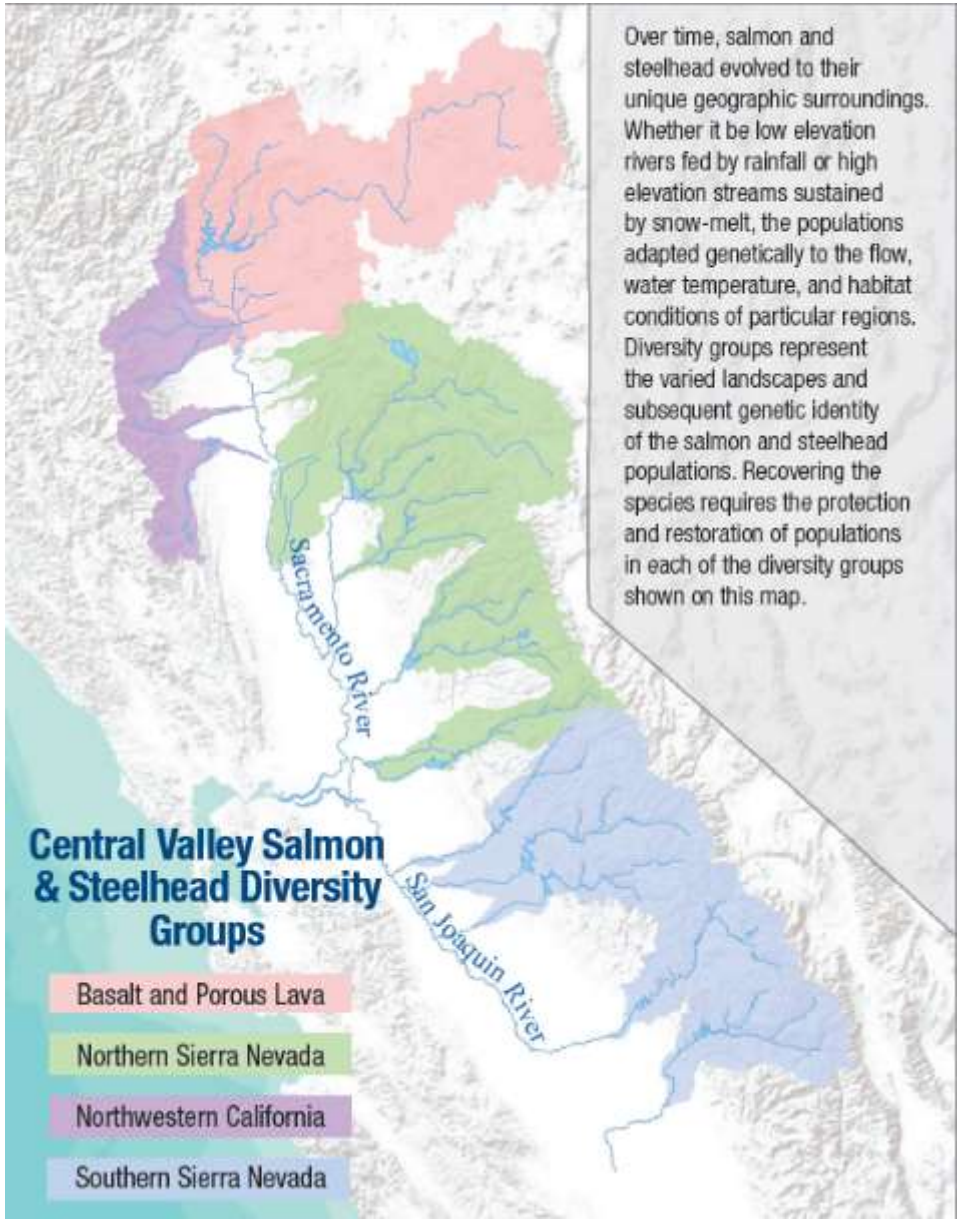
FISHERIES

Recovery Strategy

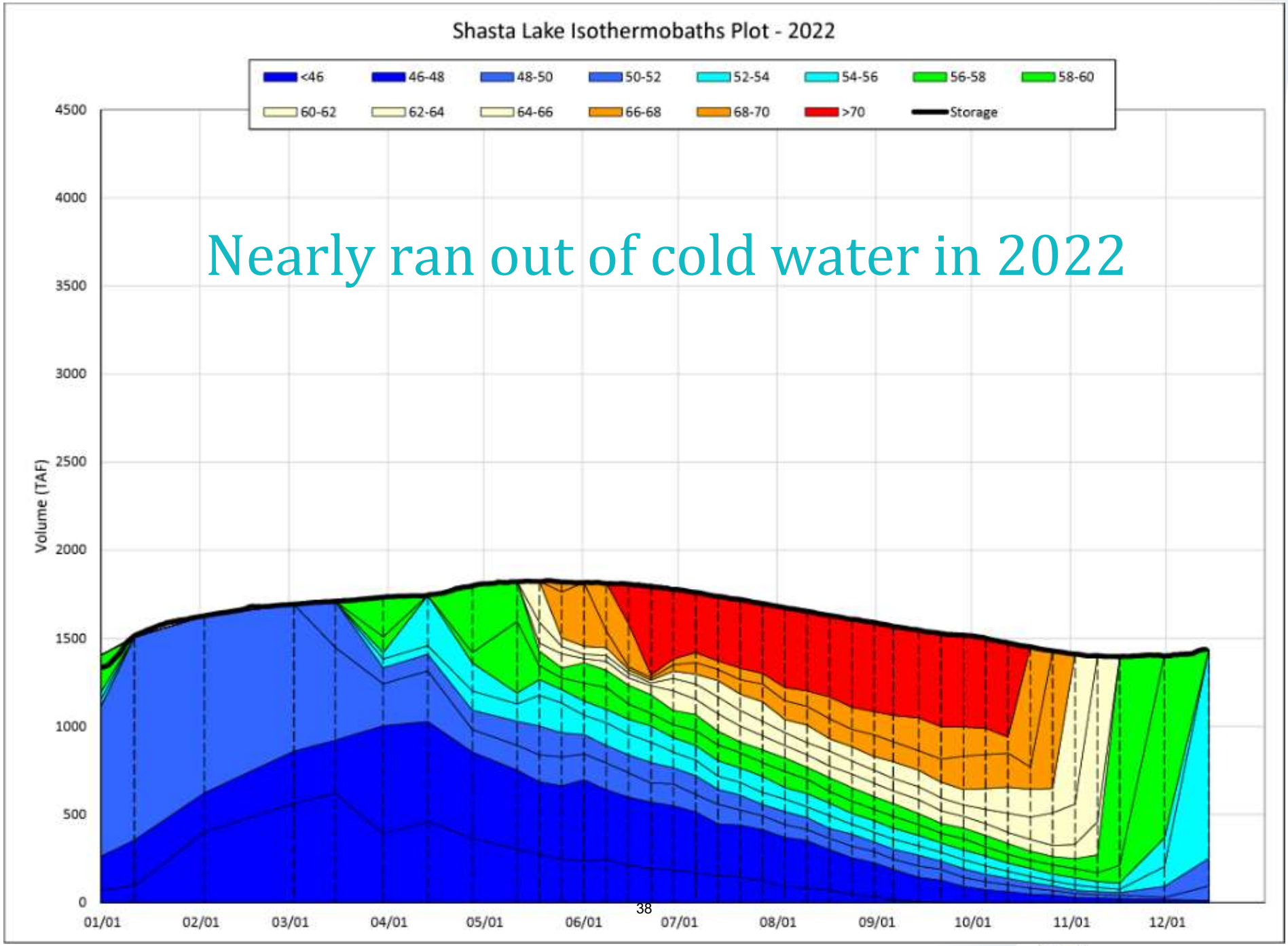
-Secure existing populations

-Reintroduce fish to historical habitats

- Reintroduction priorities:
  - McCloud River (winter-run, spring-run, steelhead
  - Battle Creek (winter-run)
  - Upper Yuba River (spring-run and steelhead)
  - San Joaquin River (spring-run)
  - Tuolumne and/or Merced (spring-run)



Winter-run Chinook salmon rely on cold water releases from Shasta Dam



Nearly ran out of cold water in 2022

Shasta Lake Isothermobaths Plot - 2022

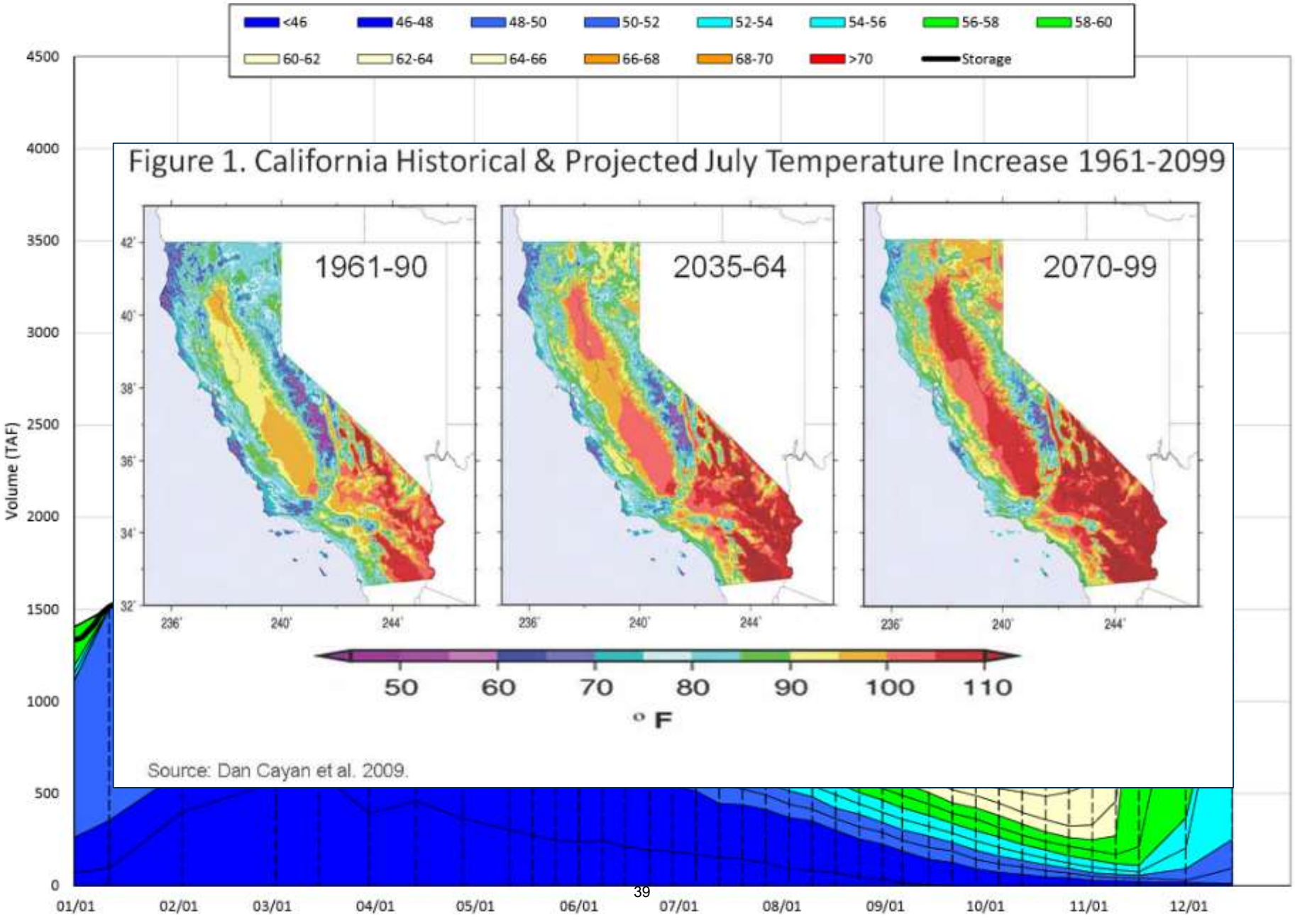
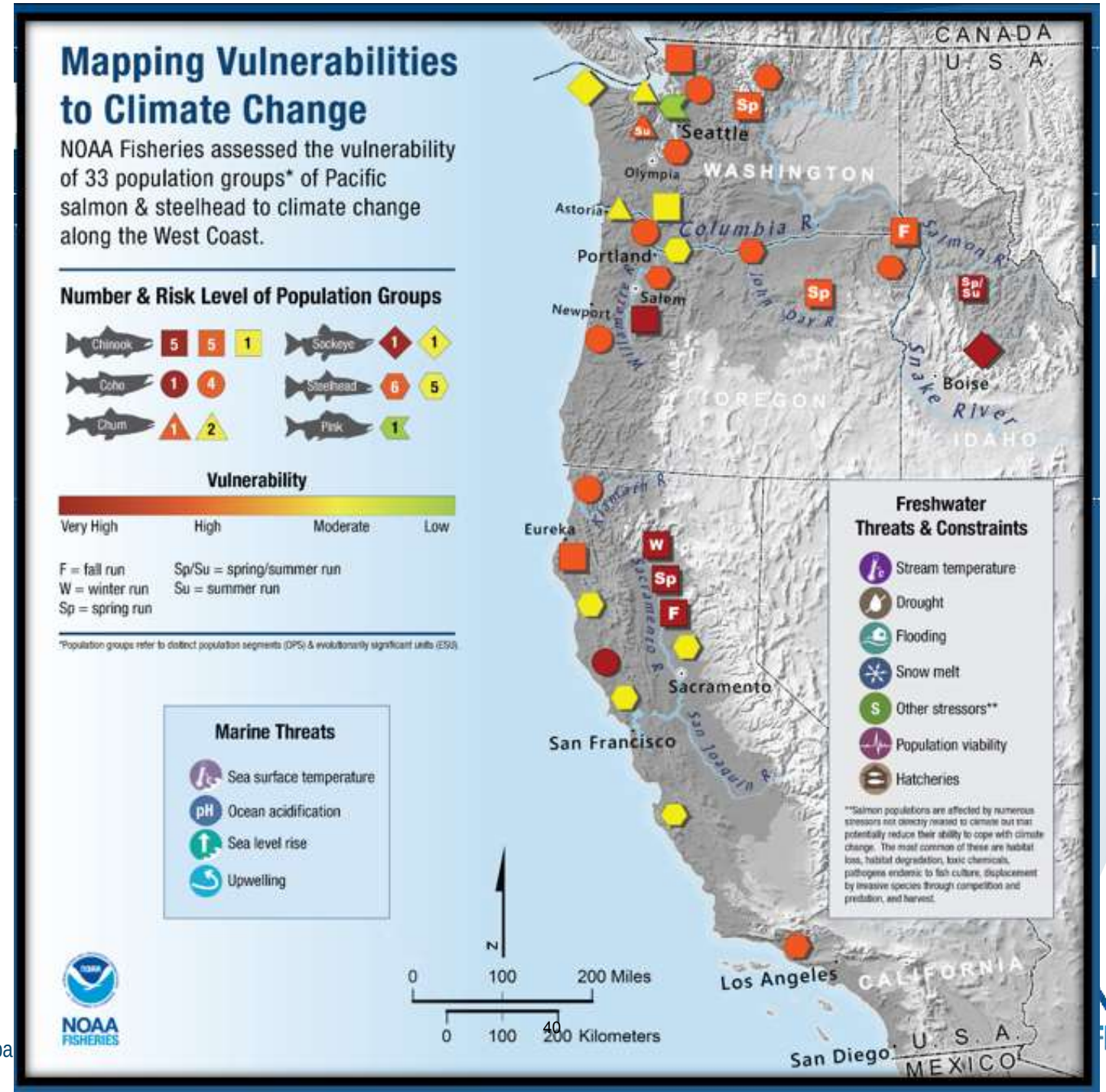


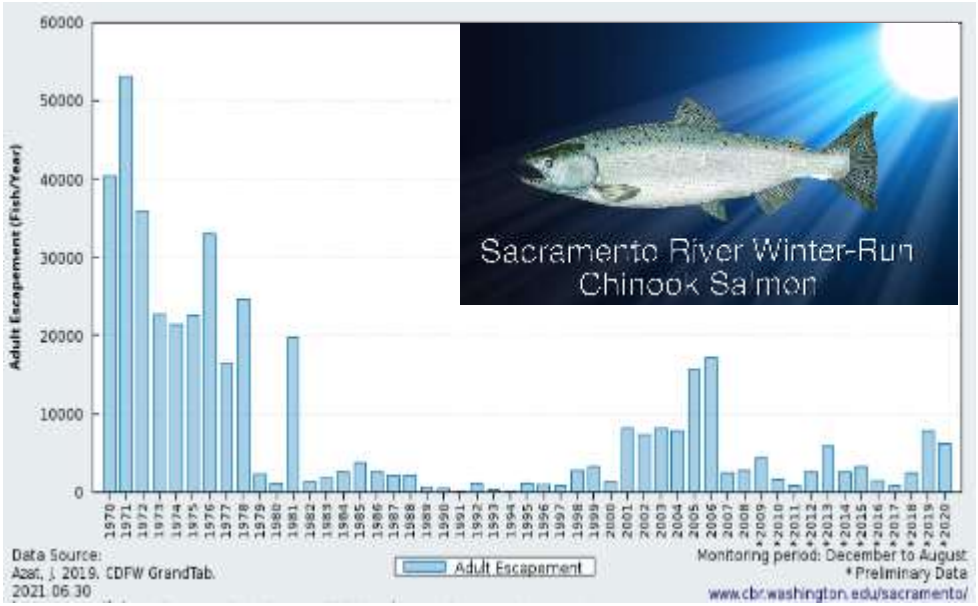
Figure 1. California Historical & Projected July Temperature Increase 1961-2099

Source: Dan Cayan et al. 2009.


Mapping Vulnerabilities to Climate Change
NOAA Fisheries assessed the vulnerability of 33 population groups* of Pacific salmon & steelhead to climate change along the West Coast.
Number & Risk Level of Population Groups
Chinook 5 5 1
Sockeye 1 1
Coho 1 4
Steelhead 6 5
Chum 1 2
Pink 1
Vulnerability
Very High
High
Moderate
Low
F = fall run
W = winter run
Sp = spring run
Sp/Su = spring/summer run
Su = summer run
*Population groups refer to distinct population segments (DPS) & evolutionarily significant units (ESU)
Marine Threats
Sea surface temperature
Ocean acidification
Sea level rise
Upwelling
Freshwater Threats & Constraints
Stream temperature
Drought
Flooding
Snow melt
Other stressors**
Population viability
Hatcheries
**Salmon populations are affected by numerous stressors not directly related to climate but that potentially reduce their ability to cope with climate change. The most common of these are habitat loss, habitat degradation, toxic chemicals, pathogens endemic to fish culture, displacement by invasive species through competition and predation, and harvest.
CANADA
U.S.A.
Seattle
WASHINGTON
Olympia
Astoria
Columbia R.
Portland
Salem
Newport
Willamette R.
John Day R.
Salmon R.
Snake River
Boise
OREGON
IDAHO
Klamath R.
Eureka
Sacramento R.
Sacramento
San Francisco
San Joaquin R.
Los Angeles
CALIFORNIA
San Diego
U.S.A.
MEXICO
N
0 100 200 Miles
0 100 200 Kilometers
NOAA FISHERIES

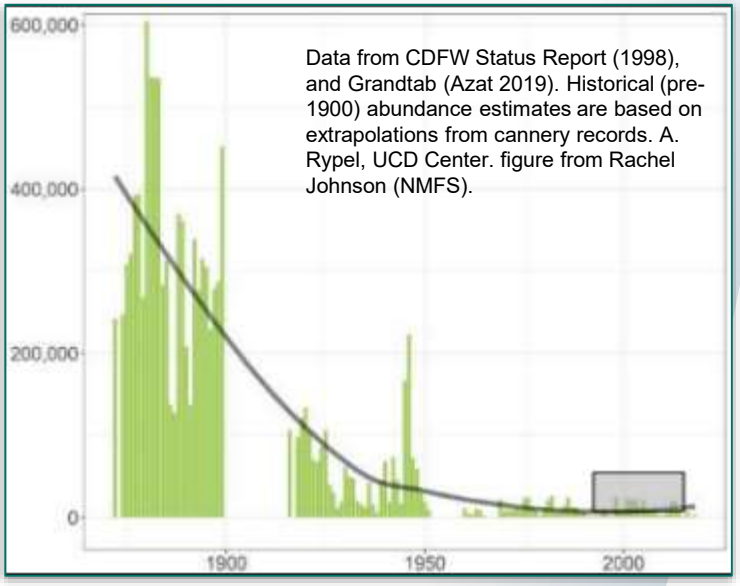
Extinction Risk

Winter-run



Winter-run	2010 Review	2015 Review	2020 Review
Extinction Risk	Low	Moderate	High

Spring-run



Data from CDFW Status Report (1998), and Grandtab (Azat 2019). Historical (pre-1900) abundance estimates are based on extrapolations from cannery records. A. Rypel, UCD Center. figure from Rachel Johnson (NMFS).

	2010	2015	2020
Mill Creek	High	Moderate	High
Deer Creek	High	Moderate	High
Butte Creek	Low	Low	Low
Battle Creek	High	Moderate	High
Clear Creek	High	Moderate	High
Feather River H	High	High	High

table from Rachel Johnson (NMFS)

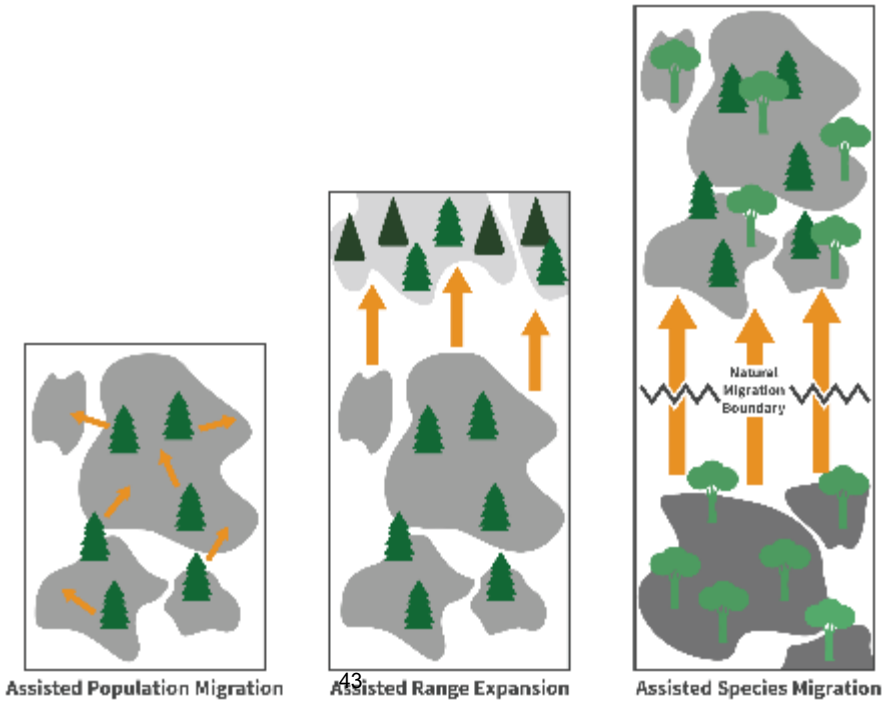
CONSIDERATIONS FOR ASSISTED AND NON-ASSISTED PASSAGE AT LARGE DAMS

PRESENTED BY:

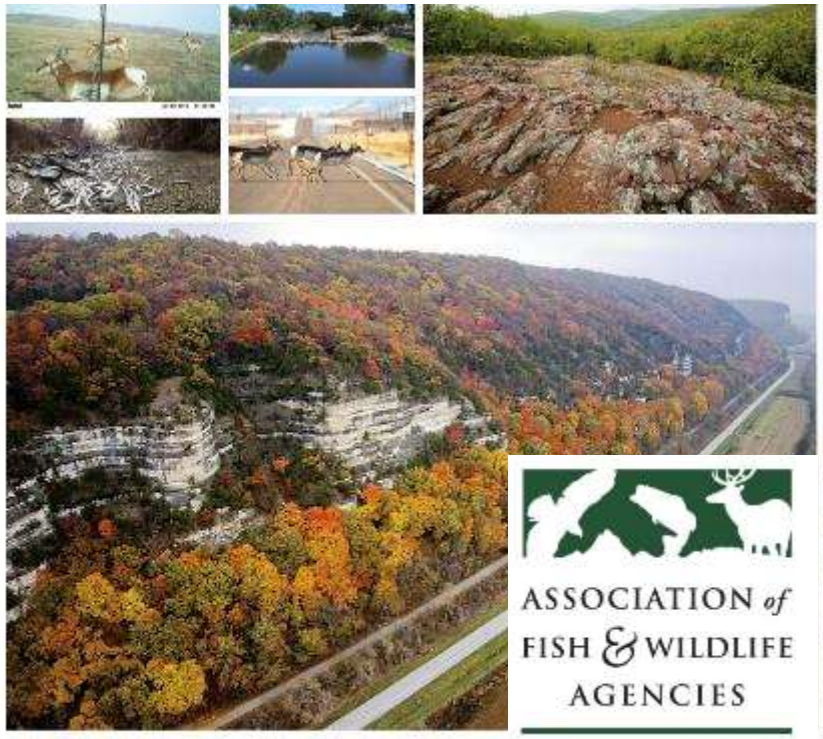
Jon Mann, California Department of Fish and Wildlife

What is assisted migration?

- Assisted population migration
- Assisted range expansion
- Assisted species migration



Assisted migration for animals



- "some species may need help more immediately through assisted migration or other approaches"

What is non-assisted migration?

- Volitional fish passage: the concept of giving fish the choice of moving upstream or downstream based on their own motivation
- A concrete fish ladder with an open-ended inlet and outlet can provide volitional fish passage, usually designed for adult salmonids
- Partially volitional/semi-volitional

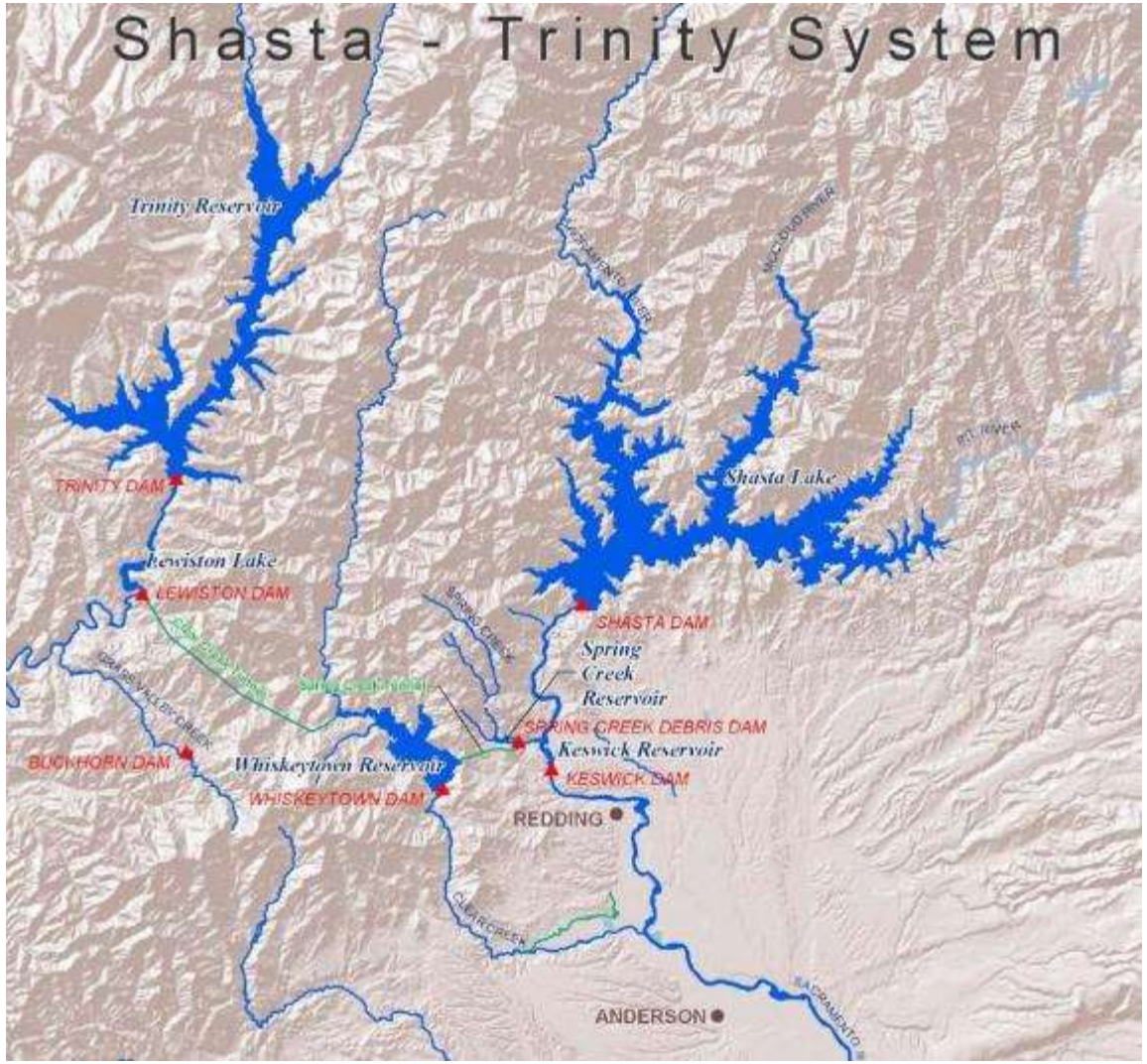
Shasta Dam

- Completed in 1945
- Structural height = 602 ft
- Hydraulic height = 525.5 ft
- Full reservoir elevation = 1067 ft
- Tailrace/tailwater elevation ~588 ft
- Lowest reservoir elevation = 882 ft in October 2021 (previous low was 890 ft in November 2014)

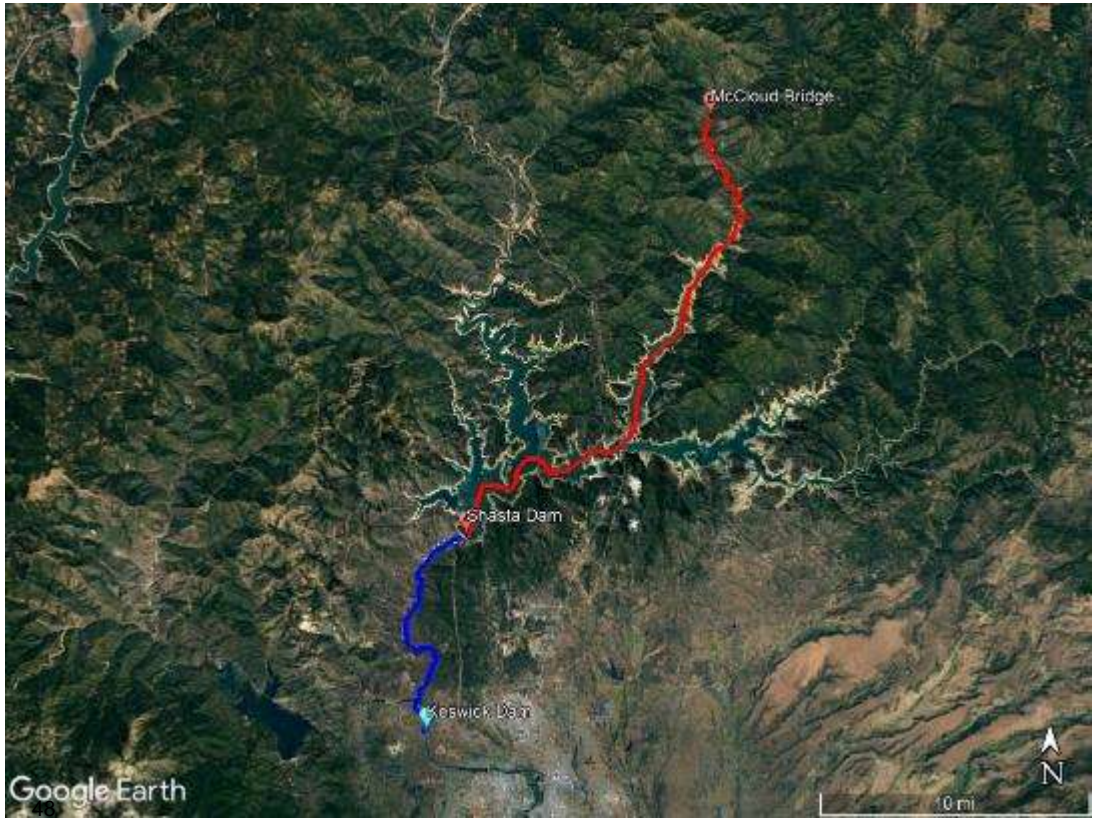
Keswick Dam

- Completed in 1950
- Structural height = 157 ft
- Hydraulic height = 118 ft
- Tailrace/tailwater elevation ~475 ft
- 12 step fish ladder (pool and weir) leads to trap with hopper for lifting fish to transport truck

Shasta-Keswick complex



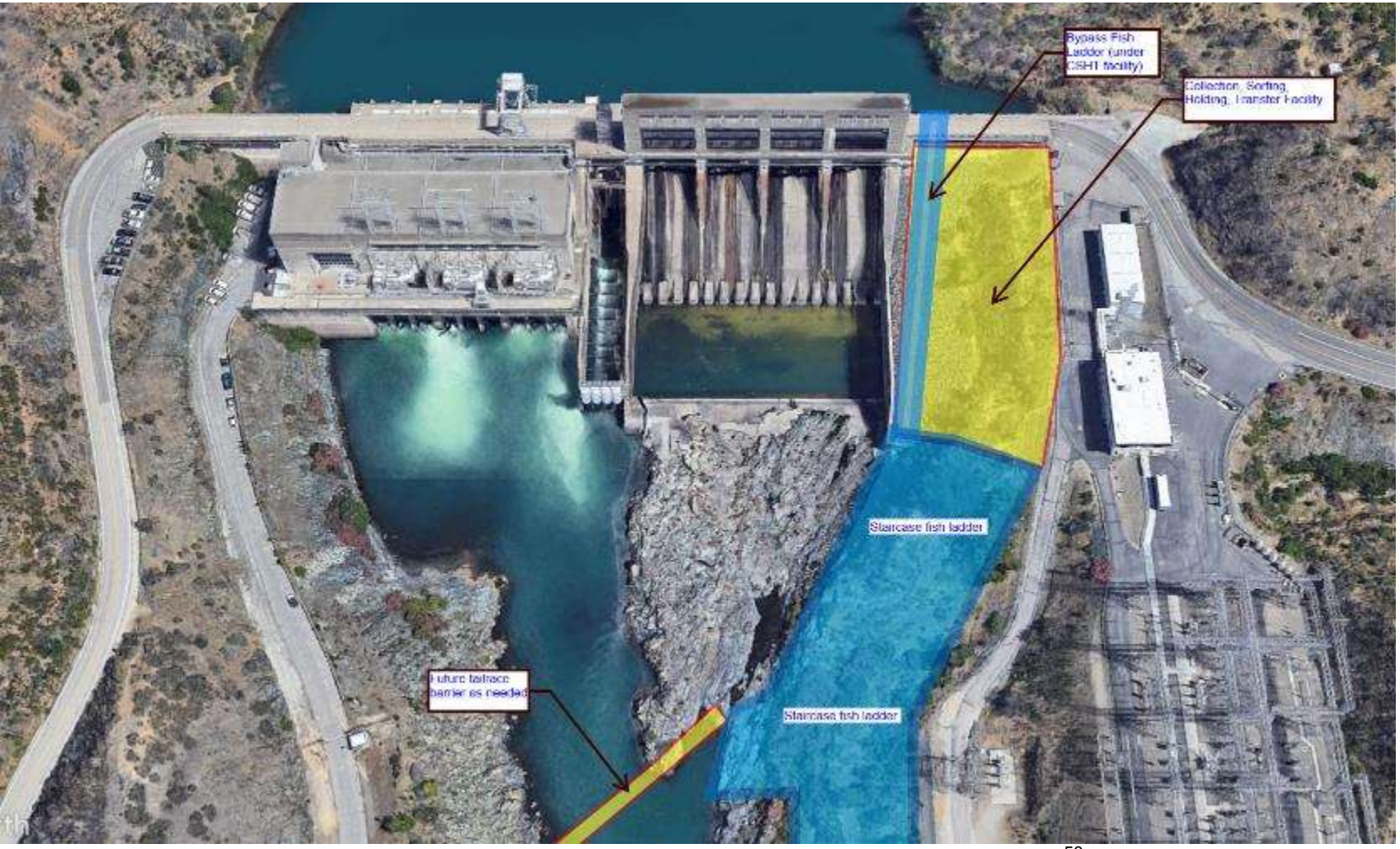
- 9.5 "river" miles between the dams
- 23 mostly reservoir miles from Shasta Dam to McCloud Bridge



Volitional Passage Feasibility - Keswick

- Ice Harbor example (and other Columbia River/Snake River dams – 12 total with big fish ladders)
- Approximately 100 feet of water surface difference (headwater – tailwater)
- Two "Ice Harbor" style fish ladders ~1400 ft long each

Volitional Passage Feasibility - Keswick

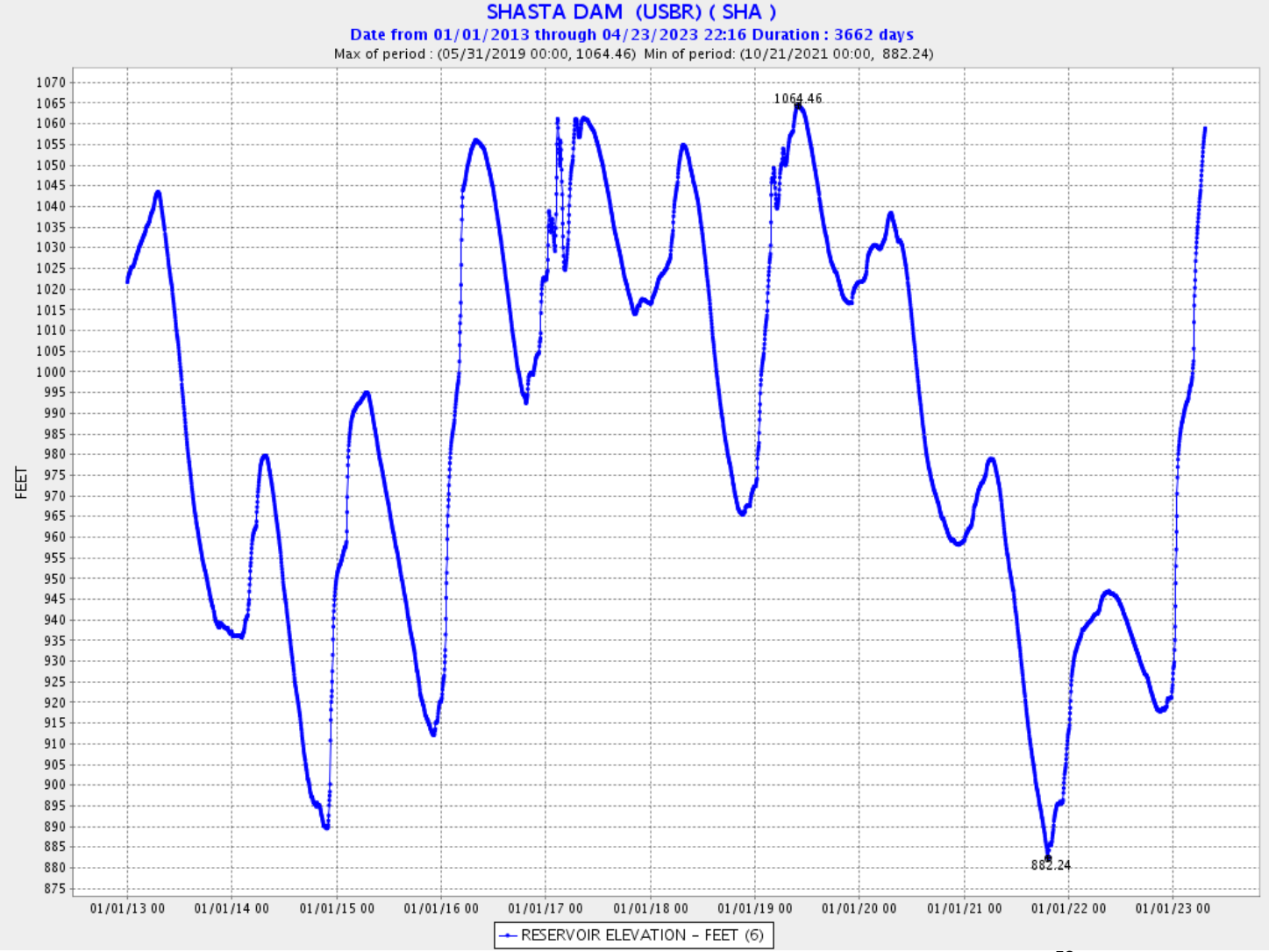


- Approximately 90 to 95 feet of water surface difference
- Feasible?:
  - Engineering – yes
  - Biological – maybe
- Collection, sorting, holding, transfer facility for fish management

Volitional Passage Feasibility - Shasta

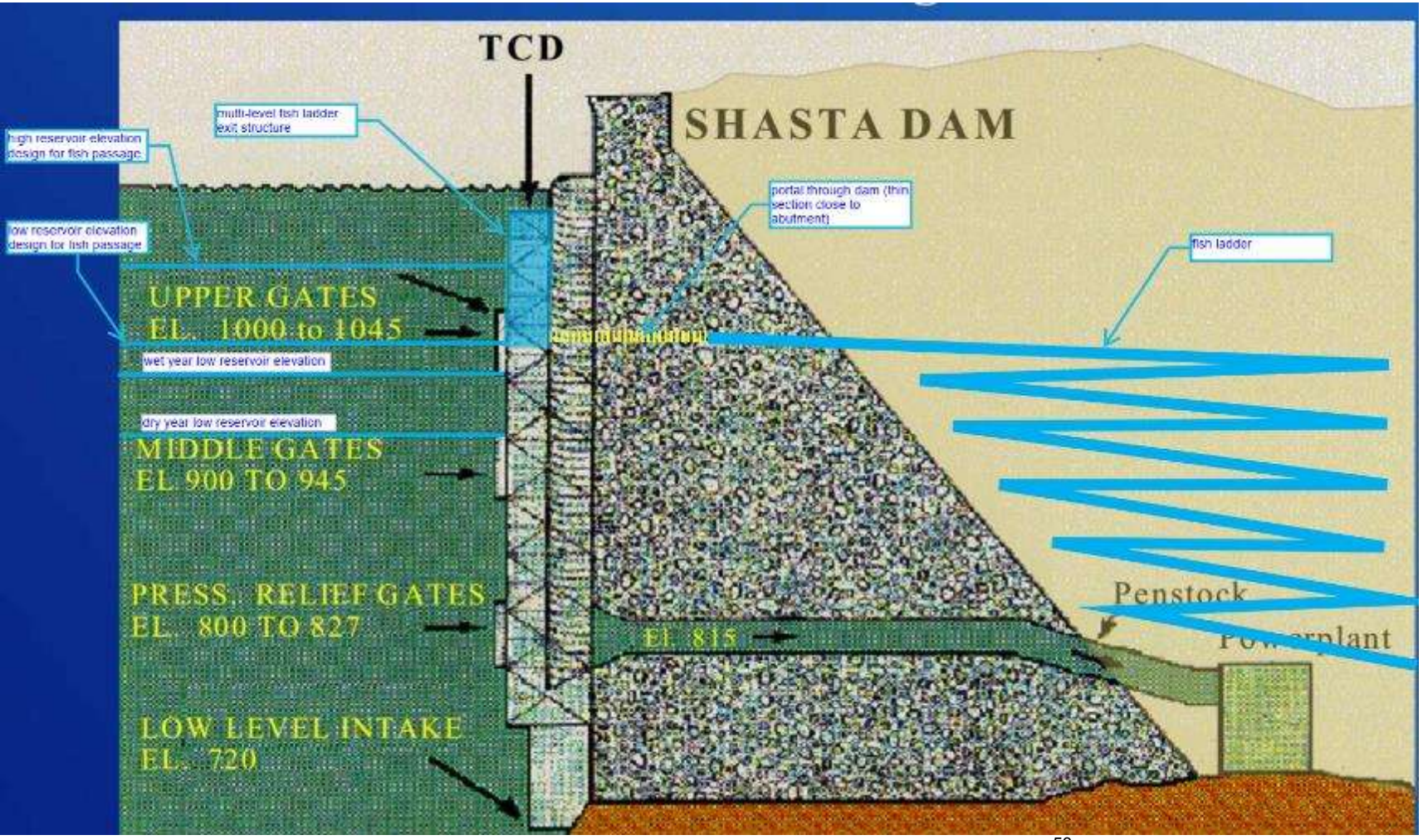
- Up to 490 feet of water surface difference
- Large reservoir fluctuation range during time of adult salmon migration

Reservoir considerations



- Reservoir February-May elevation range
- 2014 dry year el. 936 to 979
- 2021 dry year el. 959 to 979
- 2017 wet year el. 1024 to 1062
- 2019 wet year el. 1004 to 1065
- Dry year range ~ 40 feet
- Wet year range ~ 60 feet
- All years range ~ 130 feet

Volitional Passage Feasibility - Shasta



- Requires hydraulic connectivity – equalized water surface elevation for the range of headwater (reservoir) elevations within the fish passage period

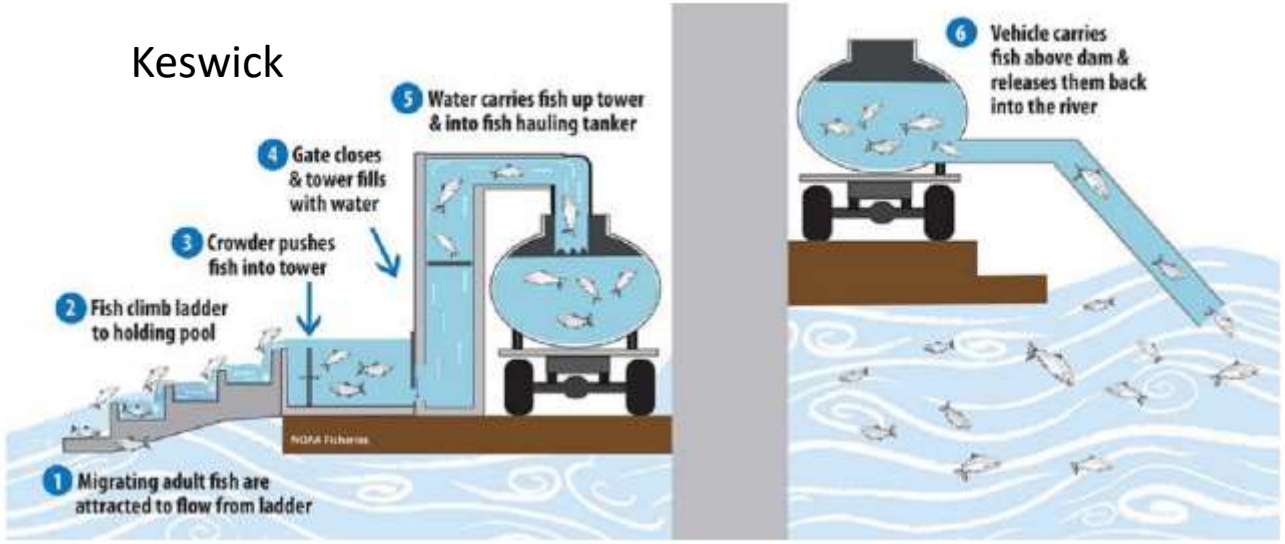
Volitional Passage Feasibility - Shasta

- Feasible?:
  - Engineering – sure
  - Biological – uncertain effectiveness
- Semi-volitional option? – still uncertain effectiveness

Fish Passage Feasibility

- If volitional passage is determined to be infeasible, then the study shall consider non-volitional passage

Keswick



Shasta Dam?
Bridge Bay
Hirz Bay?
McCloud Bridge?

Truck transport

- Road distance

From	To	Miles
Keswick	Livingston Stone National Fish Hatchery	11
Keswick	Centimudi (boat ramp nearest Shasta Dam)	9.5
Keswick	Bridge Bay Marina	14
Keswick	Hirz Bay	31*
Keswick	McCloud Bridge	38**
LSNFH	Centimudi	2.7
LSNFH	Bridge Bay Marina	13
LSNFH	Hirz Bay	30*
LSNFH	McCloud Bridge	37**

*- tortuous

** - more tortuous

Possible fish passage program – phase 1

- Continue fish collection at Keswick with sorting and holding at LSNFH
- Transfer selected fish to McCloud River
- Evaluate reservoir passage – adult and juvenile life stages
- Evaluate juvenile fish passage through dams
- Evaluate biological effectiveness of volitional passage options including tributary bypass alternatives
- Design and implement improvements at Keswick

Possible fish passage program – phase 2

- Design and implement most biologically effective fish passage alternative
- Design and implement second most biologically effective fish passage alternative
- Adaptive improvement
- Create a problem of having too many fish!

Assist or not assist?

This is the way

CDFW Mission

To manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and their use and enjoyment by the public.

Juvenile Salmonid Collection System for Shasta Dam Fish Passage

Randy Beckwith
JSCS Project Engineering Lead

Riverine Stewardship Program

CALIFORNIA DEPARTMENT OF WATER RESOURCES

SRF Conference
April 28, 2023

Presentation Overview

- Background/History
- The Juvenile Salmonid Collection System (JSCS)
- Site selection and installation
- Testing and results
- Changes for 2023

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Thanks

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- Eric Ginney
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- Cameron Reyes
- Chris Beck
- CJ January
- Bryce Kozak
- Matt Mattes
- Liza Ryan
- Bailey Setzler
- Taylor Spaulding
- Tanner Lichty
- Morgan Henry
- Nicole Dunkley
- Courtney Carpenter
- Melanie DuBoce
- Byron Amerson

NOAA Fisheries
- Stacie Smith
- Jon Ambrose
- Steve Edmondson
- Steve Thomas
- Zayleen Kalalo
- Brian Ellrott
- Cathy Marcinkevage
- Amilee Wilson

CDFW
- Jason Roberts
- Jon Mann
- Mark Gard
- Mike Harris
- Matt Johnson
- Andrew Jensen
- Monty Currier
- Doug Killam
- Tina Bartlett

Trout Unlimited
- Rene Henery

Winnemem Wintu
- Chief Sisk
- Mark Miyoshi
- Luisa Navejas
- James Ward
- Jamie Ward
- Marine Sisk
- Jessica Abbe

Pacific Netting Products
- Dave Erickson
- Michael Shaw
- Al Coultas

USBR
- John Hannon
- Connie Svoboda
- Heather Casillas

U.S. Forest Service
- Joe Stubbendick
- Sara Acridge
- Pete Schmidt
- Amanda Brinkman-Parker
- Todd Johnson

U.S. Dept. of Energy
- Brian Bellgraph (PNNL)
- Dana McCoskey

DWR
- Amy Bailey
- Austin Hall
- Michal Koller
- Anecita Agustinez
- Mariko Falke
- Barbara Cross
- Chelsea Palisoc
- Kevin Marr
- Matt Meyers
- Josh Black
- Jim Long
- Jamieson Scott
- Esther Tracy
- Kerri Klosterman
- James Campagna
- Ed Manrique
- Tyler Keys
- Art Hinojosa
- Kris Tjernell
- Ted Frink
- Marc Commandatore
- Randy Beckwith
- Roger Padilla
- Nikki Johnson
- Bill McLaughlin
- Nicole Anderson
- Beth Medeiros

DWR
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- Jason Kindopp
- Hugh Biggar
- Akiela Moses
- James Herink
- Scott McReynolds
- Justin Call
- Mike Memeo
- Adam Henderson
- Amy Lyons
- Nate Millingar
- Radley Ott
- Patrick Jarrett
- John Lance
- James Norris
- Seth Lawrence
- Nancy Snodgrass
- Jackie Wait
- Brett Harvey
- Louise Conrad
- Cesar Ciccarelli
- Ryan McKinney
- Florence Low
- Asif Ali
- Eric Lapurga
- Steve Brumbaugh
- Krissy Atkinson

Shasta Juvenile Salmonid Collection System History

- 2009 – NMFS Biological Opinion – Reclamation leads Fish Passage Program
- 2015 – Juvenile Collection Design Workshop
- 2017 – DWR contract with Reclamation to lead juvenile collection effort
- 2018 - JSCS Design Team formed - led by DWR
  - Included USBR, NMFS, DFW, Environmental Science Associates
  - Pacific Netting Products, Winnemem Wintu, Trout Unlimited added later
- 2019 - JSCS fabricated. New BiOp. Reclamation decides not to lead Fish Passage Program.
- 2020 and 2021 - Funding sought. Partnership with Winnemem Wintu began. USFS Special Use Permit and CEQA.
- 2022 - CDFW funds project. JSCS installed and tested.

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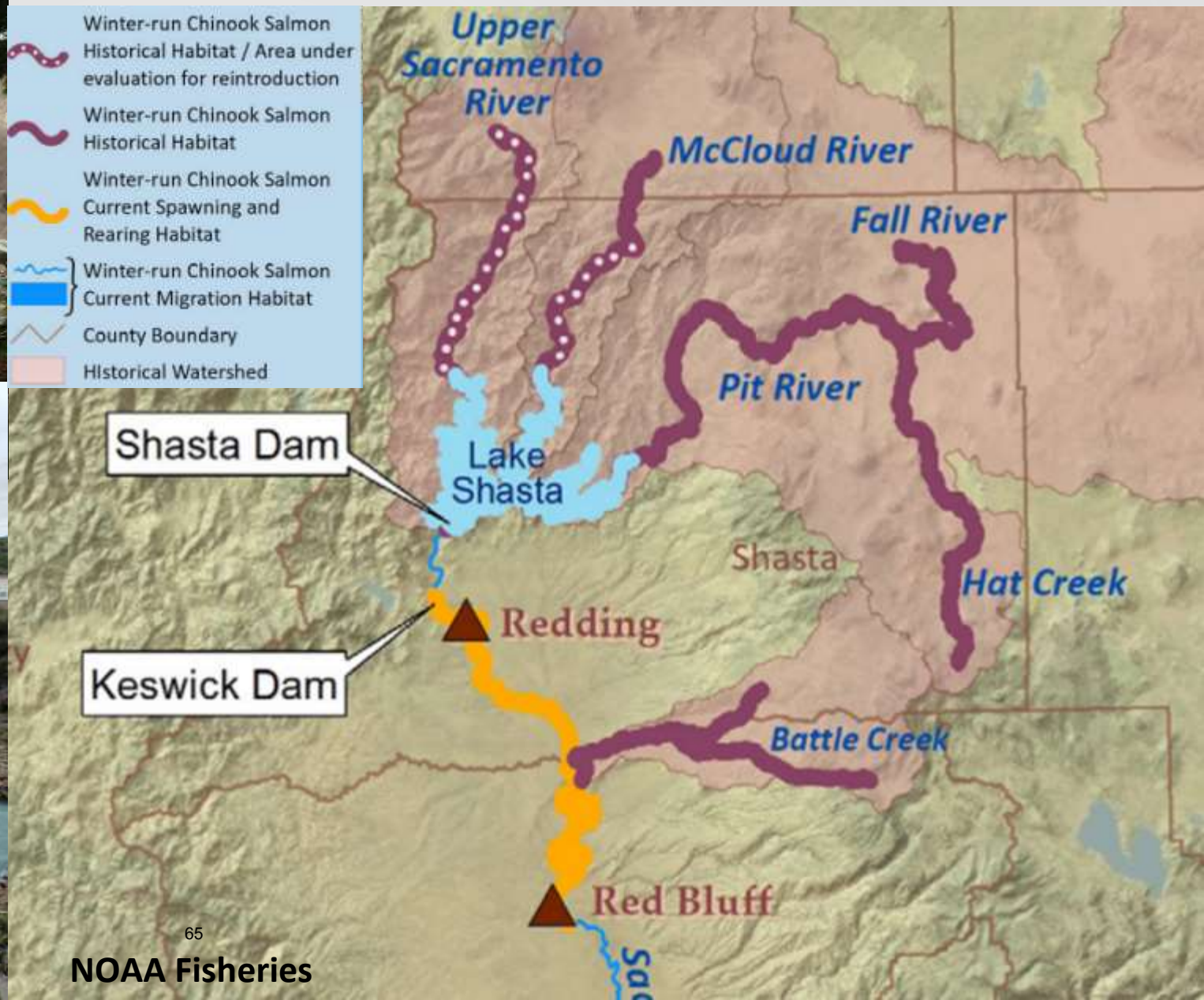
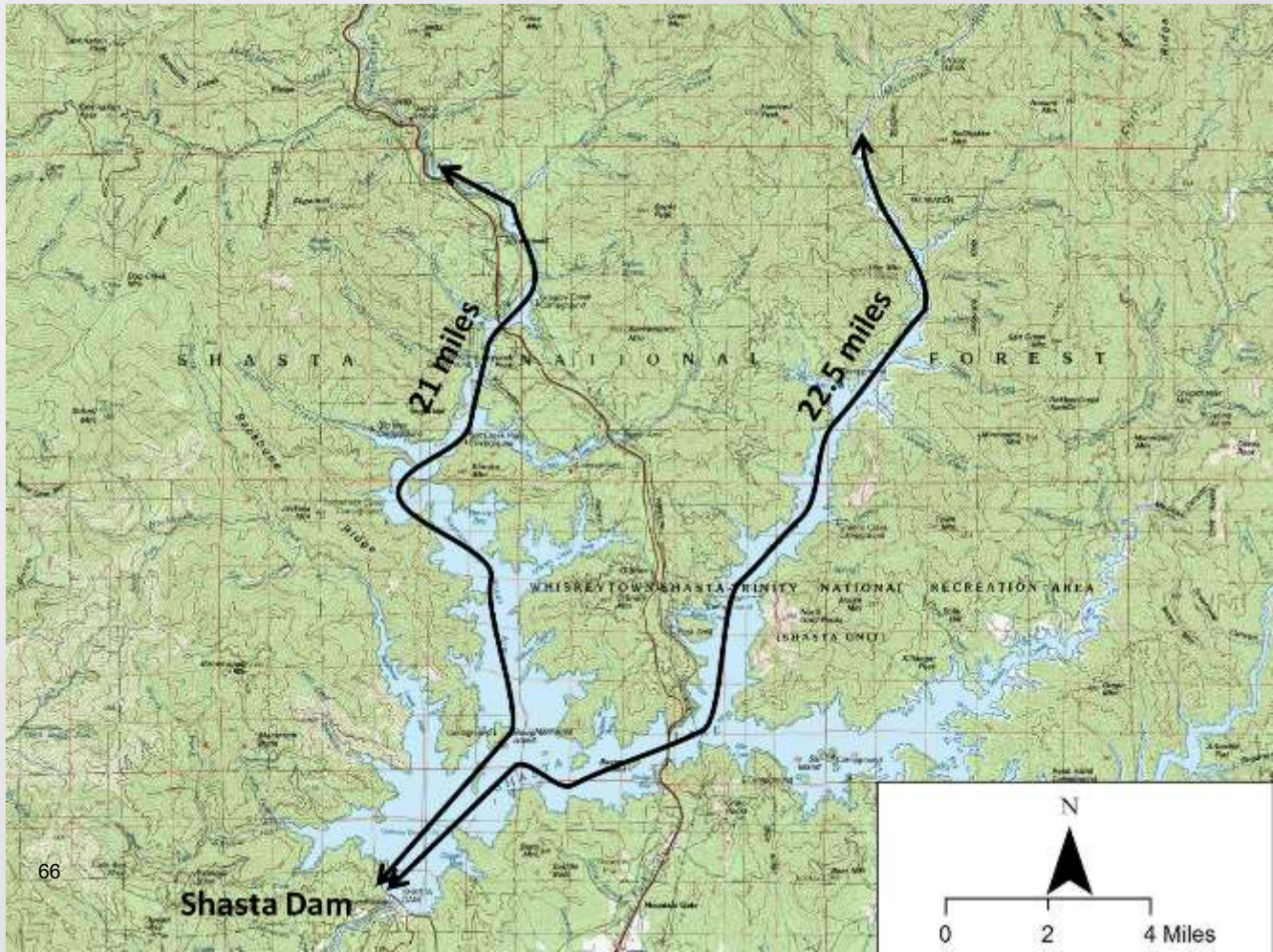
Reintroduction at Shasta Dam



NOAA Fisheries

Main JSCS Design Challenges

- Big, long reservoir with unknown flow patterns
- High water temperatures and stratification
- Predation
- Large fluctuations in lake elevation
- High potential debris loads
- High/low flows in the McCloud River
- Recreation and resident fish impacts
- Multiple culturally significant sites
- Private fishing clubs
- No power



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Juvenile Collection Solutions

- Agency experts were assembled in 2015 (CA, OR, WA)
- Brainstormed design concepts
- Due to our challenges, they recommended we look at both In-River and Head-of-Reservoir locations

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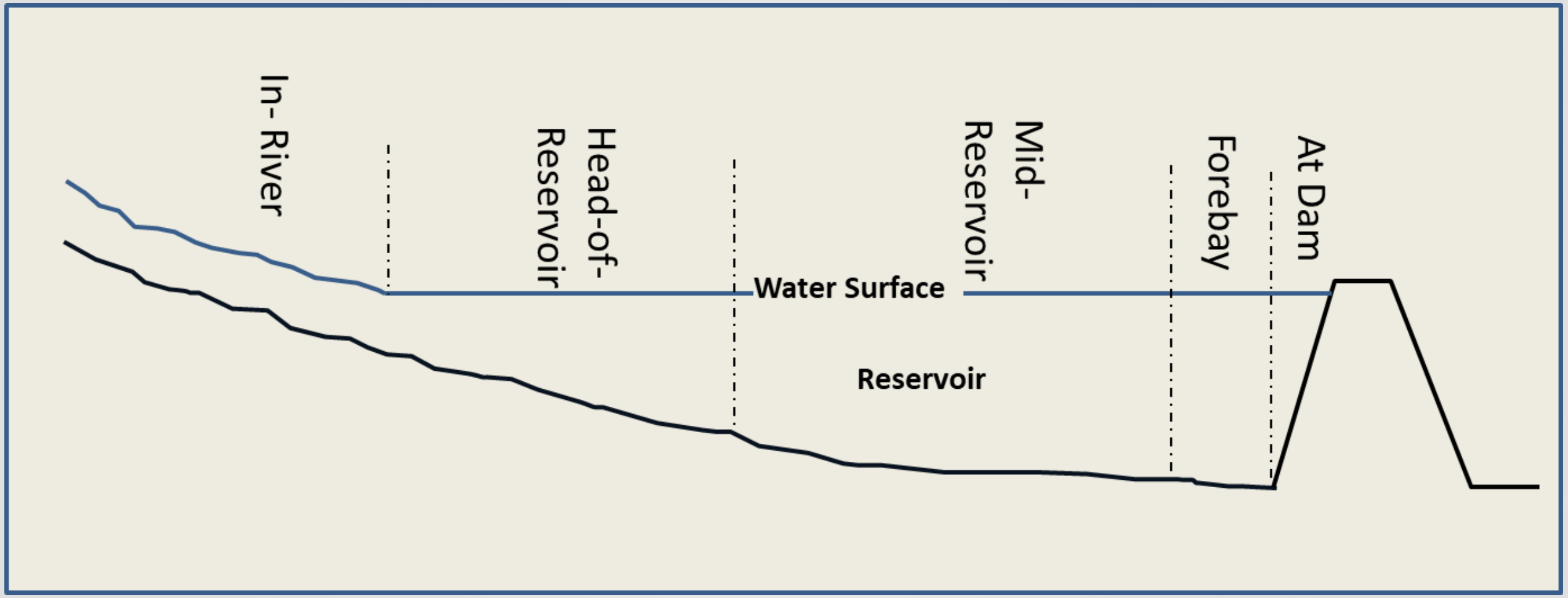
Downstream Passage Collection Location



From AECOM 2010

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JSCS Design Objectives

- Pilot effort so keep it simple
- Passive – use fish behavior instead of pumps
- Efficient at collecting fish
- Low predation
- Safe for operators and public
- Low impact
- Easy to operate and maintain
- Movable and removable
- Flexible, versatile, and adaptable to varying conditions (wet – drought)
- Cost effective

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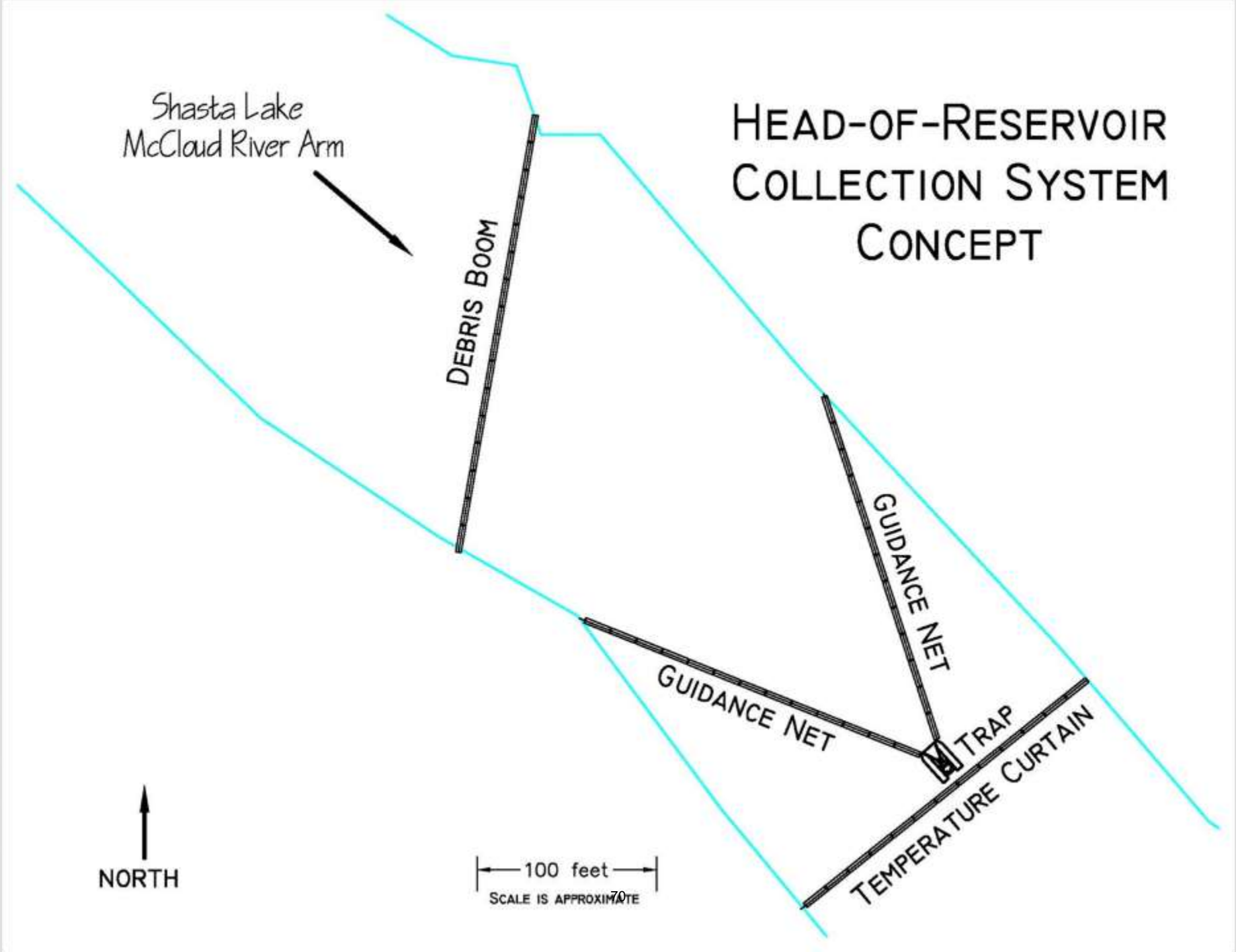
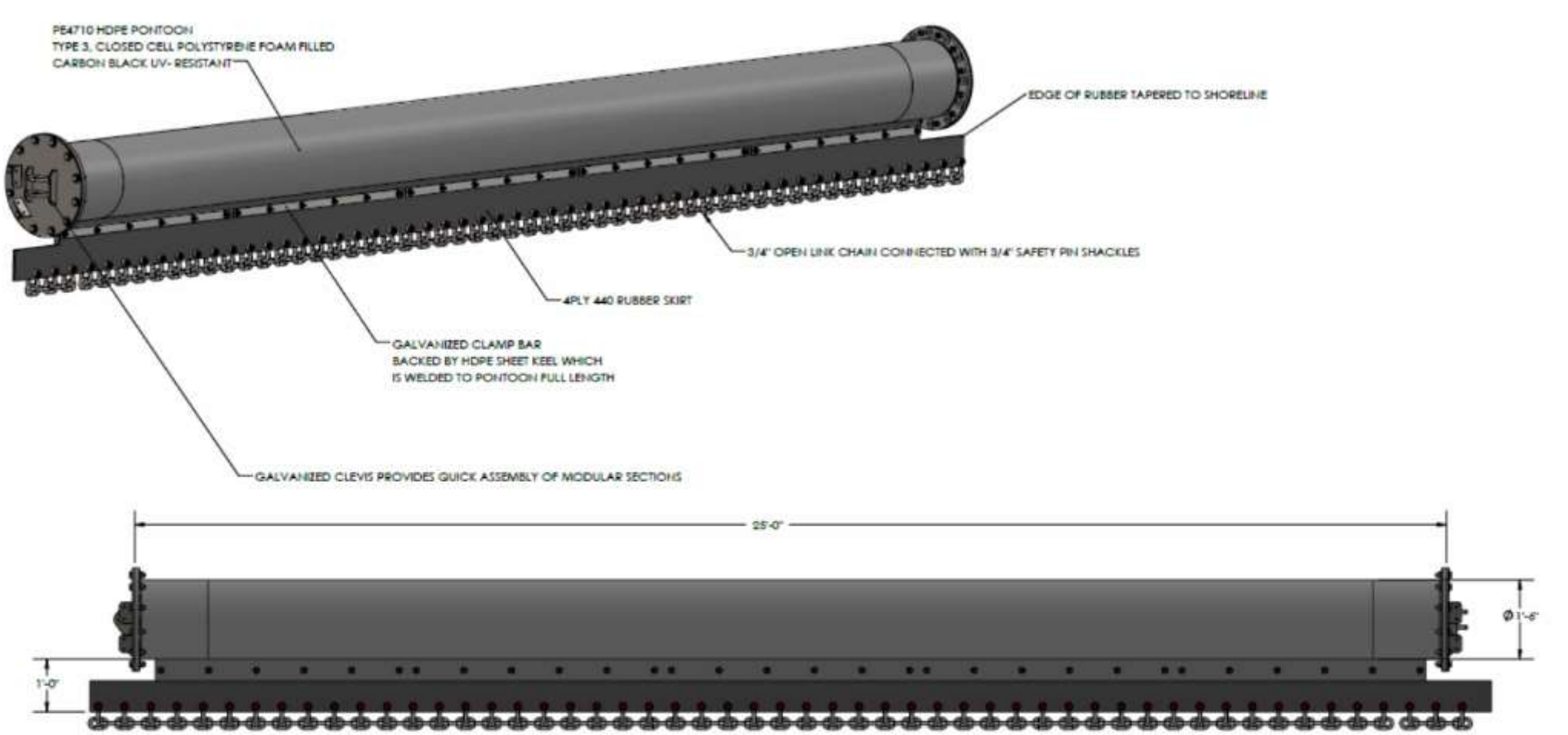

Shasta Lake
McCloud River Arm
HEAD-OF-RESERVOIR
COLLECTION SYSTEM
CONCEPT
DEBRIS BOOM
GUIDANCE NET
GUIDANCE NET
TRAP
TEMPERATURE CURTAIN
NORTH
100 feet
SCALE IS APPROXIMATE

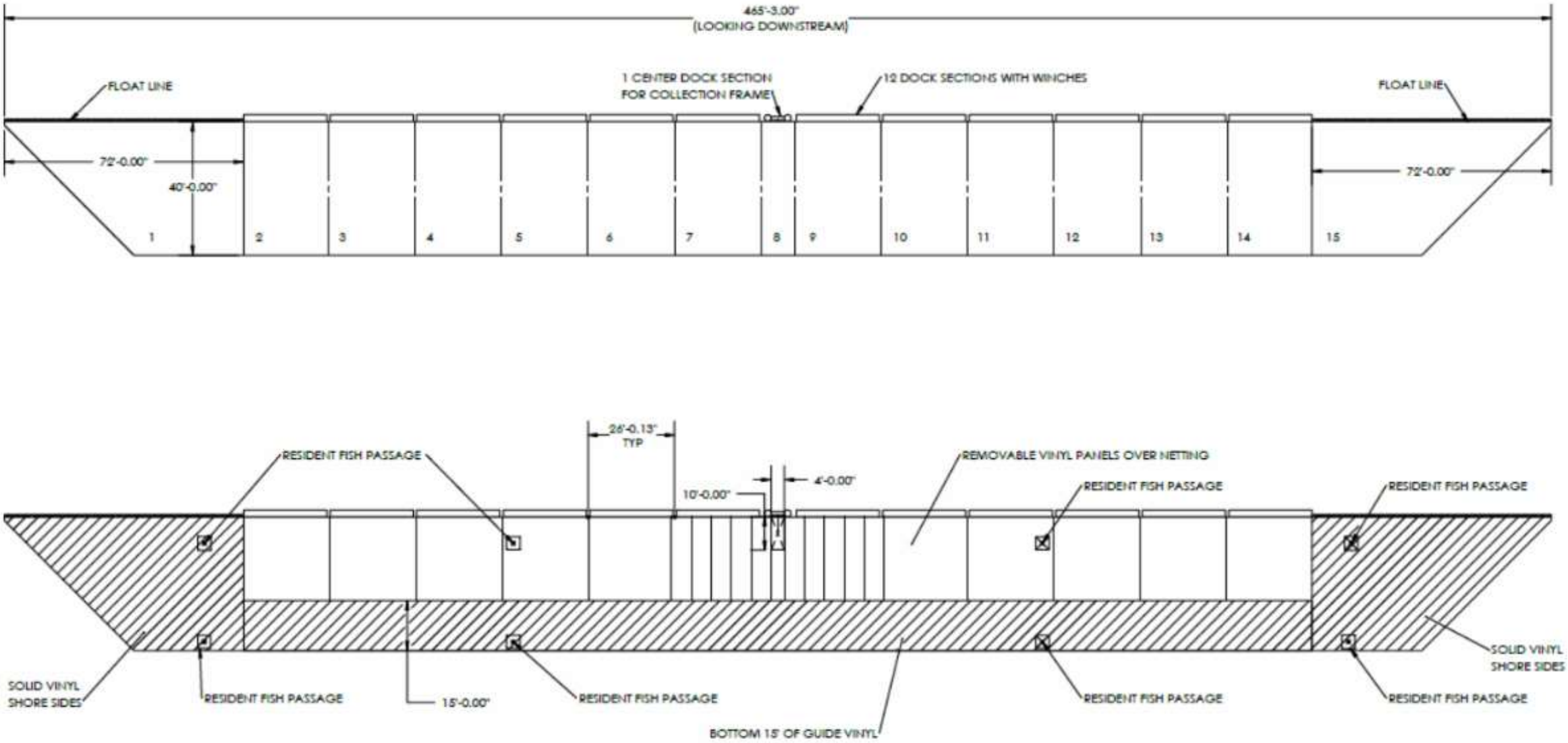


Debris Boom

PNP
PACIFIC NETTING PRODUCTS

Pacific Netting Products
25993 United Road NE
Kingston, WA 98346
1-888-582-7438

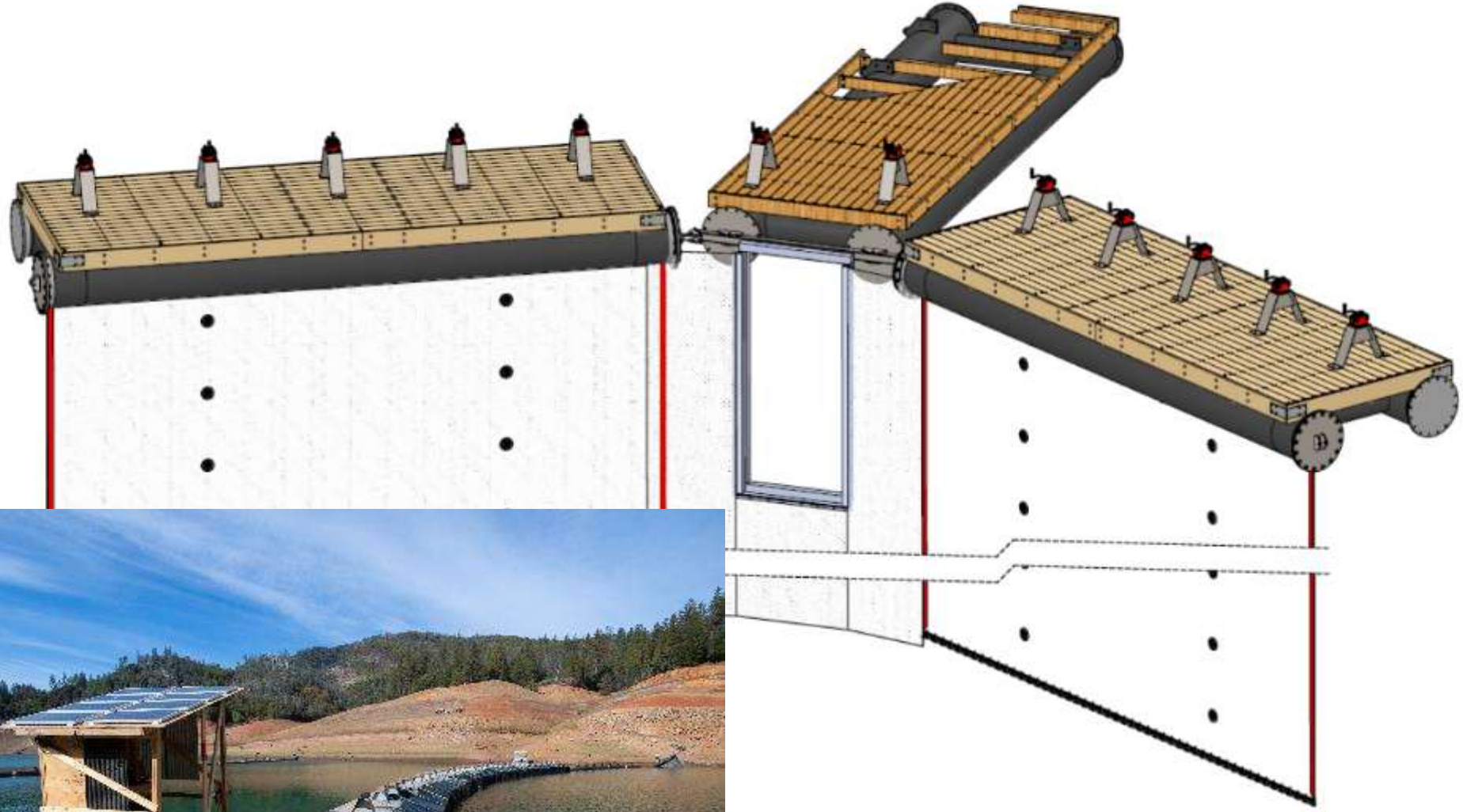
SHEET TITLE:	DEBRIS BOOM DETAIL
TITLE:	FISH COLLECTION SYSTEM
CLIENT:	LAKE SHASTA
DESIGNER: R. PASMA	PROJECT NO:
DRAWN BY: R. PASMA	REVISION: 1
CHECKED BY:	DATE MODIFIED: 7/1/2019
DRAWING NO: 18042-1	PAGE: 19 OF 33



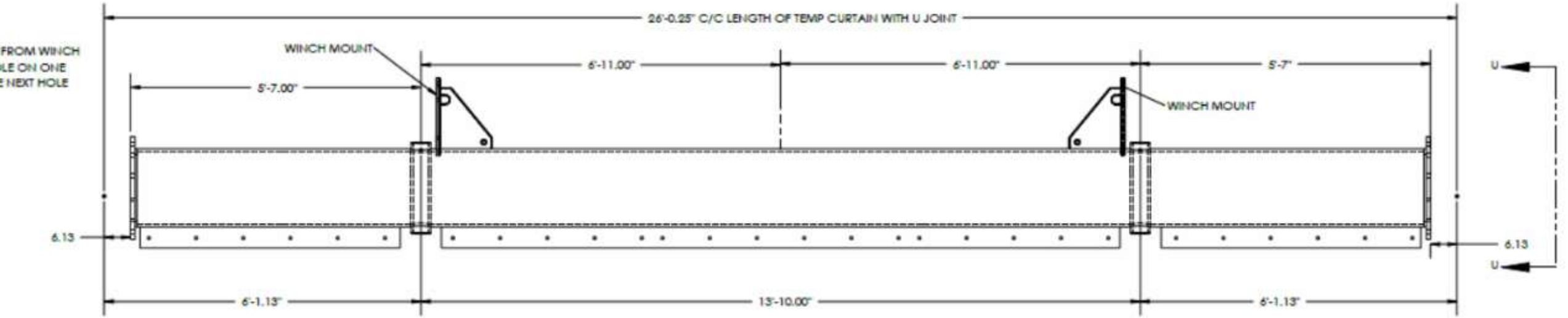
Guidance Net

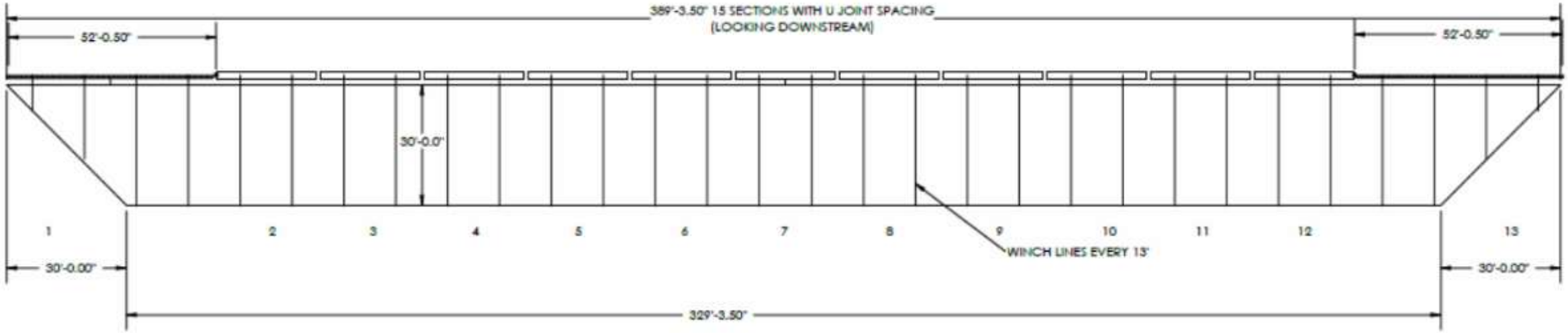
Pacific Netting Products

SHEET TITLE: NETTING PANEL DETAIL

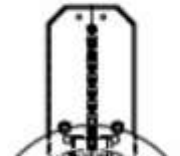


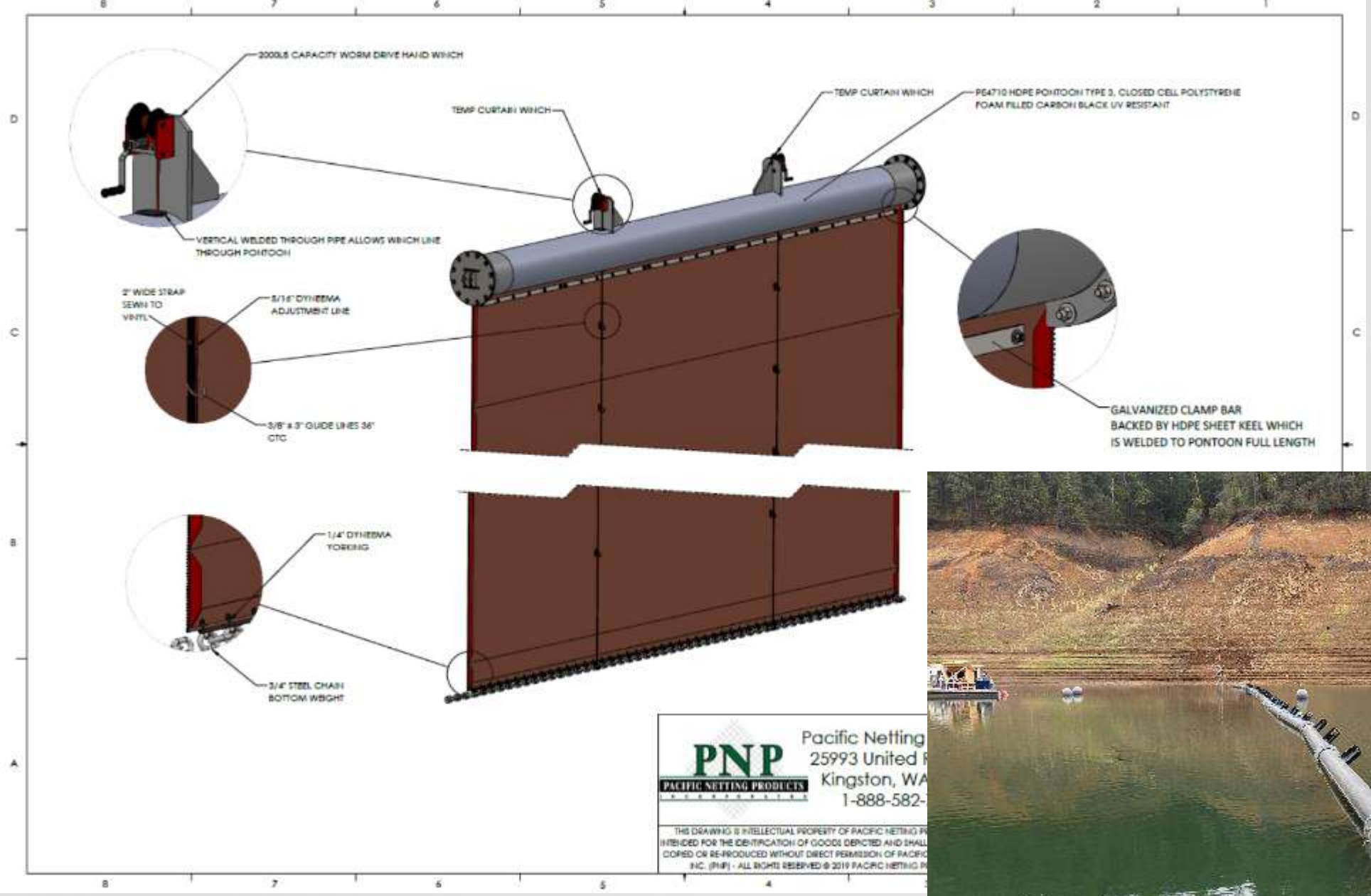
PNP PACIFIC NETTING PRODUCTS	Pacific Netting Products 25993 United Road NE Kingston, WA 98346 1-888-582-7438	SHEET TITLE: NOTCH ASSEMBLY TITLE: FISH COLLECTION SYSTEM CLIENT: LAKE SHASTA
		DESIGNER: R. PASMA / PROJECT NO:
		DRAWN BY: R. PASMA / REVISION: 1
		CHECKED BY: / DATE MODIFIED: 7/1/2019
		DRAWING NO: 18042-1 / PAGE: 32 OF 33





Temperature Curtain




2000LS CAPACITY WORM DRIVE HAND WINCH
TEMP CURTAIN WINCH
TEMP CURTAIN WINCH
PE4710 HDPE PONTOON TYPE 3, CLOSED CELL POLYSTYRENE FOAM FILLED CARBON BLACK UV RESISTANT
VERTICAL WELDED THROUGH PIPE ALLOWS WINCH LINE THROUGH PONTOON
2" WIDE STRAP SEWN TO VINYL
5/16" DYNEEMA ADJUSTMENT LINE
3/8" x 3' GUIDE LINES 36" CTC
GALVANIZED CLAMP BAR BACKED BY HDPE SHEET KEEL WHICH IS WELDED TO PONTOON FULL LENGTH
1/4" DYNEEMA YORKING
3/4" STEEL CHAIN BOTTOM WEIGHT
PNP
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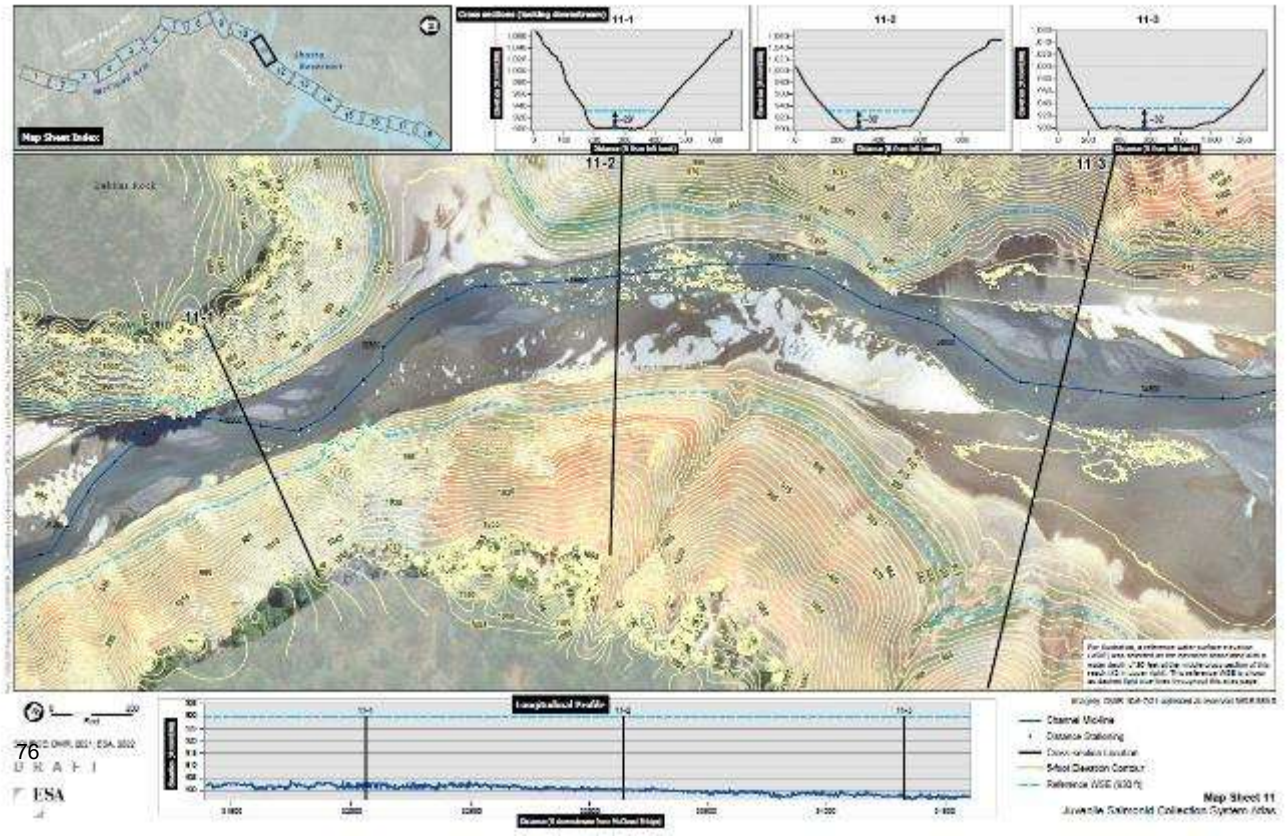
JSCS Site Selection

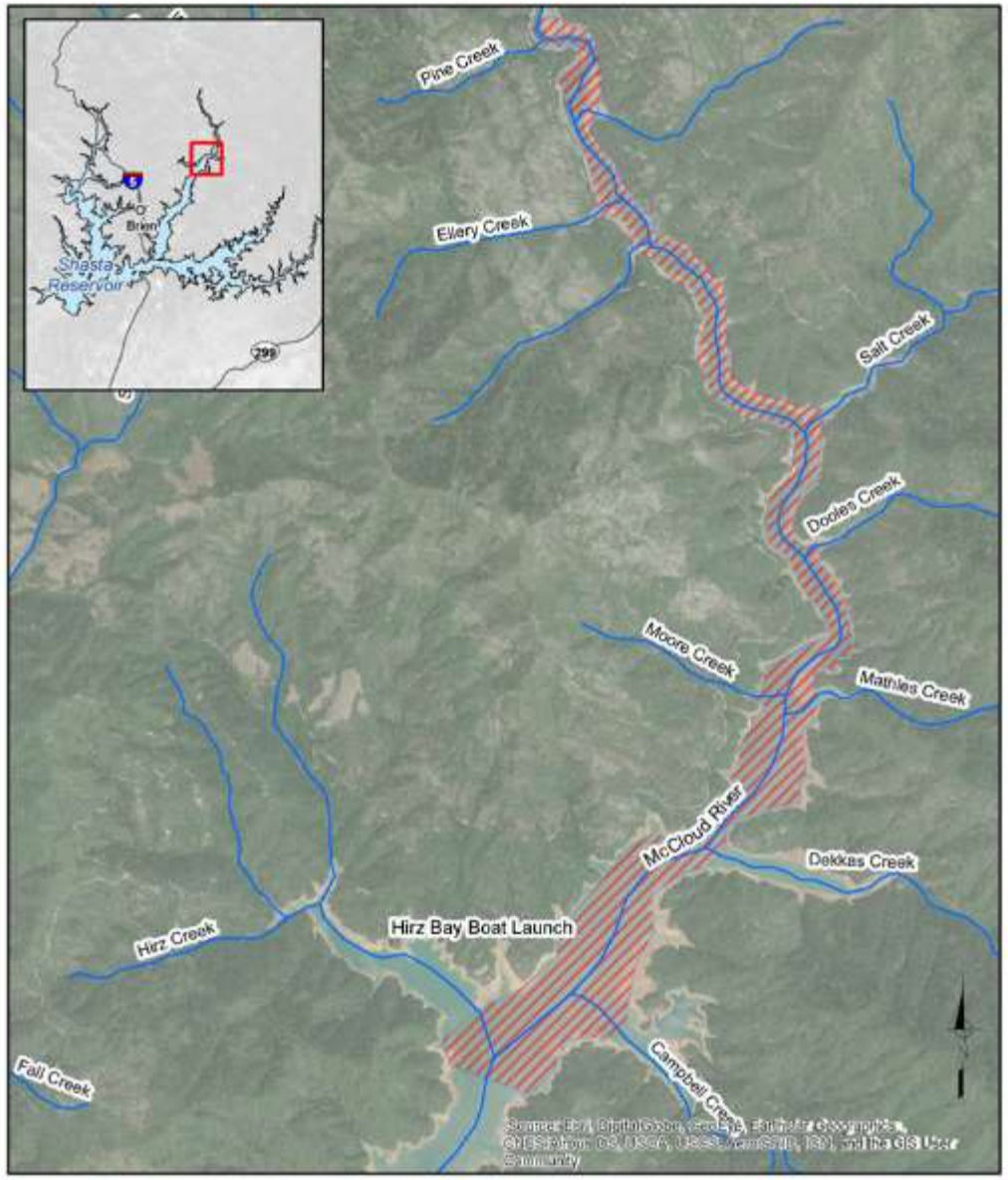
- USBR reservoir estimates
- Computer exercise
- On the ground vetting

Storages

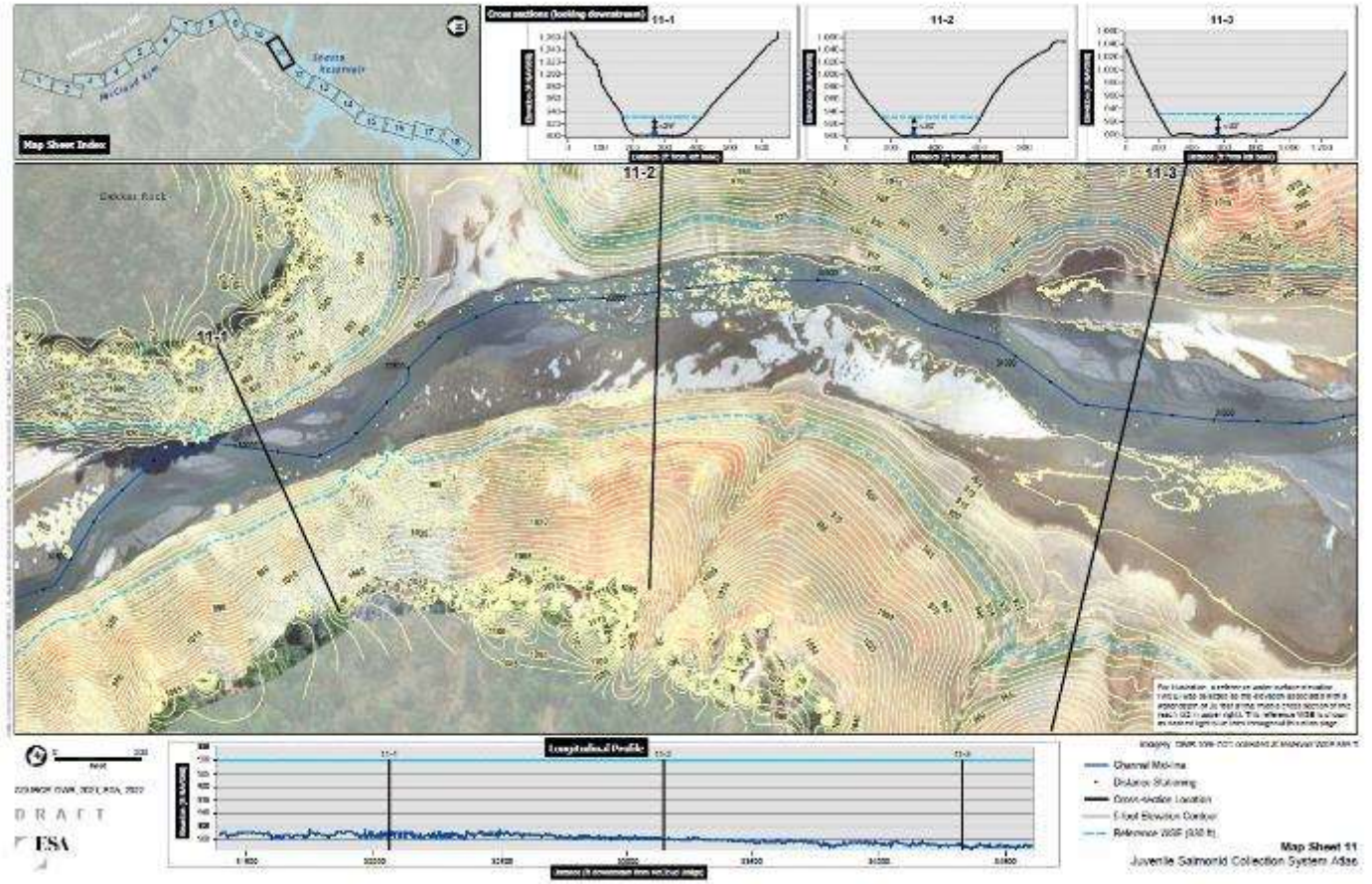
Federal End of the Month Storage/Elevation (TAF/Feet)

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Trinity	807	756	693	646	589	505	423	394	372	356	360	393	459
	Elev.	2225	2218	2209	2200	2186	2170	2164	2159	2155	2156	2164	2177
Whiskeytown	213	238	238	238	238	238	238	206	206	206	206	206	206
	Elev.	1209	1209	1209	1209	1209	1209	1199	1199	1199	1199	1199	1199
Shasta	1735	1746	1646	1523	1382	1238	1135	1132	1117	1106	1229	1432	1759
	Elev.	942	935	927	917	906	897	897	896	895	905	921	943
Folsom	584	670	669	556	366	302	298	274	254	243	272	345	293
	Elev.	435	435	423	398	388	387	382	379	377	382	395	386
New Melones	935	908	831	753	690	638	611	589	572	574	580	578	574
	Elev.	929	918	905	894	885	880	872	872	873	874	873	873
San Luis	333	332	300	231	142	110	87	31	73	130	332	328	311
	Elev.	445	438	422	403	391	383	369	379	399	436	432	430
Total		4651	4376	3947	3407	3031	2762	2606	2584	2614	2660	3281	3602





Juvenile Salmonid Collection System
Potential Installation Reach



JSCS Site for 2022

JSCS Installation Schedule

- Delivery to Hirz Bay Boat Ramp: September 6
- Deployment, assembly installation of JSCS: September 6 – September 15
- Testing of JSCS: September 16 – November 11
- Removal of JSCS: November 14 - November 21

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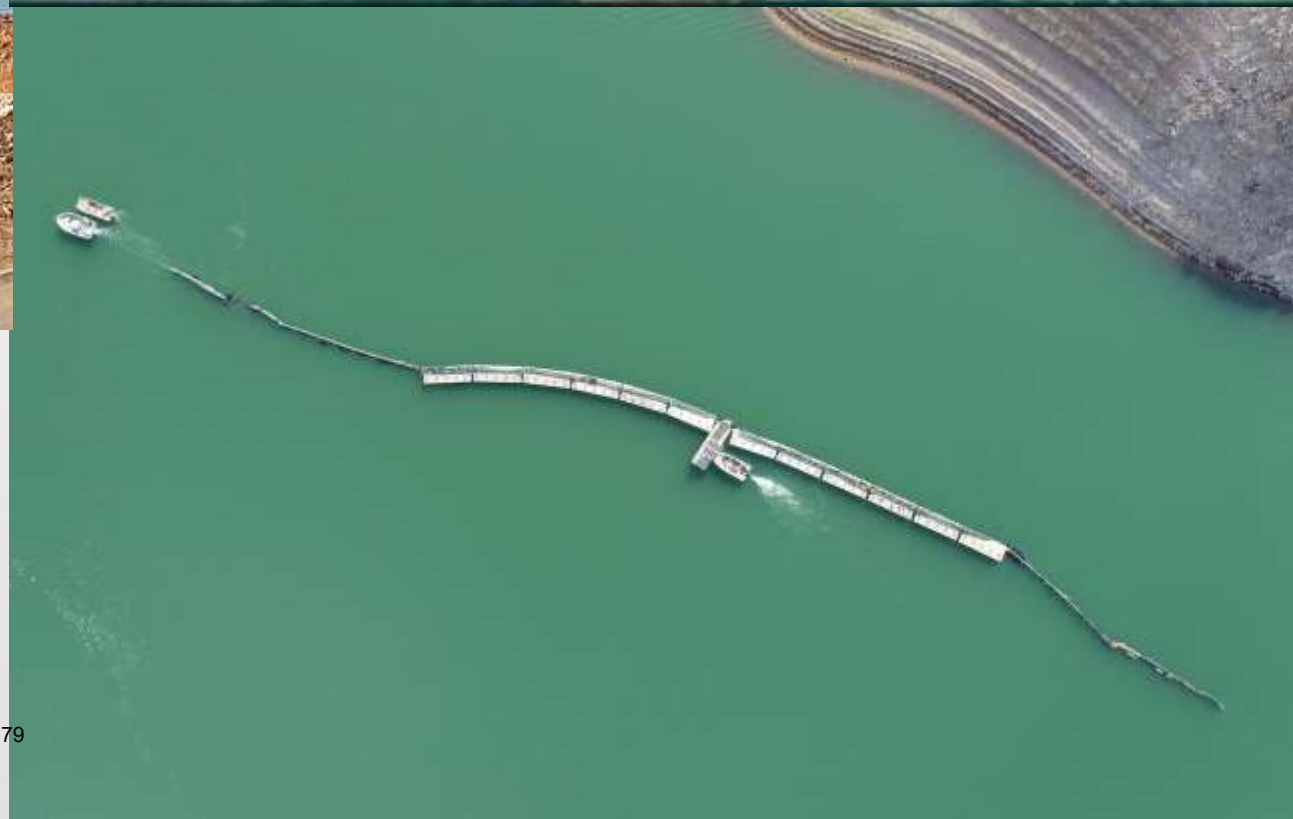
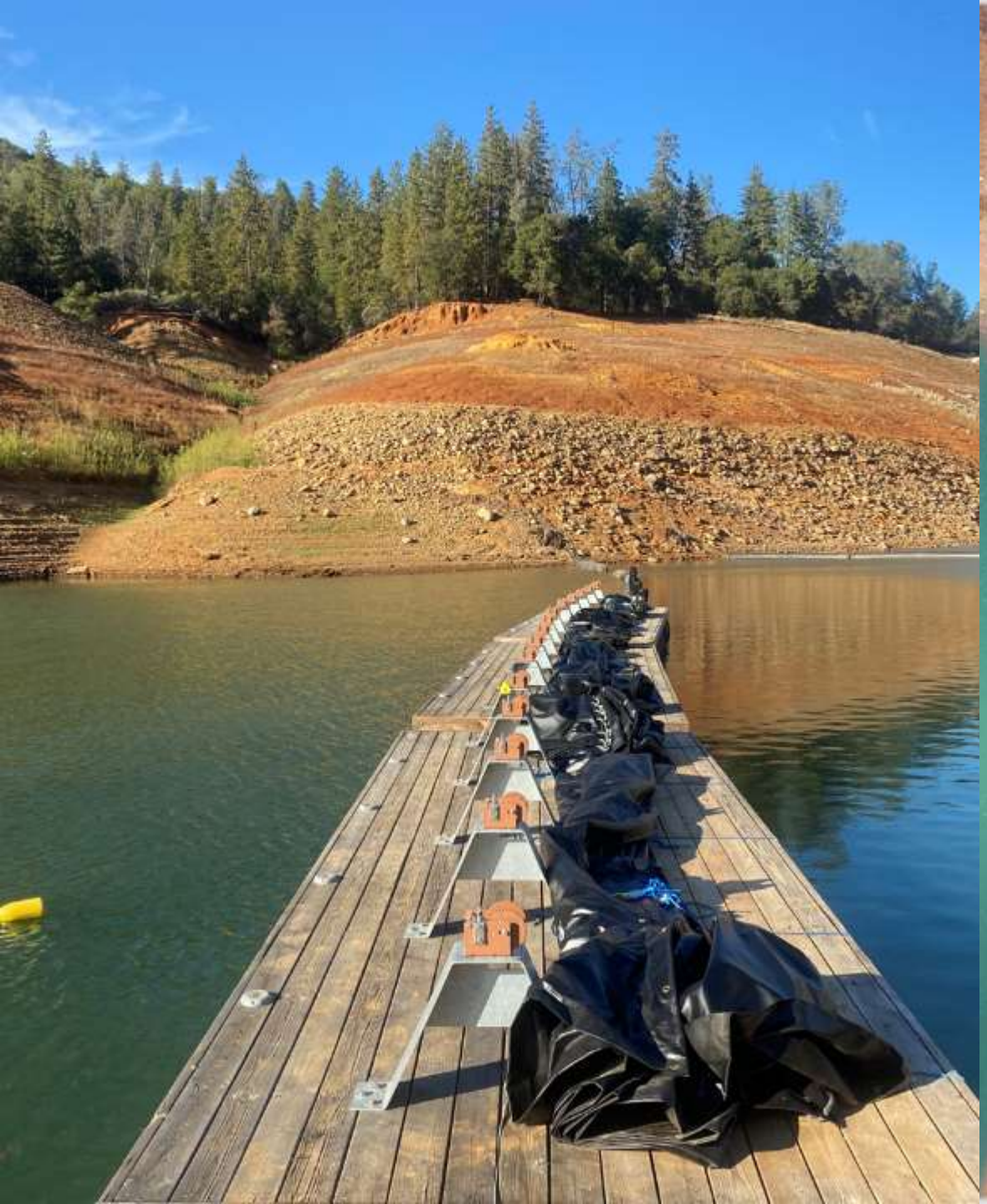
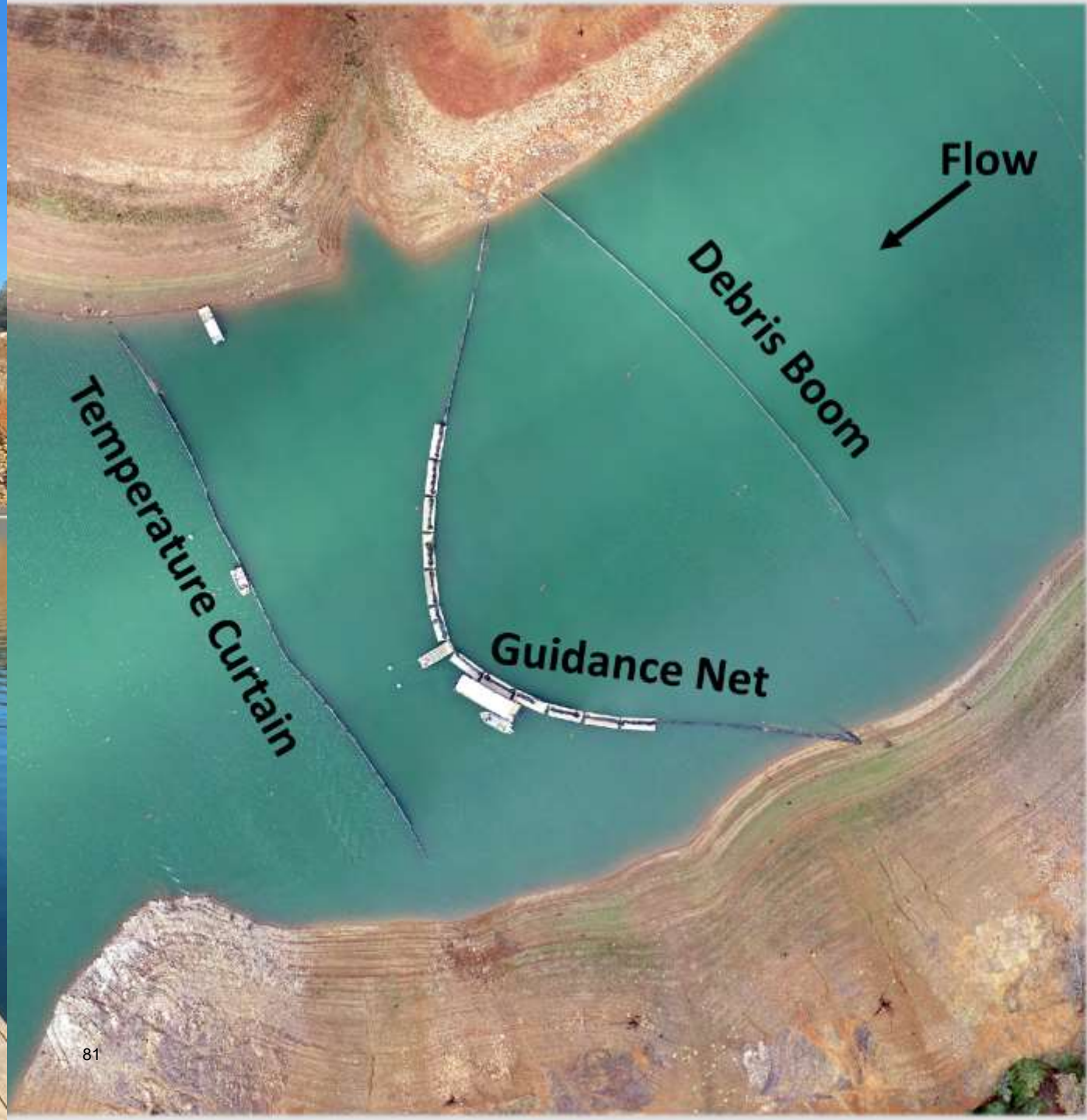


Assembly and Installation

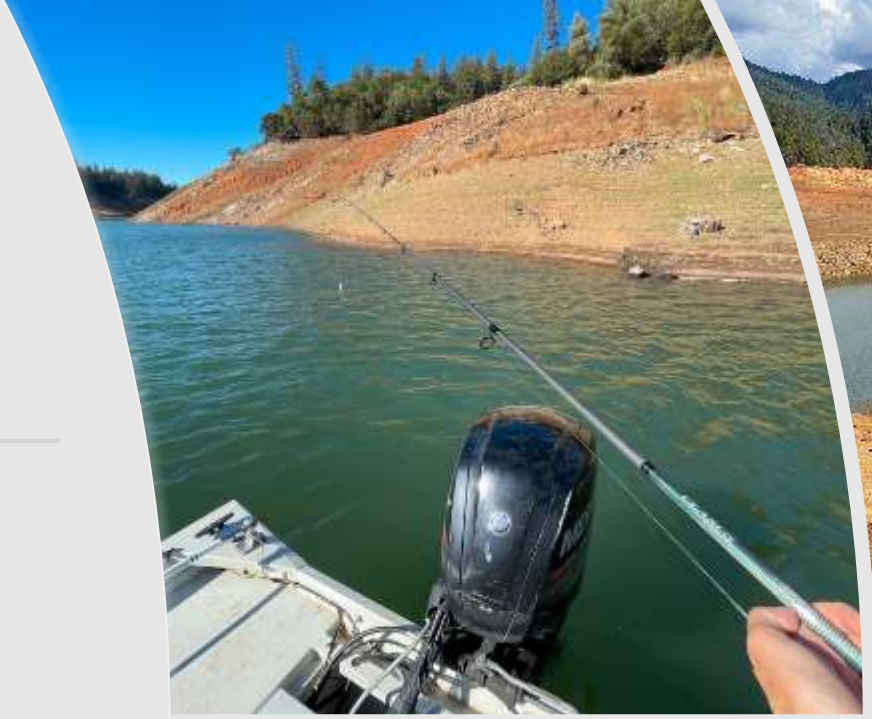
Anchoring




Flow
Debris Boom
Temperature Curtain
Guidance Net

Testing Focus 2022

- Operations
- Temperature control
- Hydraulics and flow manipulation
- Resident fish passage and assemblage
- Weather
- Debris



Temperature Data Collection Summary

Water Temperature Sensors (Continuous)

- 21 locations along McCloud River Arm
- 59 Individual sensors
  - Stratified by depth
- Hourly readings from 9/6/2022 – 11/15/2022
  - Pre-deployment through several configurations

Vertical Water Quality profiles (Discrete)

- Over 100 vertical water quality profiles
- Upstream (US) and downstream (DS) of JSCS structural elements

Water Temperature Sensor Locations

*St25000C was relocated DS on 9/27/22

Hydraulics

- Flow 257 – 850 cfs
- Panel lowering
- Notch flow and loading

Predatory Fish

- 210 Predatory fish captured
  - 79% Spotted Bass
  - 11% Rainbow Trout
  - Other 10% Largemouth and Smallmouth Bass, Brown Trout, Sacramento Pikeminnow, Brown Bullhead Catfish

*Data not fully analyzed.
**Snorkel data not processed to date.

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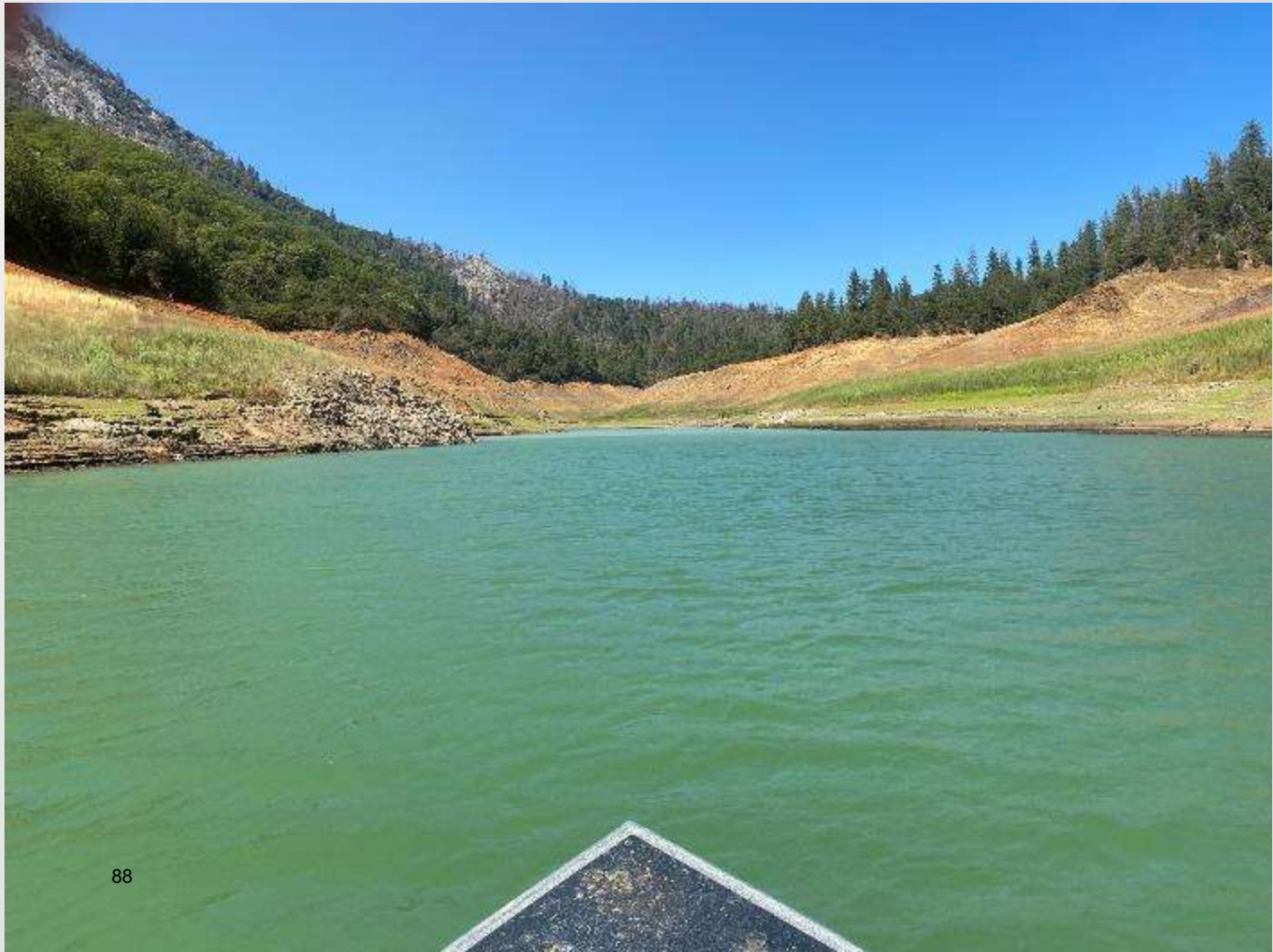
General Observations and Challenges

- Guidance net not on the bottom even with extra weight
- Cold water passing under guidance net – even with impermeable panels down, no flow through notch
- Temperature curtain worked, just not to the level needed
- Reservoir water temperatures became more uniform in November
- Guidance net billowed downstream under the docks
- Resident fish passage observations difficult
- Lots of spotted bass under the docks
- Debris loading was low

2023 Goal - Move Closer to the River

- Shallower water – Install 15’ of depth instead of 30’
- Colder water - mixed
- Narrower channel
- “V” shape – steeper angle
- Have to move it more often
- Catch released WR Chinook



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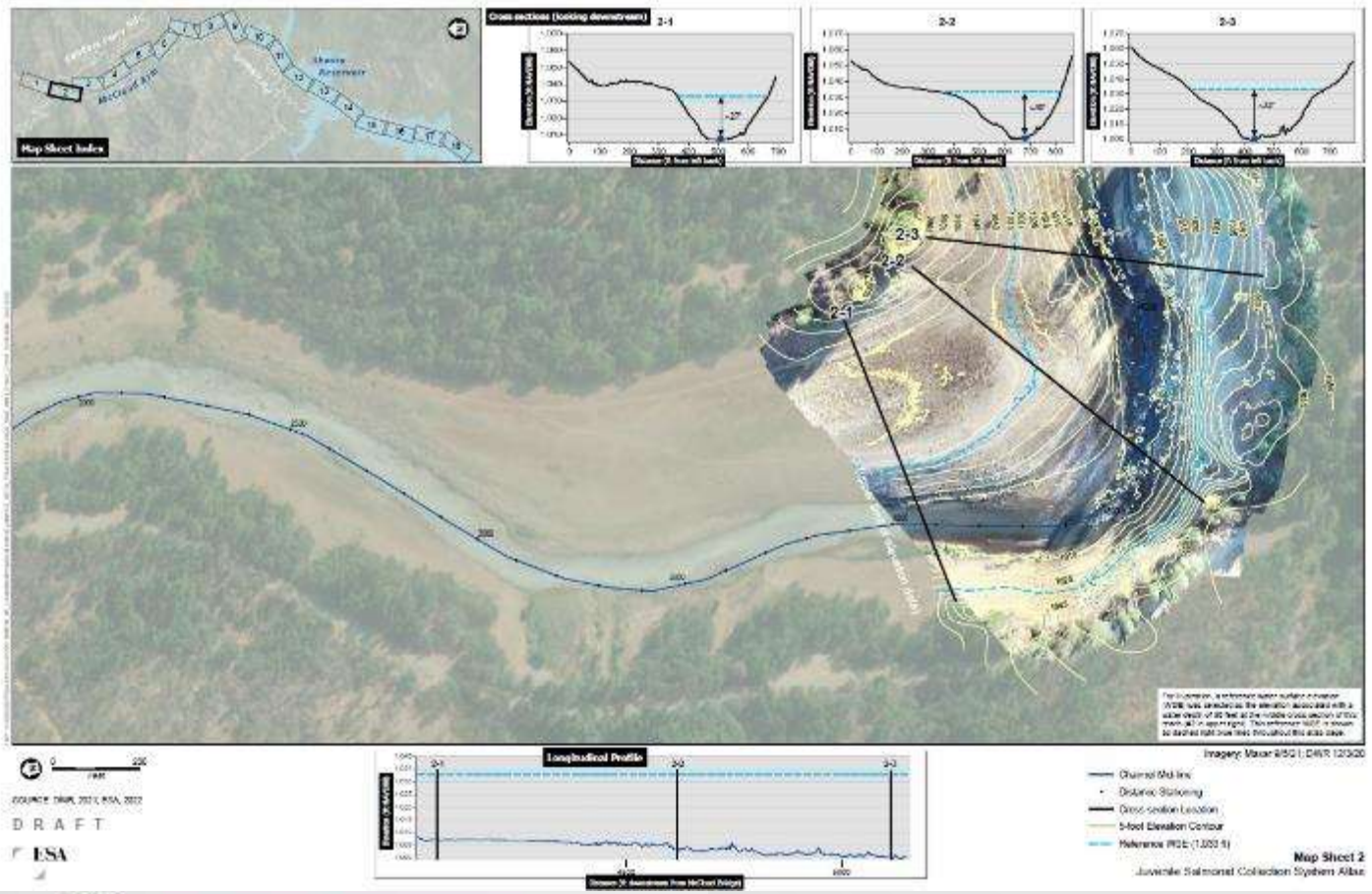
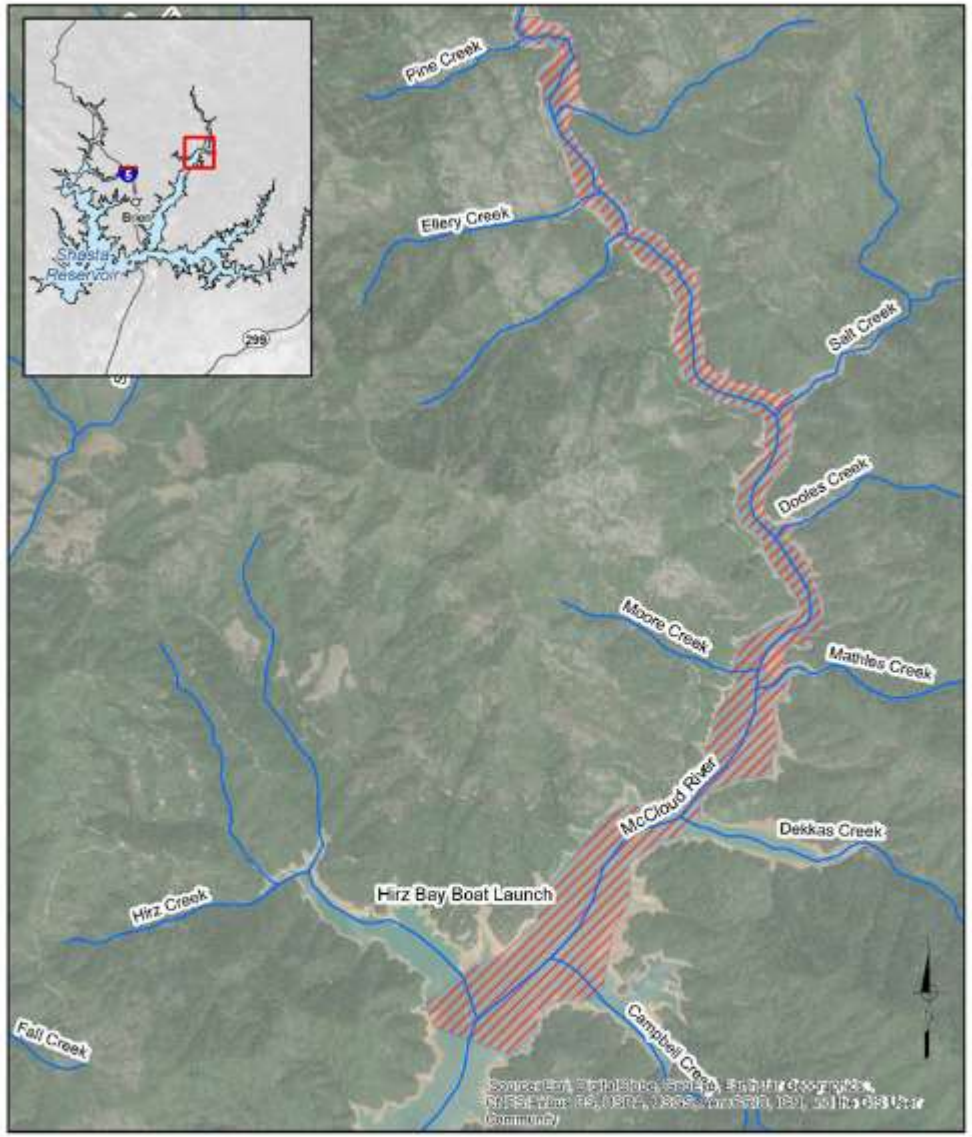
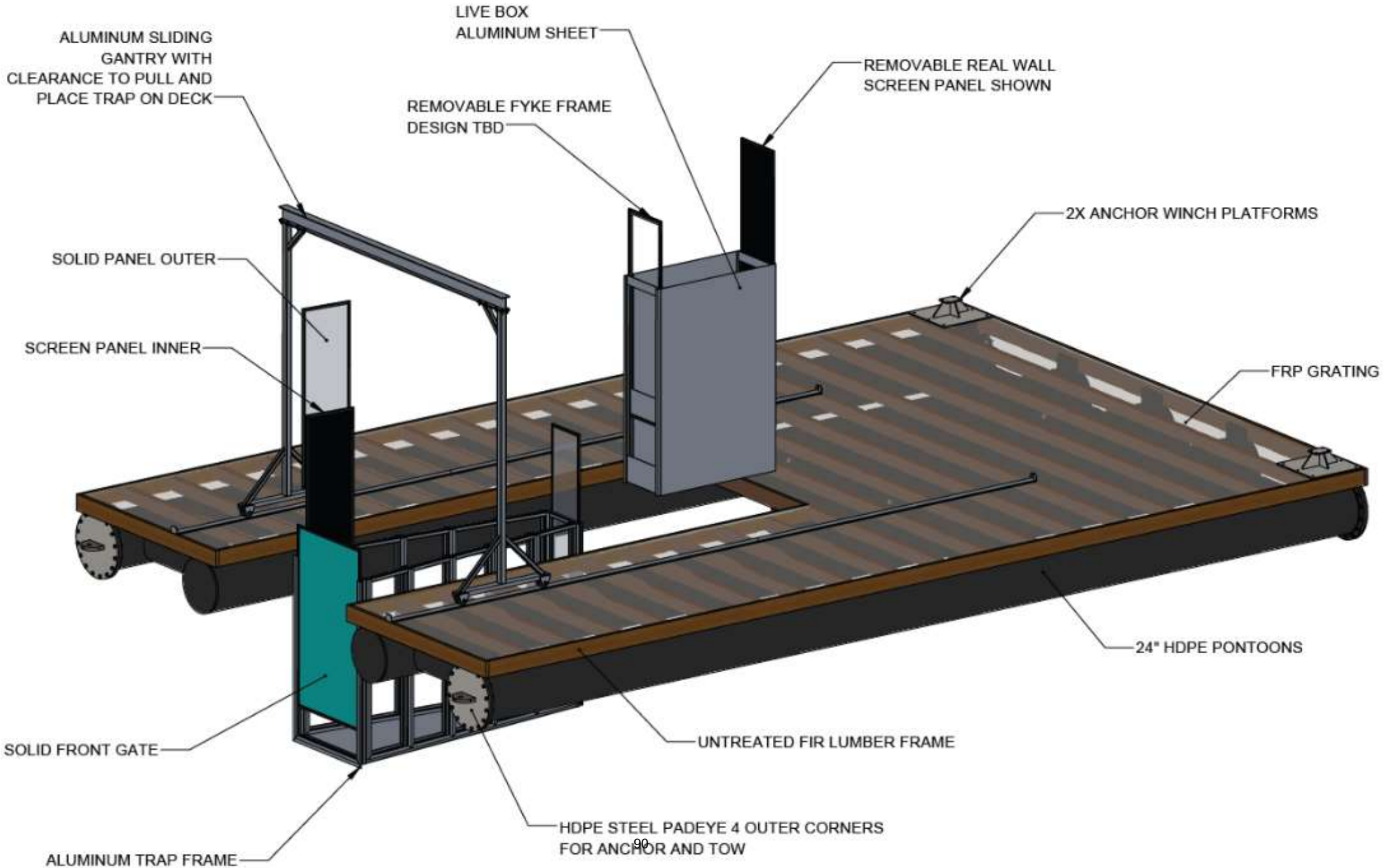
2023 Testing Location



CALIFORNIA DEPARTMENT OF
WATER RESOURCES



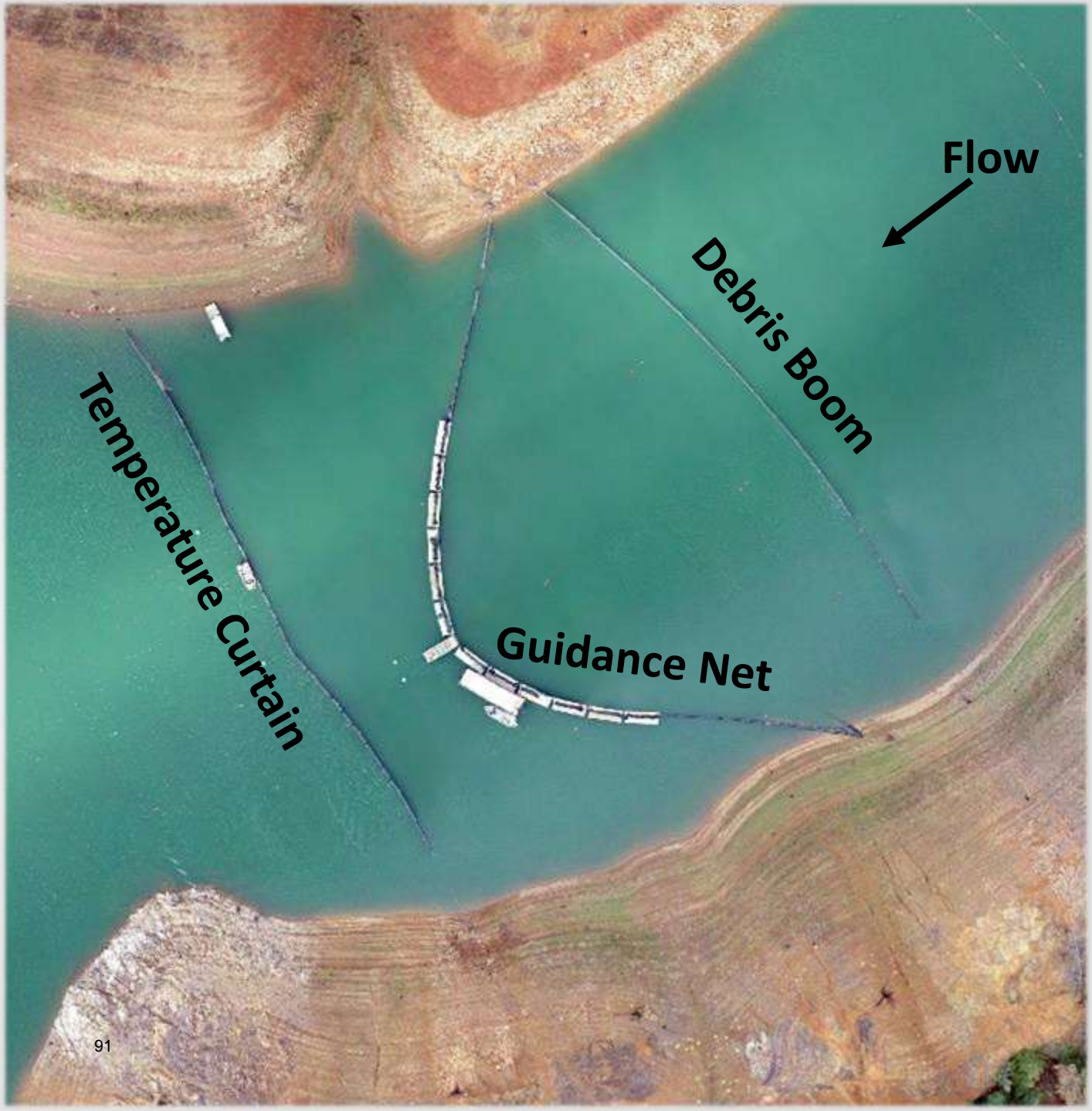
Juvenile Salmonid Collection System
Potential Installation Reach


LIVE BOX
ALUMINUM SHEET
ALUMINUM SLIDING
GANTRY WITH
CLEARANCE TO PULL AND
PLACE TRAP ON DECK
REMOVABLE REAL WALL
SCREEN PANEL SHOWN
REMOVABLE FYKE FRAME
DESIGN TBD
2X ANCHOR WINCH PLATFORMS
SOLID PANEL OUTER
SCREEN PANEL INNER
FRP GRATING
24" HDPE PONTOONS
SOLID FRONT GATE
UNTREATED FIR LUMBER FRAME
HDPE STEEL PADEYE 4 OUTER CORNERS
FOR ANCHOR AND TOW
ALUMINUM TRAP FRAME

Thank you!

Randy Beckwith
JSCS Project Engineering Lead
Randy.Beckwith@water.ca.gov

DWR Riverine Stewardship Program



CALIFORNIA DEPARTMENT OF WATER RESOURCES

The McCloud River Pilot Project, 2022

(Winnemem Wintu Tribe, NMFS, and CDFW)

Matt Johnson
California Department of Fish and Wildlife
SRF April 28, 2023

Acknowledgements

CDFW	NMFS	USFWS	Winnemem Wintu Tribe
Jason Roberts	Rachel Johnson	Taylor Lipscomb	Chief Sisk
Mike Harris	Brian Ellrott		Marine Sisk
Brian Krempasky	Stacie Smith		Mark Miyoshi
Ryan Revnak	Jon Ambrose		Luisa Navejas
Ross Schaefer			
Sam Funakoshi			

An unlikely project, a river, a people, and a hope and a prayer for California salmon…

Drought gives life to a project:

(emergency drought actions in 2022)

1. Increase production of winter-run Chinook salmon production at LSNFH
2. Relocate a portion of adult winter-run trapped at CNFH and LSNFH to Battle Creek, upstream of Eagle Canyon Dam.
3. Relocate spring-run collected incidentally at the Keswick Trap to Clear Creek.
4. Initiate a secondary captive brood-stock of winter-run Chinook salmon.
5. Incubate a portion of winter-run Chinook salmon eggs from Livingston Stone National Fish Hatchery along the McCloud River.

A river

A people. The Winnemem Wintu

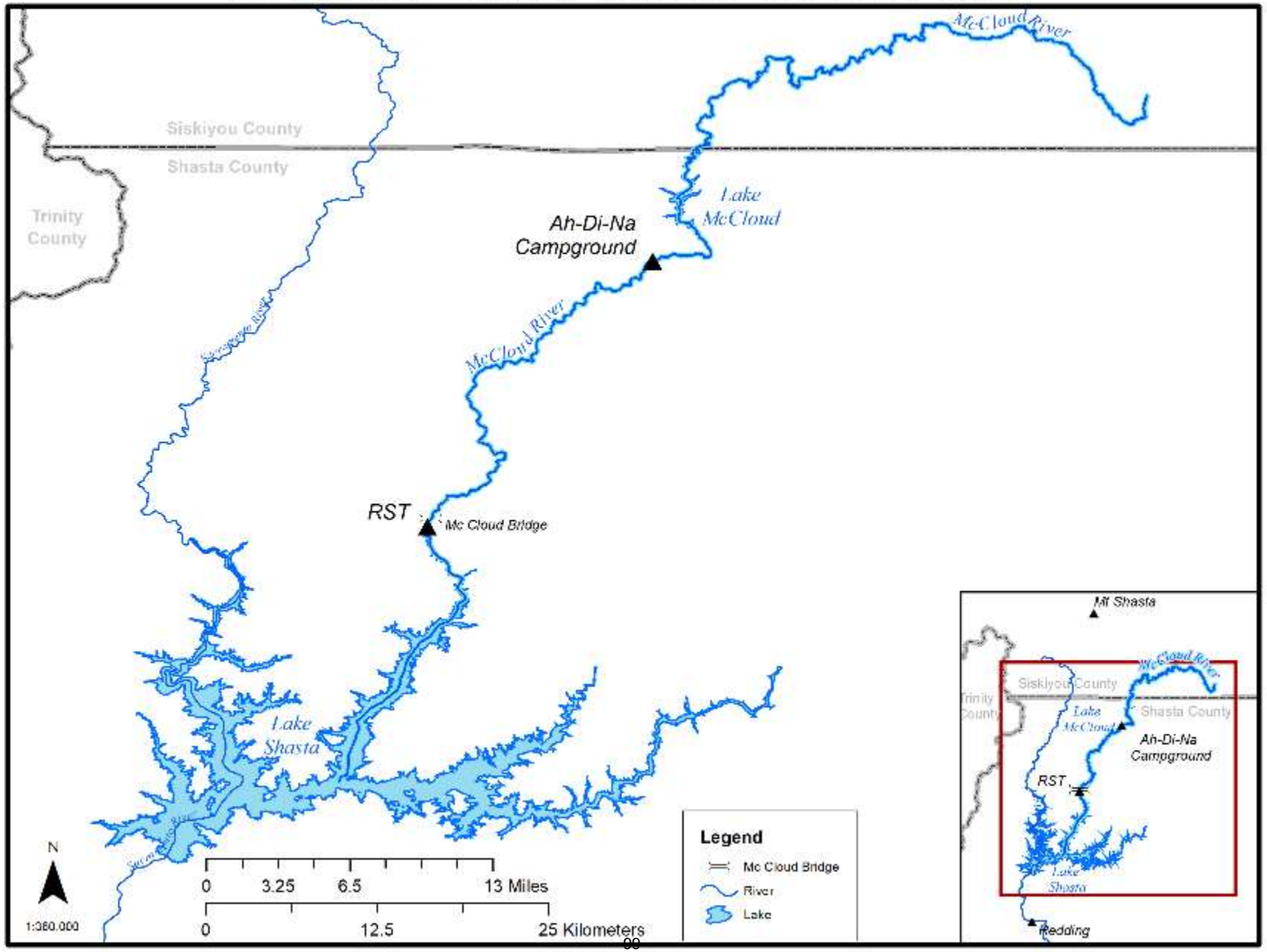
The McCloud “Pilot Project”

- We brought fertilized eggs of endangered winter-run Chinook Salmon to the McCloud River.

- Incubated them at a campground, released the hatched fry into the river, and tried to catch them 20 miles downstream before they entered Lake Shasta.

- And we didn’t exactly know what we were doing or if it would work…?

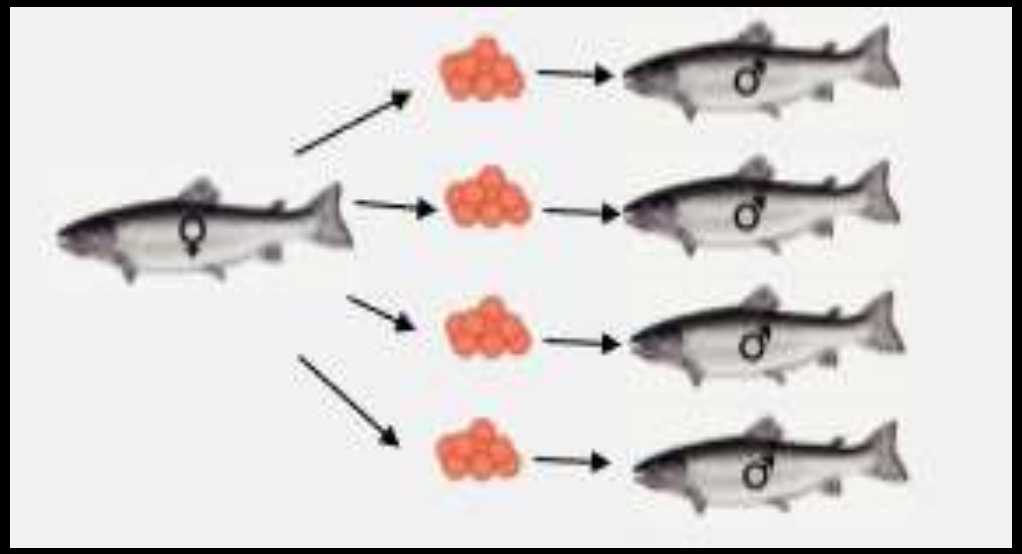
McCloud River Winter Run Chinook Reintroduction Project



Remote Site Incubation??

Success!!

Eyed Winter-Run Chinook Eggs Sourced from LSNFH



4 genetic crosses per female
22 total females x 8 males

Two groups of 20K eyed-eggs brought over, representing two separate spawn groups. Group #1 on July 11 and #2 on August 8

Slide courtesy Rachel Johnson NOAA/UCD

Trouble ahead! Mud Creek turbidity event starting approx. July 14:

Too much goo…

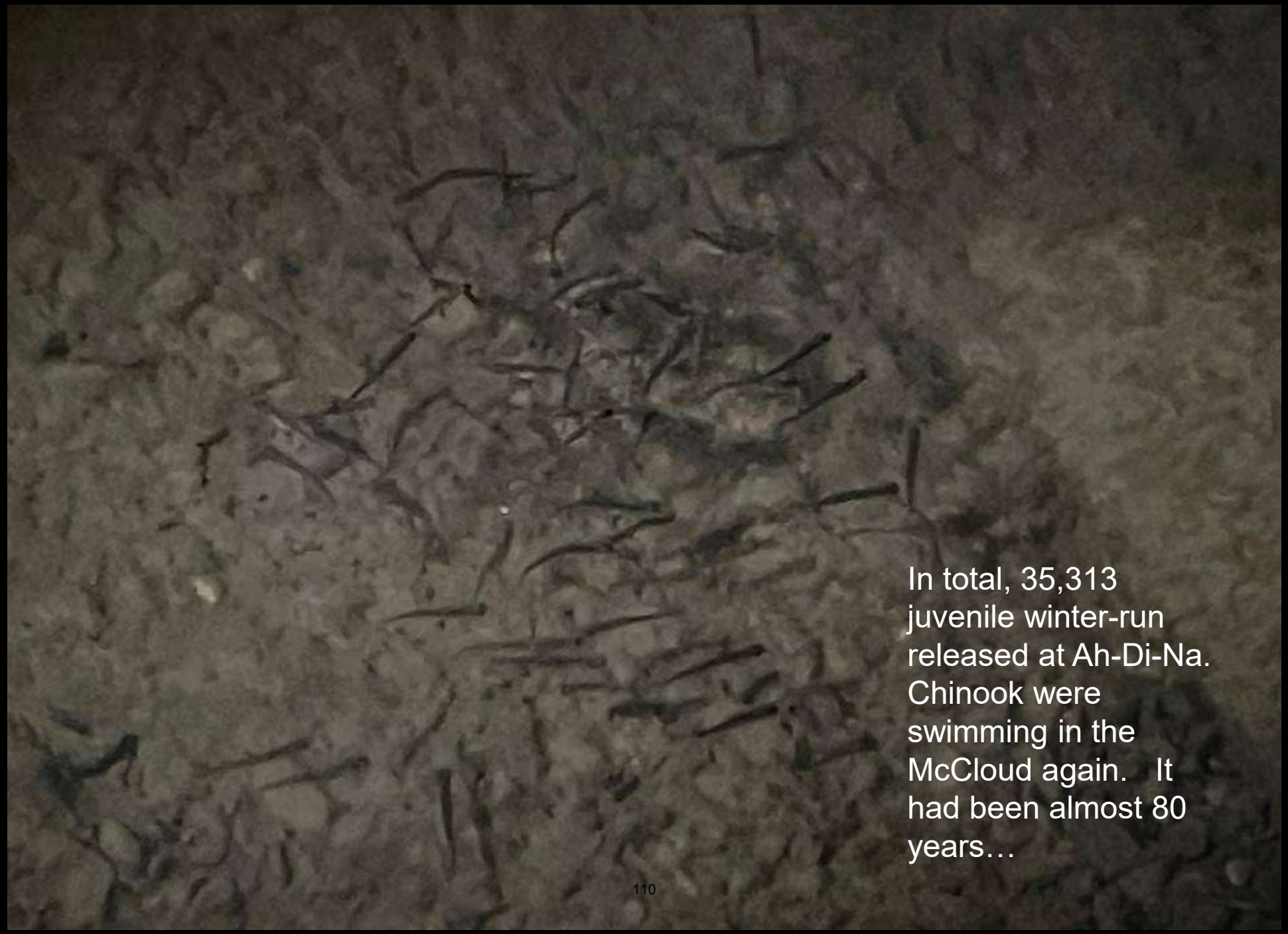
Rapid Transition to Heath Tray System

We got the egg situation squared away,
but developmental issues apparent with first egg group:

- Overall hatch-rate with first batch quite good
- However, developmental issues began to show
- “Curly-q’s” and coagulated yolk disease…
- Egg to fry survival 80% Group 1 vs 96% group 2

Group #1 ready for release in early September!

- The Winnemem Wintu built temporary rock holding pools along a downstream beach
- Fry “ready to go” removed from health trays and bucketed to release site
- This activity started approx. 8-9:30 pm on Sept 4, 2022



In total, 35,313 juvenile winter-run released at Ah-Di-Na. Chinook were swimming in the McCloud again. It had been almost 80 years…

Meanwhile, downstream at McCloud Bridge…

McCloud Bridge September 7, 2022:

- Trapping site completed on Friday, September 3rd
- With staff spread between watching eggs at Ah-Di-Na and other projects we did not set traps until afternoon of September 6…
- At 1:30 pm on September 7, 88 Chinook fry were in our traps!

Capture and transport to the Sacramento River:

- A total of 1,634 juvenile winter-run captured, 27 of those were mortalities
- Fry transported in a simple 5-gallon cooler with air stone
- Only 7 fish perished during transport
- Fry released at or near the Redding Rodeo Grounds boat ramp to continue their journey to the ocean


In total, 1,600 juvenile winter-run successfully released into the lower Sacramento River

McCloud Chinook trapping wrap-up:

- We operated traps at McCloud Bridge September 6 thru December 12.
- Gear changes made throughout season based on experimentation and environmental conditions
- Five capture-efficiency trials conducted. Trapping site up to 38% capture efficient based on these trials
- Based on efficiency trials an estimated 4, 400 juvenile Chinook migrated to site during trapping period

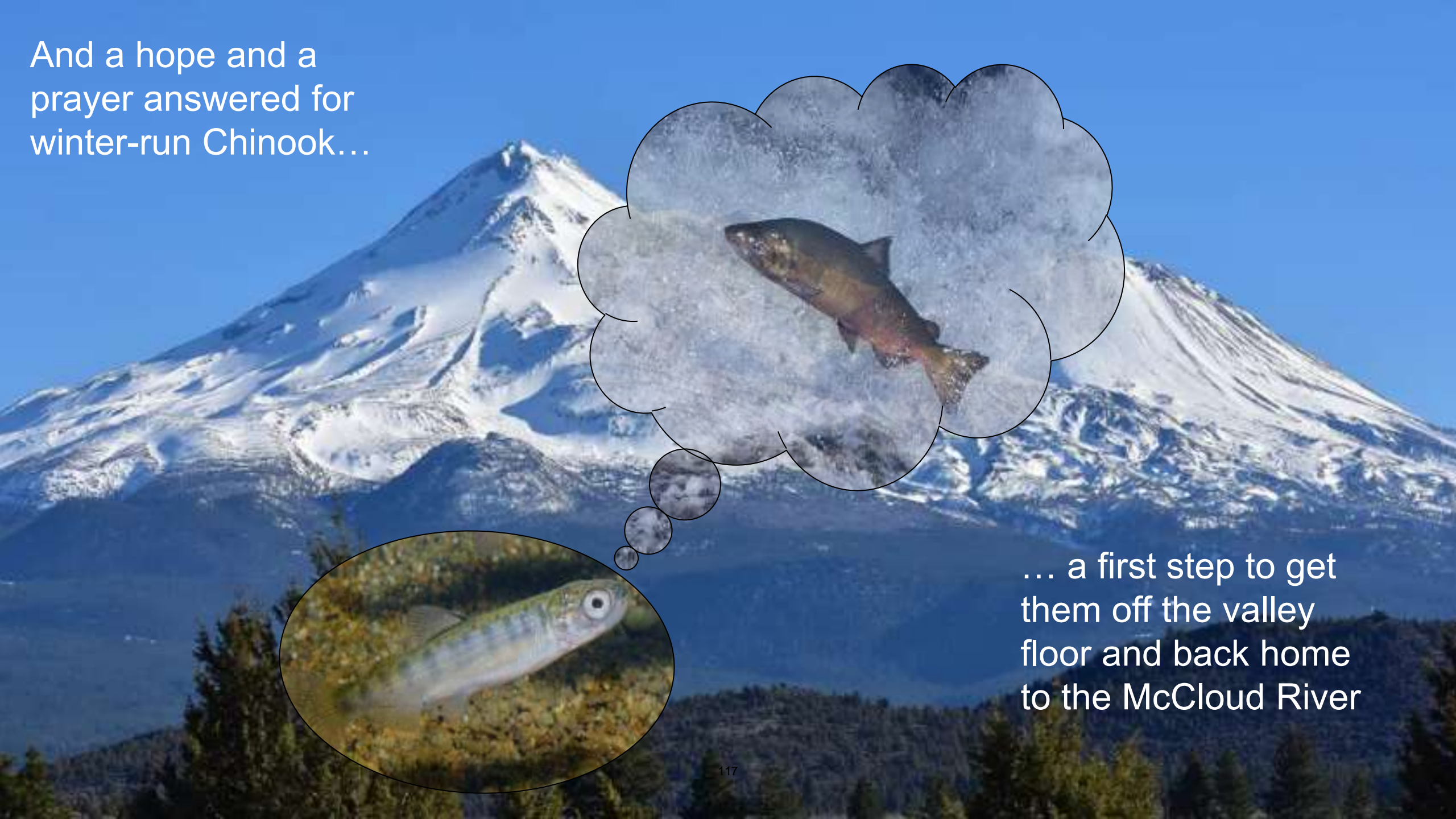
Onward:

- We successfully reared and released Chinook in a remote wilderness setting and successfully captured and translocated non-trivial numbers of fish.

- A Co-Management agreement between Fish Agencies and WWT will be signed on May 1st, setting the stage for returning all runs of Chinook to the McCloud, including returning wild salmon from New Zealand and creating volitional passage around Shasta Dam

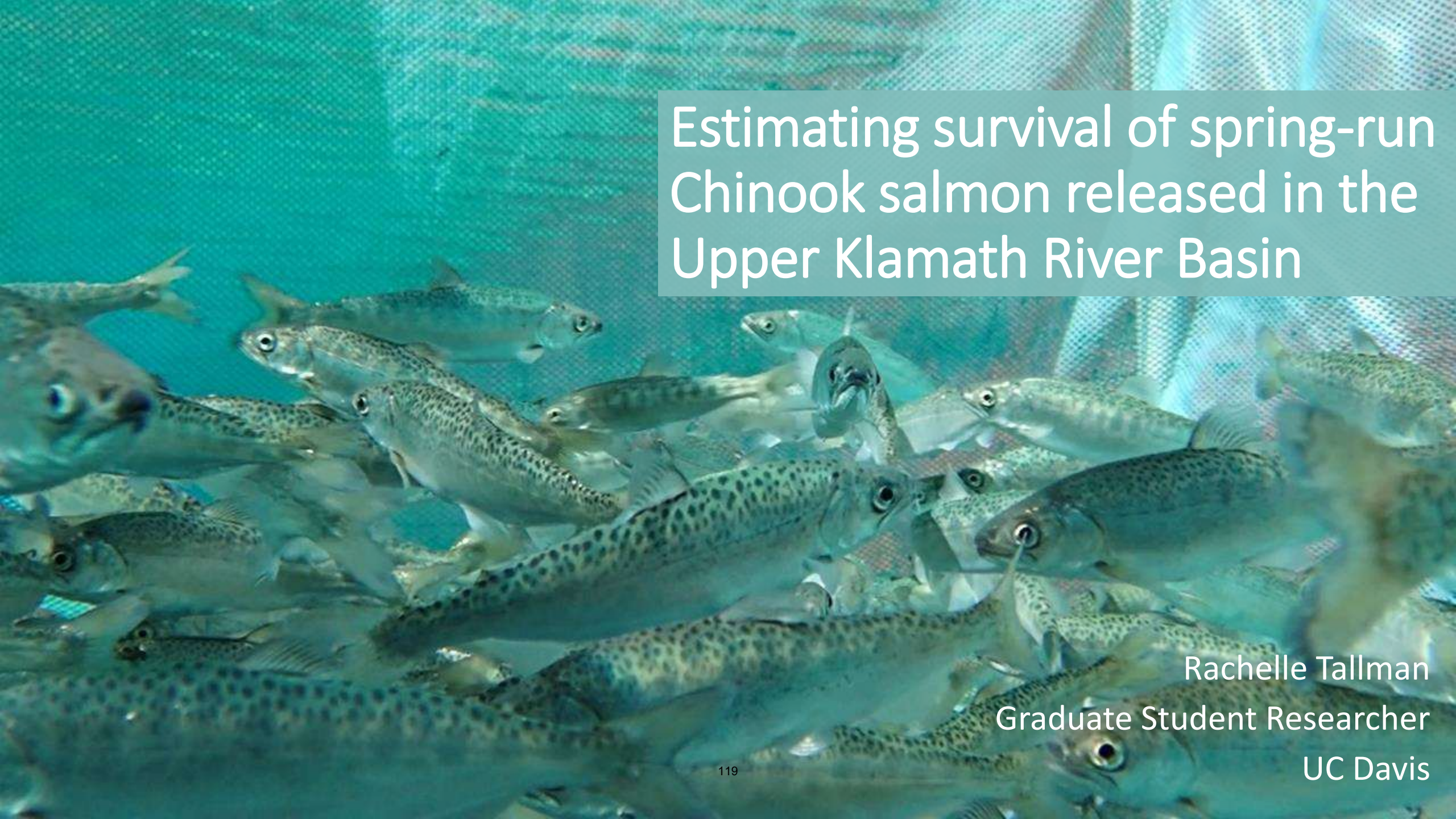
- McCloud “2.0” set to begin in June, 2023. We hope to do even better

And a hope and a prayer answered for winter-run Chinook…



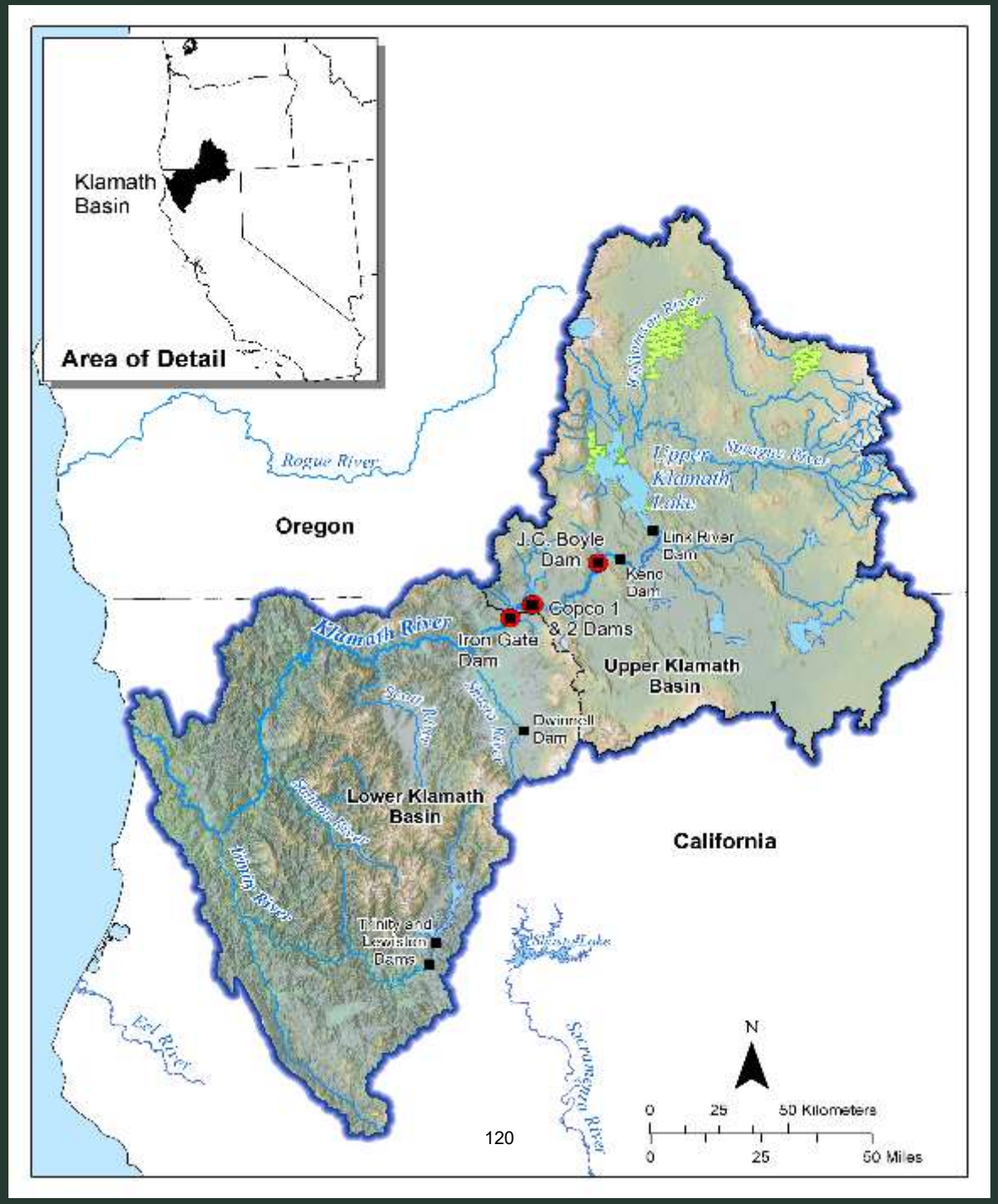
… a first step to get them off the valley floor and back home to the McCloud River


End.
Questions?

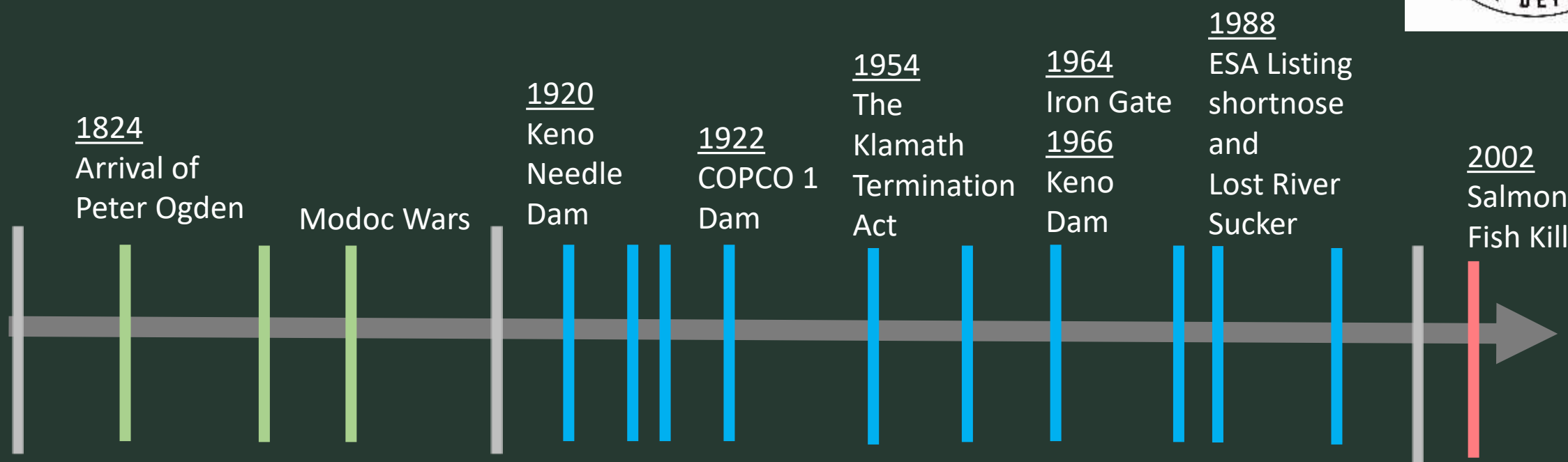


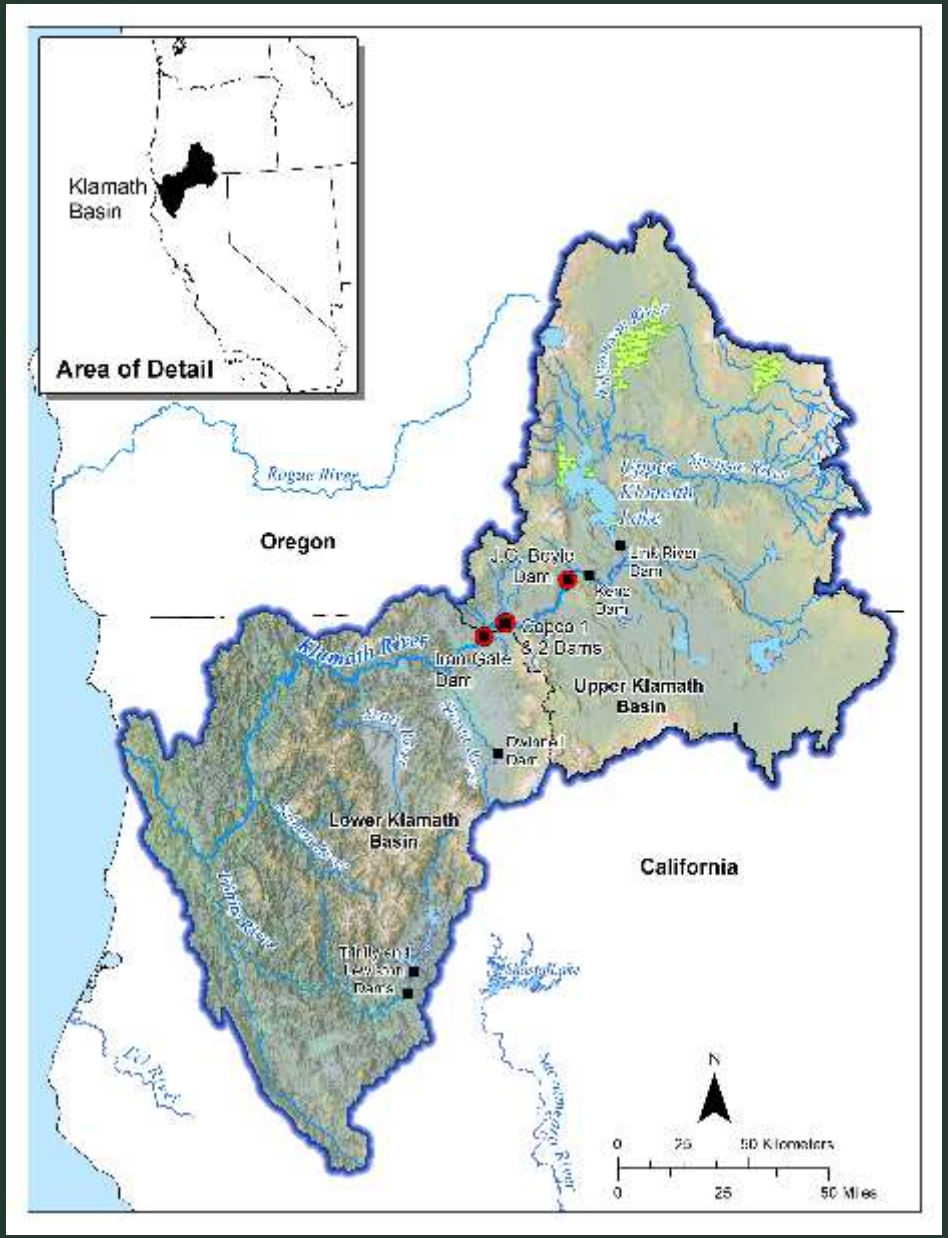
Estimating survival of spring-run Chinook salmon released in the Upper Klamath River Basin

Rachelle Tallman
Graduate Student Researcher
UC Davis


Klamath Basin
Area of Detail
Rogue River
Oregon
Upper Klamath Lake
Sprague River
Williamson River
J.C. Boyle Dam
Link River Dam
Keno Dam
Copco 1 & 2 Dams
Iron Gate Dam
Klamath River
Upper Klamath Basin
Shasta River
Scott River
Dwinnell Dam
Lower Klamath Basin
Salmon River
Trinity River
Trinity and Lewiston Dams
California
Eel River
Shasta Lake
Sacramento River
N
0 25 50 Kilometers
0 25 50 Miles

Klamath Basin Timeline





Map by:
Mark Hereford, ODFW

Photo by:
Jeff Barnard

Photo by:
Leah Mellinger

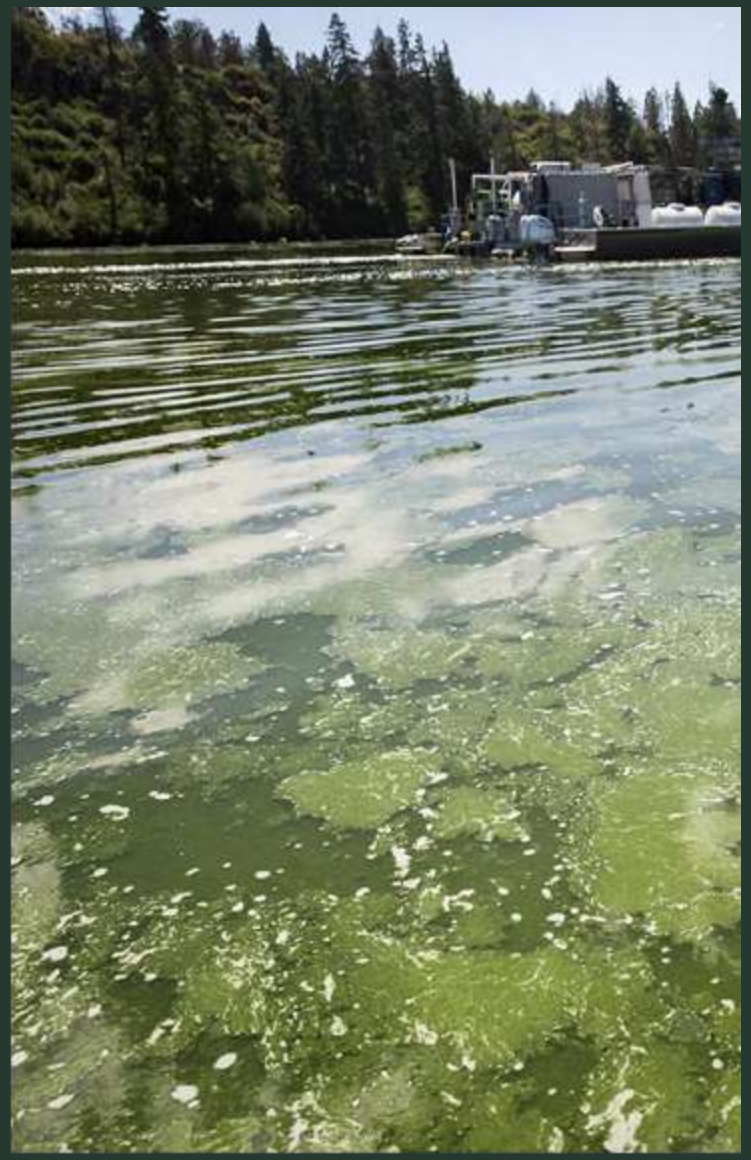
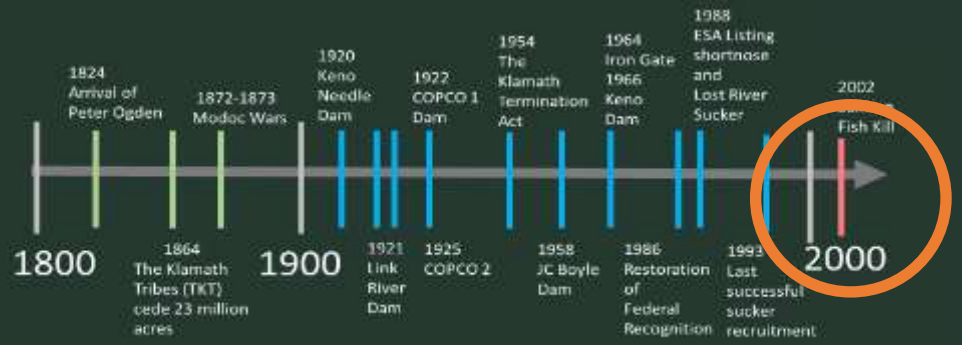
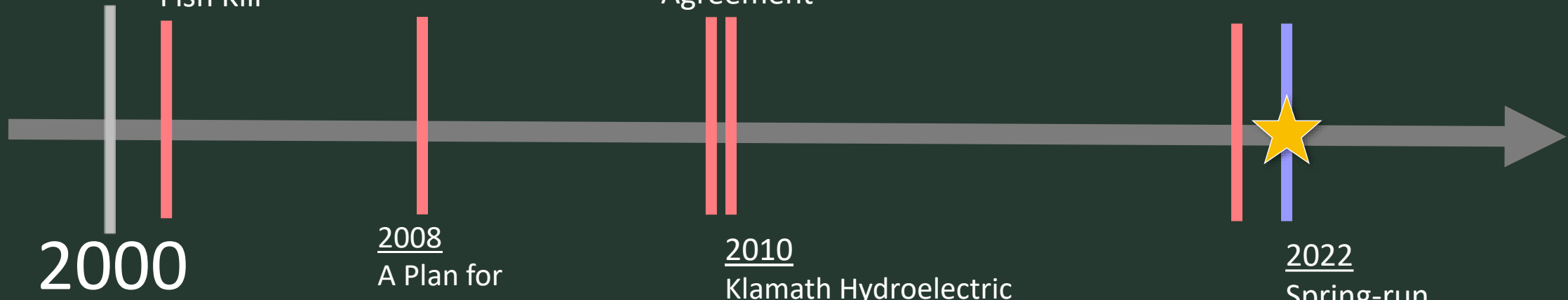


Photo by:
Brittany Hosea-Small

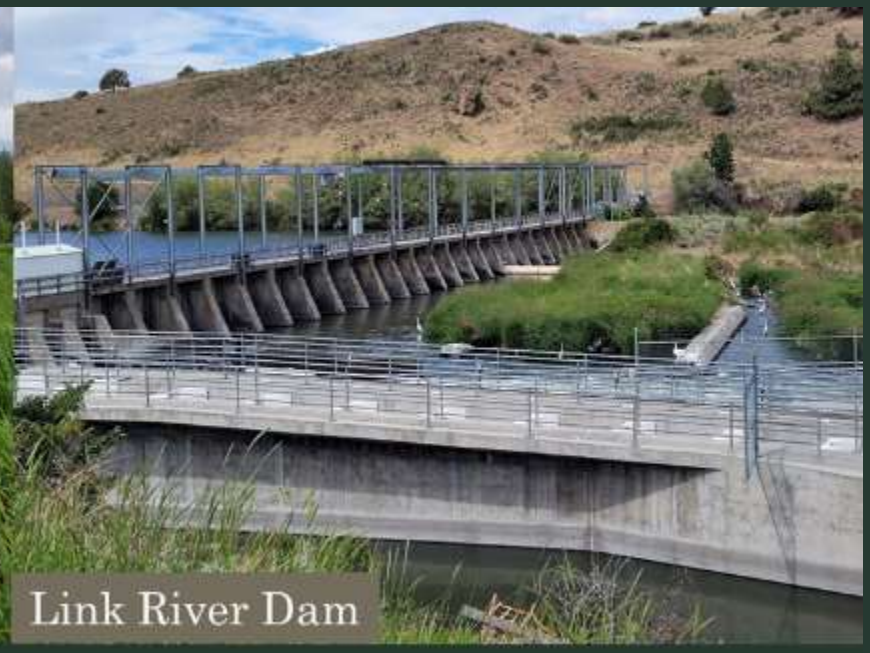
Short Nose Sucker (Koptu)

Lost River Sucker (C’waam)

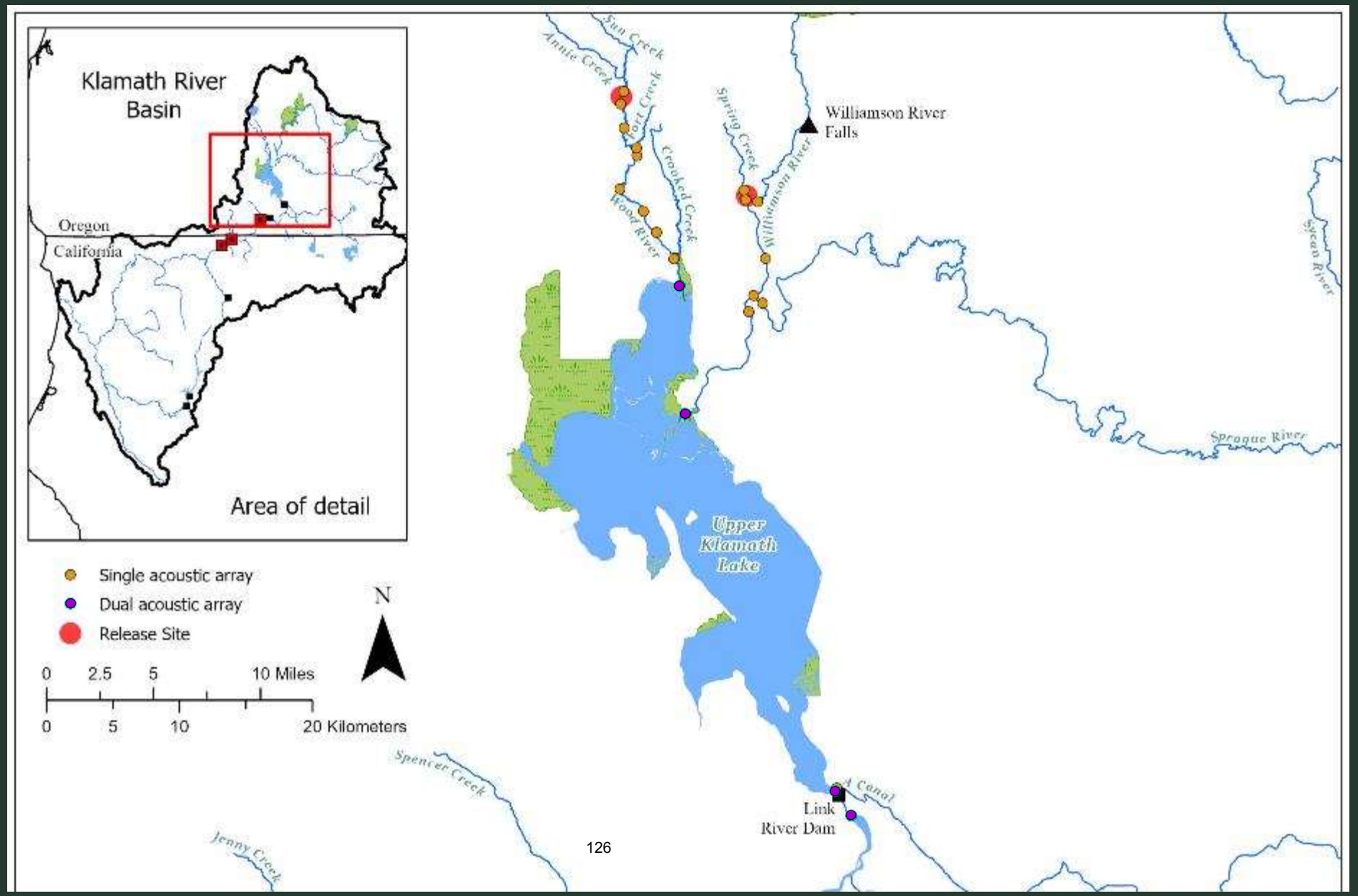

1824
Arrival of Peter Ogden
1872-1873
Modoc Wars
1920
Keno Needle Dam
1922
COPCO 1 Dam
1954
The Klamath Termination Act
1964
Iron Gate
1966
Keno Dam
1988
ESA Listing shortnose and Lost River Sucker
2002
Fish Kill
1800
1864
The Klamath Tribes (TKT) cede 23 million acres
1900
1921
Link River Dam
1925
COPCO 2
1958
JC Boyle Dam
1986
Restoration of Federal Recognition
1991
Last successful sucker recruitment
2000


2000
2002
Salmon Fish Kill
2008
A Plan for Reintroduction of Anadromous Fishes in the Upper Klamath Basin
2010
Klamath Basin Restoration Agreement
2010
Klamath Hydroelectric Settlement Agreement- signed in 2016
2021
Implementation Plan for the Reintroduction of Anadromous Fishes into the Oregon Portion of the Upper Klamath Basin
2022
Spring-run Chinook salmon release

What is the out-migration survival of released spring-run Chinook in the Upper Klamath River Basin?



Study Area


Klamath River Basin
Oregon
California
Area of detail
Single acoustic array
Dual acoustic array
Release Site
N
0 2.5 5 10 Miles
0 5 10 20 Kilometers
Sun Creek
Annie Creek
Fort Creek
Crooked Creek
Wood River
Spring Creek
Williamson River
Williamson River Falls
Sycan River
Sprague River
Upper Klamath Lake
A Canal
Link River Dam
Spencer Creek
Jenny Creek

Using Acoustic Telemetry to Assess Survival

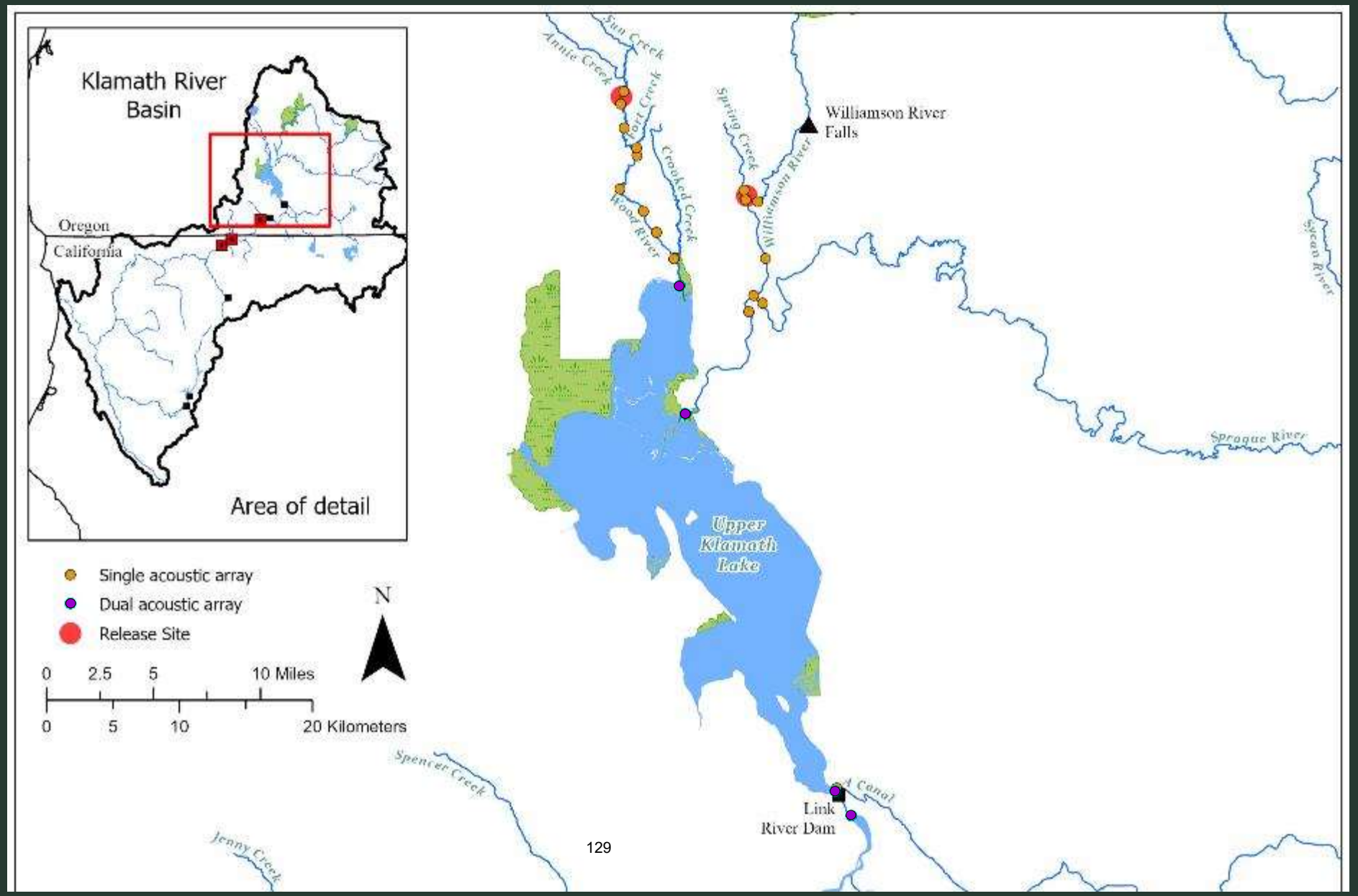
- Mark-recapture method that has high detection efficiency
- Not affected by salinity
- Stationary units and be deployed across large spatial areas

ATS SS 300 Tag

How acoustic telemetry work

1	44657.7468750,	0.65915,	4733,	0
2	44657.7468750,	0.66227,	15322,	0
3	44657.7469213,	0.61193,	26622,	0
4	44657.7469329,	0.58169,	2687,	2
5	44657.7469329,	0.58749,	6270,	0
6	44657.7469329,	0.64715,	16838,	0
7	44657.7469329,	0.67903,	36686,	0
8	44657.7469444,	0.69732,	17400,	0
9	44657.7469560,	0.72386,	61439,	0
10	44657.7469676,	0.61423,	40326,	1
11	44657.7469907,	0.99628,	40960,	0
12	44657.7470023,	0.06300,	65532,	0
13	44657.7470023,	0.78873,	37371,	0
14	44657.7472685,	0.94193,	50360,	0
15	44657.7532176,	0.09038,	1,	6
16	44657.7532639,	0.17961,	65459,	6
17	44657.7534954,	0.07214,	65453,	6
18	44657.7537153,	0.66343,	65453,	6
19	44657.7539468,	0.25639,	65459,	6
20	44657.7541667,	0.84863,	65453,	6
21	44657.7547569,	0.52168,	1,	7
22	44657.7567939,	0.54316,	32511,	7
23	44657.7568981,	0.71437,	1023,	7
24	44657.7601389,	0.06523,	1023,	7
25	44657.7656250,	0.52975,	1,	7
26	44657.7697917,	0.53399,	1,	7
27	44657.7709954,	0.23390,	1,	7
28	44657.7712500,	0.19079,	2047,	7
29	44657.7762037,	0.47397,	1,	7
30	44657.7860648,	0.58221,	16383,	8
31	44657.7895949,	0.90055,	1,	8
32	44657.7915046,	0.31711,	1023,	8
33	44657.8038426,	0.79945,	496,	8
34	44657.8084838,	0.59888,	1023,	8
35	44657.8099190,	0.63463,	1,	8
36	44657.8103356,	0.96027,	1,	8
37	44657.8120949,	0.90618,	1,	8
38	44657.8199884,	0.15540,	8196,	8
39	44657.8329977,	0.25123,	1,	8
40	44657.8332292,	0.42483,	1023,	8
41	44657.8359722,	0.63043,	1023,	8
42	44657.8400000,	0.55454,	2047,	8
43	44657.8401042,	0.38191,	1023,	8
44	44657.8443287,	0.66499,	1,	8

Study Area


Klamath River Basin
Oregon
California
Area of detail
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Dual acoustic array
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0 5 10 20 Kilometers
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Link River Dam
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Jenny Creek

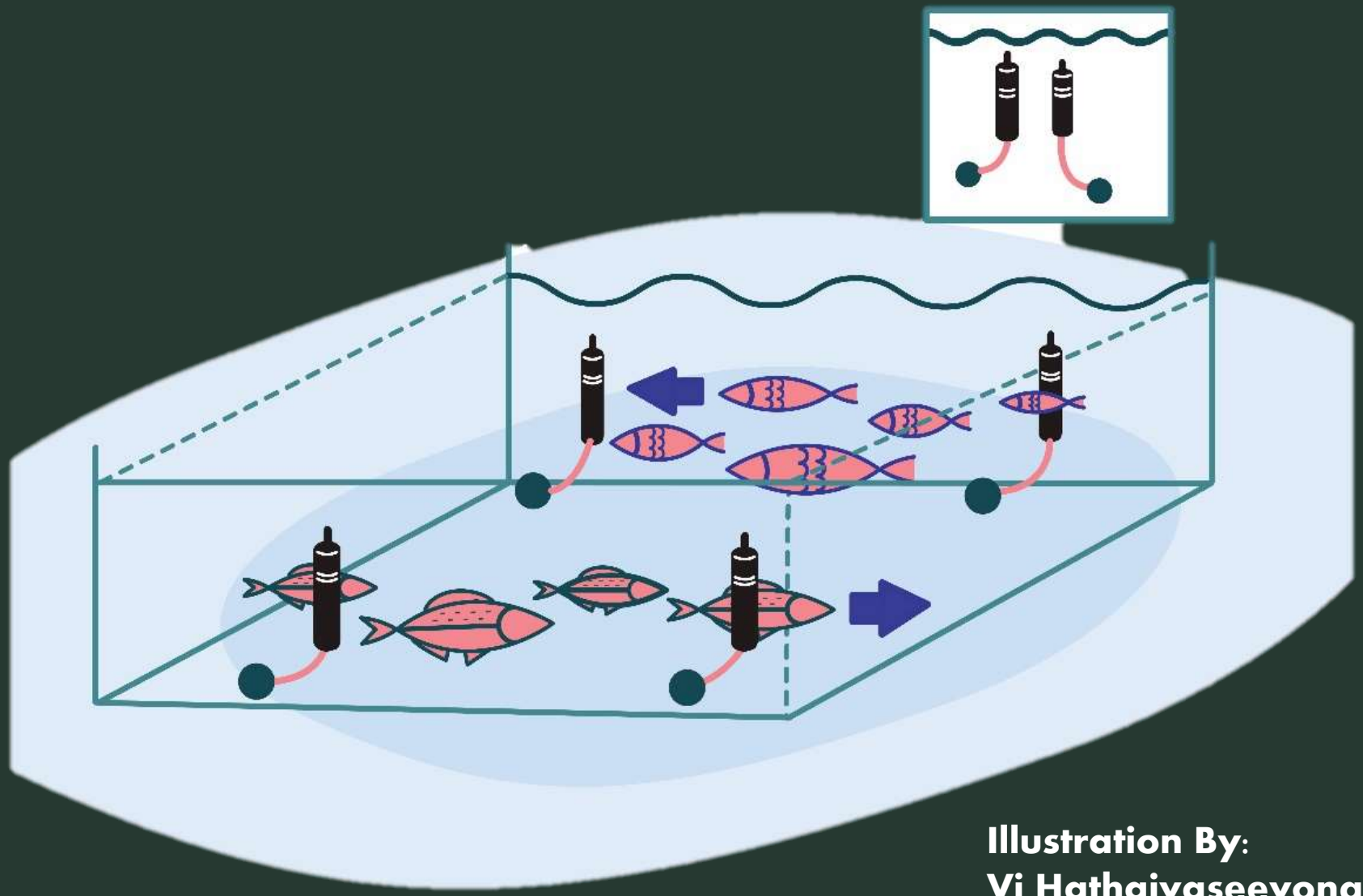


Illustration By:
Vi Hathaivaseevong

Acoustic tagging from 03/28-04/01

Fish Release 04/04

- Released **513** in Williamson River at Collier State Park
- Released **513** In Wood River at USFS Day Use Area

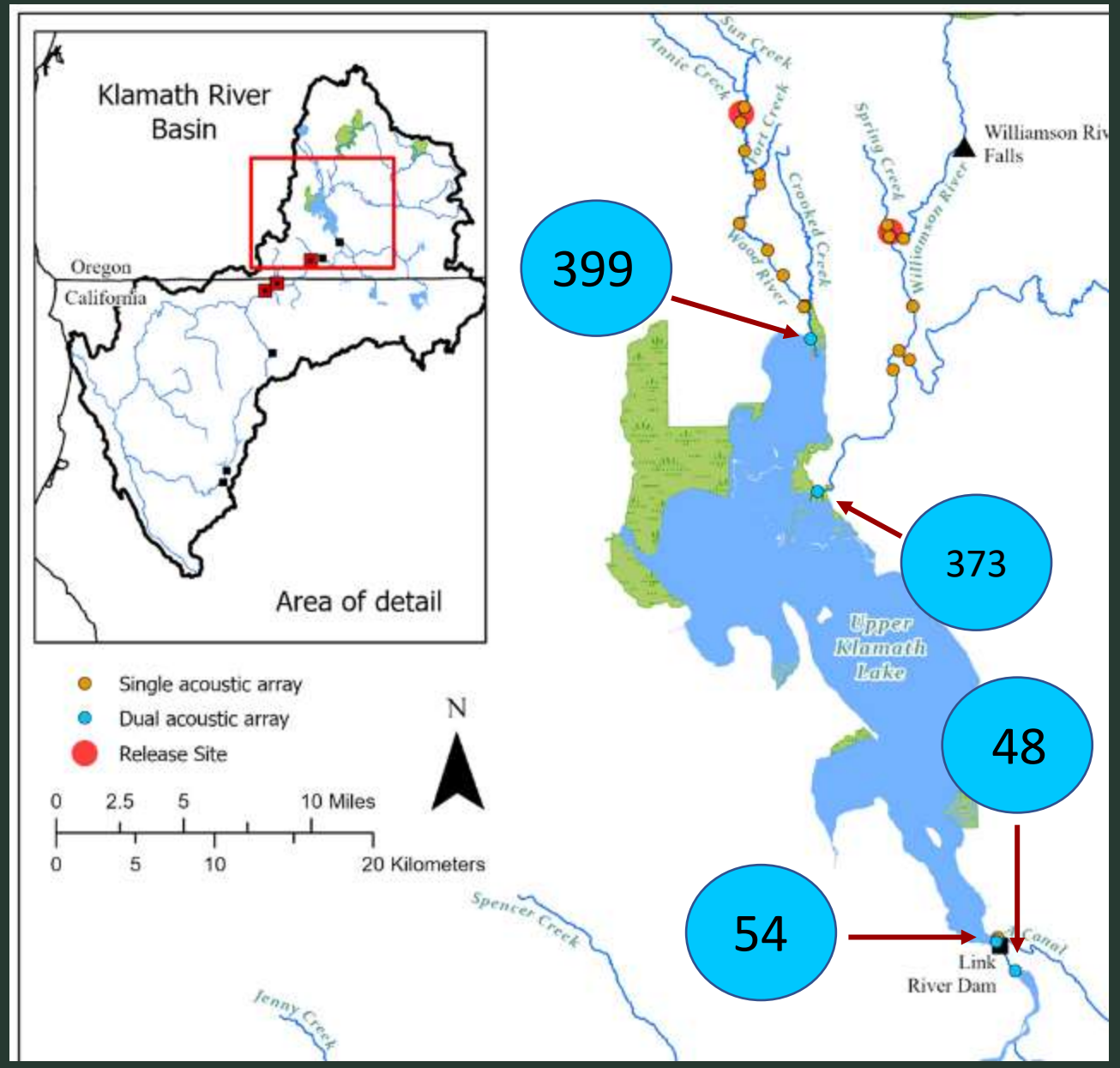
- First Receiver Download 04/27-04/29

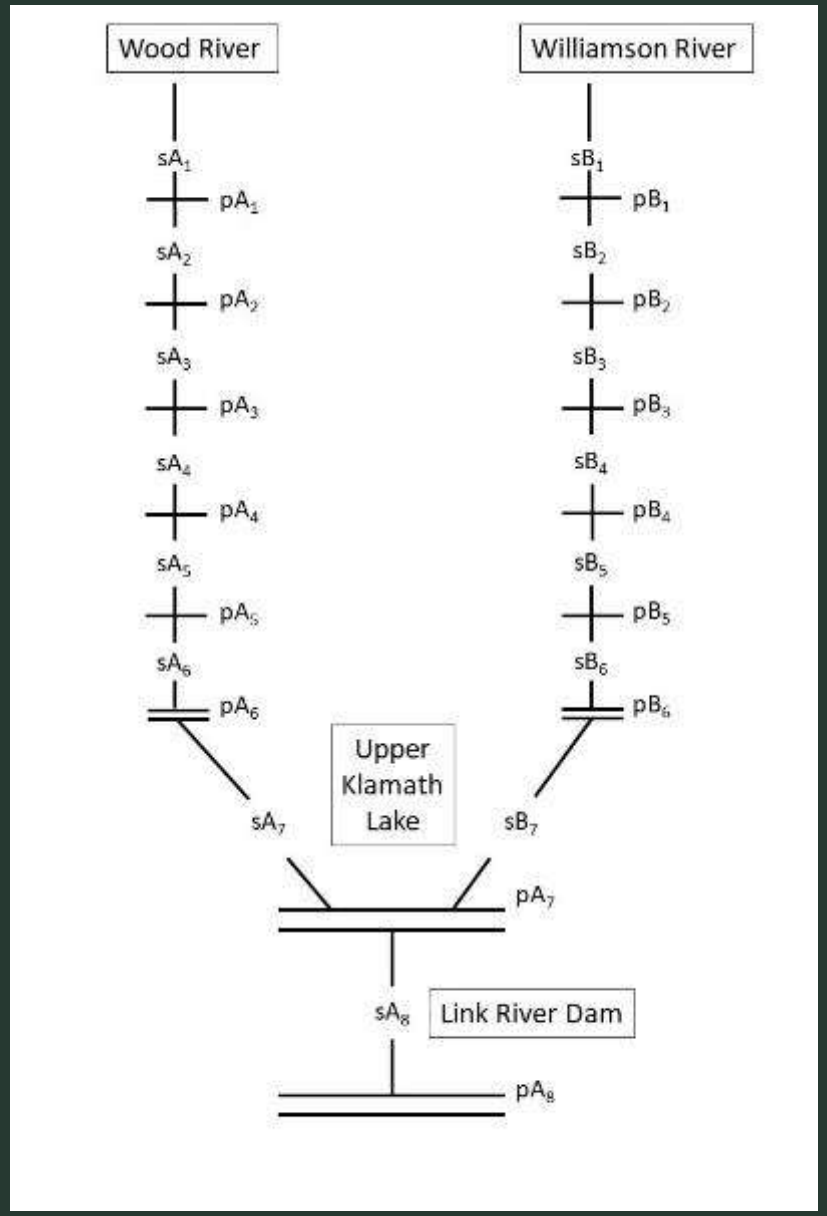
Preliminary Acoustic Results

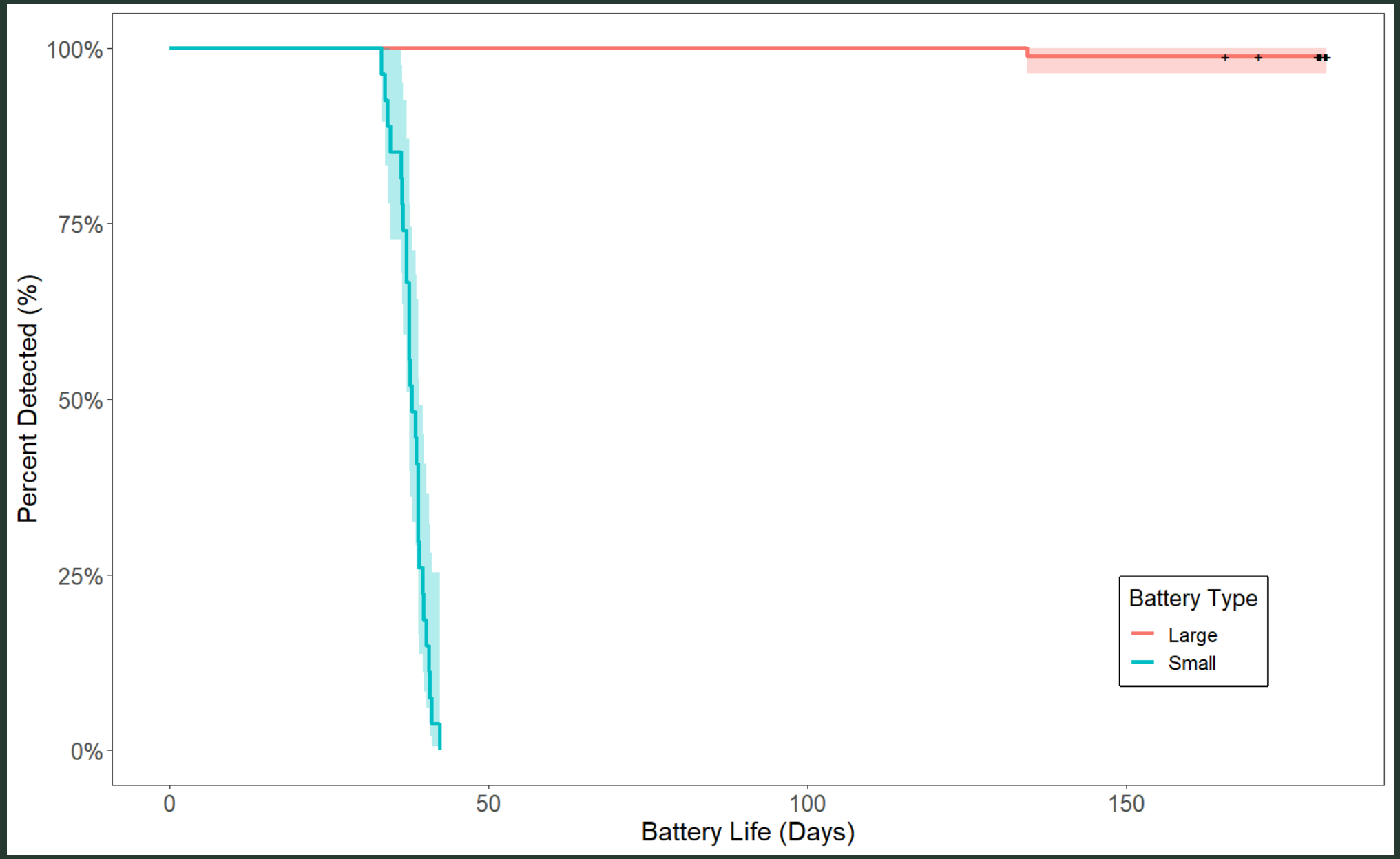
April 4th

- Williamson: **513**
- Wood: **513**
  - Downloaded receivers: April 27th – 29th

- Results are based on having at least 4 detections within 120 second interval
- PRI = 5

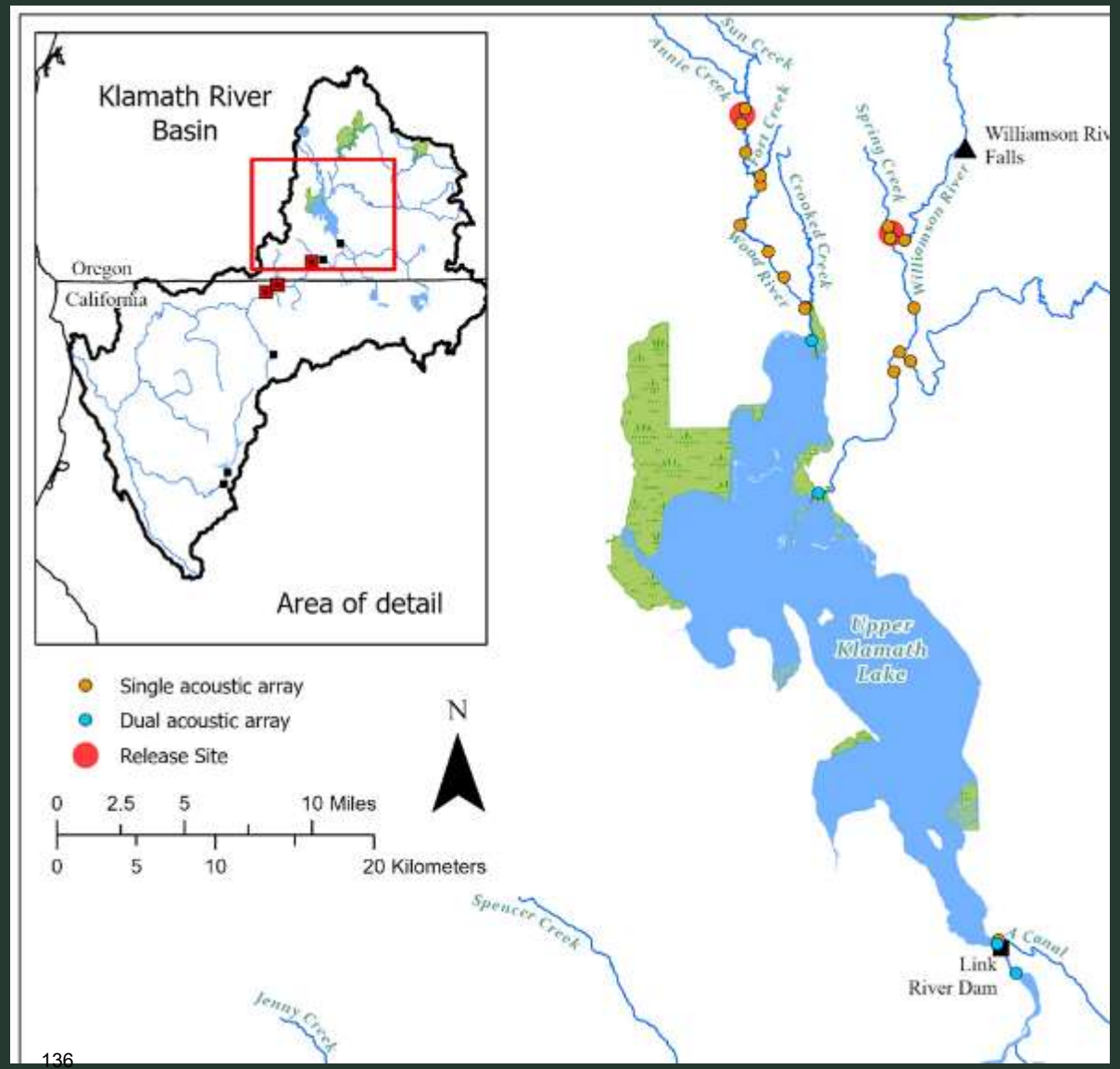


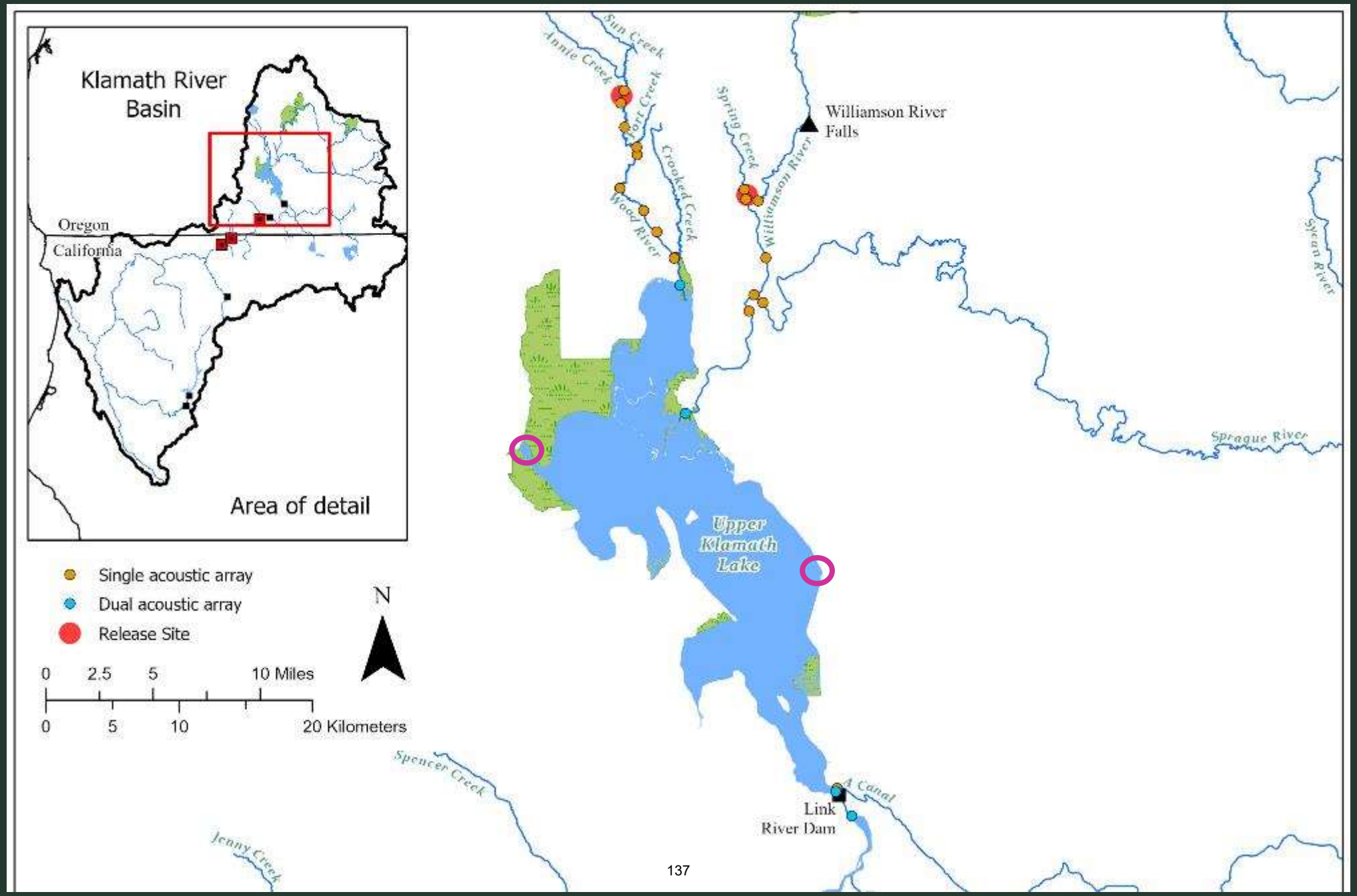

Wood River
Williamson River
sA1
pA1
sA2
pA2
sA3
pA3
sA4
pA4
sA5
pA5
sA6
pA6
sB1
pB1
sB2
pB2
sB3
pB3
sB4
pB4
sB5
pB5
sB6
pB6
Upper Klamath Lake
sA7
sB7
pA7
sA8
Link River Dam
pA8


100%
75%
50%
25%
0%
Percent Detected (%)
0
50
100
150
Battery Life (Days)
Battery Type
Large
Small

135

Upcoming Work




Klamath River Basin
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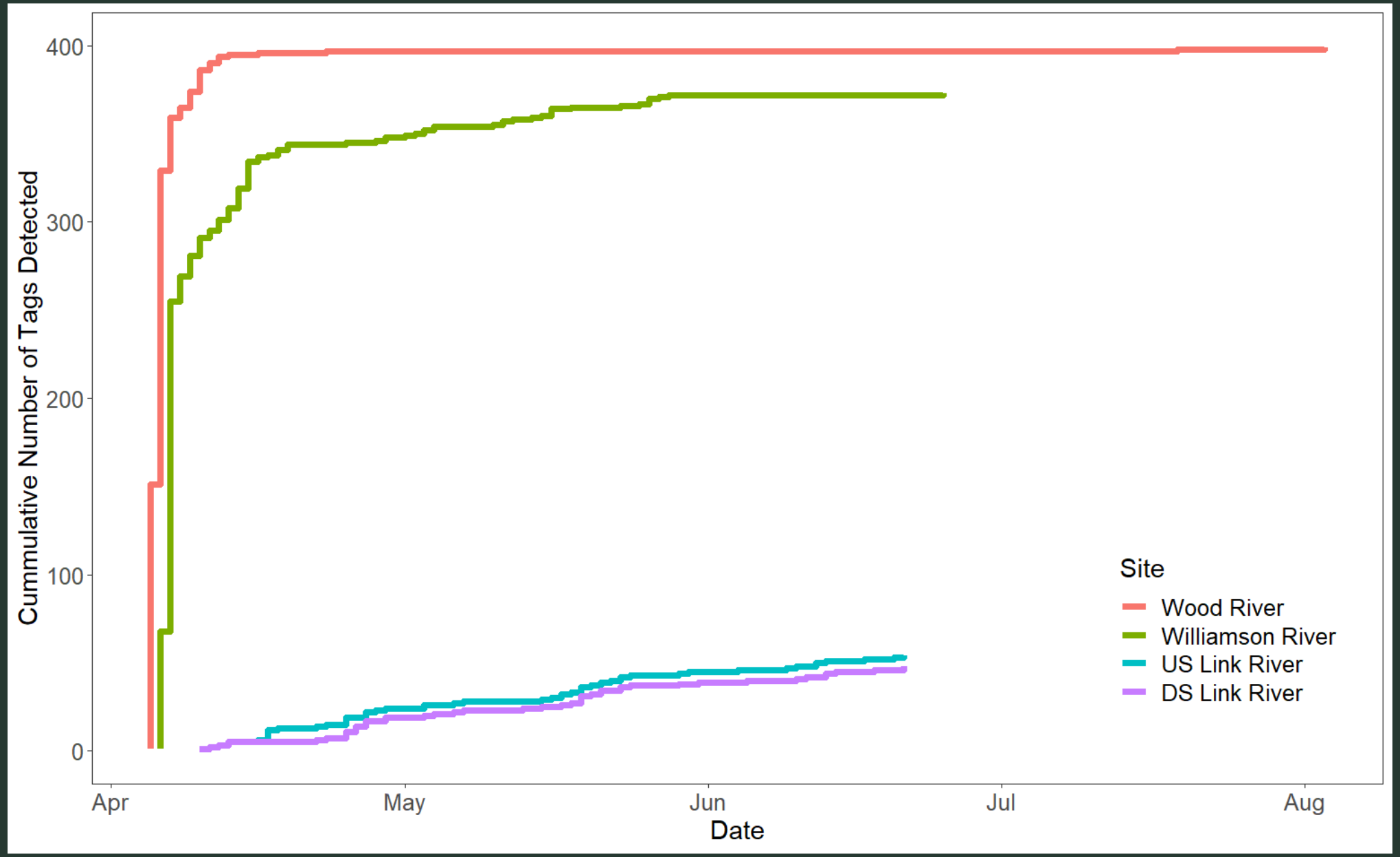
Sun Creek
Annie Creek
Fort Creek
Crooked Creek
Wood River
Spring Creek
Williamson River
Williamson River Falls
Sycan River
Sprague River
Upper Klamath Lake
Spencer Creek
A Canal
Link River Dam
Jenny Creek

April 12, 2023

- Williamson: 350
- Wood: 352
- Tag Effects fish: 31

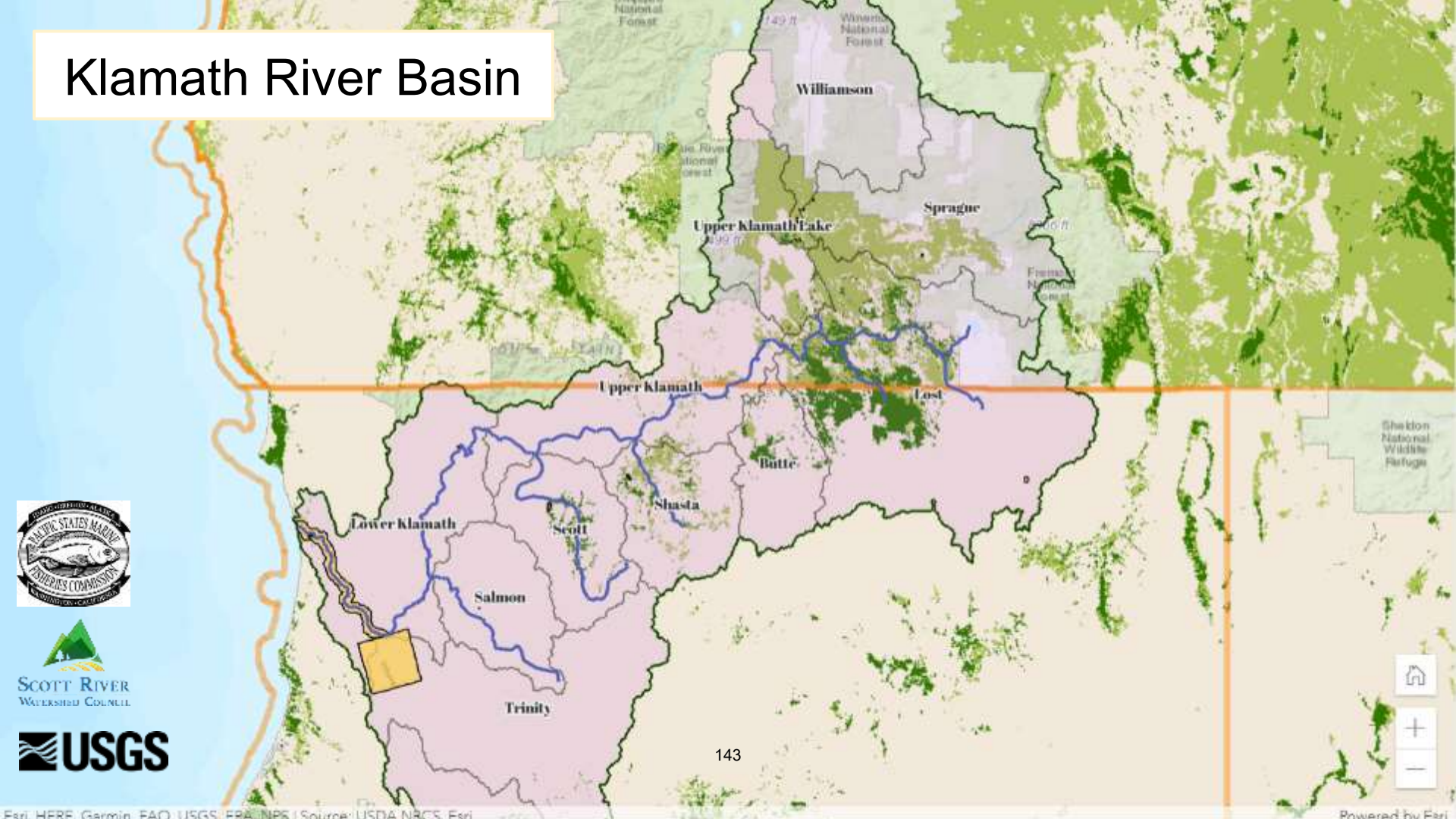
Special Thanks


Cummulative Number of Tags Detected
400
300
200
100
0
Apr
May
Jun
Jul
Aug
Date
Site
Wood River
Williamson River
US Link River
DS Link River

Klamath Basin Fisheries Collaborative: Data Integration for Monitoring Dam Removal, Project Effectiveness Monitoring, and Species Management.

Betsy Stapleton*, Alta C. Harris, Nancy Leonard PhD, and Summer M. Burdick
*Presenter

Klamath River Basin



Scott River Watershed Council

USGS

“The Klamath dam removal will be the largest salmon restoration project in history.”

Jared Huffman, California Rep. (D), April 17, 2022

Yale Environment 360

Photo Credit: Gillian Flaccus - AP

Meet the Klamath Basin Fish

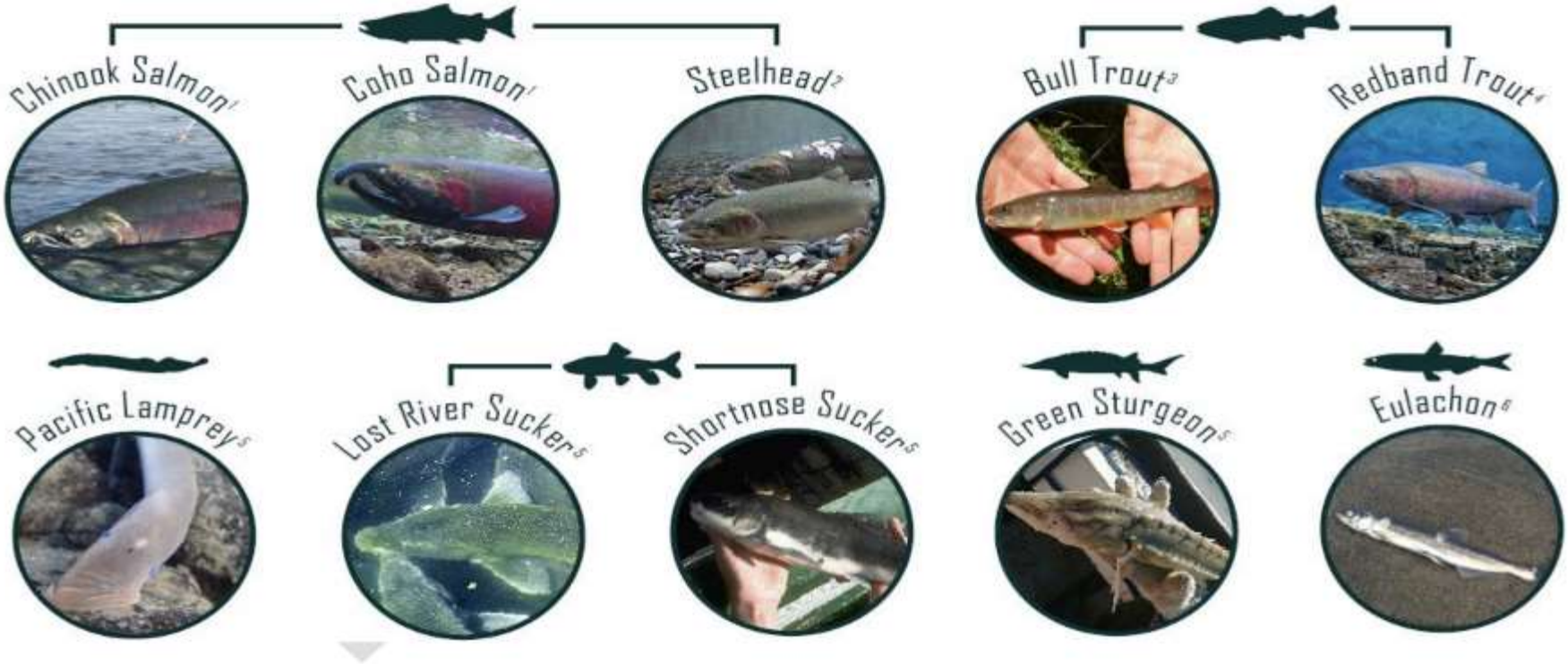


Figure 1-2. IFRMP focal fish species. Photos credited to (1) BLM, (2) Oregon State University, (3) ODFW, (4) Jason Ching, (5) USFWS, (5) Sam Beebe, all images public domain or licensed under CC by 2.0.

KLAMATH BASIN INTEGRATED FISHERIES RESTORATION AND MONITORING

Passive Integrated Transponder (PIT) Tags

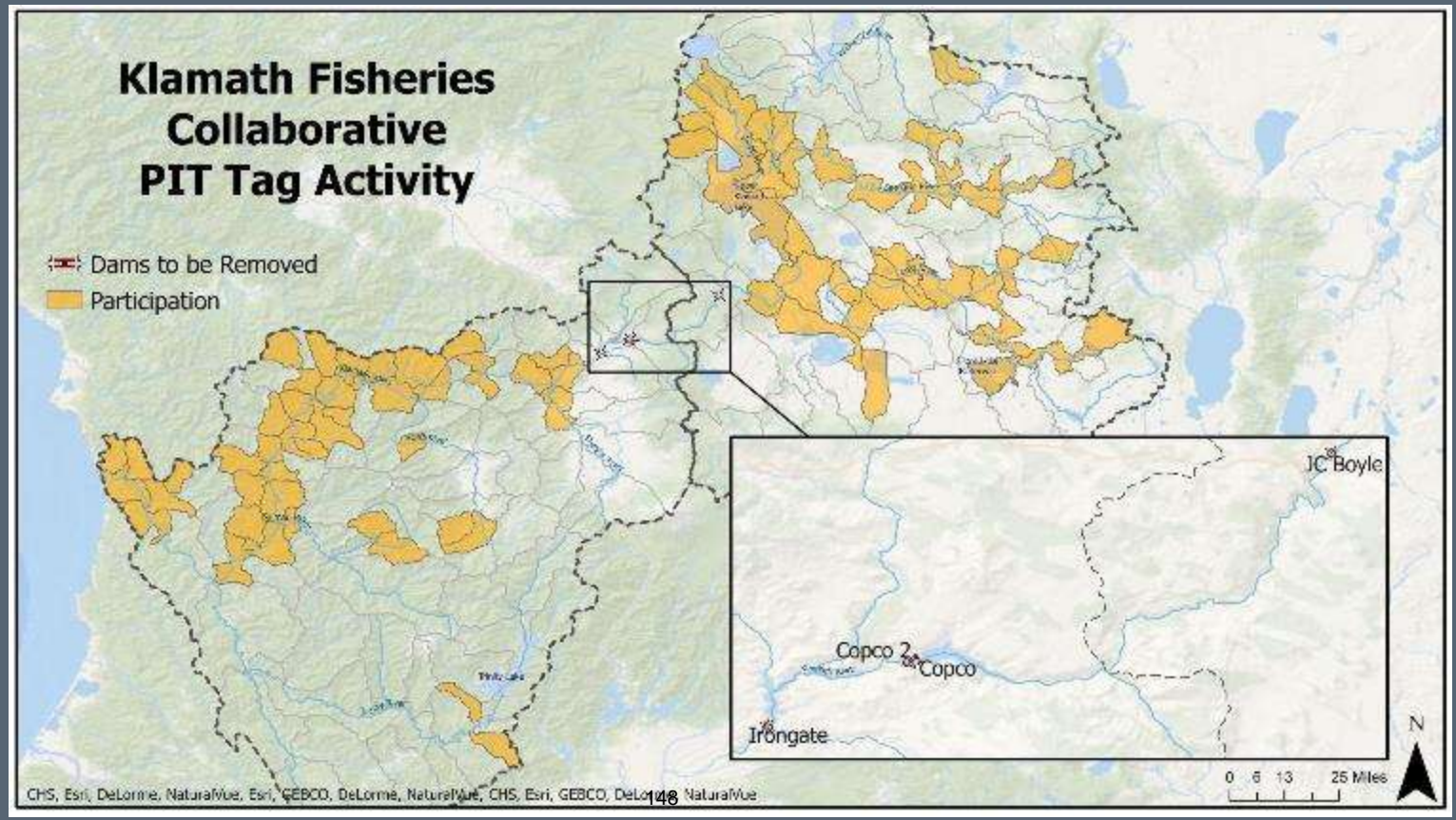
147

Pacific States Marine Fisheries Commission

Scott River Watershed Council

USGS

Diverse Monitoring Entities, Locations and Objectives



Scott River Watershed Council

USGS

Build a Cooperative Database

Share PIT tagging data among data producers and researchers in the Klamath Basin

Leadership Team Members:

- Karuk Tribe
- Klamath Tribe
- Yurok Tribe
- Pacific States Marine Fisheries Council
- USGS
- Scott River Watershed Council

Priorities for a Successful Shared Database

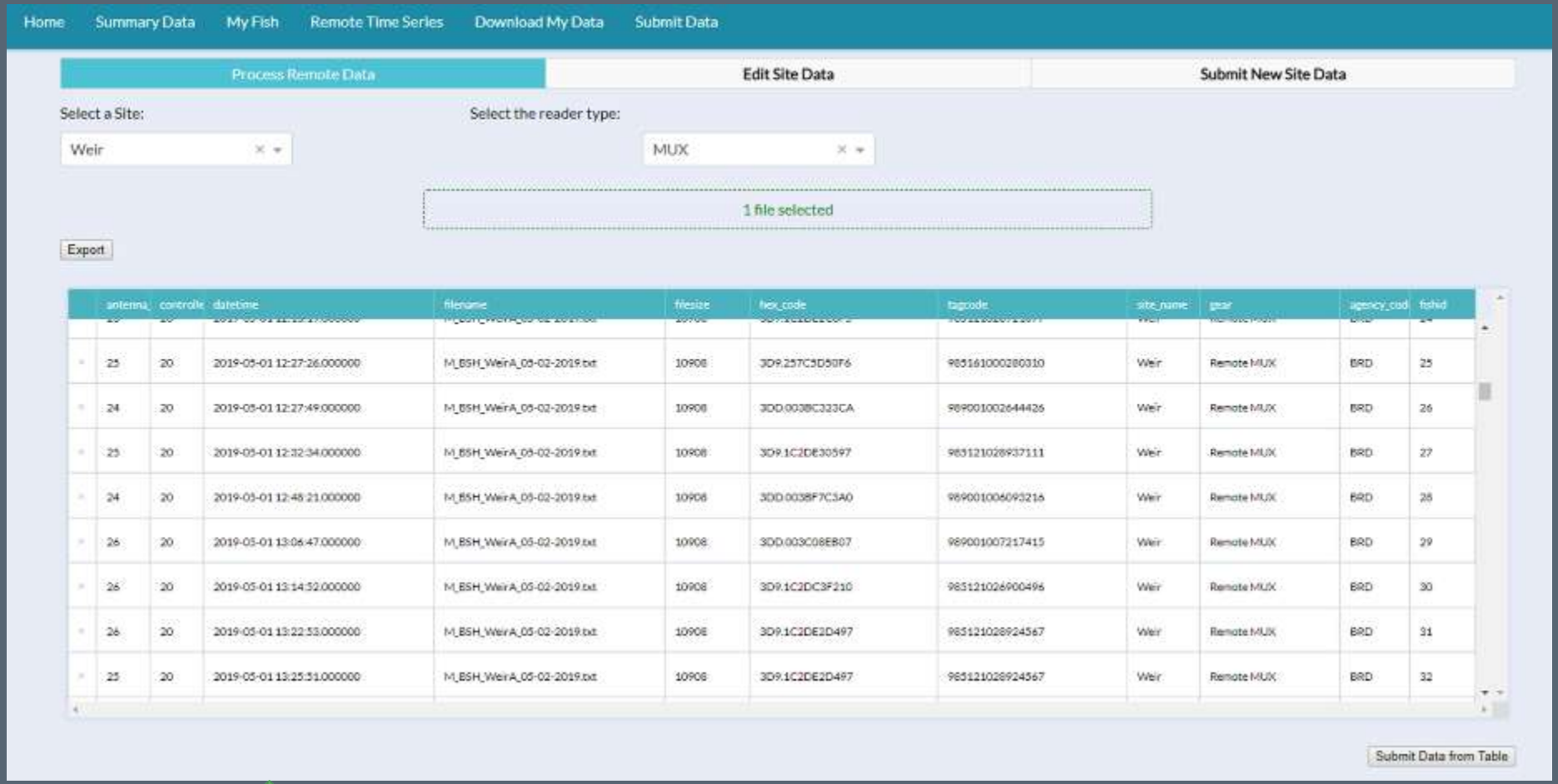
- Store Data for the Long Term
- Compile Klamath Basin PIT Tagging Data
  - Secure and reliable format
  - Easily accessible
  - Return accurate near real time results
- Locate and remediate inconsistencies
- Facilitate communication between participants
- Provide technical support

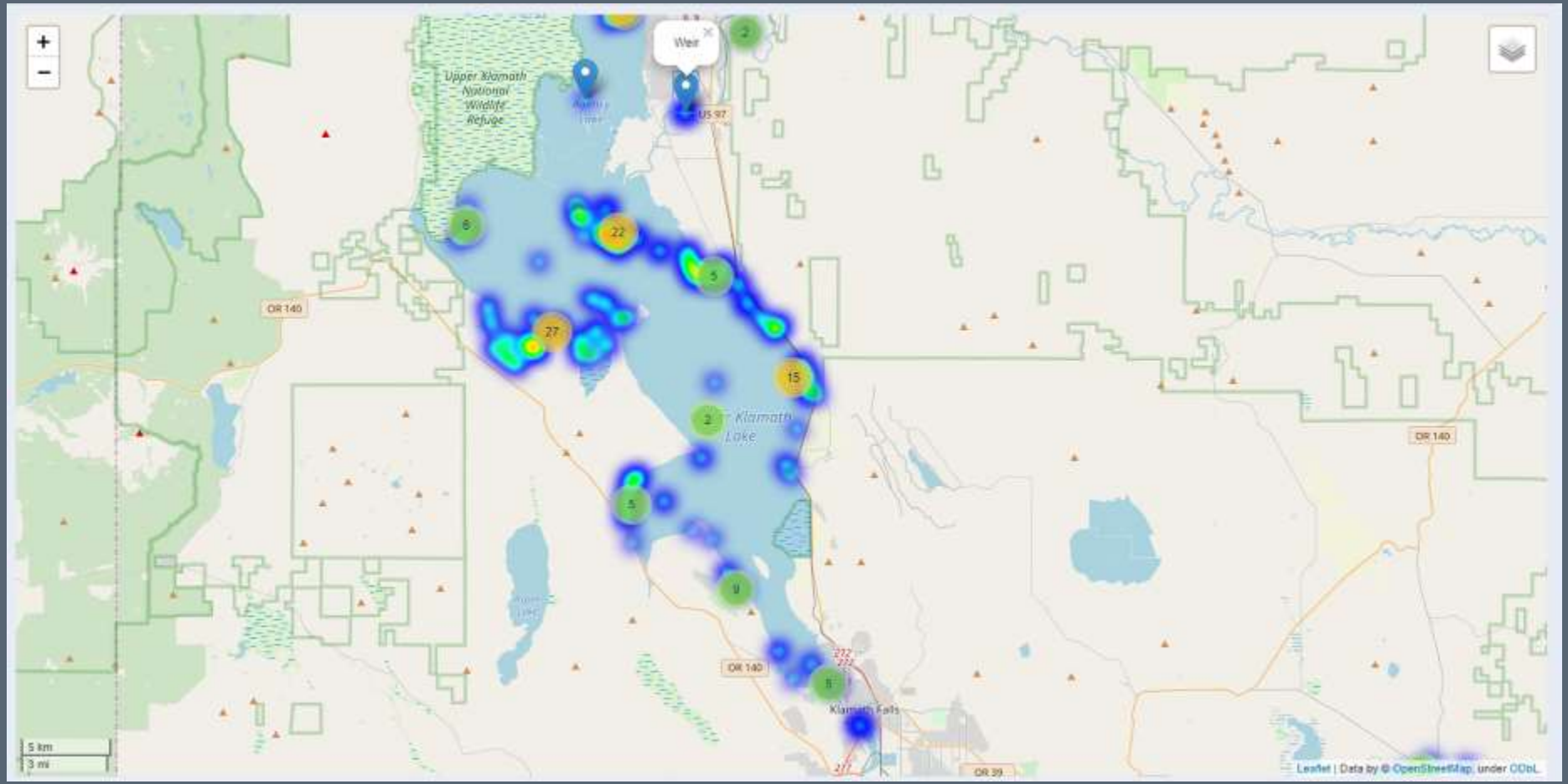
Communication And Collaboration

- Database Leadership Group
- Data Sharing Agreement
- Meetings
  - Policy/Governance
  - Feature Request
  - Science
  - Experience
- Data Management
- Technical Support
- Collaborative Side Projects

Structure Interfaces And Methods

- USGS and PSMFC
- SQL Server database
  - Schema
  - Views
- Standardization
- Web Application
  - Administrator Interface
  - User Interface
    - Query Tools
    - Maps
    - Interactive Visualizations
  - REST Services


Home
Summary Data
My Fish
Remote Time Series
Download My Data
Submit Data
Process Remote Data
Edit Site Data
Submit New Site Data
Select a Site:
Weir
Select the reader type:
MUX
1 file selected
Export
antenna_ controle datetime filename filesize hex_code tagcode site_name gear agency_cod fishid
25 20 2019-05-01 12:27:26.000000 M_BSH_WeirA_05-02-2019.txt 10908 3D9.257C5D50F6 985161000280310 Weir Remote MUX BRD 25
24 20 2019-05-01 12:27:49.000000 M_BSH_WeirA_05-02-2019.txt 10908 3DD.003BC223CA 989001002644426 Weir Remote MUX BRD 26
25 20 2019-05-01 12:32:34.000000 M_BSH_WeirA_05-02-2019.txt 10908 3D9.1C2DE30597 985121028937111 Weir Remote MUX BRD 27
24 20 2019-05-01 12:48:21.000000 M_BSH_WeirA_05-02-2019.txt 10908 3DD.003BF7C3A0 989001006093216 Weir Remote MUX BRD 28
26 20 2019-05-01 13:06:47.000000 M_BSH_WeirA_05-02-2019.txt 10908 3DD.003C08EB07 989001007217415 Weir Remote MUX BRD 29
26 20 2019-05-01 13:14:52.000000 M_BSH_WeirA_05-02-2019.txt 10908 3D9.1C2DC3F210 985121026900496 Weir Remote MUX BRD 30
26 20 2019-05-01 13:22:53.000000 M_BSH_WeirA_05-02-2019.txt 10908 3D9.1C2DE2D497 985121028924567 Weir Remote MUX BRD 31
25 20 2019-05-01 13:25:51.000000 M_BSH_WeirA_05-02-2019.txt 10908 3D9.1C2DE2D497 985121028924567 Weir Remote MUX BRD 32
Submit Data from Table


Weir
Upper Klamath National Wildlife Refuge
US 97
OR 140
Klamath Lake
Klamath Falls
OR 39
5 km
3 mi
Leaflet | Data by © OpenStreetMap, under ODbL.

Looking To the Future - Technical

- Live Application
- Improve Administrator Interface
- Build an Interface to Describe Transceiver Outages
- Improve Mapping Tools
- Continued Support and Maintenance
  - Database Administrators
  - Participant Outreach
  - Electronic Data Collection

USGS Scott River Watershed Council Pacific States Marine Fisheries Commission

Bottom-up collaborative effort driven by field researchers

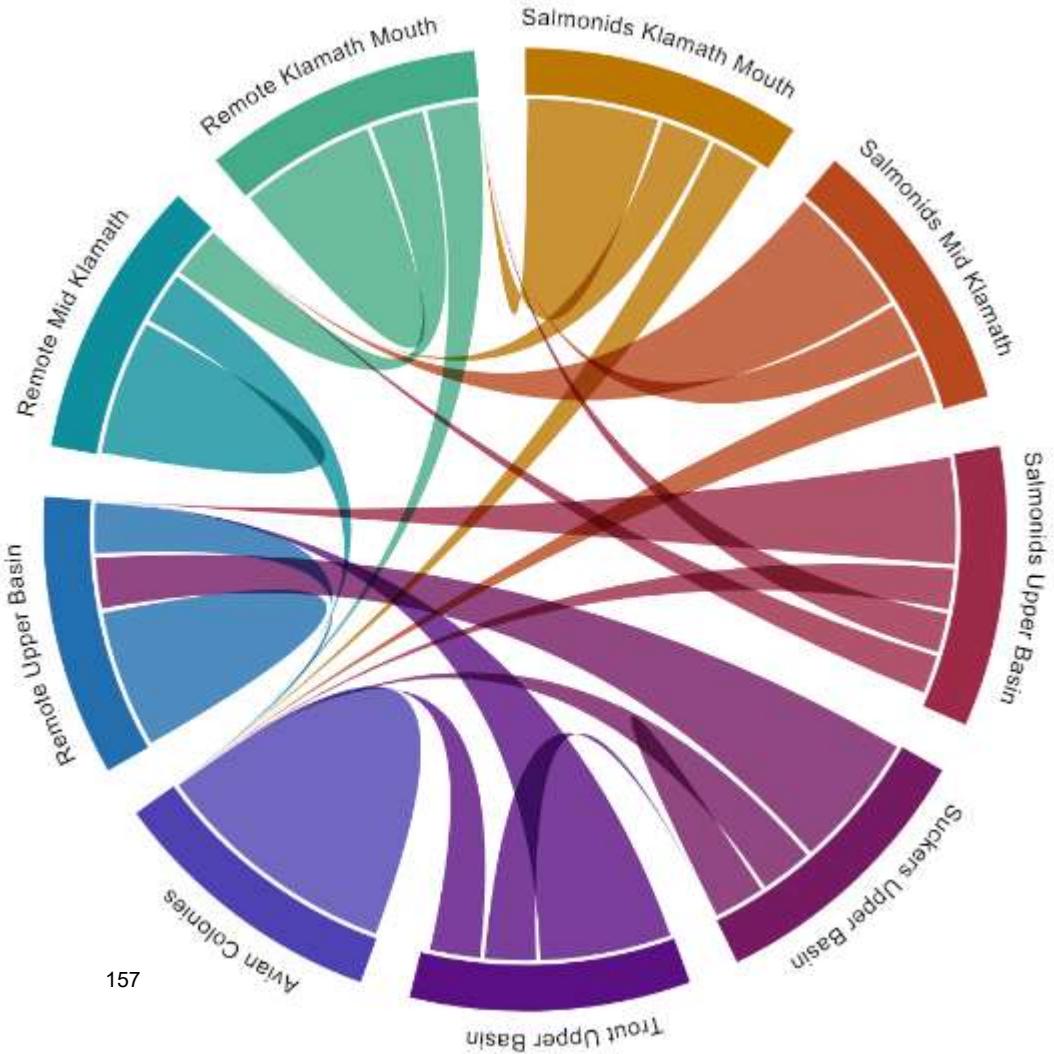
- Funding- USFWS BIL Year 1 Received, Year 2 Submitted
- Formal Governance Structure- soon to be released
  - PSMFC- to be lead
  - Paid Coordinator
  - Decision Making Structure
  - Collaborative Governs the Database and Joint Decisions, members' decisions are subject only to the originating entity.
- Decisions to be made
  - Site prioritization
  - Collaborative Projects and Funding Distribution
  - Additional species/techniques/data parameters/partners (acoustic telemetry, water quality)
- On Going Education, Collaboration, Research
  - New locations- Bogus Creek
  - New species and study plans- Tagging Chinook at RST
  - Arrays in dam removal reach
  - Annual Meetings
  - Field Tours

USGS

Scott River Watershed Council

Pacific States Marine Fisheries Commission

Data Project *and* a People Project

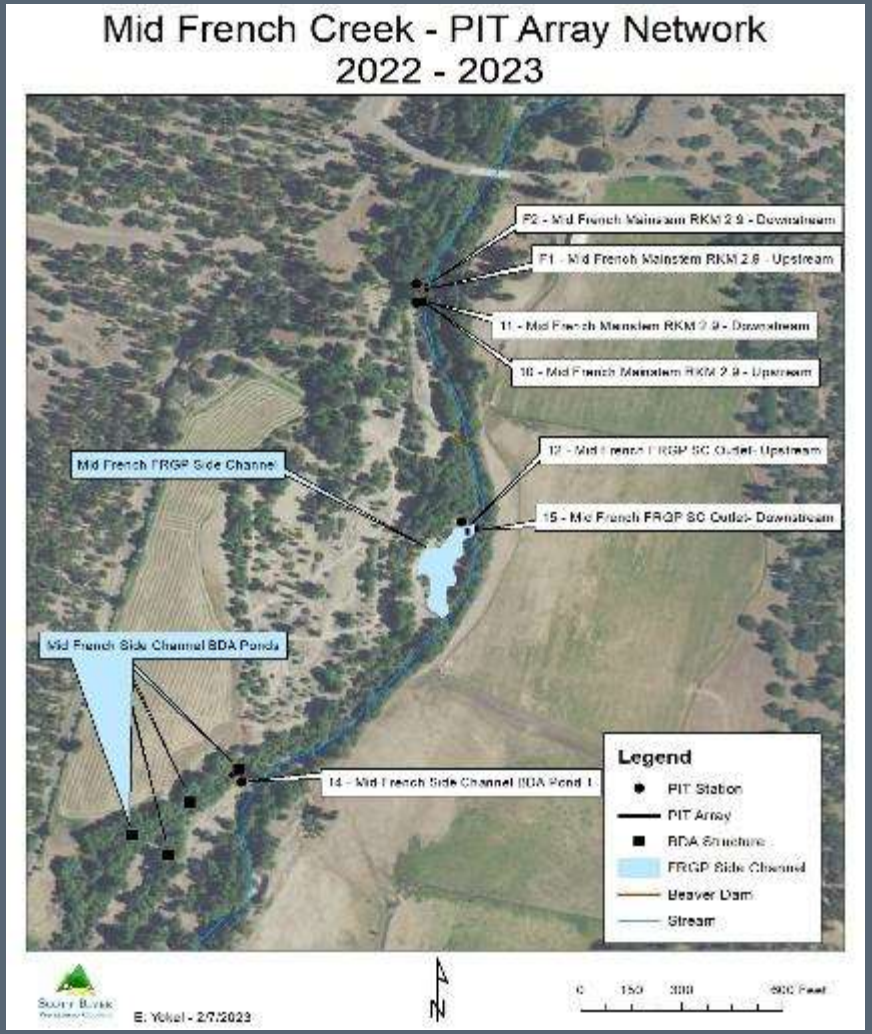


How can PIT tags help us learn about the aquatic species in the Scott Watershed?

Two-Summer Coho

- Traditional life history: 18 months in freshwater and 18 months in marine
- Tagging and recapturing shows that some are staying in freshwater for longer periods

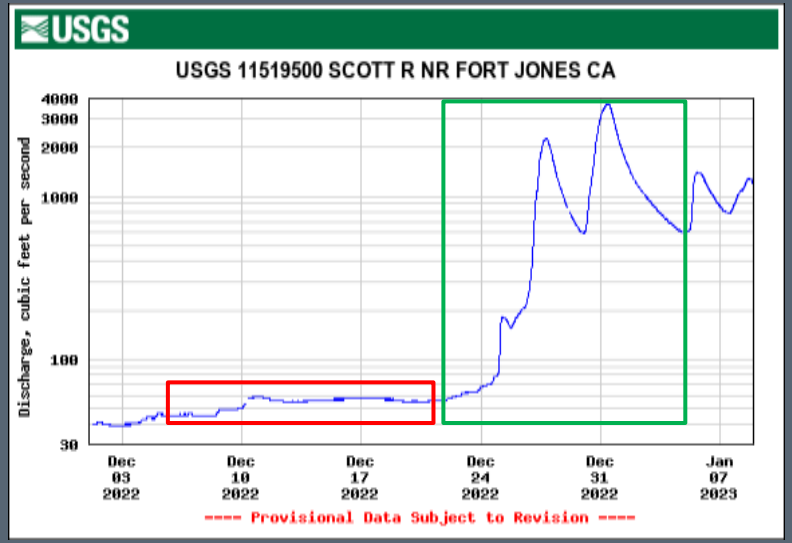
Tag No	Date	Species	Stream	FL (mm)	Weight (g)	Recapture Date	FL (mm)	Weight (g)
989001041193863	1/21/2022	Cohsal	French Creek	71	3.6	8/10/2022	97	10.5
989001041194084	3/15/2022	Cohsal	French Creek	70	3.4	8/2/2022	96	10
989001041194110	3/15/2022	Cohsal	French Creek	70	3.2	8/10/2022	87	7.7



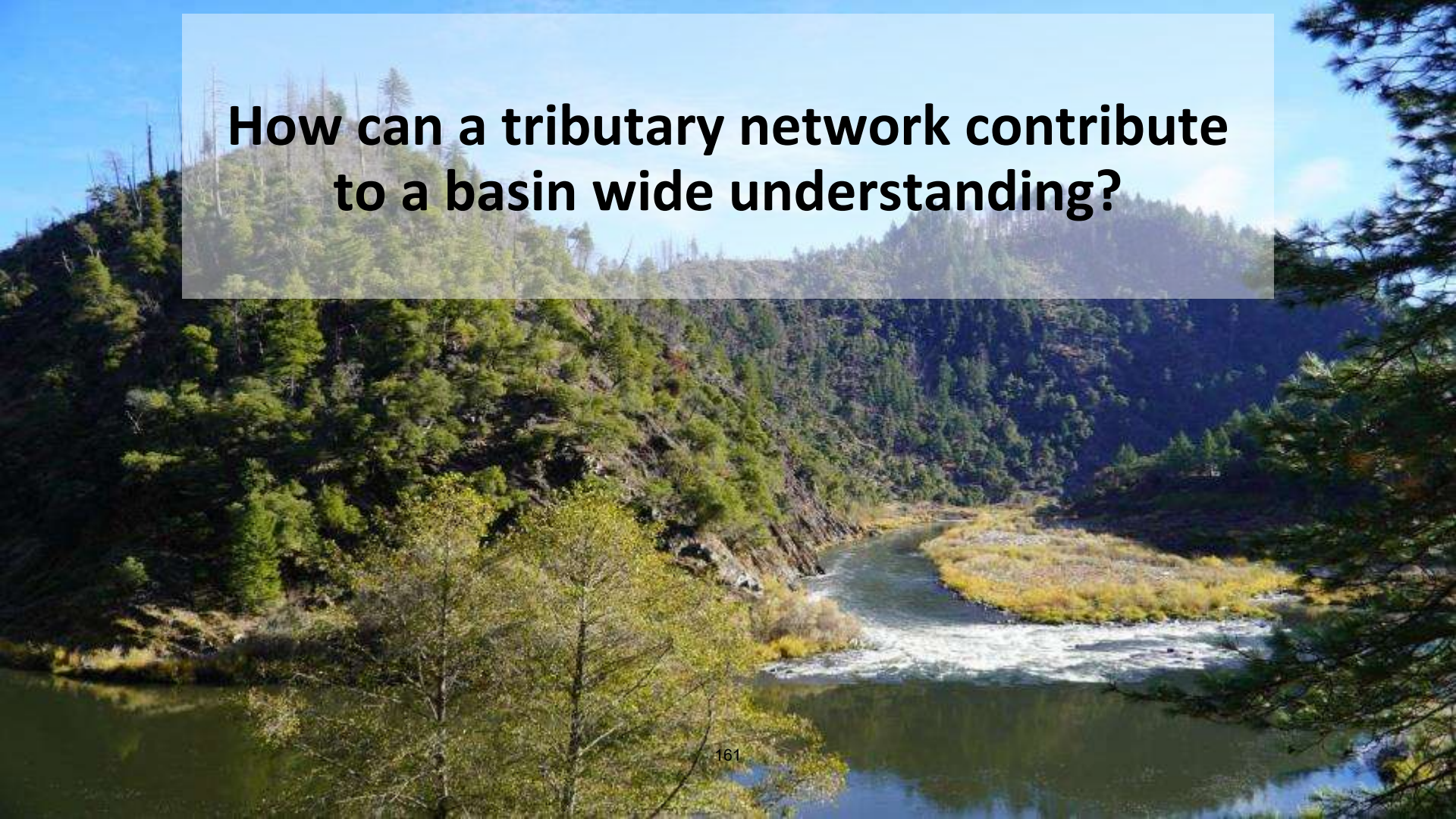
Fall Juvenile Redistribution

French Creek downstream array:

- 12/6-12/21 (red): 1 unique detection
- 12/21-1/4 (green): 58 unique detections

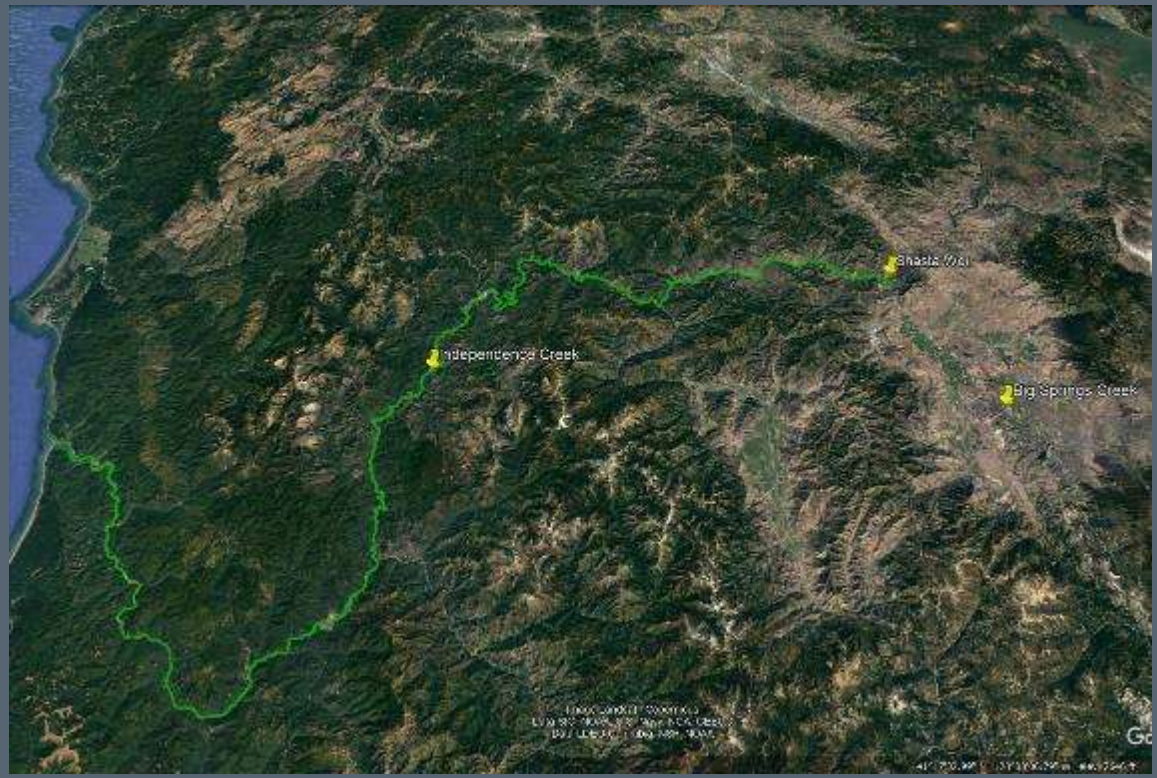


How can a tributary network contribute to a basin wide understanding?



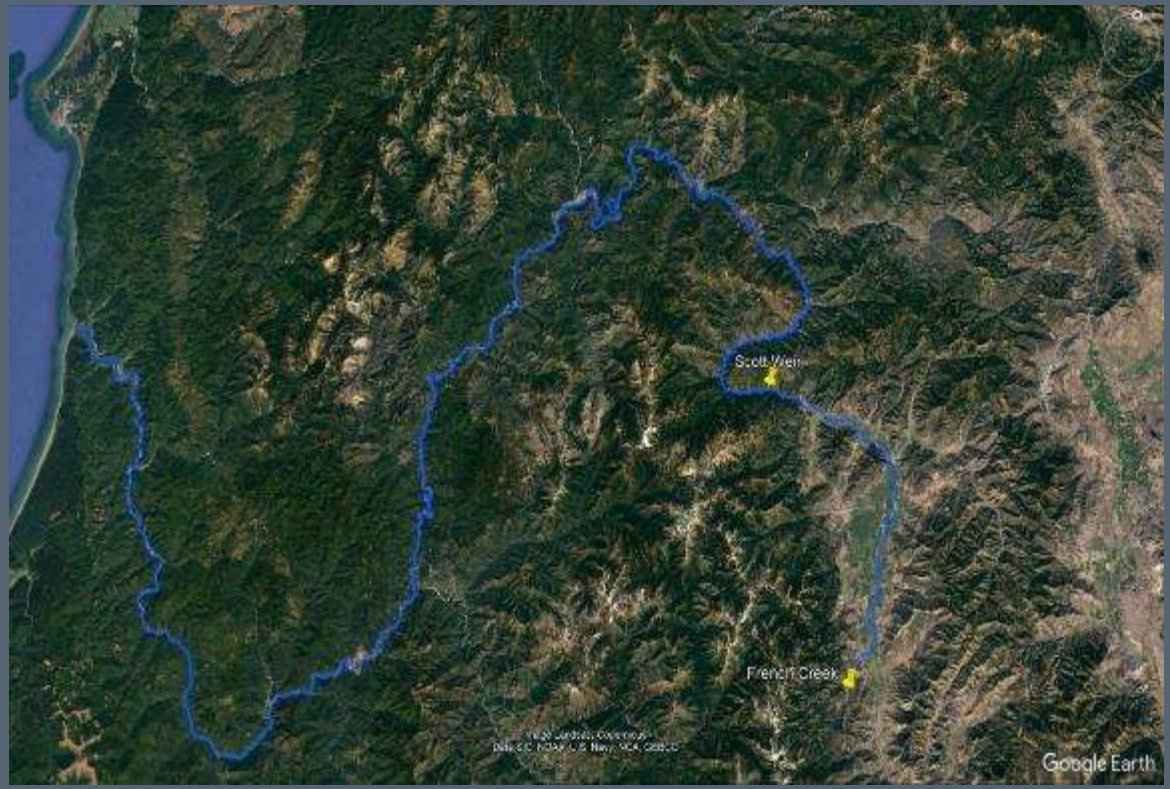
Tag No. 989001028154351

- Emerged in Shasta River (likely Big Springs Creek) in late-winter 2020
- Migrated to cold water refugia on the mainstem Klamath River near the mouth of Independence Creek (~108 miles) in spring 2020
- On September 22, 2020 this fish was weighed, measured and PIT tagged by the Karuk Tribe Fisheries Program. 83 mm and 6.3 grams
- Likely left Independence Creek and headed to the estuary/ocean (~95 miles) in spring 2021
- Re-entered the Klamath River in fall 2022 and arrived at the Shasta River (~175 miles) weir on December 12, 2022



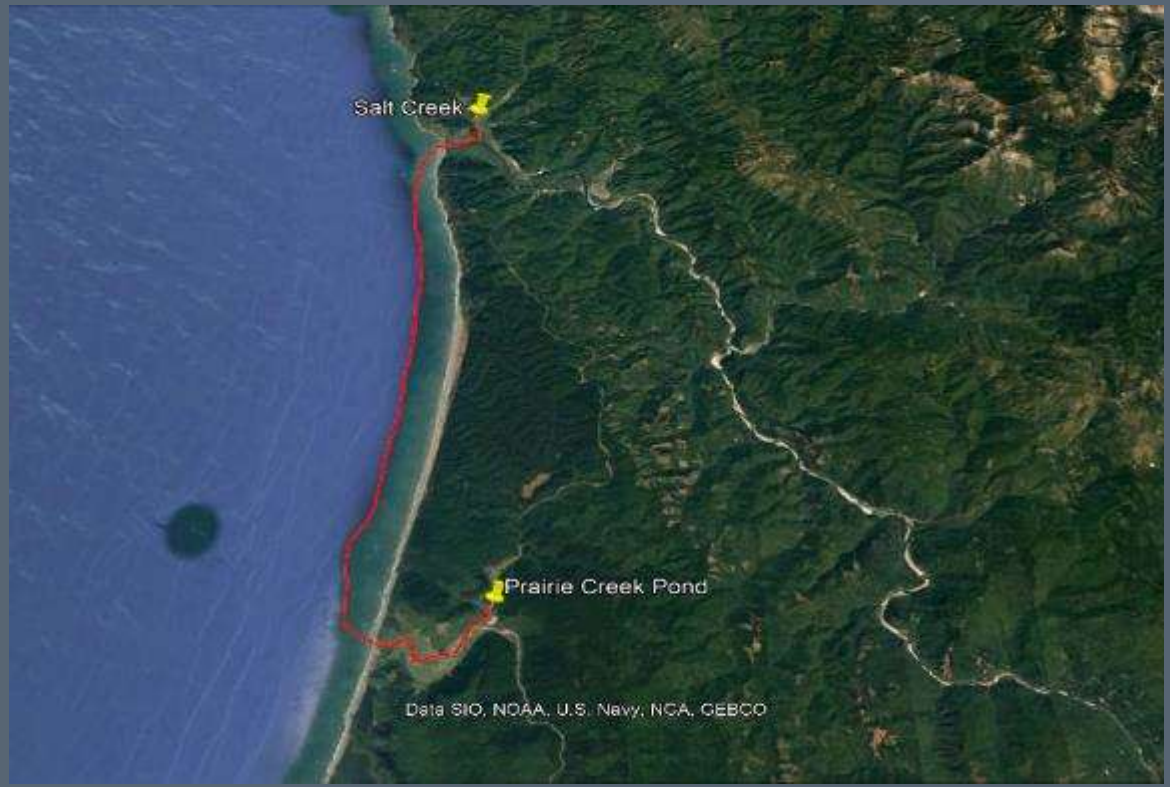
Tag No. 98900103996587

- Tagged in Miners Creek BDA habitat in February 2021
- Detected moving downstream on French Creek arrays on April 4th, 2021
- Detected on at the Scott River weir on December 14th, 2022
- Detected entering French Creek on December 25th, 2022



Tag No. 989001028582746

- Tagged in Salt Creek by the Yurok Tribe on January 24th, 2023. 117 mm and 17.8 g.
- Also detected leaving Salt Creek on January 24th.
- Detected by NOAA and HSU in Prairie Creek (a tributary to Redwood Creek) on February 15th .
- This is a journey of ~24 miles, ~18 of which are in the ocean.



"If you want to go fast, go alone; If you want to go far, go together"

Save the Date

Klamath Basin Fisheries Collaborative Spring 2023 Meeting

June,13-14. Yreka, Ca.

USGS

Scott River Watershed Council

Pacific States Marine Fisheries Commission

KBFishc.net

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