

RECLAMATION

Managing Water in the West

Shasta Dam Fish Passage Evaluation

Public Stakeholder Webinar

9-24-2015



U.S. Department of the Interior
Bureau of Reclamation

Today's Topics

- 1. Introduction – Craig Moyle (MWH)**
- 2. Project Overview – John Hannon (Reclamation)**
- 3. Sacramento River Conditions and Fishery Challenges – Jon Ambrose (NMFS)**
- 4. Livingston Stone National Fish Hatchery – Jim Smith (USFWS)**
- 5. Juvenile Fish Collection Facility Evaluations – Stefan Lorenzato (DWR)**
- 6. Pilot Implementation Plan and Environmental Assessment – Stephanie Theis (MWH)**
- 7. Project Schedule – John Hannon (Reclamation)**
- 8. Stakeholder and Public Engagement– Craig Moyle (MWH)**

Participating Agencies, and Project Organization

Bureau of Reclamation

CA Dept of Fish and Wildlife

US Fish and Wildlife Service

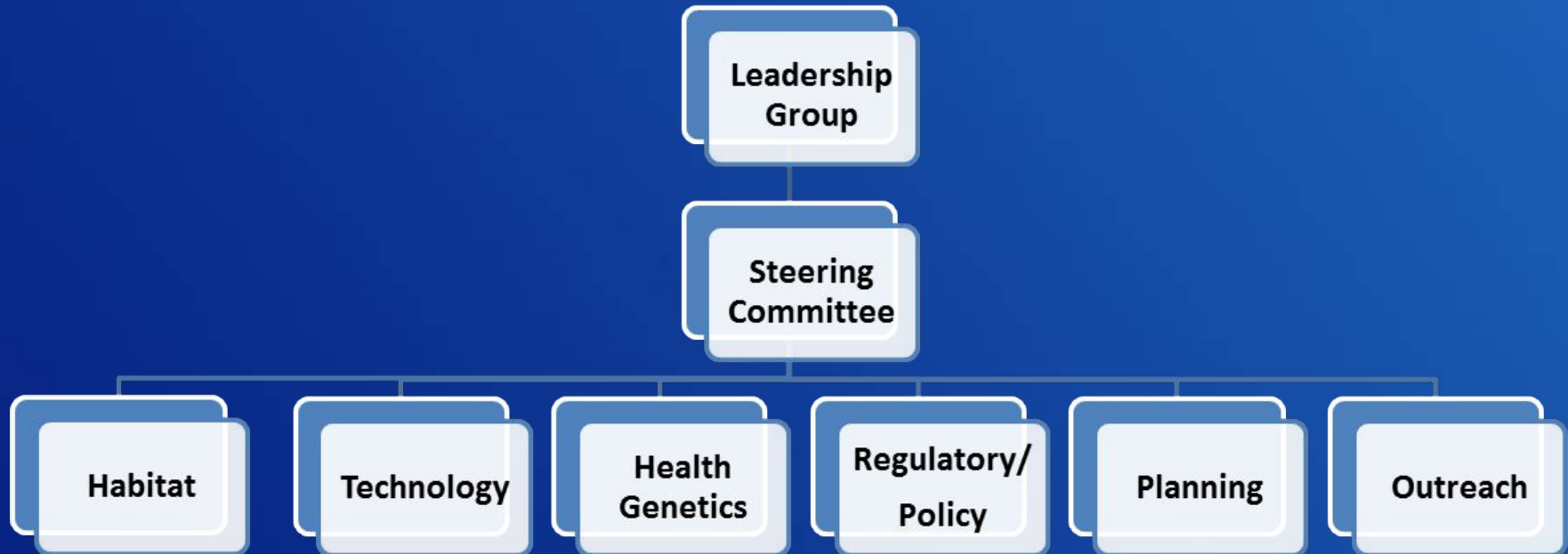
CA State Water Board

National Marine Fisheries Service

CA Dept of Water Resources

US Forest Service

UC Davis



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Geographic Location



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Project Driver

- Central Valley Project and State Water Project responsible for most of California's water storage and delivery
- Reclamation/DWR conducted formal ESA consultation in 2008
- NMFS jeopardy decision in 2009
 - Provided a Reasonable and Prudent Alternative with multiple actions
 - Action V: Fish Passage Program



Project Purpose

Evaluate the potential of providing passage for ESA-listed Chinook Salmon around Shasta Dam using a Pilot Program to make a well-informed decision about initiating a long-term fish passage program.

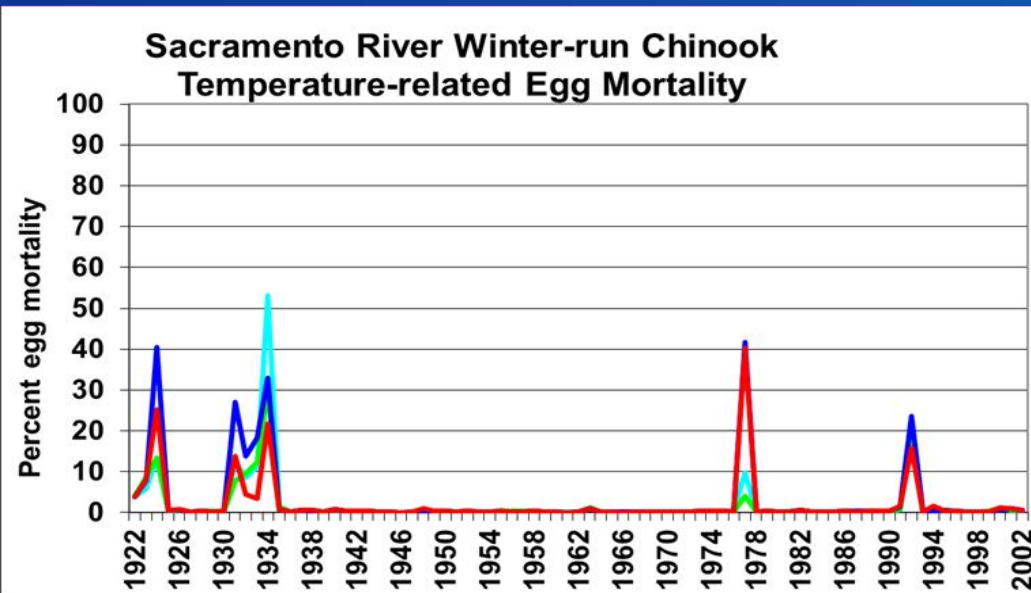


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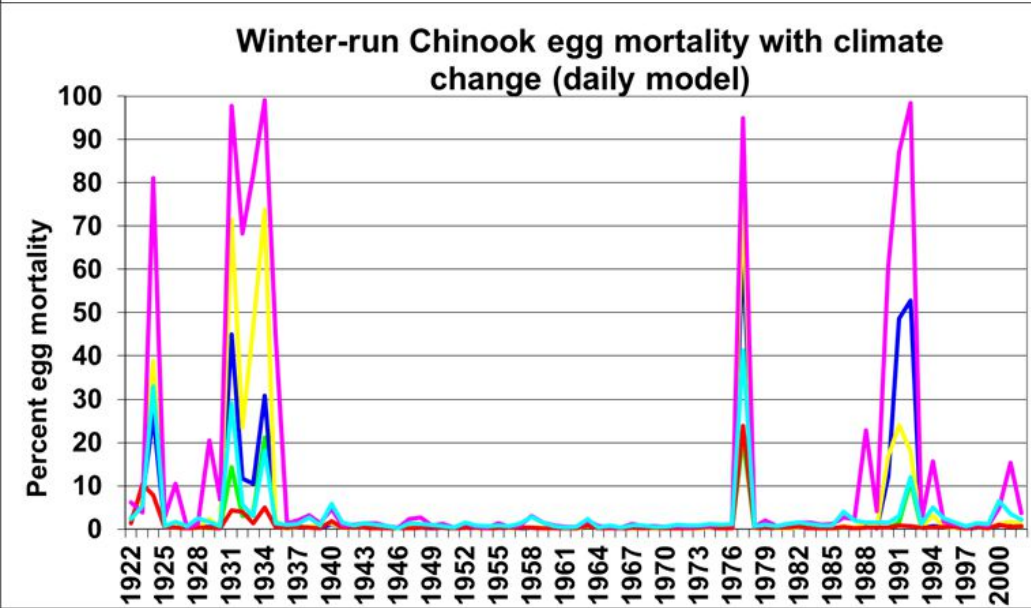
Schedule

- **Pilot Plan and Environmental Assessment – 2015**
- **Captive broodstock – first cohort – 2015-2017**
- **Experimental population designation – 2016**
- **First fish releases – 2017**

Future Risk to Winter-Run Chinook



Historical Climate Condition



Future Climate Condition

Upper Sacramento River Watershed

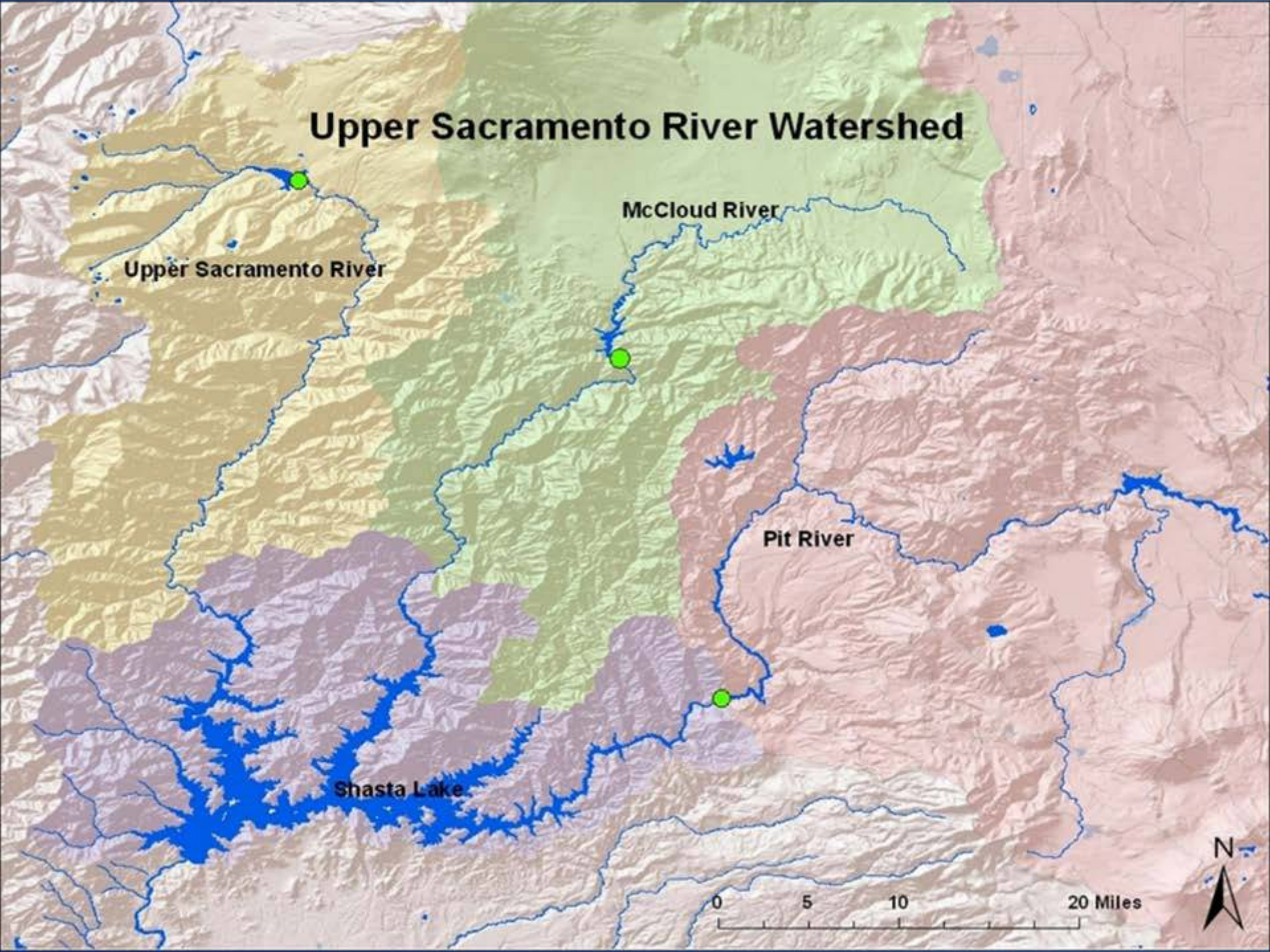
Upper Sacramento River

McCloud River

Pit River

Shasta Lake

0 5 10 20 Miles



Recovery Plan Classification of Target Rivers



McCloud River classified as a primary reintroduction area

Upper Sacramento River classified as a candidate reintroduction area

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Target River Habitat Conditions

Habitat assessment conducted to:

- Identify distribution and quality of spawning and rearing habitat
- Estimate potential spawner capacity
- Inform decision locations to focus initial pilot studies

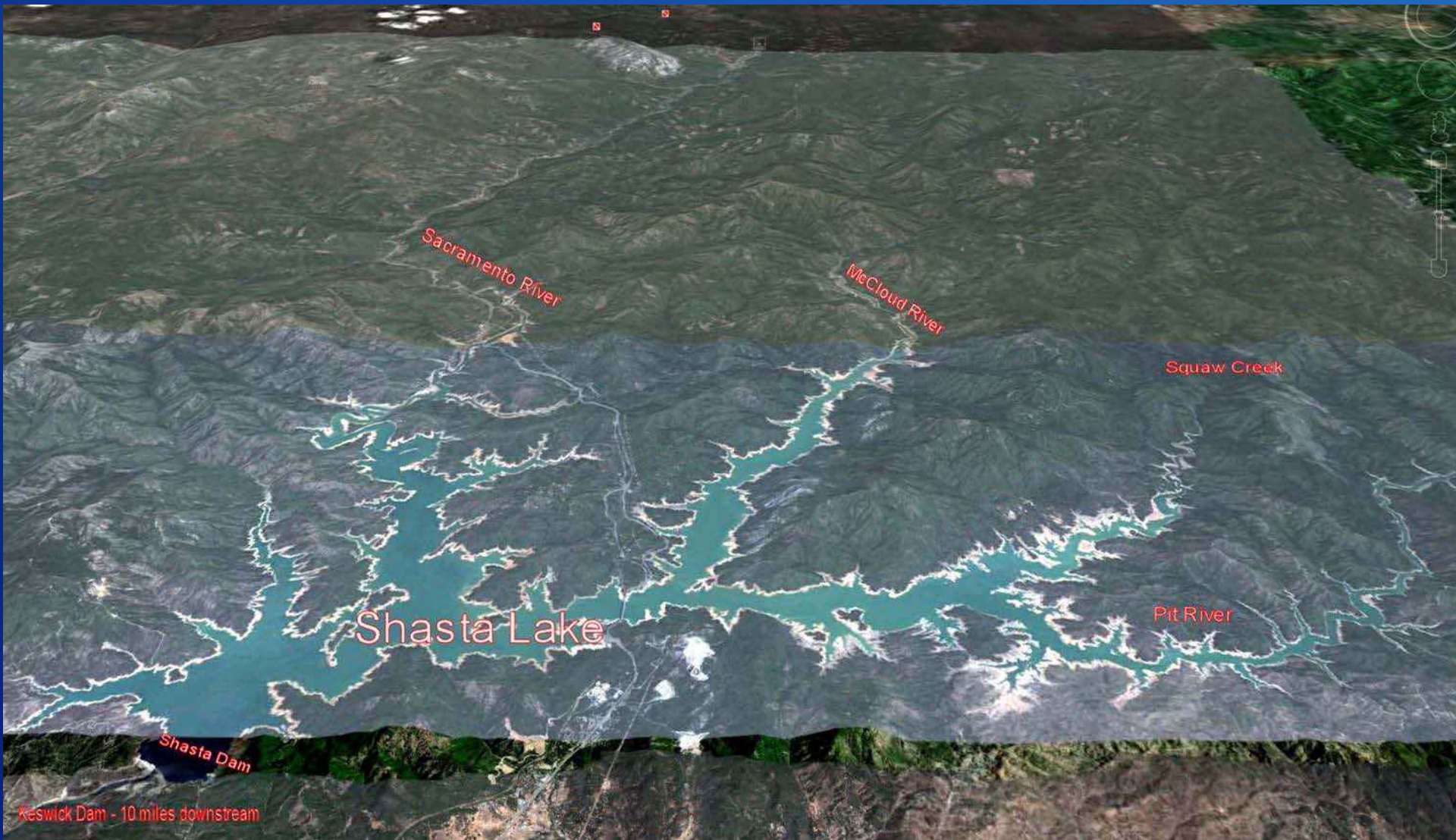


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Winter-run Chinook Female Spawner Capacity

River	River Length (miles)	Thermally Optimal Length (miles)	Estimated Spawner Capacity (Number of Females)		
			6 m ² Spawning Territory	10 m ² Spawning Territory	20 m ² Spawning Territory
Sacramento	37.0	9.0	224	134	68
McCloud	23.2	11.6	3,382	2,029	1,014

Shasta Lake



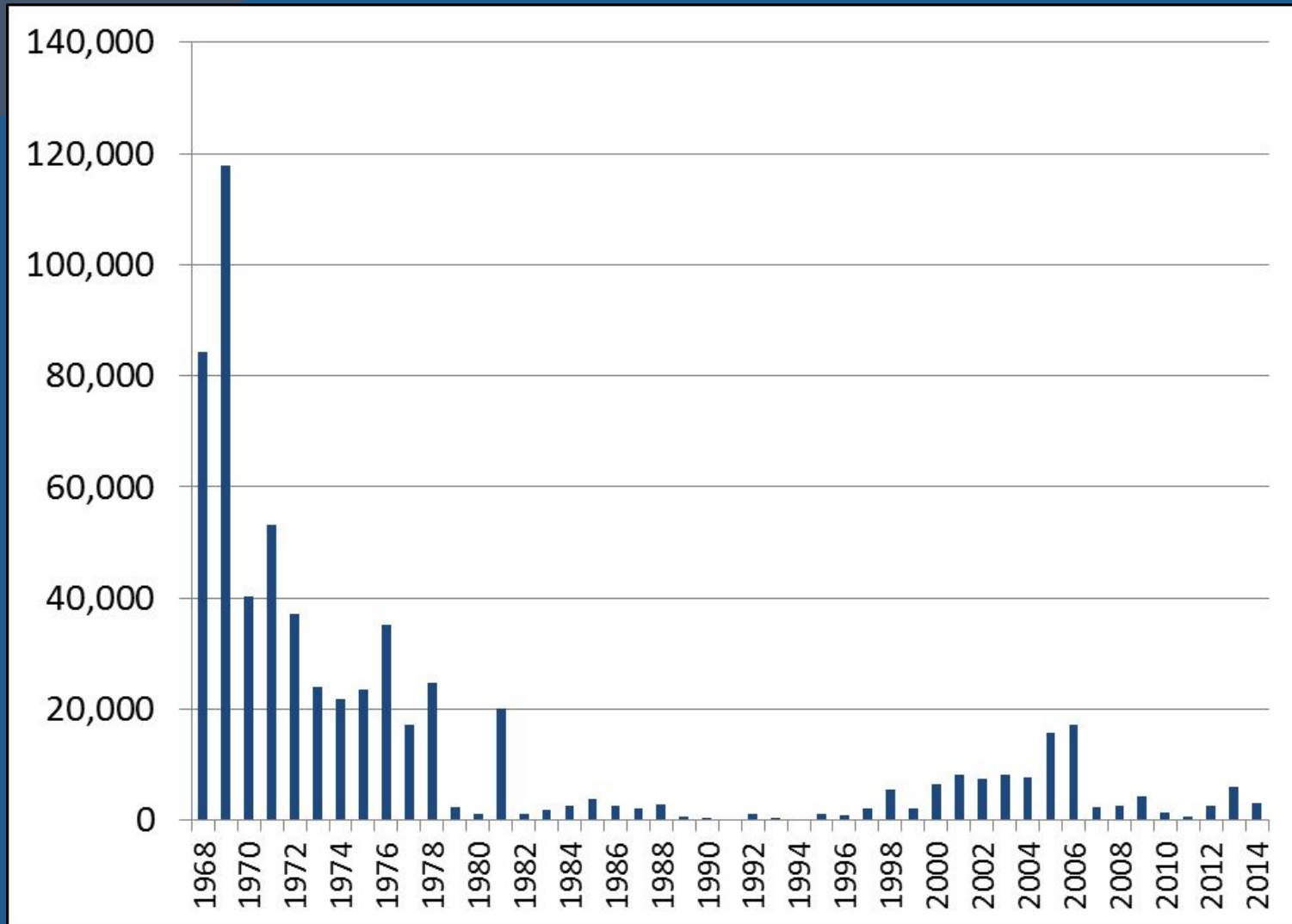
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Shasta Dam Fish Passage Evaluation

**Sacramento River Conditions
and Fishery Challenges**

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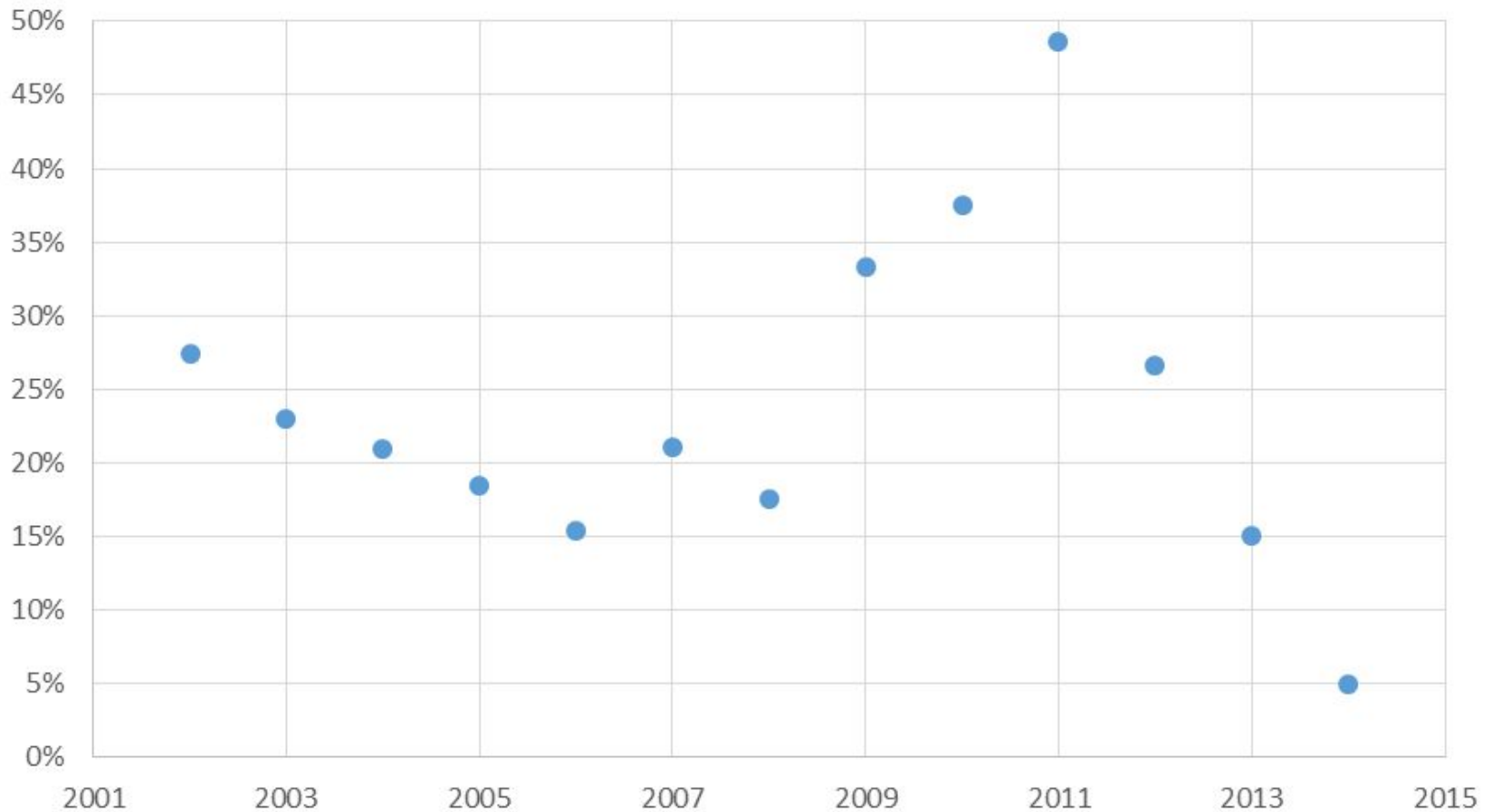
Winter-run Chinook Salmon Adult Abundance



Drought Operations

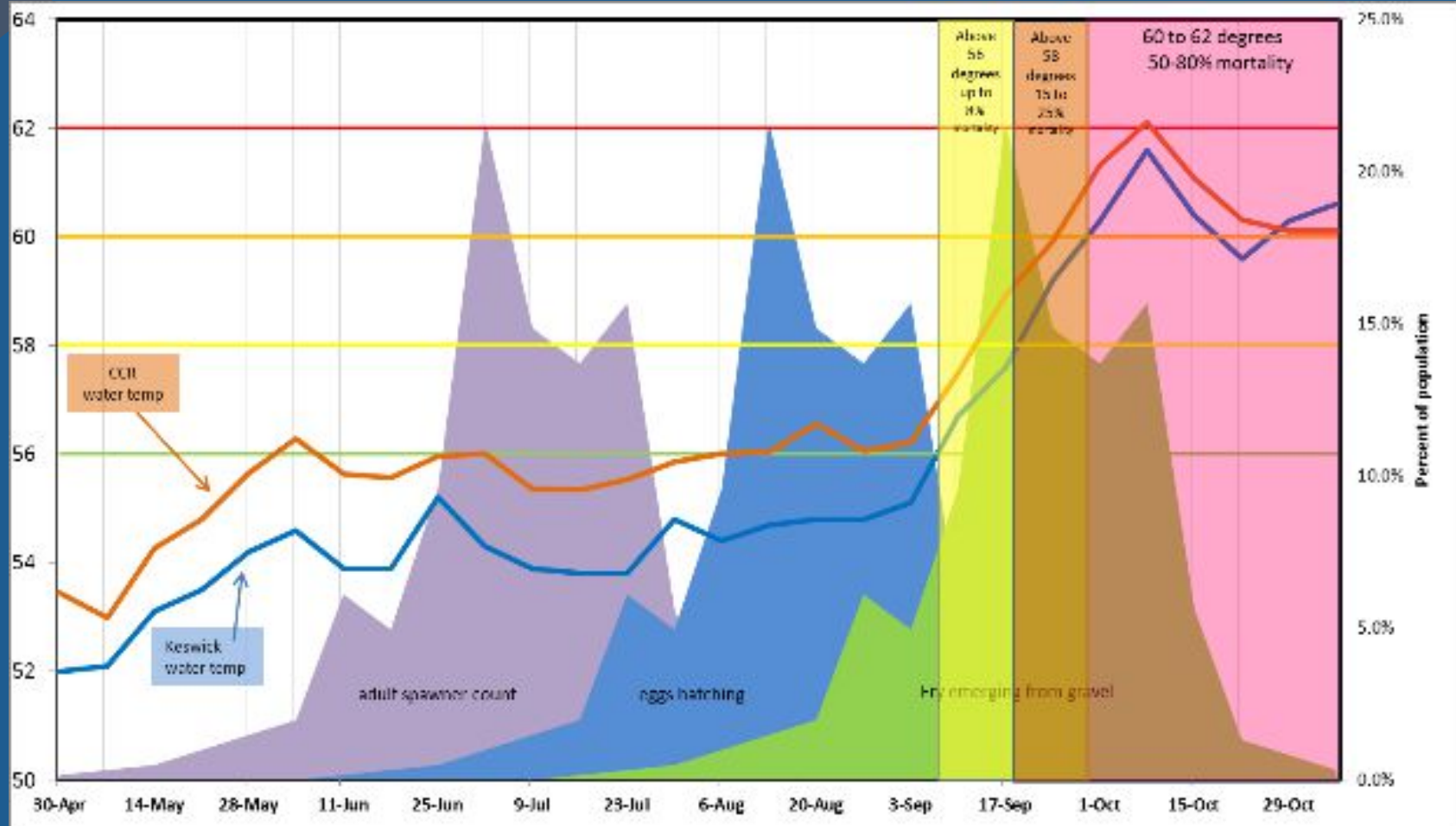
Poor Survival in 2014

Winter-run Egg to Fry Survival



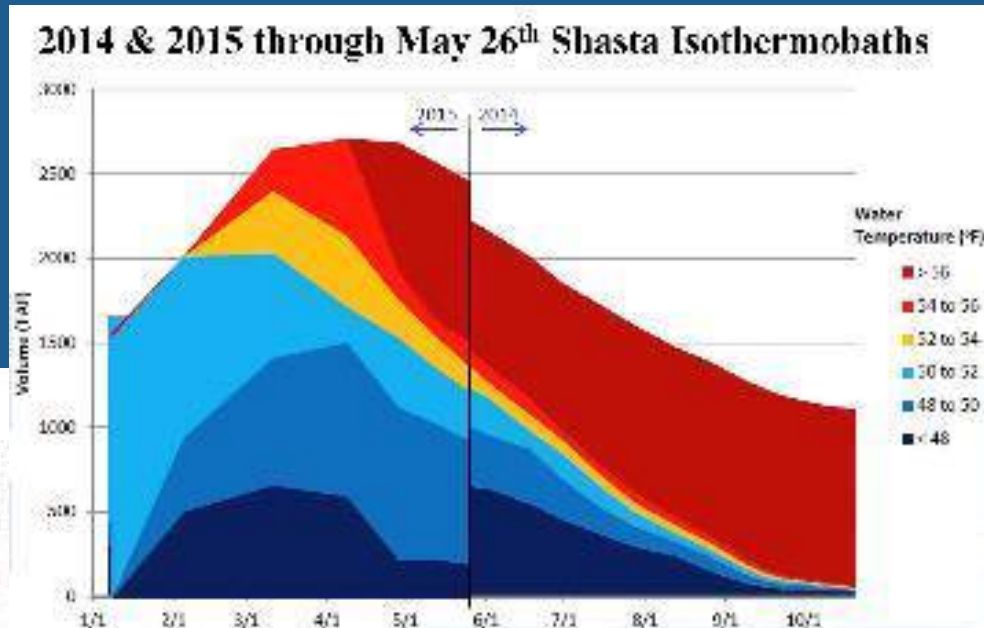
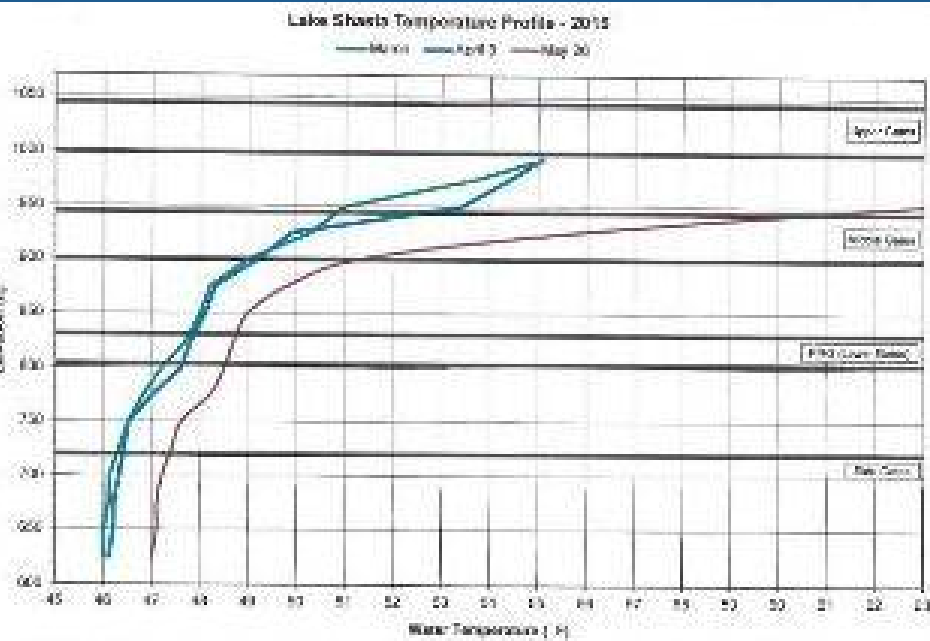
Drought Operations

2014 water temperatures had adverse effects on winter-run eggs and fry



Drought Operations

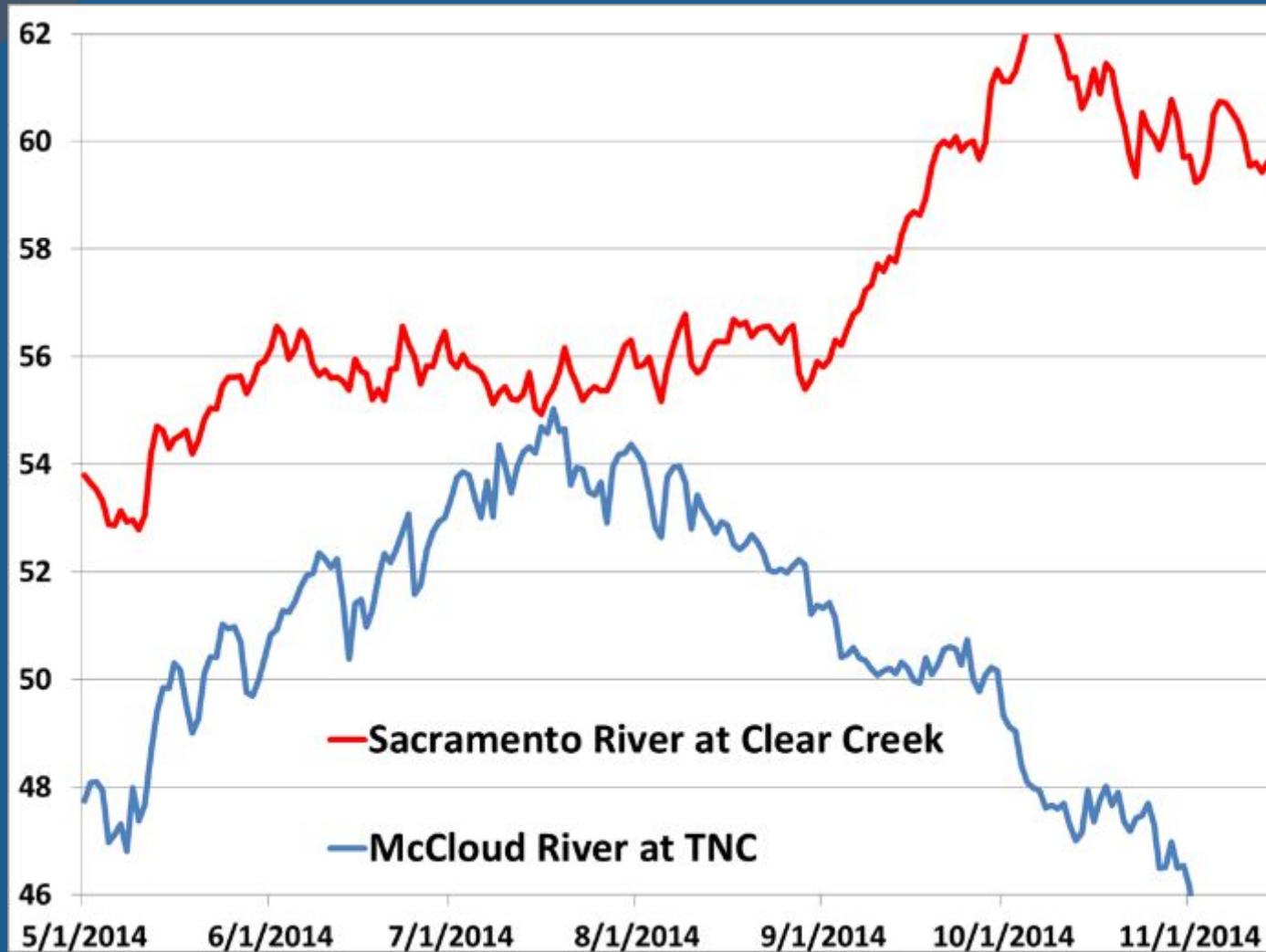
Updated May 2015 Shasta Lake profile showed water temperatures could not be met



Shasta Passage RPA

Due to recent poor survival conditions below Keswick, resumption of the Livingston Stone NFH captive broodstock program was determined necessary to ensure sufficient numbers of fish were available for the Pilot Program.

Water Temperature Comparison – upstream (McCloud River) and downstream (McCloud River) and downstream of Shasta Dam. Daily averages. Summer 2014



Endangered Species Act – Section 10(j)

1982 Amendment to the ESA

- Allows for reintroductions of T&E species as “experimental populations” into suitable habitat outside the species current natural range but within probable historic range”
- Primary purpose is to promote recovery of T&E species in the face of regulatory concern
- 10(j) actions must:
 - further the conservation of species
 - be determined “essential” or “nonessential”
 - be wholly separate from non-10(j) populations.

10(j) timelines

- NEPA – internal scoping October 2015
- Draft NEPA – Early 2016
- Draft 10(j)/4(d) rule – Early 2016
- Publish proposed rule – Spring 2016
- Complete biological opinion – Summer 2016
- Publish Final Rule – late summer/early fall 2016

Shasta Dam Fish Passage Evaluation

**Livingston Stone National
Fish Hatchery**

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Livingston Stone National Fish Hatchery



Jim Smith

US Fish and Wildlife Service

Red Bluff Fish and Wildlife Office

An aerial photograph of a water treatment facility. In the foreground, a concrete bridge spans across a river. The facility itself consists of several yellow buildings, a large circular tank, and various pipes and structures. The background is a steep, forested hillside. The word "Overview" is written in large white letters across the top of the image.

Overview

- **Background**
- **Guidelines for operation**
- **Relationship with Shasta Dam Fish Passage Evaluation**

The image features a solid blue background. At the top, there are several wavy, overlapping lines in various shades of blue and teal, creating a decorative header effect. The word "Background" is centered in the middle of the page in a white, sans-serif font.

Background

Background

**Shasta Dam &
Livingston Stone NFH**

Keswick Dam

**Pacific
Ocean**

**San
Francisco
Bay**

Redding

Clear Creek
Battle Creek
Red Bluff
Red Bluff Diversion Dam

**Sacramento
River**

**Feather
River**

**Yuba
River**

**American
River**

**Colusa
River**

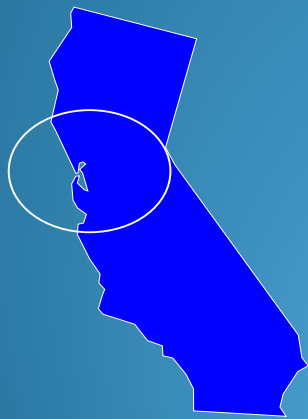
**Mokelumne
River**

**Stanislaus
River**

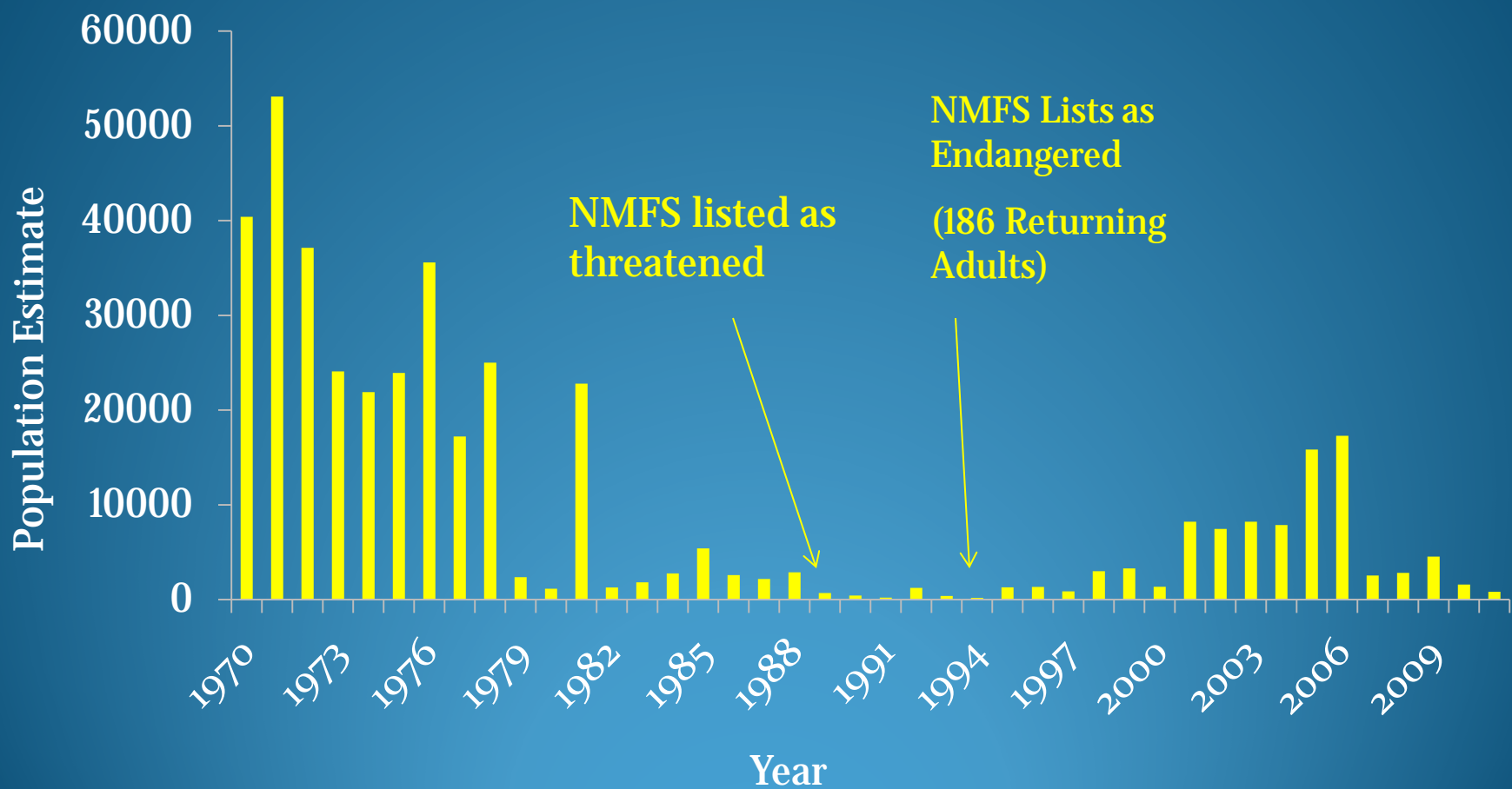
**Tuolumne
River**

**Merced
River**

**San
Joaquin
River**



Sacramento River winter Chinook returns



Source: California Department of Fish and Game

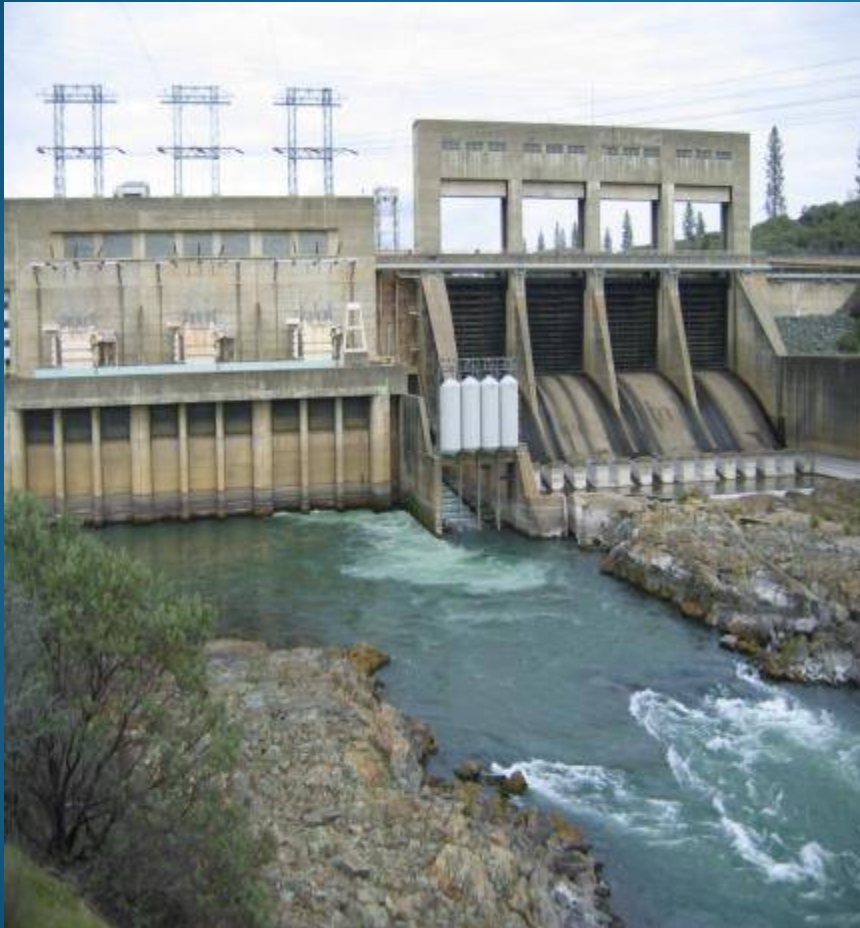
Livingston Stone NFH: Winter Run Chinook Hatchery

- Primary Goal: Preservation / Conservation
- Secondary Goal Restoration
- Source to re-establish naturally spawning populations in historic habitats



Guidelines for Operation

Broodstock Collection Methods



Broodstock Collection Methods Cont.



- LSNFH is an integrated hatchery
- Fish sorted based on phenotype and genotype
 - Natural-origin fish
 - Winter-run
 - Equal numbers of male and females

Broodstock Collection Methods Cont.

- Sampled for genetics for verification of run-call
- All fish are tagged with a dart tag for individual identification



Broodstock Collection Methods Cont.



- Retained fish are held in circular tanks
- Holding times can vary

- Retained fish are sorted weekly
- All fish disc tagged for easy identification



Broodstock Collection Methods Cont.

- Endangered species have stringent protocol:
 - Target 15% of the run
 - Min: 20, Max: 120

Month	Target
December	2
January	6
February	12
March	43
April	34
May	11
June	8
July	4
Total	120

ADULT SPAWNING

**Spawning takes place from
May through Mid- August**

**Egg lots split to
increase genetic
diversity**



**Family groups are
tracked throughout
rearing**

Juvenile Rearing and Release

- Juveniles are reared at the hatchery for about six months
- Marked and released in the Sacramento River below Keswick Dam near Redding, CA about February 1
- About 150,000 to 250,00 are released each year



More Detailed Program Information is Available

- cahatcheryreview.com/hatchery-review/



Relationship with Shasta Dam Fish Passage Evaluation

Re-Initiated a Captive Broodstock Program

- Captive broodstock salmon are a form of hatchery production that differ from standard hatchery programs in one important respect
- Fish are held in captivity for their entire life cycle
- Livingston Stone operated a captive program from 1999 to 2006

Captive Broodstock Program

- 1,035 juveniles were held back in February 2015 (3 per family group)
- Reared 2-3 years to maturity at the hatchery
- Produce 250 males and 250 females total
- Spawned as adults to produce eggs and juveniles

Captive Broodstock Program

Primary Purposes

- If needed, to supplement the Sacramento River wild population in the event of a year class failure
- A source of winter Chinook to re-introduce winter Chinook upstream of Shasta Dam
- A source of winter Chinook to re-introduce winter Chinook in Battle Creek

Adult Chinook Releases above the Hatchery

- If adult chinook are released above Shasta
- Then fish health issues become a concern to the hatchery
- Since adult chinook can carry a number of diseases that do not kill the adult
- But the disease is released in to the water after the adult has spawned and died
- This requires a water treatment facility to be built to protect the hatchery from disease in the water supply

Water Treatment Facility

- A contractor has been hired to develop a technical memo of various water treatment alternatives
- Summary of issues, concerns and opportunities
- Discussion and Assessment of available technologies
- Recommendation for treatment selection
- Cost estimate, conceptual process layout, and initial design
- Recommended implementation approach and schedule

Questions



Shasta Dam Fish Passage Evaluation

Fish Health Studies

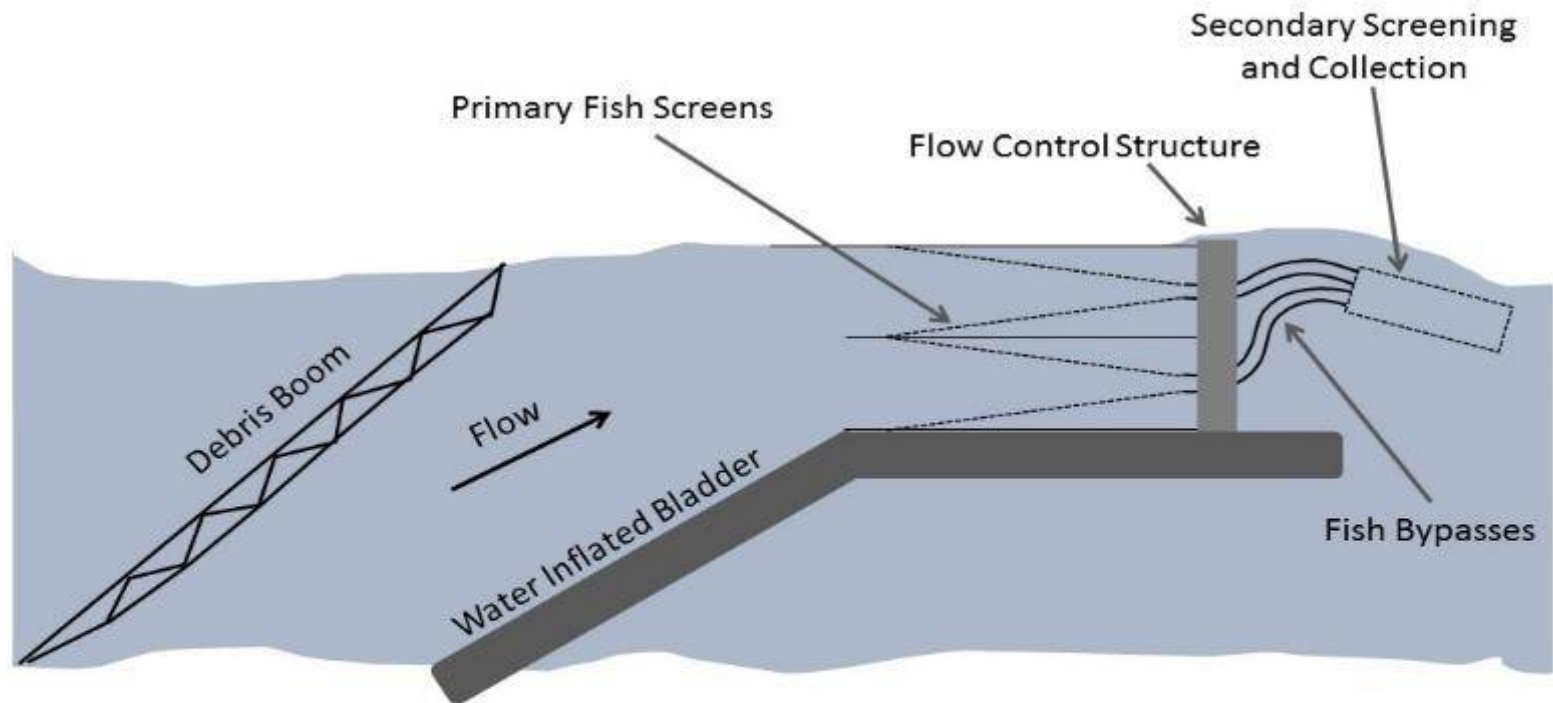
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CDFW and USFWS Cooperative Fish Health Study

- CDFW Sampling resident trout in McCloud and Sacramento Rivers in 2014 and 2015
- Sampling completed September 10, 2015
- USFWS conducting pathology tests
 - Necropsy
 - Cytology
 - Virology
- CDFW and USFWS to summarize results and implications of results relative to this project

Shasta Dam Fish Passage Evaluation
Juvenile Fish Collection
Facility Evaluations

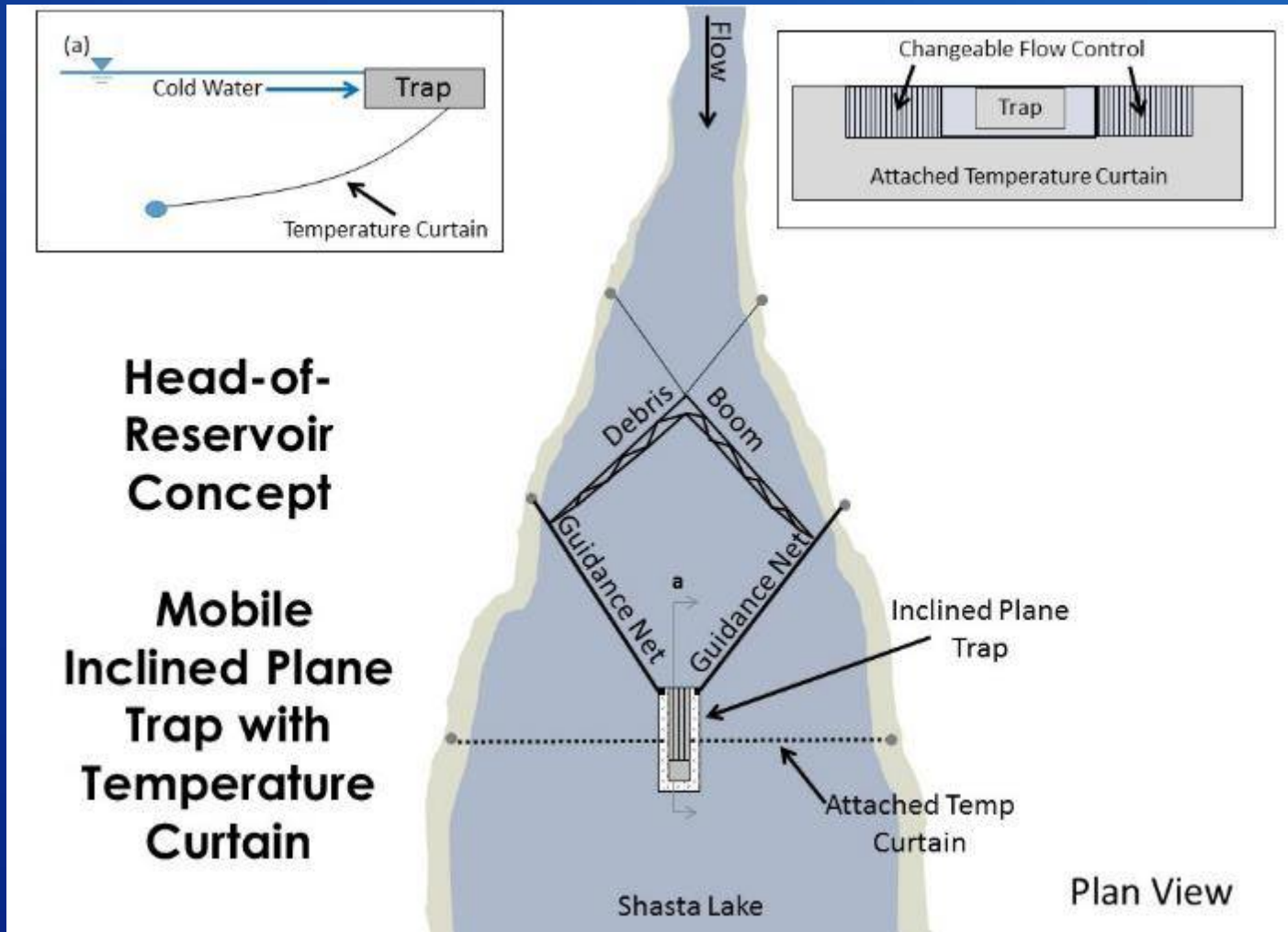
In-River Juvenile Collection



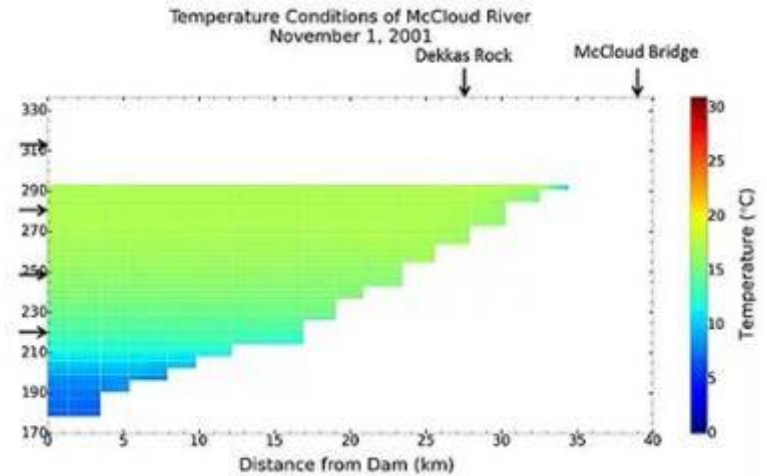
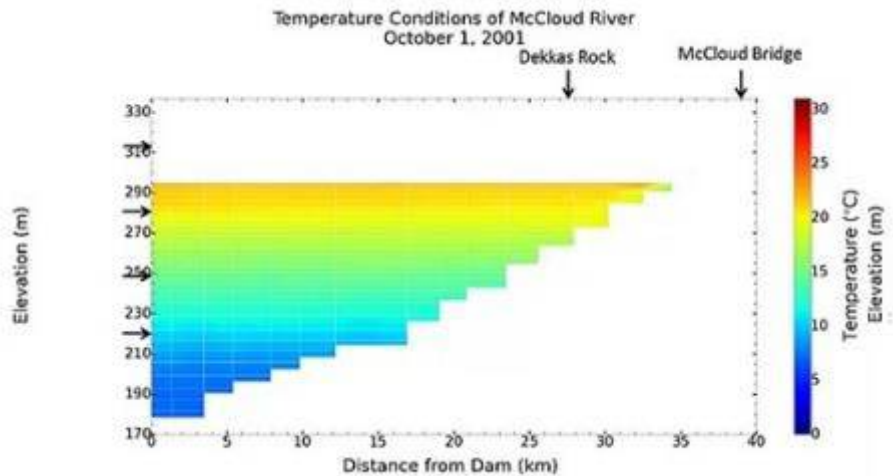
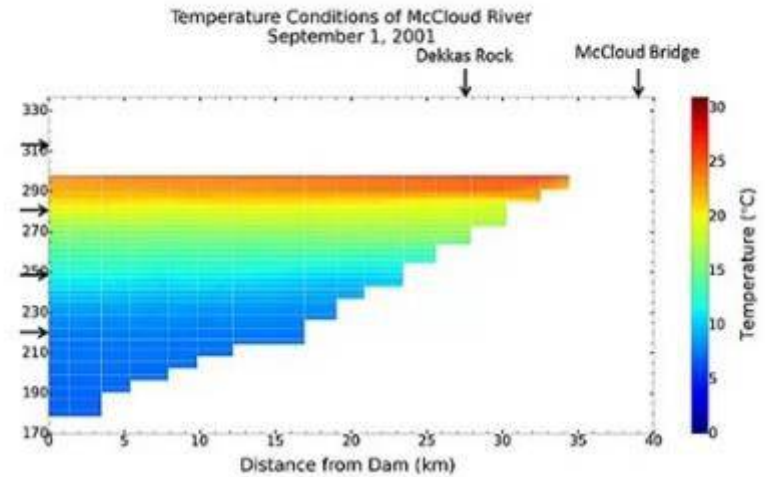
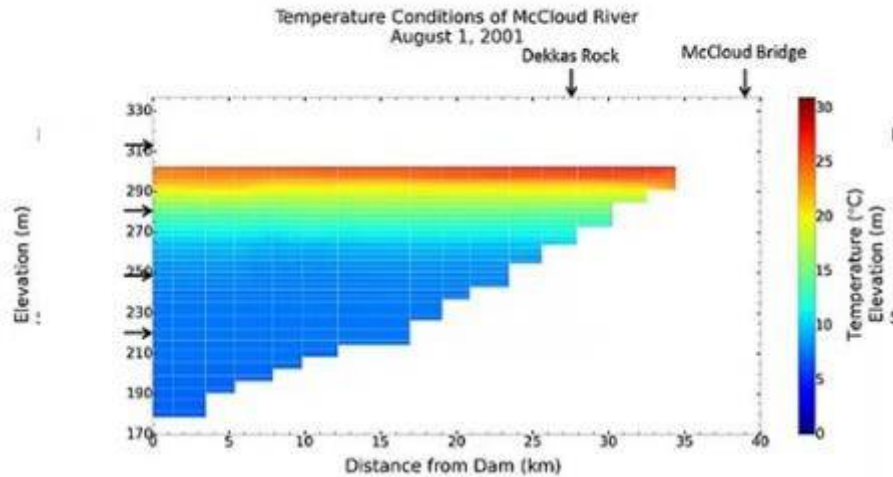
In-Tributary Concept

**Water Bladder/Fish Screen
Collection Facility**

Head-of-Reservoir Juvenile Collection

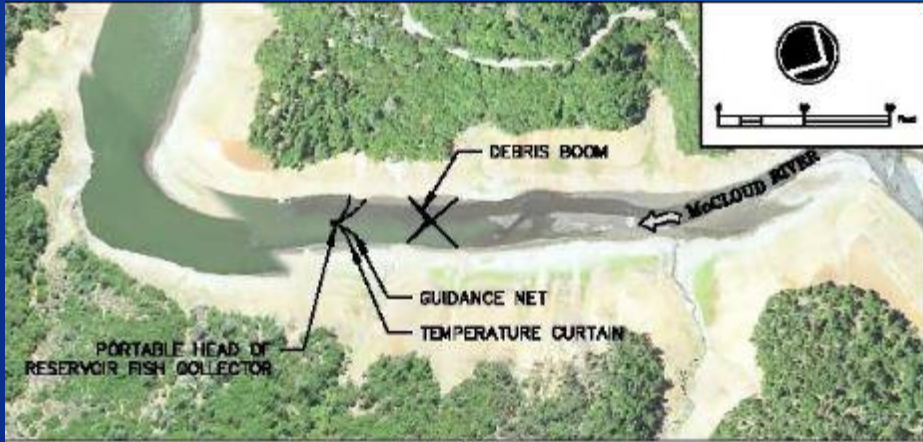


McCloud Arm Water Temperature

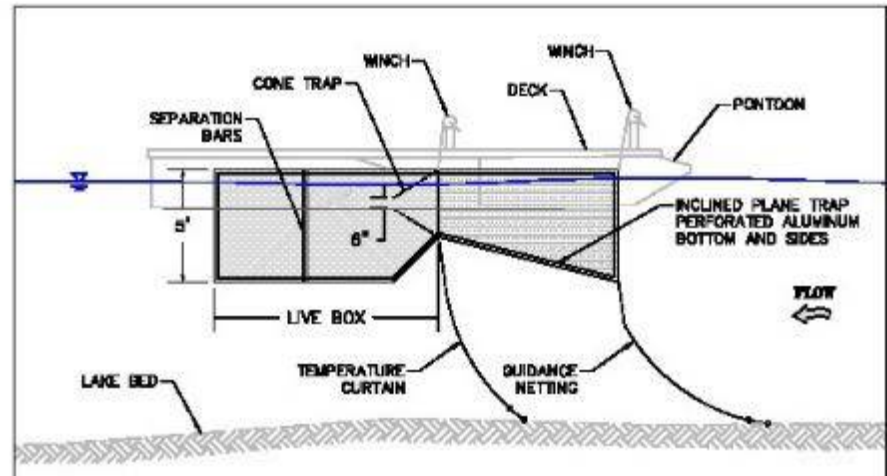
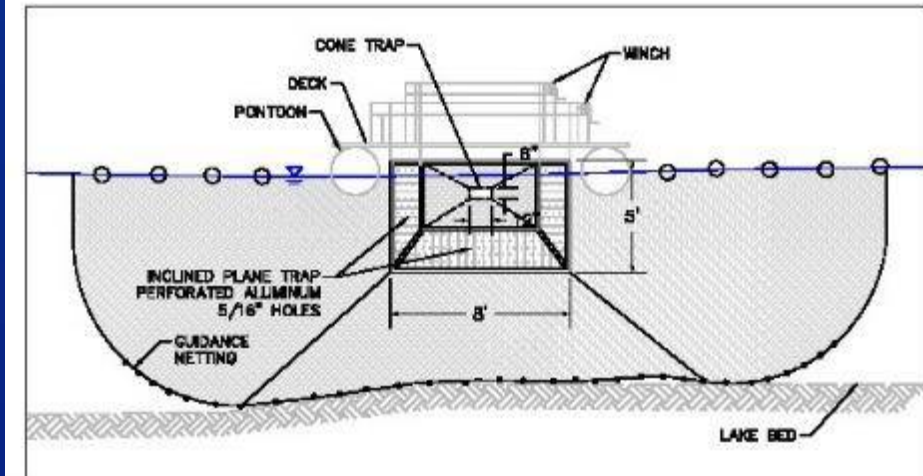
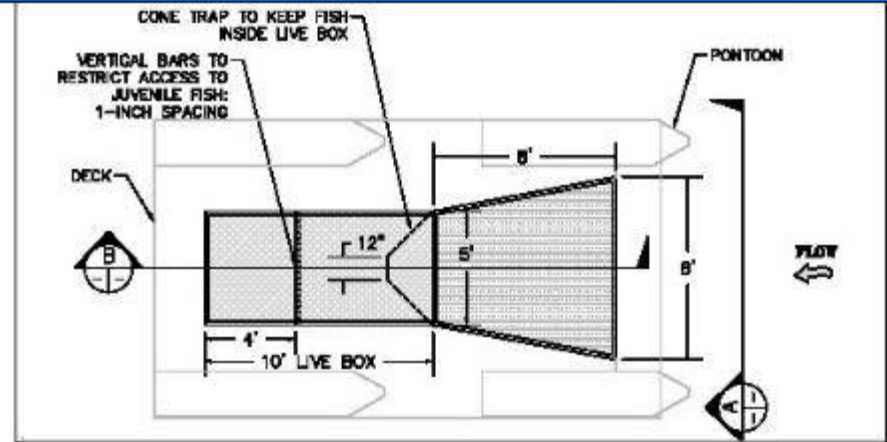


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Head-of-Reservoir Collector Design



SITE PLAN



Shasta Dam Fish Passage Evaluation

**Pilot Implementation Plan and
Environmental Assessment**

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Pre-Implementation Work Plan

- Allows Pilot Implementation Plan to focus on fish reintroduction studies
- Allows Pilot Program to move forward until captive broodstock available for reintroduction/release
- Allows for facility design



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Pre-Implementation Work Plan

Tentative work plans and studies include:

- Resident fish health studies
- Hydrology into reservoir
- Water quality sampling
- Release and collection site refinements
- Transportation logistic refinements



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Pilot Implementation Plan

Purpose

- **Work towards objectives defined in NMFS RPA**
- **Define ways to test field methods, facilities, and release and collection locations**
- **Determine if benefits outweigh risks**
 - **Benefits: abundance, productivity, spatial structure, diversity**
 - **Risks: evolutionary, demographic, ecological, disease**
- **Defines studies to test the feasibility of long-term reintroduction**

Pilot Implementation Plan

- Separates the Pilot Program into three study years
- Describes engineering options for upstream and downstream passage
- Lists key questions, objectives, metrics for different life stages for each year
- Describes pilot studies
- Includes Pilot Program timeline

Pilot Implementation Plan Structure

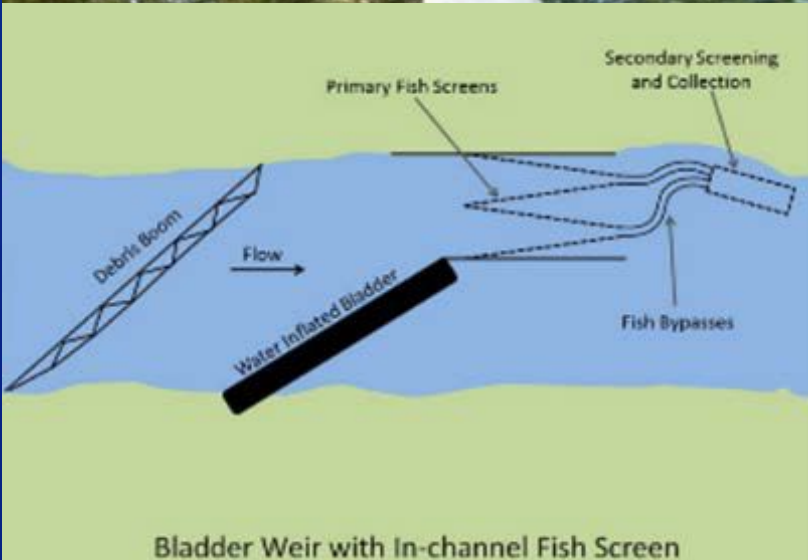
- Overview of purpose and objectives
- General reintroduction planning considerations
- Description of habitat and fish
- Overview of donor stock selection and genetic management
- Adaptive Management focus
- Fish passage options
- Proposed year-by-year pilot program with fish studies described
- Project timeline

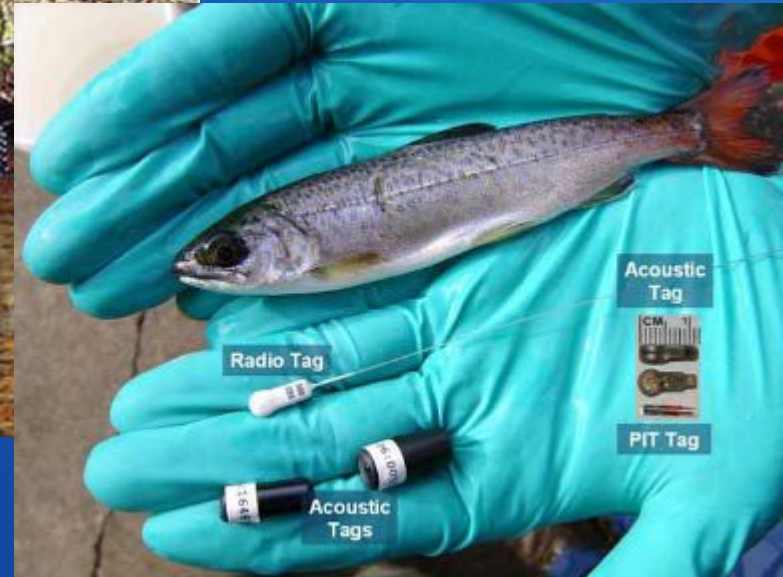
Year 1: Fry/Juveniles



Key questions focused on:

- Collection recovery efficiency
- Collection location and method
- Transport method/release location
- Timing of migration
- Size and distribution (growth rates)
- Survival rates
- Competition/predation with trout
- Number of smolts-per-female





Juvenile/Fry Introduction

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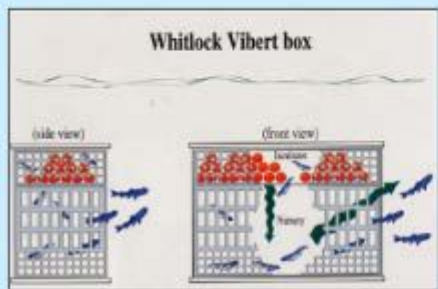
Year 2: Fry/Juveniles and Instream/ Streamside Egg Incubation

Questions from Y1 plus those focused on:

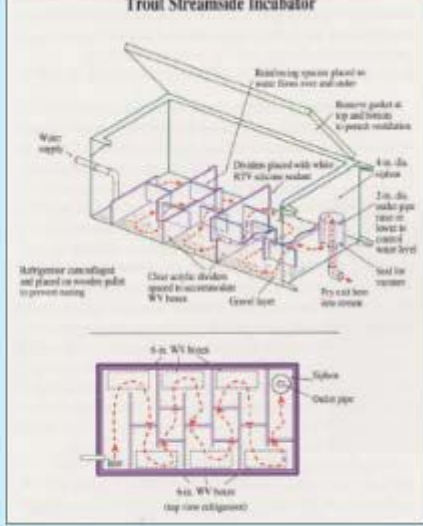
- Method for egg transplant
- Location for planting eggs
- Survival of egg-to-fry to emigrant reaching lake



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Eggs are placed in top of the Whitlock-Vibert boxes



Schematic of the Fridge Streamside Incubator



Eggs are placed in the top compartment

Boxes with eggs are placed within the fridge's 'channels'



Egg Introduction

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Year 3: Fry/Juveniles, Instream/ Streamside Egg Incubation, and Adults



Questions from Y1 and Y2 plus those focused on:

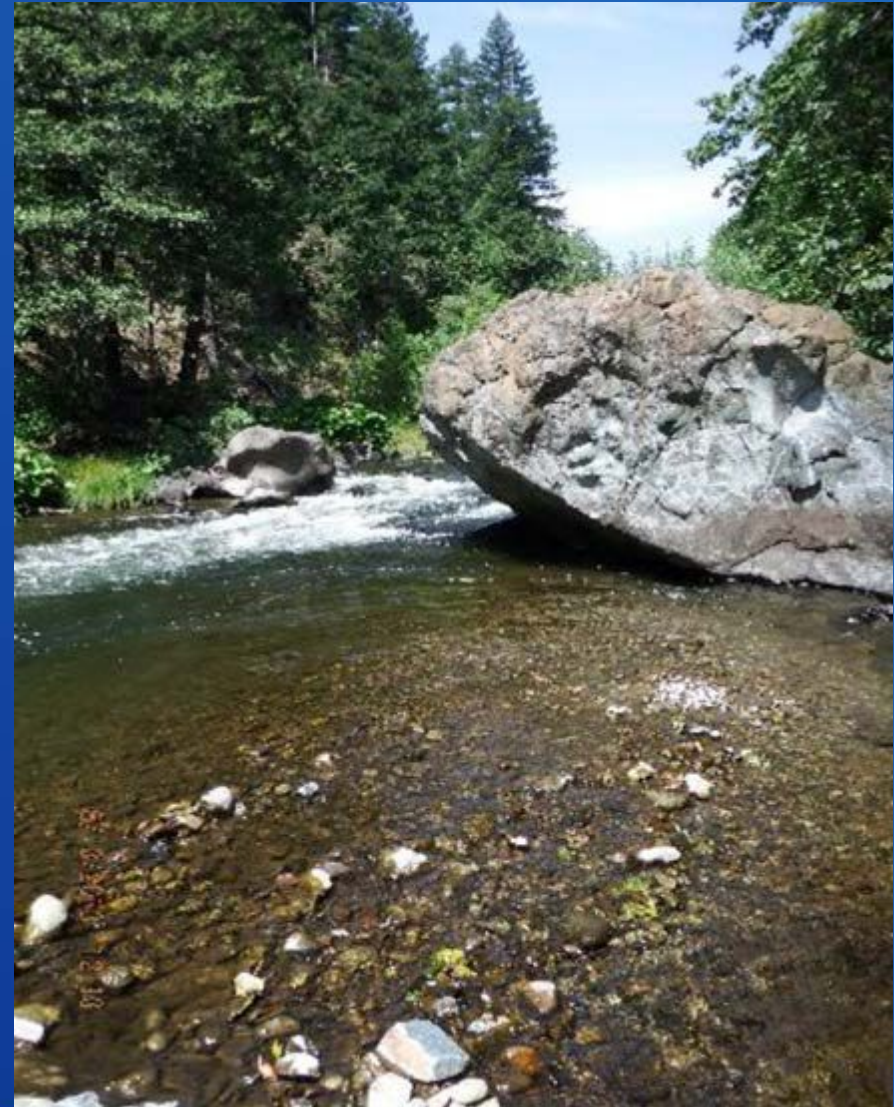
- Prespawn mortality rates
- Release location
- Recruit ratio of juvenile-to-adult female
- Sufficient holding and spawning habitat
- Distribution of holding and spawning adults



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Environmental Assessment

- Evaluates the impacts of implementing the Pilot Program
- 2 alternatives:
 - McCloud and Sacramento River introductions occurring concurrently
 - McCloud and Sacramento River introductions occurring separately



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Key Environmental Assessment Topics

- Resident fishery
- Recreation
- Water quality
- Cultural resources



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Shasta Dam Fish Passage Evaluation Project Schedule

Shasta Dam Fish Passage Evaluation Schedule

2013-2014

- Habitat assessment of Sacramento and McCloud completed
- Agency draft Pilot Implementation Plan and Environmental Assessment
- Initiation of 10(j) experimental population designation process

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Pilot Program Timeline

- Pilot Plan and EA to public – 2015
- Complete fish health study – 2015
- Captive Broodstock HGMP – 2015
- Juvenile collection designs – early 2016
- Experimental Population and EA – 2016
- Install juvenile collection device(s) – 2017
- First fish release – 2017
- Annual reports of findings - 2018, 2019, 2020...

Shasta Dam Fish Passage Evaluation

**Stakeholder and Public
Engagement**

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Stakeholder and Public Engagement

McCloud River CRMP

- February 2014
- February 2015
- September 2015

Siskiyou County Board of Supervisors

- May 2013
- January 2015

Public Meeting

- August 2013, Lakehead

Winnemem Wintu

- Multiple Meetings



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Stakeholder and Public Engagement



Caltrout Water Talk Habitat Assessment webinar

- December 2014

Field Meetings:

- Local timber managers (November 2013)
- Sweetbriar Cabin Owners (July 2014)

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Pilot Program Timeline

- Pilot Plan and EA to public – 2015
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Future Engagement

- **Pilot Plan and EA to public – 2015**
 - Public meeting to be held following document release
- **Continue meetings with stakeholders, landowners and other interested parties**
- **Annual reports of findings - 2018, 2019, 2020...**
 - Public meetings held annually during implementation to provide update on activities and gather input



Questions?

Jhannon@usbr.gov

http://www.usbr.gov/mp/BayDeltaOffice/Documents/Shasta_Fish_Passage/index.html

2:20pm

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