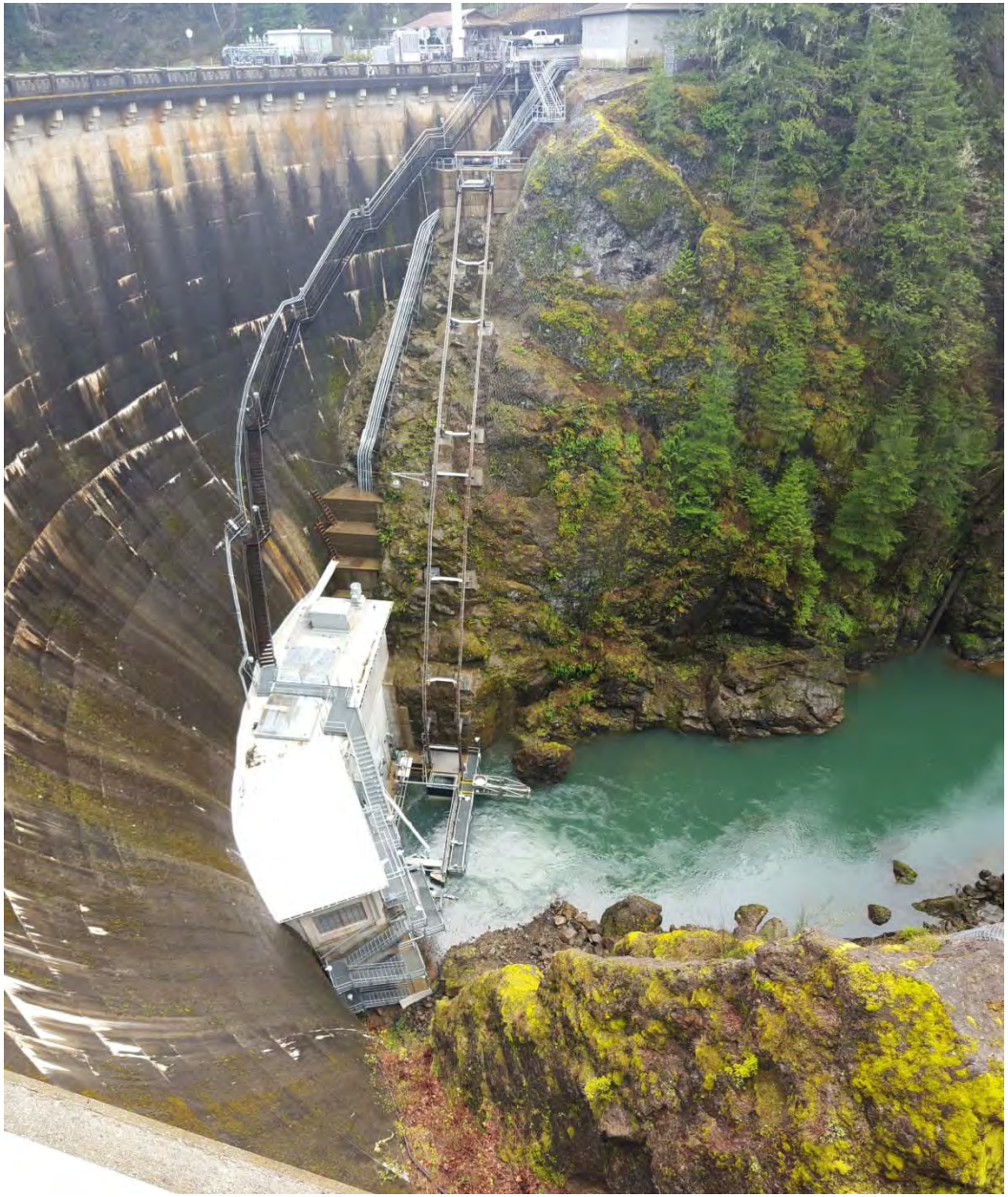
Fish Passage from the Tidewater to the Sierras Workshop - Fish Passage at High Dams - Part 1

35th Annual Salmonid Restoration Conference held in Davis, CA from March 29 – April 1, 2017.



Fish Passage from the Tidewater to the Sierras

Fish Passage at High Dams: Modern Challenges and Solutions to Addressing Uncertainty

35th Annual Salmonid Restoration Conference

March 30, 2017

Davis, California

RECLAMATION
Managing Water in the West

Acknowledgements

- American Fisheries Society – Bioengineering Section
- California Department of Fish and Wildlife
- HDR Engineering, Inc.
- NOAA – National Marine and Fisheries Service
- Reclamation
- Salmonid Restoration Federation
- Special thanks to:
  - U.S. Army Corps of Engineers, Portland District
  - U.S. Geological Survey

RECLAMATION
Managing Water in the West

Today's Speakers

- Michael Garello, PE - HDR Engineering, Inc.
- John Hannon - Reclamation
- Jonathon Mann, PE – CDFW
- Richard Wantuck – NMFS

Overview of Today's Workshop

- Regulatory Drivers
- The fish passage feasibility and design process
- Fish Passage Technologies
- Key Fish Passage Parameters
- Break
- Case Studies 1: Santa Felicia Dam
- Case Studies 2: Shasta Dam
- Panel Discussion 1: Upstream volitional passage
- Panel Discussion 2: Downstream passage and applicability of lessons learned from the Pacific Northwest

Factors Influencing Fish Passage Project Development in California

Rick Wantuck
NOAA Fisheries – West Coast Region

RECLAMATION
Managing Water in the West

NOAA's National Marine Fisheries Service
Southwest Regional Office- Habitat Conservation Division

Factors Influencing Fish Passage Project Development in California

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NOAA Fisheries – West Coast Region

Salmonid Restoration Federation - 35th Annual Conference
Davis, California - March 30 , 2017

TOPICS

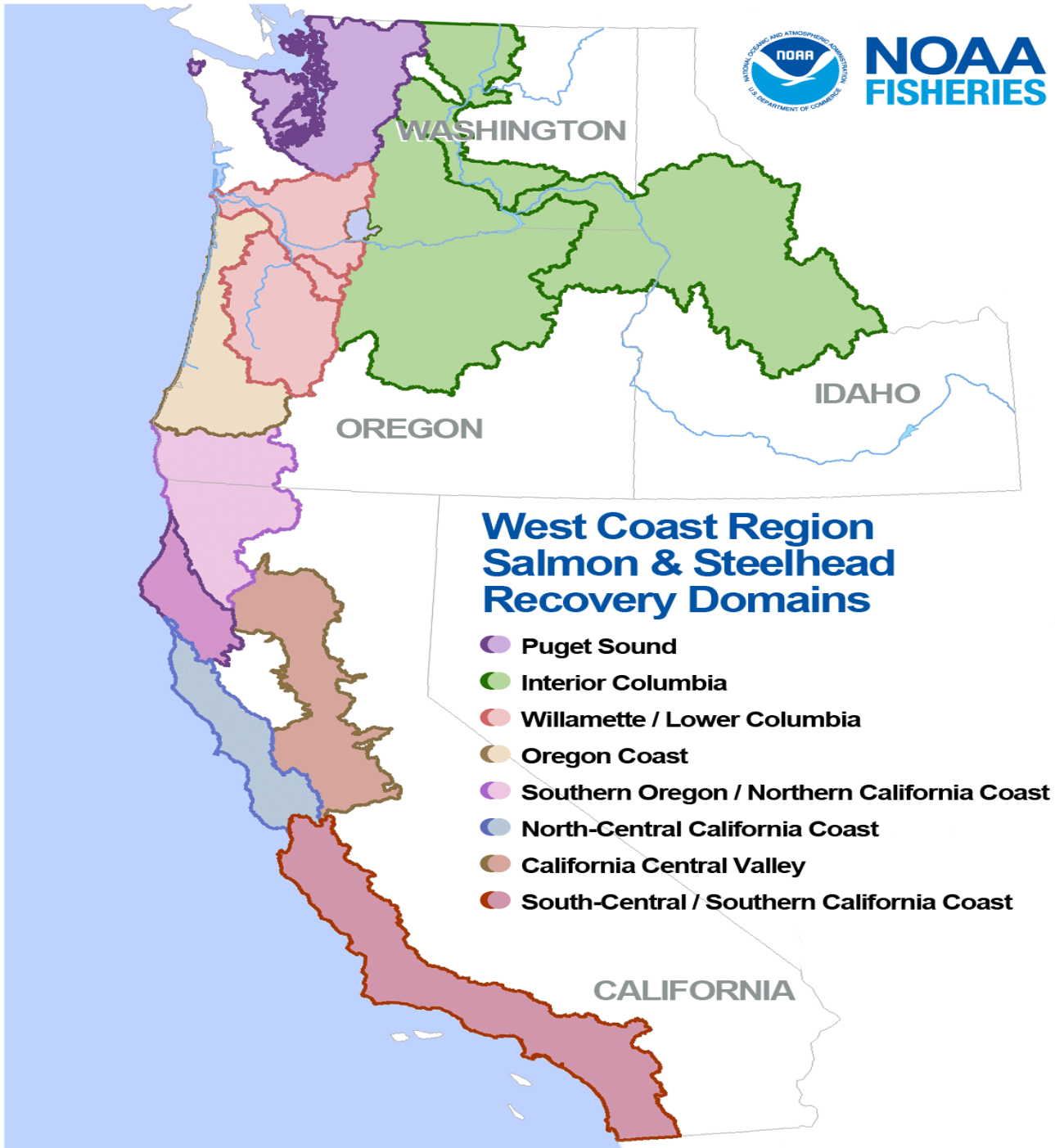
- Why Anadromous Fish Passage?
- Passage for Which Species?
- What factors influence fish passage decisions in California?
- What is the Status of select fish passage projects in key California watersheds?

Factors Influencing Fish Management Actions & Fish Passage Decisions at High Head Dams

- Status of Anadromous Fish populations
- ESA Recovery Plans; State Conservation Plans
- Collaborative Fish Passage/Habitat Restoration
- Federal-State Regulatory Actions
- Stakeholder Intervention-Environmental Lawsuits
- Multiple Uses of Water Resources
- Current and Future Utility of Dam Structure
- Feasibility and Cost of Fish Passage
- Availability of Funding and Human Resources

ESA-listed anadromous fish populations in California (NMFS 2016 Status Review)

Central Valley Steelhead – Threatened
Central Valley Spring-run Chinook – Threatened
Central Valley Green Sturgeon – Threatened
Central Valley Winter-run Chinook – Endangered
SONCC Coho – Threatened
North Coast Chinook - Threatened
Central Coast Chinook - Threatened
Central Coast Coho – Endangered
South-Central Coast Steelhead – Threatened
Southern California Steelhead - Endangered


NOAA
FISHERIES
WASHINGTON
OREGON
IDAHO
CALIFORNIA
West Coast Region
Salmon & Steelhead
Recovery Domains
Puget Sound
Interior Columbia
Willamette / Lower Columbia
Oregon Coast
Southern Oregon / Northern California Coast
North-Central California Coast
California Central Valley
South-Central / Southern California Coast

Fish Passage at California Dams

Target Species:

- **Chinook salmon**

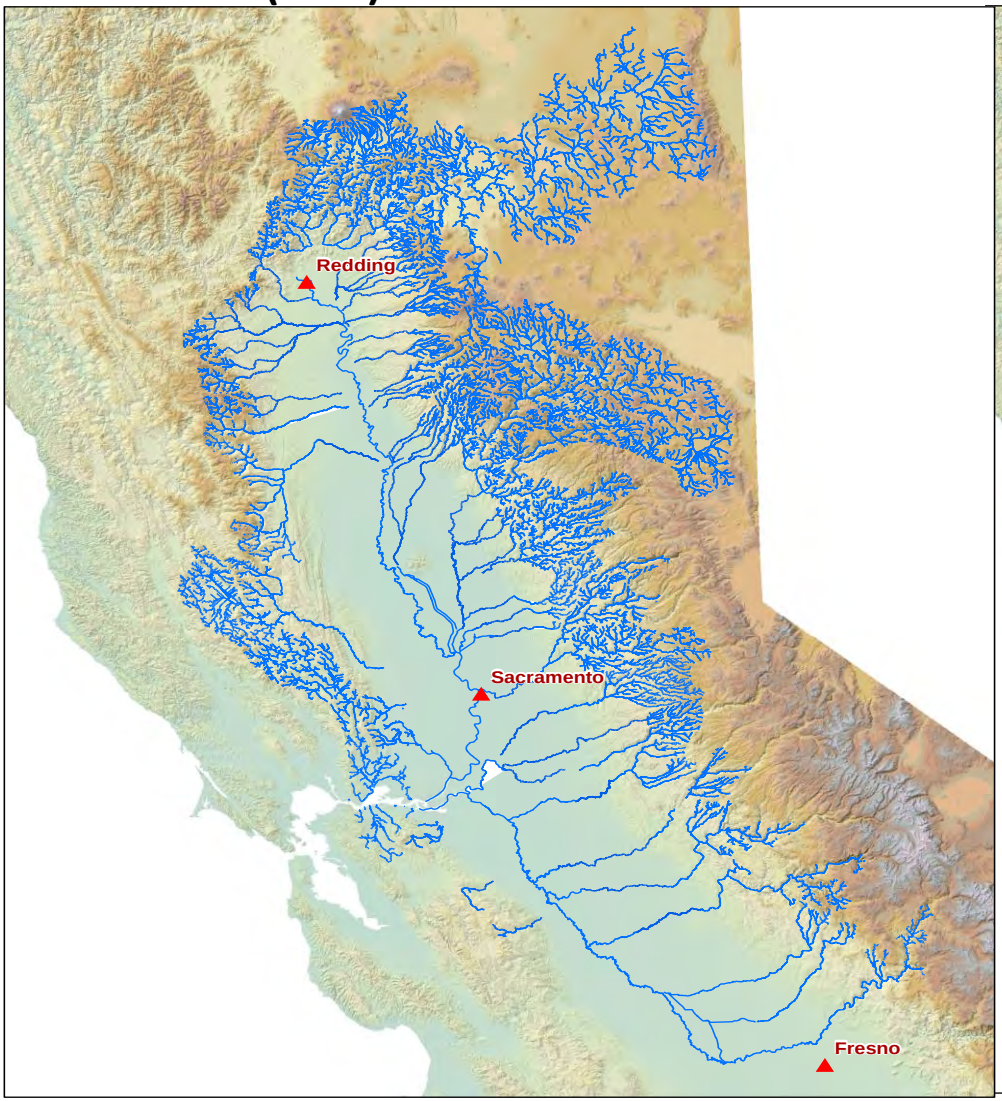
winter-run, spring-run, fall-run, late fall-run

- **Coho Salmon**
- **Steelhead**
- **Green Sturgeon**
- **Resident species**

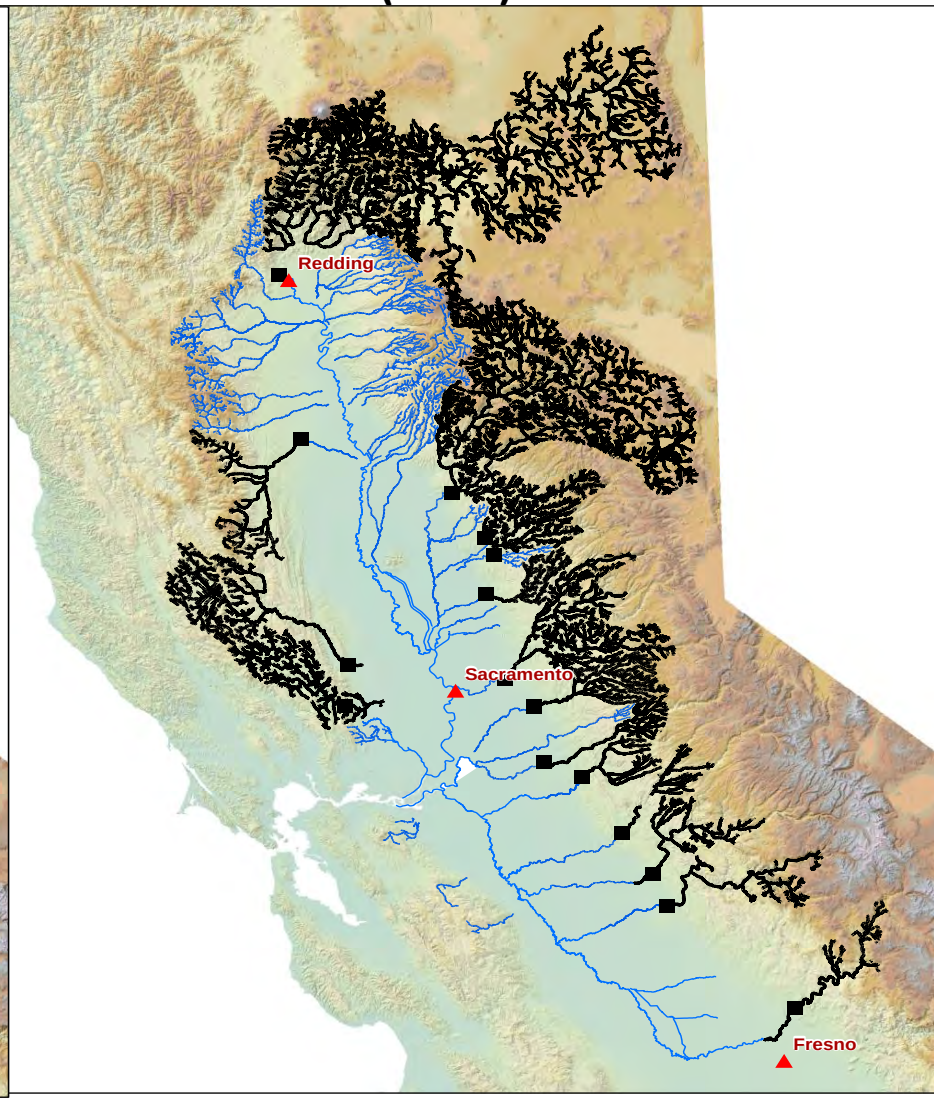
Safe, timely, and effective passage required for adult and juvenile fish in upstream and downstream directions

DAMS BLOCK ACCESS TO HISTORIC HABITAT
EXAMPLE: CALIFORNIA CENTRAL VALLEY "RIM DAMS"

Pre-Dam Era: Steelhead Habitat (blue)



Post-Dam Era: Habitat Blocked (black)



California: Multiple Use Watersheds

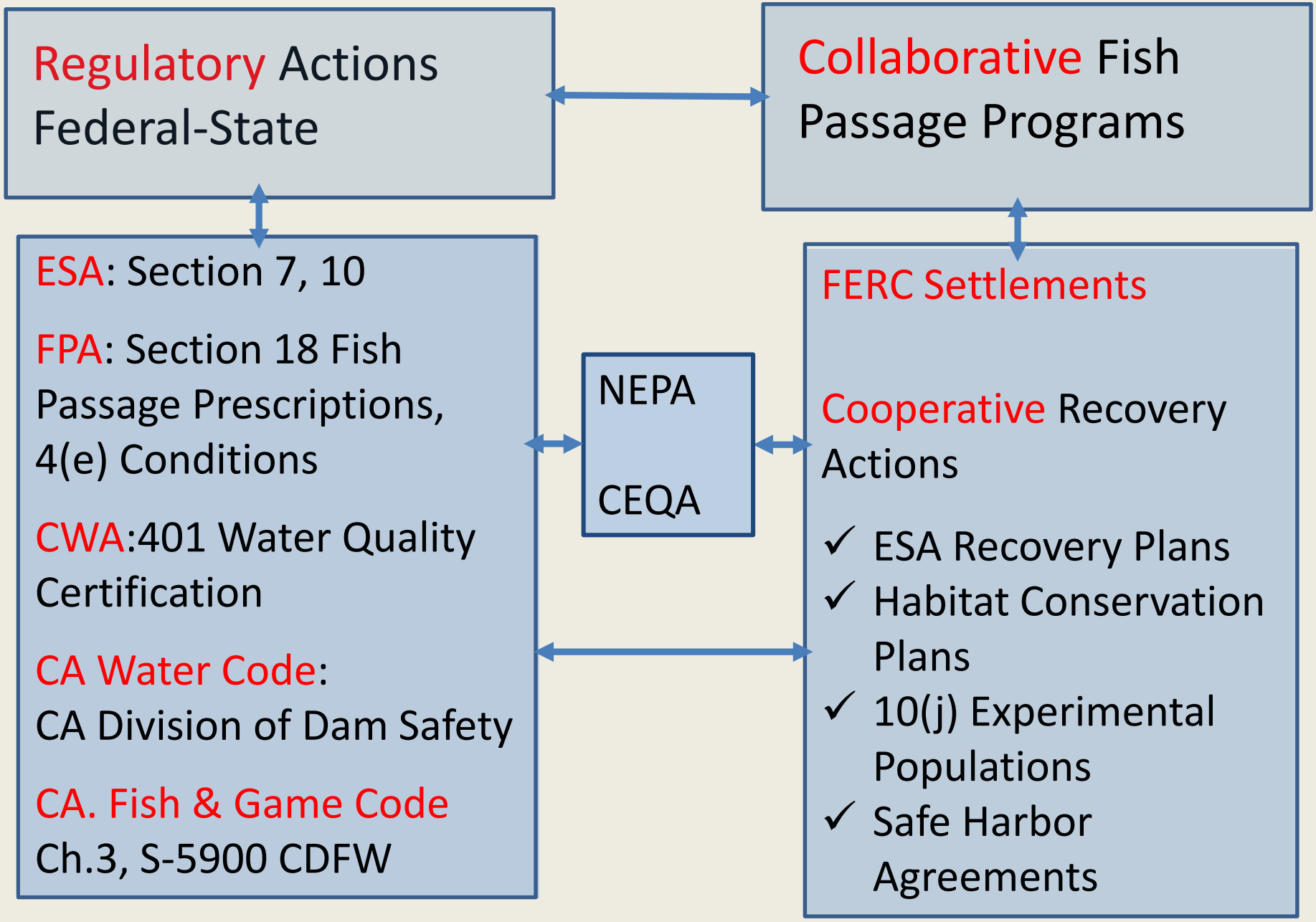
- **Flood Control**
- **Hydropower**
- **Water Supply, Storage and Delivery**
- **Recreation and Fishing**
- **Anadromous fish…and other native species**
- **“Ecosystem Services”**

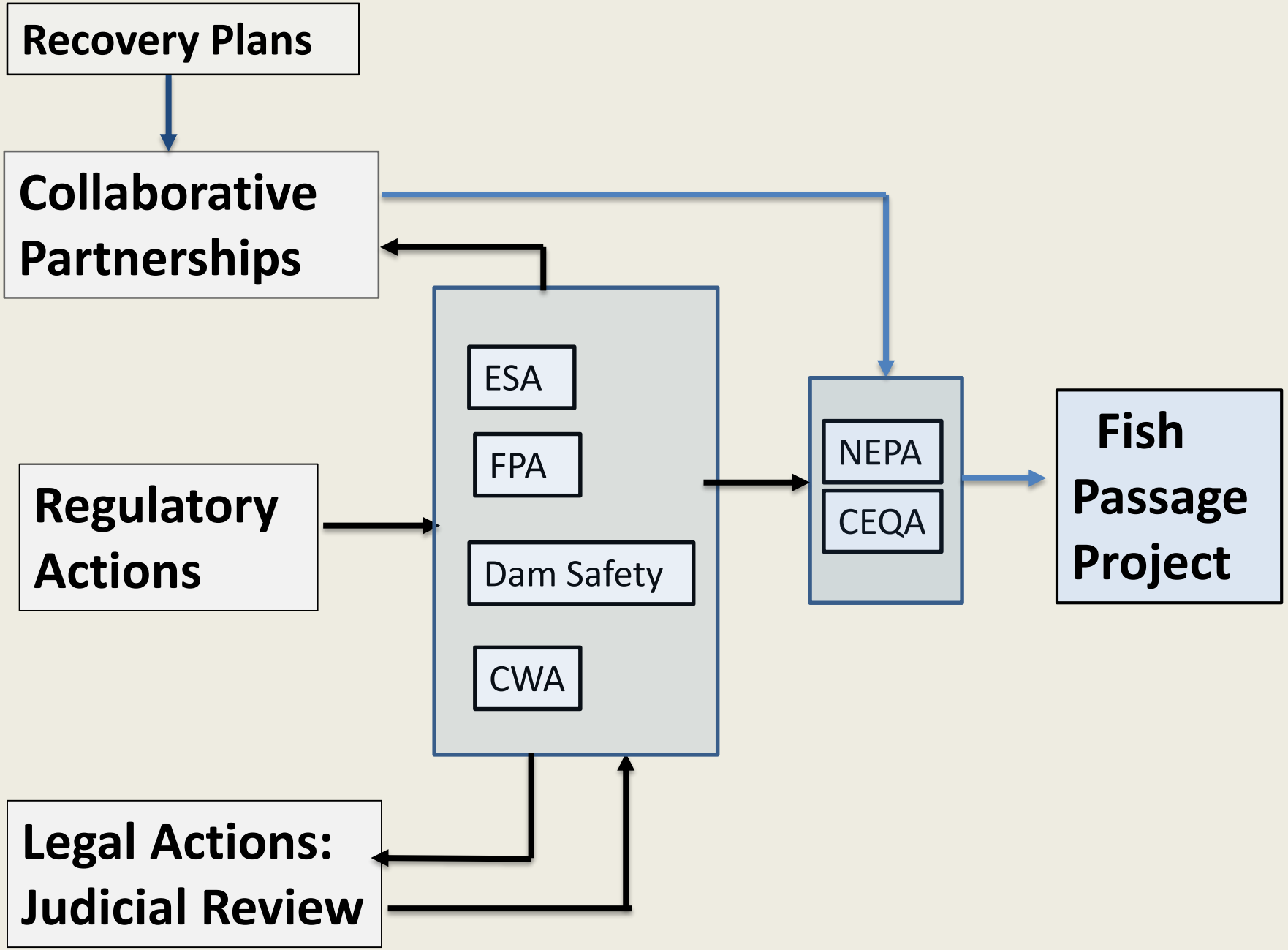
Fish Passage Decision Analysis

for determining appropriateness of upstream fish passage

- Is historic habitat blocked?
- Is blocked habitat is potentially viable?
  - quantity/quality of viable habitat?
  - habitat productivity?
  - contribution toward recovery?
- Is fish passage technologically feasible?
- What is the cost of fish passage?
- Will restored access to habitat appreciably contribute to resource management goals for watershed or fishery?

Drivers of Fish Passage Project Decision-Making



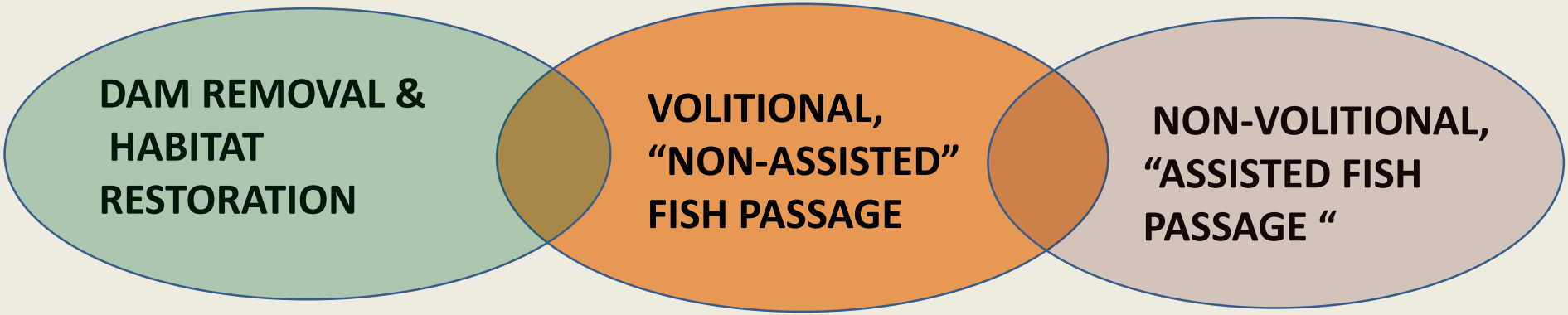

Recovery Plans
Collaborative Partnerships
Regulatory Actions
Legal Actions: Judicial Review
ESA
FPA
Dam Safety
CWA
NEPA
CEQA
Fish Passage Project

FERC's Standard for Issuing Long-Term Hydropower Licenses under the Federal Power Act

…Commission must determine [project] will be best adapted to a *comprehensive plan* for improving or developing the waterway.

In addition to…power/development purposes… Commission must give equal consideration to energy conservation and the protection and enhancement of fish and wildlife, aesthetics, cultural resources, and recreational opportunities

Range of Fish Passage Approaches

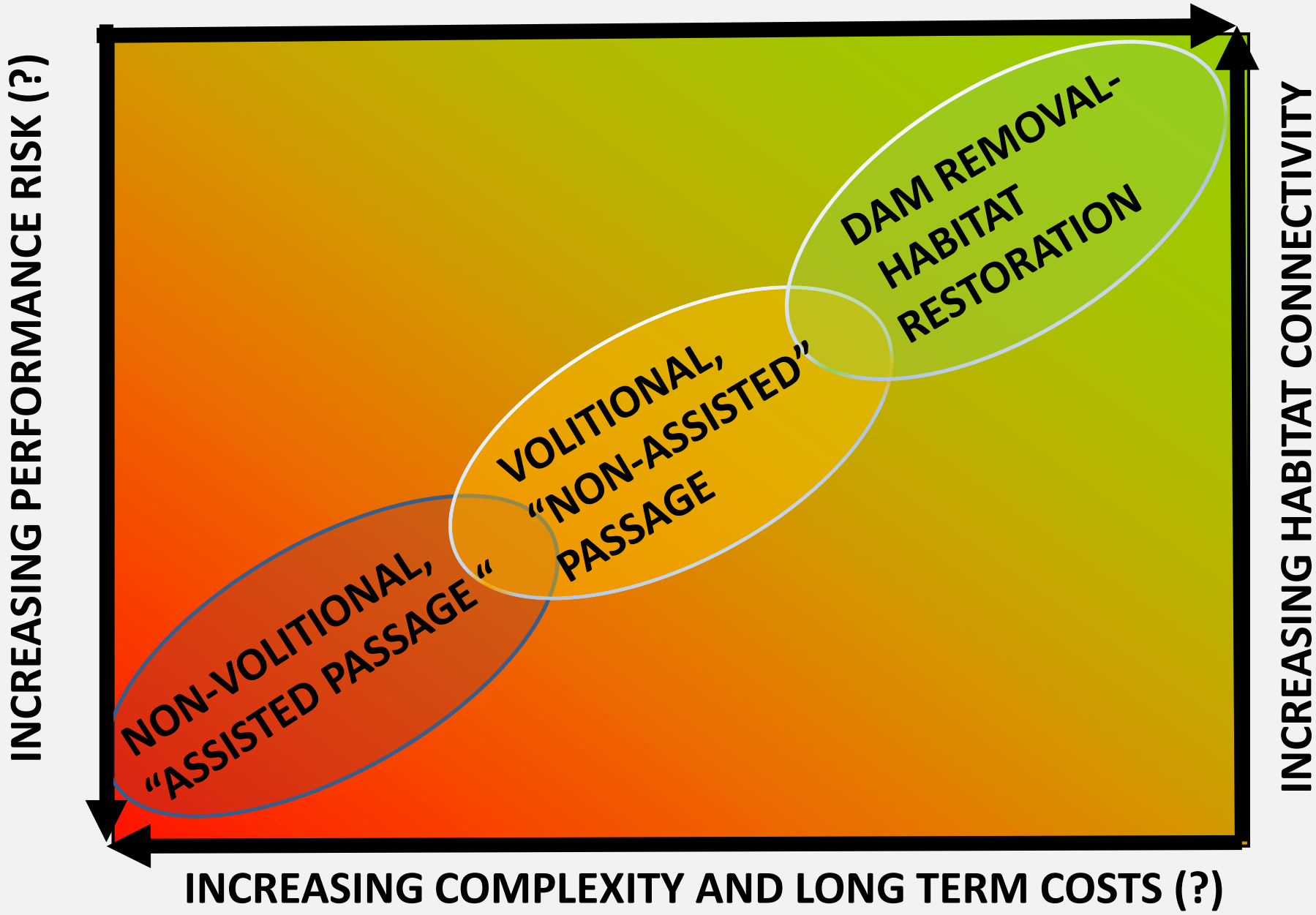


Geomorphic <----------> **Engineered**

(Natural) **(Unnatural)**

"Stationary" "Mobile"

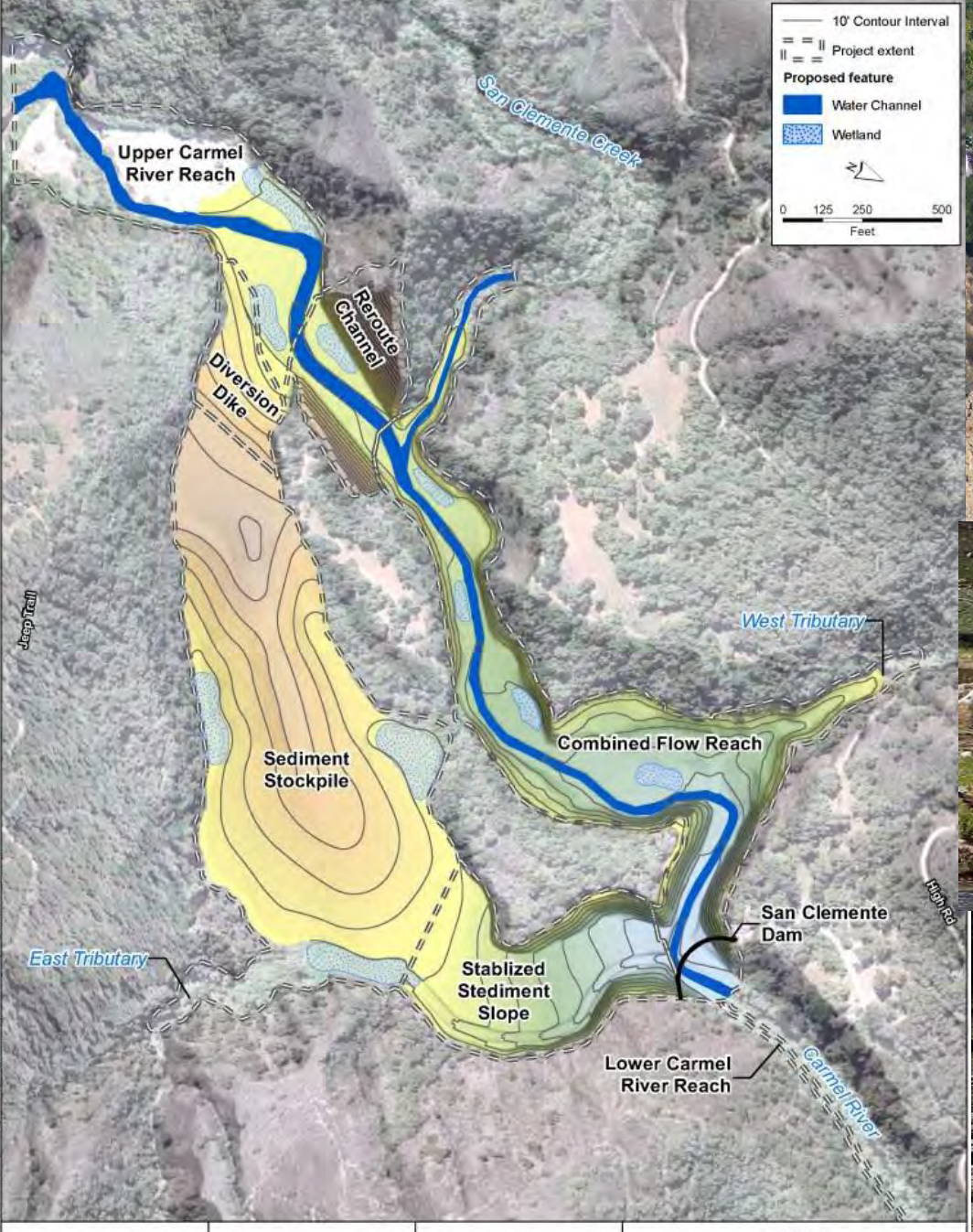
"Passive" "Active"


INCREASING ECOSYSTEM INTEGRITY AND BENEFITS
INCREASING PERFORMANCE RISK (?)
INCREASING HABITAT CONNECTIVITY
DAM REMOVAL-
HABITAT
RESTORATION
VOLITIONAL,
"NON-ASSISTED"
PASSAGE
NON-VOLITIONAL,
"ASSISTED PASSAGE "
INCREASING COMPLEXITY AND LONG TERM COSTS (?)

Status of Some Fish Passage Projects at high dams in California

- San Clemente Dam (removed)
- Matilija Dam
- Klamath River Mainstem Dams
- Shasta, Folsom, New Melones Dams
- Oroville-Feather River
- Santa Felicia Dam


San Clemente Dam
Carmel River
Removed 2015



	CARMEL RIVER REROUTE AND SAN CLEMENTE DAM REMOVAL MONTEREY COUNTY, CA	DATE OF PREPARATION: 1/24/2012 DATE OF SUBMISSION: 1/30/2012 URS PROJECT NO. 26818107	**FIGURE 2** CONSTRUCTION AREAS WITHIN THE SAN CLEMENTE PROJECT AREA

Matilija Dam
Matilija Creek
(near Ojai, CA)


1948 Photo
Matilija Dam

- Sediment Filled Reservoir (~6M Yds^3)
- Lost Utility as Water Supply or Flood Control

✓ Sediment Transport Modeling/Analysis

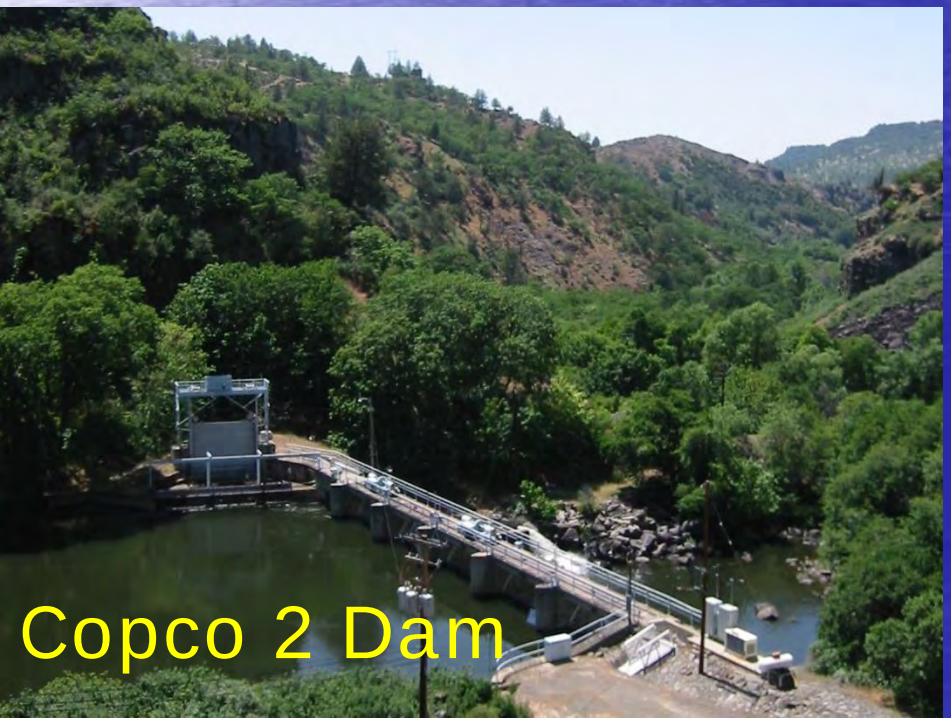
Preliminary Fish Passage Plan;

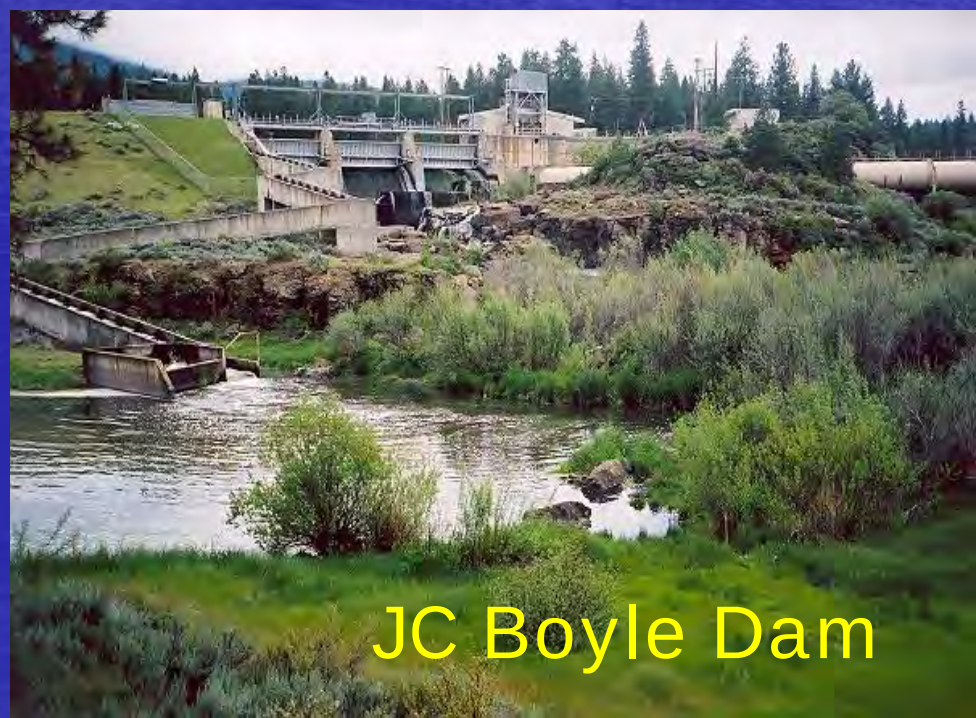
- ➢ Rapid removal sequence
- ➢ 2 (plugged) penetrations at base of dam
- ➢ Explosion of plugged orifices to initiate drawdown

Matilija Dam Removal Status

- Dam Removal Movement Began About the Time of NMFS' ESA Listing
- Fish Passage to Upper Watershed Habitats Identified in NMFS Southern California Steelhead Recovery Plan
- Dam No Longer Serves Any Useful Functions; removal is feasible
- Technical Working Groups identified a preferred alternative for removal
- More Leadership, Funding, and Permitting are needed to trigger Implementation

Four Klamath River Mainstem Dams

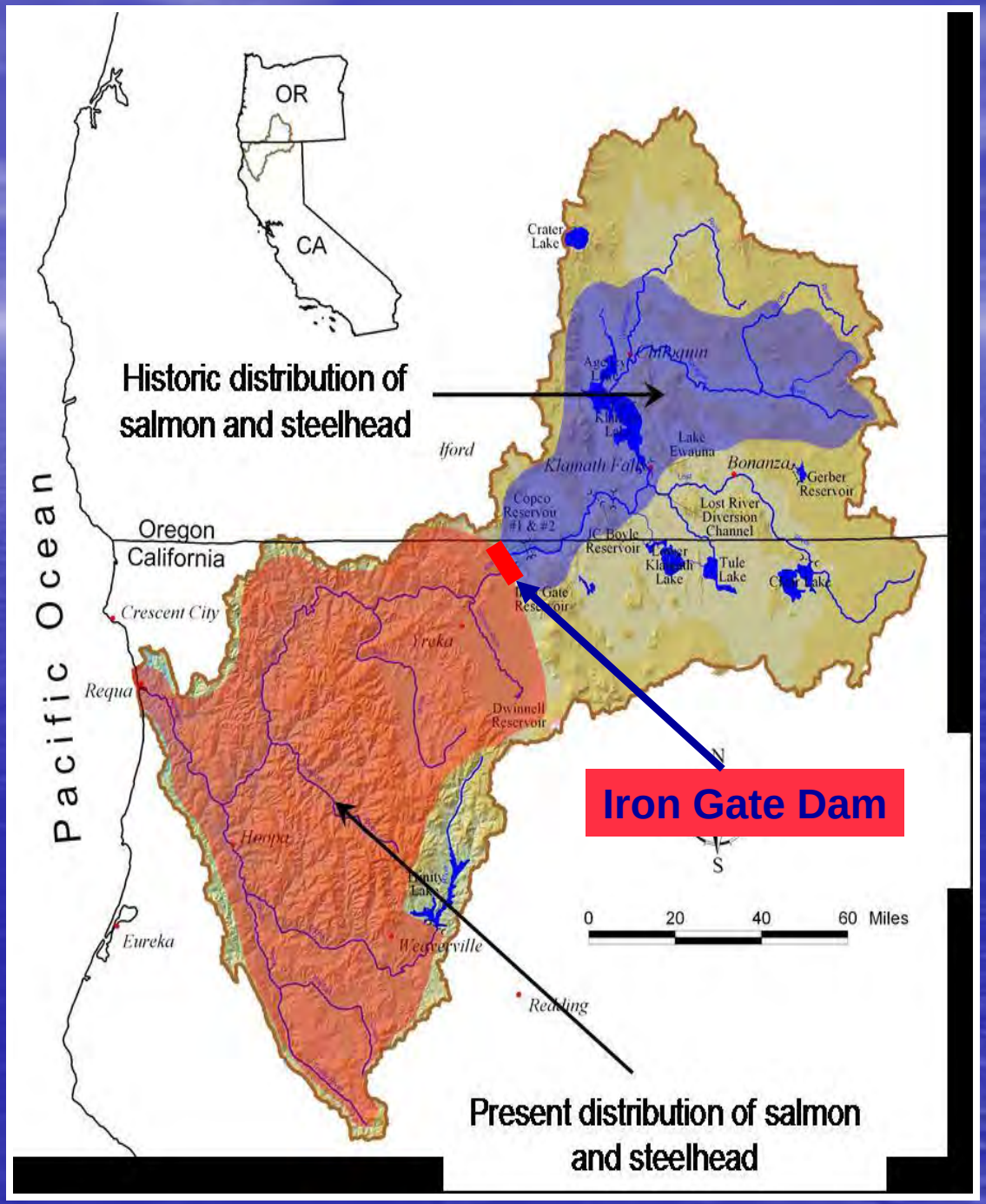




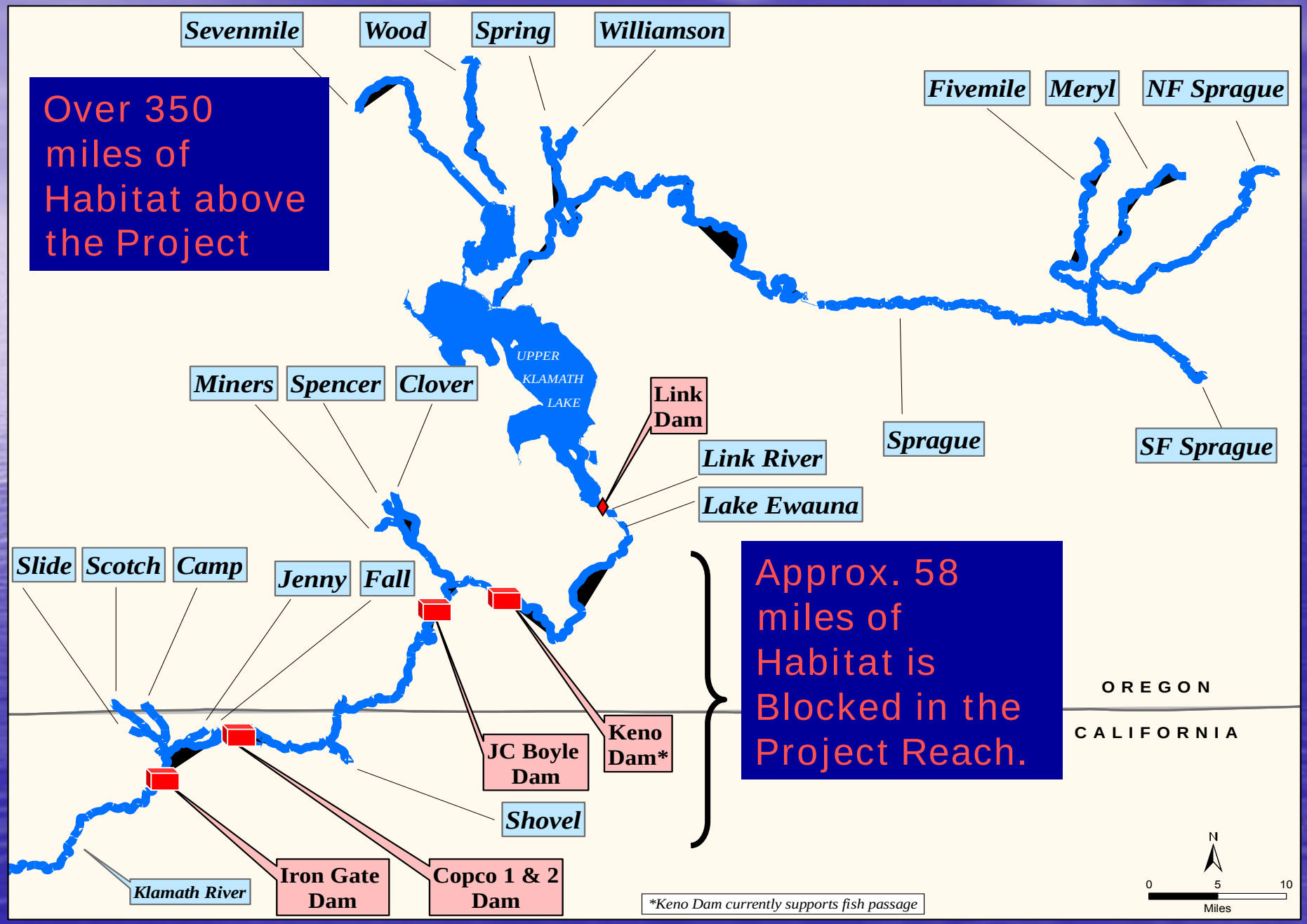
No Salmon Passage Into Project Reach:

Dams have blocked or impeded access to over 400 miles of historic habitats since 1918.

No anadromous fish exist in Project Reach today due to Iron Gate Dam.



Need for Fish Passage



Klamath Fisheries- All Species: Heavily impacted by drought

Coho – Listed ESA threatened in 1997.

- Chinook -
  - Spring run once dominant above UKL, now remnant
  - Fall Run now predominant commercial/tribal/sport run. Low numbers in 2006 lead to fishery restrictions.

- Lamprey – Important to Tribes

Steelhead – Important sport fish, *O.mykiss* above Iron Gate could revert to anadromy if passage provided.

Redband Trout – Important sport fish, listed sensitive species in Oregon.

Klamath River Mainstem Dams: Dam Removal

2001-2006 FERC Relicensing (Federal Power Act)

- NMFS/USFWS Joint Section 18 Fish Passage Prescriptions
- Klamath Trial-Type Hearing

2006-2012 Multiple Stakeholder Negotiations

- Agreement in Principle to Remove Dams, Allocate Water Resources, Protect Economic Interest

April 2016 – Amendment of KHSA

- DOI, NOAA, PacifiCorp, Oregon, California
- Return to FERC Process for Dam Decommissioning and Removal by non-profit Klamath River Renewal Corp (KRRC)

NMFS 2009 CVP-OCAP Biological Opinion

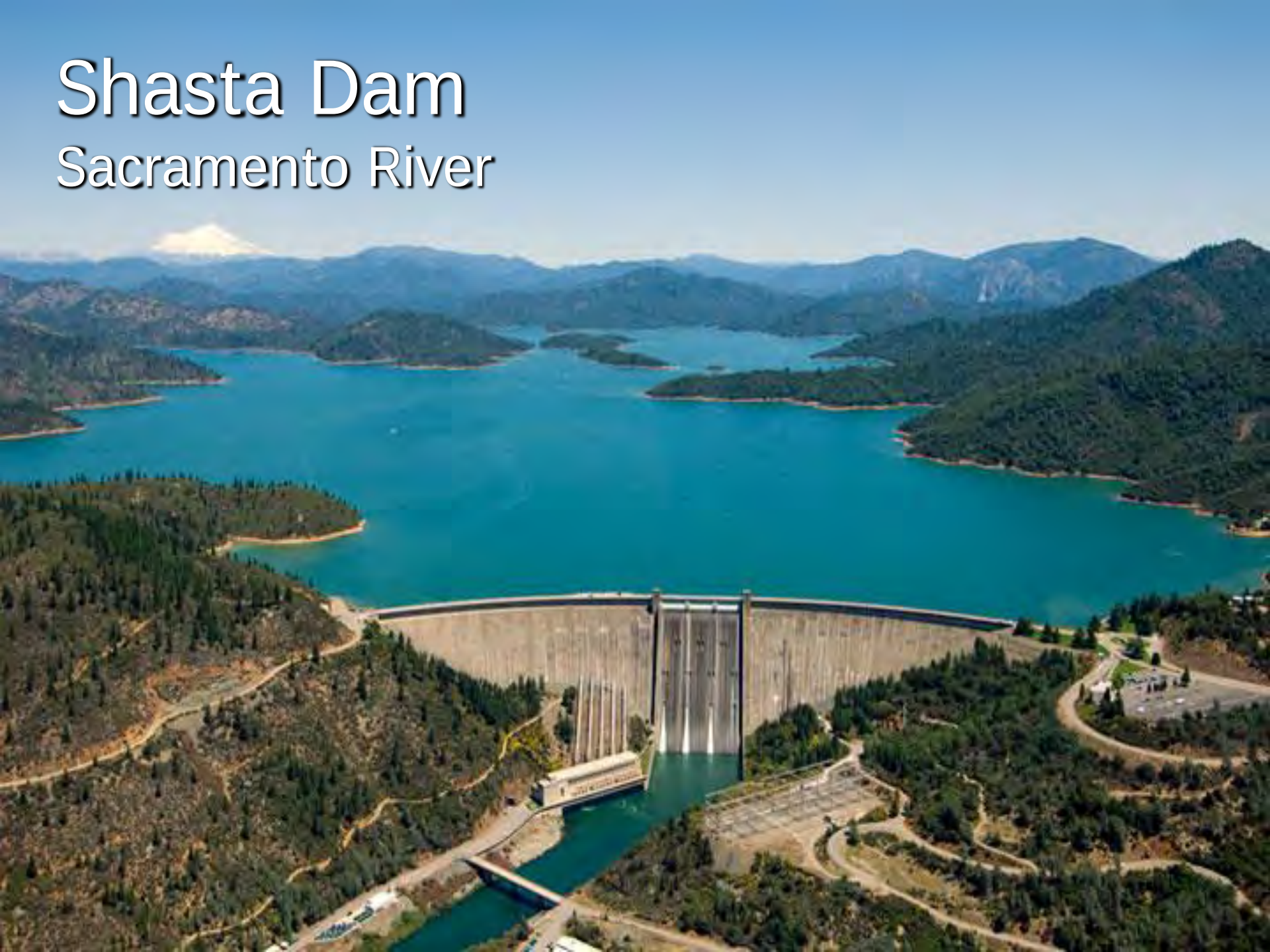
"Reasonable and Prudent Alternative"

Fish Passage Programs for salmon and steelhead

Upper watershed habitats

Shasta Dam

Sacramento River



Downstream Passage Alternatives

Floating Surface Collector

Montgomery-Watson-Harza 2010

Downstream Passage Alternatives

Floating Surface Collector

Montgomery-Watson-Harza 2010


Shasta Reservoir and Upper Tributaries:
Upper Sacramento, McCloud, Pit Rivers

Downstream Passage Alternatives

Tributary Diversions and Fish Screens


Oroville Dam
Feather River

Oroville Dam

& Feather River Hydroelectric Projects

Feather River FERC Licensed Hydroelectric Projects

CA Department of Water Resources

Oroville-Feather River – *Project No. 2100*

762 MW

Pacific Gas and Electric

* **Upper North Fork Feather River-** *Project* No. 2105

3 dams, 5 power plants, 362 MW

* **Rock Creek Cresta-** *Project No. 1962*

185 MW

* **Poe** – *Project No. 2107*

143 MW

South Feather Water & Power Agency –

FERC Project No. 2088

104 MW

Feather River Hydroelectric Project(s)

- DWR and PG&E operating on annual licenses authorized by FERC
- Habitat Expansion Agreement (2007-2010)
- NMFS December 5, 2016 Biological Opinion – no jeopardy

Santa Felicia Dam - Piru Creek

Santa Clara River Watershed

Santa Felicia Dam – *Project No. 2153*

- **Licensee: United Water Conservation District**
- **FERC issued 40 year license 9/2008**
- **NMFS submitted FPA 10(j) recommendations 2007**
- **NMFS Jeopardy Biological Opinion**
- **(ESA) Habitat Conservation Plan**
- **Fish Passage Study and Report**

Discussion ?

NMFS-SWR
Habitat Conservation
Division

Questions?

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