Klamath River Update

Bob Pagliuco
Marine Habitat Restoration Specialist
NOAA Restoration Center
PSMFC Annual Meeting
September 9, 2024

NOAA FISHERIES
Restoration Center

Photo – Thomas Dunklin

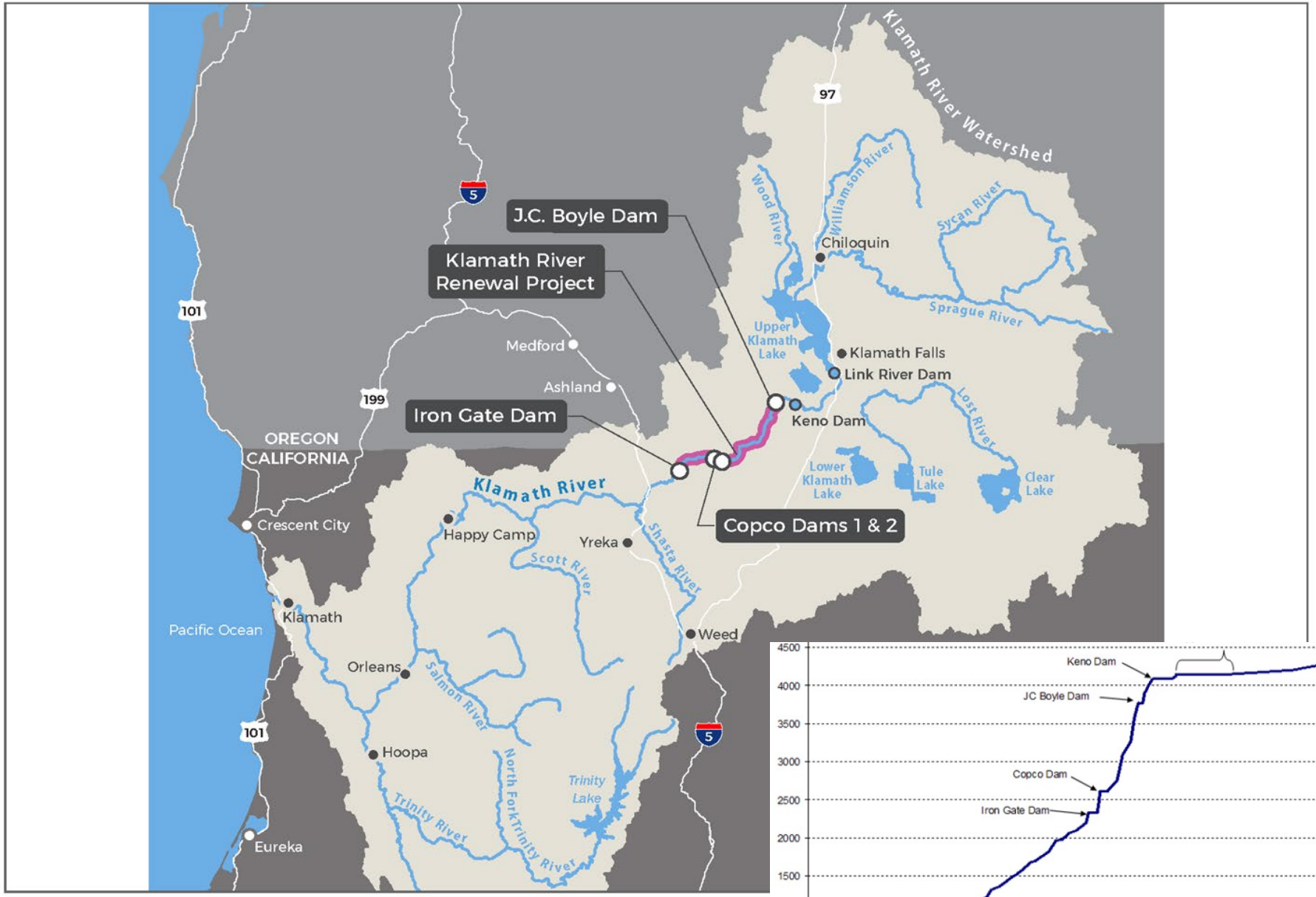
Presentation Overview and Key Themes

- Klamath Overview and Path to Dam Removal
- Current Status of Dam Removal
- Challenges and Opportunities
- Restoration and Monitoring Efforts

Photos – Swiftwater Films

Klamath Basin

- Second largest watershed in California
- Third largest salmon producer on the West Coast (historically 1 million salmon)
- Unique habitat in the Upper Basin including spring dominated systems, marshes, and lakes
- Diverse interests including Tribal, agricultural, public lands, municipal, and recreational uses
- Stressors – dams, agriculture, mining, logging, fishing, hatcheries
- Decline in fishery has had critical consequences to Tribal communities and ocean salmon fisheries



KLAMATH RIVER RENEWAL CORPORATION

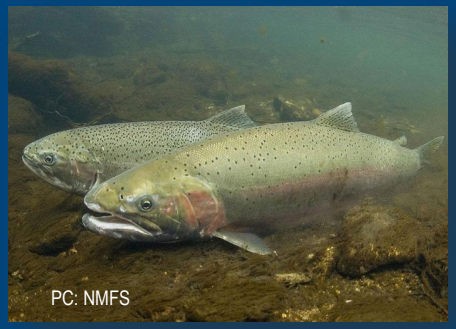
www.klamathrenewal.org

Klamath Basin - High diversity of fishes (45 native species)

Chinook Salmon (spring and fall-run)

State of CA Endangered (spring-run)

Pacific Lamprey



Steelhead Trout (anadromous *O.mykiss*)

Coho Salmon

Federally Threatened

Klamath Smallscale Sucker

Bull Trout – Federally Threatened

Lamprey ssp.

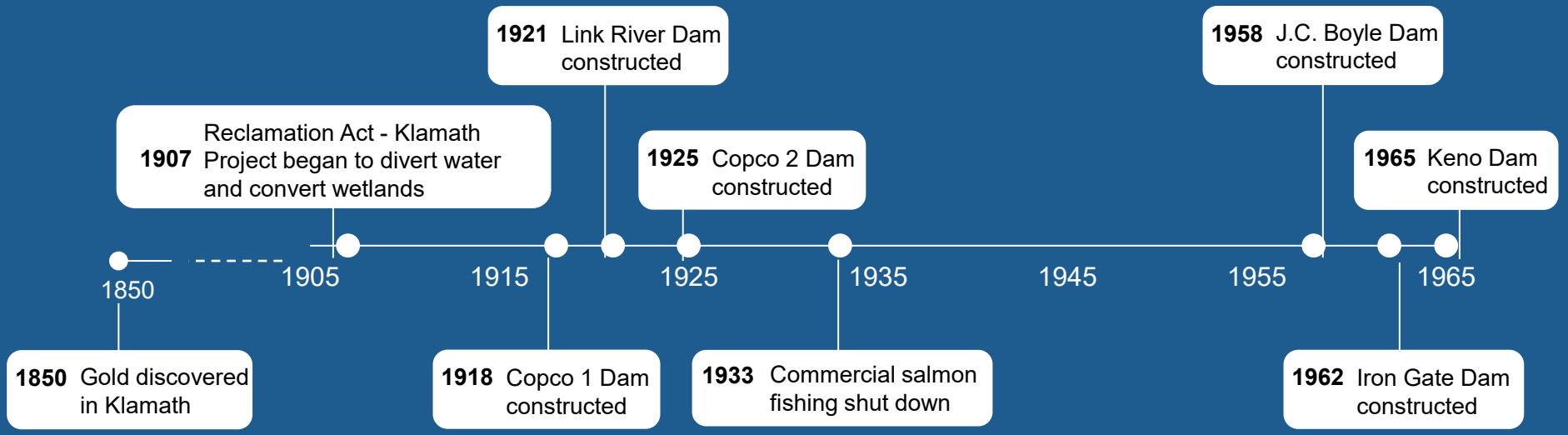
Redband Trout (fluvial *O. mykiss*)

Lost River Sucker - Federally Endangered

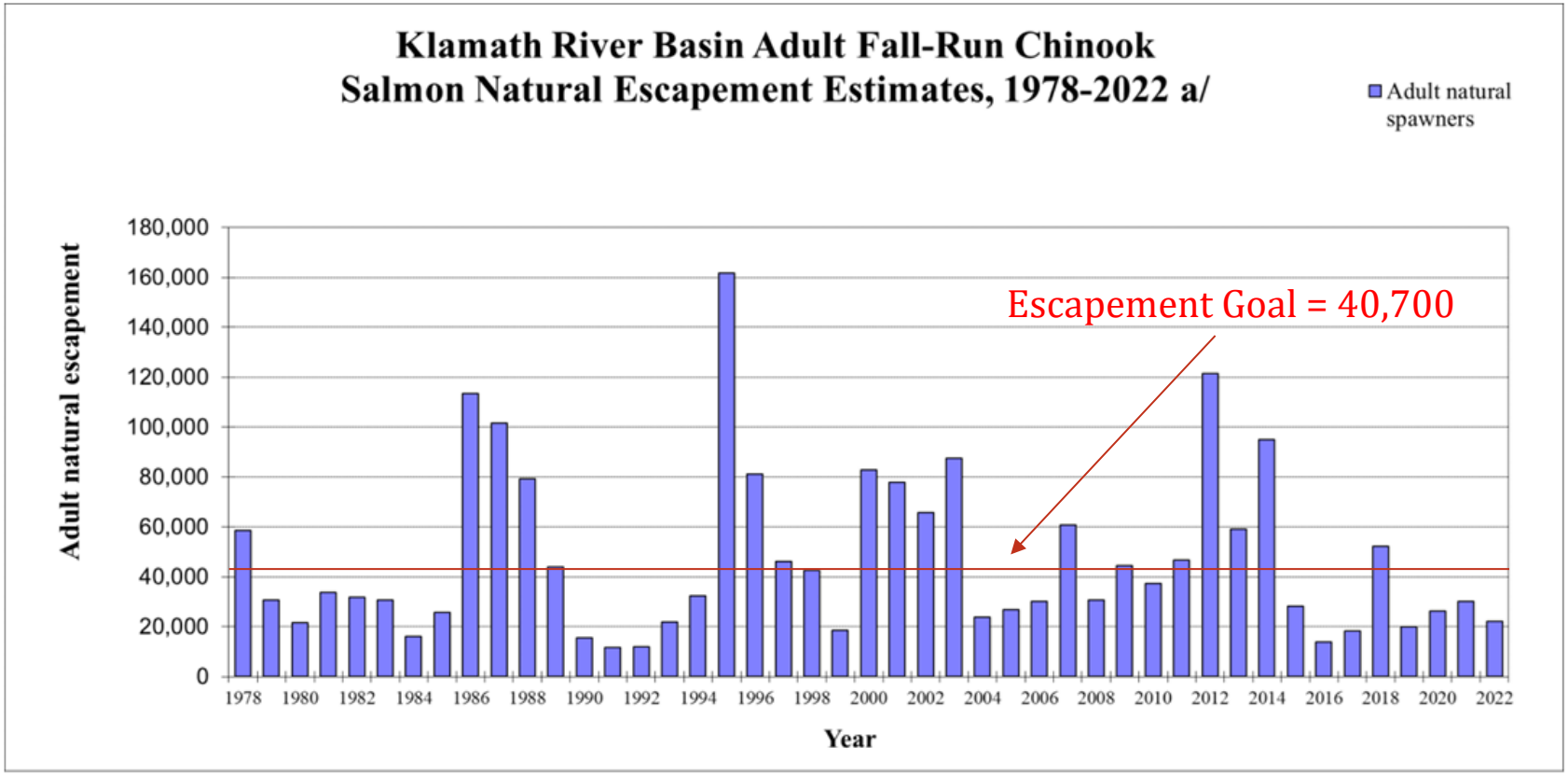
Redband Trout (adfluvial *O. mykiss*)

Shortnose Sucker - Federally Endangered

Key Moments in History (1850 – 1965)



Chinook Population Decline

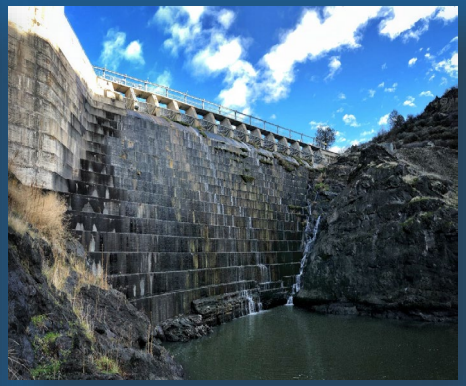


a/ 2022 data are preliminary

Met or exceeded goal only 20 out of the past 45 years

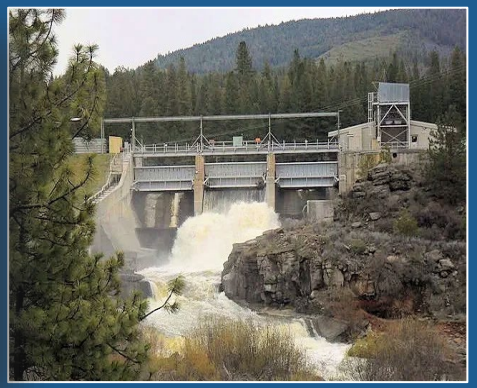
Four Hydroelectric Dams Removed

PC: Scott Wright



PC: Scott Wright

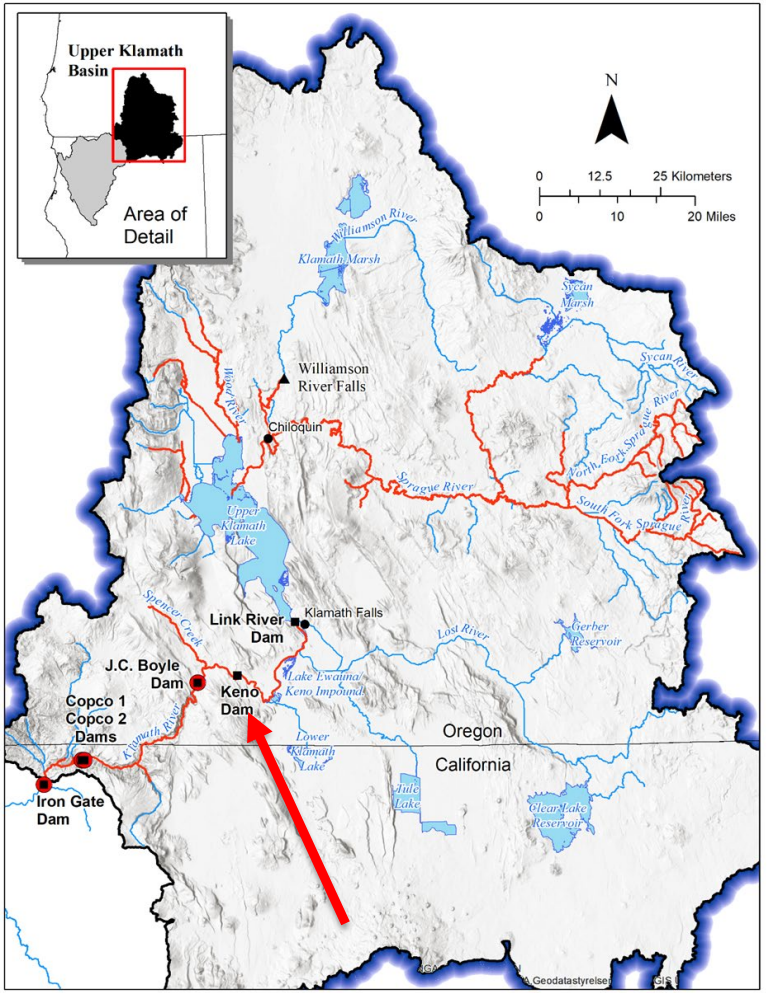
PC: PacifCorp



PC: PacifCorp

Iron Gate Dam Constructed in 1962 173 feet high RM 190	Copco 1 Dam Constructed in 1919 126 feet high RM 198	Copco 2 Dam Constructed in 1925 20 feet high RM 198	JC Boyle Dam Constructed in 1957 60 feet high RM 224 (in Oregon)

Photo – ODFW



Keno Dam, 24 ft high, built in 1967

No current plans for removal

Partial passage at fish ladder

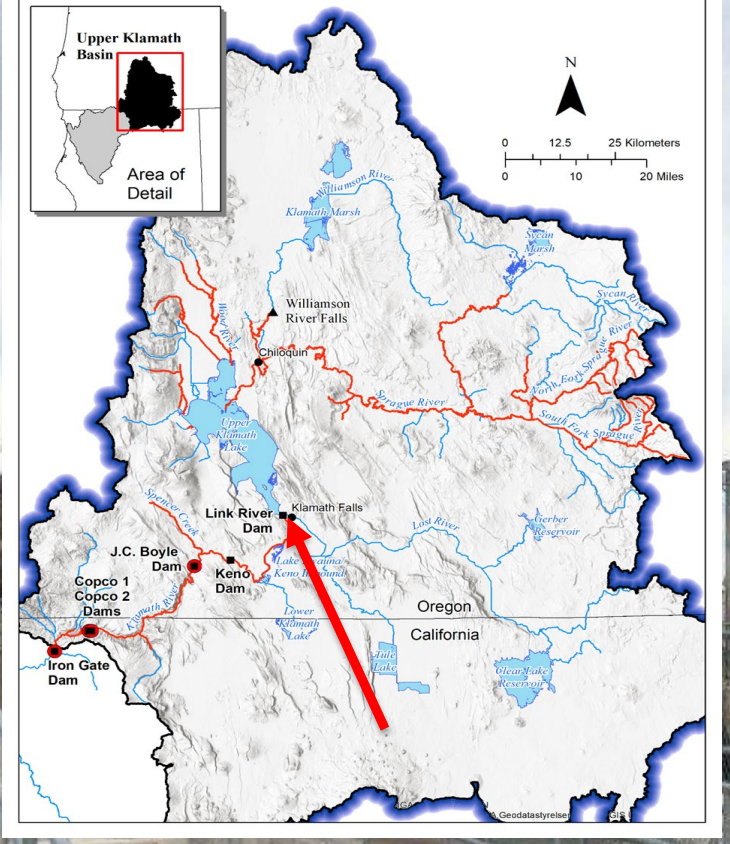


Photo – ODFW

2

Link River Dam, 22 ft high, built in 1921

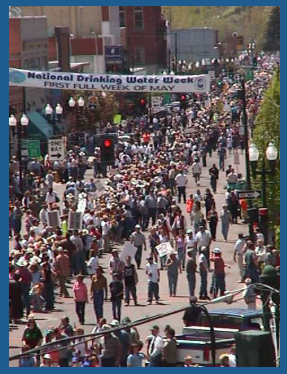
No current plans for removal

Assumed passage at fish ladder

How Dam Removal Became Possible (2000-2009)

2001 Bureau of Reclamation cuts water deliveries to farms to protect coho salmon. 20,000 people march in protest of the irrigation shutoff.

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009



Water Wars: Over several decades, people spent most of their time in courtrooms suing each other to protect their families, communities, environment, and ways of life.

The conflict escalated in 2001, when Bureau of Reclamation operators cut water deliveries to farms to protect threatened coho salmon.

Photos – Klamath Justice Coalition

How Dam Removal Became Possible (2000-2009)

2001 Bureau of Reclamation cuts water deliveries to farms to protect coho salmon. 20,000 people march in protest of irrigation shutoff.

2002 Farmers receive full water allocations during ongoing drought. This leads to the largest fish kill in U.S. history, in which 70,000 adult salmon die.

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

Photos – Yurok Tribe

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2005 Basin wide agreement negotiations begin

2006 As part of Federal Energy Regulatory Commission license renewal, NOAA Fisheries requires PacifiCorp provide fish passage over the dams.

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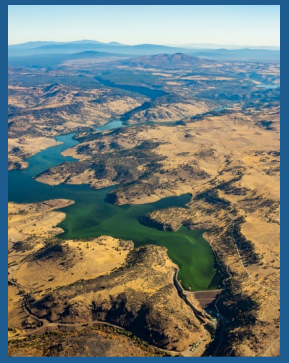

Dam Relicensing: The Federal Energy Regulatory Commission needs a license to operate a dam. The dam license needs renewal every 50 years.

Building and maintaining 4 giant fish ladders to create passage was not cost effective for PacifiCorp, leading to multi-party negotiations for dam removal beginning.

Photo- Ecoflight

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2008-2009 Draft Klamath Basin Restoration Agreement and Klamath Hydroelectric Settlement Agreement are released, providing settlement of key water conflicts and calling for removal of four dams.

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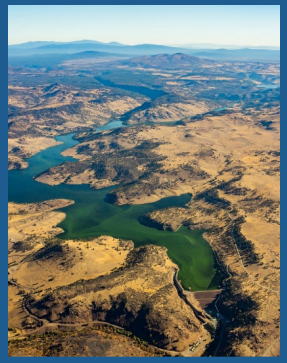

Building Basin Wide Agreements: Negotiations led to the draft Klamath Basin Restoration Agreement (KBRA), which provides settlement of key water conflicts and major salmon restoration, and Klamath Hydroelectric Settlement Agreement (KHSA), which calls for removal of four dams.

Photo- Ecoflight

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2003 Klamath Justice Coalition formed

2004 Protests at Scottish Power board meeting

2005 Basin wide agreement negotiations begin

2005 Portland protest of absence of salmon in Klamath

2006 As part of Federal Energy Regulatory Commission license renewal, NOAA Fisheries requires PacifiCorp provide fish passage over the dams.

2007 Caravan from San Francisco to Salt Lake City, then to Omaha

2008 Protest in Omaha demanding dam removal

2008-2009 Draft Klamath Basin Restoration Agreement and Klamath Hydroelectric Settlement Agreement are released, providing settlement of key water conflicts and calling for removal of four dams.

2009 Tribes organize "Day of Action Against PacifiCorp"

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

Activism from Tribes, NGOs, and fishing community has been crucial.

Photo – Klamath Justice Coalition

A New Pathway to Dam Removal (2010-Present)

2010-2013 Final KBRA and KHSA signed by all parties.

2016 Congress fails to pass legislation that would implement the KBRA, effectively ending the agreement.

2010 2012 2014 2016 2018 2020 2022 2024

Photo – Klamath Justice Coalition

In 2010 to 2023, the final KBRA and KHSA agreements were signed by all parties.

However, Congress failed to pass legislation that would implement the KBRA (~$1 billion), effectively ending the agreement.

A New Pathway to Dam Removal (2010-Present)

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2016 Klamath River Renewal Corporation, an independent non profit organization, is formed under an amended KHSA.

2010 2012 2014 2016 2018 2020 2022 2024

Signatories to KHSA appointed KRRC to take possession of the dams and oversee the removal of four dams and restoration of reservoirs.

Funded by PacifiCorp customer surcharges ($200M), California Prop 1 water bond funds ($250M), and contingency funds provided by the states ($50M).

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2021-2022 - FERC approves transfer

FERC approves surrender

2010 2012 2014 2016 2018 2020 2022 2024

2010 Protest in Salem, Oregon

2013 Protest in Portland, Oregon

2016 Protest in Washington, D.C.

2020 Protests in D.C., Klamath, Portland, Sacramento

Activism from Tribes, NGOs, and fishing community continues to be crucial.

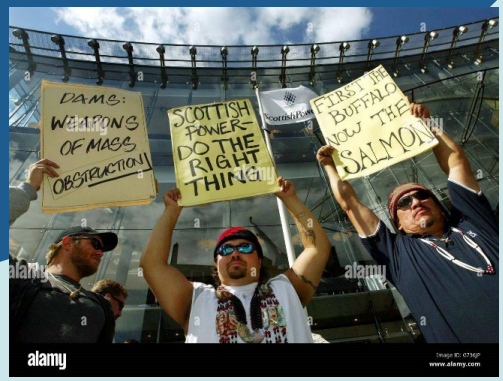


Photo – Klamath Justice Coalition

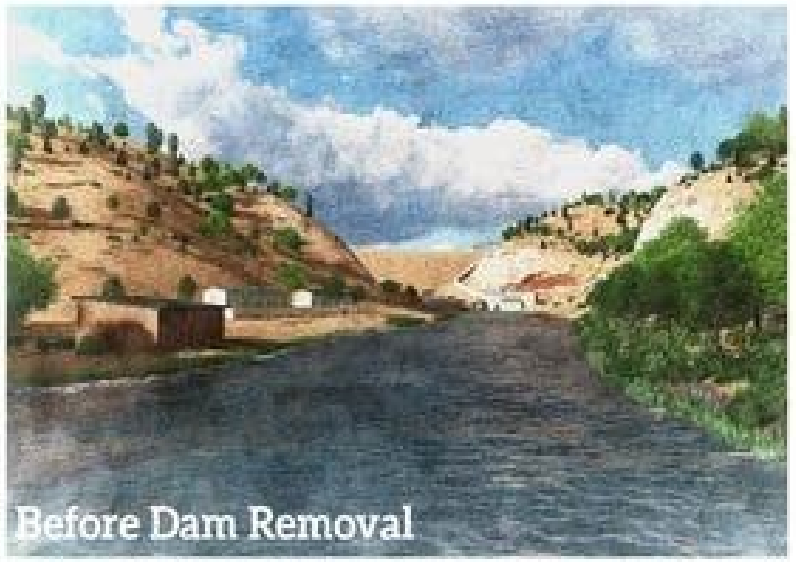
Passage Value Gained – *Largest Dam Removal in the World*

Species	RM Habitat Gained	Number of Important Tributaries
Coho Salmon	58	7
Chinook	420	49
Steelhead	420	49
Pacific lamprey	>516	>9
Redband trout	420 miles of habitat connectivity	49

Photos – Thomas Dunklin

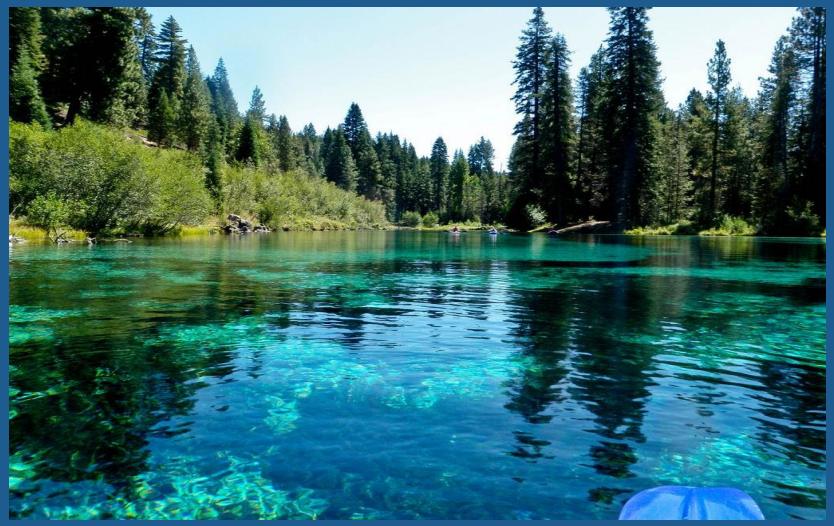
Additional Benefits of Dam Removal

- Increased flow variability
- Restoration of water temperature patterns and thermal refugia
- Increased dissolved oxygen
- Reduced toxic blue-green algal blooms
- Increased large wood recruitment
- Increased sediment transport
- Eliminating crowding, delay, and injury of migrating fish at dams
- Decreases in disease risks
- Increased opportunities for recreational, commercial, and tribal fisheries harvest quotas
- Restoring traditional tribal ceremonial and fishing practices above and below Iron Gate Dam



Upper Basin Habitat Conditions

Wood River, Sprague River, Williamson River – Salmon belong here!

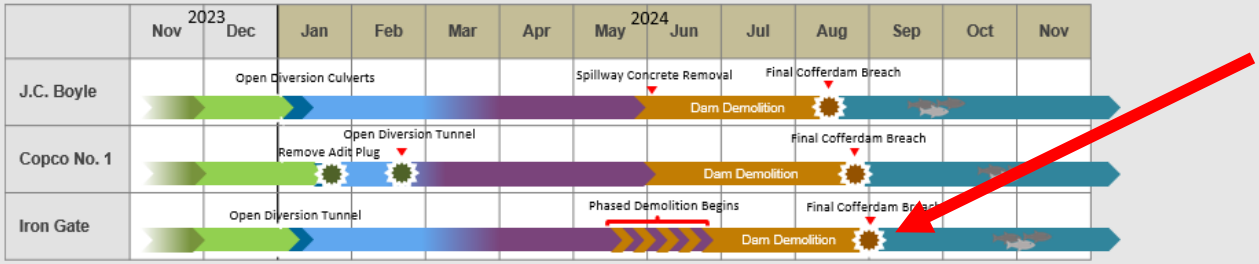


Photos – ODFW

Dam Removal Status

Photos – Swiftwater Films

Stages of Reservoir Drawdown



1. Operational Drawdown:
Lowering reservoir to its minimum operating level

2. Initial Drawdown:
Reservoir water evacuation below the Operational Drawdown limits

3. Reservoir Refilling and Releasing Period:
Inflows exceed outflow capacity periodically, causing reservoir levels to rise and fall

4. Dam Demolition:
Reservoir water elevation remains at the top of the historic cofferdam while dam concrete and embankments are removed

5. Klamath River Reconnection:
Breaching of the historic cofferdam, allowing the river to permanently flow in a riverine condition

J. C. Boyle Demolition – January 16 Blast

Photos – Swiftwater Films

J. C. Boyle Drawdown

Photos - KRRC

J. C. Boyle Demolition

Photos – Bob Pagliuco

Copco 2 Demolition – Summer 2023

Photos – Swiftwater Films

Photos – Swiftwater Films

Copco 1 Demolition – January 23 Blast

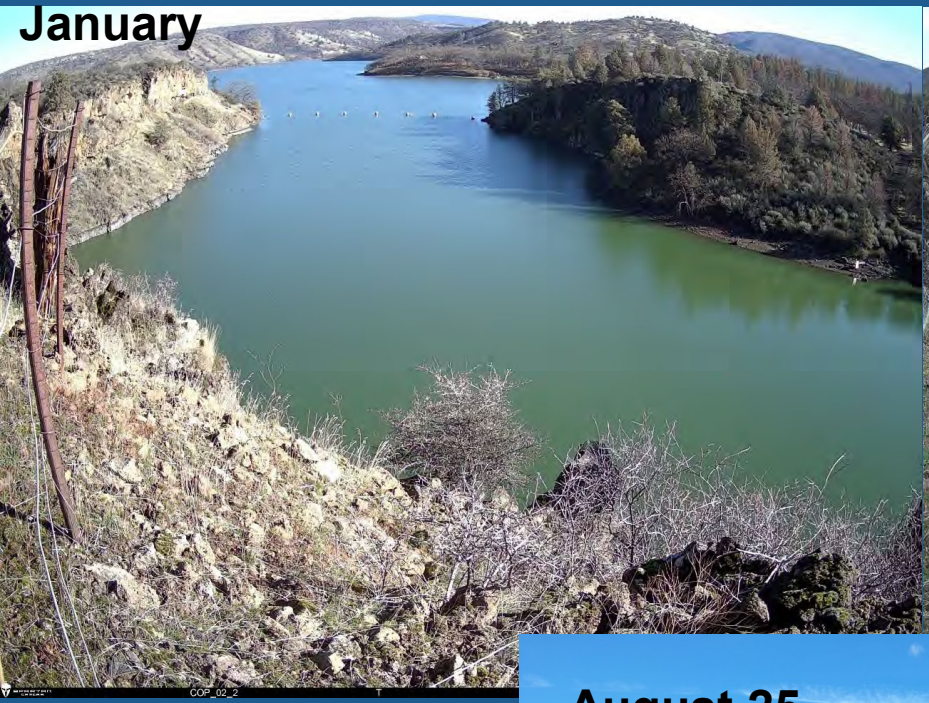
Photo – Swiftwater Films

Copco 1 – Demolition

Photos – KRRC

Copco Reservoir Drawdown

Photos – KRRC



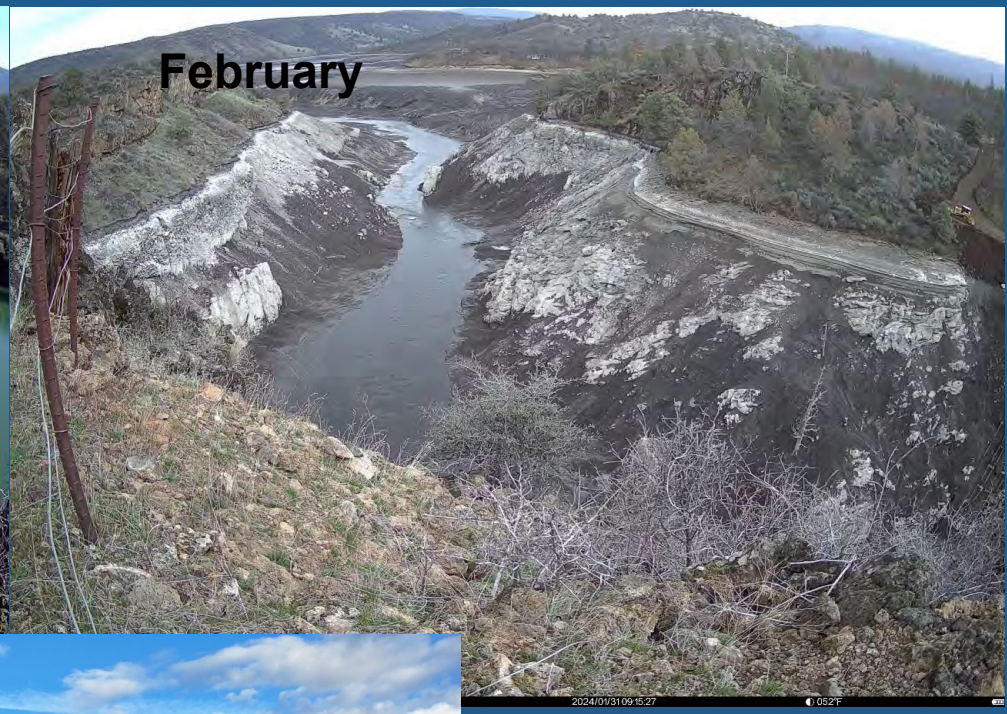


Photo – Bob Pagliuco

Copco Reservoir Drawdown- Beaver Creek

Photos – KRRC

Copco Reservoir Drawdown

Photos – KRRC

Iron Gate Demolition – January 11 Open the Gate

Photo – Bob Pagliuco

Iron Gate Reservoir Drawdown – Camp Creek

Photos – KRRC


Iron Gate – Klamath River
January 2024


Jenny Creek and Klamath River
March 2024
Photo: Olivia Vasburg, Resource Environmental Solutions

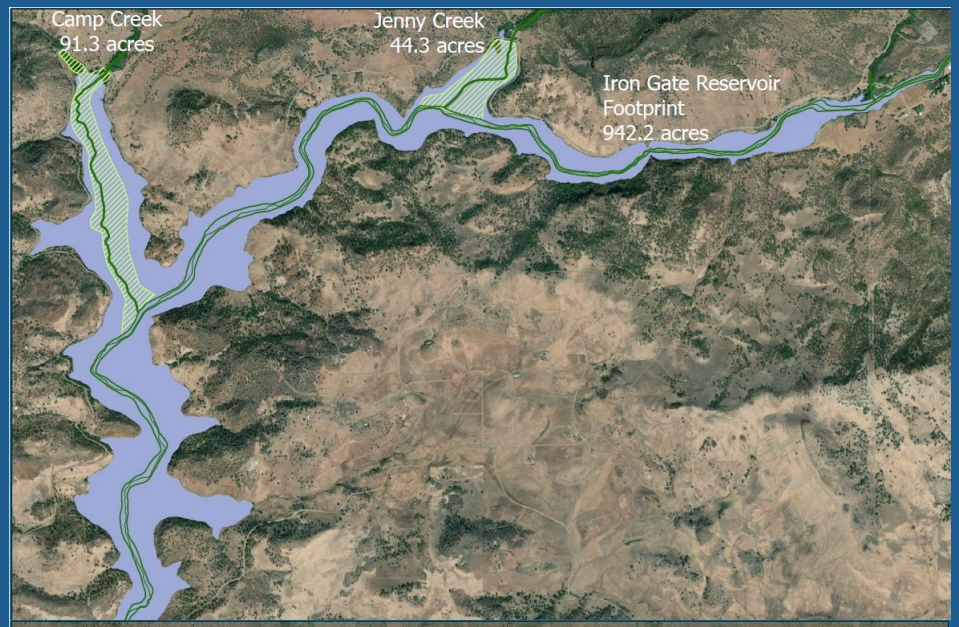

May 2024
Photos: Dan Chase, Resource Environmental Solutions

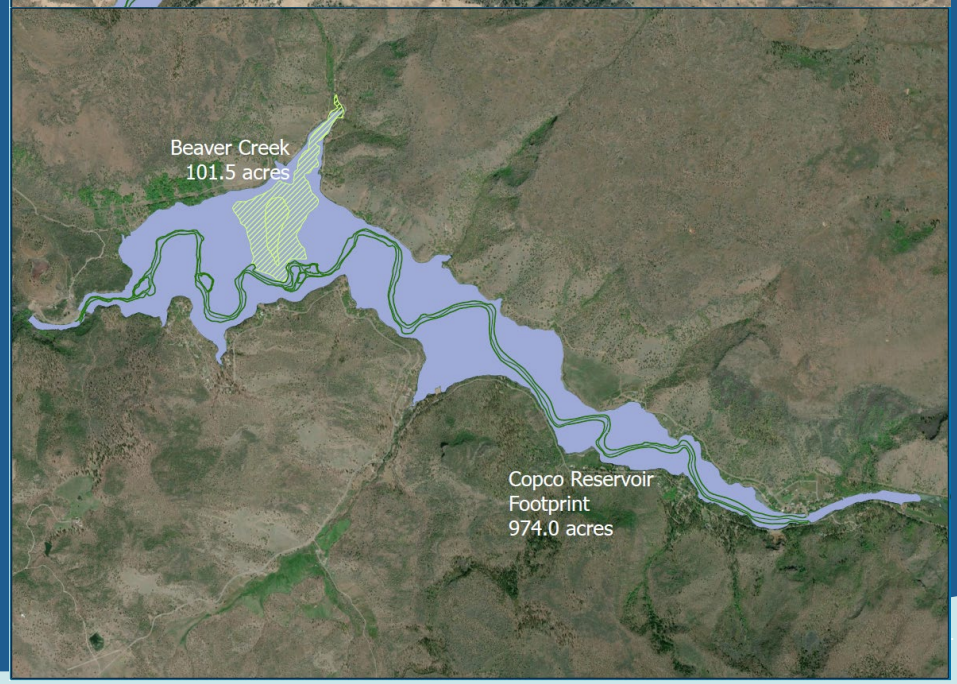

June 2024
Photos – RES
Photo: Joel Ophoff, Resource Environmental Solutions

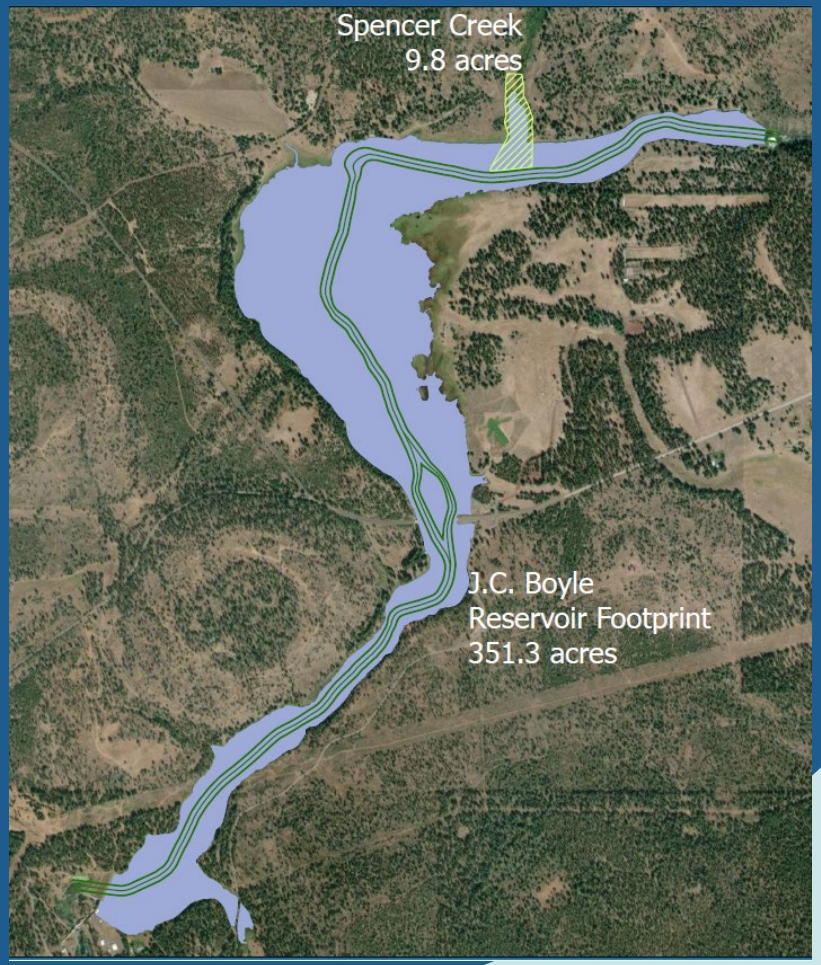
Iron Gate demolition and Cofferdam Breach

August 28, 2024
Photo by Swiftwater Films

Reservoir Footprint Restoration 2024 - 2029







Reservoir Footprint Restoration 2024 - 2029

Photos – RES

Current Challenges – and Opportunities

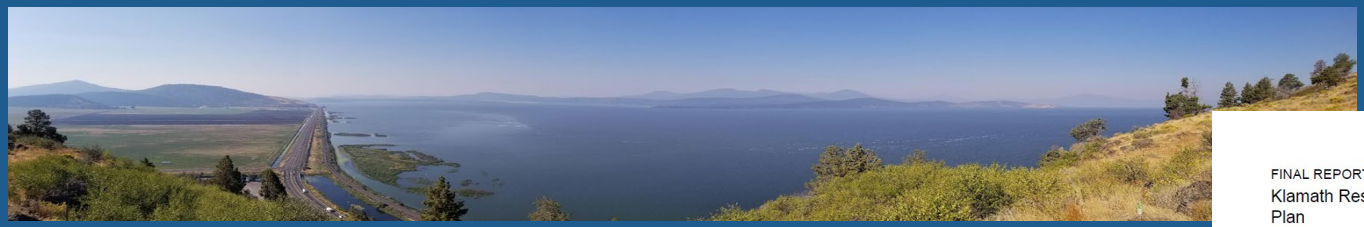


Photo – Bob Pagliuco

Challenges:

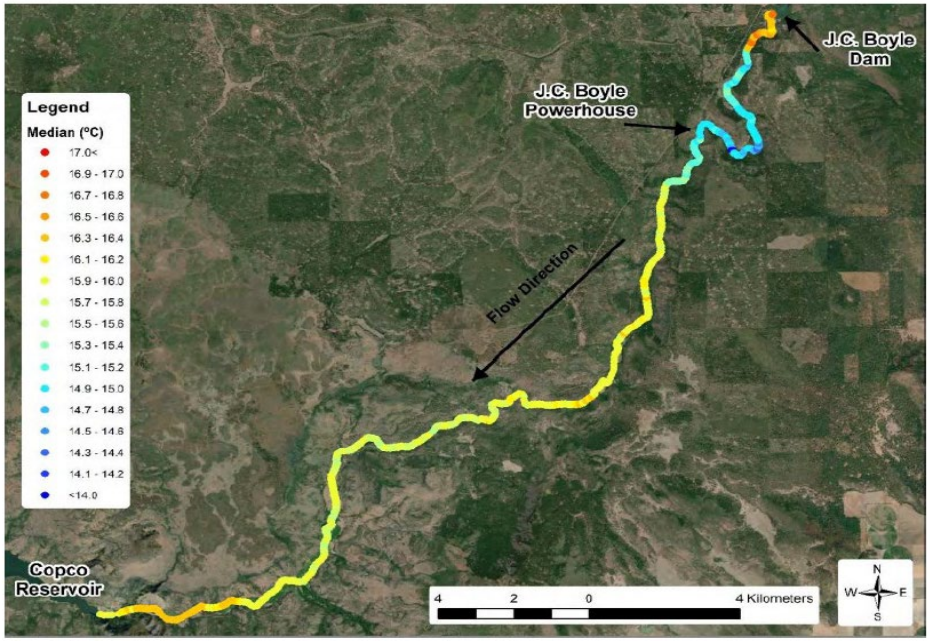
- Water quality in Upper Klamath Lake and Keno Impoundment Reach – Summer algae blooms and poor WQ
- Areas above the dams need restoration to improve habitat conditions
- Still have 2 dams (Keno and Link) and fish passage might be an issue
- 70 unscreened diversions in the reservoir reach

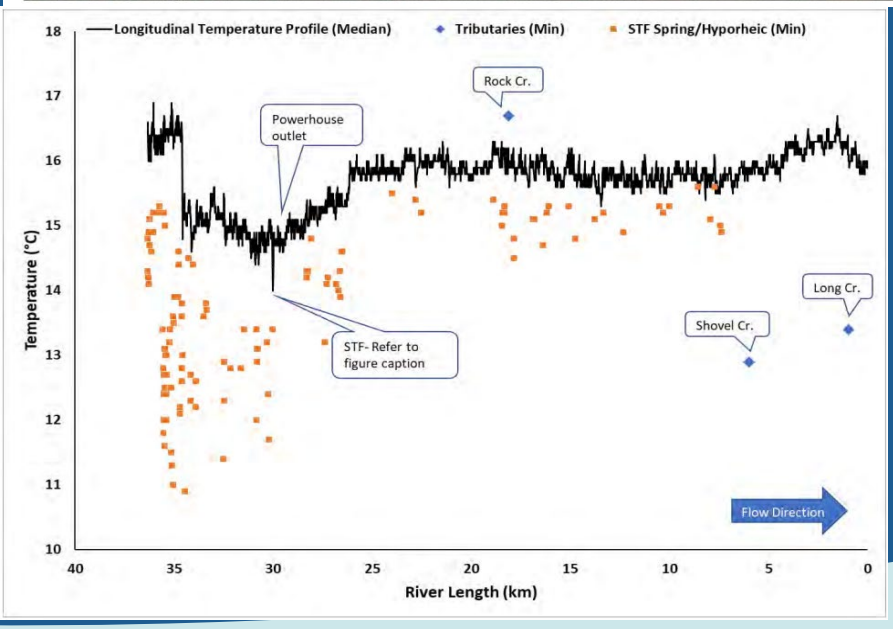
Opportunities:

- We have done the restoration planning needed in time for our fish to come home!
- BIL/IRA funding opportunities ($ Billions)
- Reintroducing spring Chinook to the upper basin
- Several hundred CFS of cold spring water above the dams

Photo – ODFW

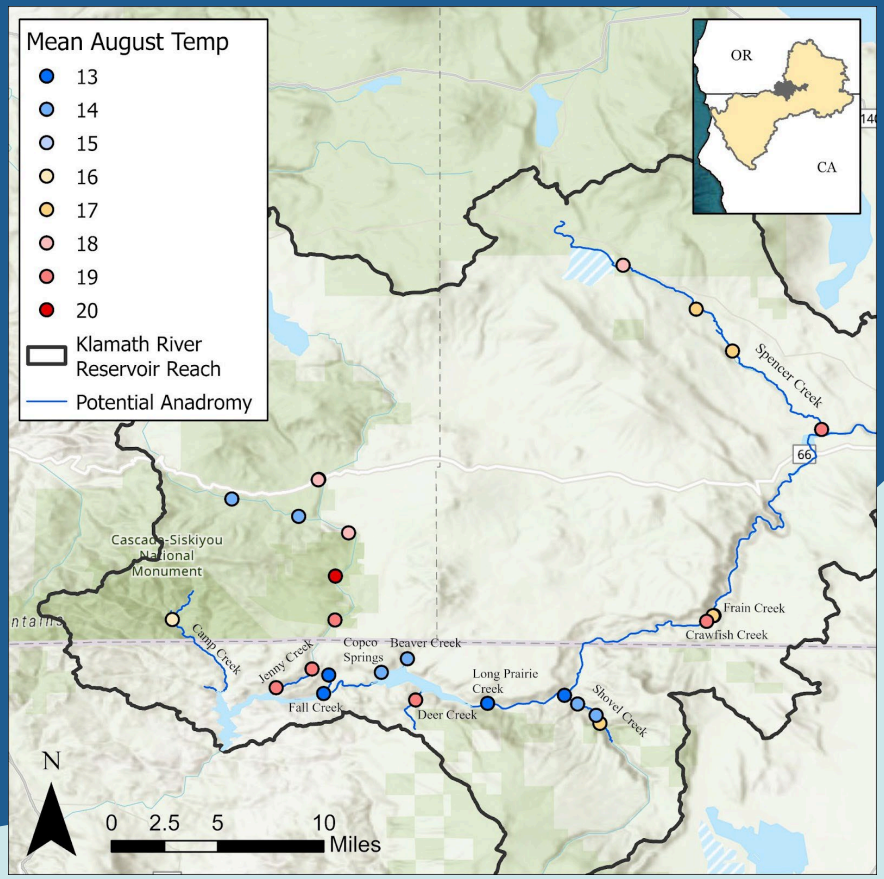
Opportunities - Cold Water - FLIR flight JC Boyle Reach





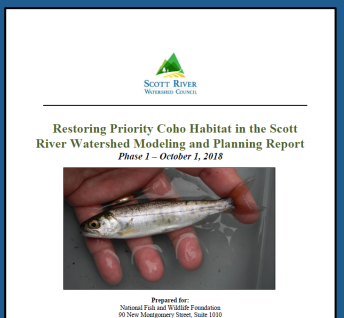
E&S Environmental, NV5 Geospatial Inc (2022) found 119 Significant Thermal Features.

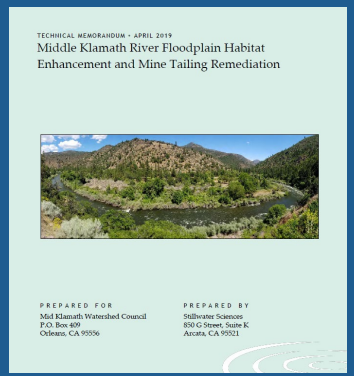
Deas (2022) found 234 cfs of spring water throughout this reach.

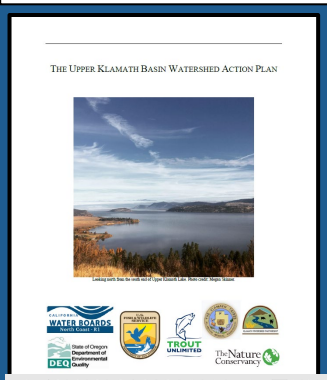


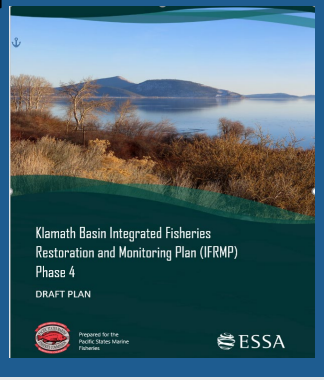
Restoration Opportunities – What's Next?

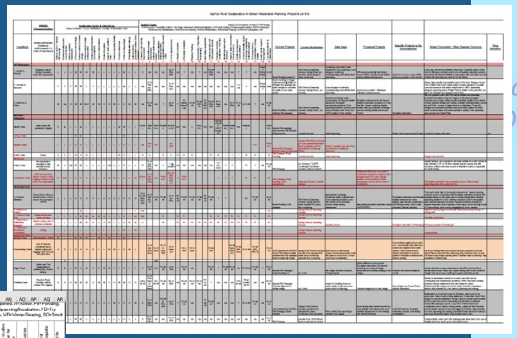
- Klamath Reservoir Reach Plan published in December 2022
- IFRMP Plan published in 2023
- We are ready to meet this historic moment of dam removal and unprecedented funding levels

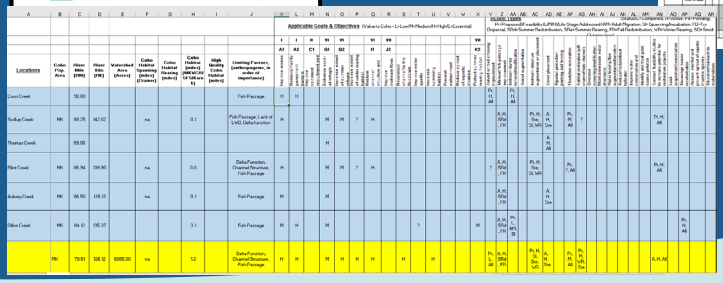




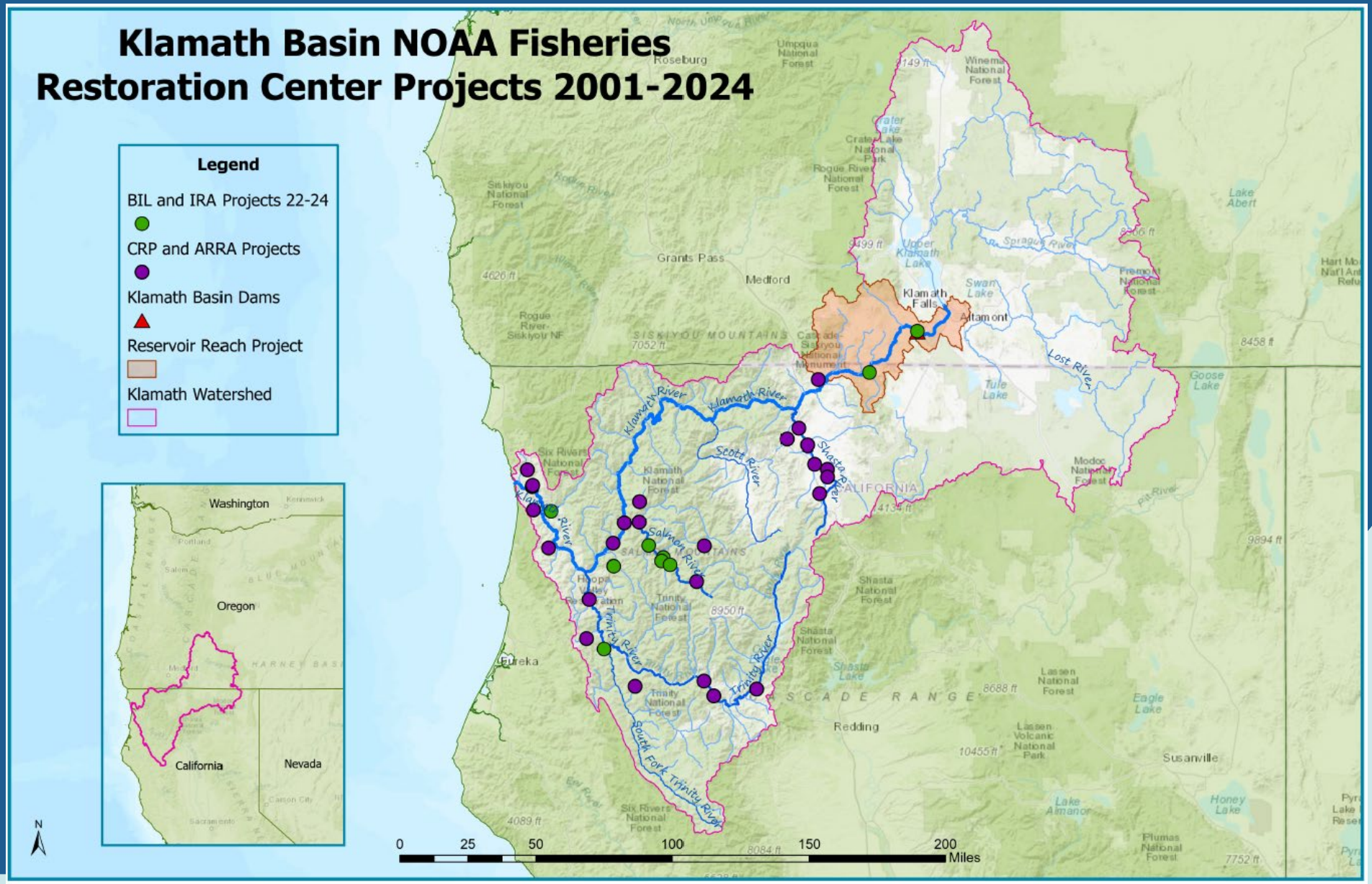








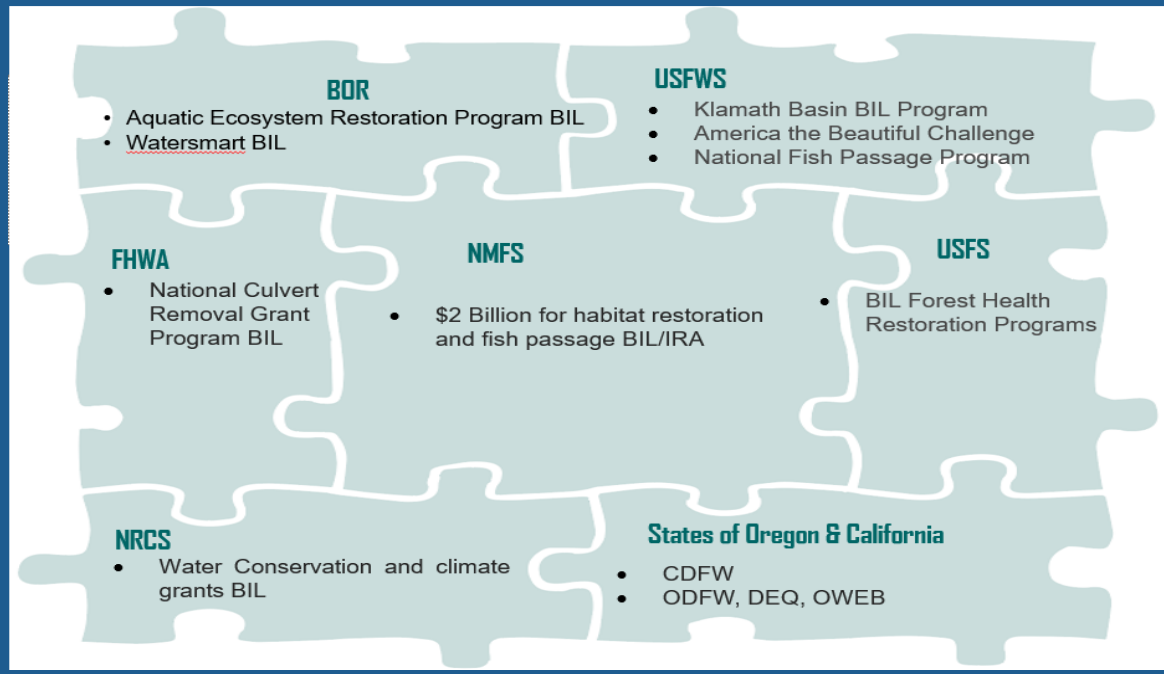
NOAA RC Funding in the Klamath - $6 Million from 2001 – 2021
$21.9 Million from 2022 - 2024

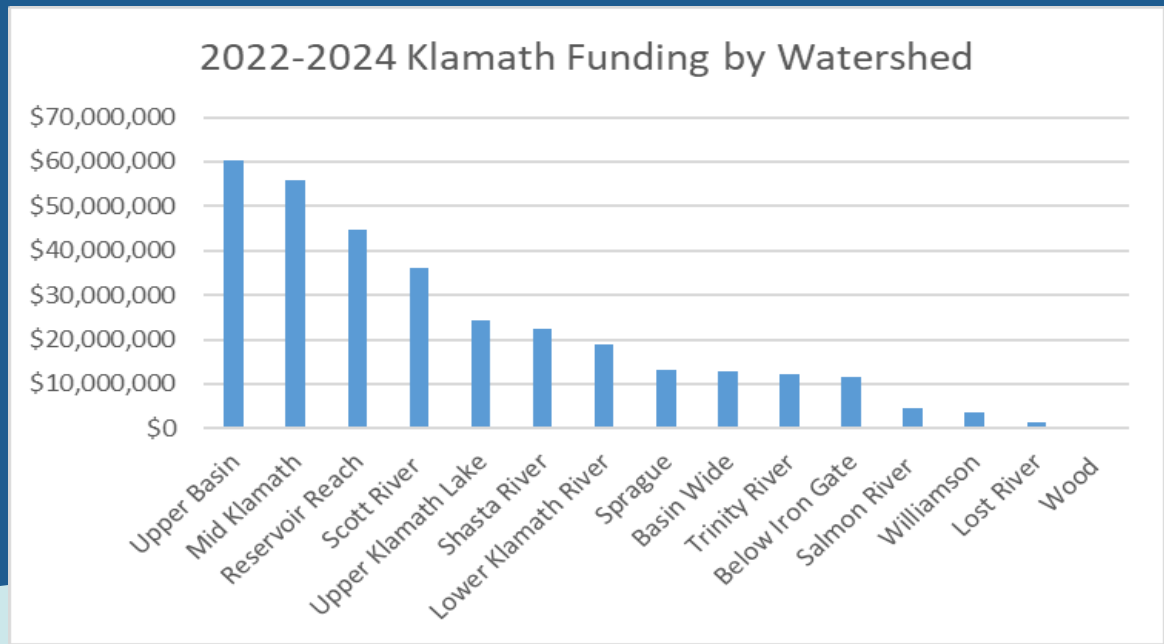


Funding to Restore the Klamath

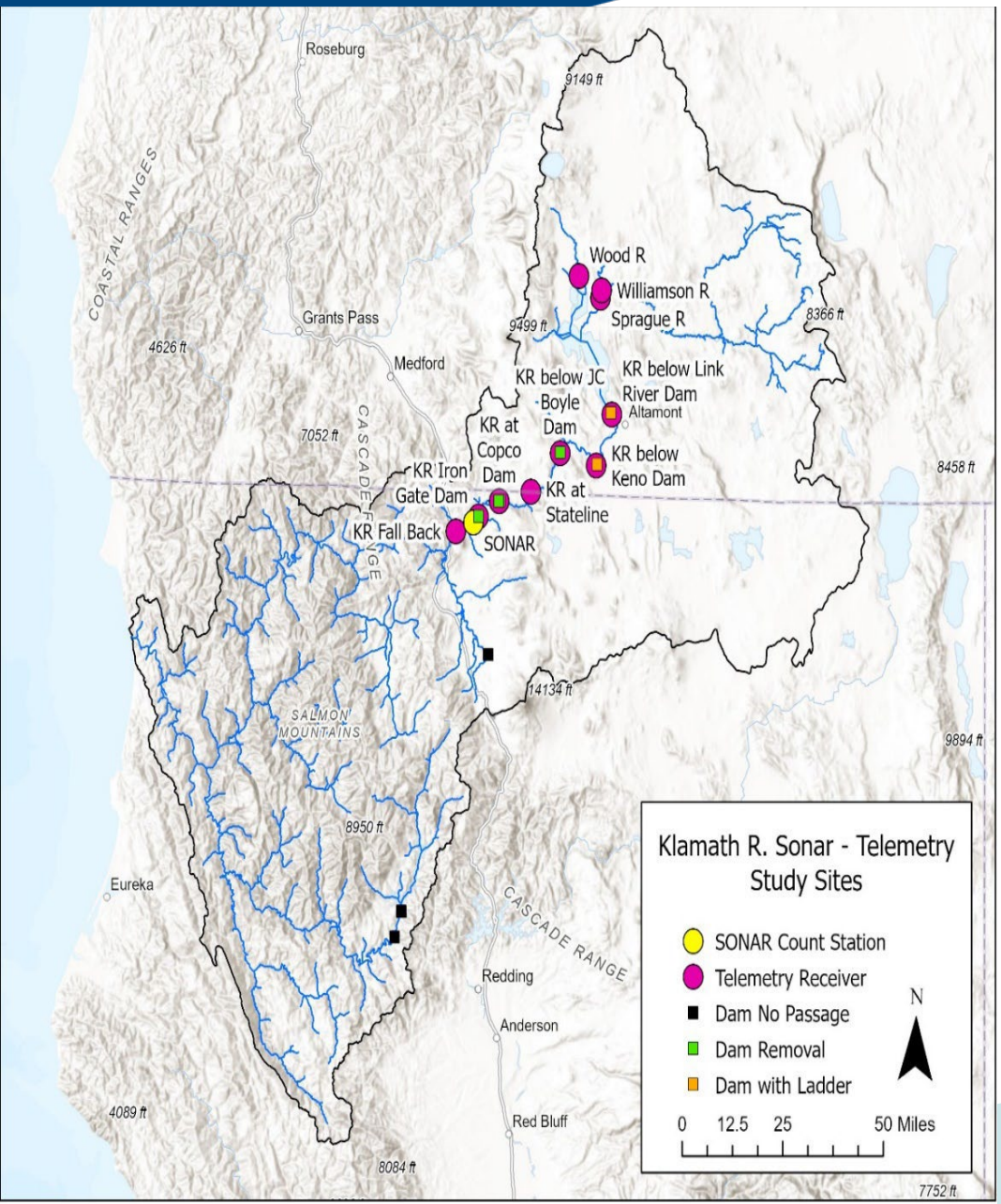
- Klamath Funding Coalition formed 2 years ago to help applicants navigate BIL/IRA and other funding and to track overall investments
- Developed a sortable spreadsheet that describes 160 funding opportunities. PSMFC building a web tool based on funding spreadsheet
- Since 2022, Coalition members have reported* **$341,000,000** in Klamath River investments

*Conservative estimate due to landowner privacy concerns and other entities not updating their data.





Monitoring – Measuring Fish Response to Dam Removal



Phase 1 Proposed Monitoring

How Many? – SONAR below Iron Gate

What Species? – Tangle netting for species apportionment

Where are they going? – Radio telemetry tagging fish at tangle net sites and stationary and mobile tracking.

Partners

Caltrout (project management)

Yurok Tribe (SONAR, tangle netting, scale analysis)

Karuk Tribe (SONAR, tangle netting, carcass survey and CA mobile tracking telemetry station maintenance)

Klamath Tribes *(Sprague, Williamson, Wood mobile tracking* telemetry station maintenance)

ODFW (State line to Link River dam mobile tracking telemetry station maintenance)

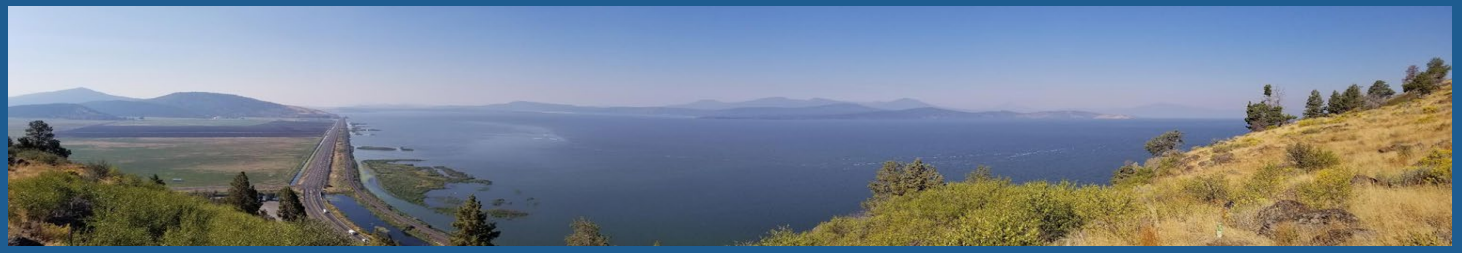
CDFW (staff for tangle net, trib carcass surveys)

NMFS (telemetry design, analysis, publication)

Keith Denton and Cal Poly Humboldt (SONAR/apportionment design, analysis, publication)

- ***USFWS*** **(**Carcass surveys-Iron Gate to State line)

To Summarize…….



- Thousands of people have worked hard for over 2 decades and have overcome incredible hurdles to pave the way for the largest dam removal in the world.
- Tribes have been crucial to making dam removal happen
- Dam removal is a giant leap forward, but there is still much more to do.
- We are taking a watershed approach to post dam restoration and prioritizing our efforts.
- Due to our past planning efforts, we are poised to “meet the moment” now that we have unprecedented BIL and IRA funding opportunities
- We will be monitoring the post dam removal response of anadromous fish to help manage the fishery and focus future monitoring and restoration efforts.

Questions?

More Information found at:

https://klamathrenewal.org/

https://bringthesalmonhome.org/