



# Klamath Fish Passage Summit

*Reconnecting the Klamath – Honoring Communities & Culture*

October 13—14, 2022  
Kahtishraam Wellness Center  
Yreka

Photo credit: NOAA

Photo credit: Ecoflight



An underwater scene with a large fish in the foreground and a smaller fish in the background. The water is greenish and slightly murky. The large fish is a salmon-like species, and the smaller fish is a smaller, more delicate species. The background shows some rocky or coral-like structures.

# Preparing the Klamath Basin for Dam Removal

A StoryMap Spotlighting Collaborative Efforts to Enhance Fish Passage in the Klamath River Basin in Honor of World Fish Migration Day 2020

Created by the California Fish Passage Forum, Klamath River Renewal Corporation & their Partners



# Thank you!

*Klamath Fish Passage Summit Planning Committee*

Photo credit: NOAA

Photo credit: Ecoflight

Craig Tucker  
Mike Belchik  
Mark Bransom  
Anna Storey  
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Bob Pagliuco  
Alicia Marrs



# California Fish Passage Forum

- **Mission:** Protect and revitalize anadromous fish populations in California by restoring connectivity of freshwater habitats throughout their historic range.
- **Members:** The Forum is an association of public, private, and nonprofit agencies and entities dedicated to promoting collaboration among public and private sectors for fish passage improvement projects and programs.

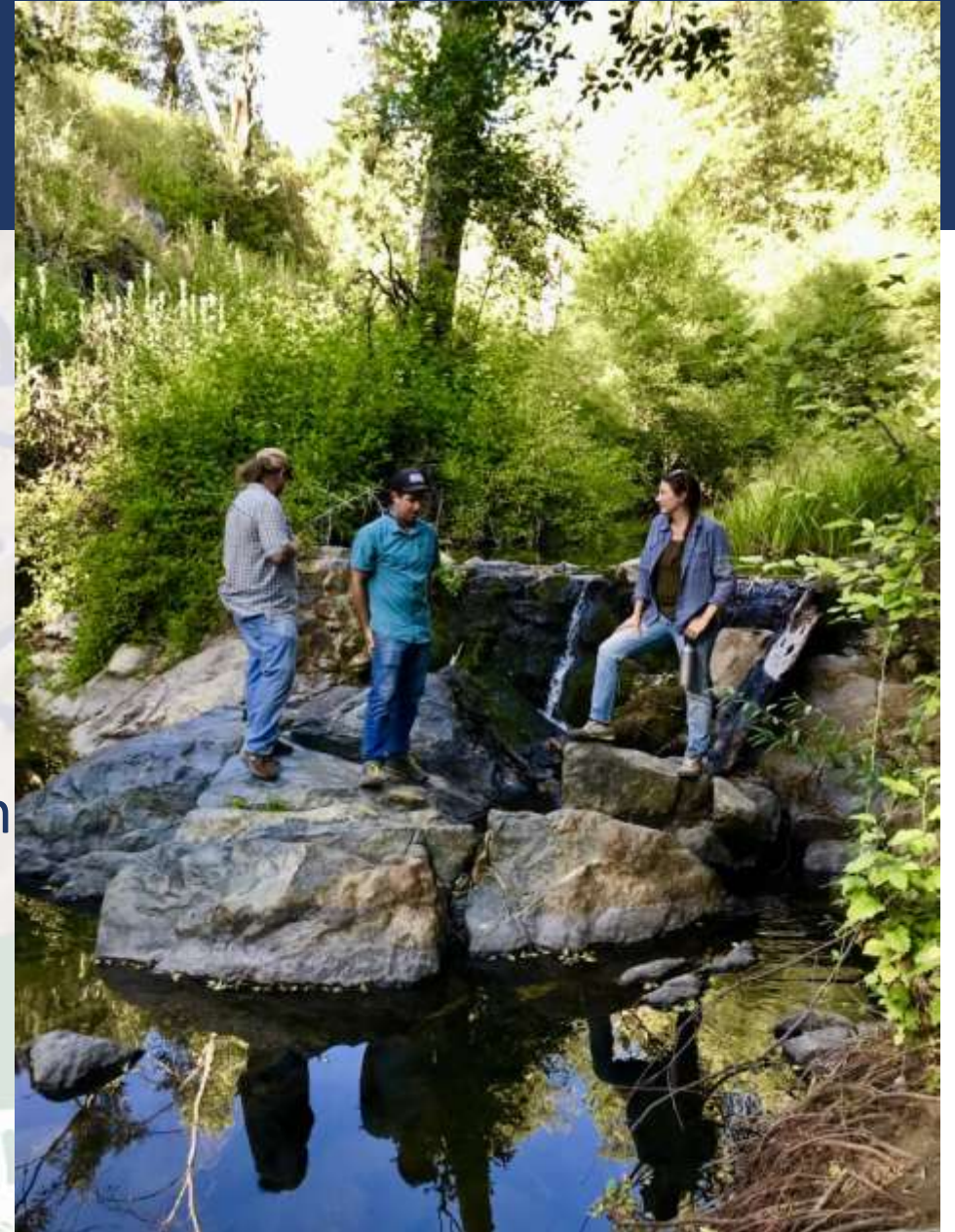
[www.cafishpassageforum.org](http://www.cafishpassageforum.org)



# Forum Signatories

**The strength of the Forum comes from its coalition of federal, state, local, and non-profit partners**

- California Dept. of Fish & Wildlife
- California Dept. of Water Resources
- California Trout
- California State Coastal Commission
- California State Parks
- NOAA Fisheries
- Pacific States Marine Fisheries Commission
- Trout Unlimited
- U.S. Fish & Wildlife Service
- U.S. Forest Service





# Leveraging a National Network



## Regional Fish Habitat Partnerships

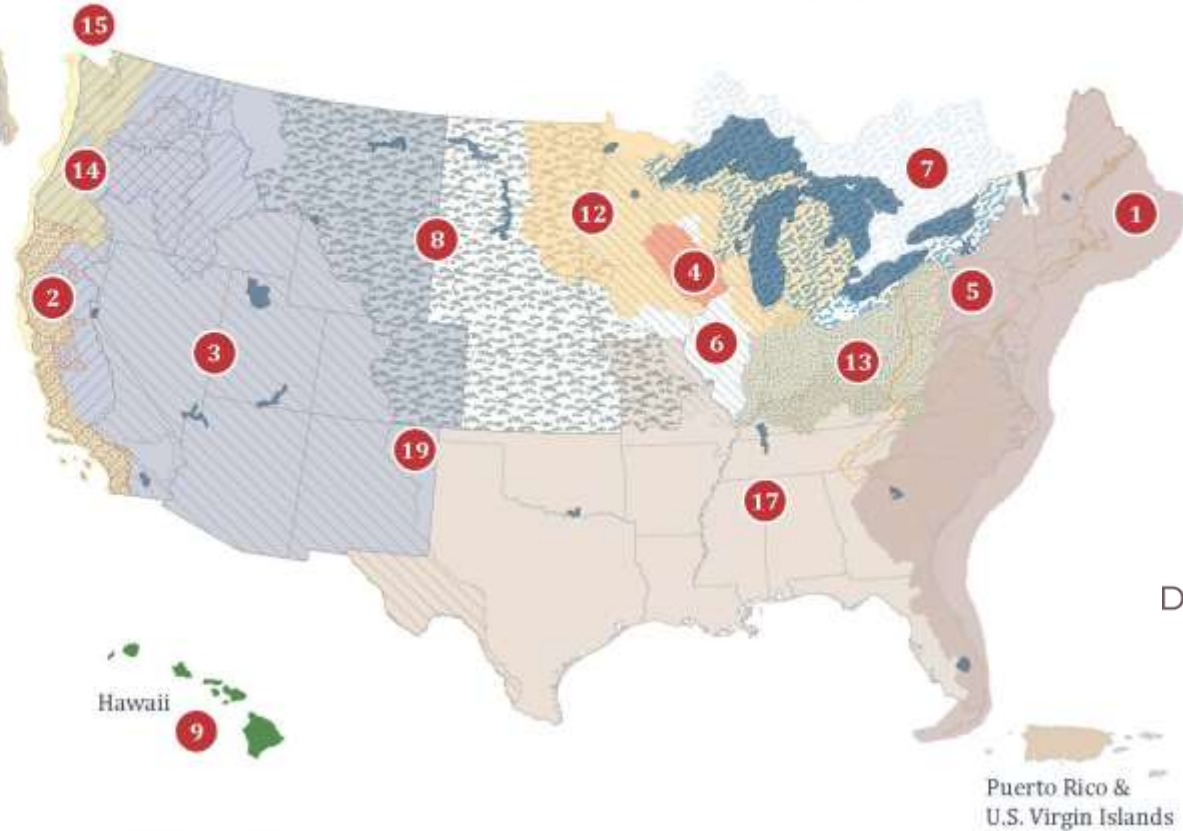


WESTERN  
NATIVE  
TROUT  
INITIATIVE



DESERT FISH HABITAT  
PARTNERSHIP

Geographic / Species Based Partnerships	
1	Atlantic Coast FHP
2	California Fish Passage Forum
3	Desert FHP
4	Defiled Area Restoration Network
5	Eastern Brook Trout Joint Venture
6	Fishers and Farmers Partnership
7	Great Lakes Basin FHP
8	Great Plains FHP
9	Hawaii FHP
10	Kenai Peninsula FHP
11	Matanuska-Susitna Basin Salmon Habitat Partnership
12	Malheur Glacial Lakes Partnership
13	Ohio River Basin FHP
14	Pacific Lamprey FHP
15	Pacific Marine and Estuarine FHP
16	Southeast Alaska FHP
17	Southern Aquatic Resources FHP
18	Southwest Alaska Salmon Habitat Partnership
19	Western Kalena Trout Initiative
System Based Partnership	
20	Reservoir FHP <i>The Reservoir FHP is a system based partnership that covers reservoirs across the country.</i>



Hawaii

Puerto Rico &  
U.S. Virgin Islands

Note: Alaska and islands not to scale

Includes current fish habitat partnerships, approved by the NFHP Board, June 2016.

# Innovative Science, Research & Tools Supported by the Forum



CALIFORNIA DEPARTMENT OF FISH and WILDLIFE BIOS

Basemaps Layers

Active Layer: California Fish Passage Assessment Database [ds69]

Identify Features Advanced Tools

Baseline Fish Habitat Feedback App

Legend:

- Partial Barrier
- Total Barrier
- Diversion
- Passage Status
- Diversion

National Marine Fisheries Service

GUIDELINES FOR SALMONID PASSAGE AT STREAM CROSSINGS

For Applications in California at Engineered Stream Crossings to Facilitate Passage of Anadromous Salmonids

Original Issue Date: September 2011  
Revised Issue Date: September 2019



Preparing the Klamath Basin for Dam Removal

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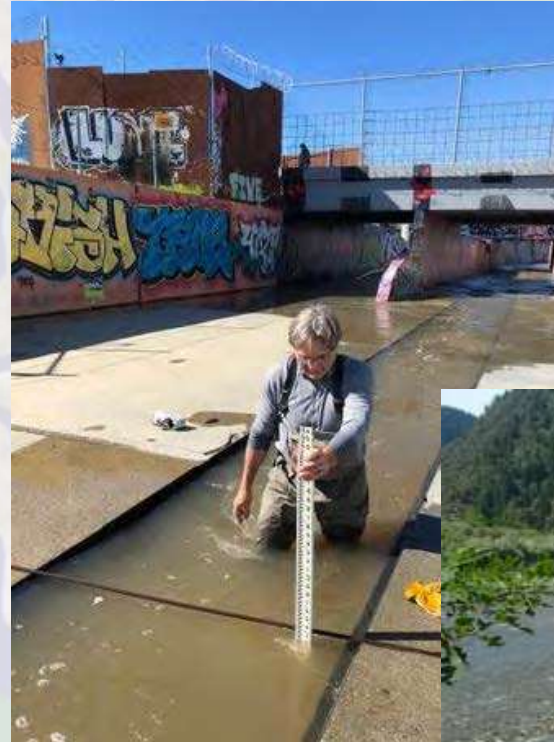
# Providing & Leveraging Funding

- Forum Funding:

- Annual RFP for funding via the National Fish Habitat Partnership (NFHP)
  - Stay tuned for next RFP in late 2022

- Partner Funding

- National Fish Passage Program (USFWS)
- Funding from Bipartisan Infrastructure Legislation
  - NOAA
  - USFWS
  - U.S. Department of Agriculture (U.S. Forest Service)
  - Etc.
- Various California State Funding Opportunities



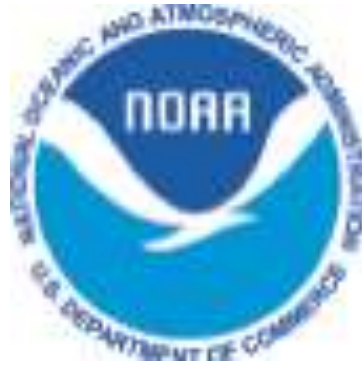
Wildcat Creek Fish Passage & Community Engagement Project  
(The Watershed Project)



Mid-Klamath Tributary Fish Passage Improvement Project  
(Mid Klamath Watershed Council, Salmon River Restoration Council)



# Thank you!





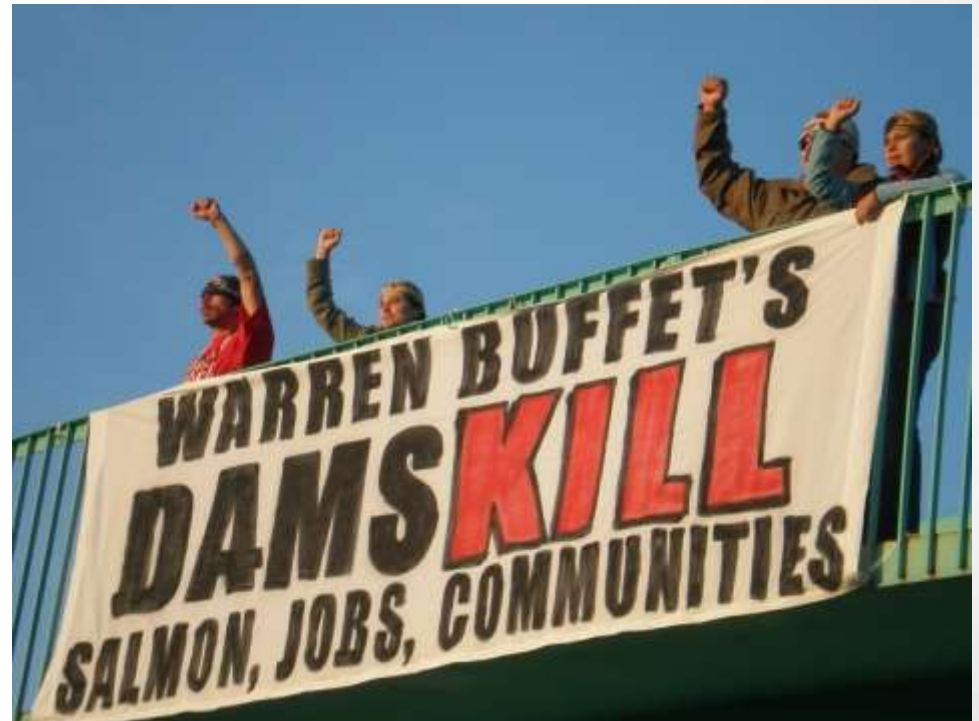
# Honoring Those Who Helped Us Along the Way

People who Made a Difference

Mike Belchik, Senior Water Policy Analyst

Yurok Tribe

Credit to Craig Tucker for many of these slides.





# The Chapters of Dam Removal

- The early FERC days
  - TANGO
  - Crucial role by NGO's in Support and funding of critical work
  - Much technical and research work
  - Building the Record and laying the groundwork for future negotiation
- Early Media and Direct Action
  - KJ Coalition and ordinary tribal members join with other supporters and make a difference
  - SCOTLAND
  - Media Campaigns
  - Portland
- The Trial-type EP Act Hearing
  - The agency/Tribe coalition really gels
  - PacifiCorp's FERC campaign is hamstrung by the ruling



# The Chapters of Dam Removal

- Negotiations begin in earnest in 2008 (ish)
- Settlement is reached in 2010
  - Required Congressional Authorization
  - Result of long and intensive negotiations
  - Critical roles by Tribes, NGO's and States, as well as Fed family
- Amended Settlement reached in 2016
  - FERC Paperwork Filed but not acted on
- Klamath Renewal Corporation Created
  - Mark Bransom hired
  - Key contractors identified
  - Construction plans refined
  - Key FERC documents filed
  - Management plans get underway
  - BiOp's written
  - And more.

# The Chapters of Dam Removal

- Key milestone when CA 401 Permit CEQA completed
- Crisis in 2020 when FERC requires PacifiCorp to stay on transferred license
  - Emergency talks with PacifiCorp yield way around
  - Parties all fully commit
  - States of CA and OR play crucial role.
- 2020-present: 2<sup>nd</sup> FERC era
- Permits, plans, and more permits and plans
- We're on the cusp



# Aawok Ronnie Pierce



# Aawok Troy Fletcher





So many more...





# Klamath Reservoir Reach Restoration Prioritization Plan

Reconnecting Klamath Event – October 13, 2022

**Bob Pagliuco - NOAA Restoration Center**

**Chris O'Keefe and Brett Holycross - Pacific States Marine Fisheries Commission**

**Nell Scott and Tommy Cianciolo - Trout Unlimited**





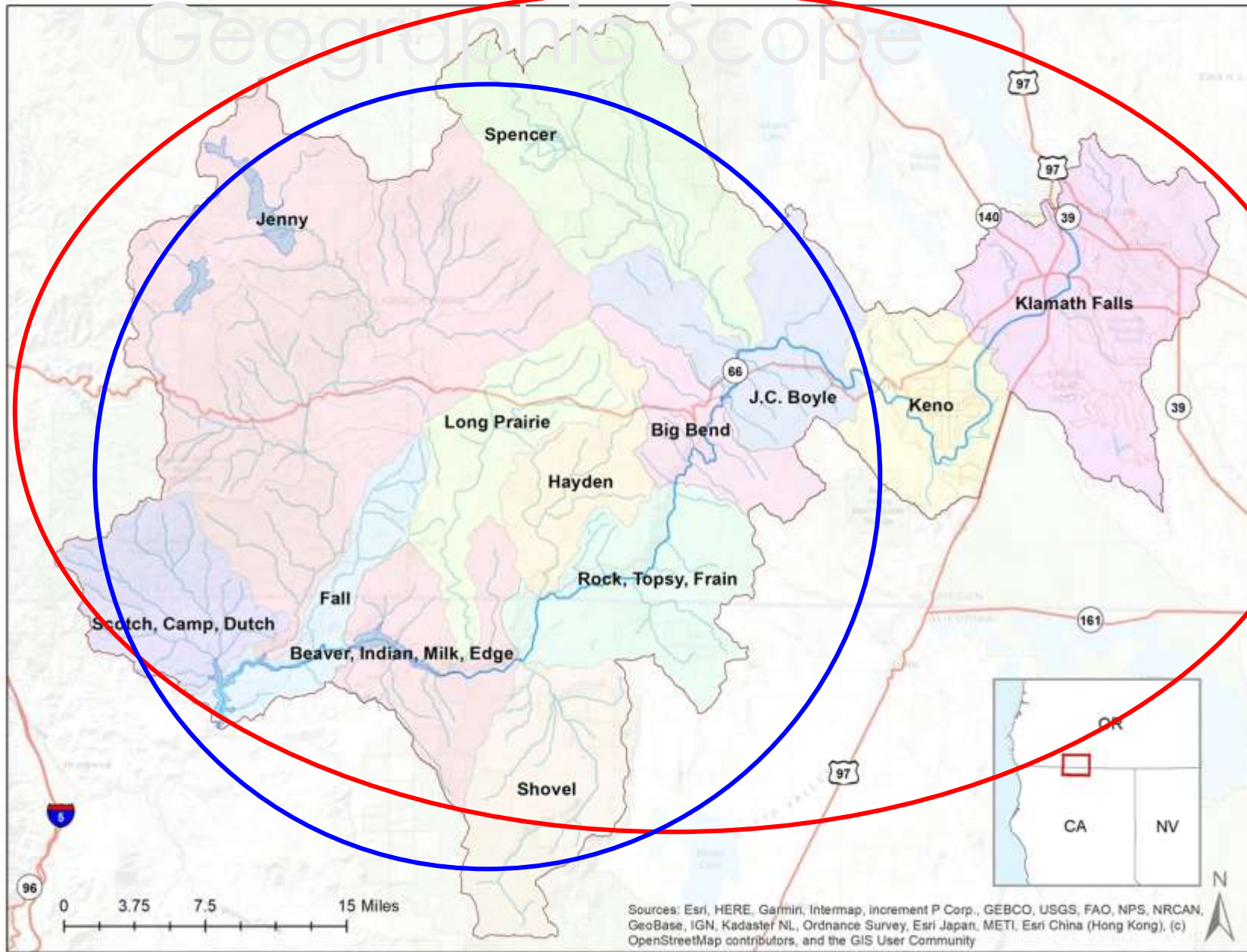
# Klamath River Reservoir Reach Habitat Assessment and Restoration Plan Summary

- ↴ NOAA Restoration Center funded the effort after recognizing the importance of a road map in the reservoir reach post dam removal for NOAA Trust resources.
- ↴ Built a partnership with NOAA, PSMFC, and TU to work on shared goals
- ↴ Collaborated with experts in the field (science panel) to vet methods and a Technical Advisory Committee to develop prioritization criteria, score projects and develop prioritized lists for habitat restoration, screening and flow restoration projects.



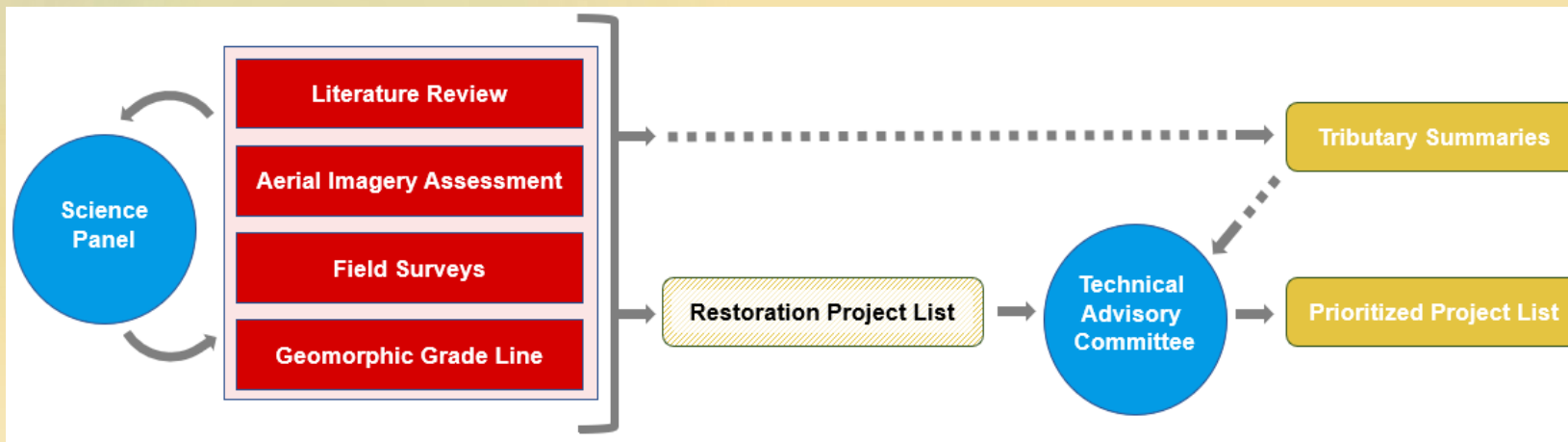


# Geographic Scope



# Project Elements

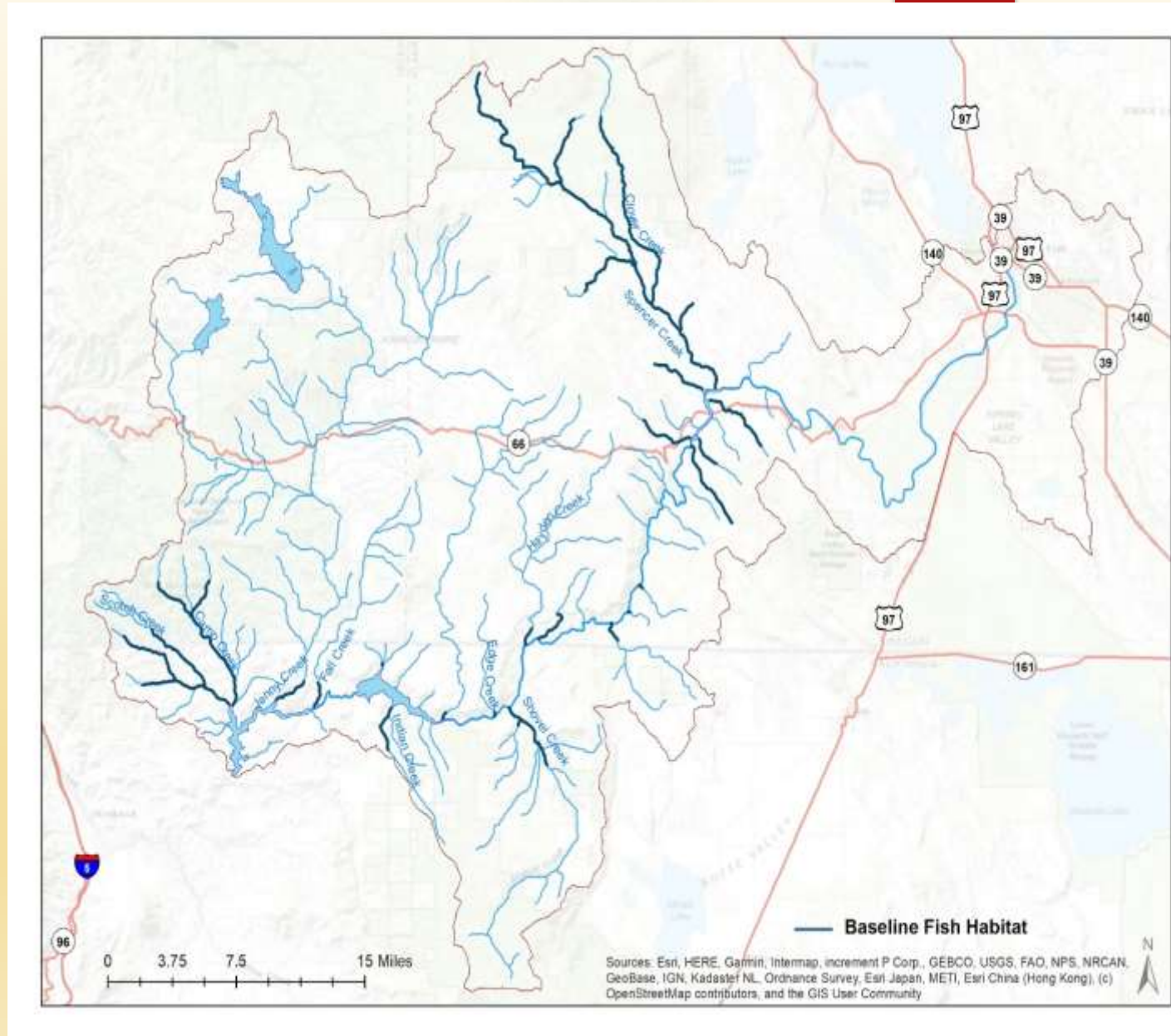
- ↴ Diversion Assessment - Focus on locations, volumes, screening and barriers
- ↴ Temperature Assessment (refugia)- Looking for the “Tom Martins”
- ↴ Habitat Assessment - Collect Baseline data and inform stresses and threats
- ↴ Restoration Project ID - Develop list of potential projects via field surveys and LiDAR/aerial imagery efforts.
- ↴ Technical Advisory Committee and prioritization process
- ↴ Final Report





# Developed Baseline Fish Habitat Layer for surveys within Anadromy

- ⌘ This layer utilizes available information from known fish barriers, fish observations, and hydrography attributes to predict potential anadromous reaches.
- ⌘ The layer was developed using the NHDPlus Version 2.1 (EPA/USGS) hydrography (Holycross 2021).



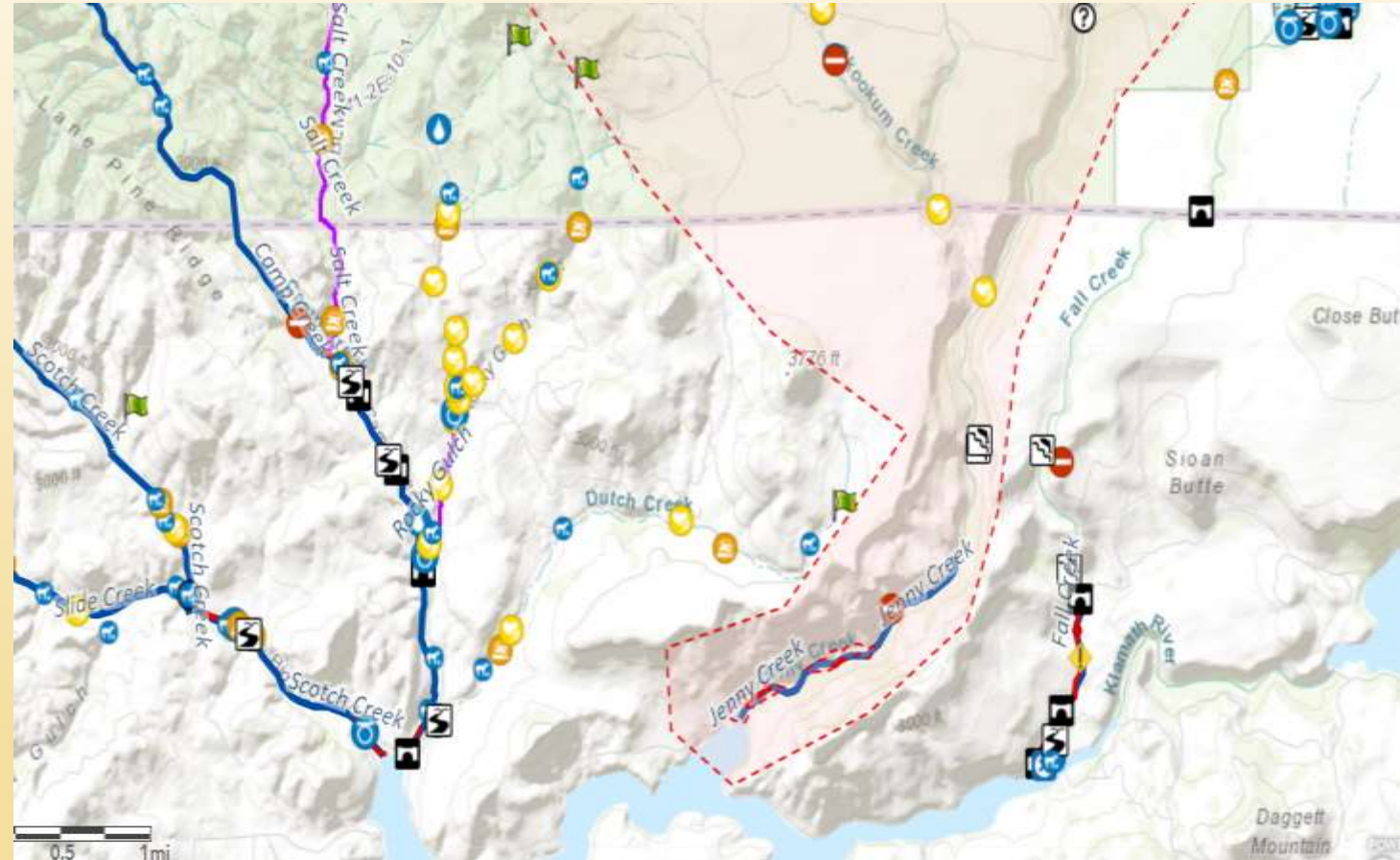
# Aerial Imagery Surveys – Above Anadromy

AGOL and Google Earth Imagery  
(NHDPlus)

Developed online map to identify key features in the watershed that might have positive or negative effects on the habitat conditions

Above and within future anadromous reaches

- Cattle
- Crossings
- Riparian Vegetation
- Diversions
- Springs
- Recent Fire
- Beaver
- Straightened Channel



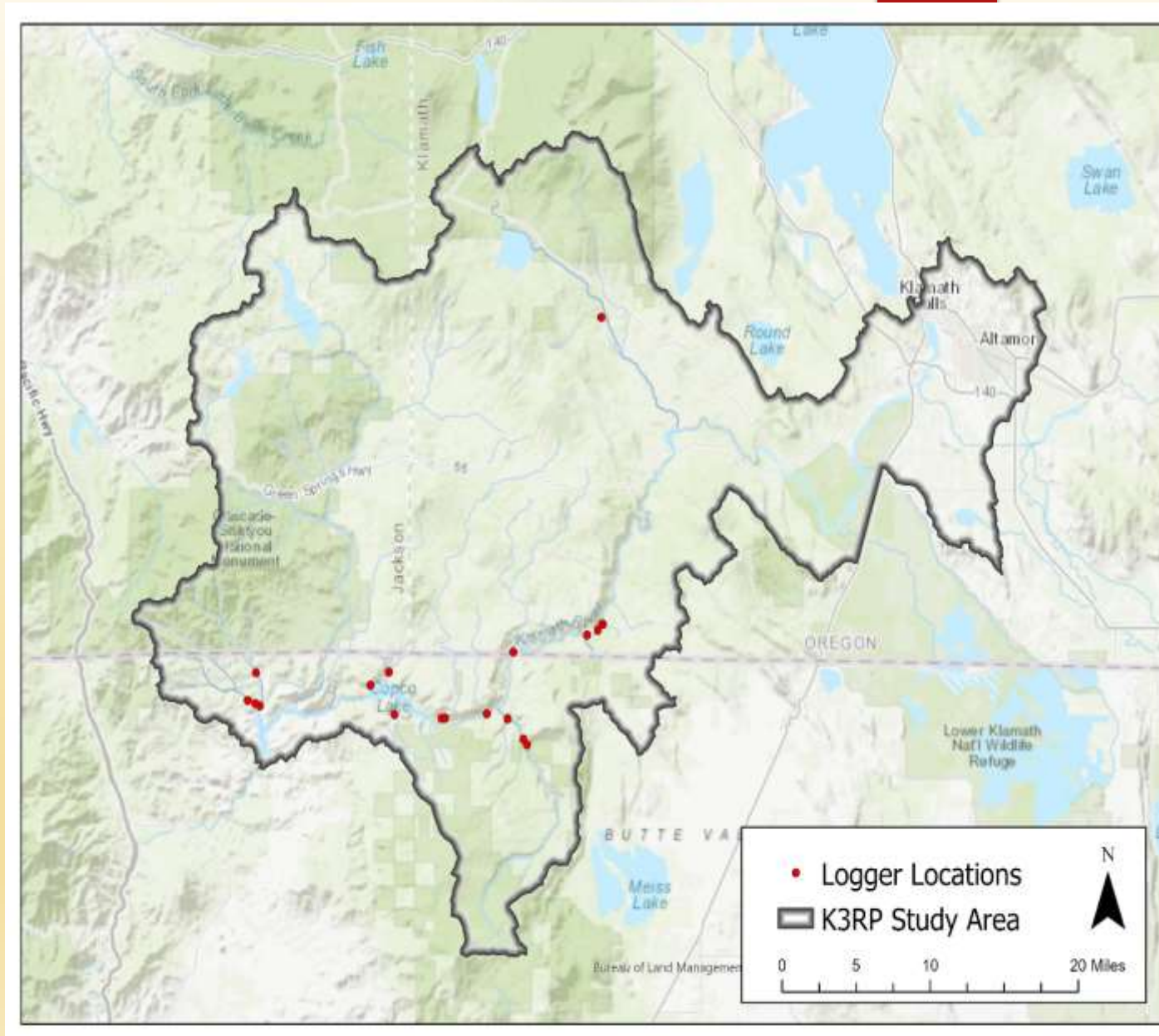


# Refugia Project Locations

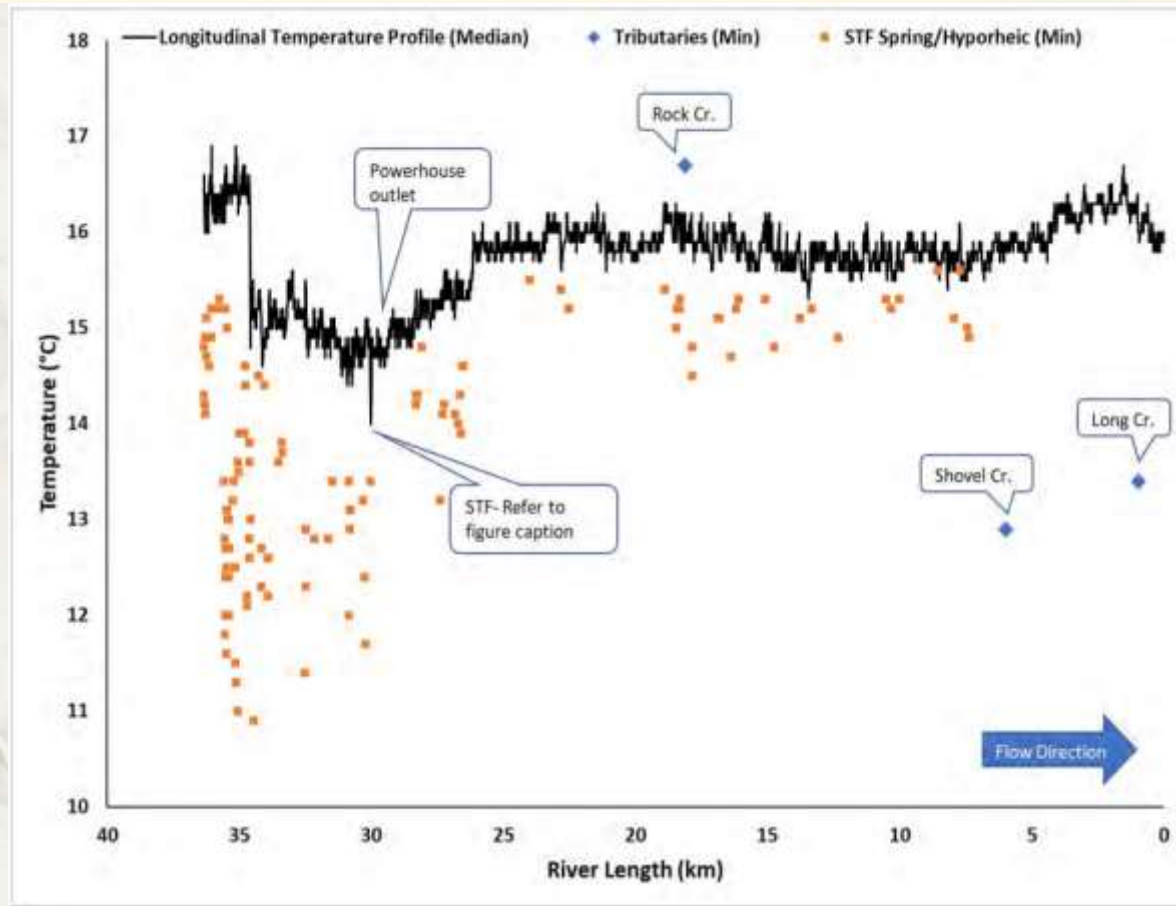
Installed Hobo Temperature loggers at 20 locations

- Scotch Creek (2)
- Camp Creek (2)
- Fall Creek Beaver Pond (1)
- Copco Springs (1)
- Deer Creek (1)
- Long Prairie Creek (2)
- Edge Creek (1)
- Shovel Creek and Tribs (4)
  - Grouse Spring Creek
  - Bear Canyon Creek
  - Panther Canyon Creek
  - Mainstem Shovel Creek
- Hayden Creek (1)
- Rock Creek (1)
- Crayfish Creek (1)
- Frain Creek Spring (1)
- Frain Creek (1)
- Miners Creek (1)

**PacifiCorp FLIR flight JC Boyle Reach**



# PacifiCorp 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.



# Habitat Surveys

We assessed:

- Stream Flow
- Spawning Gravel
- Riparian Vegetation
- Relative Stream Gradient
- LWD Count
- Temperature
- Salmonid Presence
- Restoration Opportunities

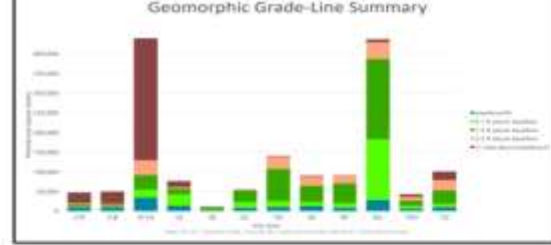
Most of these surveys were completed at the reach level



Tributaries	Expected Length of Anadromy (miles, approximate)
Klamath River Mainstem (Iron Gate to Lake Euwana)	62.3
Scotch Creek	2.2
Camp Creek	7.5
Jenny Creek	2.4
Fall Creek	1
Beaver Creek	2.1
Raymond Gulch	0
Deer Creek	2
Indian Creek	0
Spannaus Gulch	0
Milk Creek	0
Snackenbury Creek	0
Long Prairie Creek	0
Edge Creek	0.2
Shovel Creek	3.4
Grouse Spring Creek	0.8
Hayden Creek	0.2
Chert Creek	0
Rock Creek	0
Crawfish Creek	0.2
Frain Creek	0.2
Topsy Creek	0
Buck Creek	0
Spencer Creek	17
Clover Creek	0
Miners Creek	0.3
<b>Total</b>	<b>101.8</b>



# Geomorphic Grade Line Analysis in Shovel, Jenny and Spencer Creeks

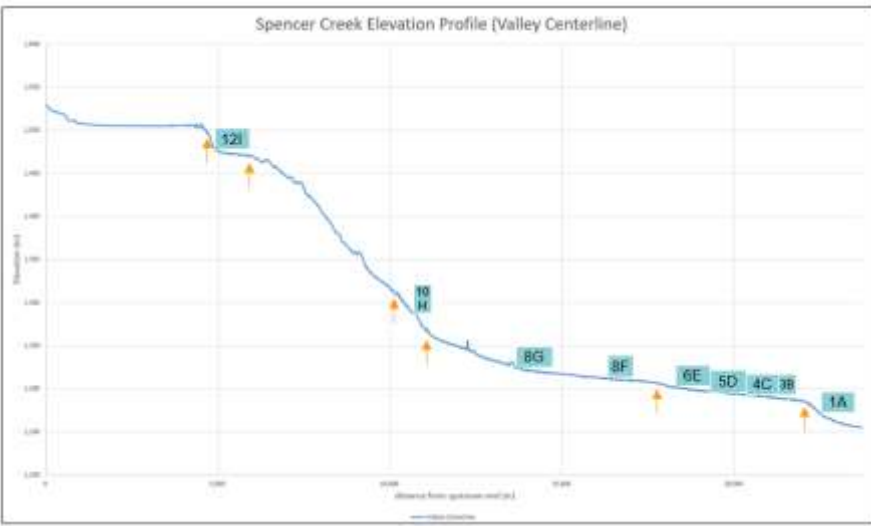
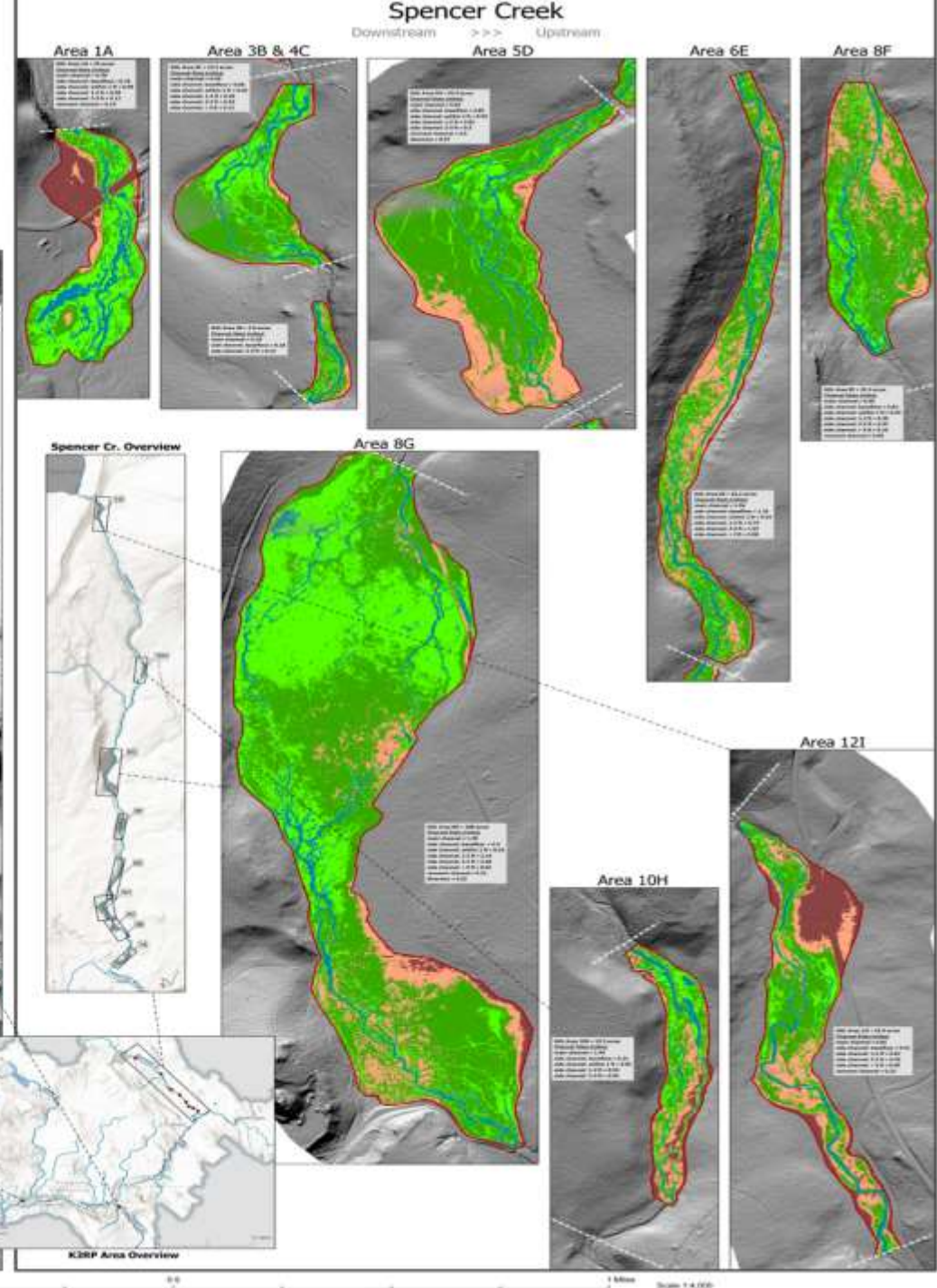
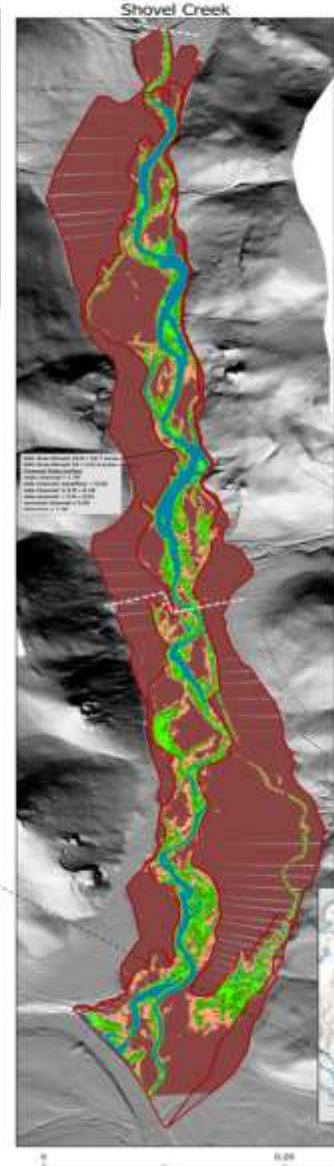
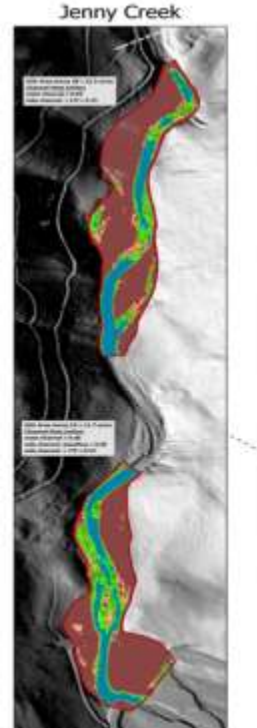
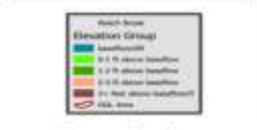


These maps and summary data represent the results of the Geomorphic Grade Line (GGL) analysis for the Shovel Creek, Spencer Creek, Jenny Creek, and Spencer Creek (CA), Jenny Creek (CA), and Spencer Creek (CA). This approach utilizes the geomorphic units (L1 and L2) to develop relative elevation models that expose the relic geomorphic surface (Peters, et al. 2010). The lowest channel at baseline is highlighted in blue, while the surface elevation above baseline are labeled in 1-foot increments. The areas highlighted in red indicate a significant level of incision to incised and terraced upland.

Note: All GGL and slope maps are shown at contour scale 1:4,000, and with the streamlines and catchment at the bottom of the map.

This summary represents a general analysis of these geomorphic units, and are not intended for site-specific geomorphic planning purposes.

Peters, P.G., Henrichs, M., Hargrave, S., 2010. A process-based approach for restoring riparian channel systems to Stage 0, an incising channel network. *Restor. Ecol. Manag.* 18, 115. <http://dx.doi.org/10.1002/rse.2010>





# Project List

Identified 82 potential projects by goal, reasoning, and specific description

Developed prioritization Criteria

Vetted Criteria and project list with TAC

Project_num	Watershed	Described_locat	Featu	Project_description_NEW	Restoration_Goal_NEW	Project_reasoning_NEW	Restoration_type_NEW
50	Long Prairie Creek	River Right Channel	Point	Replace the undersized culvert structure just upstream of Copco Reservoir	Assess culvert for fish passage. Replace if not passing fish at all life stages.	Erosion patterns below the culvert indicate that it is not properly sized for the channel.	Road Impacts
51	Long Prairie Creek	River Left Channel	Point	Remove the ATV/small vehicle crossing near the mouth or build a bridge	Prevent channel degradation from vehicles crossing the ford	Stream crossing does not have a bridge	Road Impacts
52	Long Prairie Creek	River Right Channel - Lower 300-400 feet	Line	Reconnect the floodplain and add complexity just upstream of the culvert on the RR channel by adding LWD	Floodplain connection, channel complexity for spring, summer and fall rearing.	The lower 300-400 feet of the river right channel is low gradient with some floodplain. Might be a good spot for off-channel ponds and LWD	LWD
55	Miners Creek	Lower 1500 feet of Miner Creek	Line	Install BDAs, raise elevation of the channel, add LWD to increase floodplain connectivity.	Reconnect channel to the floodplain for slow water refugia	Miner's Creek is about 2-4 feet wide and incised (3-4 ft) for much of the lower 1/2 mile reach. The vegetation was dominated by sedges, willows, and aspens, suggesting that the water table was not far below the surface. This might be a good spot for BDAs. There was also signs of recent beaver activity in the area	Channel alteration
56	Miners Creek	Just above the confluence with Spencer Creek	Point	Decommission logging road or provide an appropriate crossing structure.	Prevent channel degradation	The ford on Miners Creek appears to be degrading channel at the confluence	Road Impacts
57	Scotch Creek	From Iron Gate Reservoir upstream about 1200 feet	Line	Install structures (lwd/BDAs) in the lower 1200 feet	Retain water and provide habitat complexity	Scotch and Camp could benefit from water retention restoration	Water Retention (BDA)
59	Scotch Creek	From about 1 mile to 1.25 miles upstream of IGR	Line	Install BDAs in the meadow upstream of the barrier	Water retention	Scotch and Camp could benefit from water retention restoration. The meadow section has a year round spring. BDAs could also be highly beneficial for other aquatic and terrestrial species in the watershed	Water Retention (BDA)

# Scoring Criteria

## Weighting

1. Does the project address a Key Limiting Factor? **0.32**
2. What is the magnitude (size) of benefit or anadromous fish? **0.29**
3. How many salmonids and life stages will the project benefit? **0.22**
4. Other species benefits and ecosystem needs? **0.17**

**DRAFT Klamath River Reservoir Reach Project Prioritization Criteria (09/2024)**

- 1. Does the project directly address a major limiting factor in the watershed?**
  - 1 = Provides a benefit that does not address a major limiting factor.
  - 2 = Provides a benefit that somewhat addresses a major limiting factor.
  - 3 = Provides a benefit that addresses a major limiting factor.
  - 4 = Provides a benefit that significantly addresses a major limiting factor.
  - 5 = Permanent protection and benefit to the stream network. Addresses several major limiting factors.
- 2. What is the magnitude of benefit for anadromous salmonids? Consider the size of the project area and the amount limiting factors addressed.** For example, significant flow restoration projects higher in the stream might have a greater benefit than a smaller LWD project further downstream if the major limiting factor is identified as water quantity/quality.
  - 1 = Addresses minimal area and minimal amount of the limiting factors.
  - 3 = Addresses medium area and some of the limiting factors.
  - 5 = Addresses large area and all of the limiting factors.
- 3. Benefit to anadromous salmonids? Consider the number of anadromous salmonids and life stages that will benefit from the project.** For this analysis, seasonal runs are considered one species.
  - 1 = Only one species of anadromous salmonid and/or only one life stage benefits.
  - 2 = Only one species of anadromous salmonid and/or multiple life stage benefits.
  - 3 = Two species of anadromous salmonids and/or one life stage benefit.
  - 4 = Multiple species of anadromous salmonids and/or only one life stage benefits.
  - 5 = All species of anadromous salmonids and/or all life stages benefit.
- 4. Besides benefiting salmonids, are there other species or ecosystem needs met by the project?**

Consider if the project will result in improved water quality, channel function, removal of non-native species (if present), and habitat creation for other species of special concern such as Pacific lamprey, resident *O. mykiss*, suckers, red-legged frogs, yellow-legged frogs, and willow flycatchers.

Assign one point per box:

  - Aquatic species
  - Terrestrial species
  - Channel function
  - Water quality
  - Invasive species removal
  - Fire resilience
  - Other benefits \*List other benefits in comments
  - 1 = Only one ecological benefit of the project.
  - 2 = Project provides 2 benefits.
  - 3 = Project provides 3 benefits.
  - 4 = Project provides 4 benefits.
  - 5 = Project provides 5 or more benefits.





# Habitat Project Prioritization Results

Table 9. Average Technical Advisory Committee restoration project scores for each tributary.

Tributary	Project Count	Mean Weighted Project Score
Beaver Creek	1	3.6
Buck Creek	1	2.0
Camp Creek	3	2.4
Chert Creek	1	1.7
Clover Creek	2	2.1
Copco Springs	1	2.8
Crawfish Creek	4	2.4
Deer Creek	1	3.5
Edge Creek	2	1.8
Fall Creek	9	3.3
Frain Creek	1	2.5
Grouse Spring Creek	1	2.4
Hayden Creek	5	2.8
Jenny Creek	8	3.3
Klamath Mainstem	7	3.4
Long Prairie Creek	5	2.6
Mainstem Klamath, Long Prairie Creek, & Shovel Creek	1	4.7
Miners Creek	2	2.4
Scotch Creek	3	2.8
Shovel Creek	3	3.7
Spencer Creek	20	3.4
<b>Total</b>	<b>82</b>	<b>3.0</b>

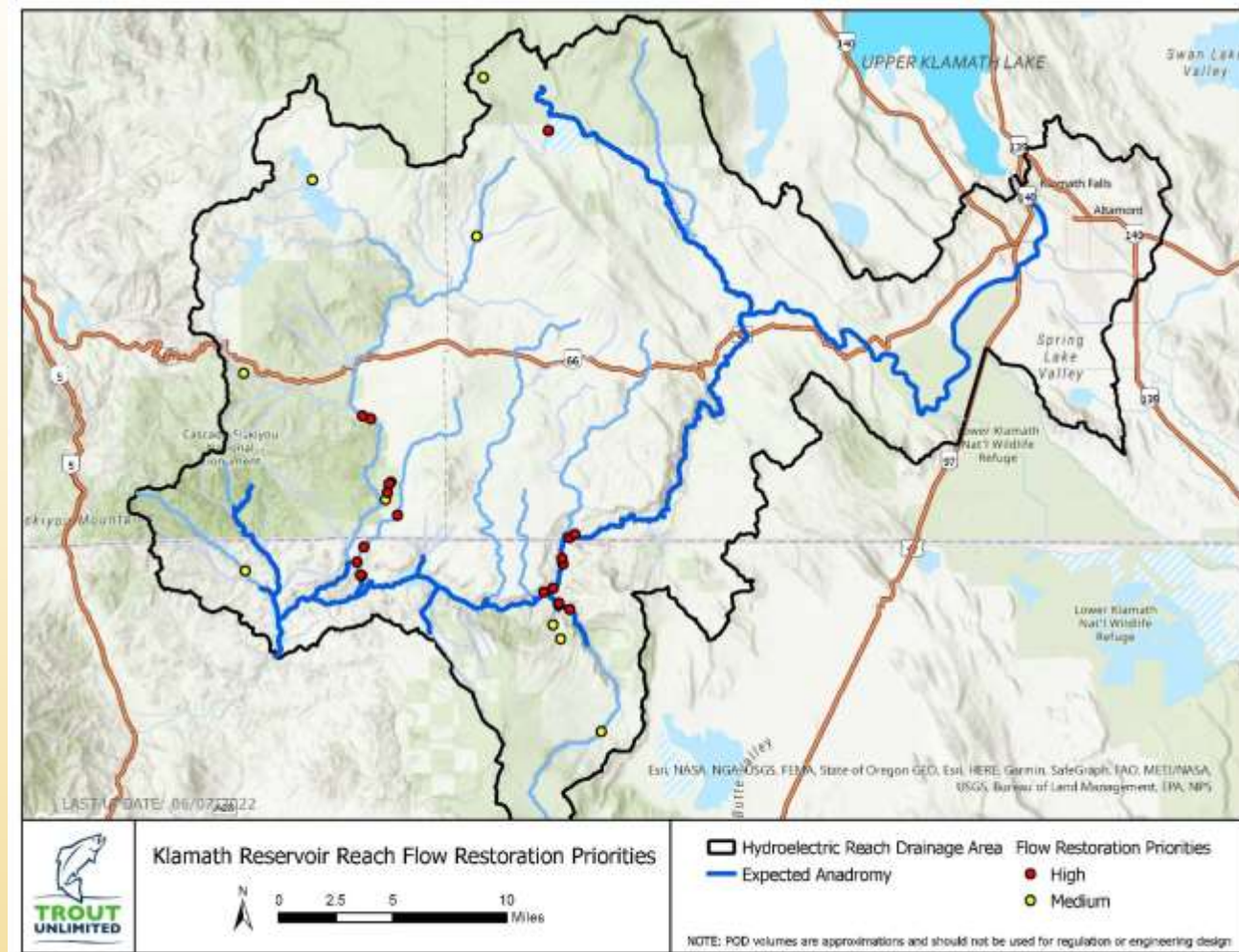
Rank	Project	Location	Project Description	Score	Tier
1	#108	Mainstem Klamath, Long Prairie Creek, & Shovel Creek	Purchase PacifiCorp Parcel A lands for conservation and future restoration	4.69	High
2	#109	Spencer Creek	Obtain a conservation easement in the Spencer Creek floodplain areas for conservation and future restoration	4.54	High
3	#95	Spencer Creek	Make Buck Lake a lake again <OR> regrade channels in the lake to improve habitat conditions, add LWD, BDAs, vegetation, and cattle fencing to the depositional valley 14J	4.34	High
4	#99	Shovel Creek	Regrade stream channel to allow for full floodplain reconnection in this reach, and add cattle fencing	4.17	High
5	#47	Jenny Creek	Develop Upper Jenny Creek riparian and fencing plan to address water quality and temperature	4.16	High
6	#48	Klamath Mainstem	Improve upstream and downstream passage at Keno and Link River Dams for all life-stages of anadromous fish	4.11	High
7	#110	Fall Creek	Assess impacts of agricultural practices and determine if a water quality improvement project would benefit Fall Creek	4.00	High
8	#70	Spencer Creek	Remove cattle operation or work with landowner to keep cattle out of the riparian area and revegetate the riparian zone. Modify or remove diversion infrastructure used for cattle to ensure fish passage. If cattle removal is not possible, add cattle fencing.	3.93	High
9	#89	Spencer Creek	Reconnect floodplain, add LWD, add cattle fencing, and increase riparian vegetation to the depositional valley 4C	3.88	High
10	#91	Spencer Creek	Remove berm, reconnect channel to floodplain, add LWD, add cattle fencing, and increase riparian vegetation to the depositional valley 5D	3.85	High

# Flow Restoration Evaluation Criteria

## Tributaries Evaluated:

Primary Tributary	Secondary Tributaries
Beaver Creek	Sloan Creek, Unnamed Springs
Camp Creek	Unnamed Springs
Deer Creek	
Edge Creek	
Fall Creek	Unnamed Springs
Hayden Creek	
Jenny Creek	Beaver Creek, Grizzly Creek, Hoaxie Creek, Johnson Creek, Keene Creek, Little Beaver Creek, Skookum Creek, Spring Creek, Willow Creek, Unnamed Springs,
Long Prairie Creek	Dixie Spring
Scotch Creek	Unnamed Springs
Shovel Creek	Bear Canyon Creek, Grouse Spring Creek, Unnamed Springs
Spencer Creek	Clover Creek, Tunnel Creek, Unnamed Springs

Diversion Rate	Water Right Priority Date	Priority Category
≥1 cfs	Before 1920 (or no priority date)	High
≥1 cfs	After 1920	Medium
0-1 cfs	Any	Low



## Evaluation Criteria:



# Flow Restoration Results

Tributary	High Priority	Medium Priority	Low Priority
Beaver Creek			19
Camp Creek			2
Deer Creek			2
Edge Creek			2
Fall Creek	6		18
Hayden Creek			2
Jenny Creek	4	9	47
Klamath River (downstream of Keno Dam)	6		4
Long Prairie Creek			1
Scotch Creek		1	3
Shovel Creek	3	3	1
Spencer Creek	4	2	5

23

15

106





# Flow Restoration Results – 38 medium and high Projects

Project Number	Primary Tributary	Priority Tier
FA-1a	Fall Creek	High
FA-2	Fall Creek	High
FA-3	Fall Creek	High
FA-4	Fall Creek	High
FA-5	Fall Creek	High
FA-6	Fall Creek	High
GS-1	Shovel Creek	High
JE-2	Jenny Creek	High
JE-4	Jenny Creek	High
JE-6	Jenny Creek	High
JE-7	Jenny Creek	High
KL-1	Klamath River	High
KL-2	Klamath River	High
KL-3	Klamath River	High
KL-4	Klamath River	High
KL-5	Klamath River	High
KL-6	Klamath River	High
SH-1	Shovel Creek	High
SH-2	Shovel Creek	High
SP-6	Spencer Creek	High
SP-7	Spencer Creek	High
SP-8	Spencer Creek	High
SP-9	Spencer Creek	High
JE-1	Jenny Creek	Medium
JE-10	Jenny Creek	Medium
JE-3a	Jenny Creek	Medium



Klamath Reservoir Reach Flow Restoration Priorities



**Flow Restoration Priorities**

- Hydroelectric Reach Drainage Area (Black outline)
- Expected Anadromy (Blue line)
- High (Red dot)
- Medium (Yellow dot)

NOTE: POD volumes are approximations and should not be used for regulation or engineering design



# Fish Screening Evaluation Criteria

Prioritization Criteria (Fish Screening)		
<p><u>1. Diversion Size:</u> Larger diversions are assigned a higher priority. Score depends on location of diversion (Klamath River Mainstem or Tributary). Estimates of mean September flow rates are derived from the NHD database.</p>	<p><u>2. Benefit to anadromous salmonids?</u> Consider the number of anadromous salmonids and other native species of concern that will benefit from the project. For this analysis, seasonal races are considered one species.</p>	<p><u>3. Impact to Fish:</u> Using best professional judgement, evaluate the potential impact to fish from the existing diversion. Factors to consider include entrainment potential, seasonality of diversion, existing infrastructure, and any other factors deemed relevant.</p>
Weight: 0.2	0.2	0.6

# Screening Results

Table 13. Descriptions of 91 fish screening projects ranked by the mean weighted priority score. Diversions that are already screened are shown in green.

Rank	Project	Location	Score	Tier	Screened
1	KENO-39	Klamath River - Keno Reach (North Canal)	5	High	no
2	KENO-41	Klamath River - Keno Reach (Klamath Straits Drain)	5	High	no
3	KENO-43	Klamath River - Keno Reach (Ady Canal)	5	High	no
4	KENO-5	Klamath River - Keno Reach (Lost River Diversion Ditch)	5	High	no
5	KL-1	Klamath River ('Beswick Diversion,' crosses Edge Creek)	4.6	High	no
6	KL-2	Klamath River ('Owens Island Diversion')	4.4	High	no

Fall Creek (and tributaries)	4
Grouse Springs Creek	1 (screened)
Klamath River (downstream of Keno Dam)	8
Klamath River (upstream of Keno Dam)	55 (5 screened)
Shovel Creek	2 (both screened)
Spencer Creek (and tributaries)	8
<b>Total unscreened</b>	<b>70</b>

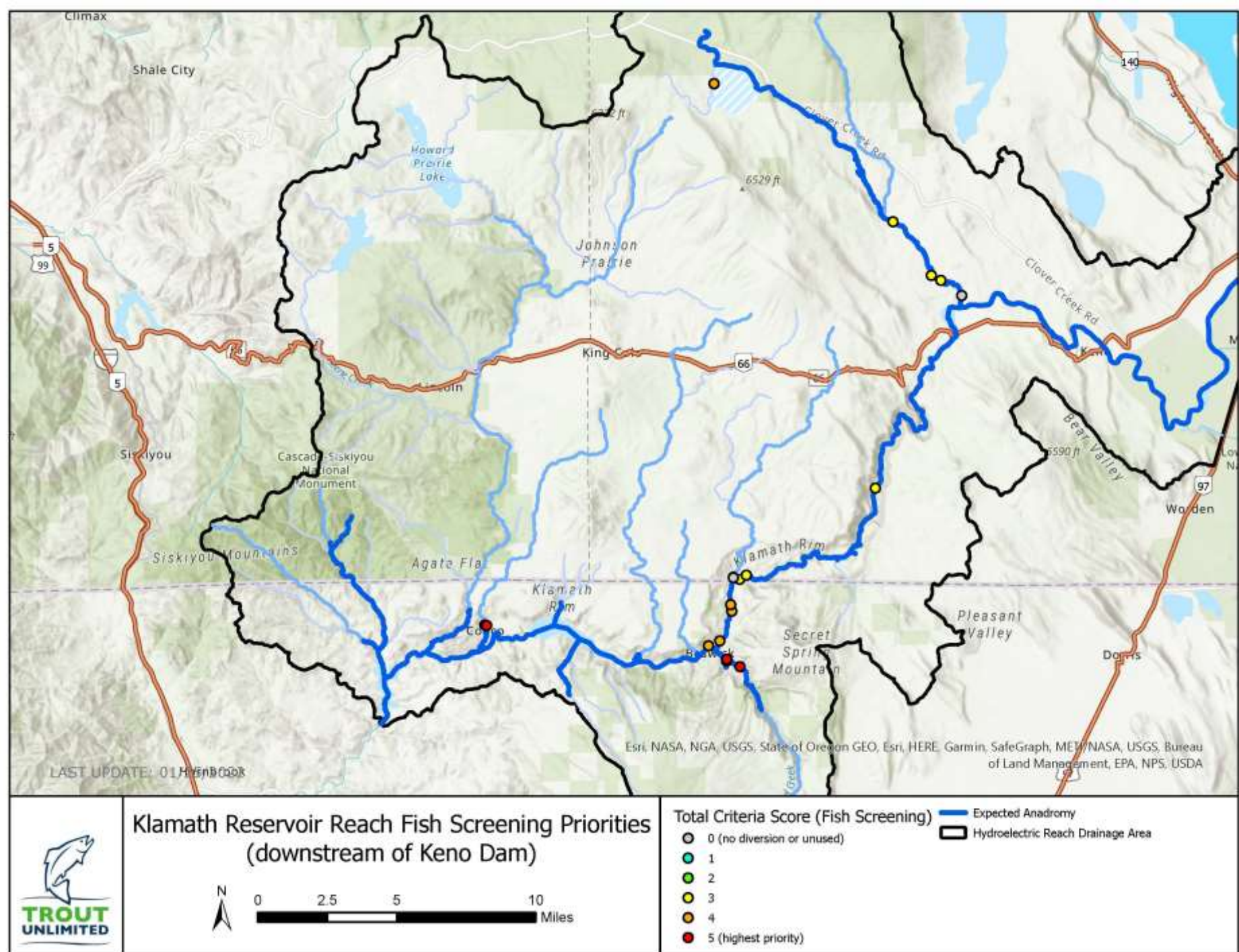




Screening results  
(downstream of Keno)

**20** unscreened diversions

**3** screened diversions

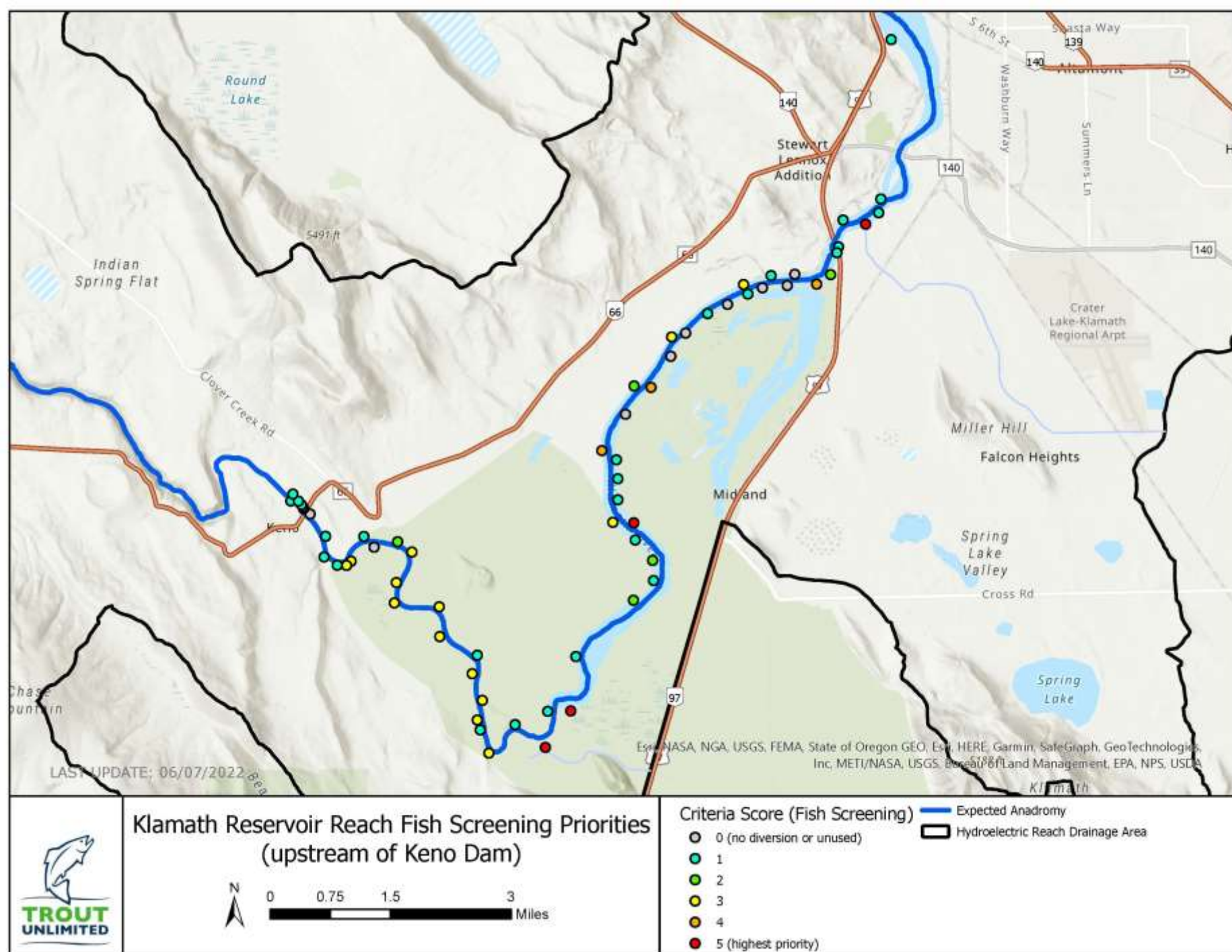




Screening results  
(upstream of Keno)

**50** unscreened diversions

**5** screened diversions





# Habitat Summary



	Length	LWD		Gravel		Canopy Cover	Trout
Tributary Reaches	(ft)	(count)	(count/mi)	(ft <sup>2</sup> )	(ft <sup>2</sup> /mi)	(%)	(present)
Camp Creek (Lower)	1083	6	29	390	1901	70	Y
Camp Creek (Upper)	3022	43	75	73	128	56	N
Crawfish Creek	981	16	86	2	11	64	N
Fall Creek	6008	98	86	108	95	61	Y
Frain Creek	564	0	0	0	0	53	N
Grouse Spring Creek	1000	8	42	0	0	76	Y
Hayden Creek	4092	76	98	0	0	41	N
Jenny Creek (Lower)	4579	46	53	87	100	49	Y
Jenny Creek (Upper)	5346	21	21	56	55	41	Y
Long Prairie Creek (E. Channel)	807	21	137	0	0	53	Y
Long Prairie Creek (W. Channel)	736	11	79	0	0	82	Y
Lower Dutch Creek	1040	0	0	0	0	27	N
Lower Edge Creek	714	0	0	0	0	43	N
Lower Scotch Creek	3760	21	29	225	316	38	Y
Miners Creek	1420	0	0	0	0	70	N
Rock Creek	4957	76	81	10	11	42	N
Shovel Creek (Lower Valley)	3824	18	25	10	14	59	Y
Shovel Creek (Upper Valley)	4627	31	35	13	15	61	Y
Shovel Creek (Canyon Reach)	6800	91	71	144	112	55	Y
Spencer Creek (R1)	2547	11	23	438	908	25	Y
Spencer Creek (R2)	1948	13	35	0	0	40	Y
Spencer Creek (R3)	1481	2	7	430	1533	22	Y
Spencer Creek (R6)	5280	18	18	12700	12700	37	Y
Spencer Creek (R7)	3191	33	55	2315	3831	28	Y
Spencer Creek (R8)	11258	113	53	8055	3778	44	Y
Spencer Creek (R9)	9171	135	78	6680	3846	26	Y
Spencer Creek (R10)	2846	124	230	1305	2421	44	Y
Spencer Creek (R11)	17427	681	206	3346	1014	33	Y
Spencer Creek (R12)	4048	171	223	4925	6424	24	Y
Spencer Creek (R13)	1555	61	207	0	0	34	Y
Spencer Creek (R15)	5757	105	96	55	50	10	Y
Spencer Creek (R16)	2463	37	79	0	0	57	Y
Spencer Creek (R17)	2015	10	26	0	0	10	Y

# Tributary Summaries

## 3.3.3 Deer Creek

### Location

Deer Creek is a tributary that flows into the southern side of Copco Lake (Figure 45). Once Copco Dam is removed, Deer Creek will flow into the Klamath River at river mile 200.4.

### Ownership

The watershed is privately owned with some federal (BLM and USFS) parcels.

### Size

The watershed is approximately 7 square miles. Estimated 2 miles of anadromy based on Baseline Fish Habitat, but unable to confirm due to private property.

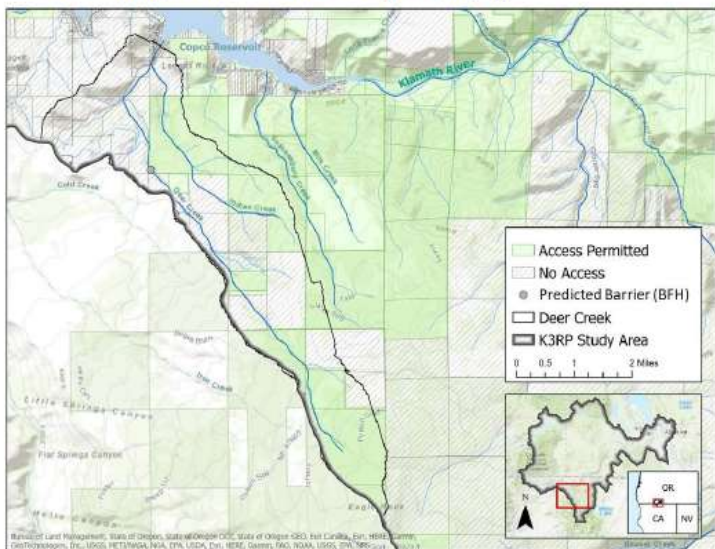


Figure 45. Deer Creek watershed. No habitat surveys were conducted in 2021. The location of the predicted barrier is the expected limit of anadromy in the creek based on the Baseline Fish Habitat model.

### Natural Barriers

- Unknown. K3RP and previous groups were unable to gain access.

### Man-Made Barriers

- Unknown. K3RP and previous groups were unable to gain access.

### Temperature

- Temperatures were within a suitable range for coho salmon and *O. mykiss* during the summer-drought conditions of 2021 (Figure 46) (K3RP Temperature Assessment 2021).

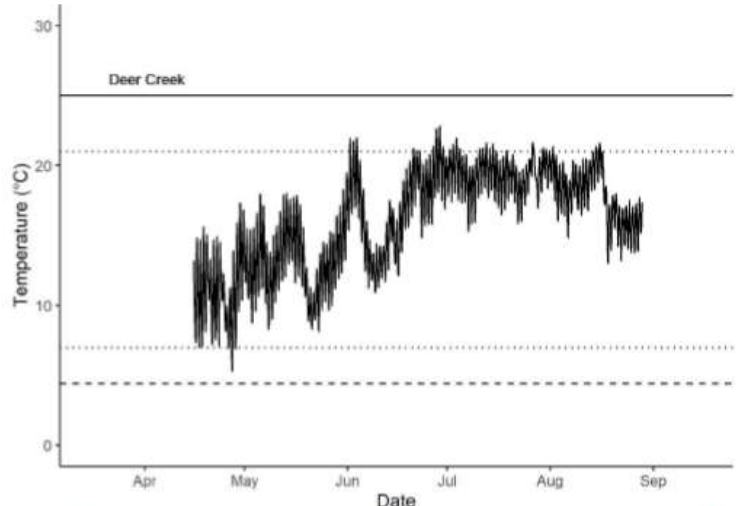


Figure 46. Deer Creek temperature data from 2021 for a logger placed just below Ager Beswick Road Crossing. Logger was installed on 04/15/2021 and the pool remained wetted throughout the summer. The black line indicates the temperature. Recommended summertime rearing temperature for juvenile coho salmon is 7 – 21 °C (dotted lines), cessation of growth occurs at a minima of 4.4 °C (dashed line), and the Upper Lethal Temperature (ULT) occurs at 25.0°C (solid black line).

### Stream Flows

- Stream remained wetted during the 2021 drought. On April, 15, flows were ~1.0 CFS and on August 28, flows were ~0.5 CFS. The consistent stream flows even during the drought period might suggest the creek has spring inputs (K3RP Temperature Assessment 2021).

### Diversions

- Aerial imagery suggests there are several diversions in the upper watershed for cattle and flood irrigation activities. There is likely a large percentage of summer base flow being diverted on private parcels (K3RP Aerial Imagery Assessment 2021).

### Salmonid Presence

- Salmonid presence is unknown, we but suspect *O. mykiss* and possibly coho salmon might use this tributary, especially if the habitat was restored (K3RP Habitat Assessment 2021).
- Bullfrogs were spotted near the Ager Beswick culvert during the 2021 K3RP effort and they might have a negative impact on salmonid rearing success (K3RP Habitat Assessment 2021).

### Habitat Description

- Unable to survey due to restricted access, but based on assessing the stream from the road, it seems like a relatively small tributary with some sections of low gradient habitat (Figure 47). There might be some areas suitable for coho and *O. mykiss* spawning. The few habitat units near the road crossing have significant issues with fine sediments covering the substrate, likely caused by the upstream cattle ranching (K3RP Habitat Assessment 2021).



# Tributary Summaries continued



Figure 47. Looking downstream from the road at the Ager Beswick culvert on Deer Creek on 06/25/2021.

## Identified Habitat Limitations

- Diversions likely limit flow (K3RP Aerial Imagery Assessment 2021)
- Significant issues with fine sediments covering the substrate (Figure 48) (K3RP Habitat Assessment 2021).



Figure 48. Looking upstream from the stream channel at the Ager Beswick culvert on Deer Creek on 06/25/2021.

## Restoration Recommendations

- Restoration efforts should focus on assessing the impacts of agricultural practices and determine if a water quality improvement project would benefit Deer Creek.

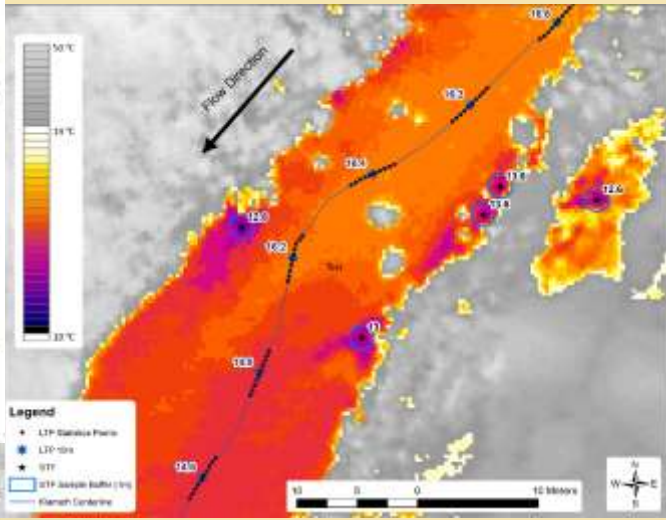
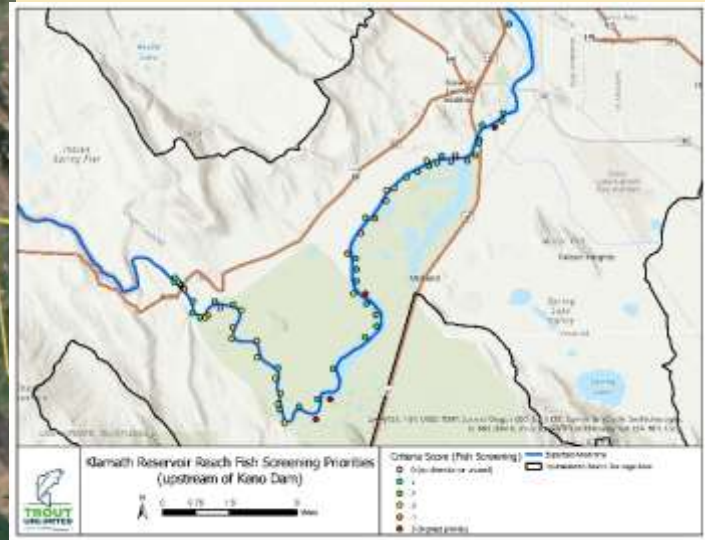
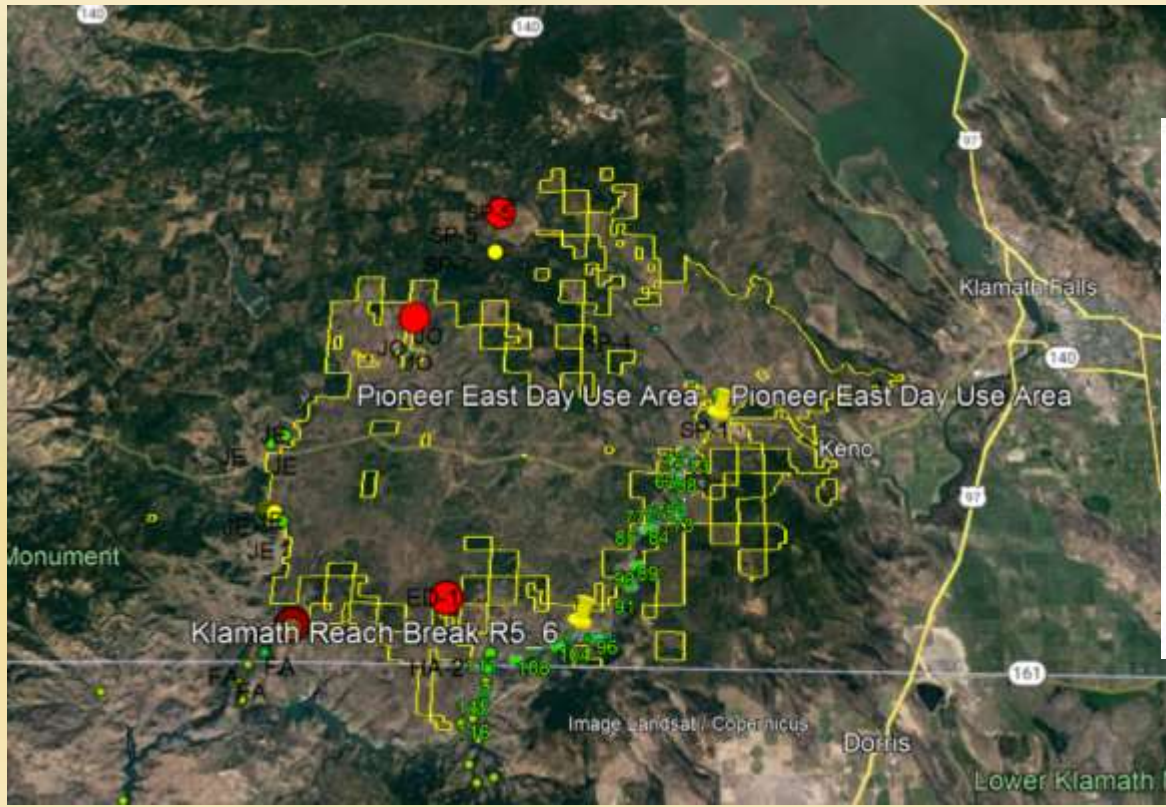
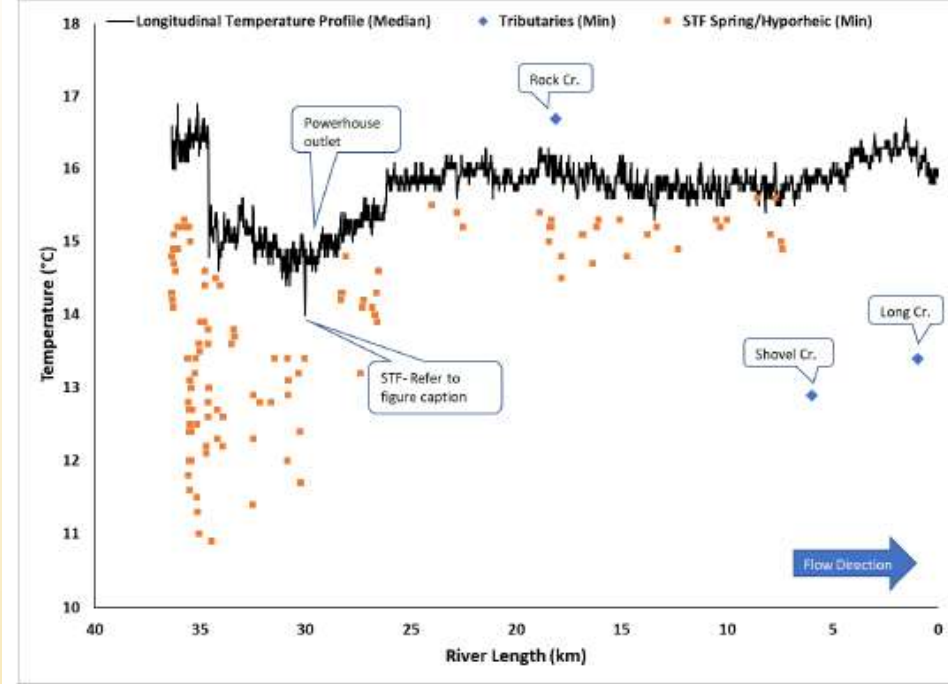
## Restoration Projects Identified

- Project #113 (high priority): Assess impacts of agricultural practices and determine if a water quality improvement project would benefit Deer Creek



# Outcomes so Far

- ↵ Klamath River FLIR flight and cold water springs prioritization – 119 TSFs
- ↵ Green Diamond Habitat Restoration discussions on Spencer Creek.
- ↵ Several conversations regarding combining/screening diversions on the Keno Reach





# Current Status and Next Steps

- ↩ The project team is incorporating TAC comments and plan to release the Plan in November/December 2022.
- ↩ Start working on 82 habitat projects, 70 potential screening projects and 38 potential flow restoration projects.
- ↩ Continue collecting temperature data until 2023
- ↩ Outreach to irrigation districts, practitioners, stakeholders.

Draft Report Klamath Reservoir Reach Restoration Prioritization

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5

DRAFT REPORT • APRIL 2022  
**Klamath Reservoir Reach Restoration Prioritization**  
*A Summary of Habitat Conditions and Potential Restoration Actions for the Mainstem Klamath River and Tributaries between Iron Gate Dam and Link River Dam*



Prepared by:

NOAA U.S. FISH AND WILDLIFE SERVICE TROUT UNLIMITED



# Questions???



Photos by Thomas Dunklin



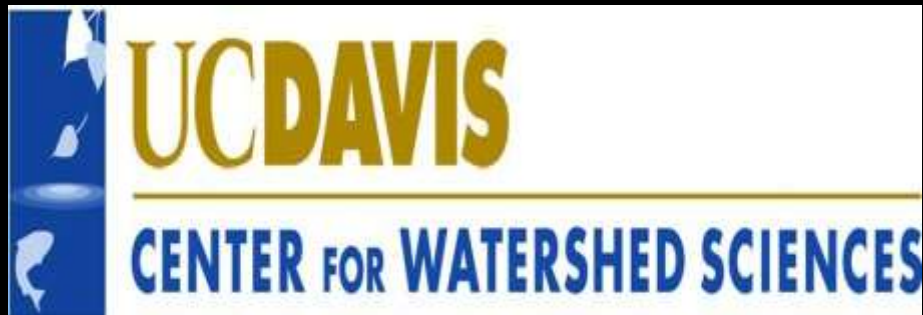


# Klamath dam removal: the use of multiple tools to establish scientific baselines

Robert A. Lusardi and Rachelle Tallman

Department of Wildlife, Fish, and Conservation Biology

Center for Watershed Sciences, University of California, Davis

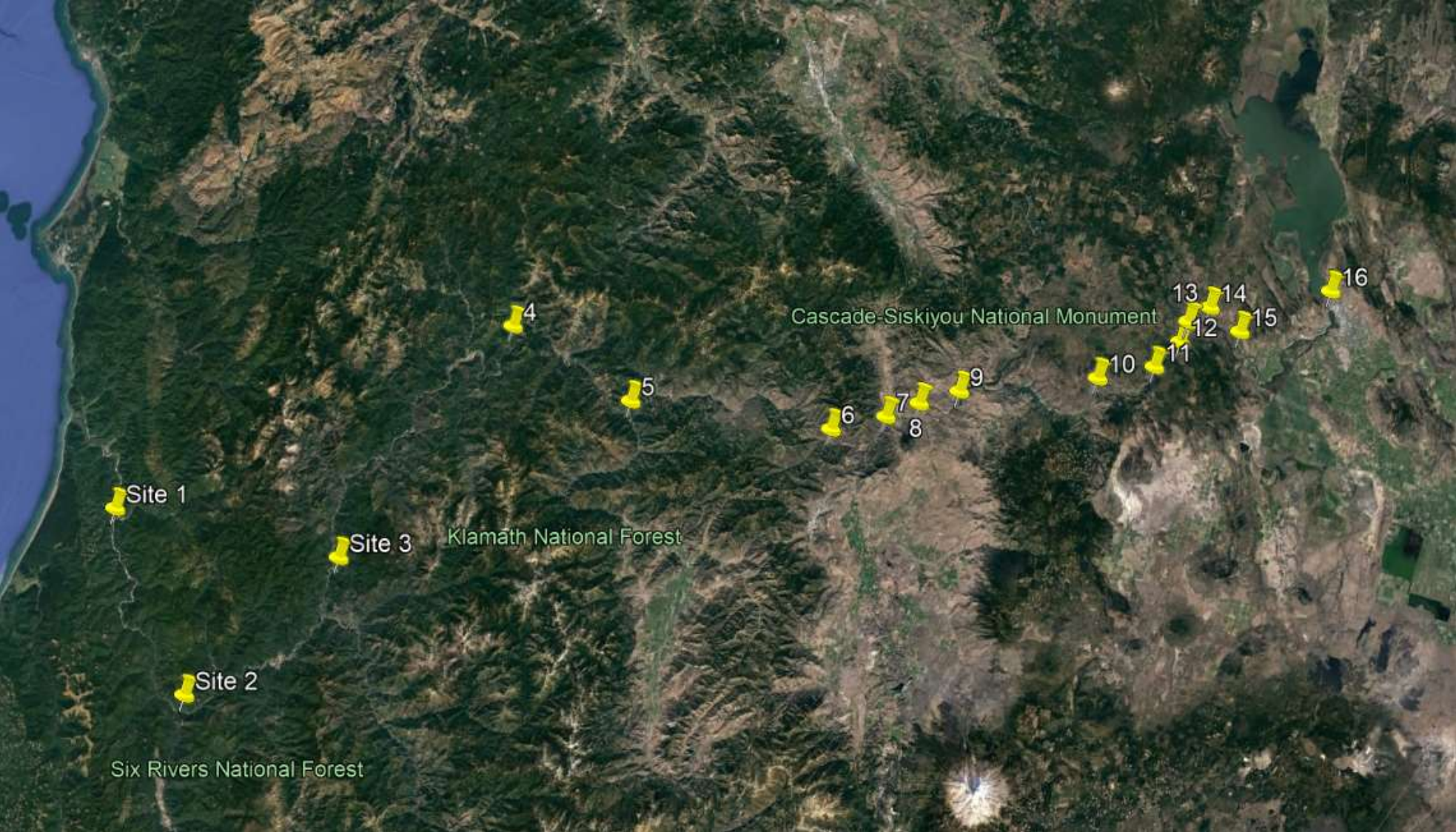


# Questions to consider with dam removal

1. How does the physical environment change?
2. How does the biology change with changes in the physical environment?
3. How do juvenile salmon currently use the Klamath River during their early life history? How does that change post dam removal?
4. How will spring-run Chinook use the upper Klamath Basin and what role does upper Klamath Lake play in their outmigration and survival?



# How does the physical environment change with dam removal?



# How does the biology change with changes in the physical environment?

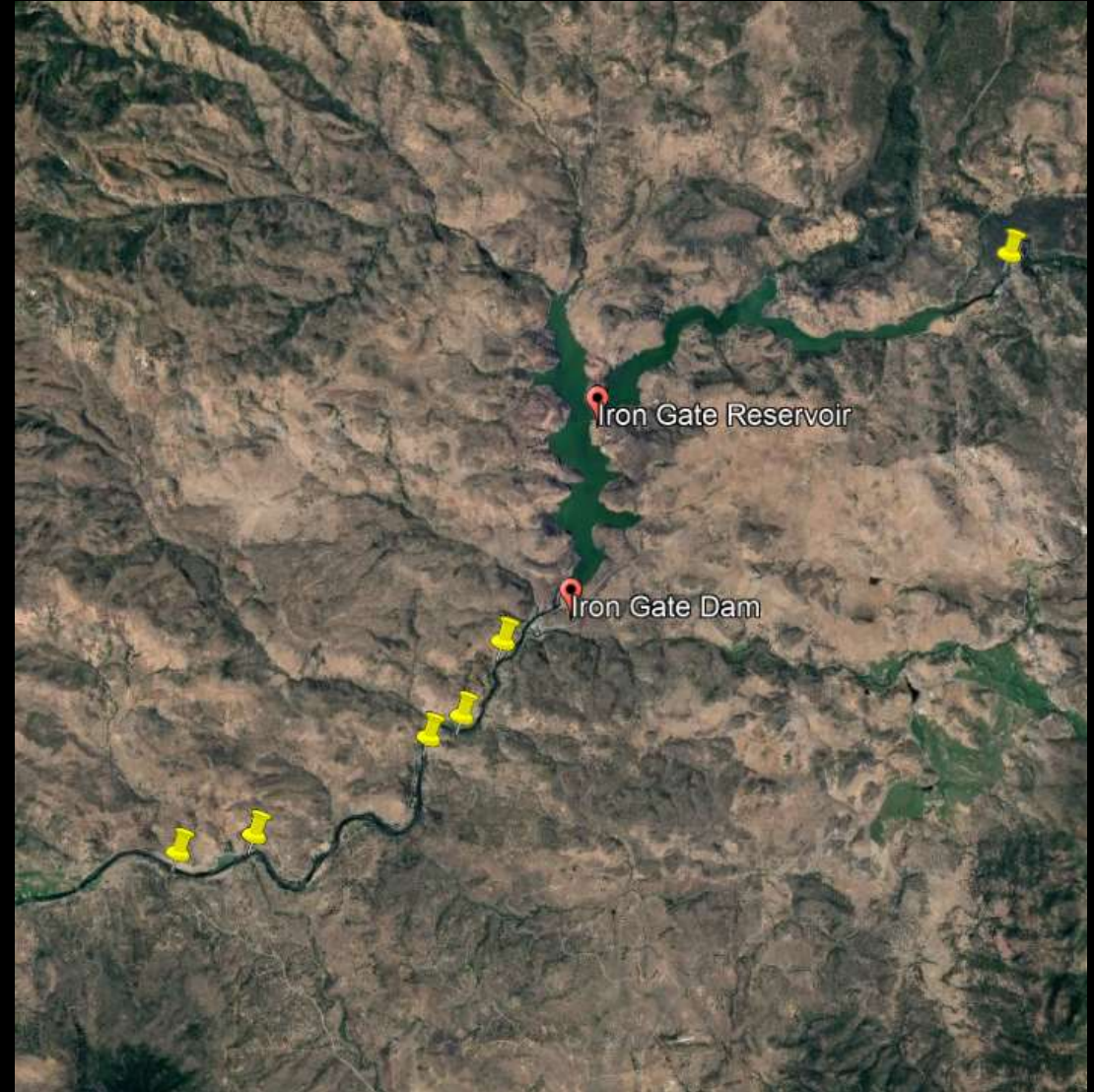
- Macroinvertebrates: short life cycles, fast turnover, speciose
- Ability to quantify response through space and time
- Annual sampling at established sites (July), replicates. 2020-2022.
- Fall, winter, spring below IG dam (Yurok)
- Food web analysis: stable isotopes, carbon and nitrogen (O'Dowd, HSU).
  - Tributaries as controls

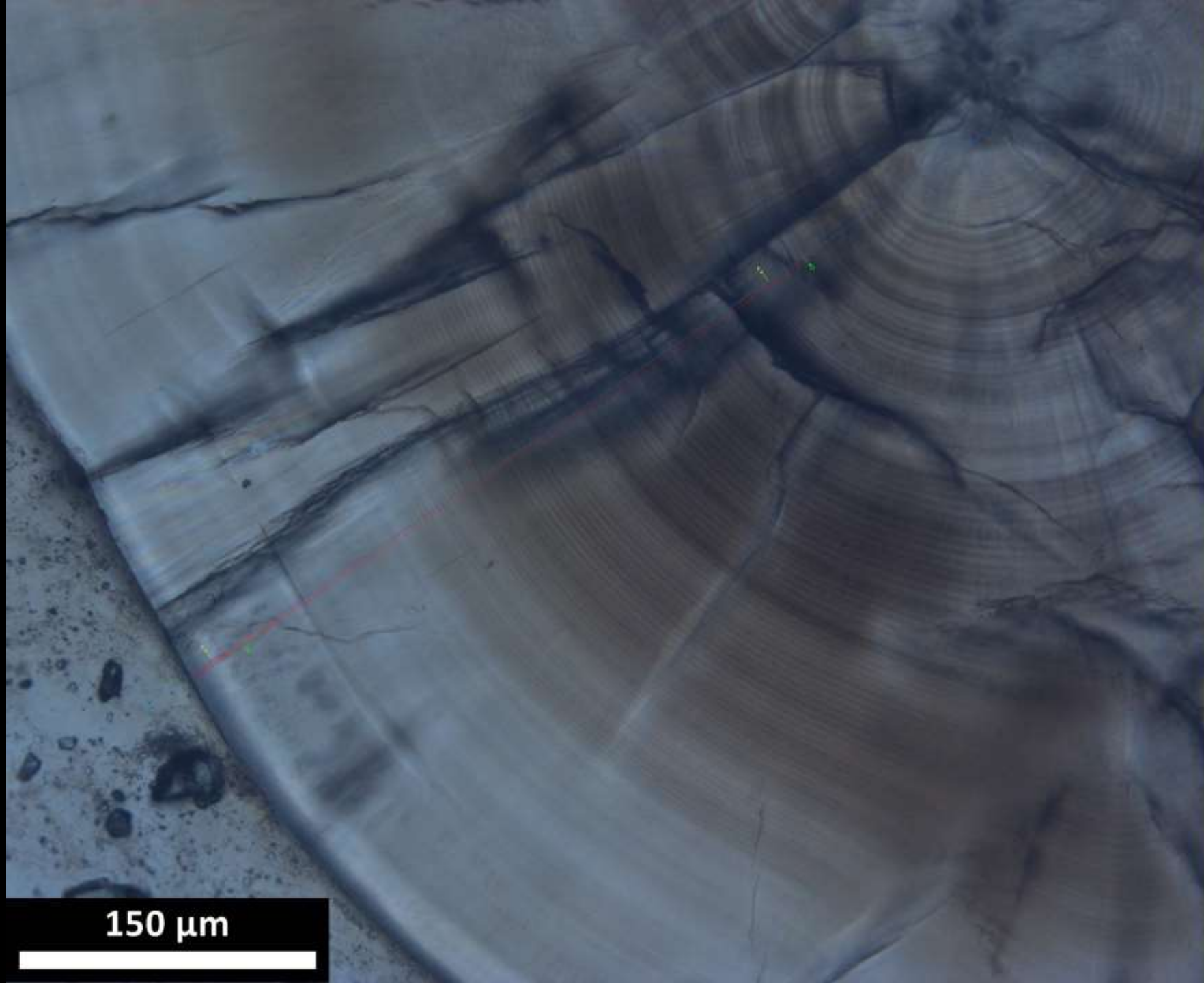




# How does the biology change with changes in the physical environment?

- Objective: Fish Sampling (Yurok Tribe)
  - Document fish assemblage patterns and movement
  - Methods: seining, capture and release
  - Frequency: spring, summer, fall, winter
- Six sampling locations: five downstream of Iron Gate Dam.





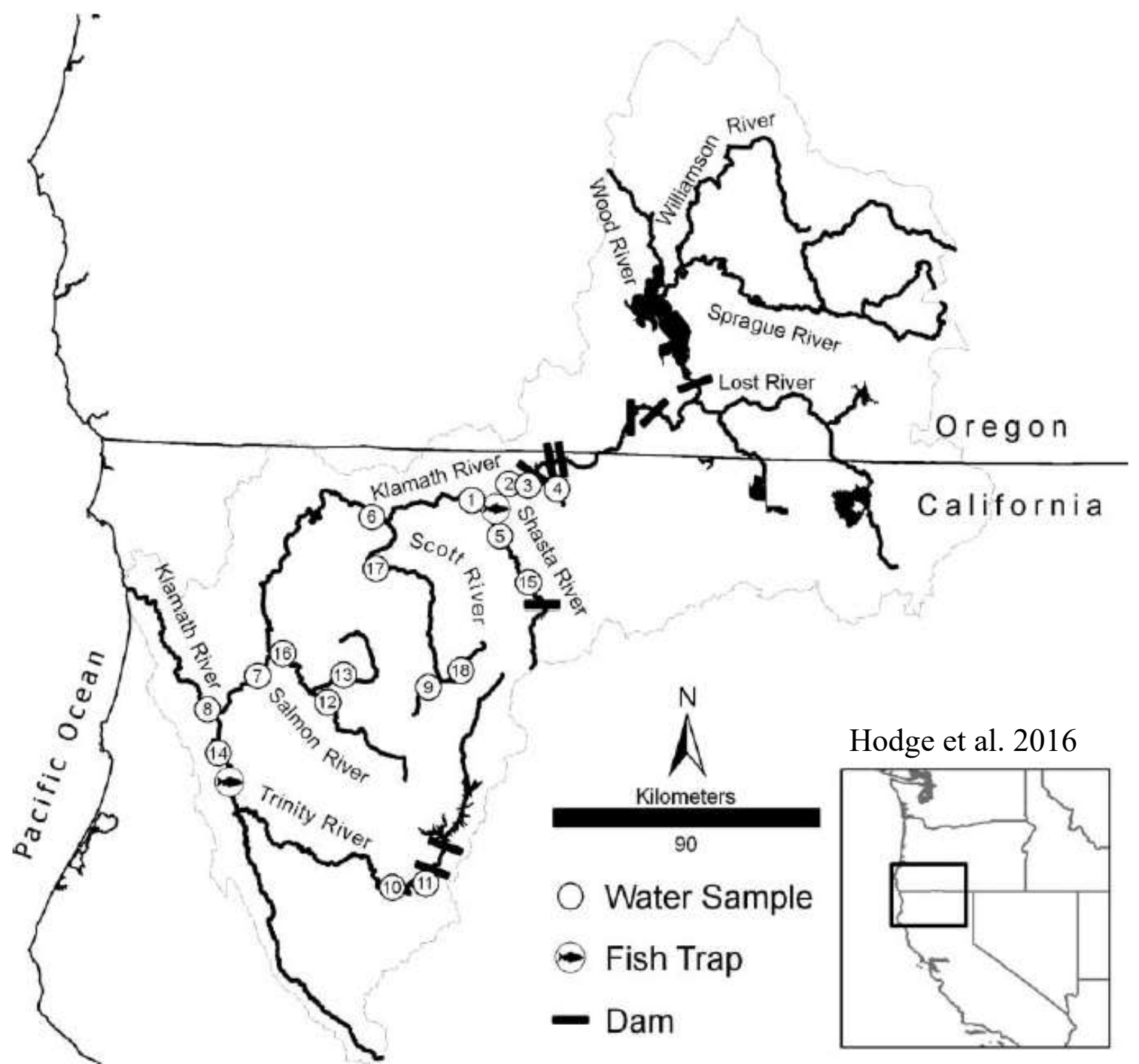
150  $\mu\text{m}$



# Defining the Isoscape

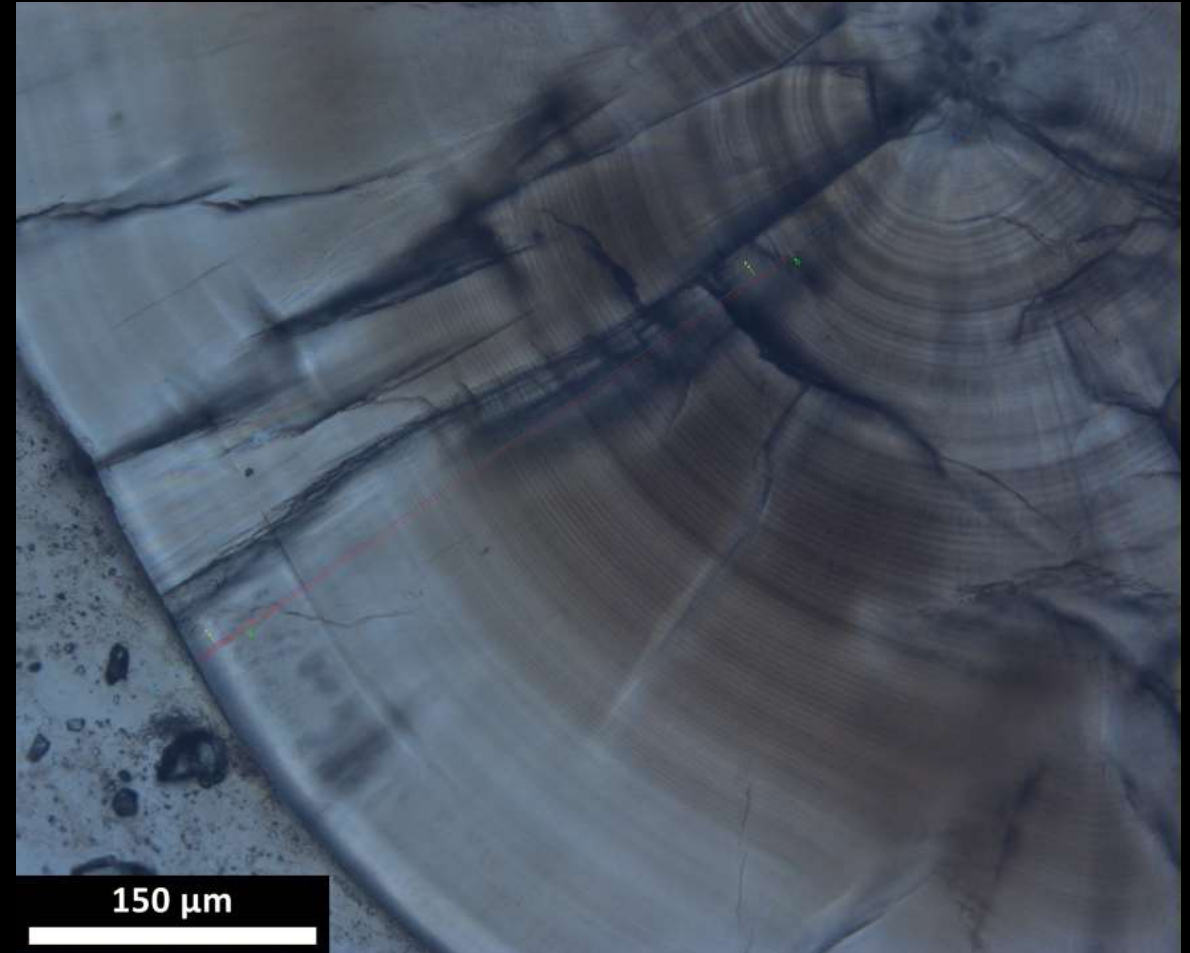


Wait. Remind me where I came from before I went to the ocean?



# How do juvenile salmon currently use the Klamath River during their early life history and how does that change with dam removal?

- Defining the Isoscape:
  - Strontium water samples
  - 43 distinct watershed locations
- ~40 pair of fall-run otoliths collected each year (2020, 2021, 2022 planned)
  - Otolith analysis
- Strontium isotope  $^{87}\text{Sr}/^{86}\text{Sr}$  signatures
  - Retrospective analysis of life history and migration timing





How do spring-run Chinook use  
the upper Klamath Basin?

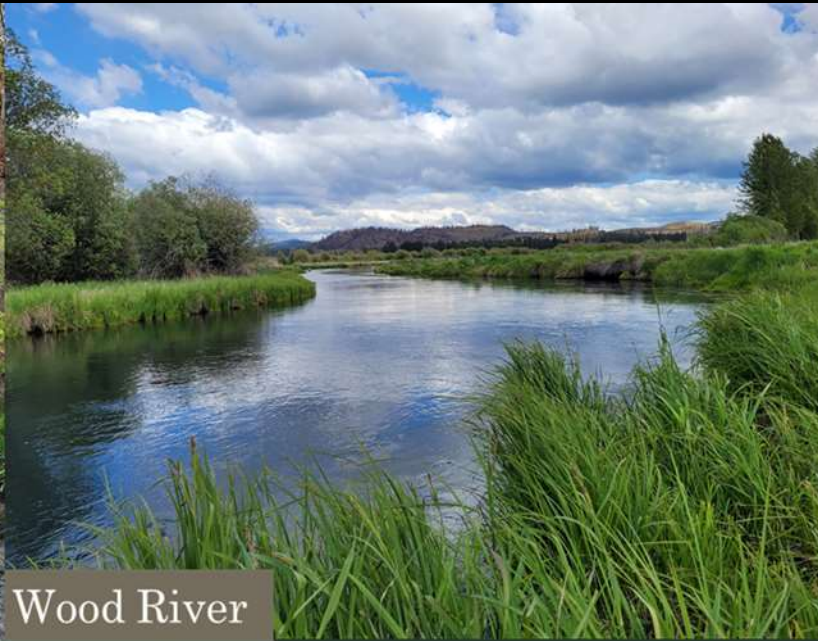




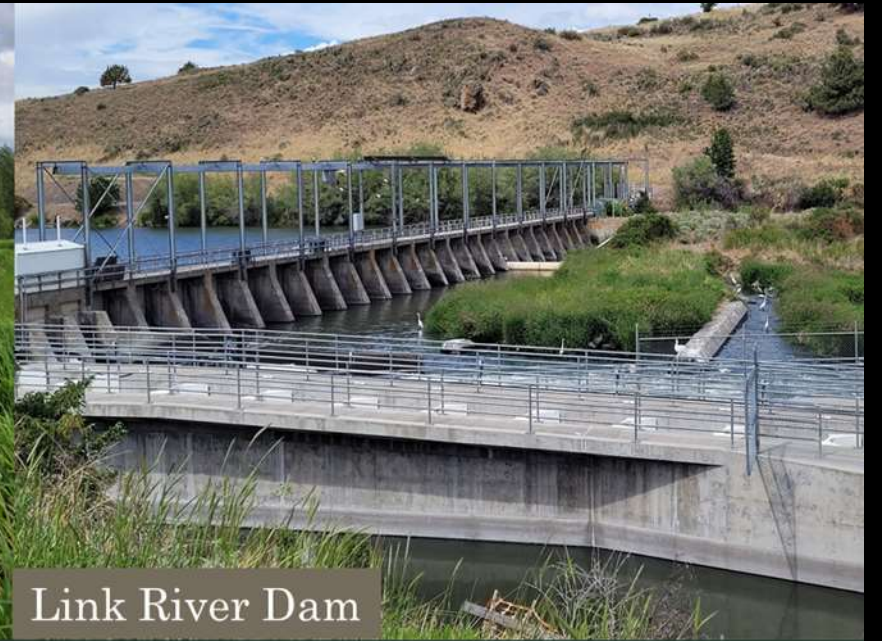
How will spring-run Chinook use the upper Klamath Basin and what role do tributaries, upper Klamath Lake, and Link River dam play in outmigration and survival?



Williamson River



Wood River



Link River Dam



# 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





# Acoustic tagging and release, spring 2022

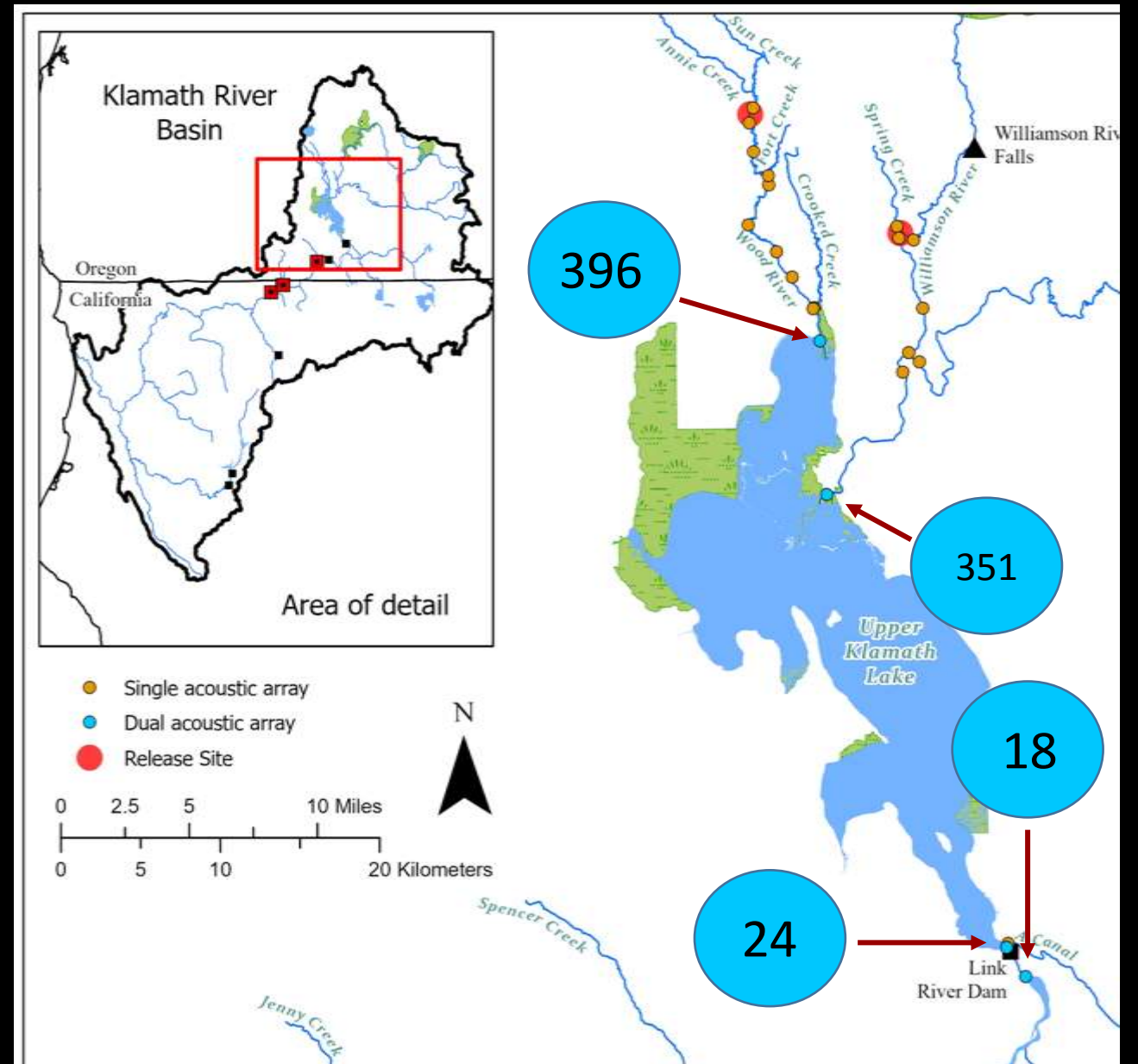




# Preliminary Acoustic Results

**April 2022**

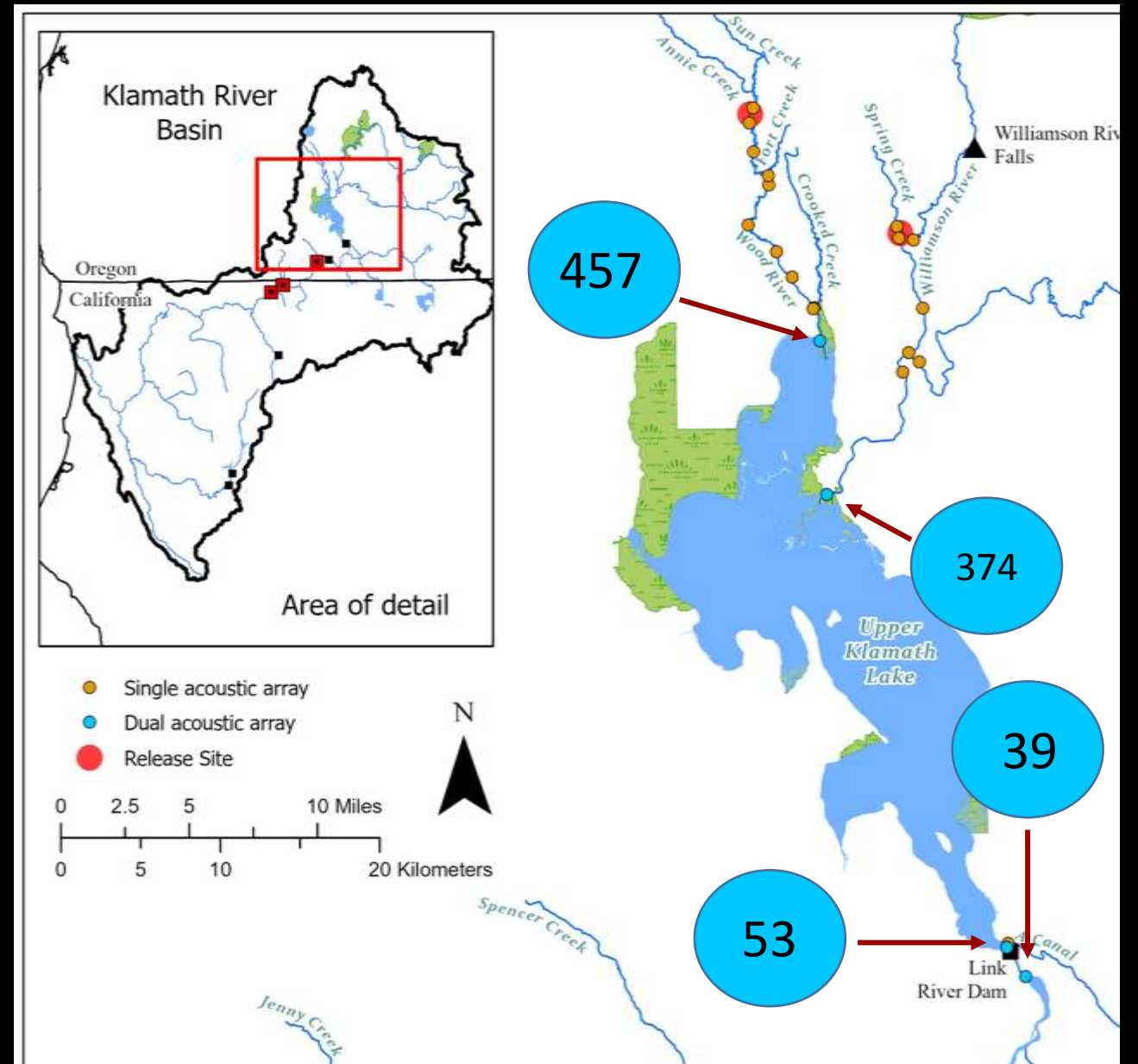
- Williamson: **513**
- Wood: **513**
  - Downloaded receivers: April 27<sup>th</sup> – 29<sup>th</sup>
- Results are based on having at least 4 detections within 120 second interval
- PRI = 5



# Preliminary Acoustic Results

**June 2022**

- Williamson: **513**
- Wood: **513**
  
- Results are based on having at least 4 detections within 120 second interval
  
- $PRI = 5$

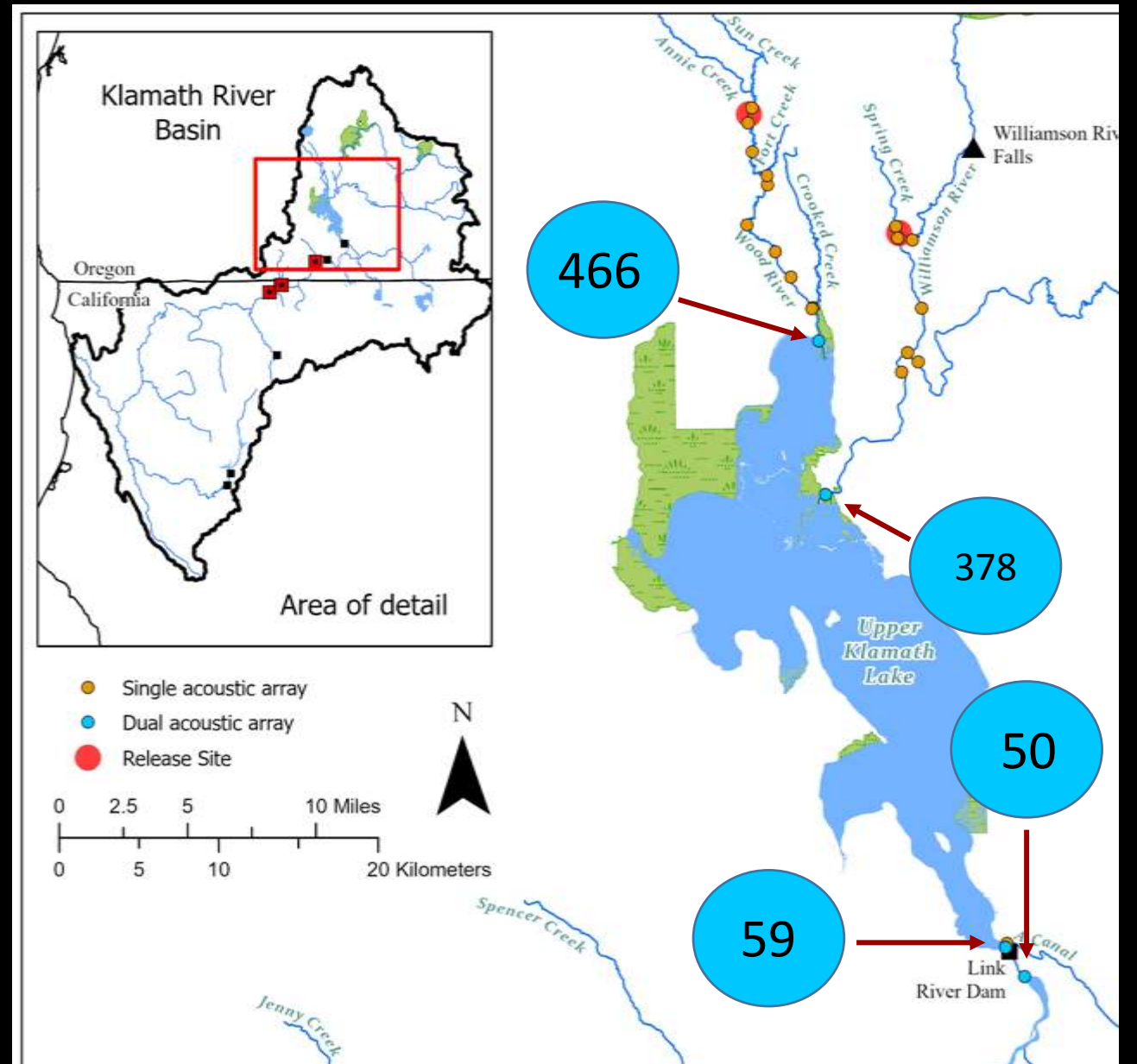




# Preliminary Acoustic Results

September 2022

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



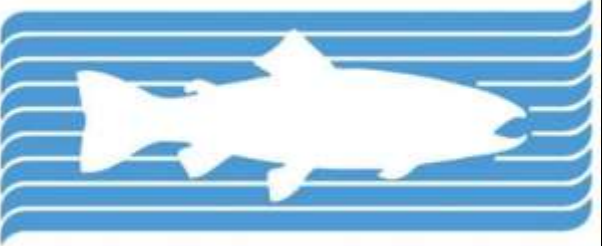
# Summary and next steps

- Planned experimental release: spring 2023
- Stagger releases through time
- Deploy additional receivers in upper Klamath Lake/Pelican Bay
- Consider releasing additional age classes to understand differences in life histories and outmigration timing





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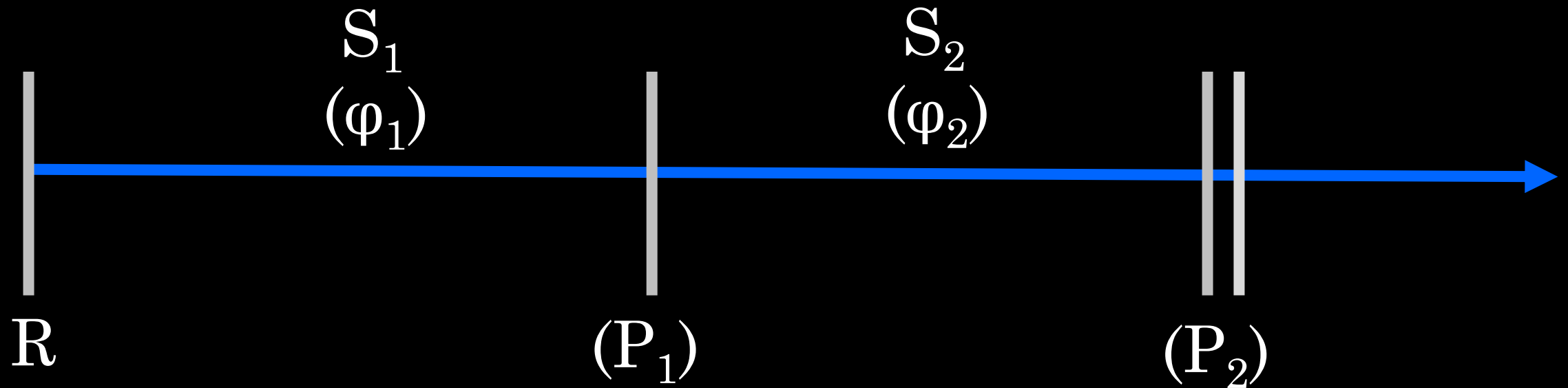
CENTER FOR WATERSHED SCIENCES



Oregon State University



# Data Analysis: Cormack Jolly Seber Mark Recapture Analysis to estimate survival





# Time to Event Analysis: Estimating survival over Link River Dam



# DAM REMOVAL & CULTURAL TRANSITION



**WENDY POPPY FERRIS-GEORGE**

Basket Weaver/Cultural Arts Instructor

Owner: Ferris Institute

Founder: World Renewal Non-Profit Organization

Karuk Council Appointee KRRC 2016

*MPS-CHRM Archaeologist*



# Native American's of the Klamath and Trinity Rivers Pre-Contact



“Their skin was dark. Their languages were foreign. And their world views and spiritual beliefs were beyond what most white men could comprehend.” (David L. Fixico)





# REPITITIOUS LIFESTYLE



## Transformation of an Entire Race



**When Native Americans Were Slaughtered in the Name of  
'Civilization'**



# The New World

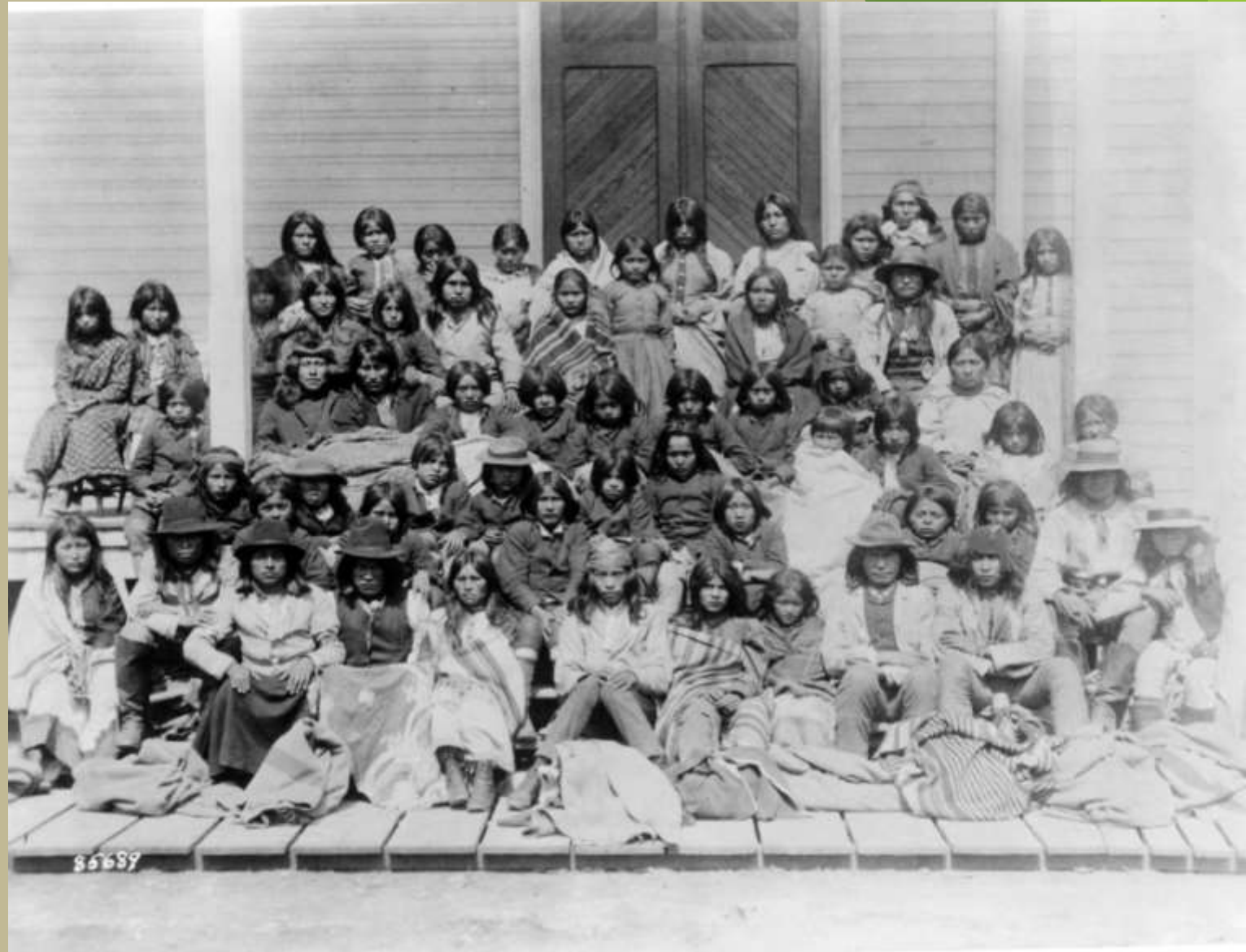


- Forced Removal
- Massacres
- Boarding School
- Alcohol
- Decline in Ceremonial Activity
- Loss of Language
- Ecosystem Management
- Sterilization
- Military Takeover
- Trade Systems Decline
- Basket Weaver Decline
- Loss of Communal Living
- Loss of Social Structures and Societal Expectations
- Loss of Land, Water, and Resources
- Loss of healthy Food and Gathering Rights
- Loss of Trust
- Introduction to Drugs
- Loss of Traditional Government Systems
- Bureau of Indian Affairs (BIA) Control over our Daily Affairs

## The Outcome of the New World



- Health Disparities
- Alcohol & Drug Addiction
- Anxiety, Social Phobia, & Schizophrenia
- Loss of Religion and Self Identity
- Diabetes
- Food Disparities
- Poverty
- Cancer
- Death





# Transformation of a Race



Biden-Harris Administration  
Selects Karuk Tribal Leader  
to Serve on Federal Wildfire  
Commission



*Karuk Natural Resources Department Director Bill Tripp was recently selected to serve on the Biden-Harris administration's Wildfire Commission. Photo contributed by the Karuk Tribe.*



# A WARRIOR'S TRANSITION

**REBUILDING WHAT WE'VE LOST**





# Holistic Healing



“We are going back  
to the way it was.”

*PF*





**California, c.1851  
(simulated satellite image)**



**California, c.2013  
(actual satellite image)**

