April 8, 2024 WAC TAC Special Meeting
Agenda Item 9

Eel-Russian Project Authority

Designing a New Eel-Russian River Diversion Facility

Fish Passage Alternatives after Removal of Cape Horn Dam

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Today's Presentation

- Potter Valley Project Background
- New Eel-Russian Diversion Alternatives
- Alternatives Evaluation Process
- Recommended Project
- Next Steps

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Cape Horn Dam Existing Conditions

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Existing Pool and Weir Fish Ladder

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Cape Horn Dam After High Flow in 2019

Cape Horn Dam Fish Hotel and Ladder with Debris

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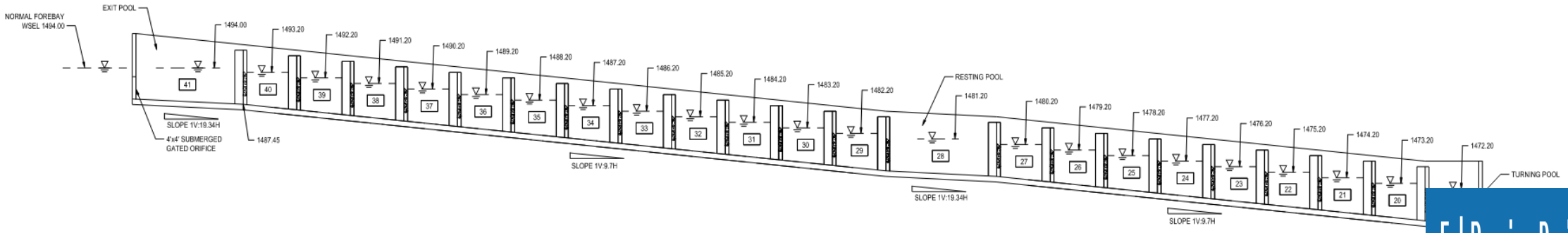
New Eel-Russian Diversion Alternatives

Several alternatives considered, including:

- Ranney collector system
- Upstream diversion canal
- Fish passage improvements at Cape Horn Dam
- **Control section and pump station (Alternative E-2)**
- **Roughened channel with gravity supply (Alternative E-3)**



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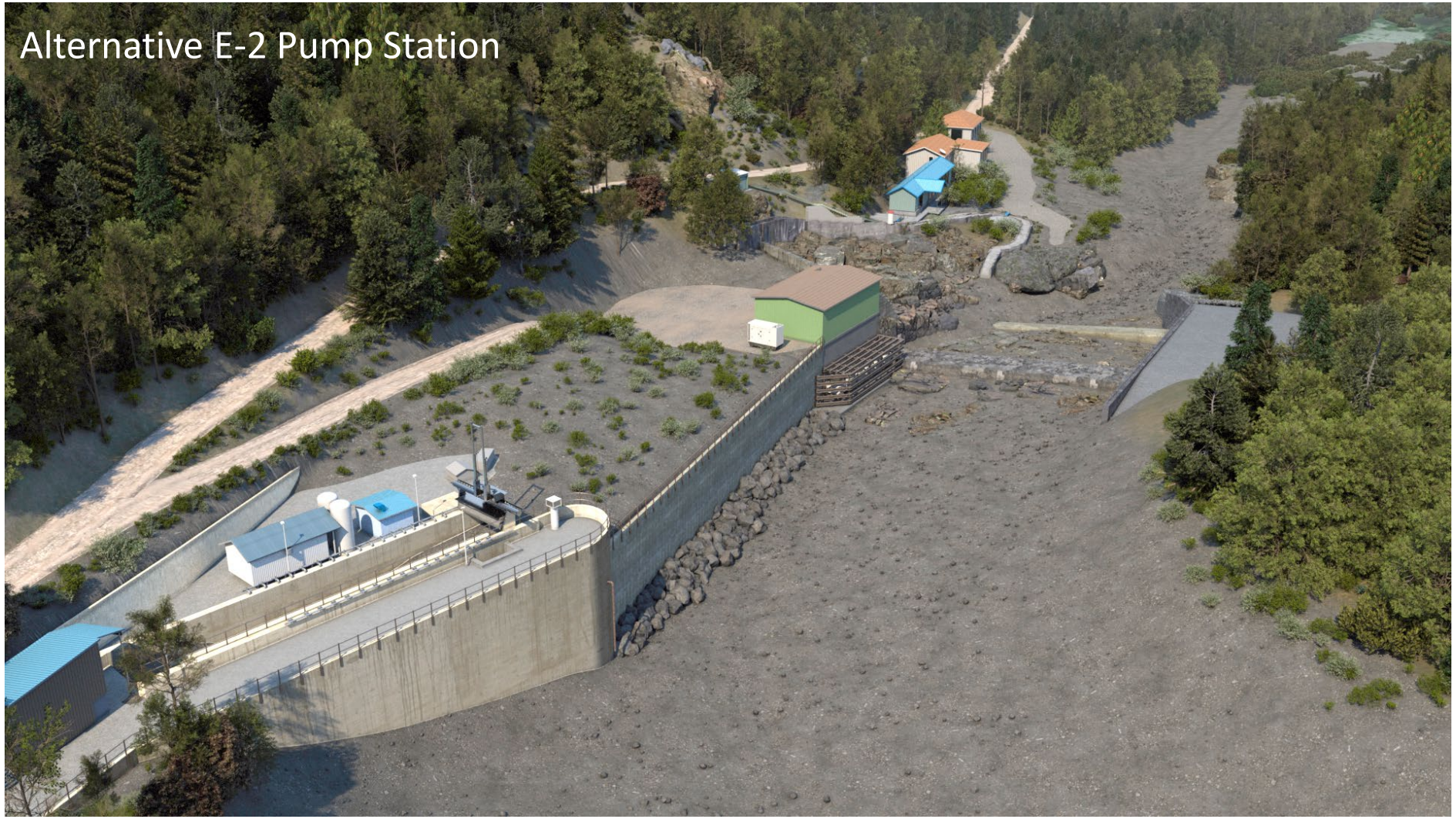
New Eel-Russian Diversion Alternatives



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New Eel-Russian Diversion Alternatives

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Alternatives Evaluation Process

10 Meetings from July 2023 to March 2024 Biologists, Engineers, Water Managers from:

- California Department of Fish and Wildlife
- National Marine Fisheries Service
- U.S. Fish and Wildlife Service
- California Trout
- Round Valley Indian Tribes
- Mendocino IWPC
- Sonoma Water
- McMillen, Inc. and Stillwater Sciences

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Evaluation Criteria

- Biological Feasibility for Upstream Passage
- Biological Feasibility for Downstream Passage
- Resiliency and Reliability
- Constructability
- Cost
- 38 Total Criteria

Alternatives Evaluation Process

Biological Feasibility Evaluation Criteria

Evaluation Criteria	Description	Scoring Key 1 2 3 4 5 6 7 8 9 10		Supporting Information
Biological Feasibility for Upstream Passage				
High Flow Fish Passage Hydraulics	Ability to meet prescribed design criteria for velocity, depth, energy dissipation, hydraulic drop.	Velocity/depth inadequate	Velocity/depth optimal	1D velocity contours, cross-sectional velocity plots, long profile of velocity, field visit information at reference reach
Low Flow Fish Passage Hydraulics	Ability to meet prescribed design criteria for velocity, depth, energy dissipation, hydraulic drop.	Velocity/depth inadequate	Velocity/depth optimal	1D velocity contours, cross-sectional velocity plots, long profile of velocity, field visit information at reference reach
Energy Expenditure	Overall swimming performance and total energy expenditure; bioenergetics and optimal swimming speed; jump height from pool to pool; comparison with reference reach; presence of resting areas.	High expenditure/exhaustion likely	Low expenditure/good performance	1D velocity contours, cross-sectional velocity plots, long profile of velocity, field visit information at reference reach
Delay	Risks of migration delay, fallback potential, confusion or lost migratory cues, etc. Consider all infrastructure, hydraulic, and hydrologic constraints. Successful and efficient fish passage must be safe, timely, and effective.	Appreciable migration delay/low success	No delay/high success	Length of reservoir; structure of channel
Injury	Presence of threats to bodily harm (e.g., sharp objects; risks of impingement; risk of gilling).	High injury potential	Low injury potential	Concept design descriptions; expected to be roughly the same between E-2 and E-3
Predation	Potential risk of being consumed by bass, pikeminnow, mammals, and birds, possibly indicated by presence of slow-moving water (e.g., reservoir; lower slope channel); availability of refugia.	High risk	Low risk	Concept design descriptions
Habitat	Potential habitat conversion within the former reservoir footprint.	Poor spawning/resting habitat	Good spawning/resting habitat	Concept design descriptions; drawings showing long profile and channel plan

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Comparing Alternatives

higher average score = better performance
higher range = greater uncertainty

Criteria	Scores		Fraction of Scorer Participation	Score Commentary	Range		Range Commentary
	E-2 Pump Station	E-3 Roughened Channel			E-2	E-3	
Constructability and Implementation							
Design Complexity	6.8	4.6	5/6	The pump station includes more proven infrastructure design, wheras the type and scale of design for roughened channel is considered to be less proven and more unprecedented.	2.0	6.0	Some scorers factored in more advanced CFD and/or physical modeling; others only considered channel and not diversion.
Timeframe to Achieve Benefits	6.4	5.4	5/6	Pump station is assumed to be slightly speedier construction with similar design and permitting windows.	3.0	5.0	
Site Access	7.8	5.8	4/6	Site access accomodating large boulders for roughened channel may prove more challenging if imported from offsite; larger equipment needed if harvested onsite.	1.0	5.0	
Cofferdam and Dewatering Challenges	5.2	4.2	5/6	Pump station ranked slightly higher due to roughened channel having longer temporary channel for diversion and larger area to be dewatered, in addition to relying on adit for temporary diversions to Potter Valley, whose condition is unknown. May be slightly more challeneing to meet fish passage needs during construction under Alternative E-3. May be more opportunity to dewater by dividing channel longitduinally under Alternative E-2 (i.e., may be mroe flexibility).	3.0	2.0	
Integration with PG&E Dam Removal Approach	5.0	6.0	5/6	Due to similarity in overall project extents and uncertainties related to PG&E restoration plan, little discernible different between alternatives at this stage.	2.0	4.0	
Vulnerability to Subsurface Conditions	6.8	3.5	4/6	Pump station ranked higher due to potential for larger removal of subsurface for foundation of roughened channel; much more earthwork leading to potential changed conditions and impacts to design/construction	1.0	2.0	
Availability of Materials and Equipment	7.0	5.0	5/6	Pump station equipment may be difficult to procure; this can be managed by procuring in a timely manner. However, the size and quantity of material needed for a roughened channel of this scope may challenge both materials sourcing and equipment sizing.	4.0	2.0	

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Alternatives Evaluation Process

Differentiating between Alternatives

Criteria	Pump Station (E-2)	Roughened Channel (E-3)	Score Differential E-2 vs. E-3
Upstream Passage			
High Flow	7.0 (3.4)	5.0 (5.1)	2.0
Low Flow	7.5 (3.6)	5.5 (4.9)	2.0
Energy Expenditure	8.7 (2.7)	5.4 (2.4)	3.3
Delay	8.5 (2.6)	5.7 (1.5)	2.7
Downstream Passage			not significant
Resiliency and Reliability			
Geomorphic Stability (fish passage)	7.7 (2.0)	5.2 (4.0)	2.5
Mechanical Systems	5.4 (3.0)	7.6 (3.0)	2.2
Natural Hazards (water supply)	5.4 (1.0)	7.4 (3.0)	2.0
Natural Hazards (fish passage)	7.8 (2.0)	5.3 (5.0)	2.5
Constructability and Implementation			
Design Complexity	6.8 (2.0)	4.6 (6.0)	2.2
Site Access	7.8 (1.0)	5.8 (5.0)	2.0
Subsurface Conditions	6.8 (1.0)	3.5 (2.0)	3.3
Materials Availability	7.0 (4.0)	5.0 (2.0)	2.0
Cost			
Operational Cost	3.7 (2.0)	7.7 (1.0)	4.0

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Alternatives Evaluation Process

Scoring Results Summary

- **Fish Passage:** Superior upstream and downstream passage for E2
  Advantage: Pump Station
- **Sedimentation:** Greater risk of sediment deposition with E3
  Advantage: Pump Station
- **Construction Costs:** Construction cost for E2 should be lower
  Advantage: Pump Station
- **Operations & Maintenance Costs:** O&M costs for the roughened channel are lower
  Advantage: Roughened Channel
- **Constructability & Implementation:** E2 is less complex to design, better site access, and less vulnerable to subsurface conditions.
  Advantage: Pump Station
- **Non-Differentiating Factors:** geomorphic stability for water supply, low and high flow diversion, and challenges integrating with PG&E dam removal alternatives.
  Advantage: equal

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Recommended Project

Alternative E-2 – Pump Station

Lower risk for Water Supply

Superior for Fish Passage

- lower design and construction risk,
- better upstream and downstream passage, and
- better ability to design around potential reliability issues.

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Next Steps

- **CA Dept. of Water Resources (DWR) Grant**
  - Final Diversion Facility Assessment Report
- **US Bureau of Reclamation (USBR) Aquatic Ecosystem Restoration Program**
  - Preferred Diversion Facility Alternative to 60% design
  - Grant Awarded: December 2023
  - Grant Agreement: Anticipated by May 2024
  - RFP for Consultant Services: Summer 2024
- **Technical Advisory Group**
  - Continue meeting to inform design and operations

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Thank You

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