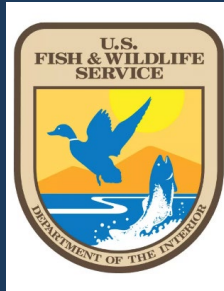


Fish Ladder Assessment

Alternatives & Feasibility Study

Wallowa National Fish Hatchery | Wallowa County, Oregon | March 2026



Lower Snake River
Compensation Program



Oregon Dept of
Fish & Wildlife

Prepared by:



Wallowa Hatchery

Wallowa Hatchery was built in the 1920's primarily to raise trout for stocking in nearby rivers and lakes.

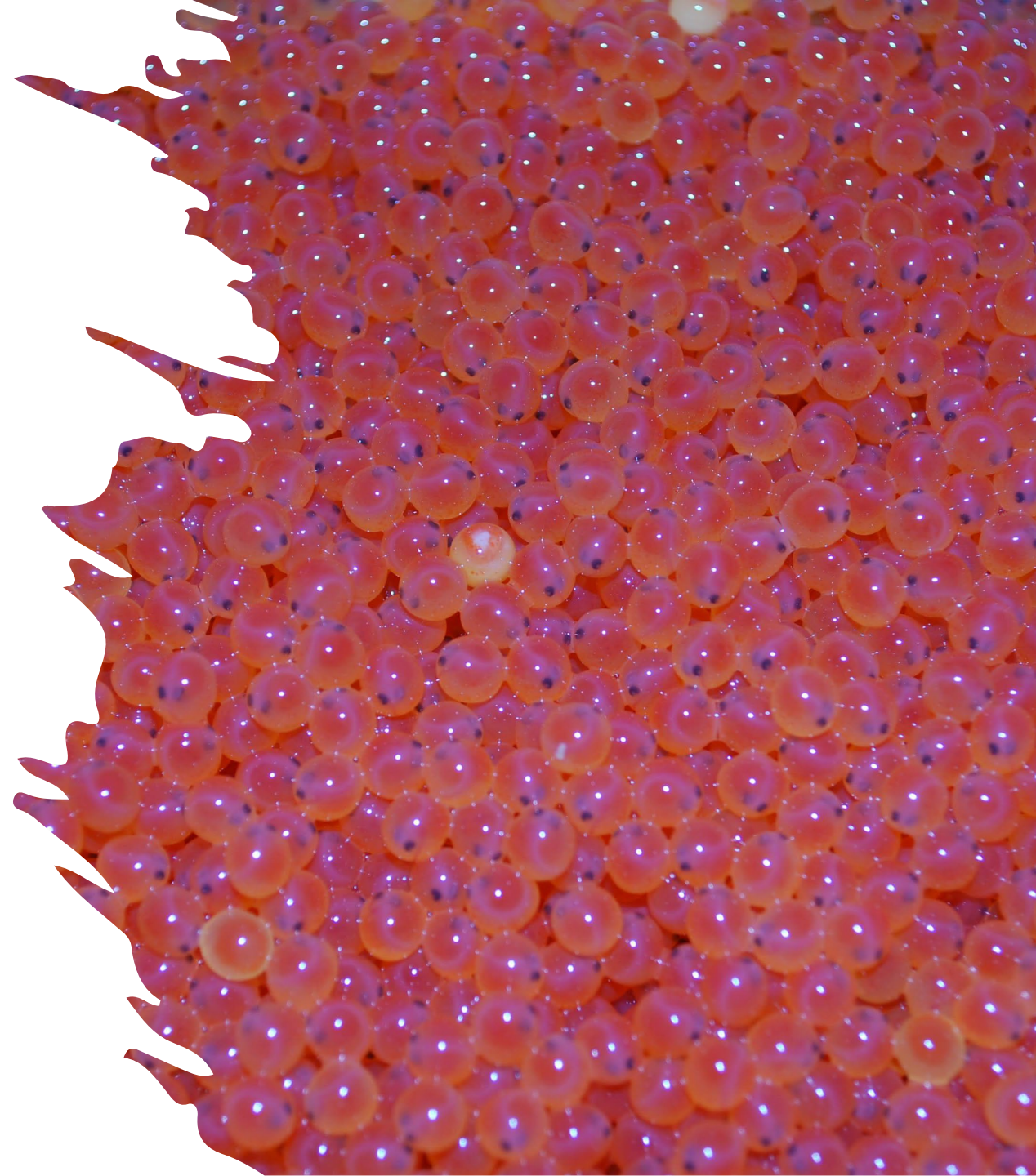
In 1939 hatchery operations were expanded when the main hatchery in Enterprise was built through the Works Progress Administration. Raising sockeye salmon and experimenting with bull and brown trout.

In 1985 the hatchery underwent a major renovation and began to raise summer steelhead and spring chinook. These new hatchery programs are part of the Lower Snake River Compensation Program managed by the U.S. Fish and Wildlife Service.



Wallowa Hatchery Production

- Wallowa egg take/transfer goal
1,022,000/ 920,000
- Little Sheep egg take/transfer goal
275,000/ 247,500
- Wallowa smolt release goal
560,000 smolts
- Big Canyon smolt release goal
240,000 smolts
- Little Sheep smolt release goal
215,000 smolts
- Wallowa adult return
2,181 Ad 34 Un
- Big Canyon adult return
1,140 Ad 50 Un
- Little Sheep adult return
1,021 Ad 77 Un



Ladder Compliance

- The pond ladder is structurally outdated and substantially fails NOAA/ODFW fish-passage criteria in nearly all major categories; pool depth, width, length, hydraulic drop, energy dissipation, and transport velocity.
 - Pool-to-pool hydraulic drops exceed NOAA 1-ft maximum, requiring 2.0–2.3 ft drops.
 - Pool geometry fails criteria: widths ~4 ft (min 6 ft), lengths <8 ft, depths as shallow as 0.6 ft (min 5 ft).
 - Energy Dissipation Factor massively exceeds limits, reaching 19–105 ft-lb/s (max allowed 4 ft-lb/s).
 - Entrance depth below minimum 6-ft requirement, reducing attraction and passage compliance.
- These issues result from inherent design limitations, not just maintenance.
- Questions about the ladder's adequacy began with the formal USFWS-commissioned NOAA compliance evaluation in mid-2016, with field assessment in September 2016 and full findings presented in the December 2016 draft report. However, ODFW staff had identified issues long prior to formal evaluation.



Pond Evolution

Aerial Photo 9.29.1946



Pond Evolution

Aerial Photo 9.26.1954



Pond Evolution

Aerial Photo 2025



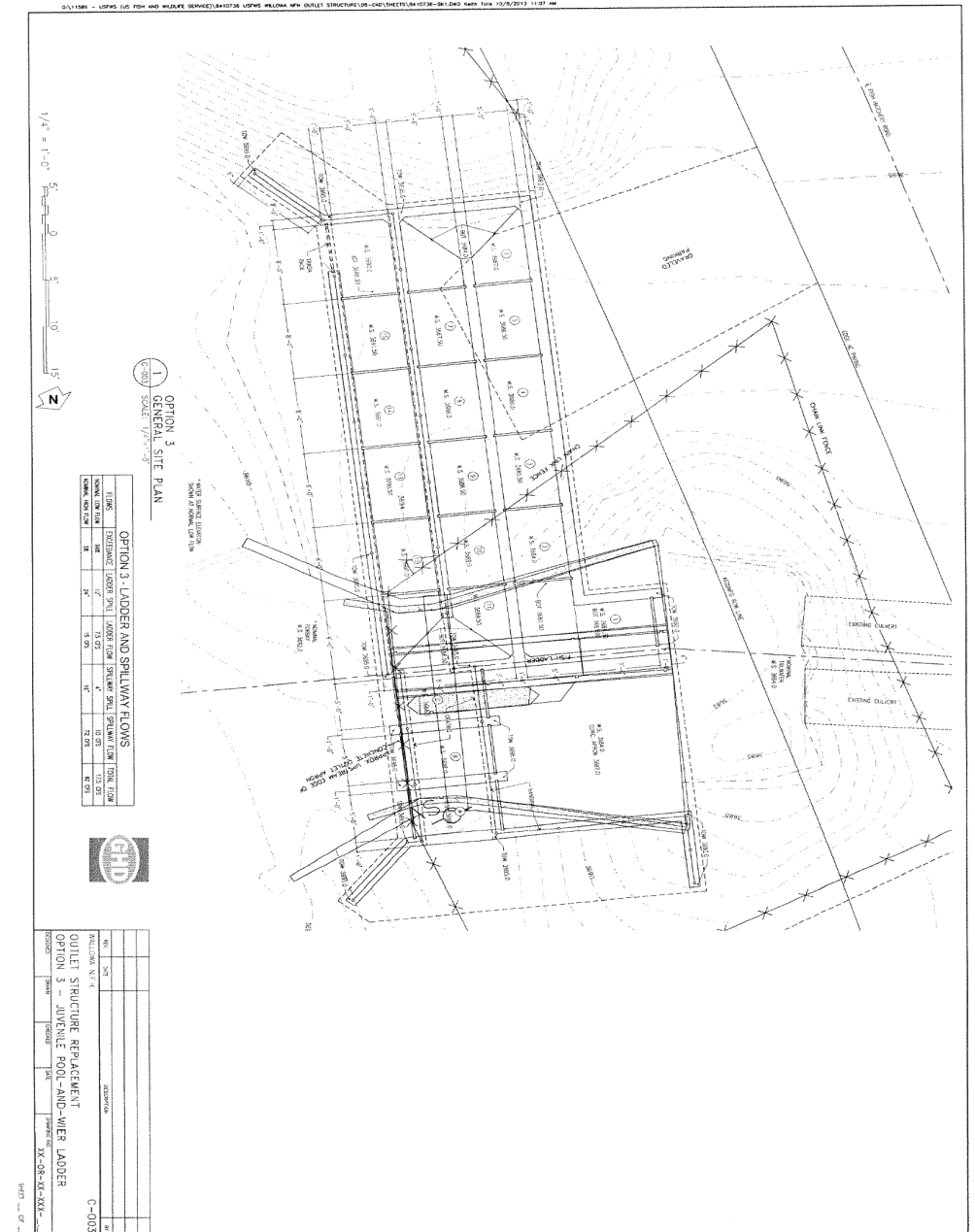
Involvement Prior to RIVHAB

Talks began as early as 2013 to develop options for the ladder and spillway replacement.

GHD USA-Engineering, Architecture & Construction presented LSRCP with 3 ladder and spillway options.

After many discussions between ODFW and LSRCP it was apparent that a 6 in drop for the ladder could not be accomplished without a much larger and more expensive design.

RIVHAB was contacted in 2025 to take a fresh look at the project to ensure there weren't other options to consider.



RIVHAB Engineering & Earthworks

- Based in Eagle, Idaho
- Founded in 2019 by Jeanne McFall, who worked 5 years in consulting (McMillen & HDR), and 15 years at the Idaho Fish and Game
- 18 employees
 - 9 Engineers (fish passage, water resource, civil, & mechanical)
 - 6 Scientists (fisheries biologists, aquatic ecology, fluvial geomorphologists)
 - 3 full-time operators & construction laborers
- Awarded the Contract through Simplified Acquisition 8(a) Business Development procurement statute (direct contract through USFWS and US SBA on behalf of RIVHAB)



Licensed Engineers &
Public Works Contractors



Project Purpose & Scope

Why this assessment was needed

PROBLEM

- Aging concrete fish ladder no longer meets NMFS criteria
- Excessive vertical drops, poor attraction flow, smolt injury risk
- Decades of abatement pond sedimentation altered hydraulics
- USFWS requested a comprehensive evaluation and alternatives

SCOPE

- Comprehensive site survey & assessment
- Three concept-level alternatives developed
- Hydraulic modeling (HEC-RAS 2D) for preferred alternative
- Construction feasibility & sequencing
- AACE Class 4 cost estimates
- Permitting pathway analysis



CP 9000

CP 9002

CP 9001

Wallowa Hatchery
Fish Ladder Assesment





Existing Fish Ladder: Key Problems

Three-pool reinforced concrete structure on Spring Creek

Excessive Vertical Drops

~5 ft head loss at first weir; pool-to-pool drops of 2.0–2.3 ft (max allowed: 1 ft)

Decreasing Hydraulic Coherence (in pond)

Decades of sediment produce diffuse flow paths that weaken attraction flow consistency

Attraction Flow Competition

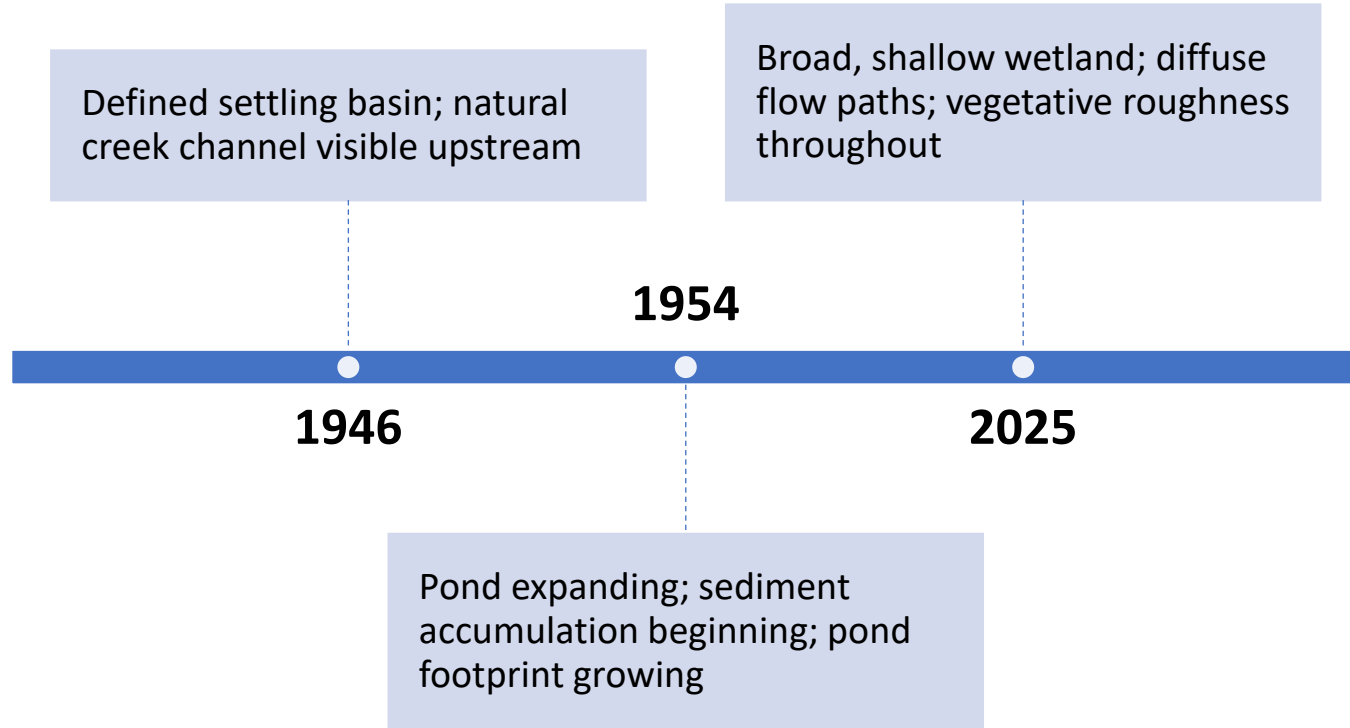
Flow split among ladder, spillway, and dam leakage weakens directional cues for migrants

Smolt Outmigration Risk

Juveniles drop onto concrete sill — risk of injury, disorientation, and predation

These issues reflect inherent design limitations.

Abatement Pond: Decades of Change



Hydraulic Implications

- Reduced flow depth
- Weakened approach velocities
- Increased flow fragmentation
- Expanding footprint requiring periodic sediment management



Three Alternatives Evaluated

Each developed to address identified hydraulic and biological deficiencies

ALT 1 – CONCRETE POOL-AND-WEIR LADDER

- Replace 3-pool ladder with 12-14 pool NMFS-compliant structure
- Familiar configuration for hatchery
- Predictable hydraulic control
- Doesn't resolve pond sediment issues and attractant flows through pond

Estimated Cost: \$2.1M



Three Alternatives Evaluated

Each developed to address identified hydraulic and biological deficiencies

ALT 2 – NATURE-LIKE FISHWAY

- Remove dam & ladder; restore sinuous Spring Creek channel
- 1-1.5% slope with riffle-pool morphology & boulder weirs
- New ~1-acre abatement pond
- Wetland/riparian habitat restoration

Estimated Cost: \$1.3M



Figure 3. Example of a nature-like fishway.
Photograph taken by Jeanne McFall (RIVHAB).



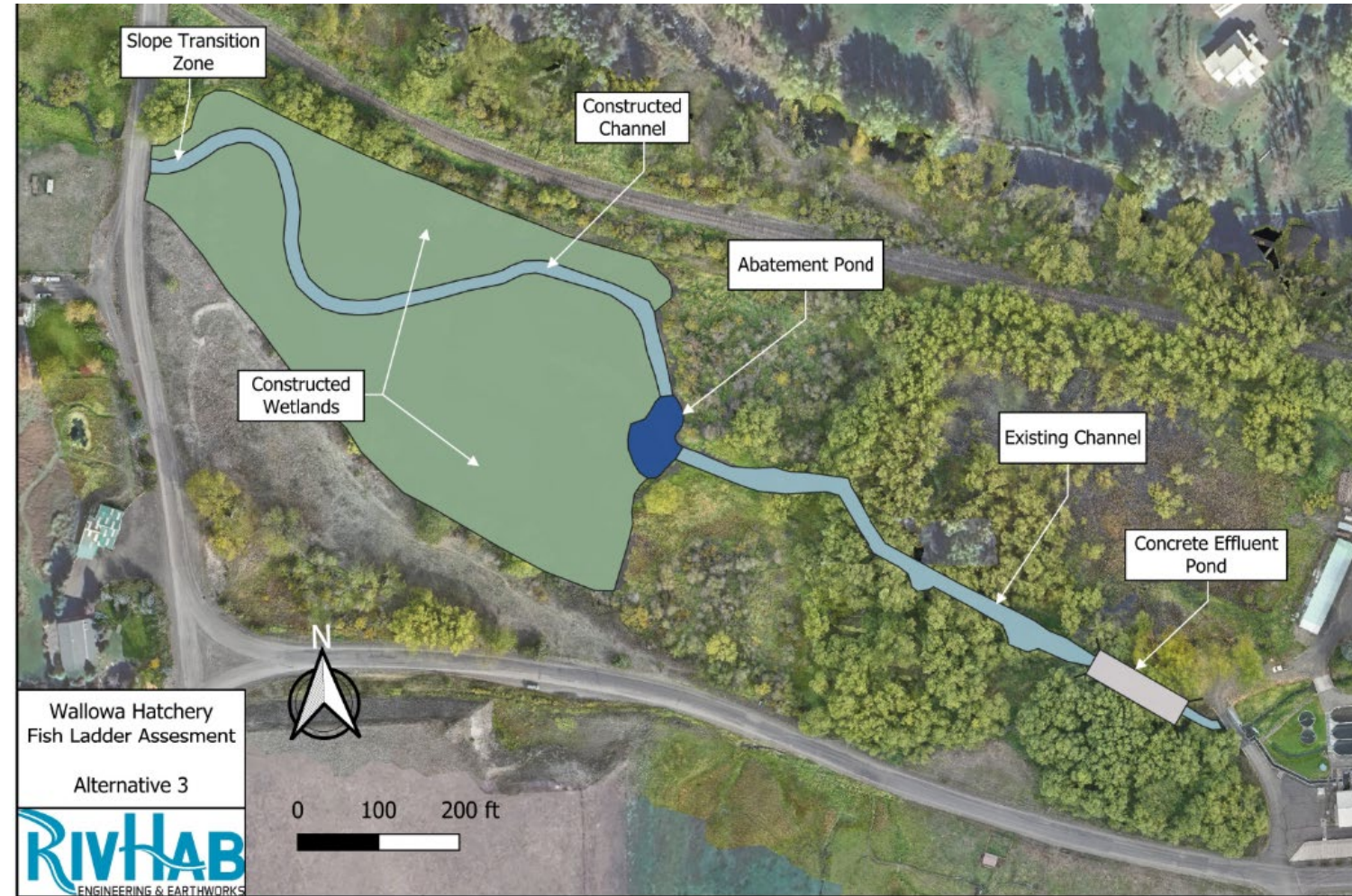
Three Alternatives Evaluated

Each developed to address identified hydraulic and biological deficiencies

ALT 3 – ENGINEERED EFFLUENT BASIN

- Concrete-lined baffled sedimentation basin
- Dam removal & creek restoration at 1% slope
- Highest effluent management control
- More engineered infrastructure vs. Alt 2

Estimated Cost: \$1.6M



Alternatives

Evaluation Matrix -

comparison relative to project objectives

Evaluation Criterion	Alternative 1 – Concrete Ladder	Alternative 2 – Nature-like Fishway + Constructed Wetlands	Alternative 3 – Engineered Effluent Basin + Restored Creek & Wetlands
Adult Passage Effectiveness	Meets goals – meets NMFS hydraulic criteria; performance limited by diffuse pond hydraulics 	Meets goals – natural hydraulic diversity, restored 2% creek gradient provides predictable hydraulics and strong guidance cues 	Meets goals – restored 1% creek gradient provides predictable hydraulic pathway 
Smolt downstream passage	Does not address goals – smolts continue dropping onto concrete sill unless modified 	Meets goals – volitional downstream movement through restored creek 	Meets goals – controlled flow path eliminates drop injuries; wetland refugia 
Hydraulic Predictability	Partially addresses goals – strongly dependent on pond conditions; affected by sedimentation 	Meets goals – defined channel improves coherence; wetlands attenuate high flows 	Meets goals – engineered basin provides stable operational control; restored creek improves attraction flow 
Construction Feasibility	Does not address goals – intensive concrete work, cofferdams, tight access 	Partially addresses goals – substantial earthwork but conventional methods 	Partially addresses goals – mix of earthwork and engineered basin; fewer in-water risks 
Permitting Complexity	Does not address goals – largest concrete footprint; impacts to ESH and existing wetlands 	Partially addresses goals – dam removal, large wetland reconfiguration; strong ecological justification 	Partially addresses goals – dam removal, engineered concrete basin, wetland creation; strong ecological justification 
Operational Integration	Partially addresses goals – predictable operation but requires ongoing pond management 	Meets goals – restored hydrology removes need for ladder maintenance 	Meets goals, but some operational maintenance concerns & frequency with a smaller effluent pond – engineered system designed for routine cleanout and predictable effluent control 
Resilience to Pond Evolution	Partially addresses goals – dependent on dredging and periodic pond management 	Meets goals – wetland and channel are self-adjusting; pond reduced 	Meets goals – engineered basin isolates sediment function; creek/wetland evolution improves habitat 
Long-Term Maintenance	Partially addresses goals – periodic concrete repairs, debris removal, sediment management in pond 	Meets goals – mostly natural adjustments with occasional riffle/bank touch-ups 	Partially addresses goals – scheduled sediment basin cleanouts; minimal creek maintenance 
Relative Cost	\$2,126,250 	\$1,336,500 	\$1,593,675 

Preferred Alternative

Nature-Like Fishway with Constructed Wetlands & Reduced Abatement Pond

Selected through collaborative charette (Dec. 16, 2025) with USFWS, ODFW & RIVHAB

-
1. Restores a defined, continuous creek → **improves adult attraction flow and upstream passage reliability**
 2. Eliminates vertical drop conditions that currently pose risk to juvenile smolt out-migration
 3. Separates fish passage function from solids-settling and effluent management
 4. Enhanced ecological uplift through wetland creation and floodplain reconnection
 5. Restoring natural processes provides greater long-term resilience than structural fixes

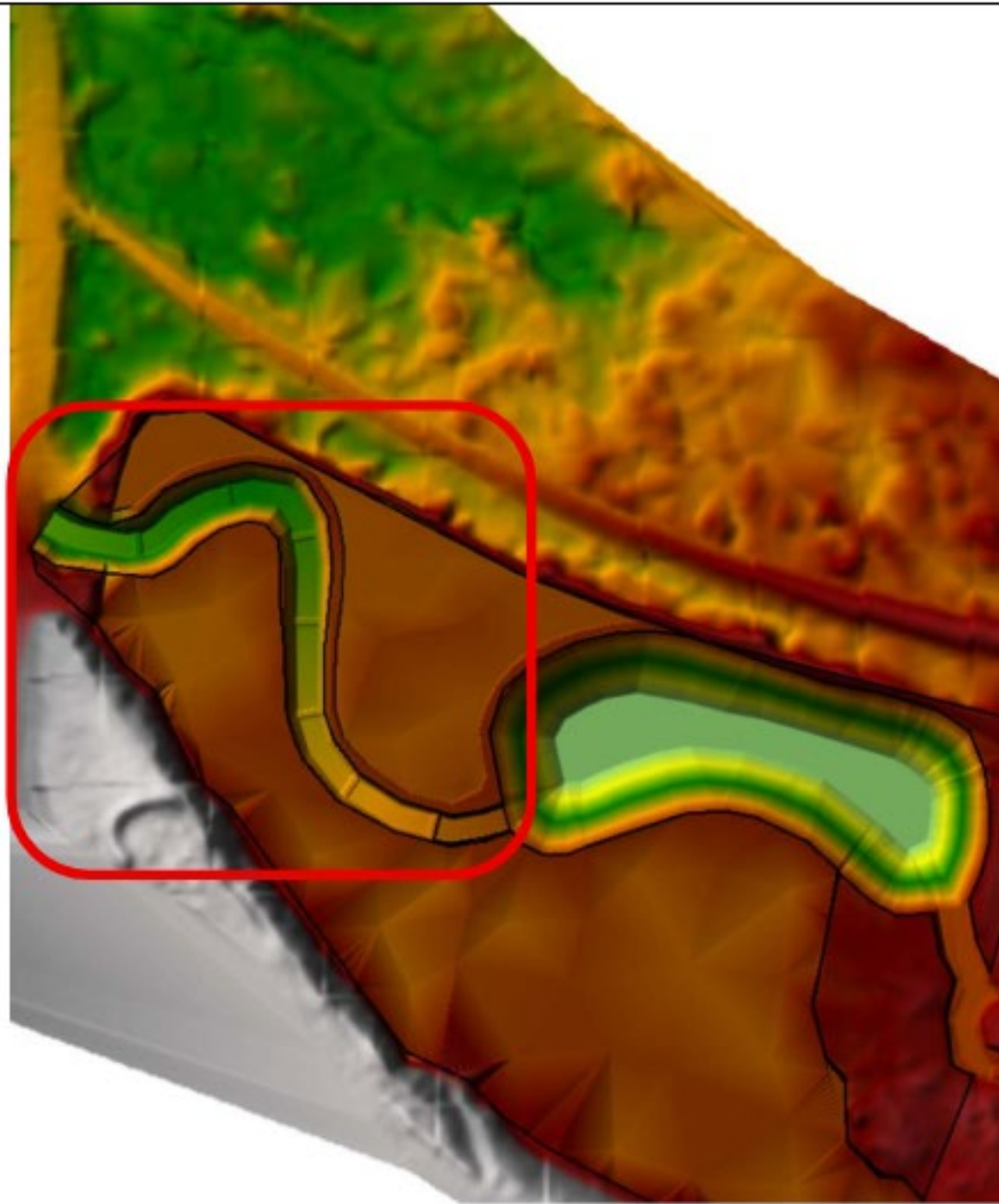


Figure 1: HEC-RAS Terrain of the Stream Simulation for Alternative 2

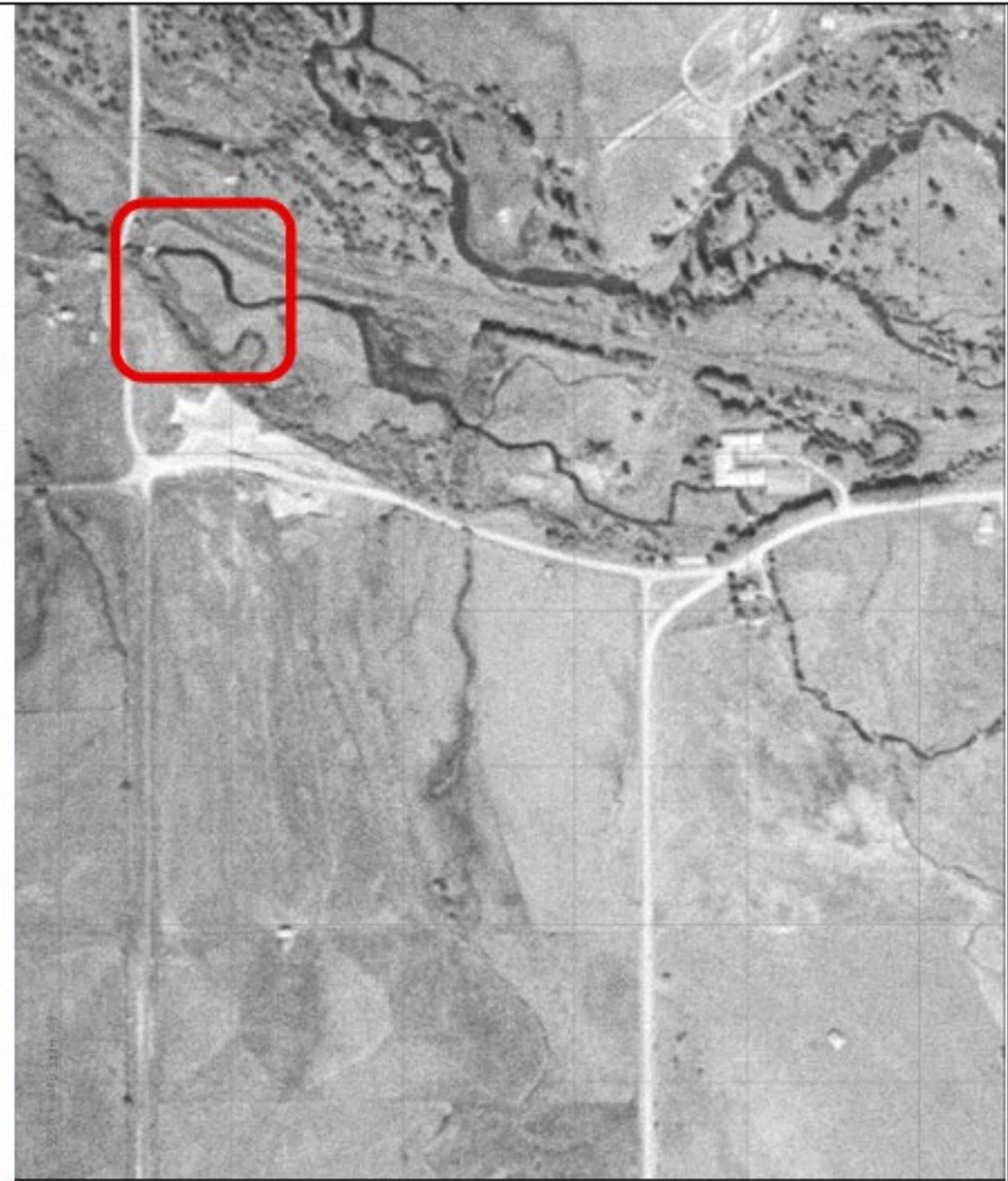
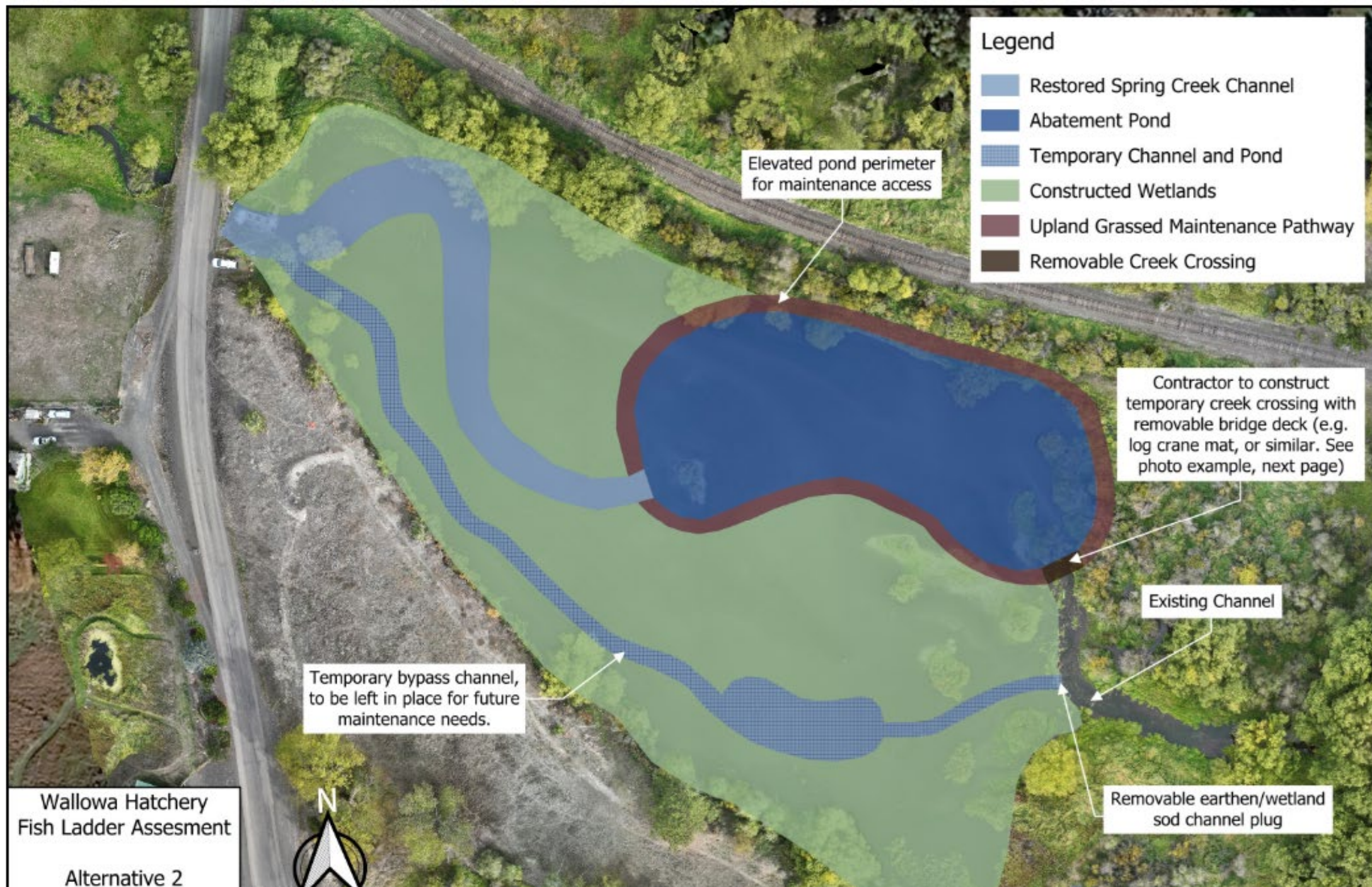


Figure 2: Wallowa Fish Hatchery Imagery from 09.29.1946



Alternative 2: Design Overview

Stream simulation channel, reduced abatement pond & constructed wetlands

Stream Simulation Channel	Boulder Weirs & Grade Control	Abatement Pond & Wetlands
515 ft total length through former pond footprint 1.5% slope (upper) transitioning to 1.0% slope (lower) 17-ft bankfull width; 2:1 side slopes - Modeled on upstream reference reach (600 ft upstream) - Informed by 1946 historical channel imagery	7 boulder weirs at ~60-ft intervals - Two rows of boulders (min 24" diameter) per weir - Max 6" crest height above channel bed - Keyed into banks for structural stability 50-ft rock riffle at upstream end for grade control	~1 acre new abatement pond; ~15 ft depth 3:1 side slopes; elevated maintenance perimeter - Sediment cleanout needed every 10–20 years - Remainder of pond footprint → riparian & wetland - Bypass channel retained for future maintenance

Constructed wetlands (example photos)

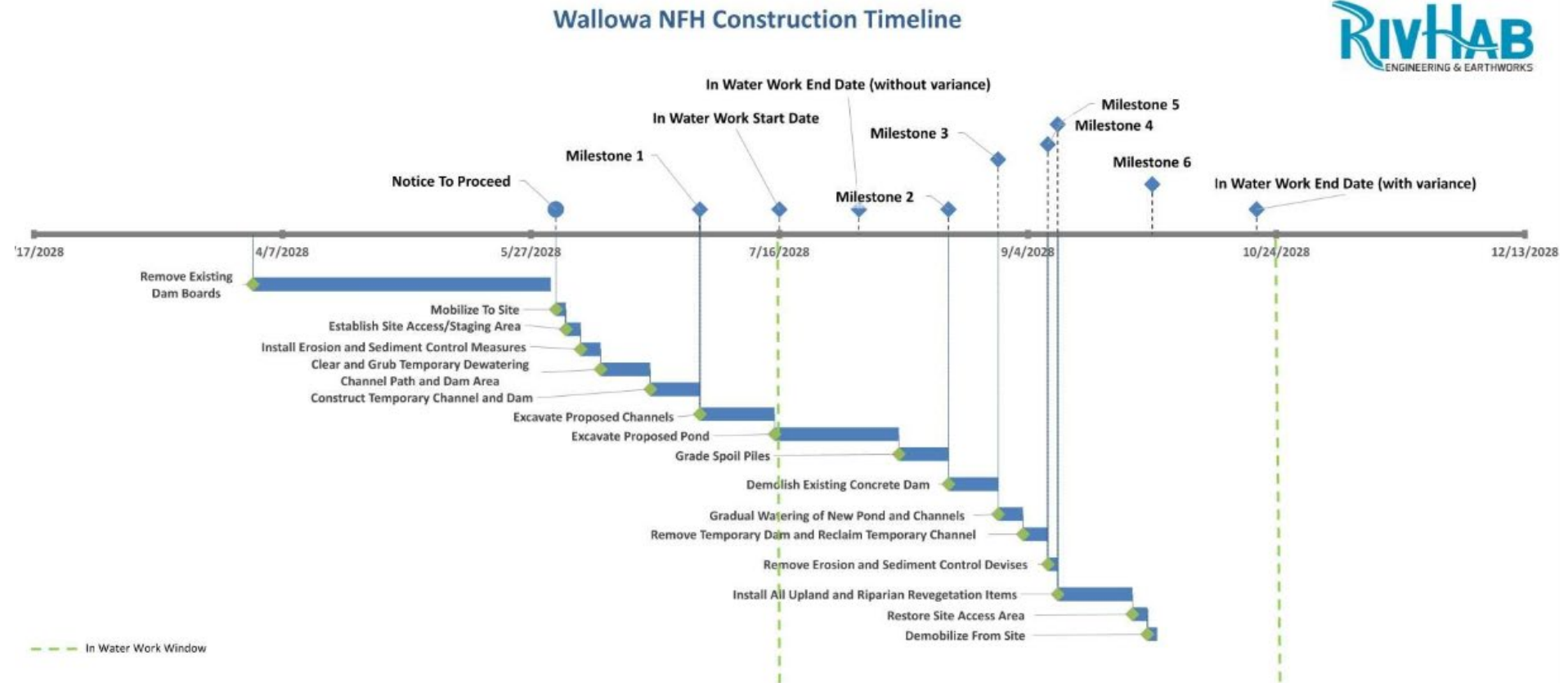


Spring creek narrowing to restore stream processes and create expanded wetlands (before & after)



Additional Information Provided

- Permitting pathway & timeline
- Breakdown of cost estimate
- Construction timeline & sequencing
- Public outreach & stakeholder engagement
- Discussion on Adaptive Management



Next Steps & Path Forward

2026

Design

- Design contract
- Begin preliminary design
- Initiate early agency coordination
- Install staff gage on Spring Creek

2027

Permitting

- Submit all permit applications
- ESA Section 7 consultation
- DSL Removal-Fill, USACE 404
- Wallowa County NRAC presentation

2028

Construction

- In-water work window: July 15 – Aug 15 (+ variance to Oct)
- Dam boards removed April 2028
- Major construction June – Sept 2028
- Upland revegetation fall 2028

2029+

Monitoring & Adaptive Mgmt

- Wetland planting spring 2029
- Annual inspections 2029–2030
- Adaptive management for vegetation
- Long-term passage performance monitoring

The Nature-Like Fishway is technically feasible, biologically sound, and operationally compatible — ready to advance to design.

THANK YOU



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