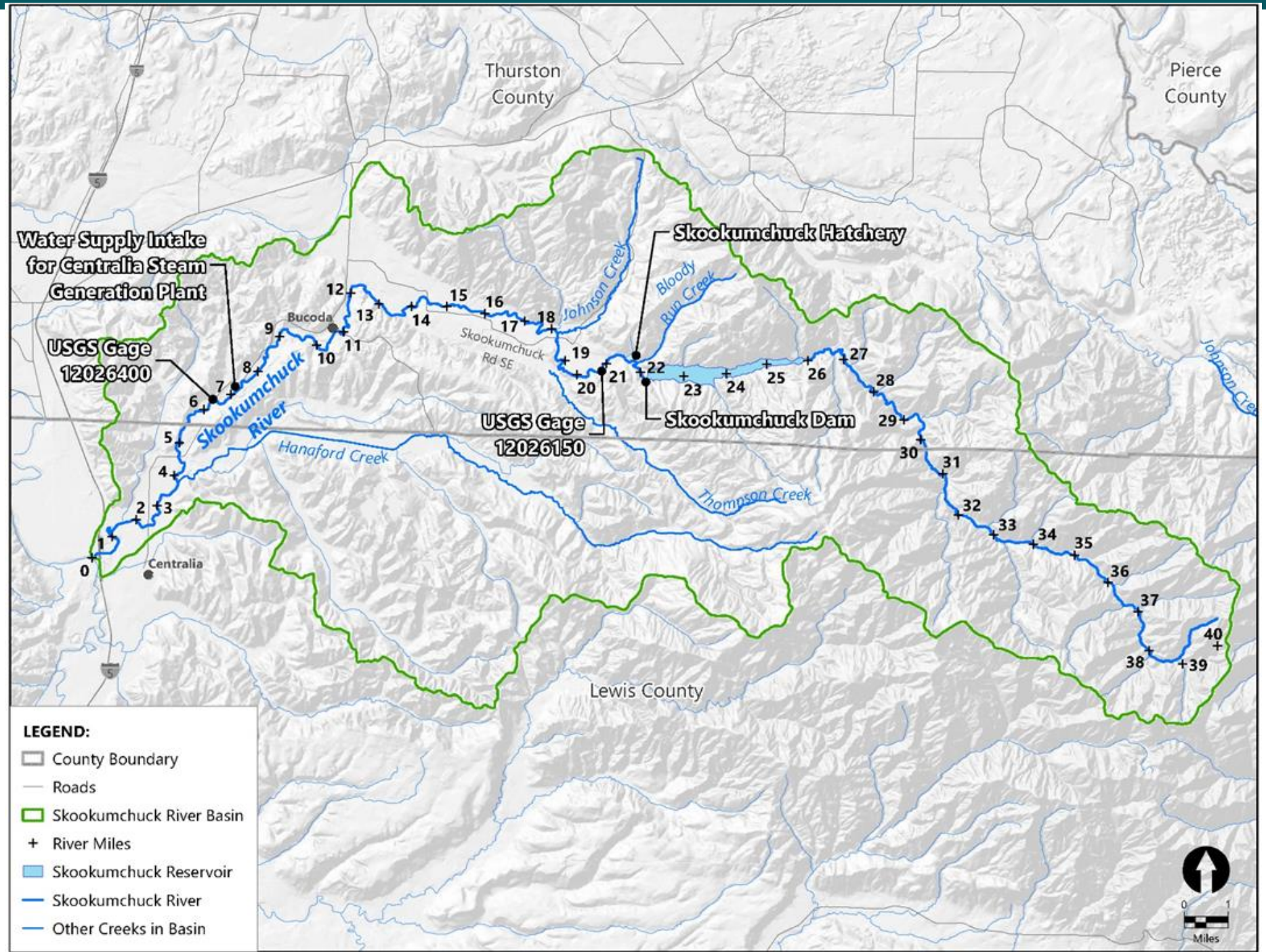
SKOOKUMCHUCK DAM PHASE 2 RESULTS

NAT KALE AND MERRI MARTZ

February 2, 2023

CHEHALIS BASIN STRATEGY

DEPARTMENT OF ECOLOGY
State of Washington
OFFICE OF CHEHALIS BASIN


Thurston County
Pierce County
Lewis County
Water Supply Intake for Centralia Steam Generation Plant
USGS Gage 12026400
Skookumchuck Hatchery
Skookumchuck Dam
USGS Gage 12026150
Skookumchuck River
Hanaford Creek
Thompson Creek
Johnson Creek
Bloody Run Creek
Skookumchuck Rd SE
Bucoda
Centralia
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
LEGEND:
County Boundary
Roads
Skookumchuck River Basin
River Miles
Skookumchuck Reservoir
Skookumchuck River
Other Creeks in Basin
0 1
Miles

IN 2021, THE CHEHALIS BASIN BOARD REQUESTED:

- OCB to conduct a Phase 1 Analysis to:

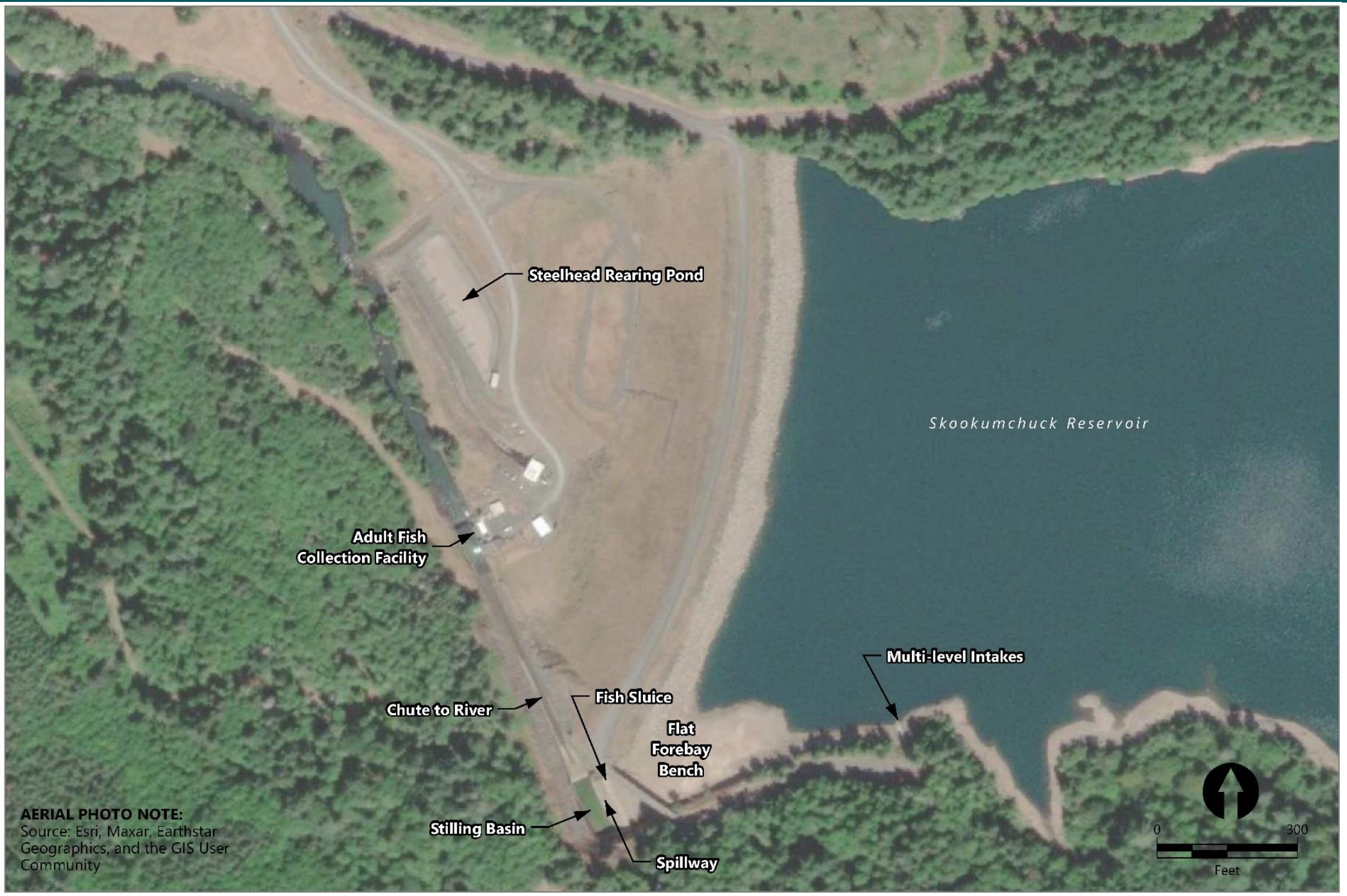
- Document what we do and don't know about Skookumchuck Dam based on existing studies/reports

- Identify the possibility of any near-term operational changes that could benefit fish passage and/or flood storage

- Identify data gaps and potential future analyses

PHASE 2 PRIMARY ELEMENTS (2022)

- Detailed hydraulic modeling of the reservoir and fish sluice and Skookumchuck River from the dam downstream to the Chehalis River
  - Further evaluate fish passage, flood storage, and dam removal to see if any of these scenarios are feasible
- Develop concept design for downstream fish passage
- Initial evaluation of potential benefits and impacts to flooding, habitat, water rights downstream from scenarios
- Additional investigation and habitat modeling of the quality of aquatic species habitat upstream of the reservoir


Steelhead Rearing Pond
Skookumchuck Reservoir
Adult Fish
Collection Facility
Multi-level Intakes
Fish Sluice
Chute to River
Flat
Forebay
Bench
Stilling Basin
Spillway
AERIAL PHOTO NOTE:
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
0
300
Feet

ALTERNATIVES EVALUATED

- Current Operations
- Fish Passage Only
- Flood Storage Only
- Combined Fish-Flood
- Dam Removal

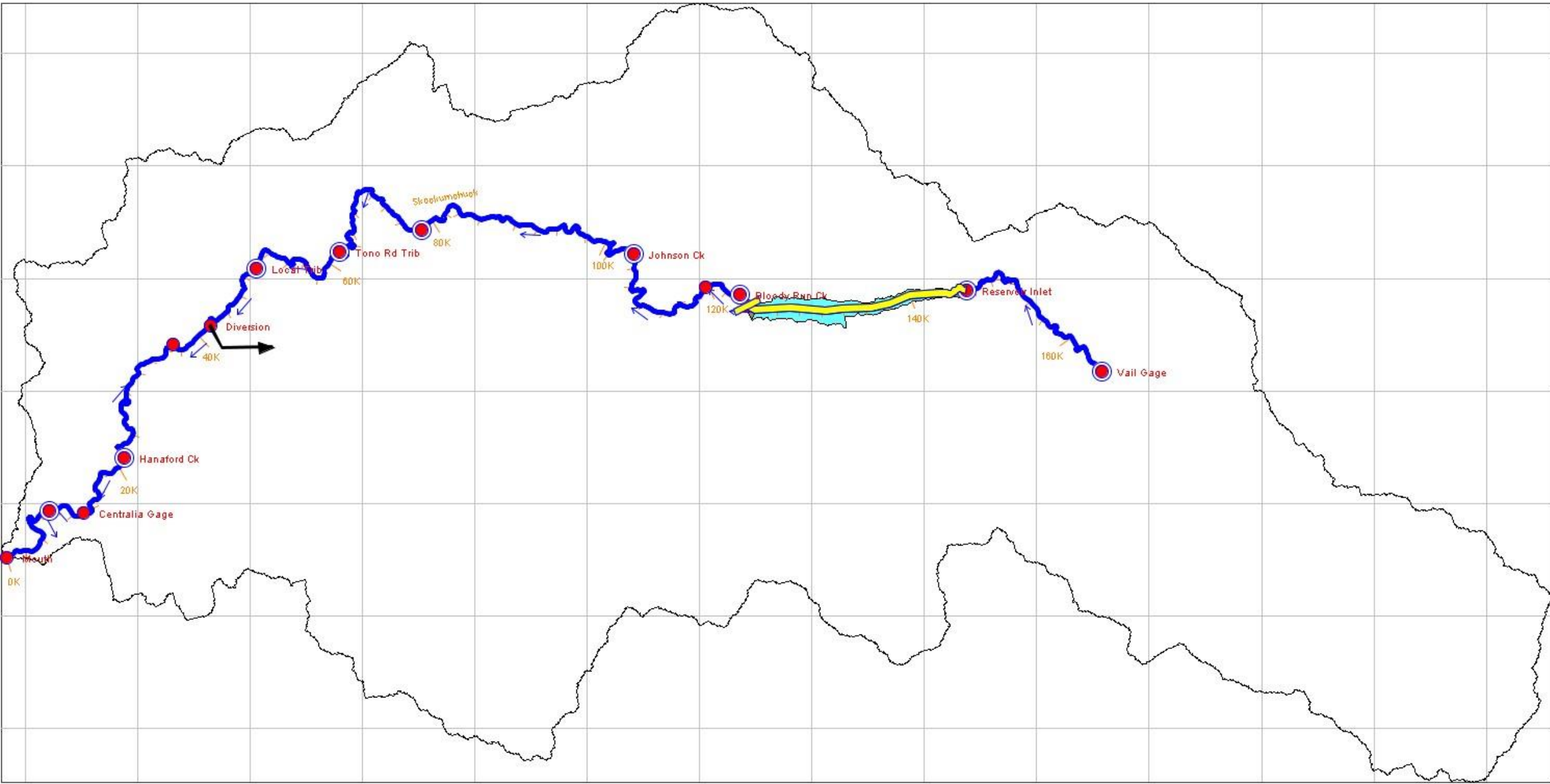
CHEHALIS BASIN STRATEGY

METHODS

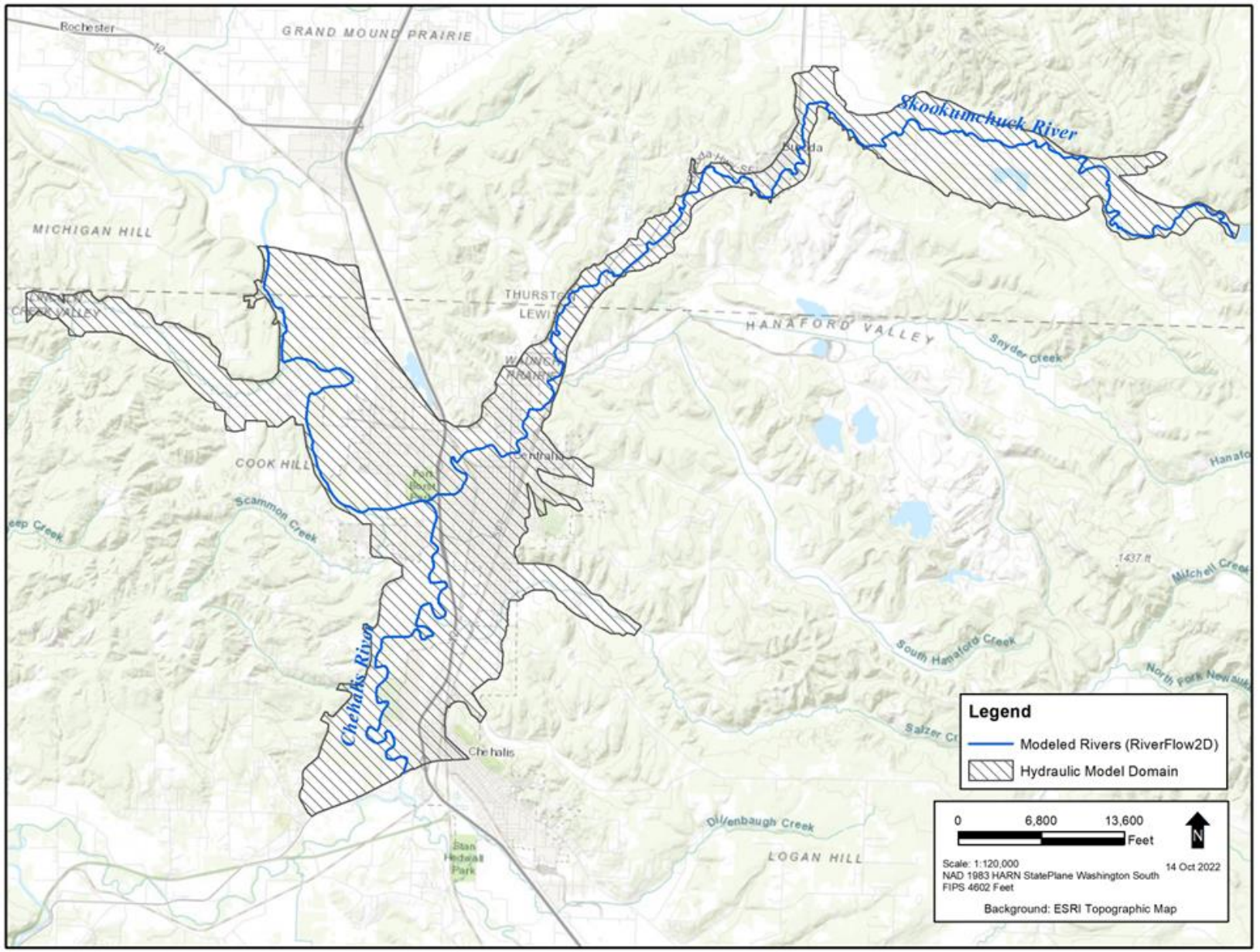
- Hydrologic Analysis
- Hydraulic Models
  - HEC-ResSim
  - HEC-RAS-2D and Computational Fluid Dynamics (CFD)
  - RiverFlow2D

- Ecosystem Diagnosis and Treatment (EDT)

HEC-ResSim Model



RIVERFLOW2D MODELING – DOWNSTREAM OF THE DAM



CHEHALIS BASIN STRATEGY

ALTERNATIVES MODELED FOR DOWNSTREAM EFFECTS

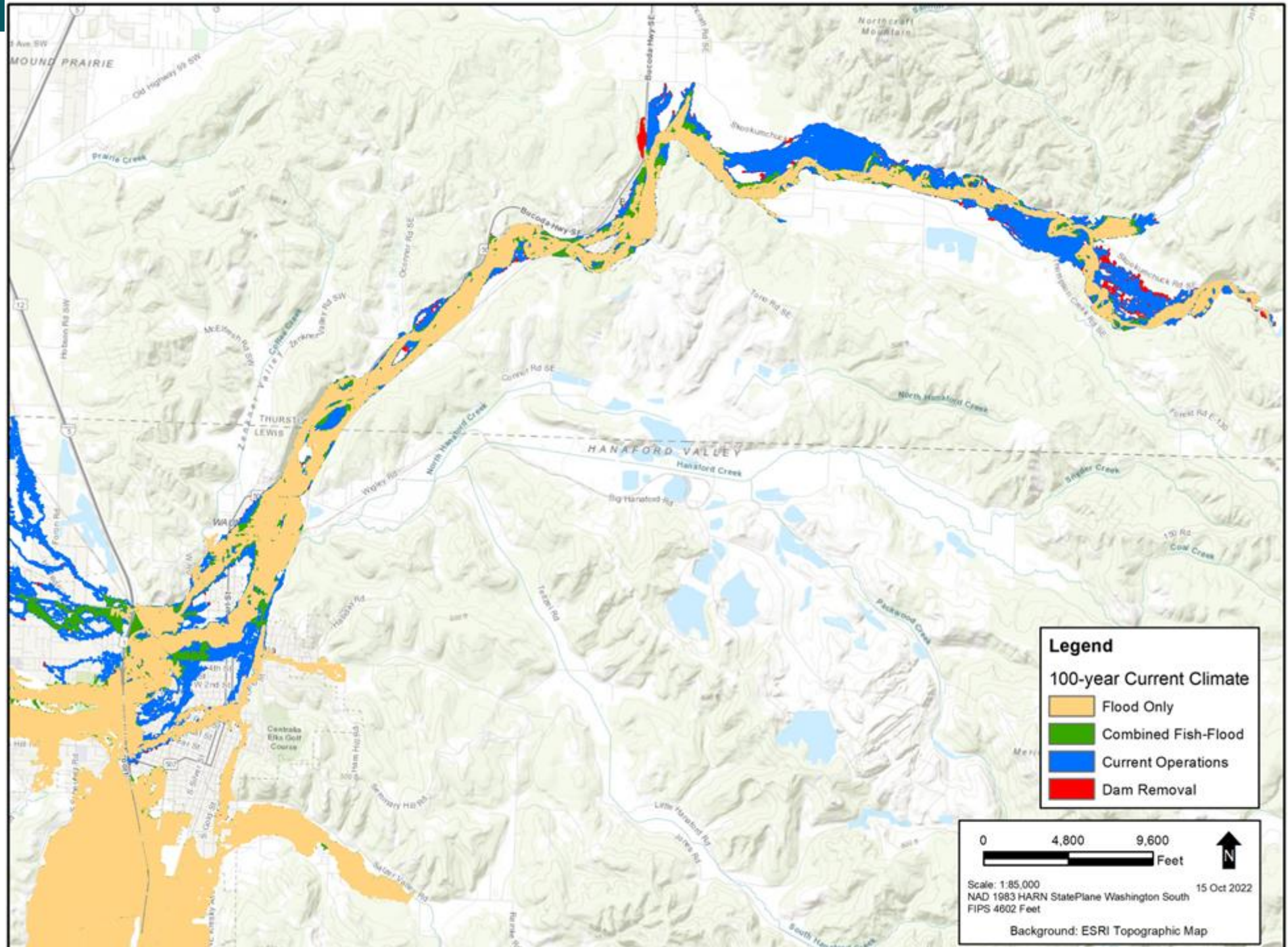
- Current Operations
- Fish Passage Only – 65 cfs discharge through fish sluice
- Flood Storage Only – 20,000 ac-ft with 2,000 cfs outlet
- Combined Fish-Flood – 20,000 ac-ft with 2,000 cfs outlet flood season (Nov – March 15); 65 cfs discharge through fish sluice (March 15 – end of migration season)
- Dam Removal

* More scenarios were modeled, but these were the most effective

MODELED PEAK FLOW FOR ALTERNATIVES (JANUARY 2009); BLOODY RUN GAGE

ALTERNATIVE	JANUARY 2009 PEAK FLOW AT BLOODY RUN (CFS)
Current Operations	12,970 (actual recorded discharge was 6,900)
Fish - Max 65 cfs through sluice	12,970
Flood - 20,000 AF & 2,000 cfs outlet	5.590
Combined - 20,000 AF & 50% probability refill	3,940
Dam Removal	13.710

Modeled 100-Year Floodplain Extents, Current Climate



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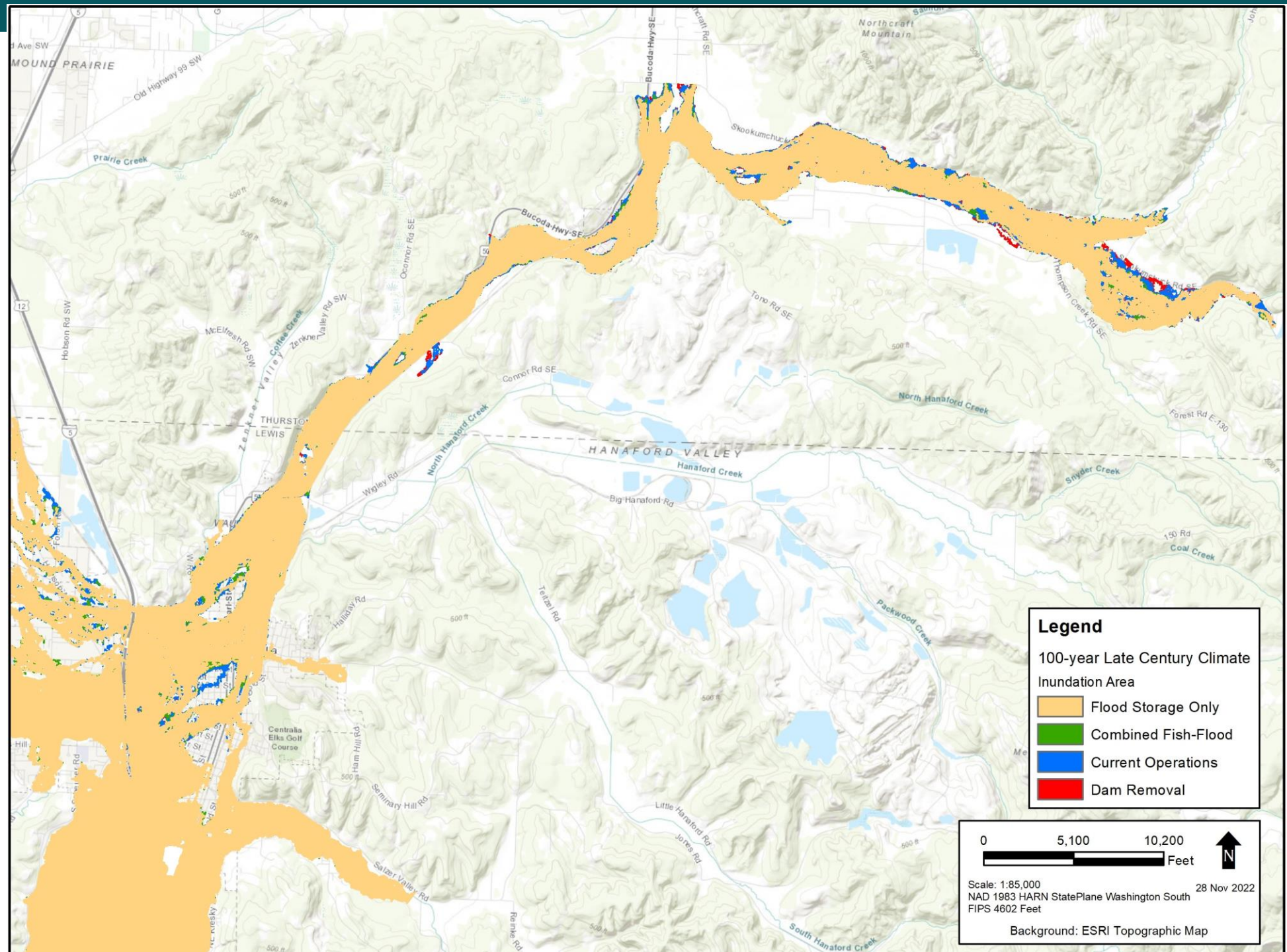
Modeled 100-Year Floodplain Extents, Late-Century Climate



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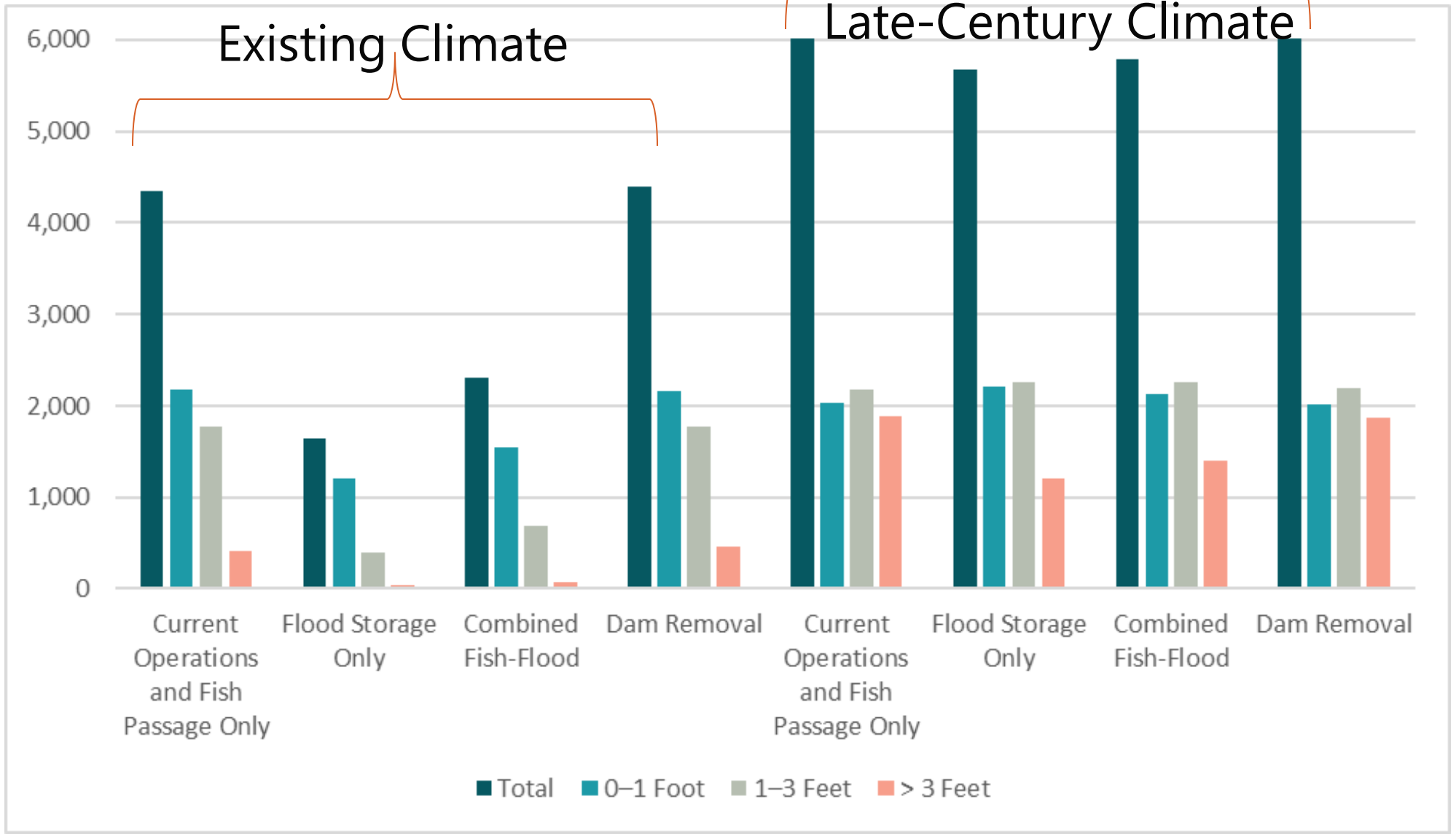
NUMBER OF STRUCTURES FLOODED IN 100-YEAR RECURRENCE FLOOD FOR EXISTING AND LATE-CENTURY CLIMATE FOR THE ALTERNATIVES



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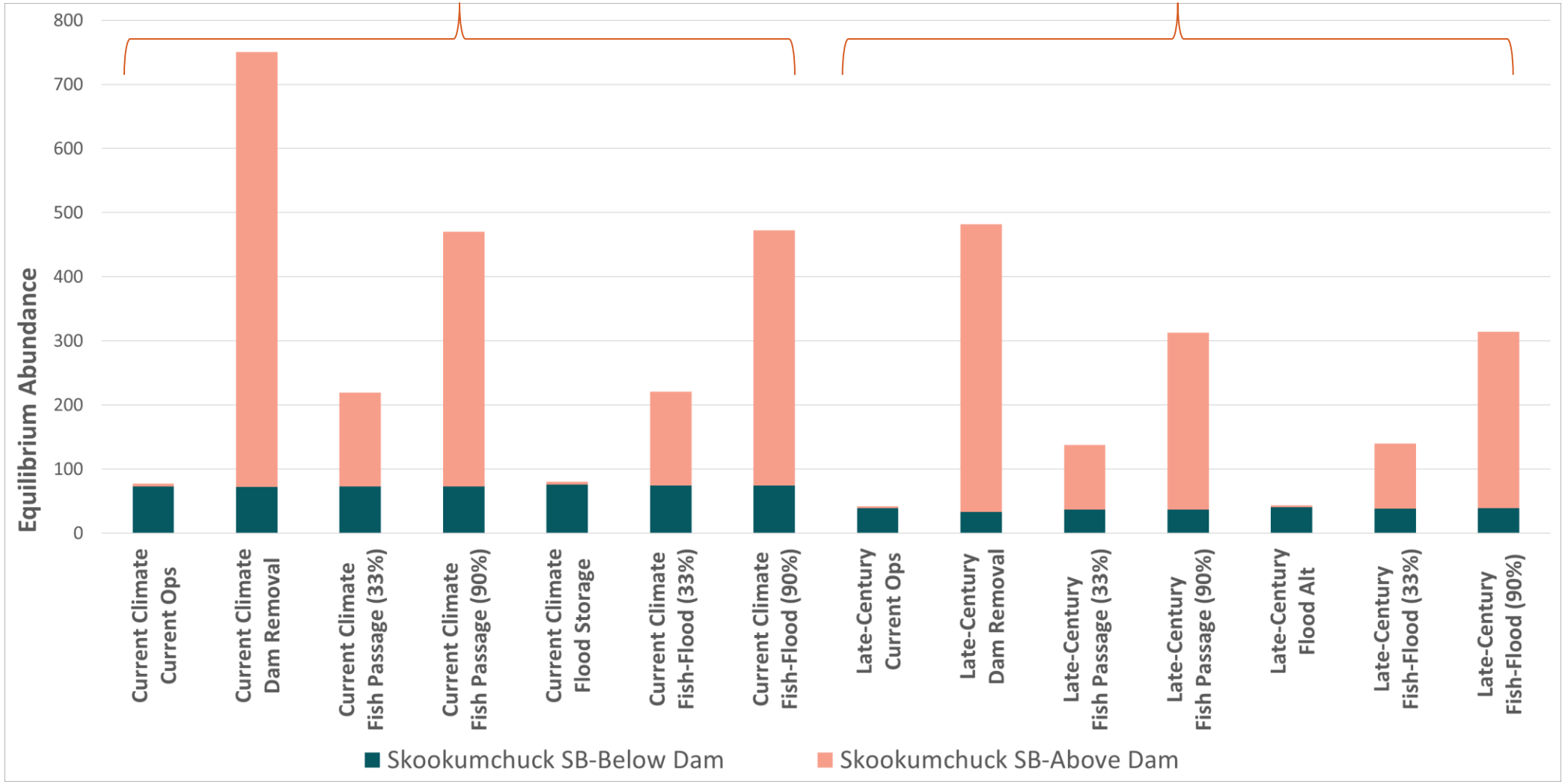
EDT MODELING

- Used the EDT model developed for the ASRP
- Updated model
  - Updated Thermalscape temperatures
  - Barrier updates
  - Updated steelhead life history patterns/age structure from QIN/WDFW data
  - Updates to upper Skookumchuck based on aerial photography/LiDAR of upper river
  - Updates to lower Skookumchuck based on ASRP projects (completed or in-progress)

STEELHEAD RESULTS



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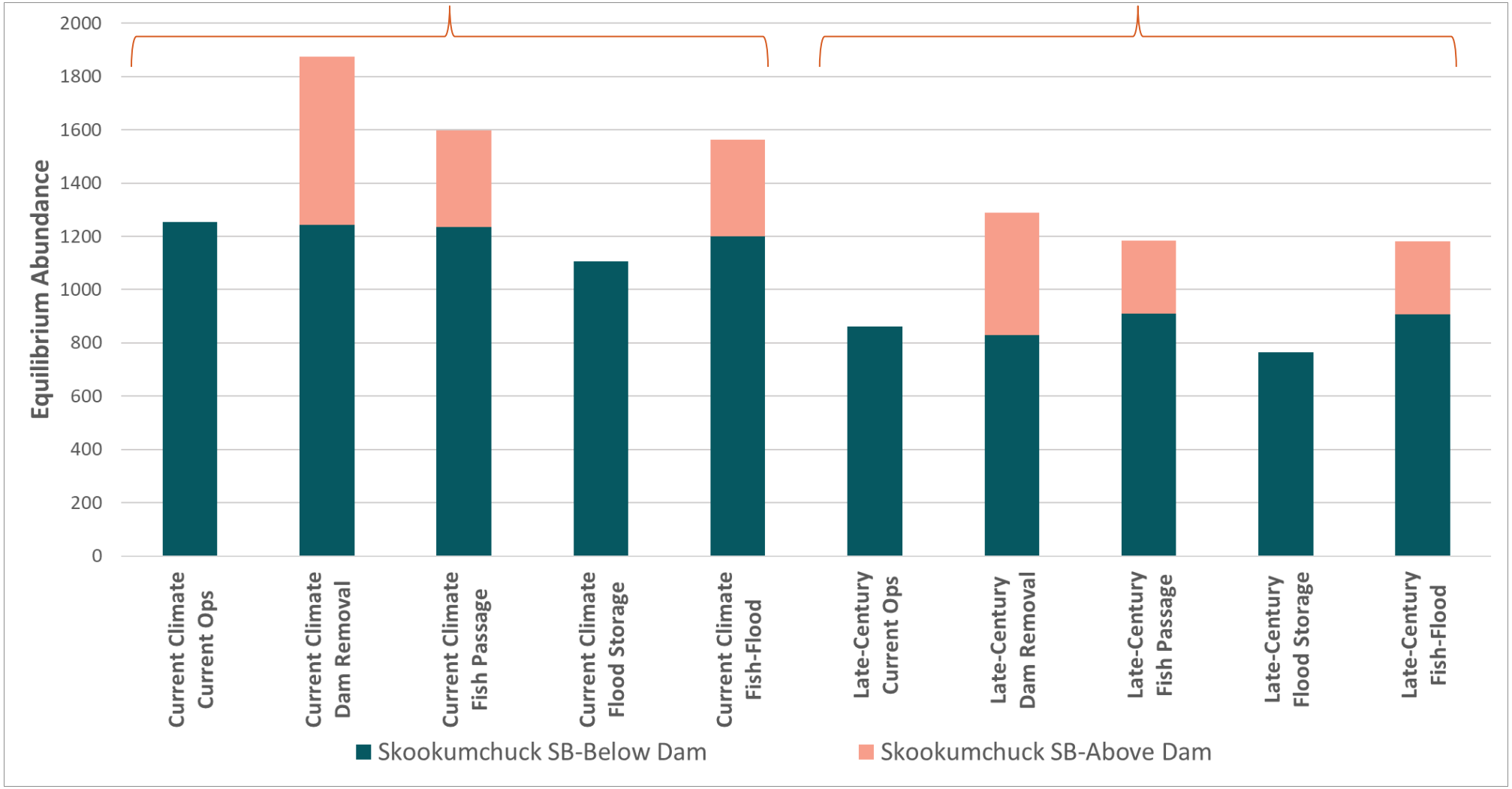
COHO RESULTS



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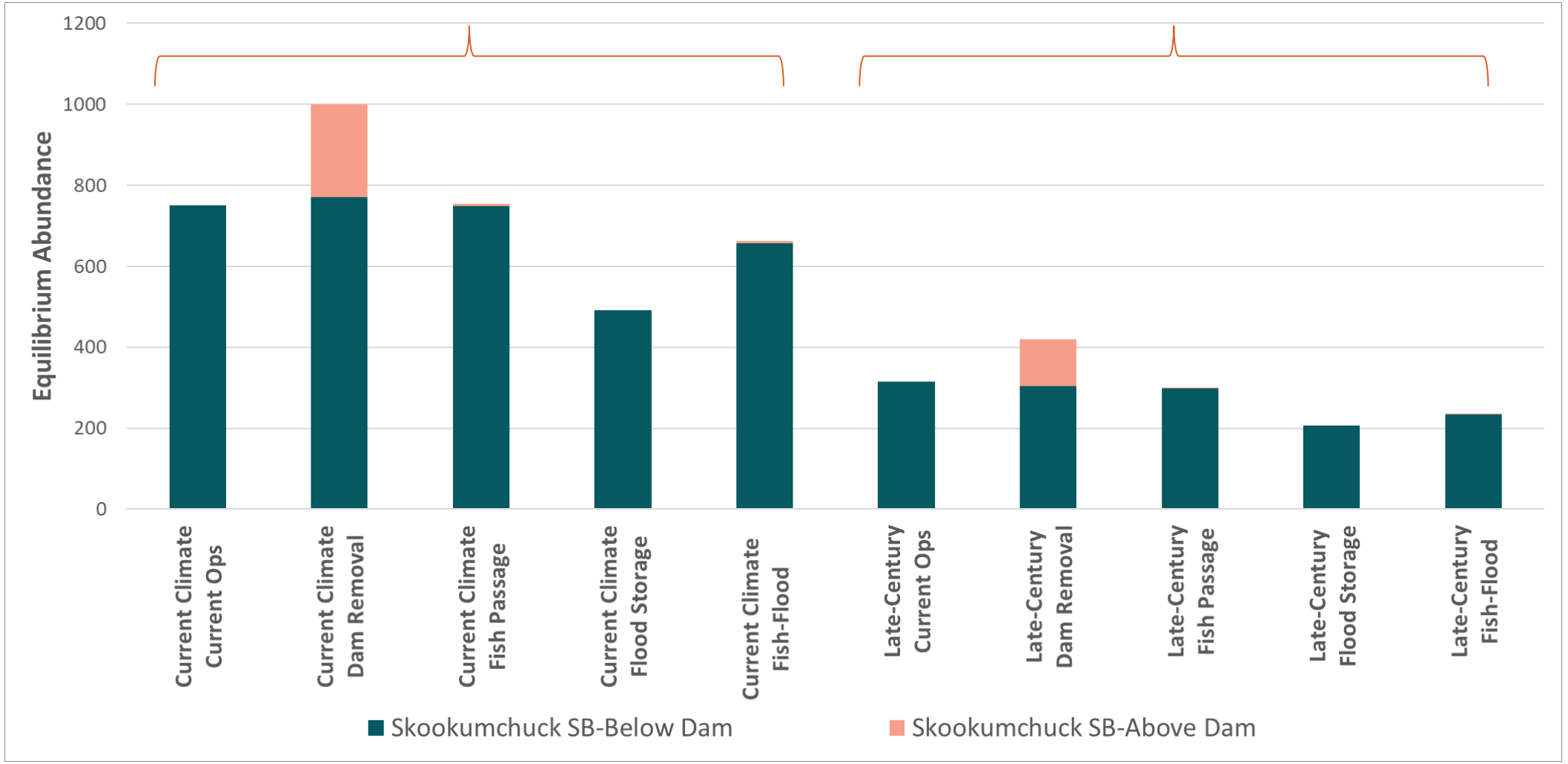
SPRING CHINOOK RESULTS



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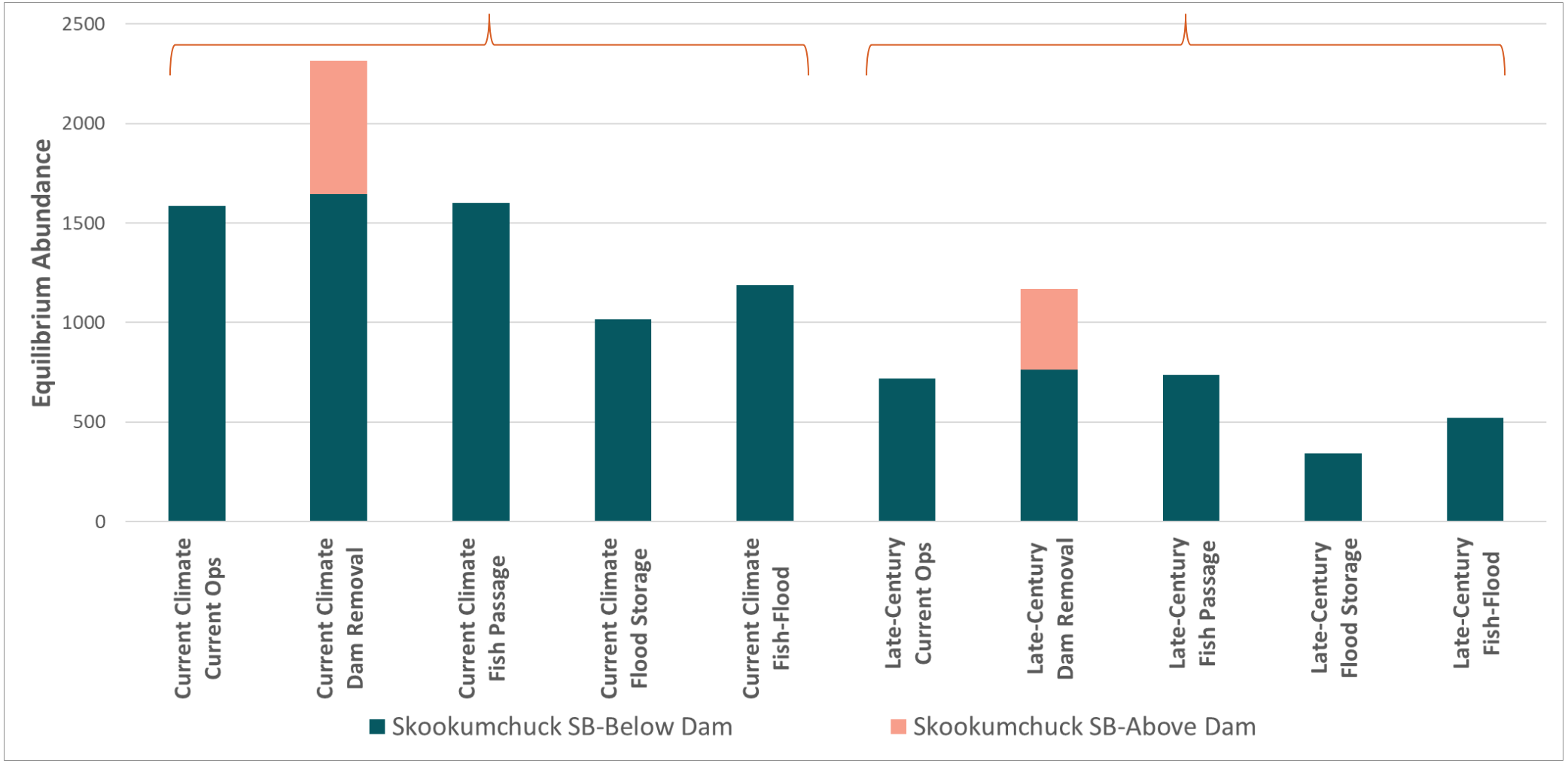
FALL CHINOOK RESULTS



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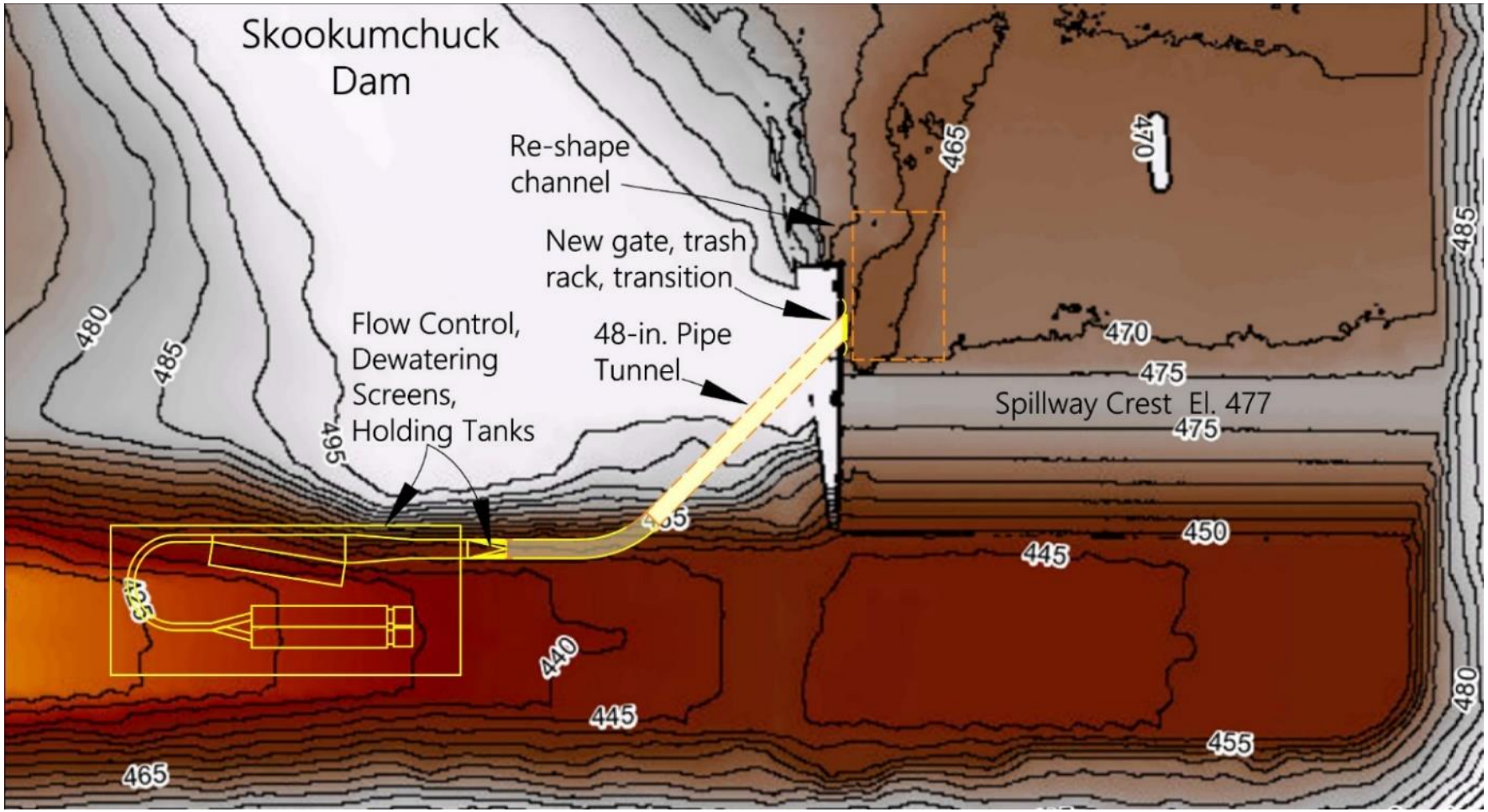
FISH SLUICE CONCEPT DESIGN

- Regardless of alternative, if the dam stays in place, a new fish sluice would improve downstream fish (salmonid) passage
- Key elements:
  - Which fish species to consider?
  - Providing safe passage
  - Vertical drop to the river downstream

CONCEPT OF NEW FISH SLUICE



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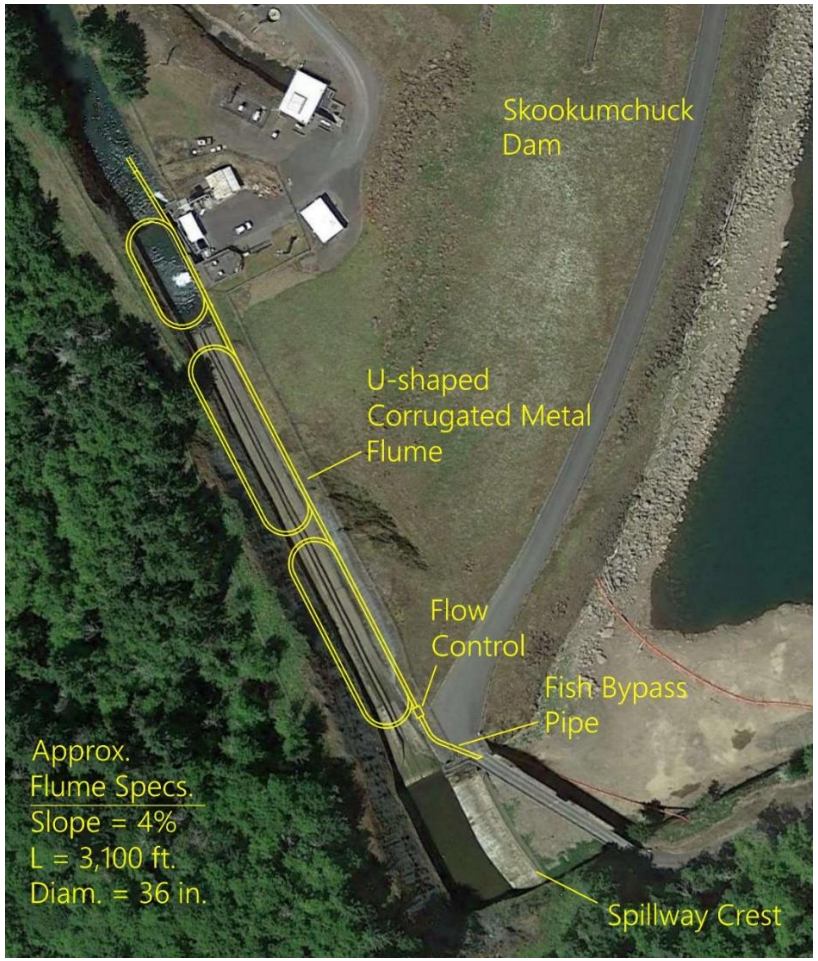
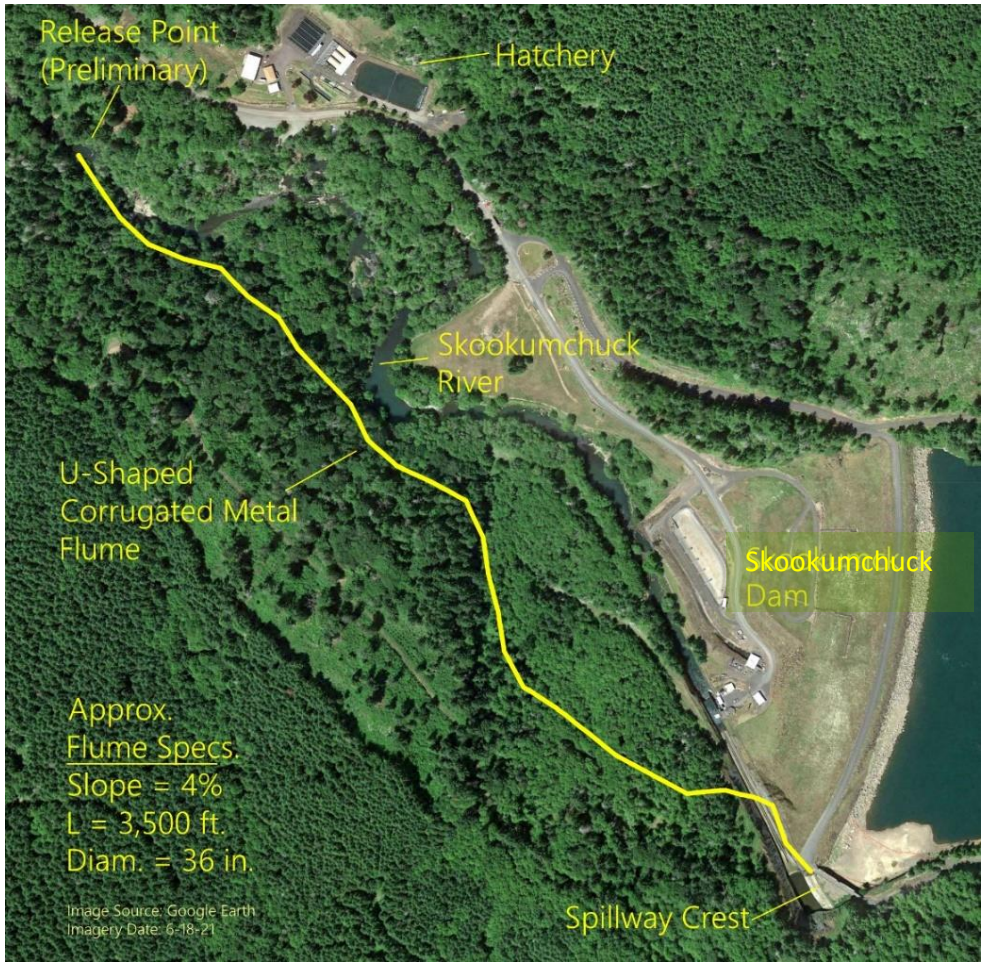
POSSIBLE DOWNSTREAM ROUTES VIA A FLUME





CHEHALIS BASIN STRATEGY

COSTS OF THE ALTERNATIVES

ALTERNATIVE	CLASS 5 COST ESTIMATE
Current Operations	N/A
Fish Passage Only	$8.3 million
Flood Storage Only	$42.2 million
Combined Fish-Flood	$50.5 million
Partial Dam Removal	$24.9 million (median) + $80 million (water rights)
Full Dam Removal	$34.6 million (median) + $80 million (water rights)

COMPARISON OF THE ALTERNATIVES

ALTERNATIVE	FISH ABUNDANCE	FLOOD EFFECTS	WATER RIGHTS	COST
Current Operation	No change	No change	No change	N/A
Fish Passage Only	Steelhead **+** Coho **+** Spring Chinook **=** Fall Chinook **=**	No change	Small but increased risk of water rights curtailments in drought years	$8.3 million
Flood Storage Only	Steelhead **=** Coho **-** Spring Chinook **-** Fall Chinook **-**	Substantial reductions in flood extent and depth; less benefit in late-century	Small but increased risk of water rights curtailments in drought years	$42.2 million
Combined Fish-Flood	Steelhead **+** Coho **+** Spring Chinook **-** Fall Chinook **-**	Substantial reductions in flood extent in depth; less benefit in late-century	Small but increased risk of water rights curtailments in drought years	$50.5 million
Dam Removal	Steelhead **++** Coho **+** Spring Chinook **+** Fall Chinook **+**	Small increases in flood extent and depths	Higher risk of water rights curtailments in drought years	$25–$35 million (median) +$80 million (water rights)

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QUESTIONS OR DISCUSSION

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