



SKOOKUMCHUCK DAM PHASE 1 ANALYSIS SUMMARY

October 7, 2021

INFORMATION AND ANALYSIS TO DATE

- Compiled studies and data such as from U.S. Army Corps of Engineers 2003/2012 flood reduction studies, pre-dam habitat/fisheries studies, TransAlta, etc.
- Existing dam configuration and operations
- Hydrologic analysis (inflows and outflows)
- Simple reservoir spreadsheet model
- Possible fish passage or flood storage options
- Dam modification potential costs
- Dam removal considerations and costs
- Water rights

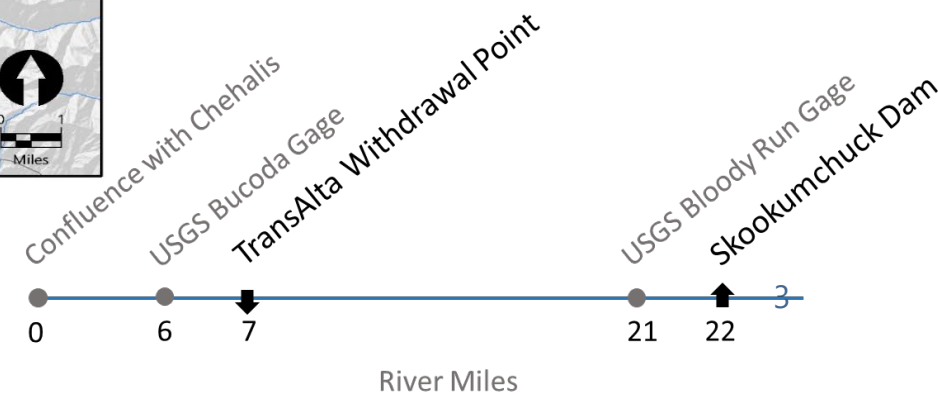
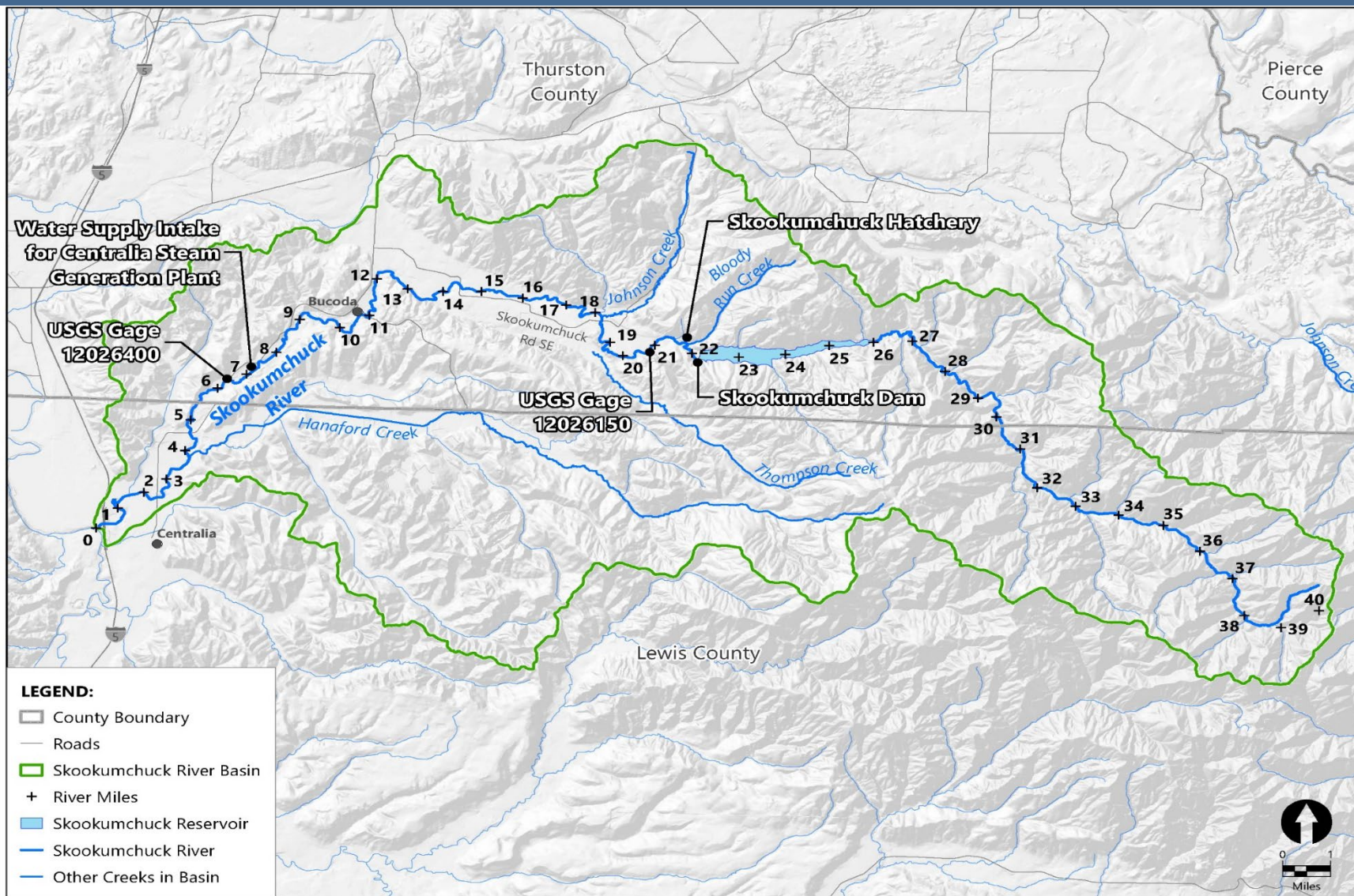




Figure ES-2
Schematic of Skookumchuck Dam Inlets and Outlets

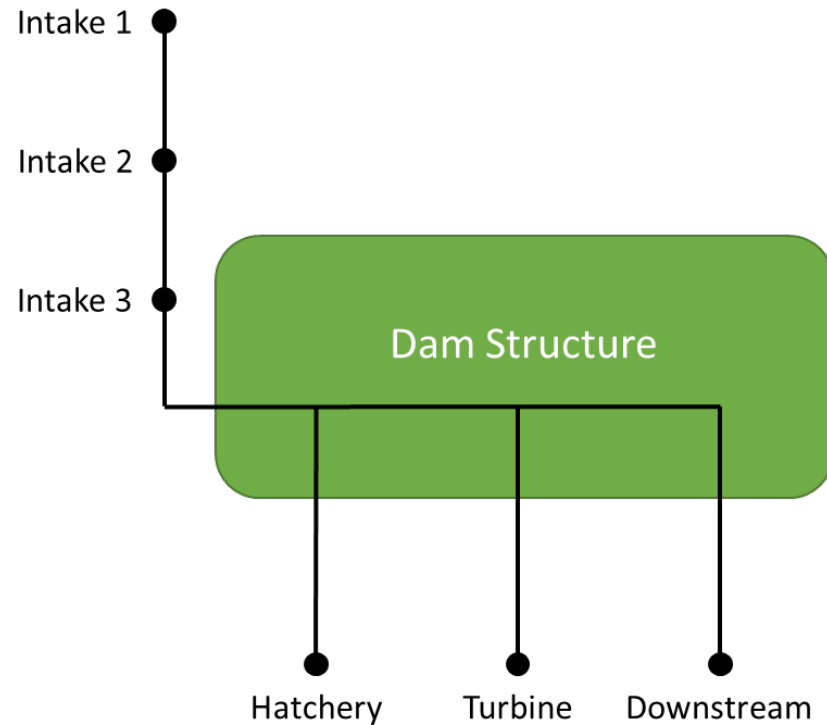
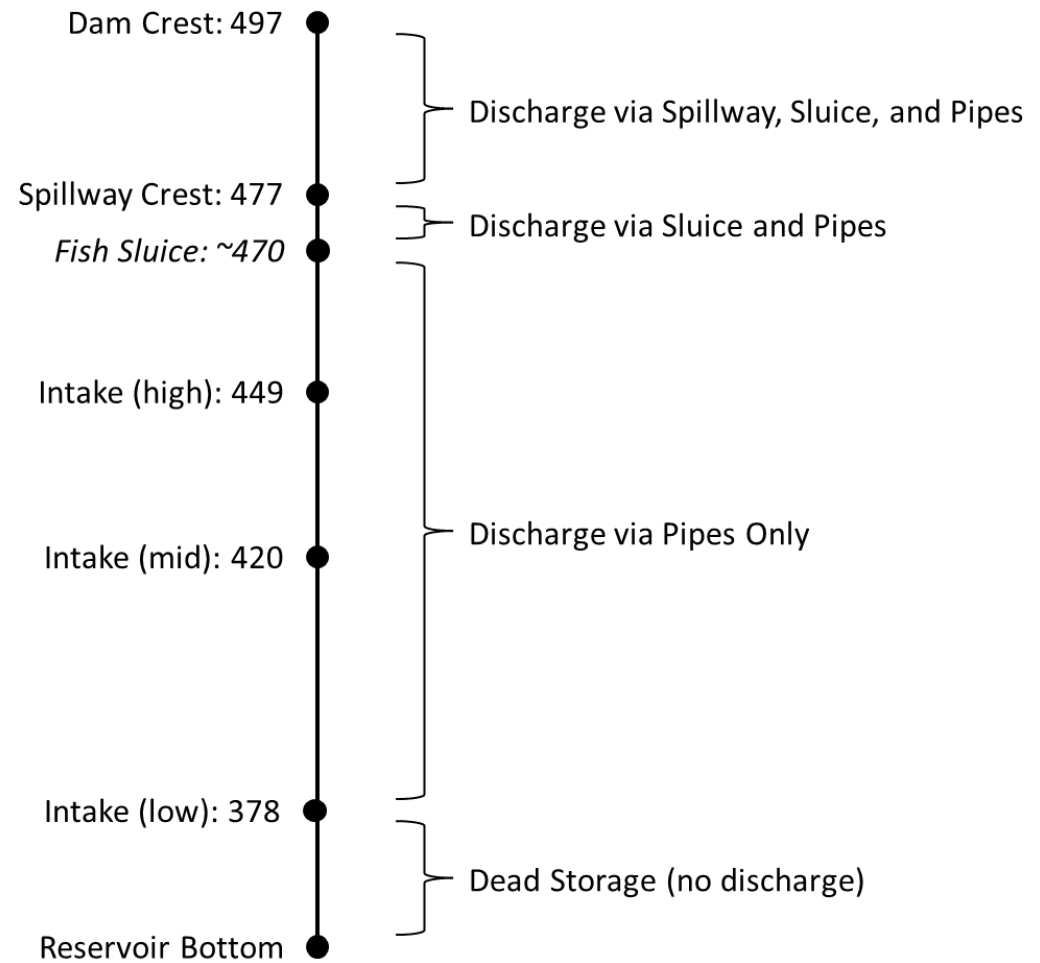


Figure ES-3
Schematic of Skookumchuck Dam Key Elevations





UPPER WATERSHED HABITAT CONDITIONS

- Limited recent data
- Pre-dam survey and Weyerhaeuser watershed assessment indicate:
 - Three splash dams present historically, last one removed in 1969; affected fish access to most of the river
 - Pre-dam, WDF estimated spawning capacity based on habitat area/accessibility:
 - ~ 4-5 miles of Chinook spawning habitat
 - ~8 miles of coho spawning habitat
 - ~20+ miles of steelhead spawning habitat
 - Estimated potential chum spawning because they historically occurred in the river

POTENTIAL FLOOD STORAGE AND/OR FISH BENEFITS

- Hydrologic analysis of gages (4 gages: 1940- 2021)
- Simple spreadsheet model of reservoir
- Simple model evaluates flood storage separately from fish passage flows
 - Routed reservoir inflows to meet Minimum Discharge (95 cfs):
 - Ran three different operating scenario (2 fish, 1 flood storage)
 - Plotted reservoir exceedance levels throughout year

HYDROLOGIC ANALYSIS

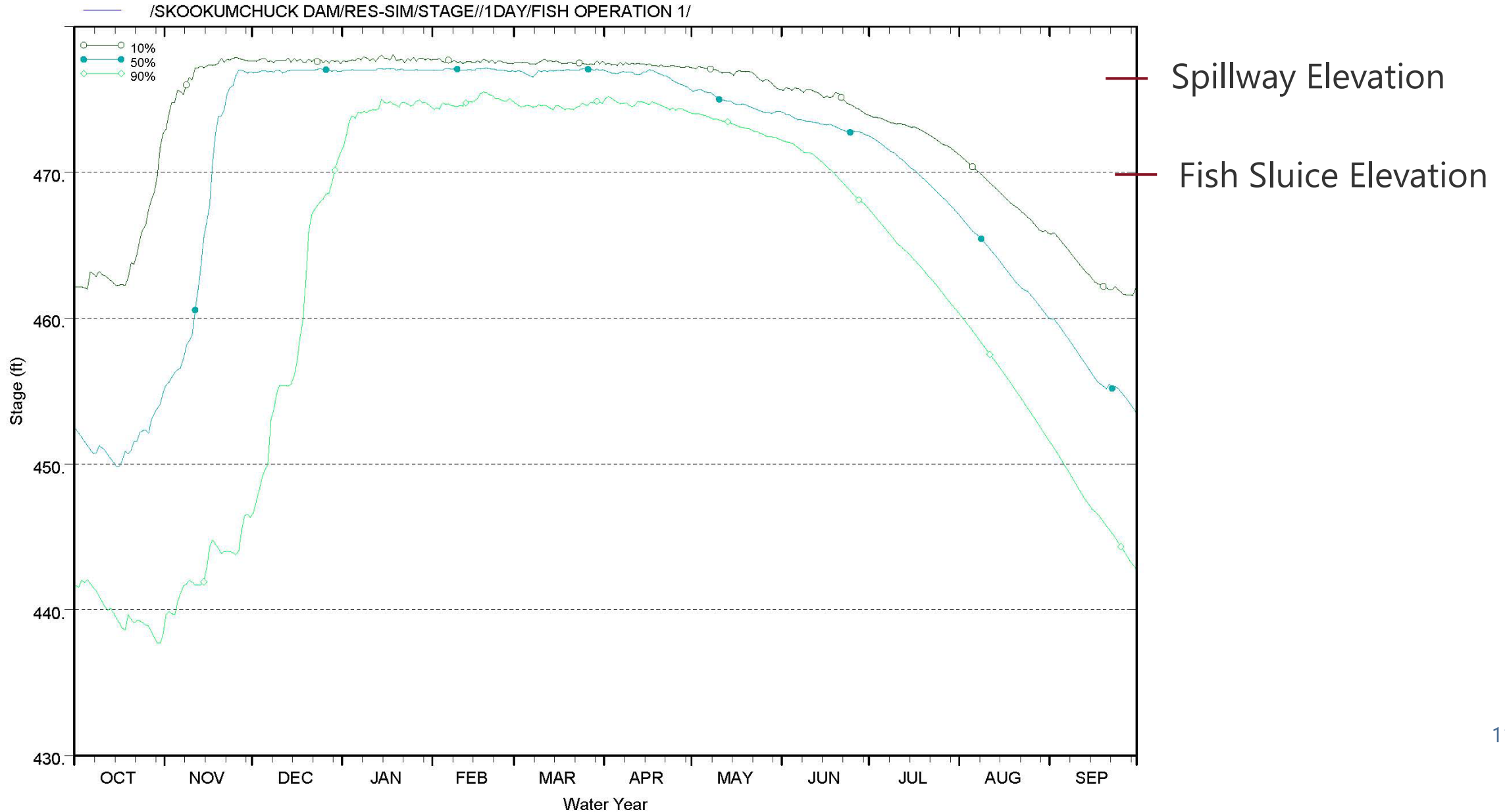
- Reservoir has approximately 33,000 acre feet of active storage
- Volume frequency analysis of reservoir inflows shows events that would fill all storage (assuming zero outflow)

Frequency Analysis of Skookumchuck Reservoir Inflow Volumes (acre-feet)

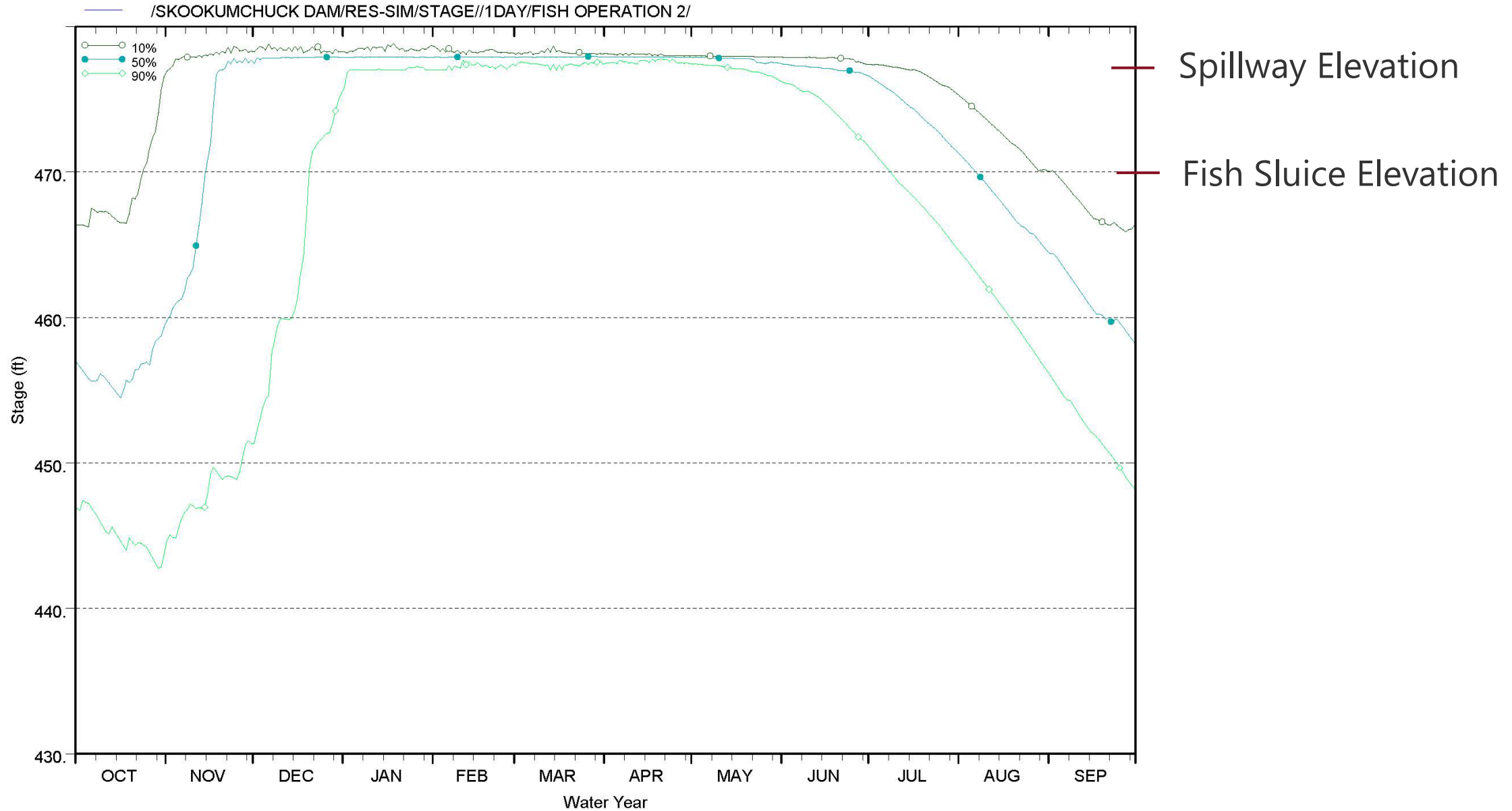
RETURN PERIOD	1-DAY	2-DAY	3-DAY	5-DAY	7-DAY
2-Year	5,700	9,700	12,400	17,400	21,500
10-Year	11,000	18,000	22,000	28,300	33,300
25-Year	13,900	22,300	26,700	33,000	39,000
100-Year	18,200	28,700	33,600	39,500	47,100



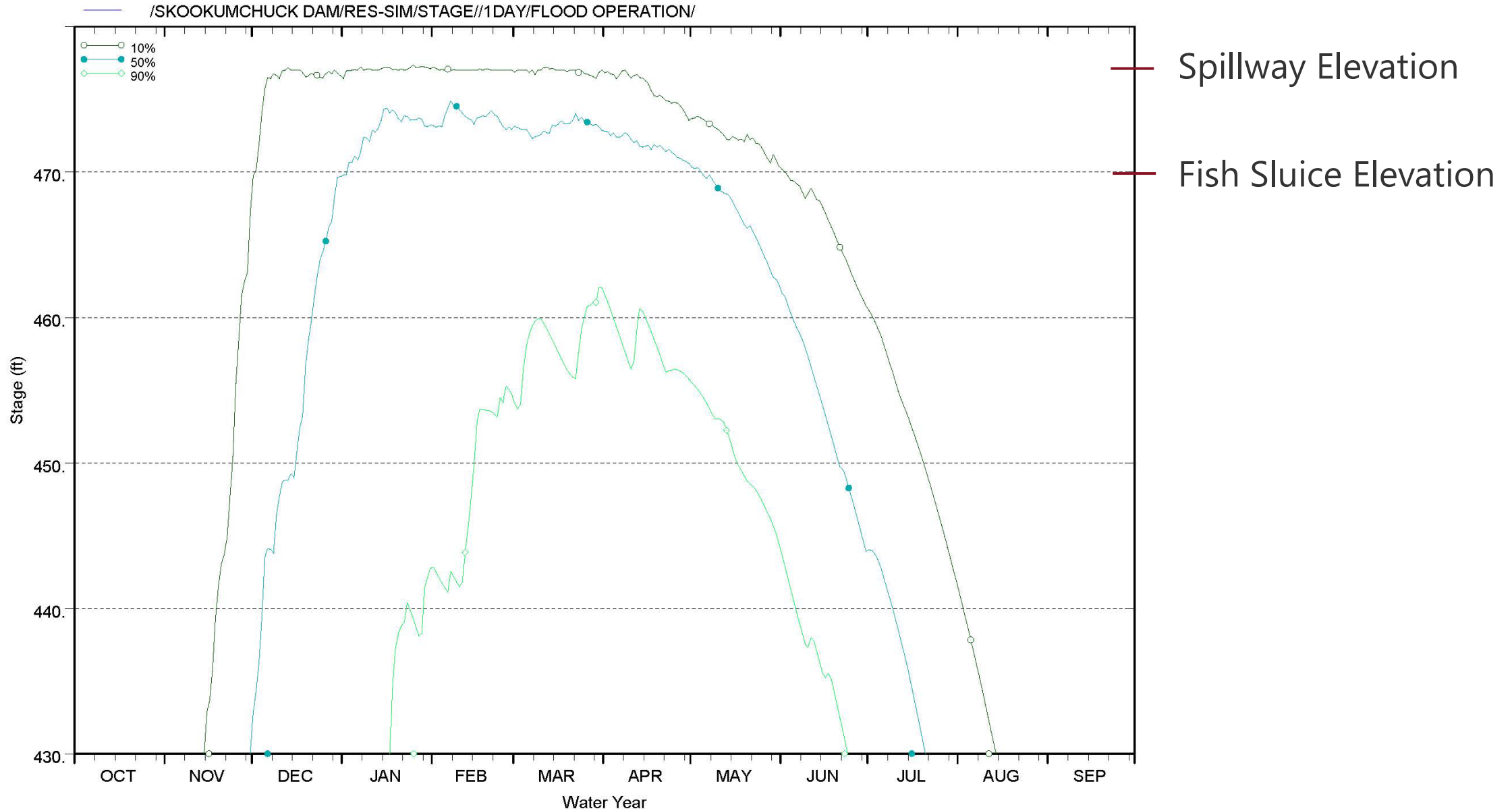
Skookumchuck Dam
Simulated Water Levels with Fish Operation Scenario 1
Percentiles of Daily Data from Water Years 1941 to 2021



Skookumchuck Dam
Simulated Water Levels with Fish Operation Scenario 2
Percentiles of Daily Data from Water Years 1941 to 2021



Skookumchuck Dam
Simulated Water Levels with Flood Operation Scenario
Percentiles of Daily Data from Water Years 1941 to 2021



CURRENT TAKEAWAYS

- Fish passage and flood storage are currently not compatible
- Flood storage capability is limited with current dam configuration except in the driest years; have not analyzed future climate change
- Downstream steelhead passage is feasible if dam operated to release most flows through sluiceway in spring
- An adjustable sluice would be more effective

DOWNSTREAM SPAWNING FLOWS

- Currently, TransAlta is required to ramp up flows from September 1 through October 20 of each year to support spawning
- Flows typically ramp up from 95 cfs (or less) prior to September 1 to 100-140 cfs during the designated spawning timing (Chinook salmon)
- May contribute to issue of fall Chinook spawning over spring Chinook redds
- Currently, WDFW actively working with TransAlta to reduce the spawning flows to see if this delays fall Chinook spawning, let flows come up more naturally

WATER RIGHTS INFO

- TransAlta current water right is for 51.6 cfs (28,003 ac-ft) water; recently applied to place this water right in a water bank
- TransAlta applied for a temporary water right for 27.5 cfs (12,000 ac-ft) to continue operating the one turbine through 2025
- The City of Centralia agreed to purchase 6,720 ac-ft from the TransAlta water bank
- TransAlta holds a non-consumptive water right of 140 cfs for the small hydropower; proposed to continue
- WDFW holds two non-consumptive water rights of 20 and 10 cfs for fish propagation at the hatchery; proposed to continue
- Downstream along the Skookumchuck River are an additional ~21 cfs of water rights (not related to TransAlta)

DAM MODIFICATIONS

- Escalated costs for spillway and outlet modifications proposed by the U.S. Army Corps of Engineers in 2003/2012
 - \$22.3 million without spillway elevation raise (actively control 11,000 AF of storage)
 - \$27.5 million with spillway elevation raise (adds 9,000 AF of storage)
 - This likely did not include mitigation costs for reservoir raise, costs above do not include operational costs
- Ballpark estimate for fish sluice modifications (such as adding a floating weir)
 - \$500,000, does not include operational costs

DAM REMOVAL CONSIDERATIONS

- Several recent Pacific Northwest dam removal examples; only one was an earth fill dam (Skookum Dam, Oregon coast)
- Could consider partial or full removal, both types of removals have occurred
- Partial removal screening estimate ranges from \$20 – 35 million
- Full removal screening estimate ranges from \$30 - 50 million



POTENTIAL FURTHER ANALYSES

- Detailed reservoir model
- Hydraulic modeling of downstream reaches/including updated cross-section survey
- Concept designs for fish sluice
- Habitat survey upstream of the reservoir
- Bathymetric survey of the reservoir
- Detailed modeling of fish sluice
- Concept design for spillway/outlet modifications (only if storage is feasible)
- EDT updates and modeling of upper watershed
- Evaluation of impacts to water rights downstream, including affected portion of Chehalis River

QUESTIONS/COMMENTS

