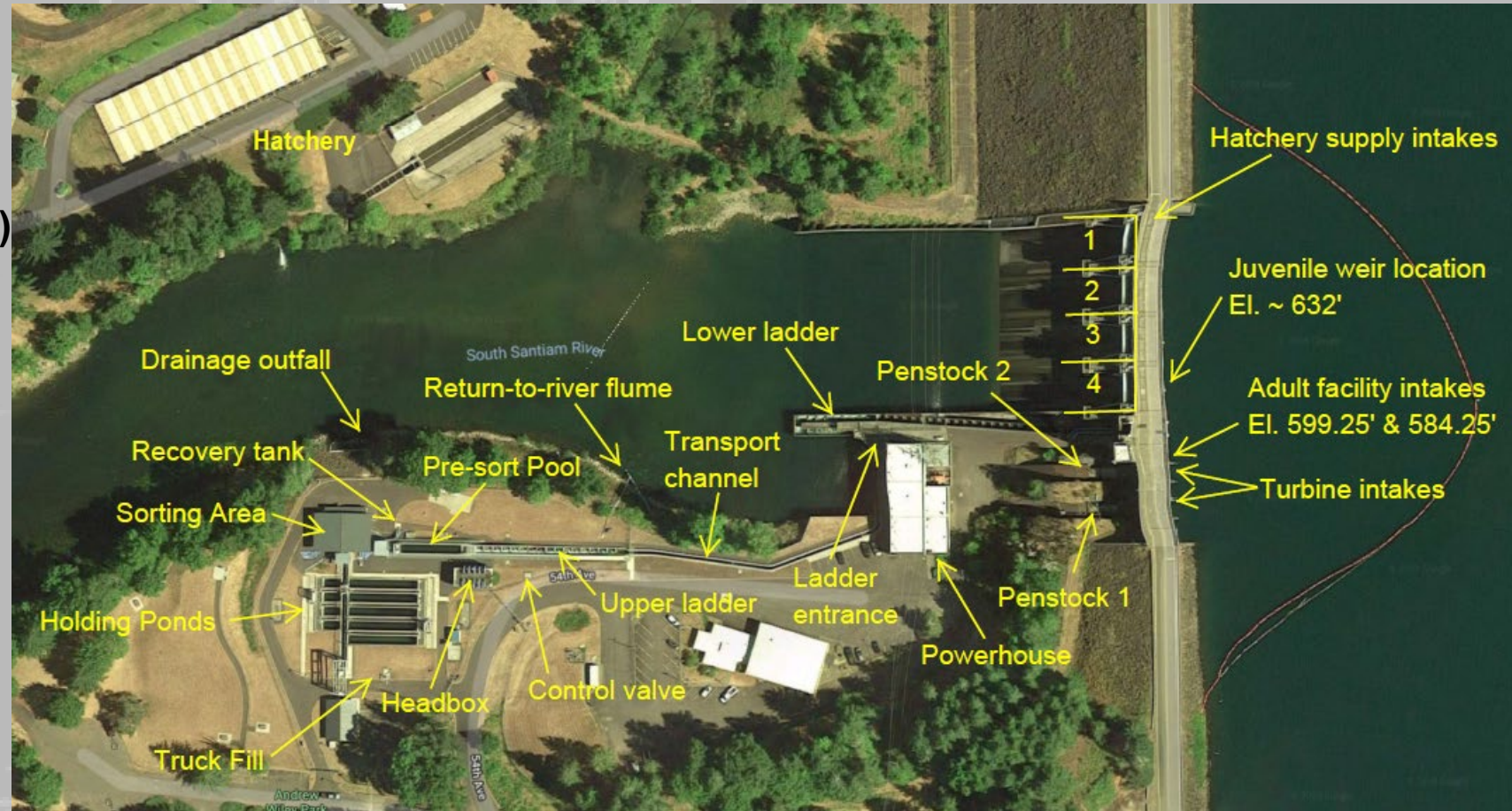


FOSTER UPSTREAM PASSAGE UPDATE

Chris Budai, PM
Stephen Schlenker, TL (EDR phase)
Shari Dunlop, TL (DDR phase)
Ida Royer, Fish Biologist
Greg Taylor, Fish Biologist
Norm Buccola, Hydraulic Engineer
And more....

12 February 2020



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Temperature Targets for the FOS Fish Ladder



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- Match ladder temps to the upstream South Santiam temperatures when reasonable
- Maximum ladder temperatures of 60 °F to minimize stress

Date	FOS Fish Ladder Target (°F) *
1-May	51
15-May	53
1-Jun	55
15-Jun	57
1-Jul to 30-Aug	60
1-Sep	58
15-Sep	55

* Design criteria – operations may change

Alternatives



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3

- ▶ Operational alternative (spill at GRP)
- ▶ Connect to existing intake piping by coring from above or through trashrack
- ▶ Torpedo screens with piping through valve room (EL 590)
- ▶ Torpedo screens with piping above winter pool (Centerline EL ~615)
- ▶ Rectangular screen with piping through valve room
- ▶ Rectangular screen with piping above winter pool

Alternatives



- ▶ Operational alternative (spill at GRP) → Modeling indicates this warms hatchery intake and not enough warm water to current ladder intake, year-to-year availability of spill at GRP a question
 - ▶ Connect to existing intake by coring from above or through trashrack → Connection point a structural (welding) concern, probable cavitation due to undersized existing pipes, poor maintenance access
 - ▶ Torpedo screens with piping through valve room
 - ▶ Torpedo screens with piping above winter pool
- } Torpedo screens require pipe manifold in forebay (underwater), added complexity in hydraulic balancing; Submerged flow control valve difficult to maintain.
- ▶ Rectangular screen with piping through valve room (Centerline EL ~615)
 - ▶ Rectangular screen with piping above winter pool (EL 630)

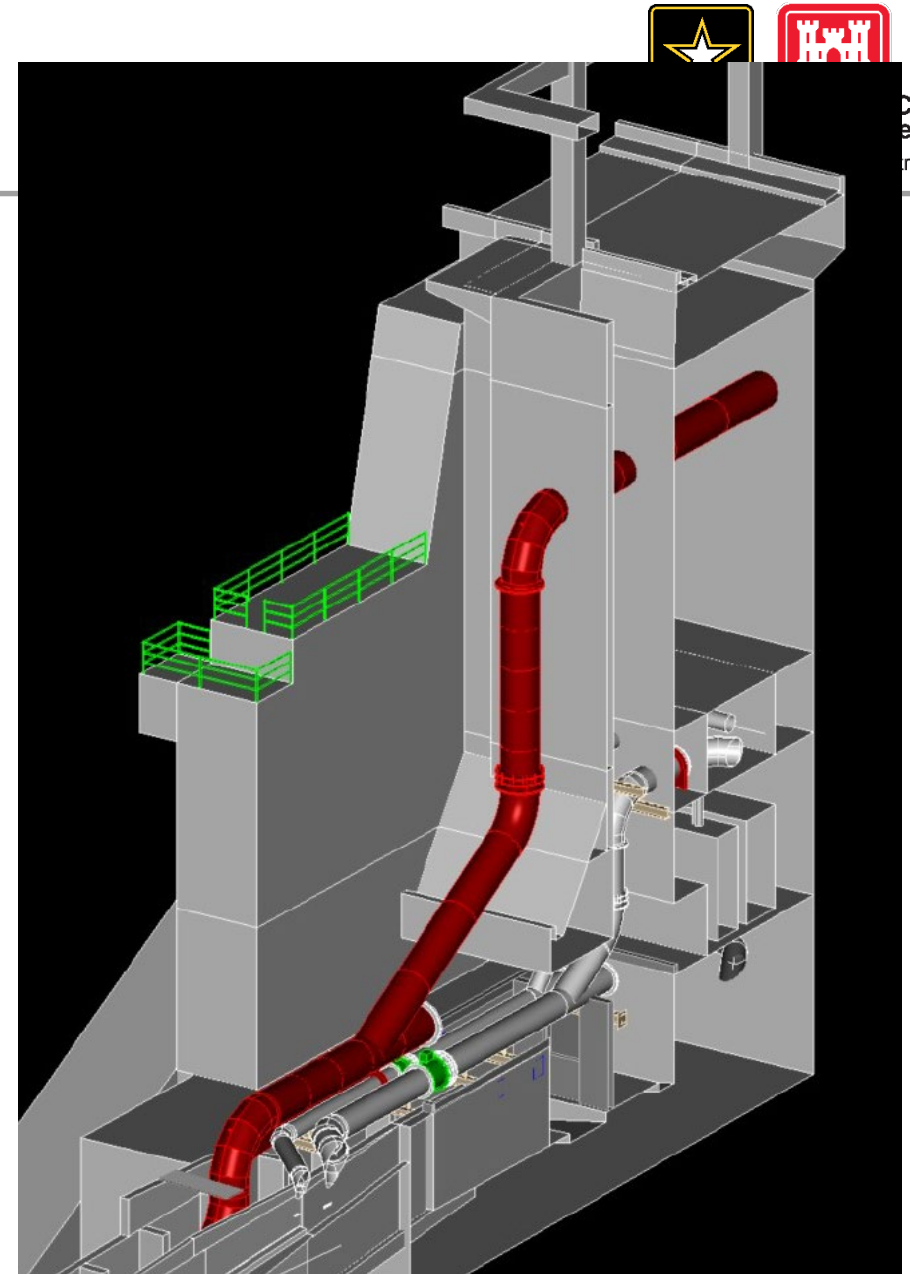
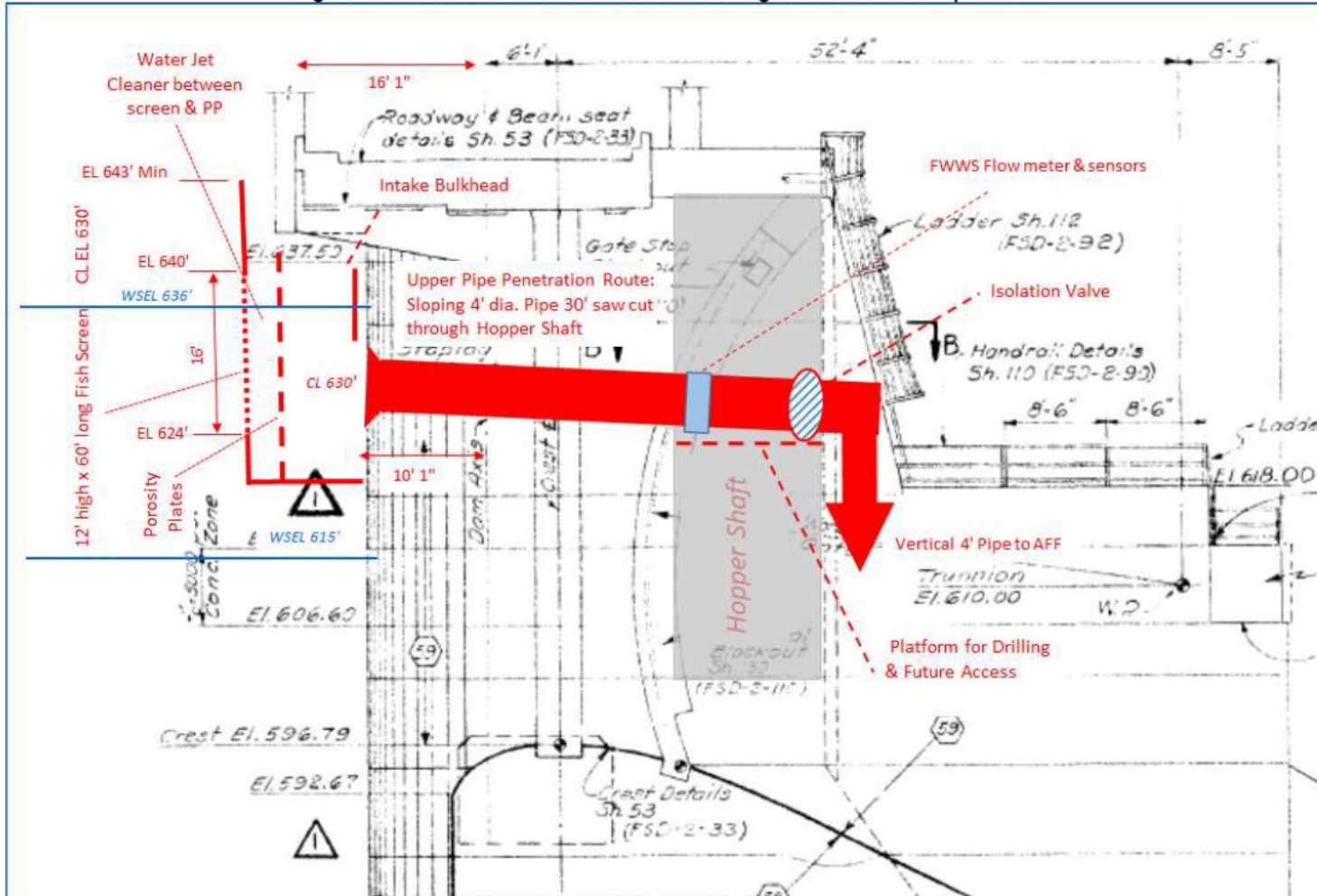
Alternatives



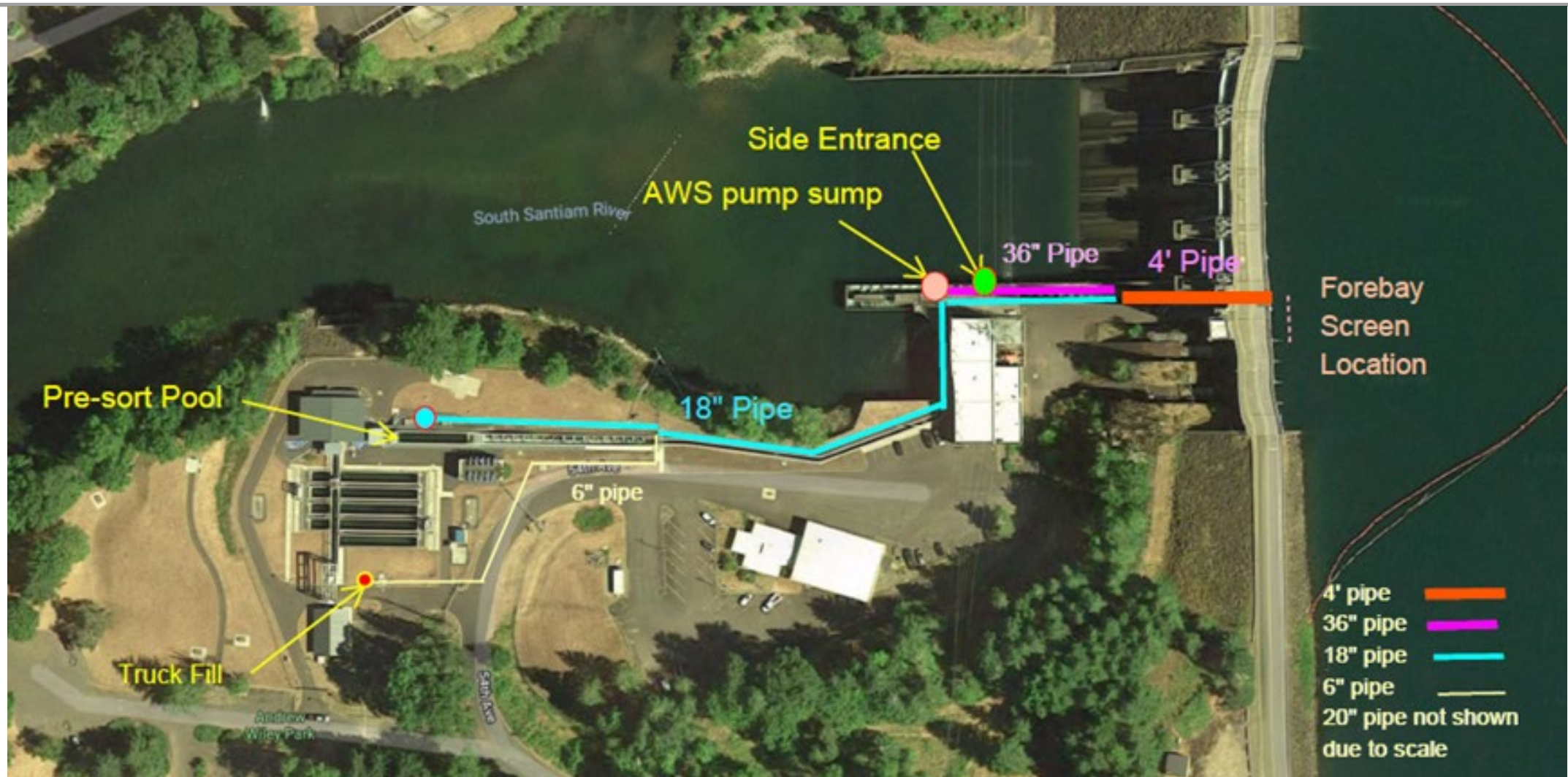
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 - ▶ Torpedo screens with piping through valve room
 - ▶ Torpedo screens with piping above winter pool
- } Torpedo screens require pipe manifold in forebay (underwater), added complexity in hydraulic balancing; Submerged flow control valve difficult to maintain.
- ▶ Rectangular screen with piping through valve room (Centerline EL ~615) → Insufficient space for new pipe, & existing pipe through dam is undersized, poor access, probable cavitation
 - ▶ Rectangular screen with piping above winter pool (EL 630)
- Preferred Alternative**
Screen flow controlled by porosity plates
Allows for bulkhead on dam face without manifold

Selected Alternative

- ▶ Rectangular screen with piping above winter pool



Target Locations with General Piping Plan



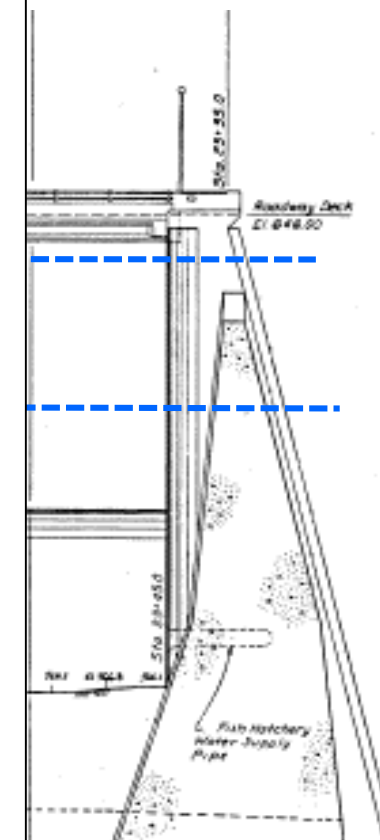
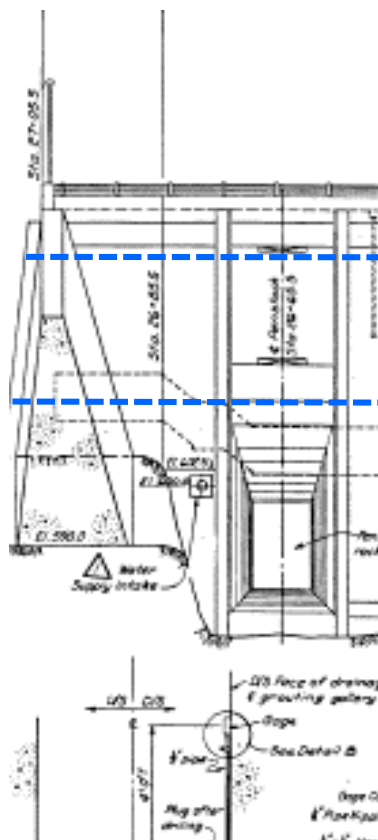
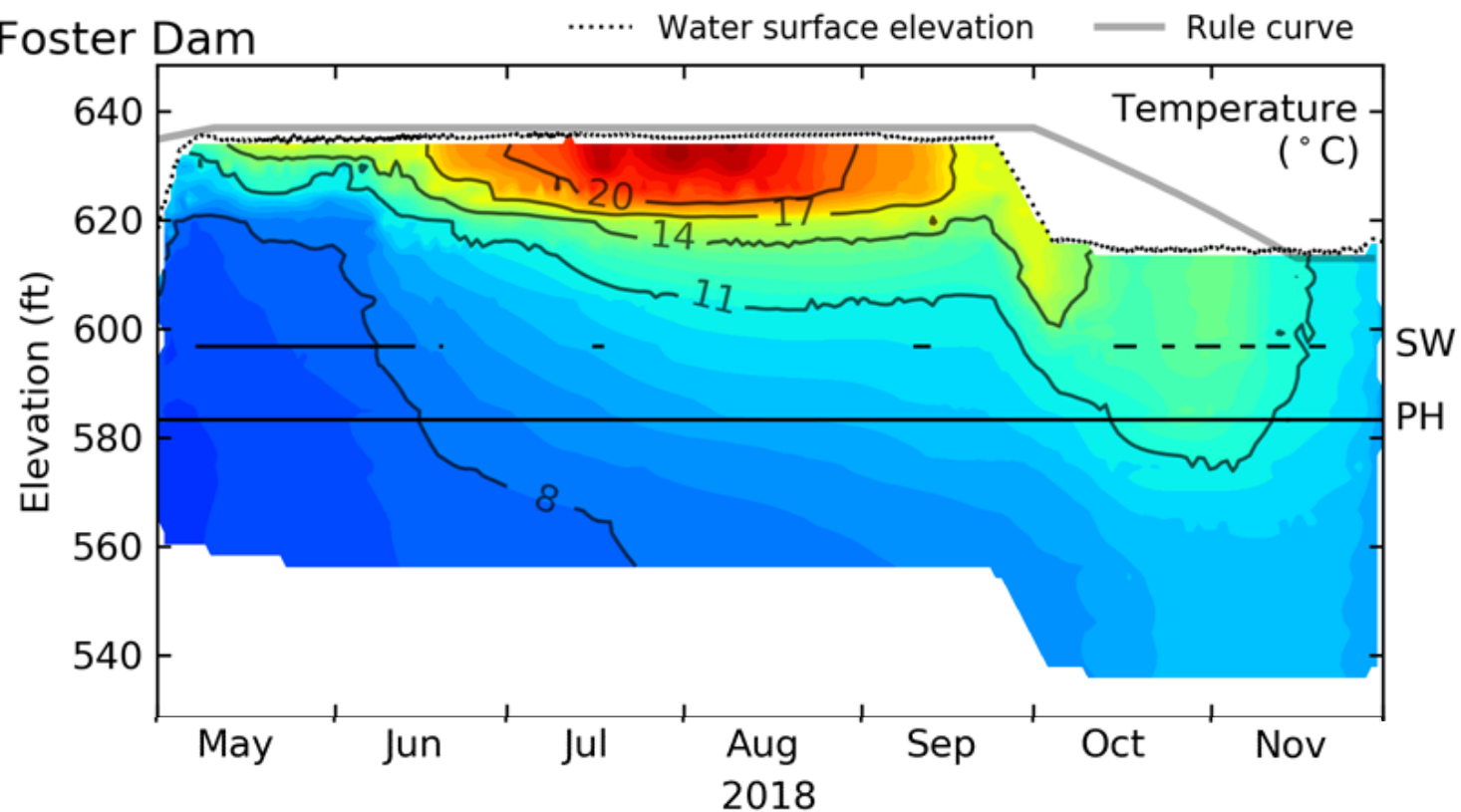
Questions?



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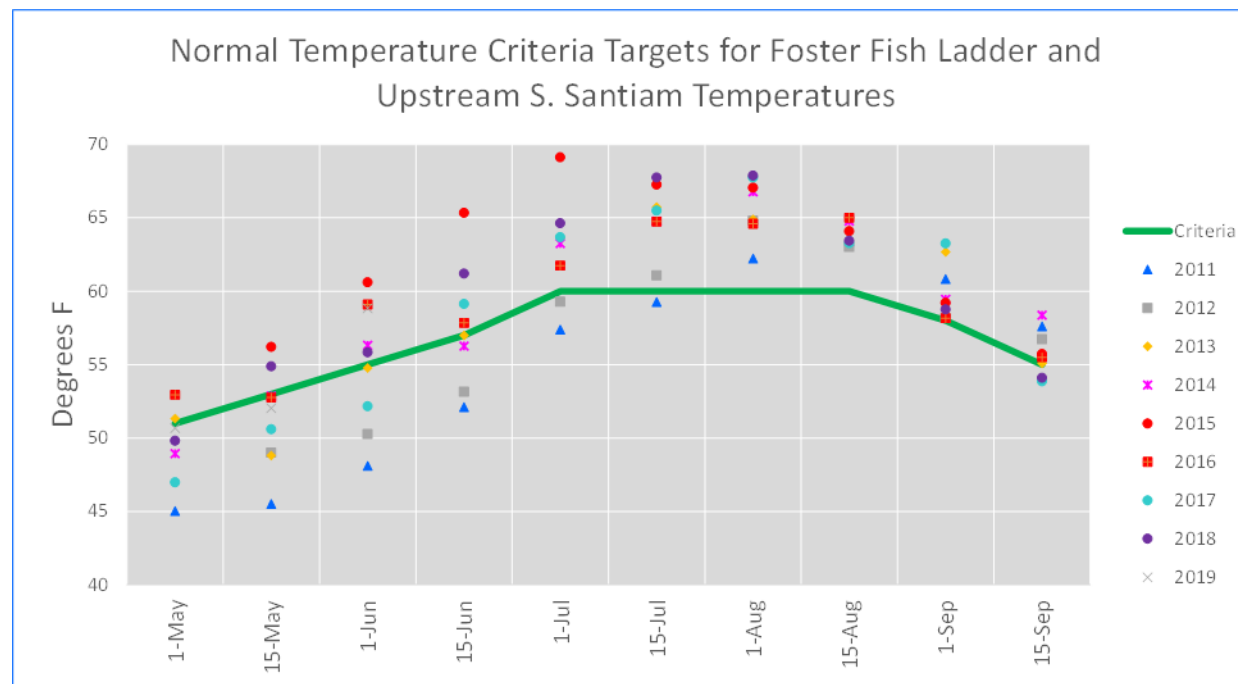


Foster Dam



Upper intake – EL 599 – side entrance and AWS (lower ladder)

Lower intake – EL 584 – head box (pre-sort pool/upper ladder and holding ponds)



Foster Dam and Adult Fish Collection Facility



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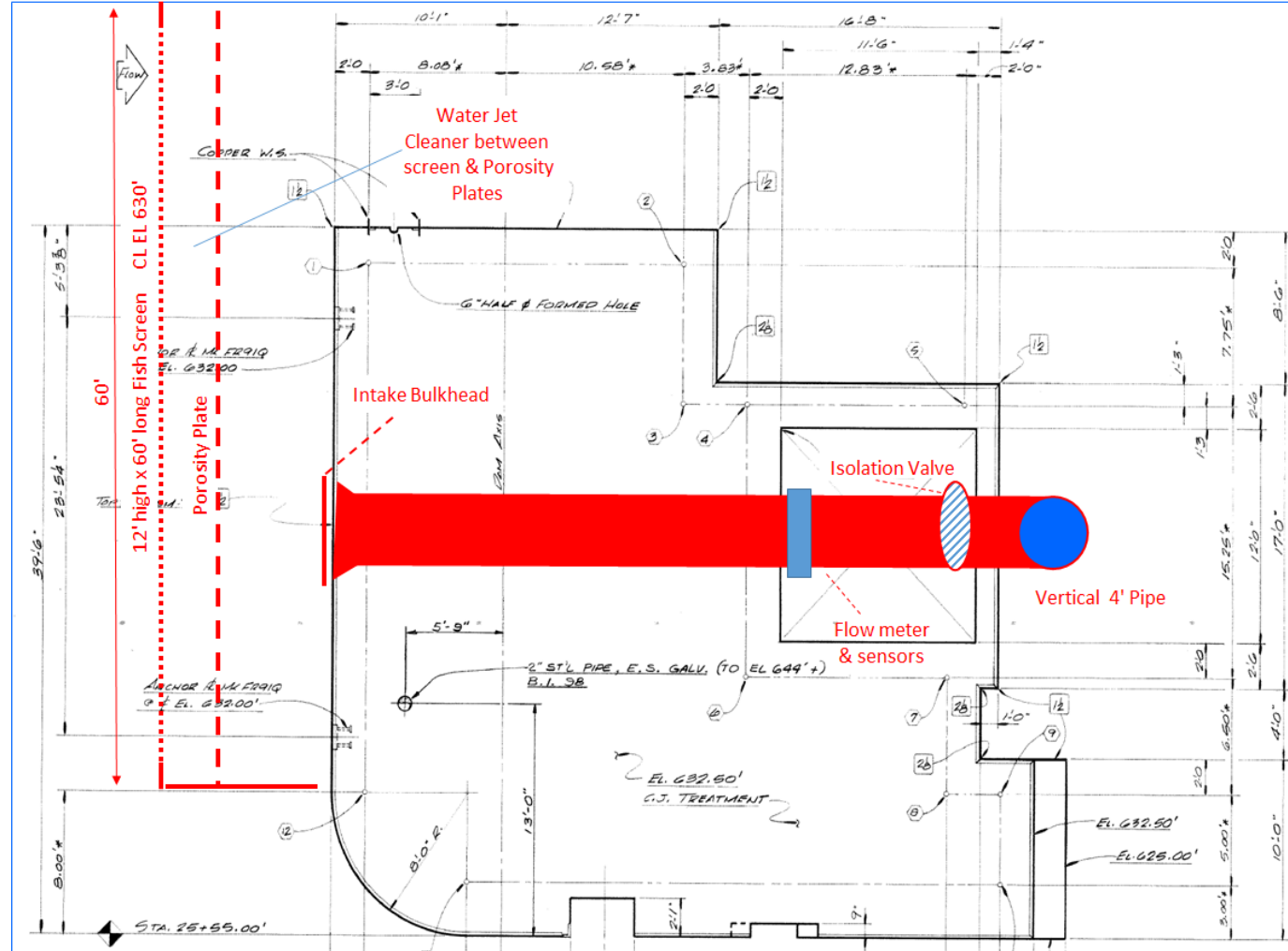
11

Foster adult collection rates for spring Chinook are not meeting expectations in spring – summer

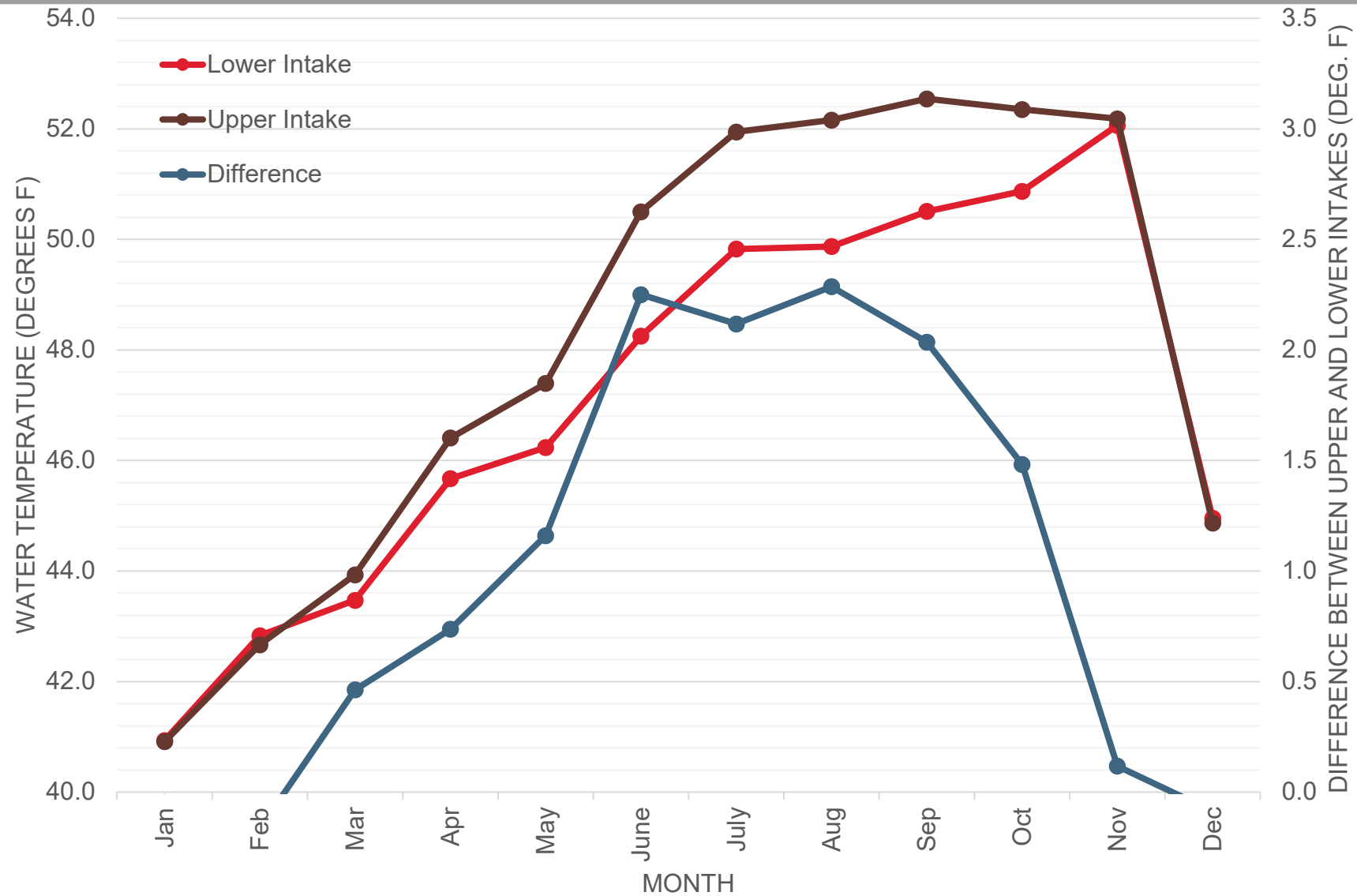
- * Visually see fish holding/spawning in the tailrace – median holding time of 25-52 days (Jepson et al. 2015)
- * Fish studies indicate fish moving in and out of the ladder (Keefer et al. 2018)
- * Fish ladder is consistently 1-2°C cooler than the powerhouse tailrace (Keefer et al. 2018)

Corps Team: Find a fish ladder temperature solution for the spring Chinook migration season (reservoir is at full pool)

Selected Alternative (Plan View)



Foster Fish Ladder Temperatures - 2017

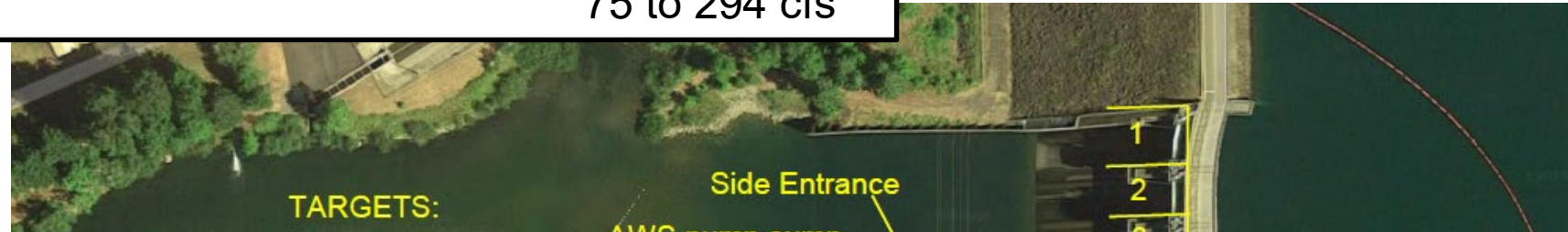


Flow Requirements for the FOS Fish Ladder



<ul style="list-style-type: none"> • Pre-Sort Pool (feeds upper ladder) • Side entrance AWS • AWS pump sump 	<p>30 cfs</p> <p>0 to 58 cfs</p> <p>45 to 180 cfs</p>

Σ ladder discharge	75 to 294 cfs

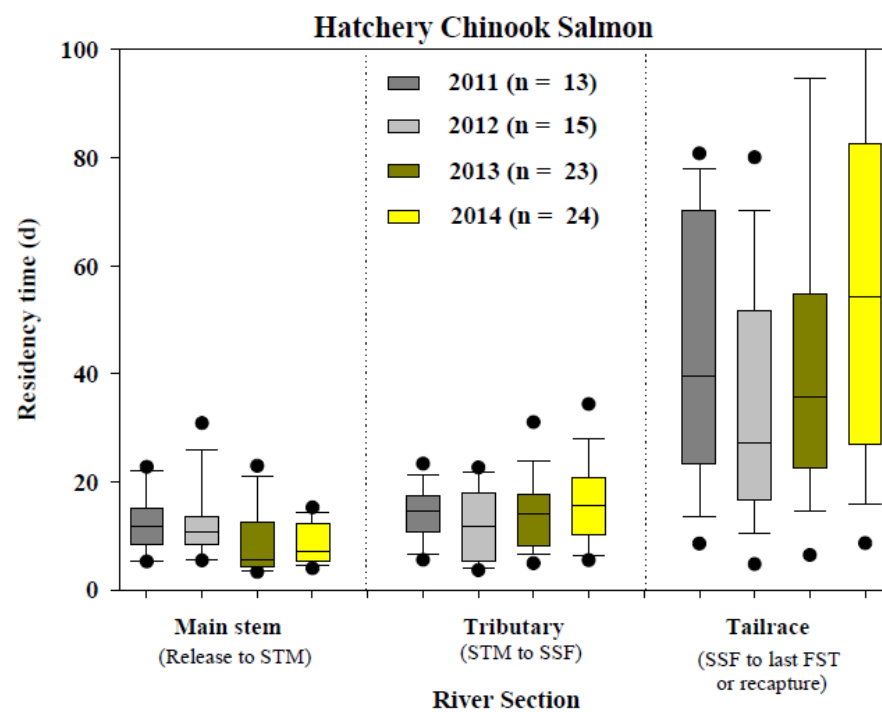
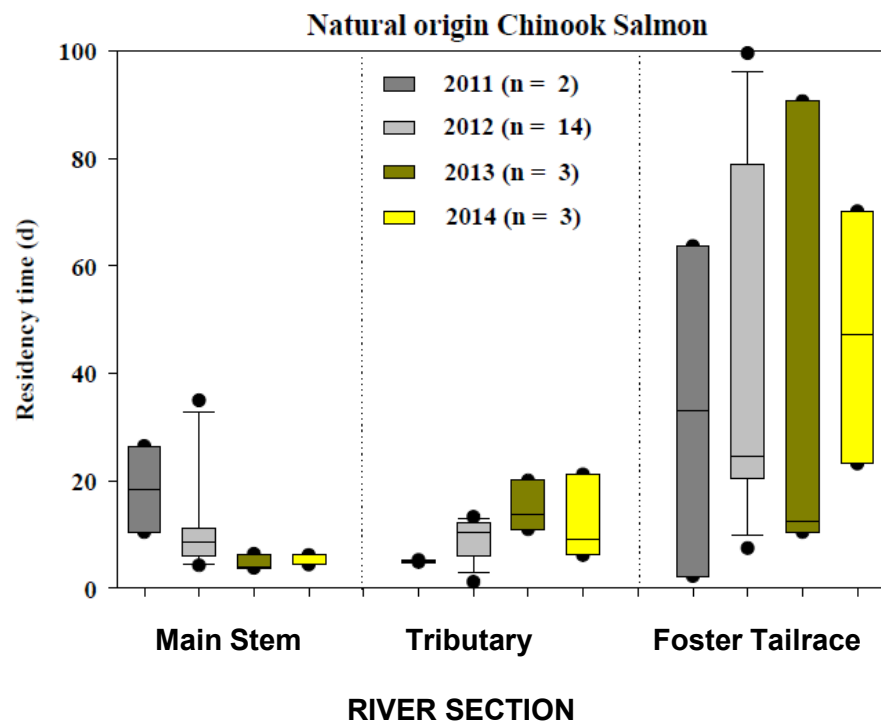


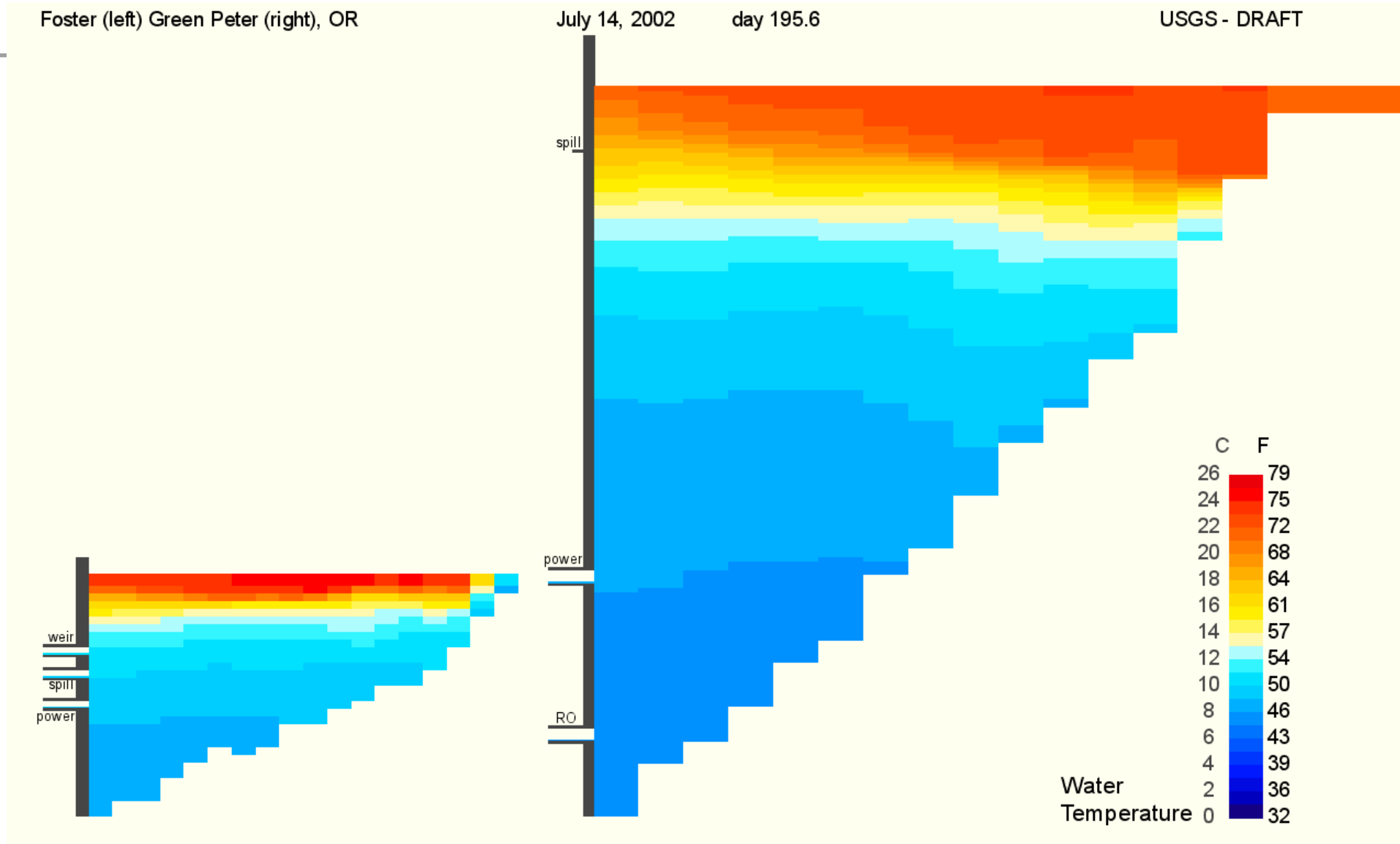
Thermocline	≈ 12 ft
Available distance between turbine intakes and spillway	66 ft -> 60 ft with support structures
Approach velocity criteria for passive screens	0.2 ft/s

Maximum allowable discharge	114 cfs



Jepson et al. 2015

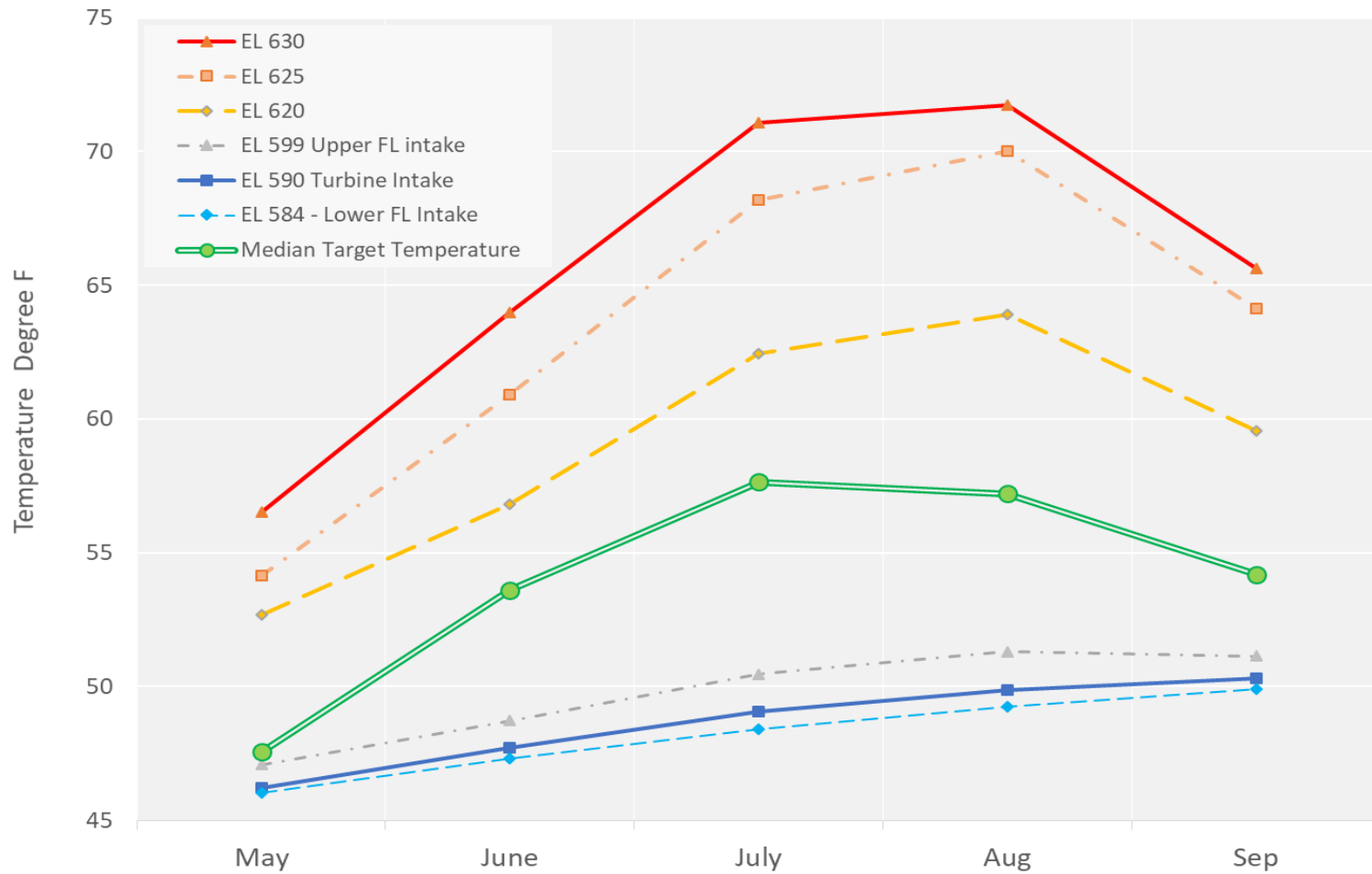




Foster Fish Ladder Temperatures



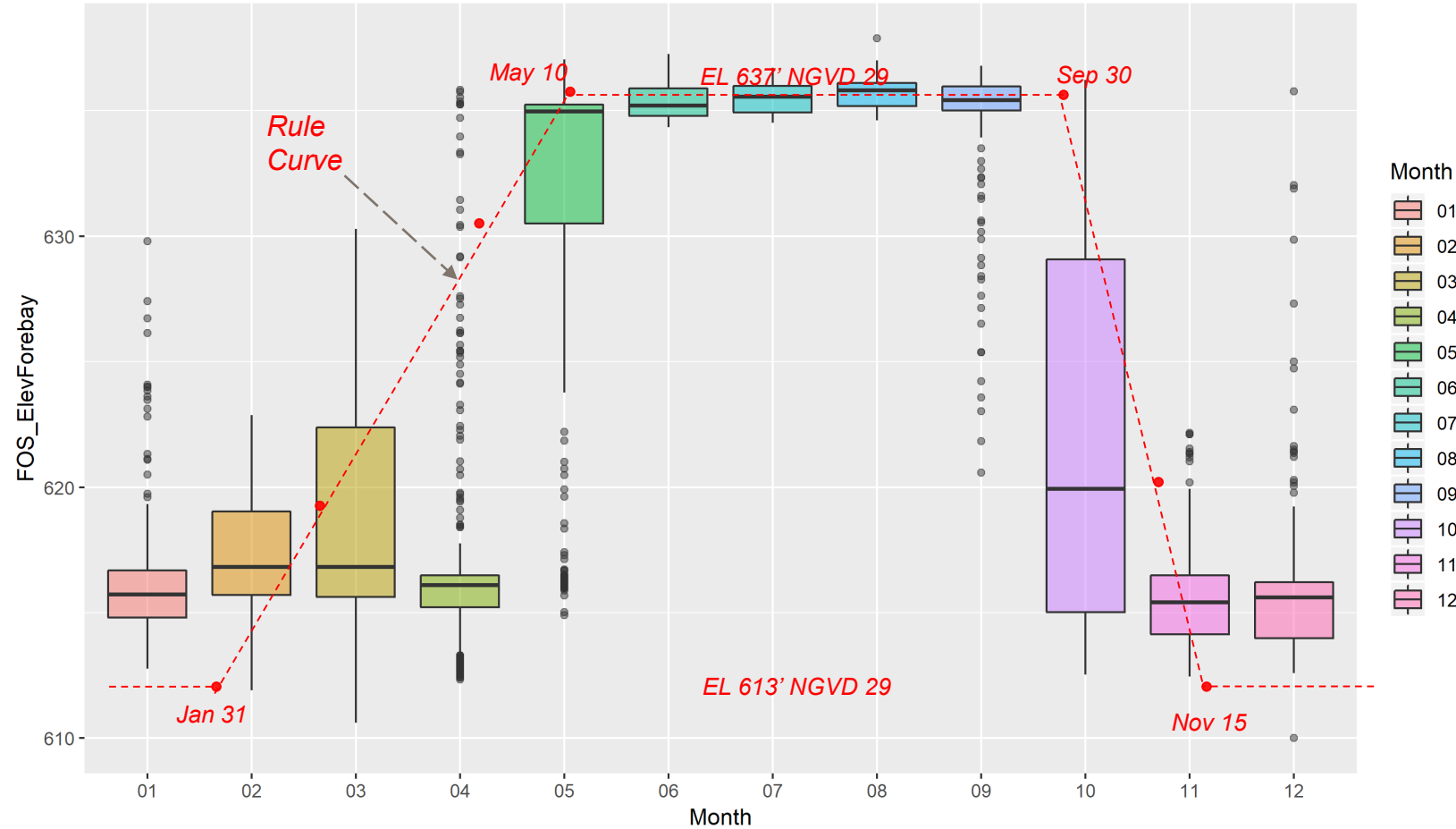
Foster Temperatures as Function of Elevation (2010 -2018)





FOSTER MONTHLY RESERVOIR ELEVATIONS (NGVD 29)

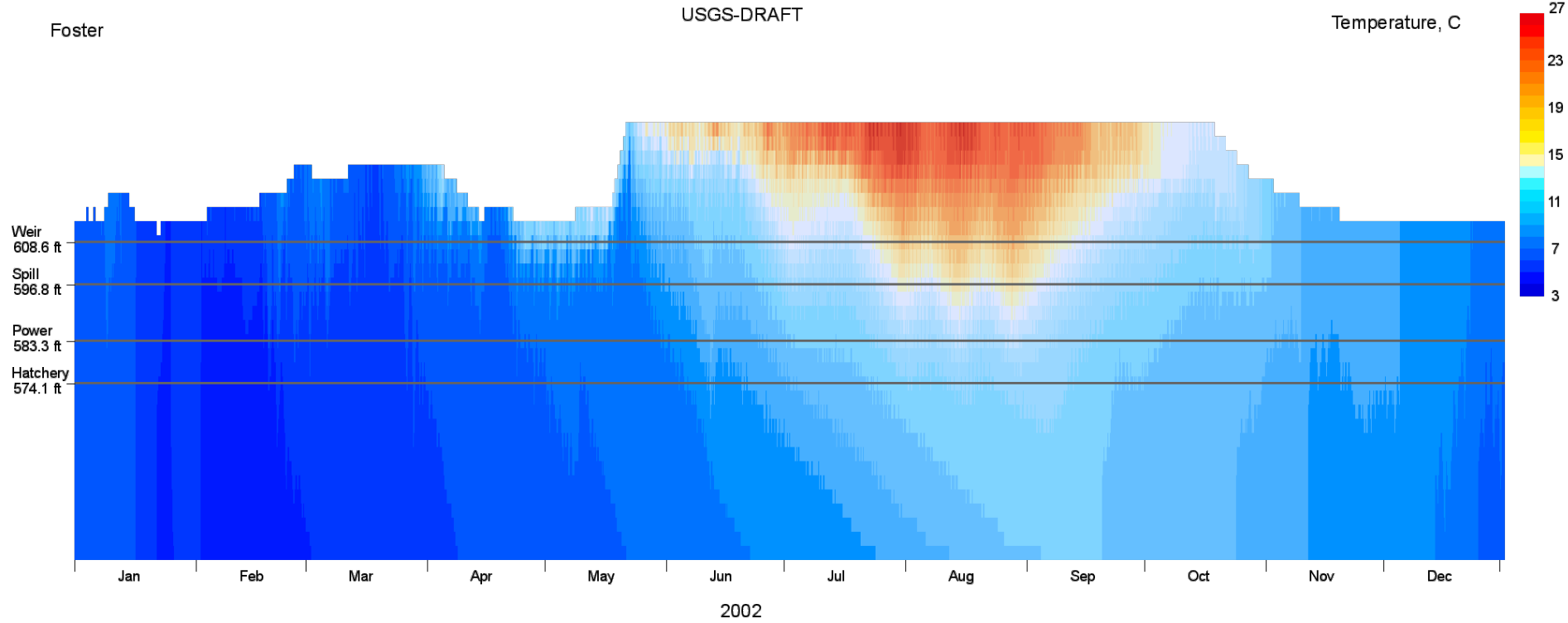
FOS Lake Level By Month 2010-2018



Foster Reservoir



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FOSTER RESERVOIR TEMPERATURES AS FUNCTION OF ELEVATION



FOS Temperature at Fixed Elevations 2010-2018

