

Willamette Valley Downstream Fish Passage Monitoring Project: Reservoir Distribution Studies

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Overview



- CFS was contracted by the U.S. Army Corps of Engineers to sample juvenile salmonids in Lookout Point and Green Peter Reservoirs during 2023
- The purpose of the project was to assess juvenile Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) reservoir habitat use, longitudinal distribution, and growth in relation to water management strategies implemented as part of the interim injunction measures.
- Part of larger project involving bulk releases of PIT tagged hatchery fish and rotary screw trapping.
- This project will continue in 2024 with sampling planned to occur from February through November.



Study Area

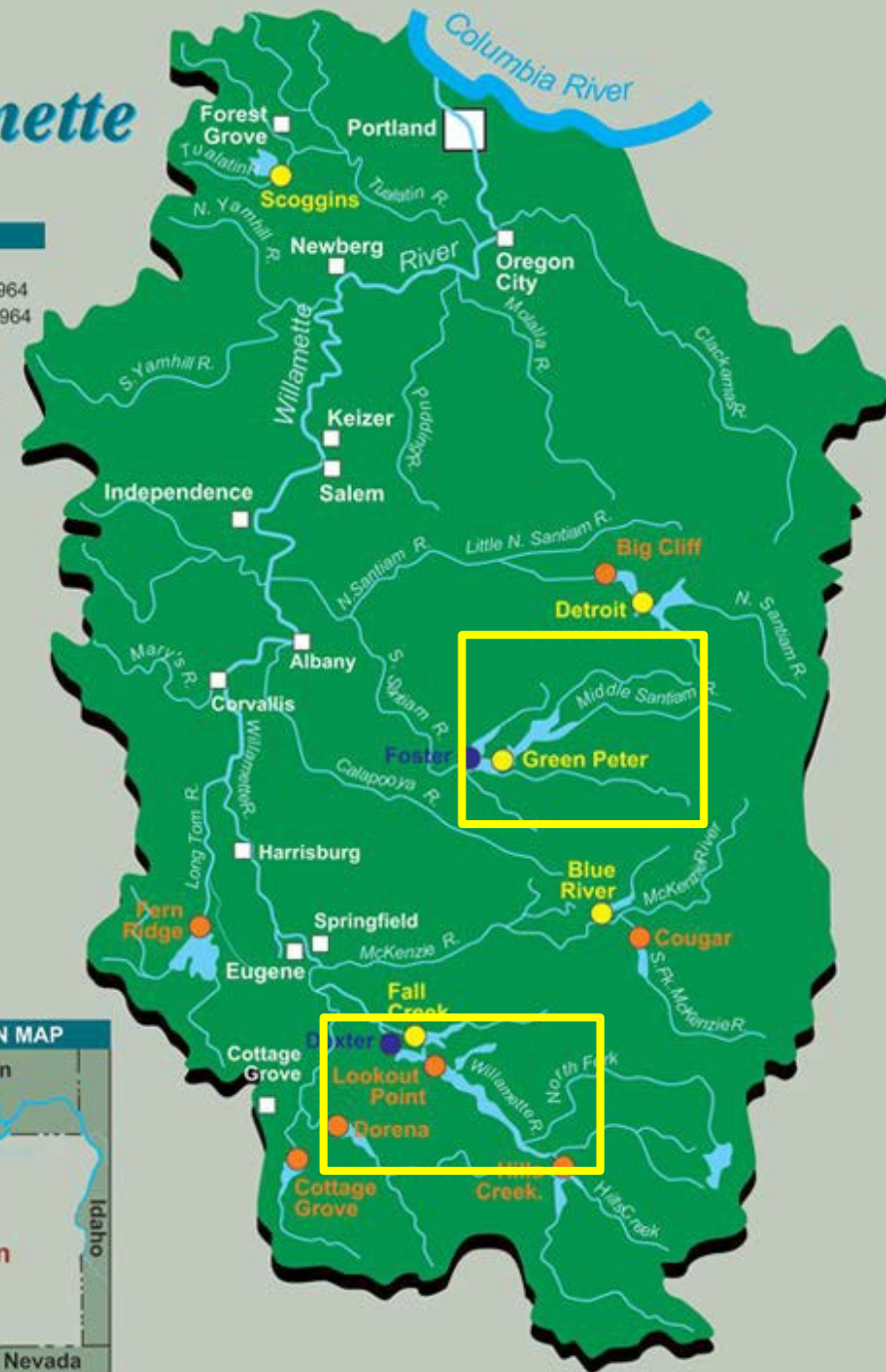
- Lookout Point and Green Peter Reservoirs



The Willamette Basin

LEGEND

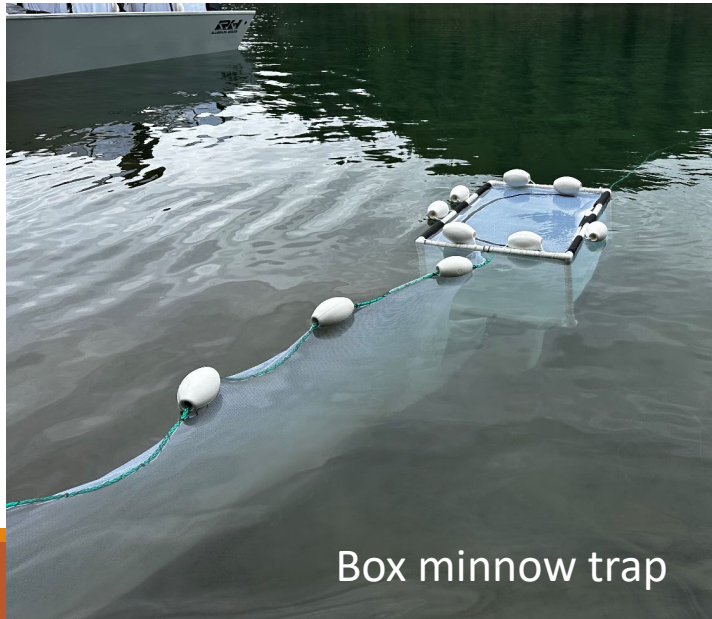
- Projects operating in 1964
- Projects added since 1964
- Re-regulating Dams



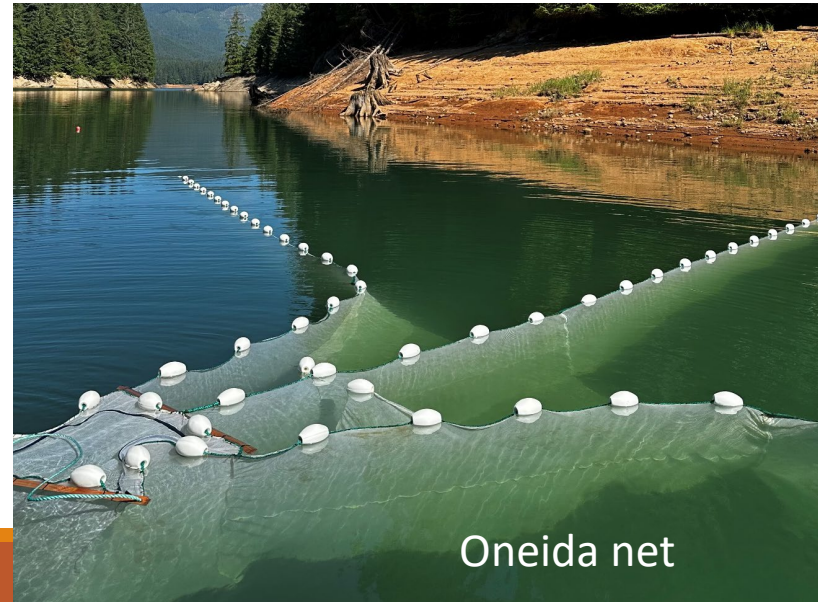
Approach



- Duplicating ODFW methods of Monzyk et al. 2015 to the extent feasible
- Biweekly sampling spring – December
- Weekly limnology profiles of temperature, DO & turbidity
- Nearshore sampling using Oneida nets and box minnow traps
- Offshore sampling using small mesh suspended gill nets
- Assess all captured juvenile Chinook for length, weight, marks, copepods, PIT or VIE tag
unmarked fish, enumerate and length non-target fish



Box minnow trap



Oneida net



Small mesh suspended gill net

Sampling design

Limnology

- Stations in each reservoir zone

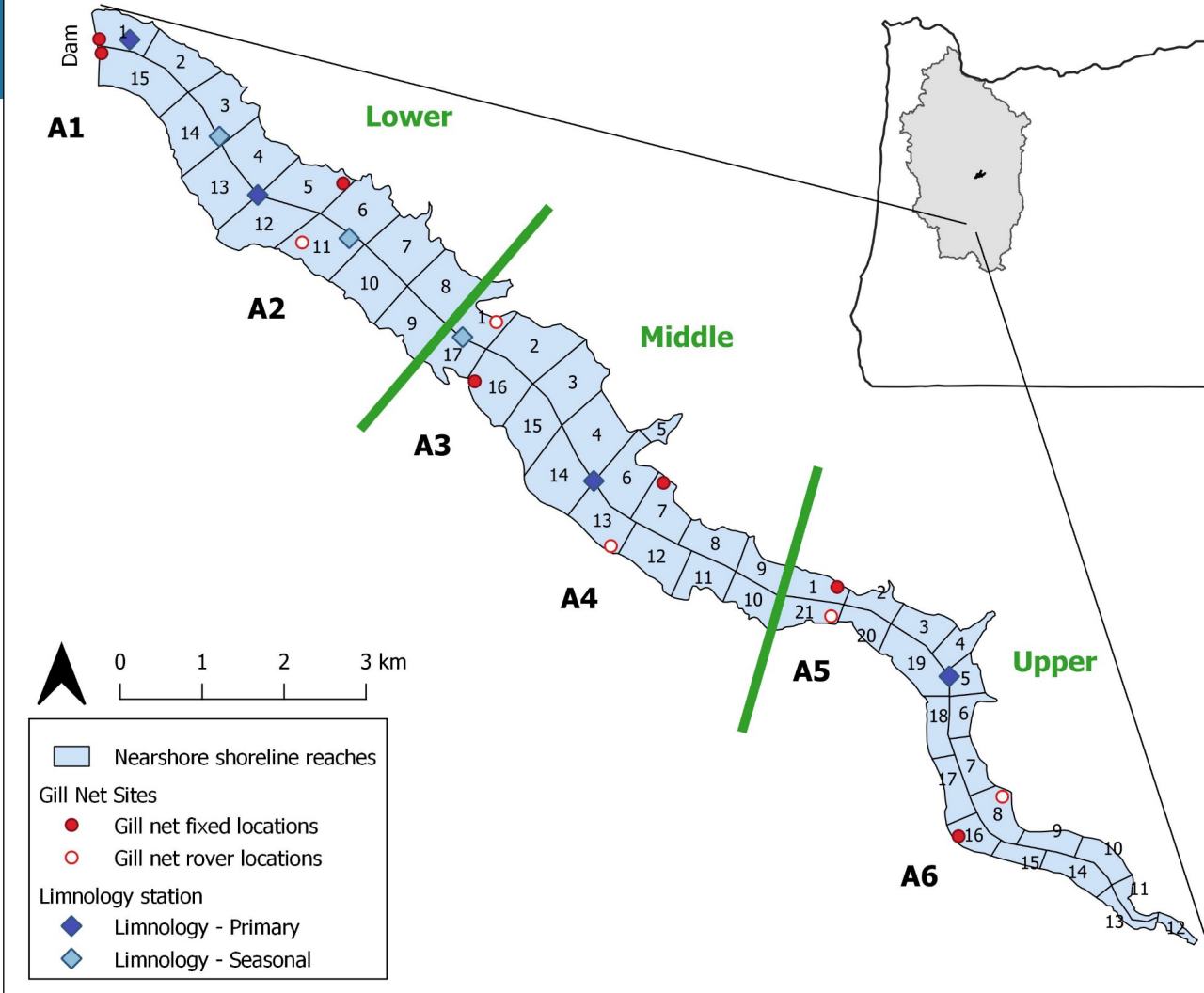
Nearshore sampling

- Reservoirs split into Lower, Middle and Upper zones, shoreline divided into segments
- Each sampling week: 9 segments per reservoir zone randomly selected for box minnow placement, 3 segments per zone selected randomly for Oneida trap
- 24 hr sets
- Sampled mid June – mid July (target had been April but had delays)

Offshore sampling

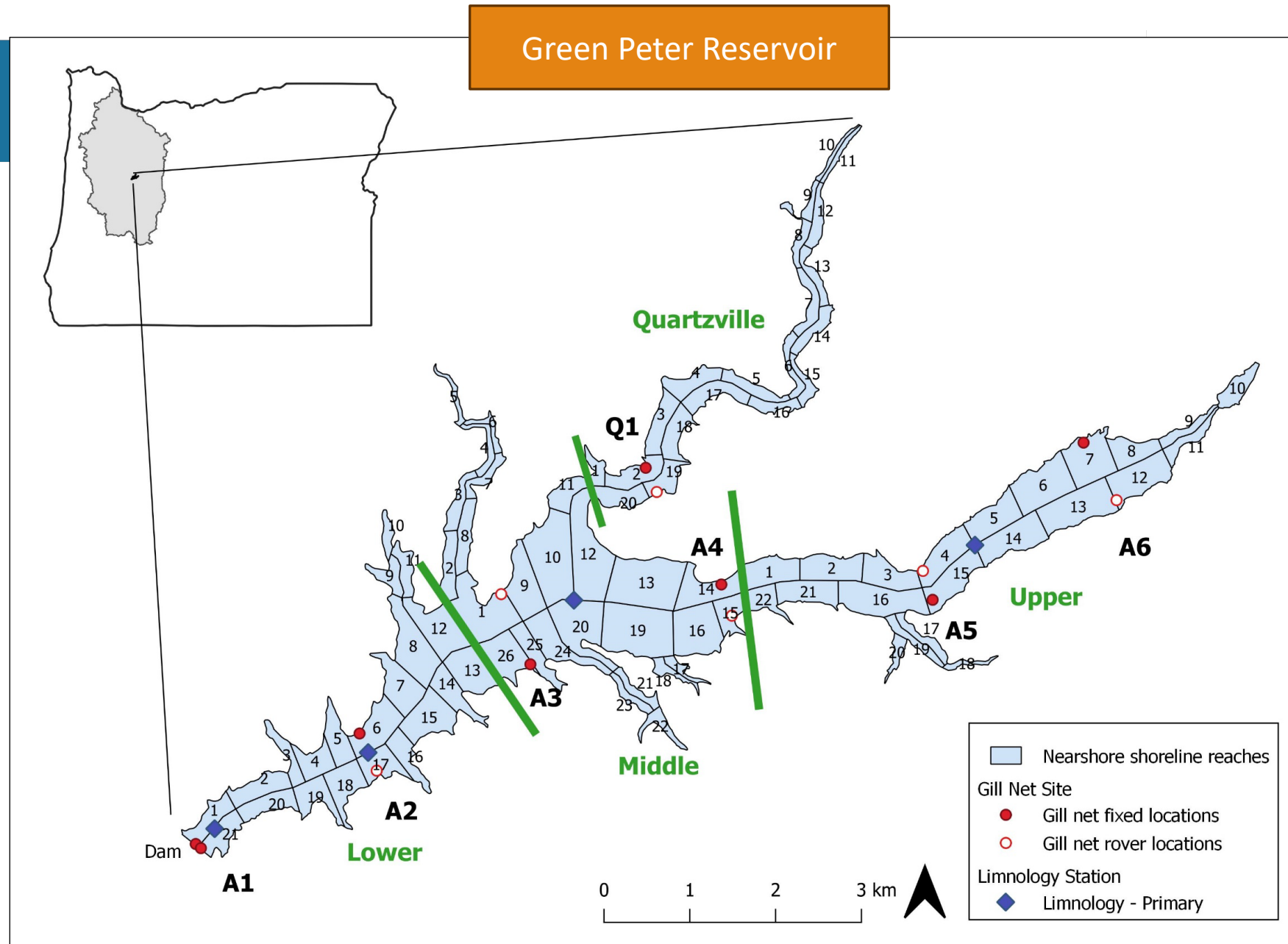
- Small mesh gill nets set at 6 stations A1-A6

Lookout Point Reservoir

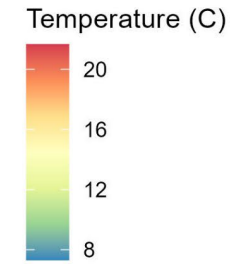
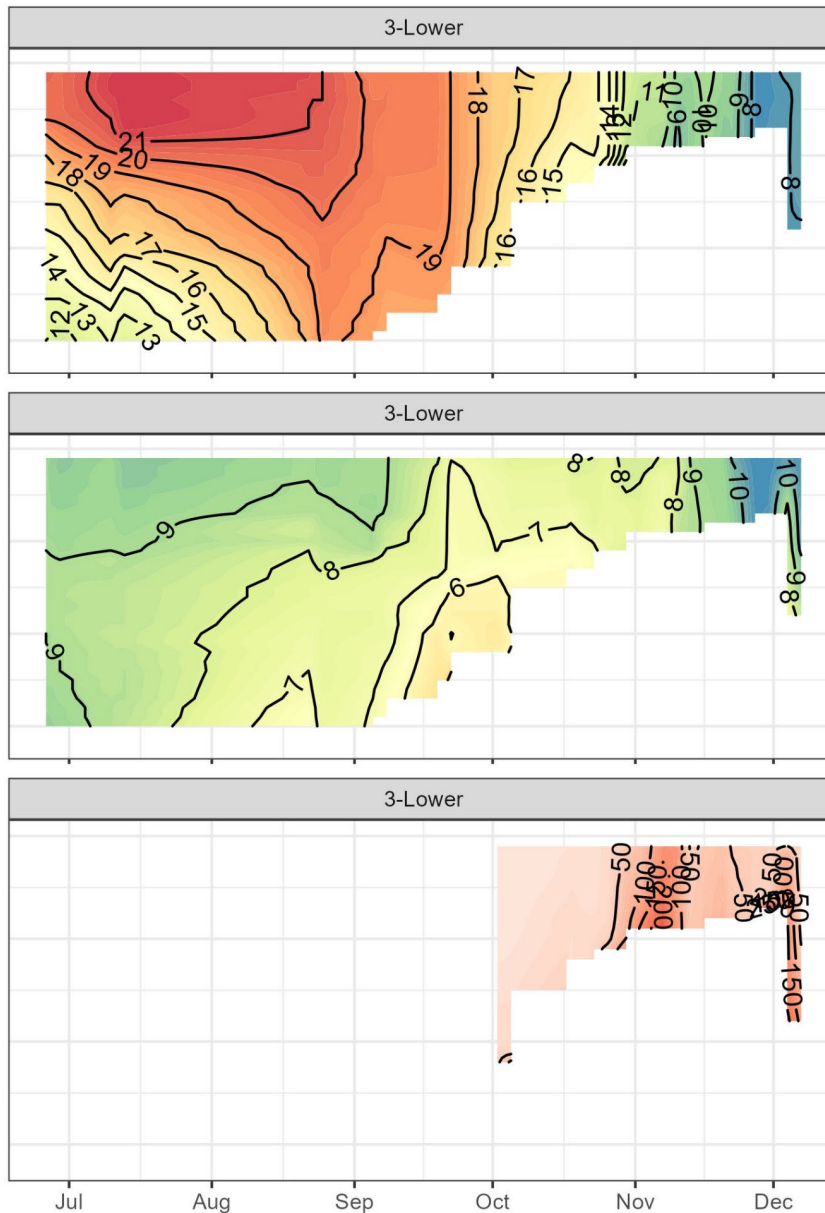
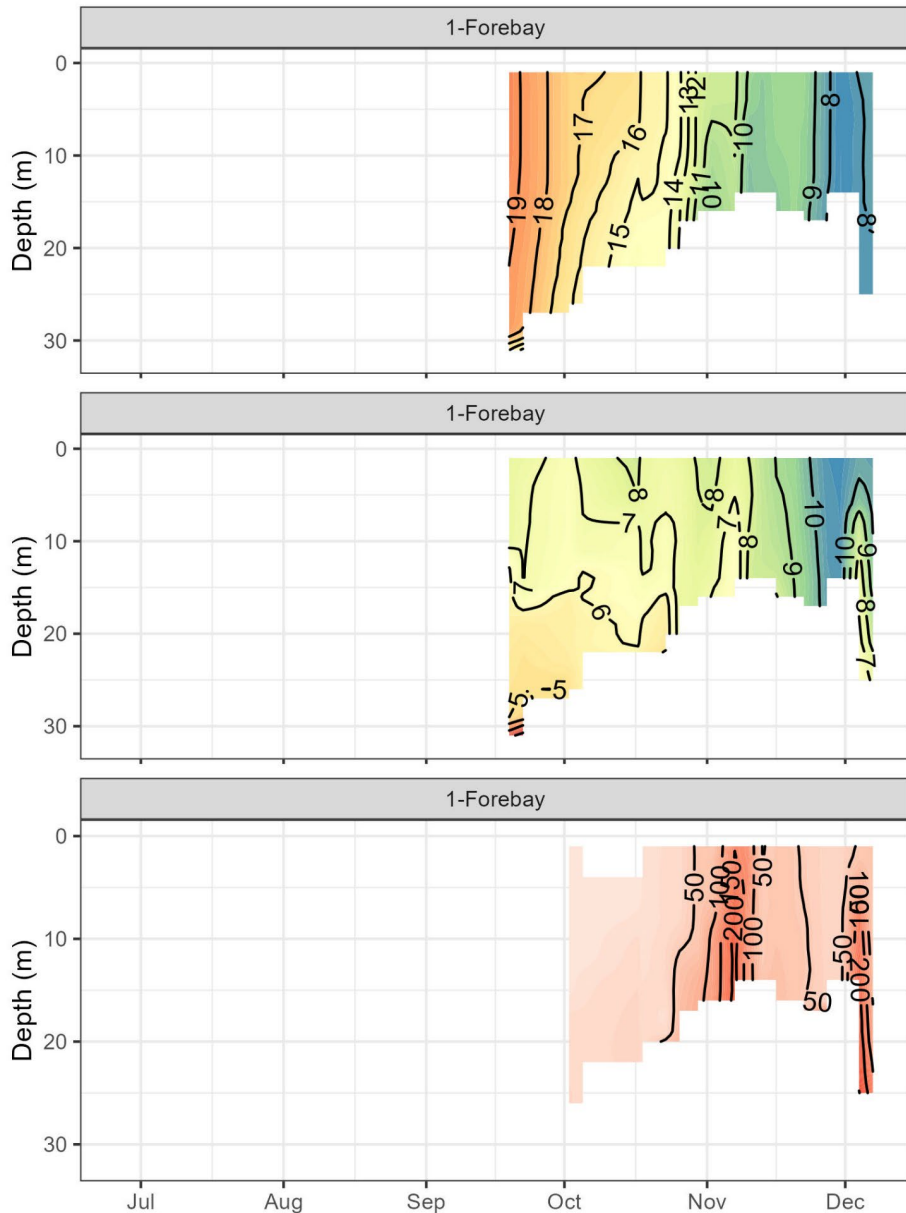


Sampling design

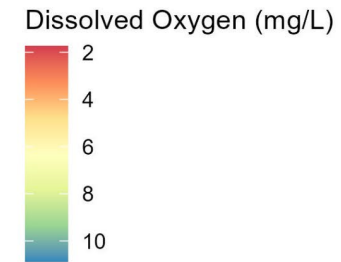
- Same design, additional zone for Quartzville arm where an additional box minnow and Oneida lake trap were set



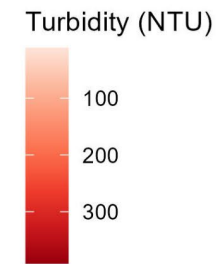
Results – Lookout Point Limnology



High summer temps, no refugia

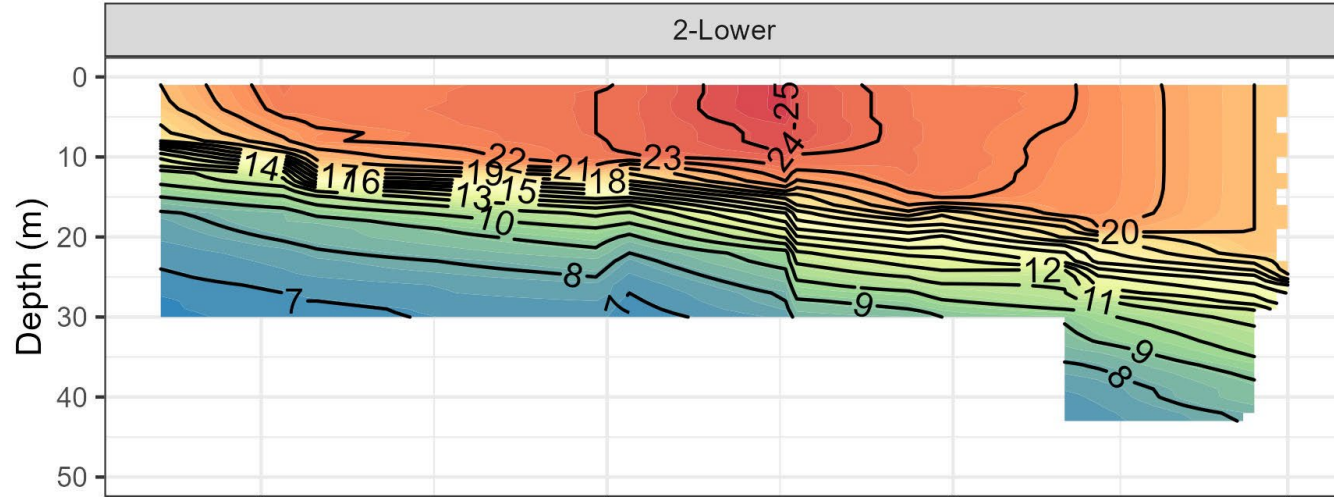


DO low during peak summer at depth <5 mg/L

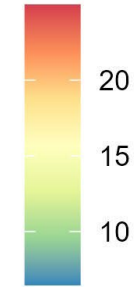


Very high turbidity > 200 NTU during peak of fall drawdown

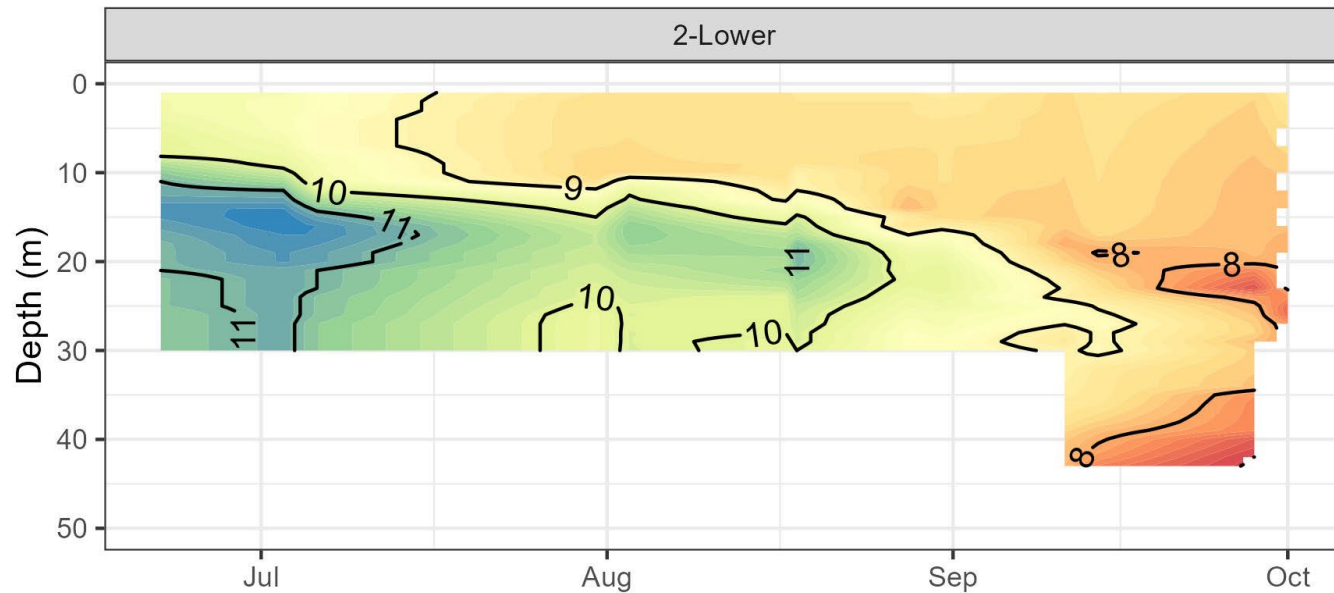
Results – Green Peter Limnology



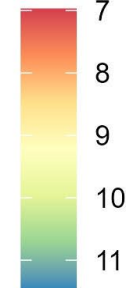
Temperature (C)



High summer surface temps but cool at depth



Dissolved Oxygen (mg/L)



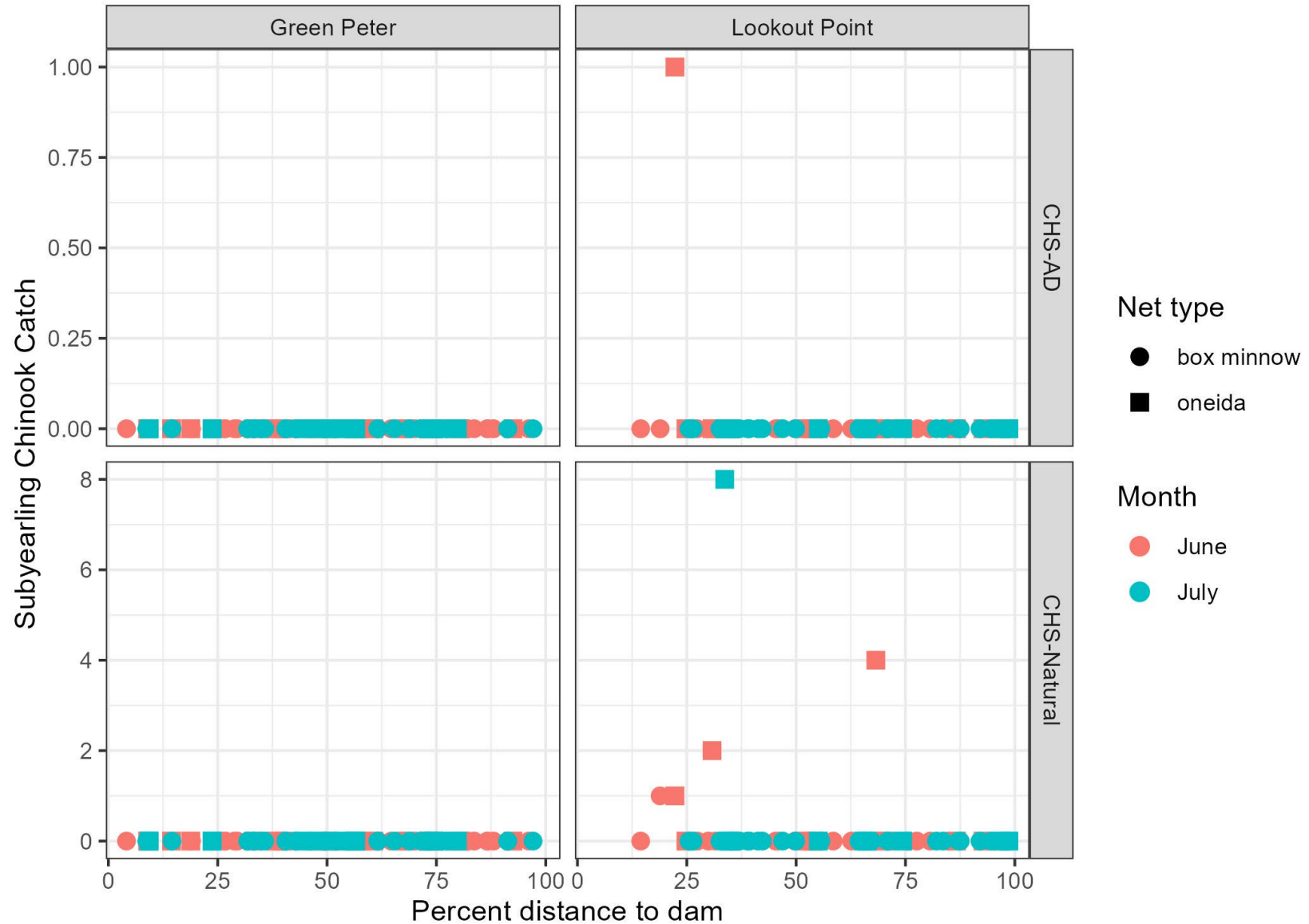
No DO concerns over depths surveyed

Turbidity was not assessed in GPR but USGS tailrace monitoring during fall showed >200 NTU in Nov-Dec

Results –Nearshore Sampling



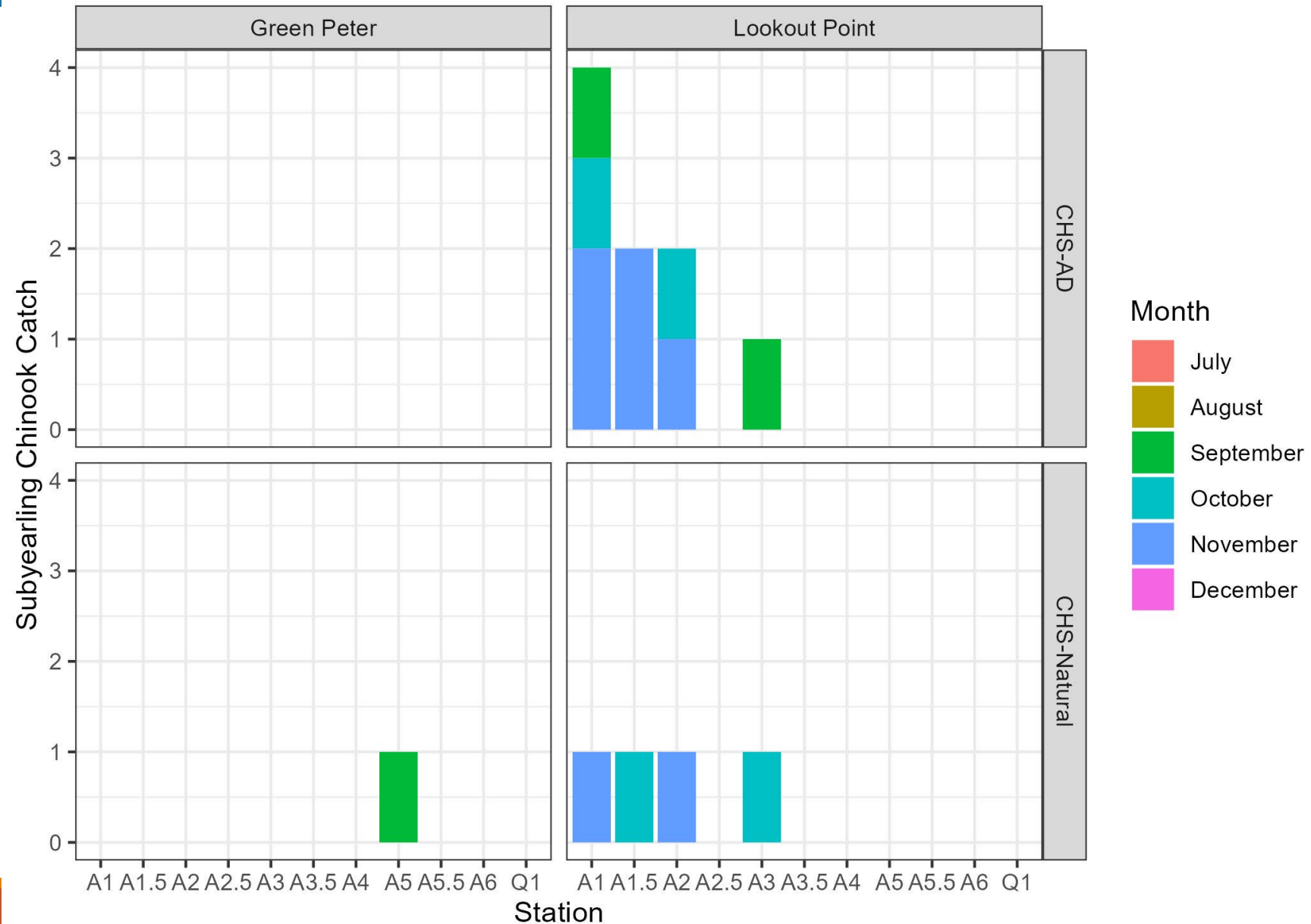
- 2 weeks of sampling mid-June through mid-July
- LOP: 17 subyearling Chinook captured (16 natural, 1 hatchery)
 - 13 Upper zone, 4 middle zone, 0 lower
- GPR: 0 Chinook captured



Results –Offshore Sampling



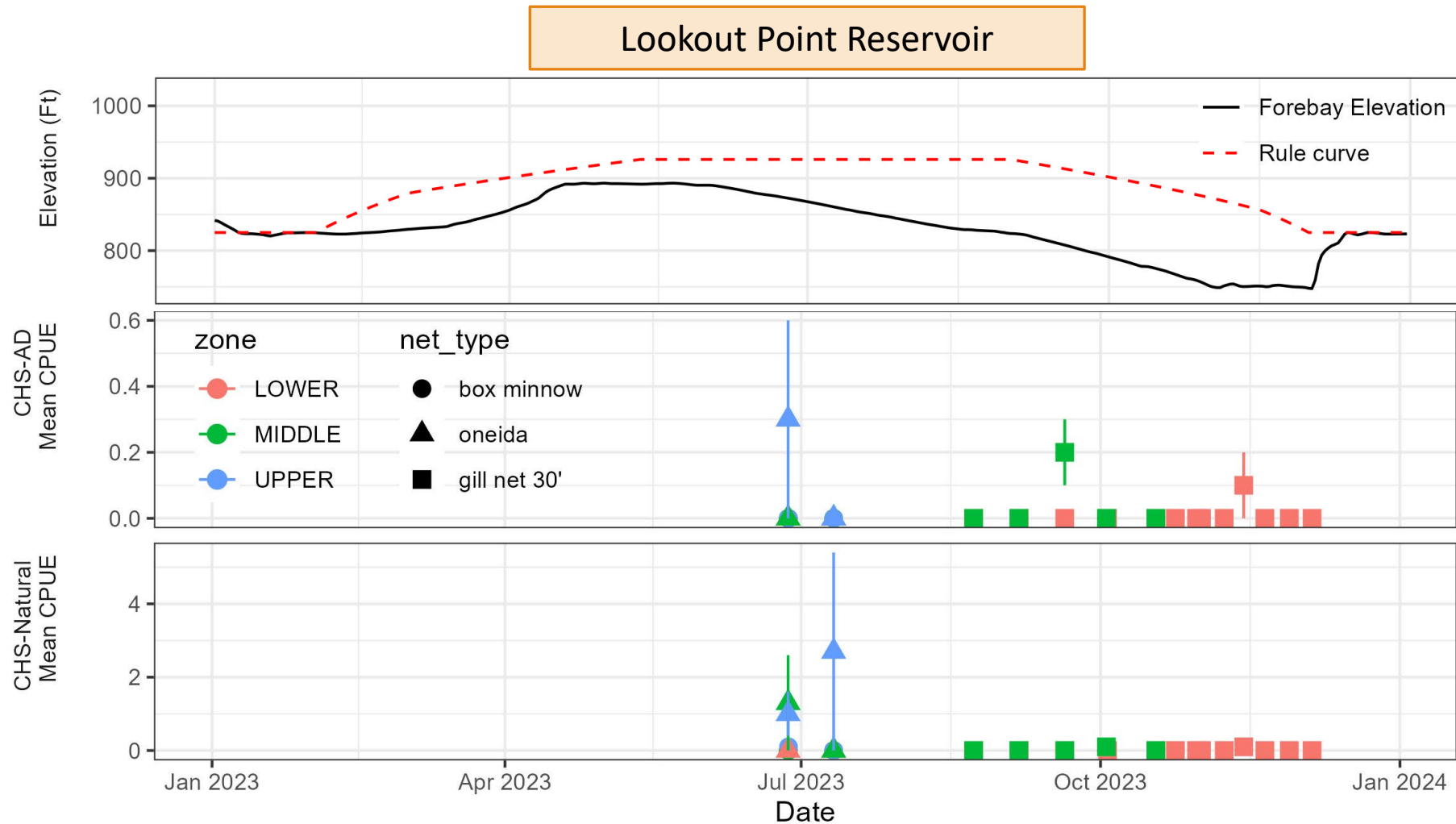
- Sampled July-Sep in GPR (boat loss & safety concerns)
- Sampled Aug-Dec in LOP
- Drawdown shrunk reservoir, upper and middle zones not sampled later in season
- LOP: 13 subyearling Chinook captured (4 natural, 9 hatchery)
 - All captured lower/mid reservoir
- GPR: 1 Chinook captured in upper zone



Results – Catch in relation to injunction measures



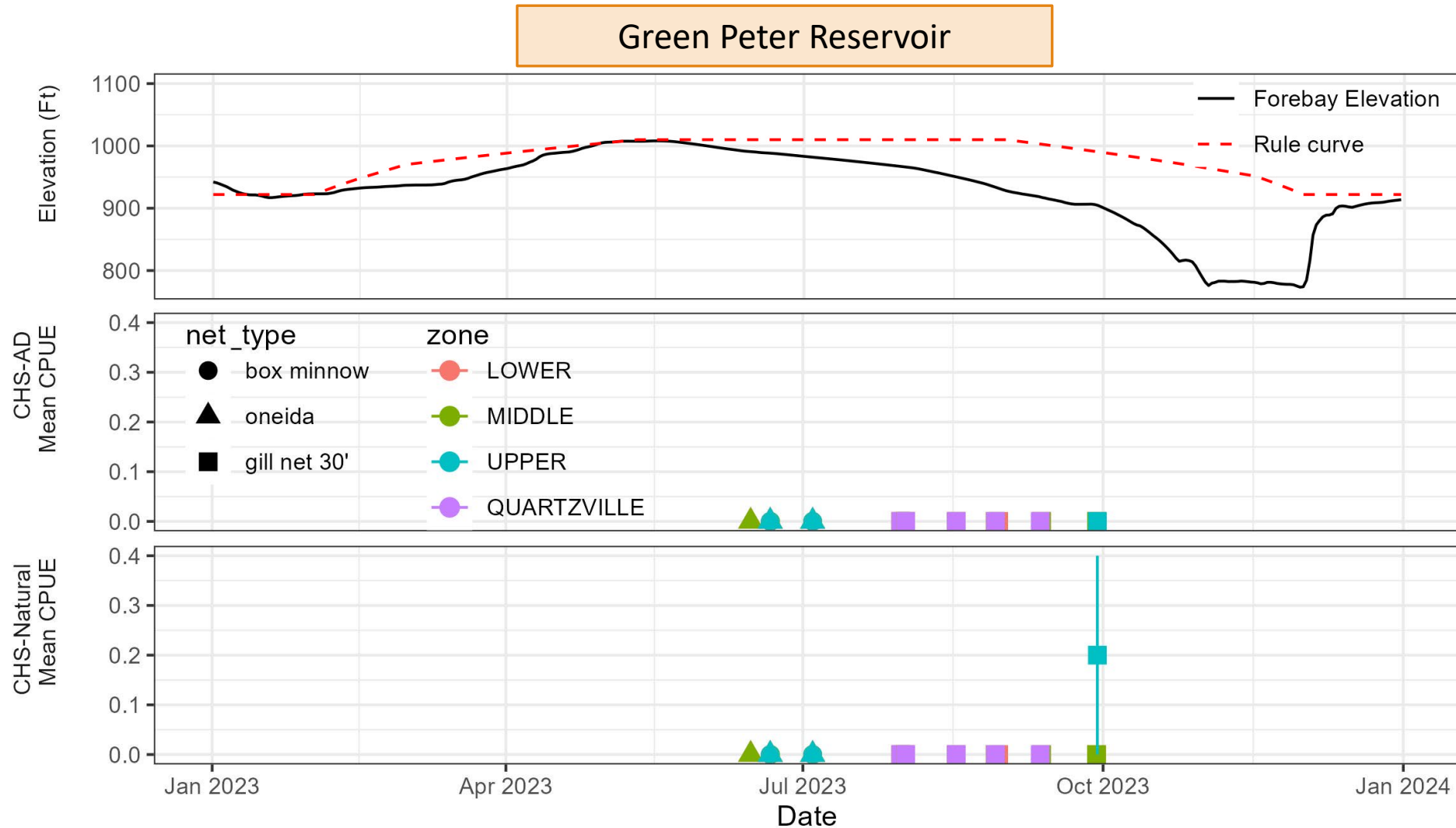
- Limited ability to draw inference due to low catch rates



Results – Catch in relation to injunction measures

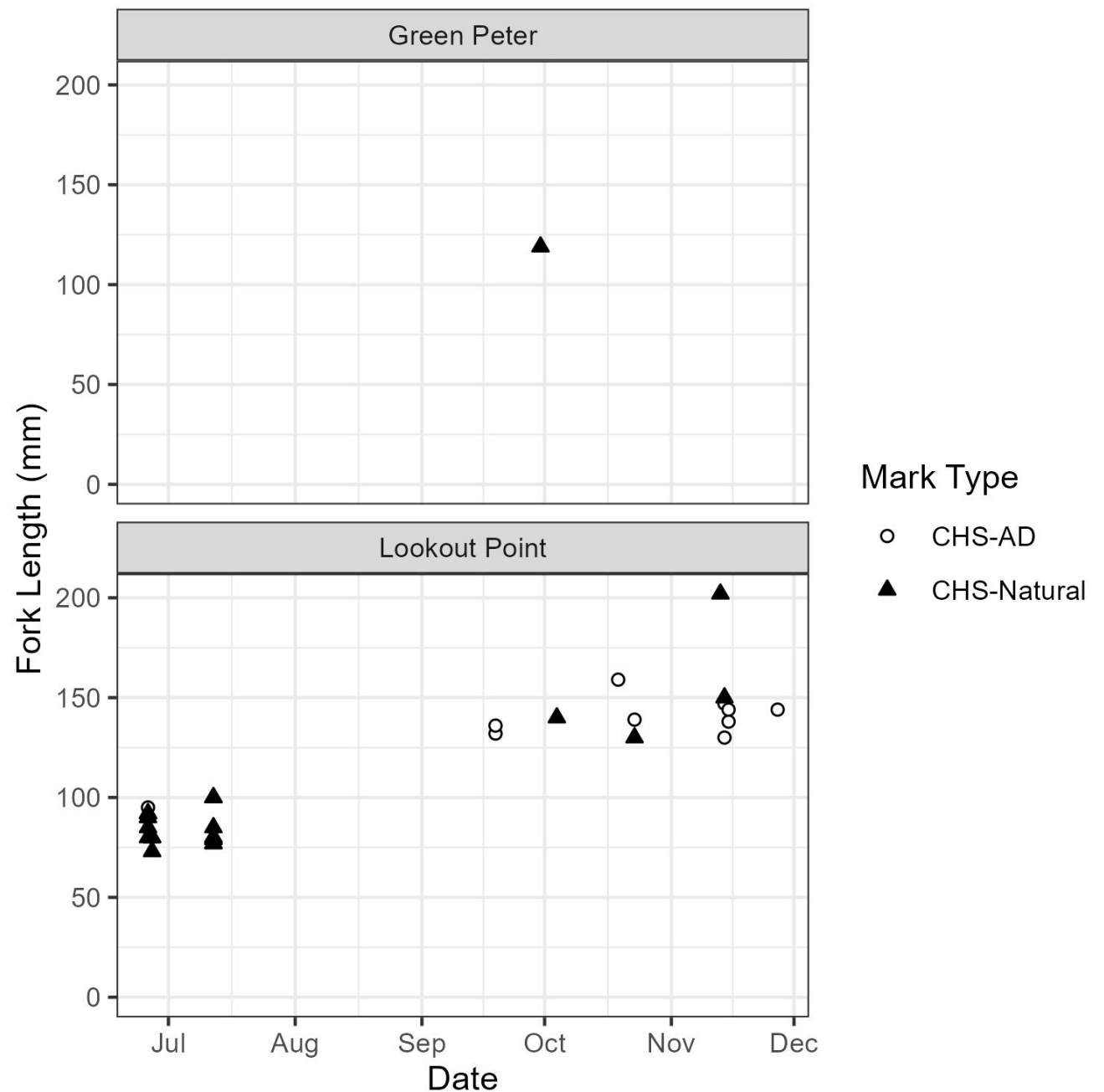


- Too few fish captured to evaluate



Results –LOP Chinook size and growth

- Natural origin Chinook salmon captured in early summer had a mean fork length of 84 mm, which increased to a mean of 156 mm for natural origin Chinook salmon captured during fall sampling
- Growth rate of 0.61 mm fork length/day between mean capture dates.



Results –Recaptures



- 7 bulk marked fish recaptured in LOP

Tag code	Release Site	Release date	Capture reservoir	Capture zone	Net type	Recapture date	Travel time (days)	Fork length (mm)
3D6.15348010F9	LOP Head of Reservoir - Black Canyon	5/30/2023	Lookout Point	UPPER	oneida	6/26/2023	27	95
3DD.003E56DA4A	LOP Forebay - Signal Point	9/18/2023	Lookout Point	LOWER (A1)	gill net 30'	10/19/2023	31	159
3D6.1534843D2A	LOP Head of Reservoir - Black Canyon	9/18/2023	Lookout Point	MIDDLE (A3)	gill net 30'	9/19/2023	1	132
3DD.003E4C26BB	LOP Head of Reservoir - Black Canyon	9/18/2023	Lookout Point	MIDDLE (A3.5)	gill net 30'	9/19/2023	1	136
3DD.003E571ABF	LOP Head of Reservoir - Black Canyon	9/18/2023	Lookout Point	LOWER (A2)	gill net 30'	10/23/2023	35	139
3DD.003E55F157	Hills Creek Dam Tailrace	11/9/2023	Lookout Point	LOWER (A1)	gill net 30'	11/14/2023	5	130
3DD.003E56771E	Hills Creek Dam Tailrace	11/9/2023	Lookout Point	LOWER (A1.5)	gill net 30'	11/14/2023	5	147

Results –Copepod infection rates

- No parasitic copepods detected on fins or in gill cavity
- Possibly artifact of small salmonid catches

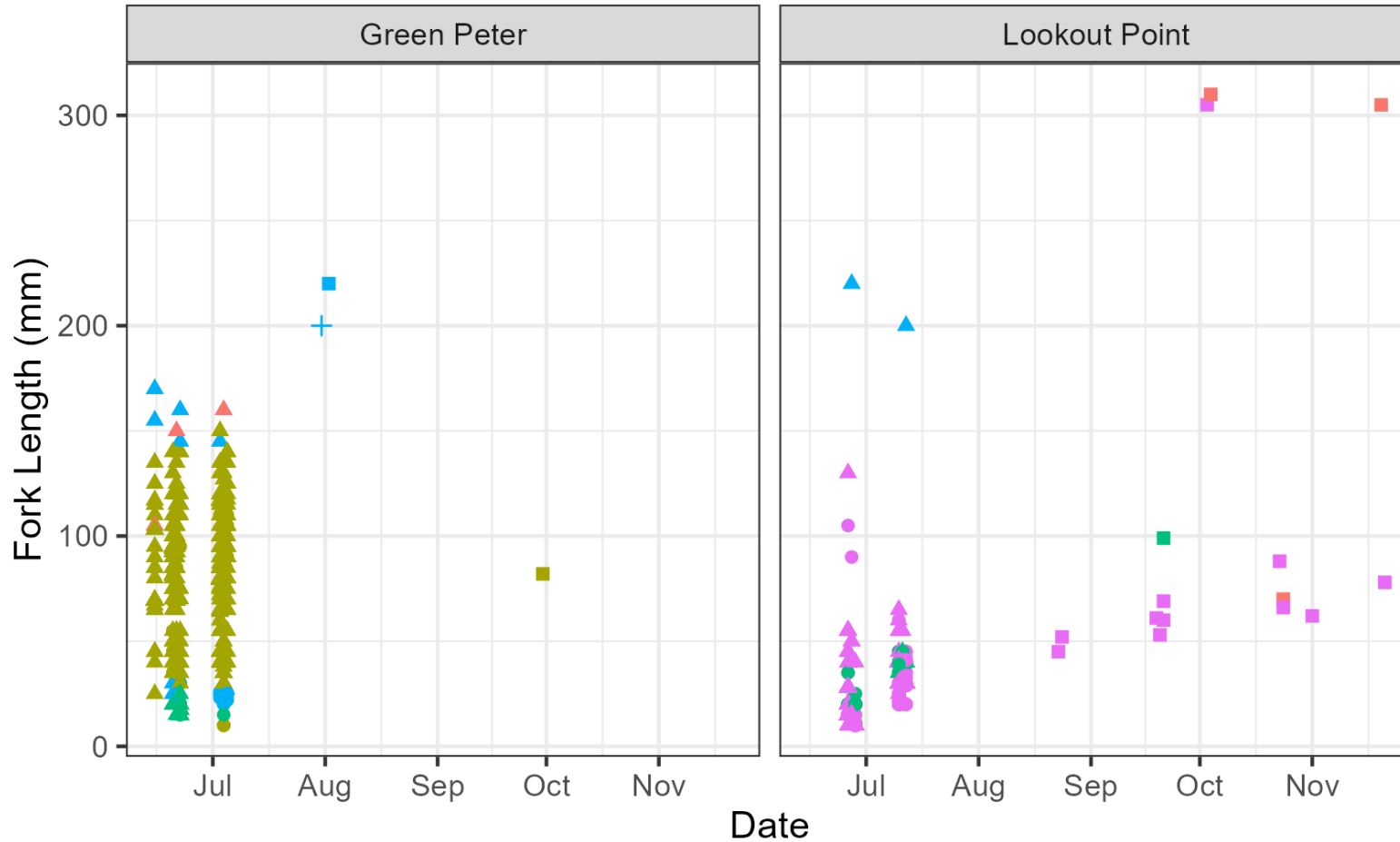


Reservoir	Species	N	Mean Capture Week	Mean Fork Length (mm)	Min Fork Length (mm)	Max Fork Length (mm)	Copepod Prevalence
Green Peter	CHS-Natural	1	39	119	119	119	0.0%
	CUT	4	29.5	184.2	165	217	0.0%
	KOK	16	35.5	157.7	75	307	0.0%
	RBT	11	31	261.9	225	290	0.0%
Lookout Point	CHS-AD	10	41.9	136.4	95	159	0.0%
	CHS-Natural	20	30.4	98.6	73	202	0.0%
	RBT	1	38	432	432	432	0.0%

Results – Catch fork lengths



Centrarchids



net_type

- box minnow
- ▲ oneida
- gill net 30'
- + gill net 80'

species

- BLC
- BLG
- LMB
- SMB
- WHC



Discussion

- Very low juvenile Chinook and steelhead catches severely limit our ability to draw inferences regarding the longitudinal distribution in relation to dam operations
- Same gear specs as previous assessments
- Low nearshore catches – likely caused by our late start and short sampling window (supply chain delays). Missed key April-May migration window. Sampled nearshore when water temps were prohibitively high for salmonids (20-24C)
- Started sampling in Feb 2024 to not miss window this year



Discussion



- Very low offshore gill net Chinook and steelhead catches
- Different gear specs than previous assessments – smaller surface area and mesh sizes than ODFW (Monzyk et al 2015). Procuring identical nets for 2024 offshore sampling.
- High temps with no thermal refuge in Lookout Point during summer may have affected juvenile salmonid reservoir habitat use (19-21 C down to 30m, DO <5mg/L below 30m), no suitable habitat
- Drawdown turbidity concerns in both reservoirs: 200-1000 NTU seen during Nov-Dec
 - May have caused avoidance of reservoir or had other adverse impacts on juvenile salmonids.
 - Adverse effects as low as 18-70NTU(Gregory 1992), juvenile steelhead avoid areas with mean 167 NTU or higher (Sigler et al. 1984). High levels may be fatal, reduce foraging capability, growth, disease resistance or impair migration (Lloyd 1987).



GPR November



LOP November



Questions & Feedback

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