Willamette Valley Screw Trap Monitoring

Ryan Flaherty, Hans Berge and Caitlyn Jobanek

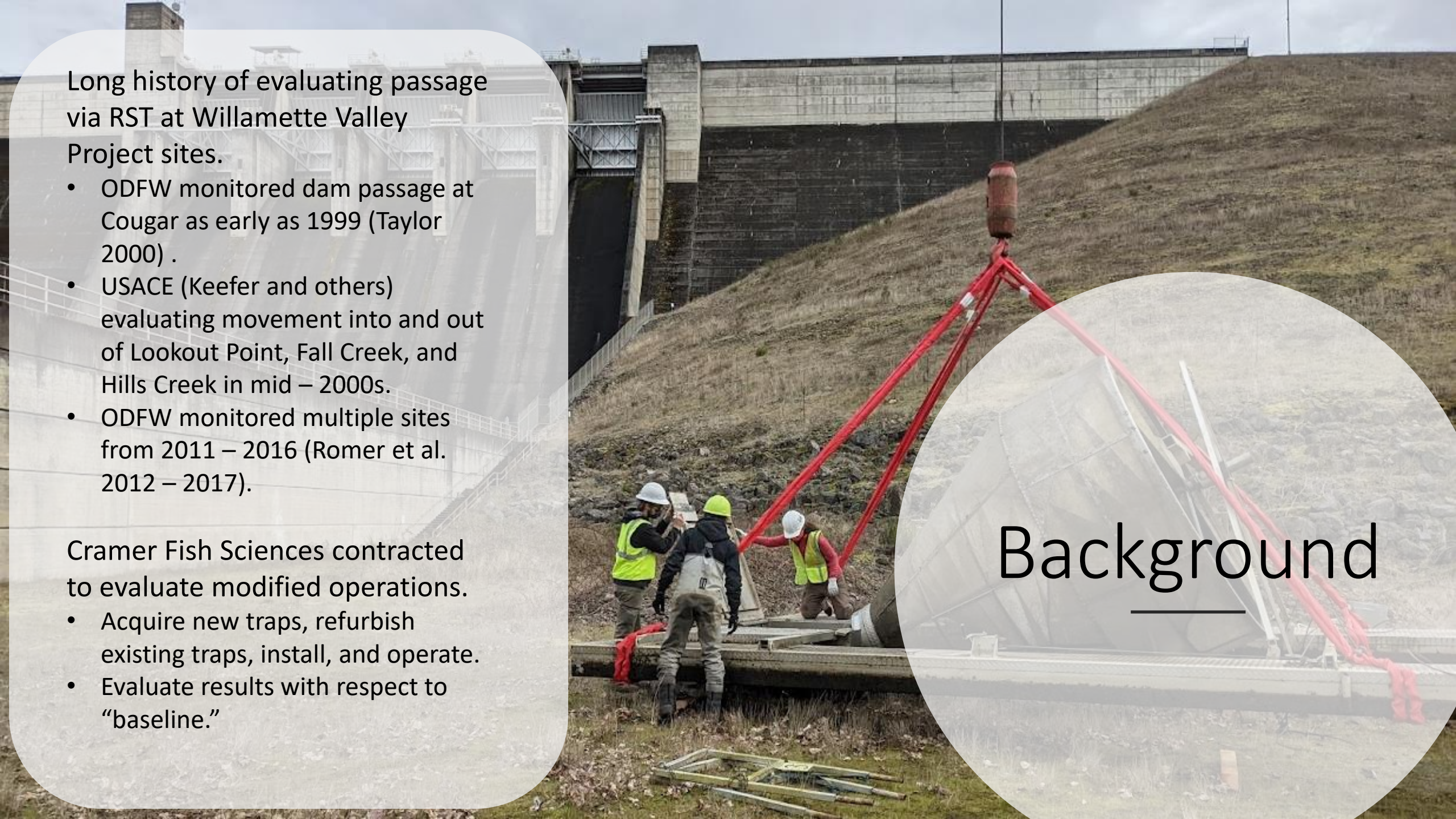
Background

Long history of evaluating passage via RST at Willamette Valley Project sites.

- ODFW monitored dam passage at Cougar as early as 1999 (Taylor 2000) .
- USACE (Keefer and others) evaluating movement into and out of Lookout Point, Fall Creek, and Hills Creek in mid – 2000s.
- ODFW monitored multiple sites from 2011 – 2016 (Romer et al. 2012 – 2017).

Cramer Fish Sciences contracted to evaluate modified operations.

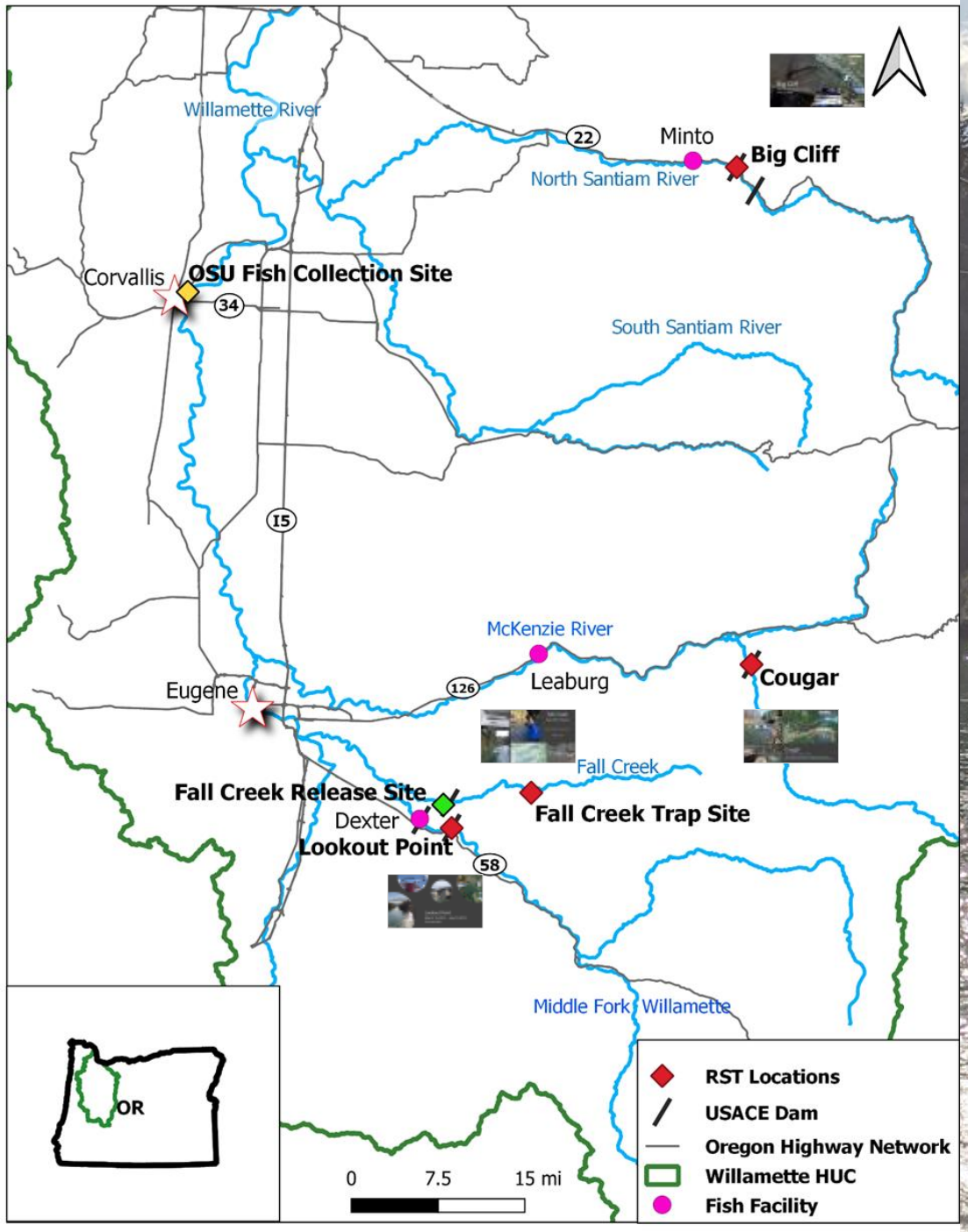
- Acquire new traps, refurbish existing traps, install, and operate.
- Evaluate results with respect to “baseline.”



Objectives

- **Objective 1. Juvenile Chinook salmon and non-target abundance**.
  - Juvenile salmon, steelhead and non-target fish were captured using RSTs and enumerated.
  - Efficiency trials were conducted and when trap efficiency was sufficient, juvenile Chinook salmon abundance was estimated.
- **Objective 2. Juvenile Chinook salmon out-migration timing, sizes, and age-class.**
  - Assess Outmigration timing.
  - Fork lengths and weights were measured, and age classes were assigned using length frequency histograms.
- **Objective 3. Fish condition, injury, and mortality.**
  - Juvenile Chinook salmon were examined for injuries (mechanical injuries, barotrauma, etc.), presence/quantity of parasitic copepods (*Salmincola californiensis*), and mortality.

Monitoring Sites

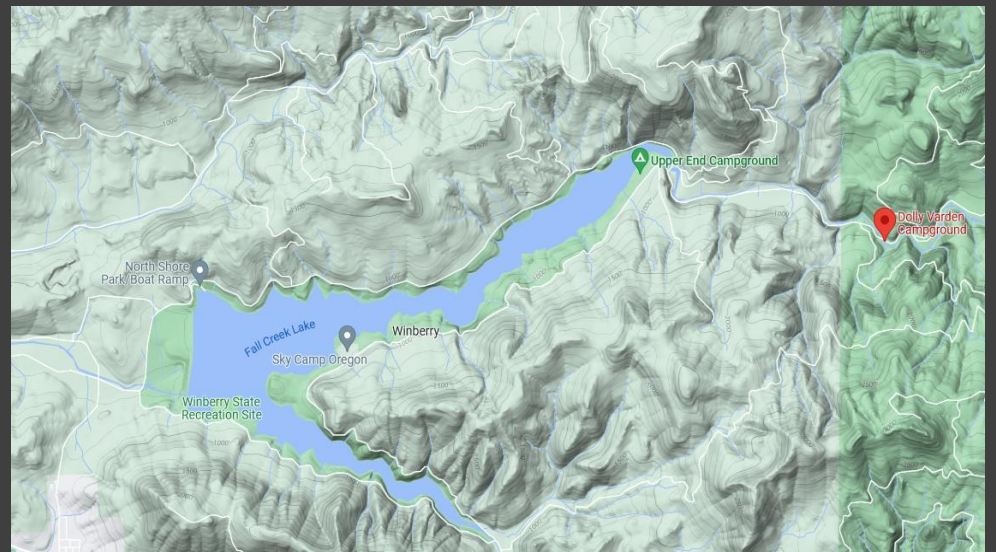


Fall Creek

Trap and Transport

March 10, 2021 – June 1, 2021

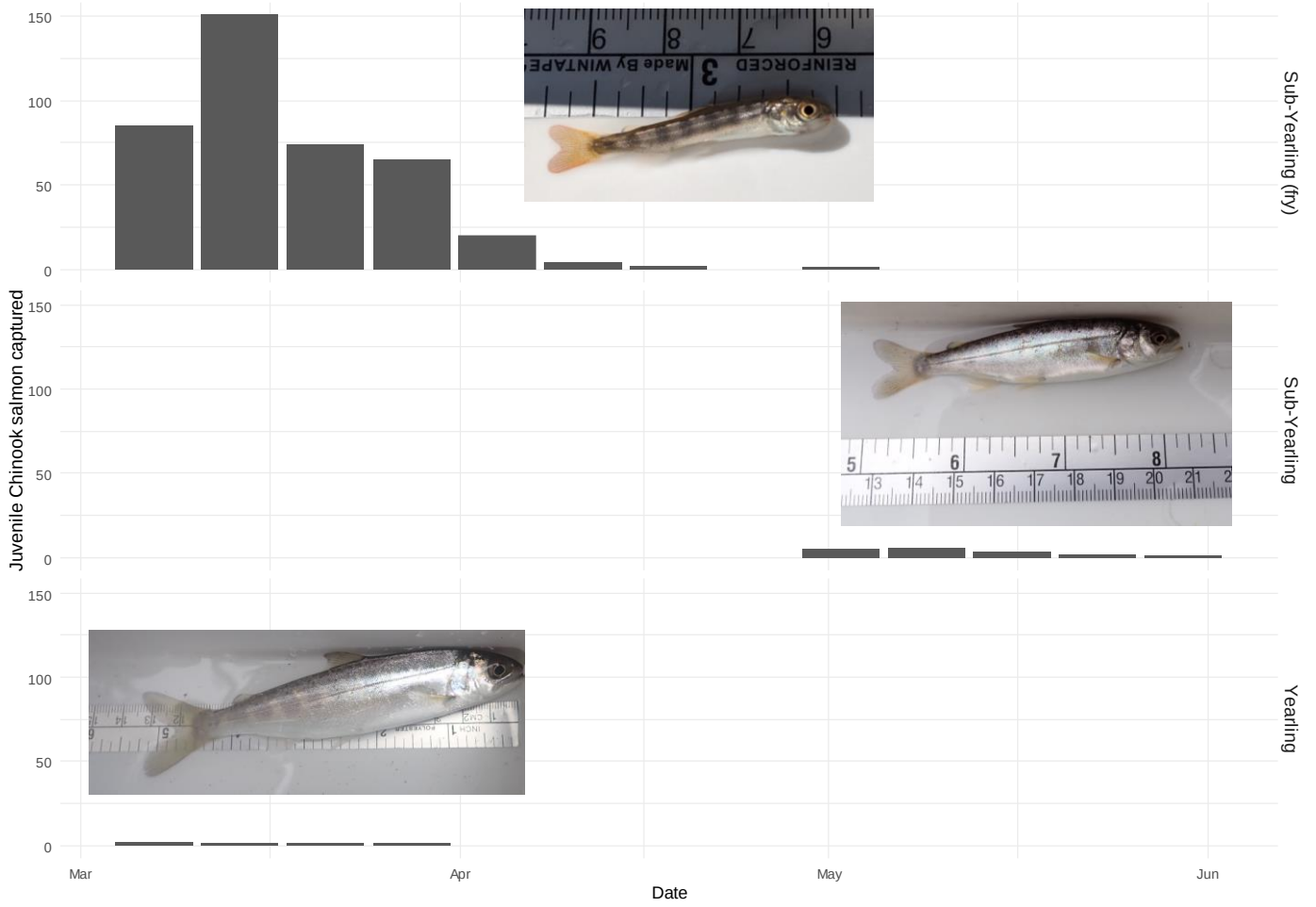
Single 8-ft RST

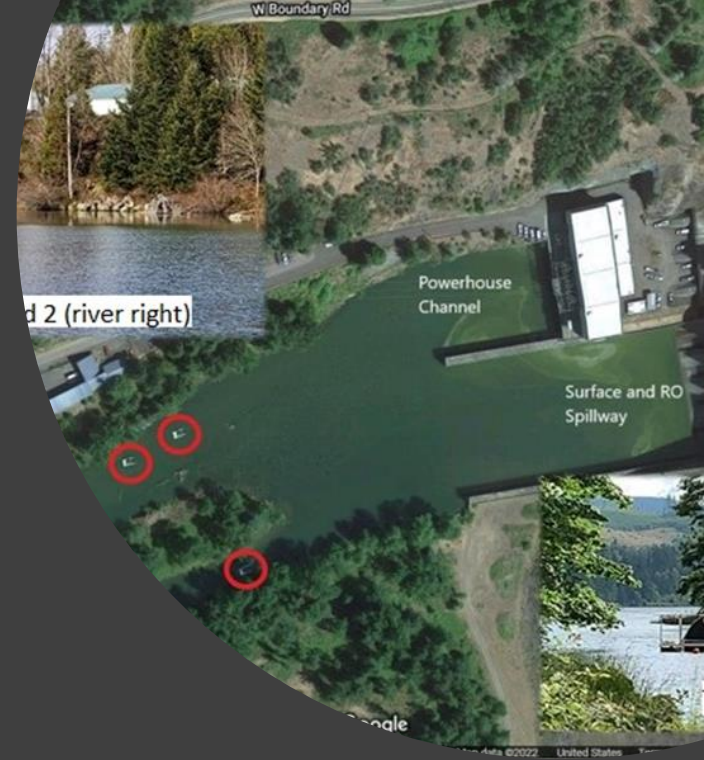


Fall Creek Results

- Monitored for **83 days capturing 424** juvenile Chinook salmon.
- **Catch was dominated (95%) by fry** (mean FL = 35mm) and peaked in mid-March. A handful of yearlings (FL = 122 mm) were captured in March and trickle of subyearlings was observed throughout May (FL = 73 mm).
- **Transported 244** around Fall Creek Reservoir and **released 180 upstream for trap efficiency**.
- Insufficient number of **recaptures (n = 4)** to estimate abundance.
- Nine fish presented with an adverse external condition (~2.4%).
- Rainbow trout most abundant non-target species (n = 824), a subset of which appeared to be transitioning to smolts (n = 71).
- Monitoring period of March 10, 2021 – June 1, 2021 **likely missed the peak emigration of fry**. Historical monitoring efforts suggest peak migration occurs from February – March (Keefer et al. 2012).

			Fork Lengths (mm)				Weights (g)		
	Site	Age Class	n	Min	Max	Mean	Min	Max	Mean
Fall Creek (Total)		Sub-Yearling (fry)	402	28	57	34.7	NA	NA	NA
		Sub-Yearling	17	63	86	72.5	2.5	6.3	4.1
		Yearling	5	112	126	121.8	15.1	22	19.5





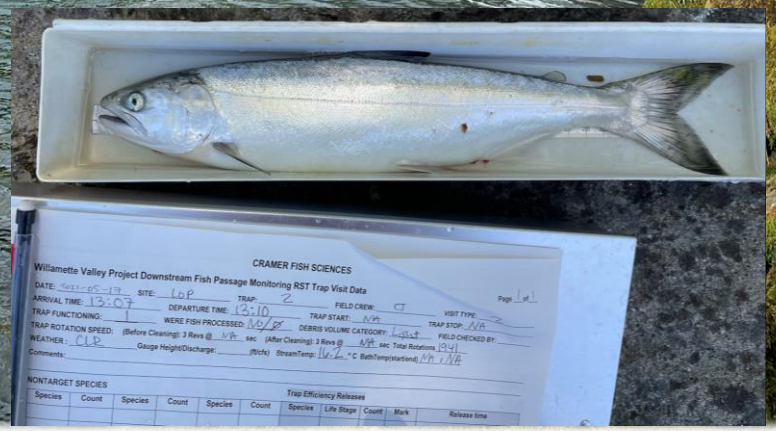
Lookout Point

March 15,2021 – July 19,2021

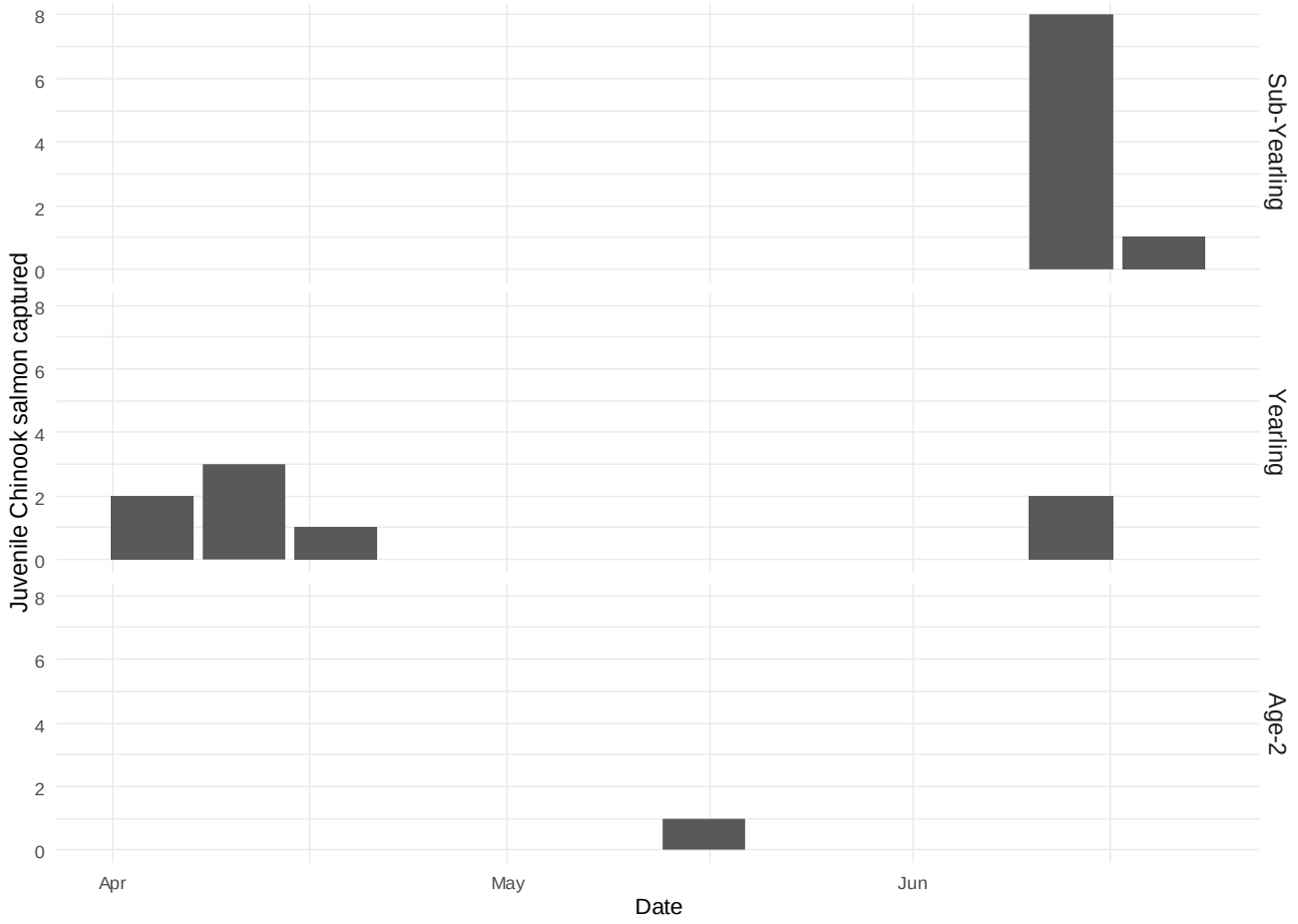
Three 8-ft RSTs

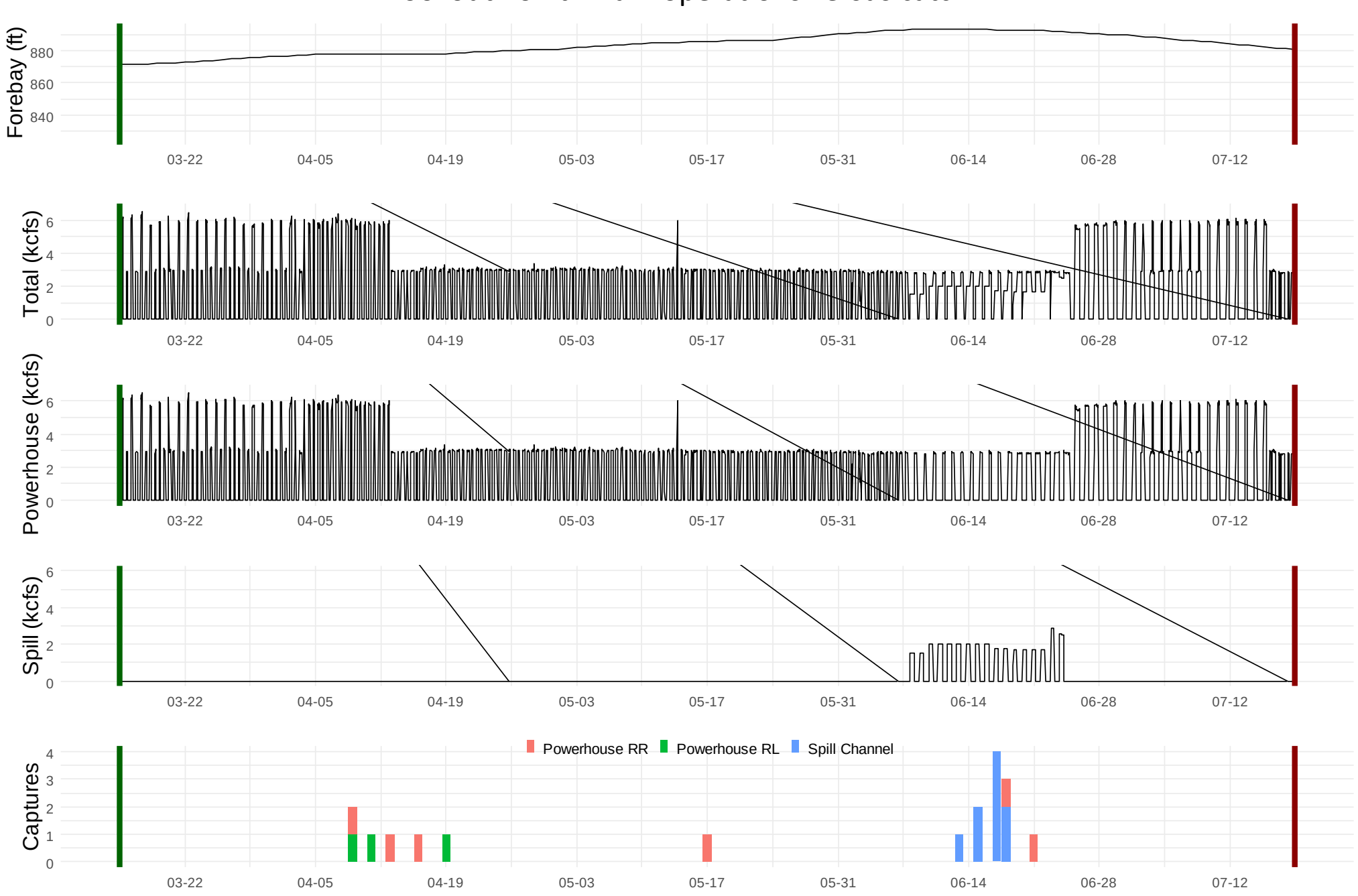
Lookout Point Results

- **18 juvenile Chinook salmon captured** across 122 days of monitoring.
- Near equal proportion of sub-yearlings and yearlings. Single 2+ year-old? **Highest catch rate coincided with spill operations** in mid-June.
- **Very low trap efficiency.** Release 1,943 juvenile hatchery Chinook salmon, recaptured only four (0.2%).
- Six Chinook salmon presented with an adverse external condition (33 %).
- Three mortalities.
- **Low catch rates were not surprising** because they mirrored rates observed during previous monitoring effort (0.3 – 0.7 fish per day; trap efficiency 0.0 – 1.9%; Keefer at al 2012, Romer et al 2012 – 2016).



			Lengths (mm)			Weights (g)		
Site	Age Class	n	Min	Max	Mean	Min	Max	Mean
Lookout Point	Sub-Yearling	9	95	122	105.6	5.6	20.5	11.2
	Yearling	8	108	176	143.2	14.1	60.9	36.6
	Age-2+	1	322	322	322	NA	NA	NA




Lookout Point - Dam operations versus catch
Forebay (ft)
880
860
840
Total (kcfs)
Powerhouse (kcfs)
Spill (kcfs)
6
4
2
0
Captures
4
3
2
1
0
Powerhouse RR
Powerhouse RL
Spill Channel
03-22
04-05
04-19
05-03
05-17
05-31
06-14
06-28
07-12

Cougar

March 24, 2021 – August 31, 2021

Two 8-ft RSTs below powerhouse, single 5-ft RST below RO

Cougar Results

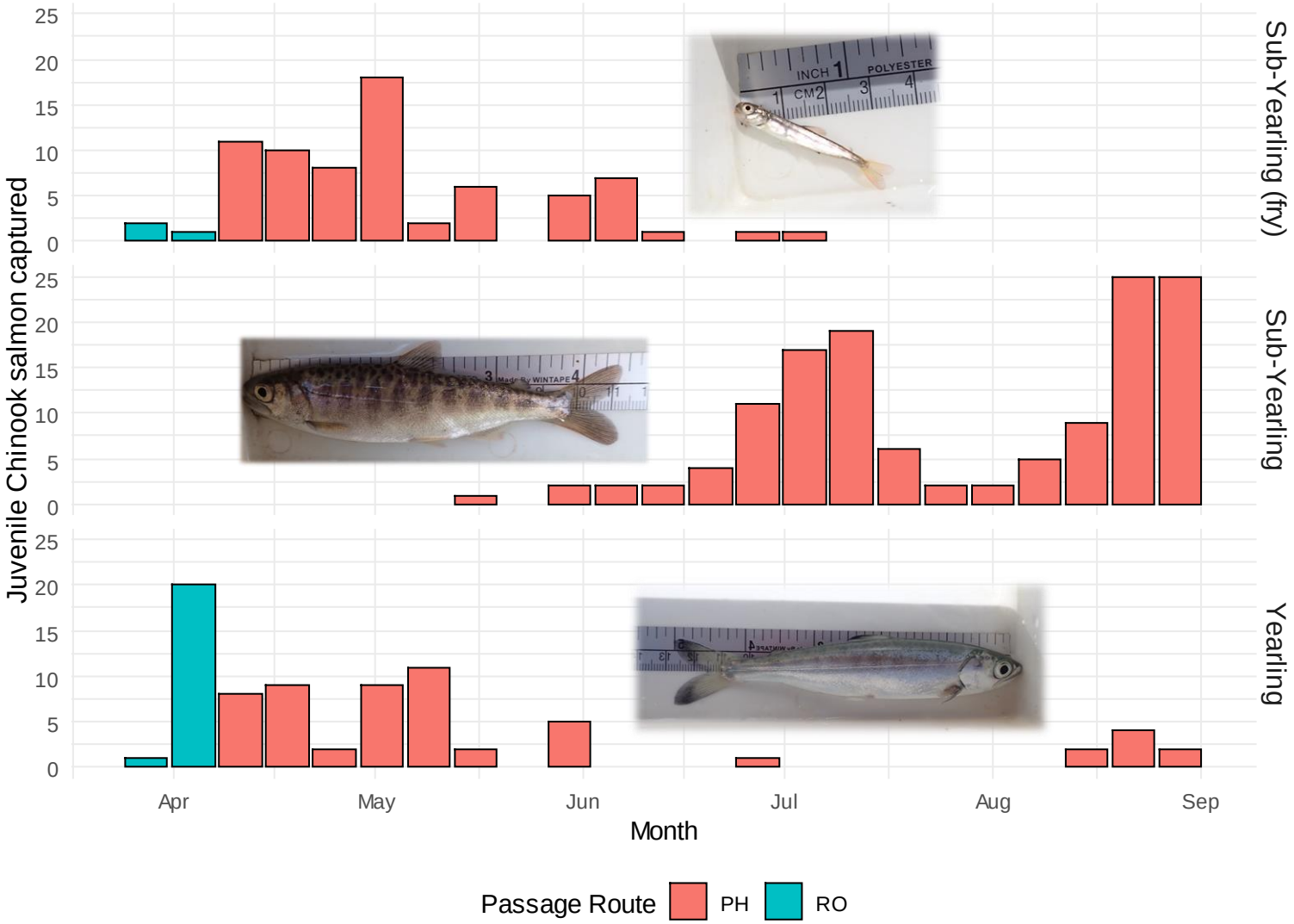
- **264 juvenile Chinook salmon caught across 160 days** of monitoring. 24 caught in the RO channel.

- Sub-yearlings (n = 116; mean 95 mm) were the most abundant age-class captured, followed by yearlings (n = 75; mean 137 mm), and fry (n = 73; mean 42 mm).

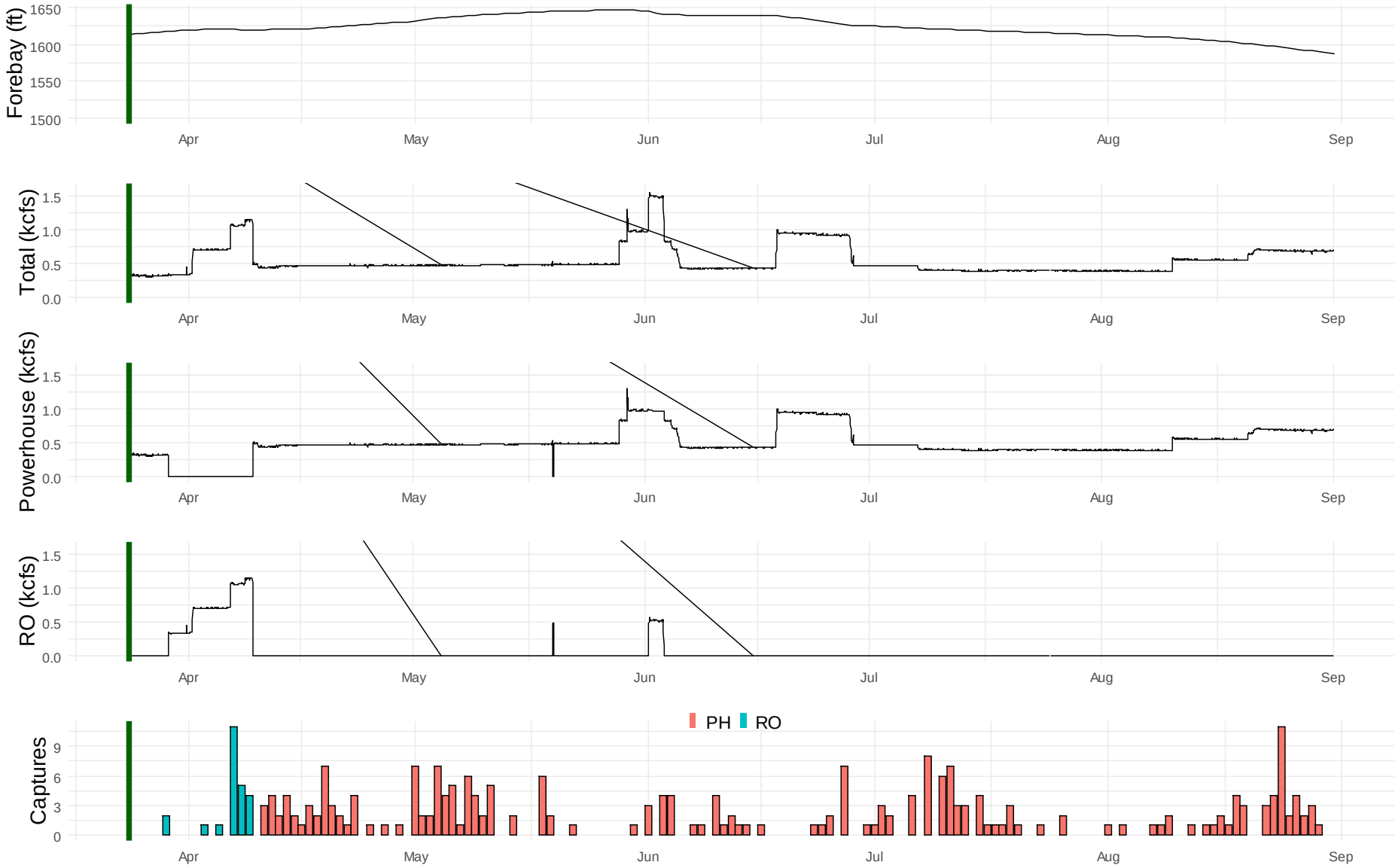
- Fry and yearling age-class dominated catch from April – June, sub-yearlings from June – August.

- Recapture rate was too low to estimate trap efficiency and abundance.

Site	Passage Rout	Age-class	n	Length (mm)			Weight (g)		
				Min	Max	Mean	Min	Max	Mean
Cougar	Powerhouse	Sub-Yearling (fry)	70	33	59	41.7	1.5	2.5	1.8
		Sub-Yearling	116	60	140	95	1.6	29.5	10.6
		Yearling	54	94	186	136.5	7.9	86.5	28.8
	Regulating Outlet	Sub-Yearling (fry)	3	36	45	42	NA	NA	NA
		Yearling	21	91	159	132.8	8.9	34	24.9



Cougar – Dam operations vs Catch



Regulating outlet operated for 11 days.

No obvious relationship between dam operations and catch rate during the monitoring period.

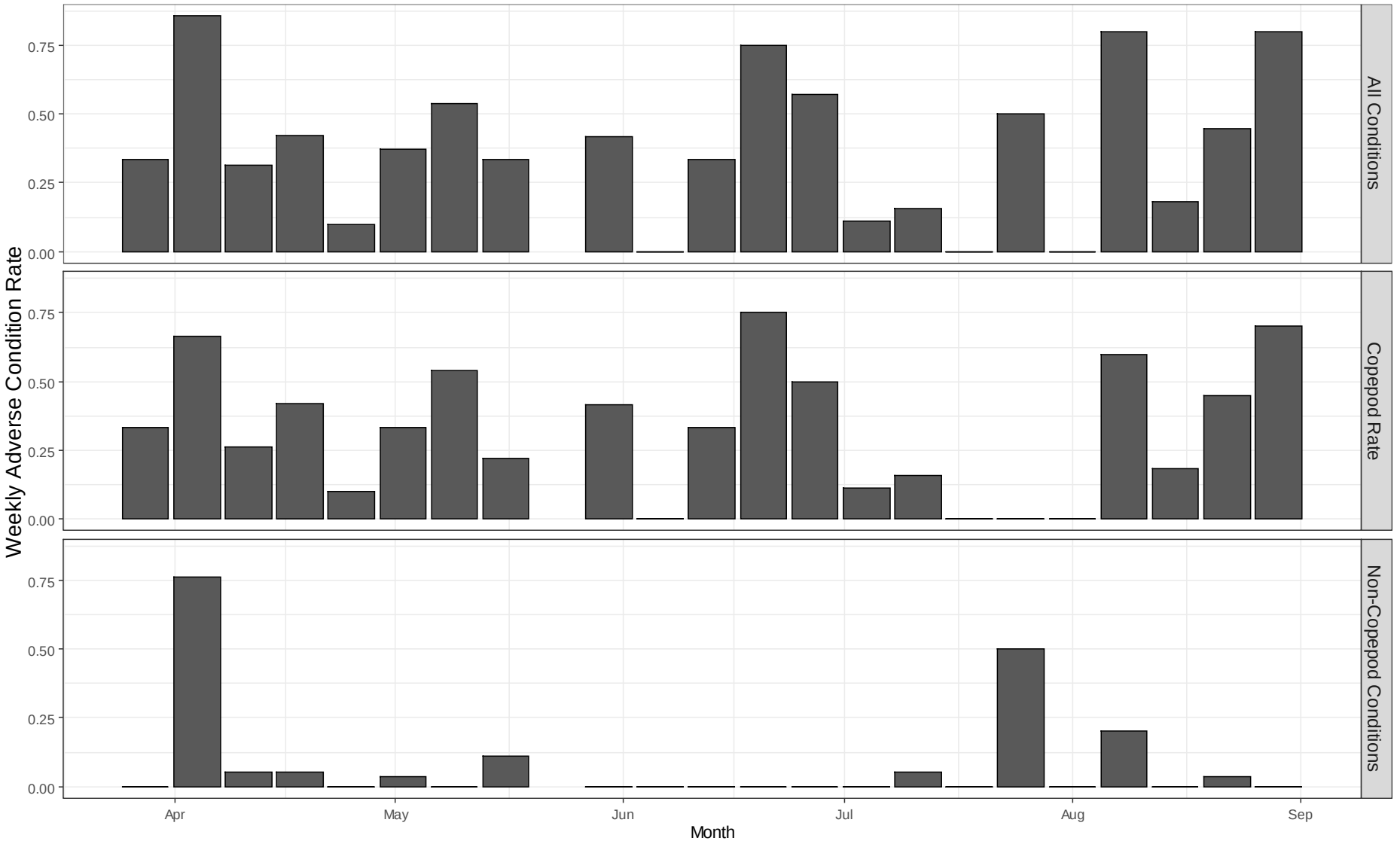
Cougar – Juvenile Chinook salmon condition

38% exhibited at least one adverse external condition.

Most prevalent condition as copepod infection. (33% of catch).

Most common injury was descaling (n = 14) observed primarily in RO channel (n = 12).

1% of the catch were mortalities (n = 3).



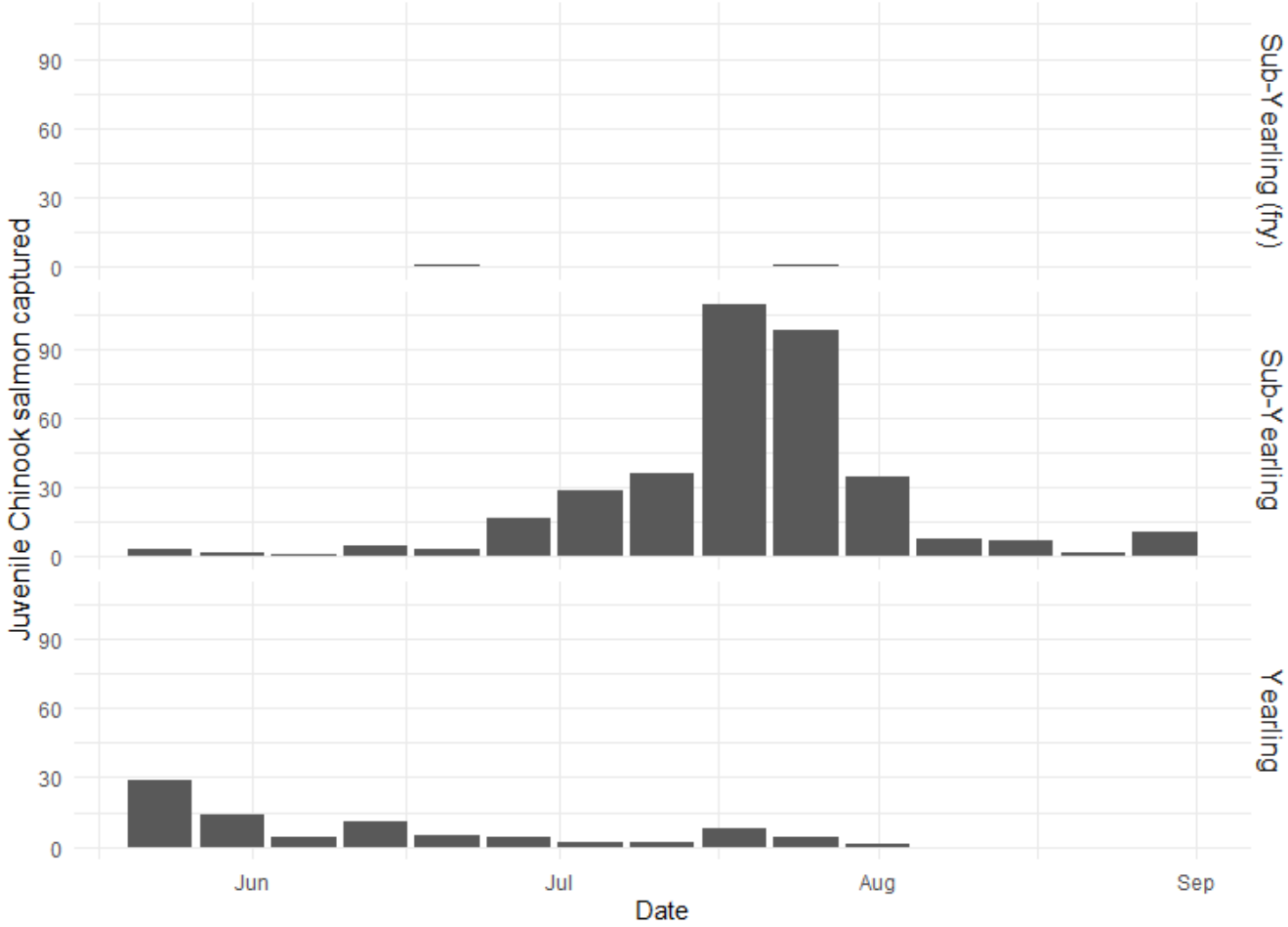
Big Cliff

May 23, 2021-August 31,2021
Single 8-ft RST

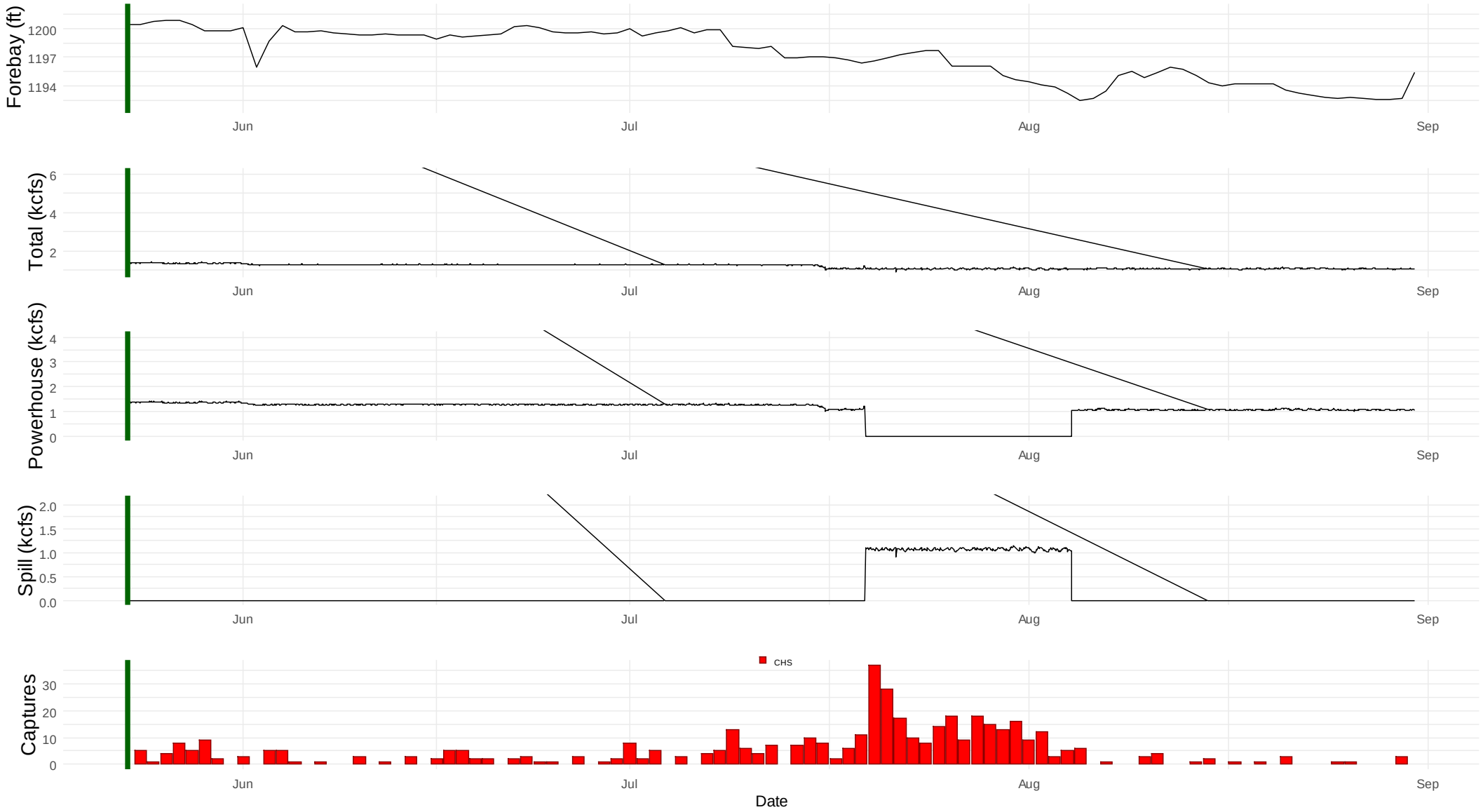
Big Cliff - Results

- Captured 447 juvenile Chinook salmon across 100 days.
- Sub-yearlings (n = 361; mean 122 mm) were the dominant age class followed by yearlings (n = 84; mean 165 mm) and fry (n = 2, mean 50 mm).
- Yearlings catch peaked in March, sub-yearlings in July.
- Estimated juvenile Chinook salmon abundance at 4,066 (95% CI: 2,489-8,507) fish during the period of 7/4/2021 - 8/8/2021.
- Catch peaked in July, coinciding with the spill gates being opened.

Site	Age-class	n	Length (mm)			Weight (g)		
			Min	Max	Mean	Min	Max	Mean
Big Cliff	Sub-Yearling (fry)	2	43	56	49.5	NA	NA	NA
	Sub-Yearling	361	65	158	122.2	3.2	39.5	21
	Yearling	84	125	240	164.6	11.8	153.6	46.6

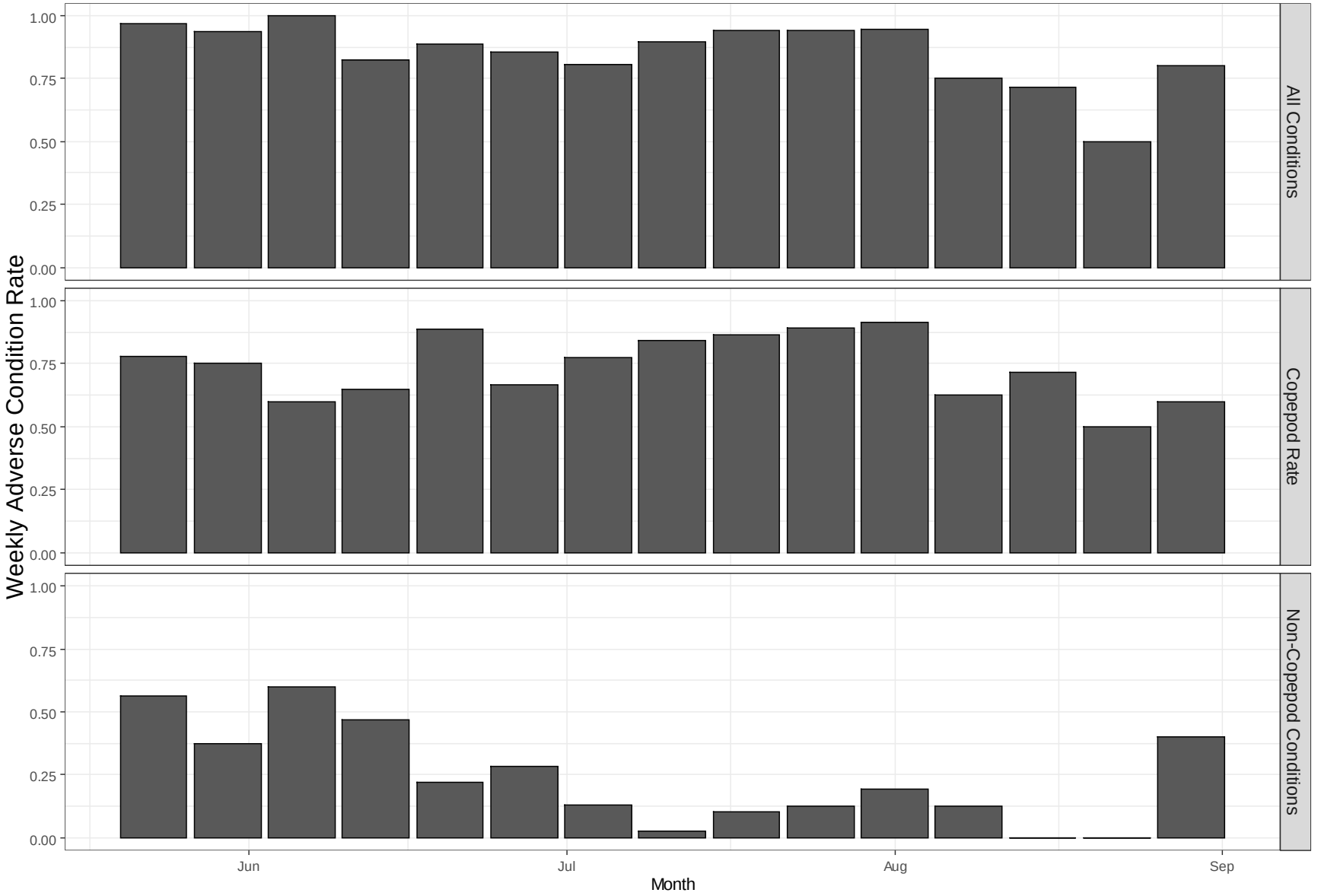


Big Cliff – Dam operations vs Catch



Big Cliff – Juvenile Chinook salmon Condition

- 91% (407/447) exhibited some type of adverse external condition.
- 83 % were infected with copepods (369/447).
- 19% exhibited mechanical/barotrauma injury (83/447).
- Minor descaling was most common injury.
- Overall mortality rate during the sampling season was 4% (n = 18) and was highest for the yearling age class (n = 13).

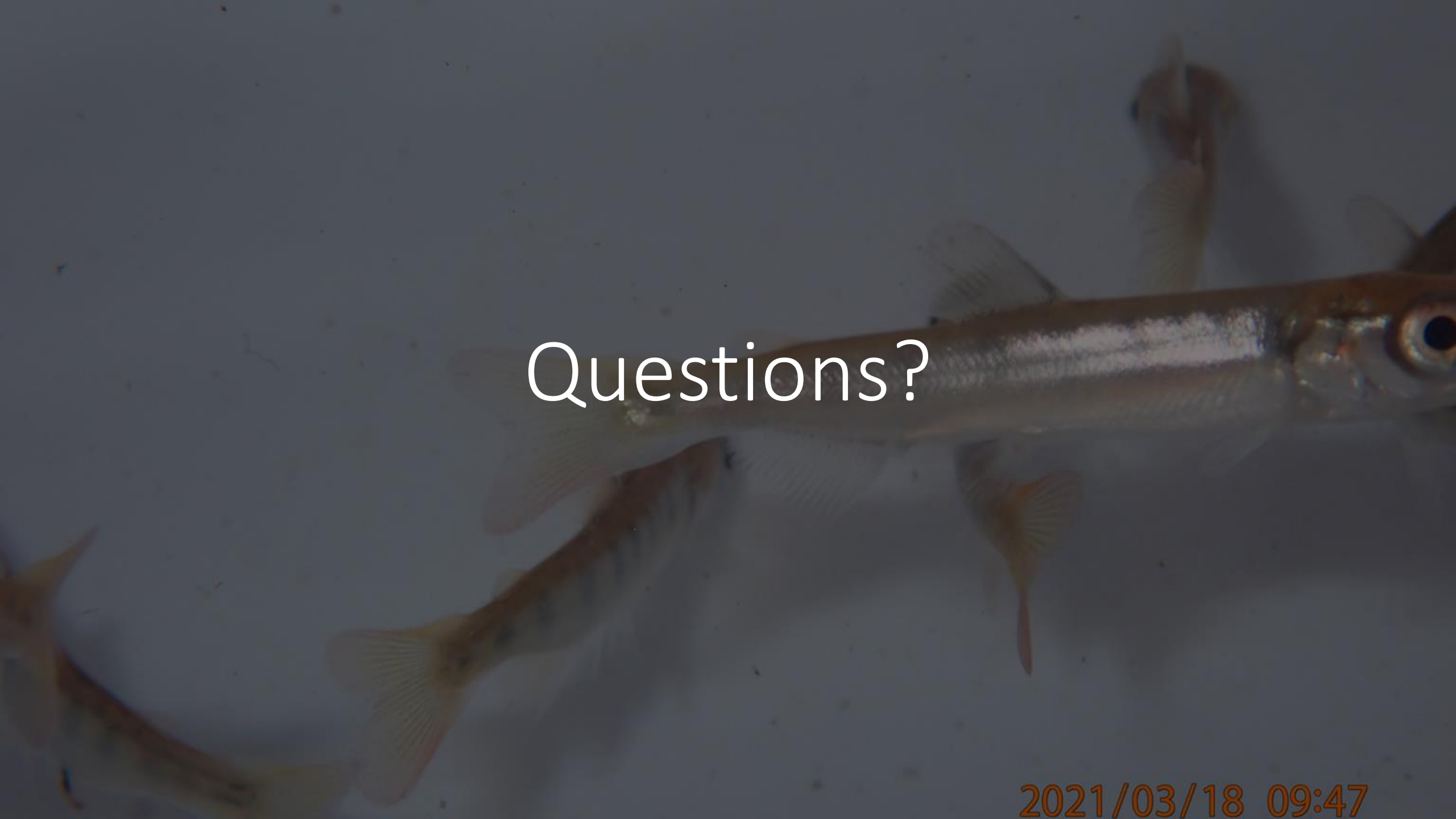


Summary

- Monitored juvenile Chinook salmon emigration at Lookout Point, Cougar, Big Cliff and above Fall Creek Reservoir.
- Catch of fry and yearlings peaked earlier in the monitoring period, while catch of sub-yearlings peaked through the summer months.
- Higher capture rates coincided with spill operations at Lookout and Big Cliff.
- Copepod infection was the most common adverse external condition with higher rates observed at Big Cliff than at Cougar.
- Minor descaling was the most common injury.

Acknowledgements

- Cramer Fish Sciences – Caitlyn Jobanek, Peter Fasolino, and Derek Watts
- USACE – David Trachtenberg, Doug Garletts, Chad Helms, Jesse Jernigan, and Fenton Khan.
- ODFW – Permitting Team, Hatchery Managers, District Biologists.


Questions?
2021/03/18 09:47