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Report Period: June 16th to June 30th, 2023

Re: **CRAMER FISH SCIENCES - WILLAMETTE VALLEY FISH PASSAGE
MONITORING VIA ROTARY SCREW TRAPS**

Project Schedule

Table 1. Project Schedule

Site	Task	Start	End	Days
Breitenbush River RST	Trap Install	6/16/2023	6/16/2023	1
Breitenbush River RST	Operation	6/16/2023	11/30/2023	167
Breitenbush River RST	Trapping Efficiency (749 fish)	6/21/2023	6/21/2023	1
Detroit Head of Reservoir- North Santiam River RST	Trap Install	4/19/2023	4/19/2023	1
Detroit Head of Reservoir- North Santiam River RST	Operation	5/4/2023	11/30/2023	210
Detroit Head of Reservoir- North Santiam River RST	Trapping Efficiency (539 fish)	6/6/2023	6/6/2023	1
Detroit Head of Reservoir- North Santiam River RST	Trapping Efficiency (750 fish)	6/20/2023	6/20/2023	1
Green Peter Head of Reservoir- Middle Santiam River RST	Highline Install	4/25/2023	4/25/2023	1
Green Peter Head of Reservoir- Middle Santiam River RST	Trap Install	4/26/2023	4/26/2023	1
Green Peter Head of Reservoir- Middle Santiam River RST	Operation	5/4/2023	11/30/2023	210
Green Peter Head of Reservoir- Middle Santiam River RST	Trapping Efficiency (1000 dead, 750 alive)	6/7/2023	6/7/2023	1
Hills Creek Head of Reservoir RST	Trap Install	5/9/2023	5/9/2023	1
Hills Creek Head of Reservoir RST	Operation	5/9/2023	6/30/2023	52
Hills Creek Head of Reservoir RST	Removal	6/30/2023	6/30/2023	1
Hills Creek Head of Reservoir RST	Trapping Efficiency (519 fish)	5/18/2023	5/18/2023	1
Hills Creek Head of Reservoir RST	Trapping Efficiency (760 fish)	6/19/2023	6/19/2023	1

Table 2. Sampling Dates for Reporting Period

Site	Total Sampling Period Start	Current Reporting Period Start	Current Reporting Period End	Days Sampled This Period	Total Days Sampled
Breitenbush River RST	6/16/2023	6/16/2023	6/30/2023	15	30
Detroit Head of Reservoir- North Santiam River RST	5/4/2023	6/16/2023	6/30/2023	15	56
Green Peter Head of Reservoir- Middle Santiam River RST	5/4/2023	6/16/2023	6/30/2023	15	57
Hills Creek Head of Reservoir RST	5/9/2023	6/16/2023	6/30/2023	15	52

Table 3. Willamette Valley Rotary Screw Trap Monitoring Catch Summary

Site	Species	Catch (Reporting Period)	Recaptures (Reporting Period)	Total Catch	Total Recaptures
Breitenbush River RST	CHS	30	53	30	53
Breitenbush River RST	STW	4	0	4	0
Detroit Head of Reservoir- North Santiam River RST	CHS	604	60	9126	88
Detroit Head of Reservoir- North Santiam River RST	STW	4	0	492	0
Green Peter Head of Reservoir- Middle Santiam River RST	CHS	0	0	21	1
Green Peter Head of Reservoir- Middle Santiam River RST	STW	0	0	0	0
Hills Creek Head of Reservoir RST	CHS	9	6	93	52

Summary of Rotary Screw Trap Data

There are 3 rotary screw traps (RSTs) that have been installed and sampled during the reporting period. For this reporting period, traps were operated at the following 3 locations: Detroit Head of Reservoir – North Santiam River, Green Peter Head of Reservoir – Middle Santiam River and Hills Creek Head of Reservoir on the upper Middle Fork Willamette River.

The Detroit Head of Reservoir – North Santiam RST and Green Peter Head of Reservoir – Middle Santiam RST were installed on April 19th and 26th, respectively. The RSTs at Detroit Head of Reservoir –

North Santiam and Green Peter Head of Reservoir – Middle Santiam rivers started sampling on May 4th once permits were received. The Hills Creek Head of Reservoir RST on the upper Middle Fork Willamette River was installed and began sampling on May 9th.

Winter Steelhead may be present at the Breitenbush River, Detroit Head of Reservoir – North Santiam, and Green Peter Head of Reservoir – Middle Santiam River sites. All natural origin juvenile *O. mykiss* captured at these sites will be treated and reported as Winter Steelhead.

The RST for the Breitenbush River sampling site is being installed on June 16th after a trap is repaired by EG Solutions.

Sampling start dates are included in Table 2, and season total collection numbers are displayed in Table 3. The locations of the RSTs are depicted in Figures 1 through 4.



Imagery Source: 2022, ESRI.



FIGURE 1
Breitenbush River

● RST Locations

500 Feet



EAS ENVIRONMENTAL ASSESSMENT SERVICES
 Wholly Owned Subsidiary of Natives of Kodiak



Imagery Source: 2022, ESRI.



FIGURE 2
North Santiam Above Detroit

● RST Locations

———— 500 Feet





FIGURE 3
Middle Santiam River

● RST Locations

500 Feet



EAS ENVIRONMENTAL ASSESSMENT SERVICES
 Wholly Owned Subsidiary of Natives of Kodiak

Portland
 Salem
 Eugene

■ MAP AREA

OREGON



Imagery Source: 2019, ESRI.



FIGURE 4
Middle Fork Willamette Above Hills Creek

● RST Locations

500 Feet



Breitenbush River

The Breitenbush River RST was installed on June 16th, 2023 and began sampling the same day. All natural origin *O. mykiss* captured at this site will be reported as Winter Steelhead.

Target Species

This reporting period began on June 16th and ended on June 30th. There were a total of 30 Chinook Salmon (CHS) and 4 Winter Steelhead (STW) captured during the 15-day sampling period (Figure 5). Sampling duration was 100% of the reporting period for the RST. Figure 6 shows length frequency data to-date. Table 4 provides life stage, length, and weight data for all Chinook Salmon and Winter Steelhead that have been caught at the Breitenbush River site to-date and for the reporting period.

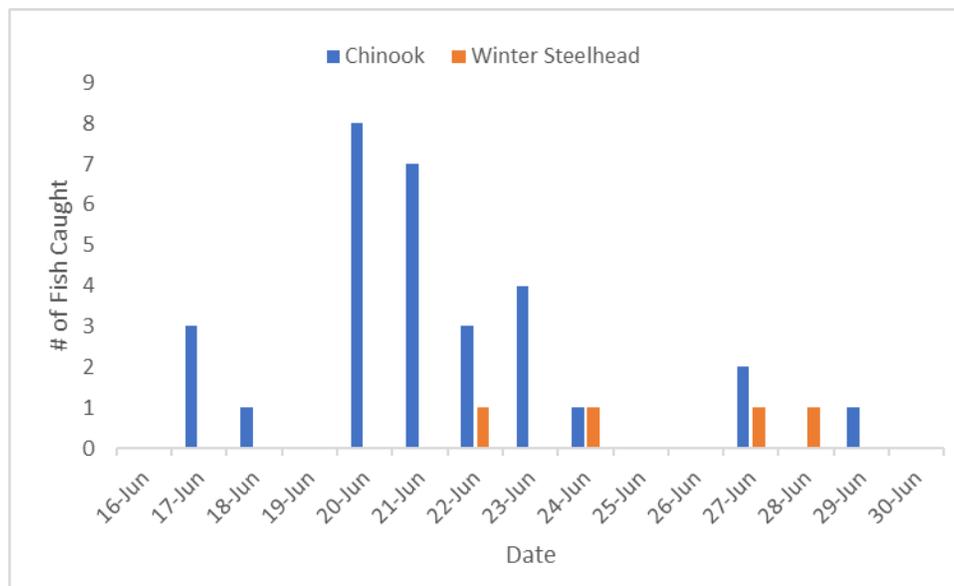


Figure 5. Chinook and Winter Steelhead Captured per day 06/16/2023 to 06/30/2023 (Breitenbush River)

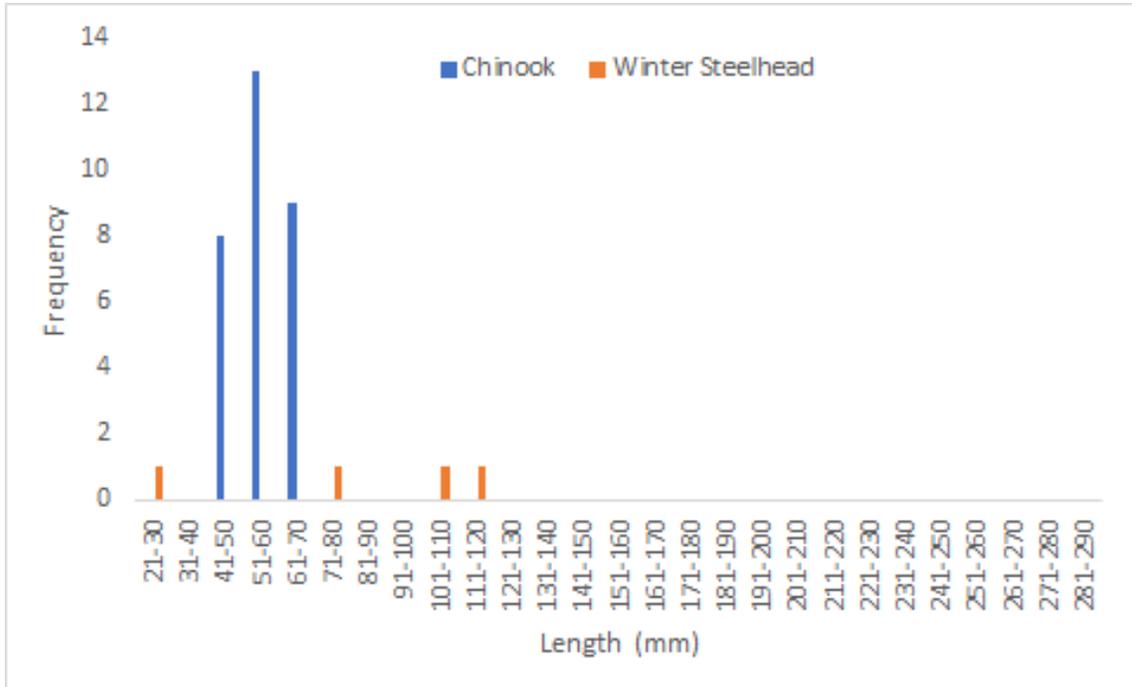


Figure 6. Length Frequency of Juvenile Chinook Sampled Season To-Date (Breitenbush River)

Table 4. Descriptive Statistics of Target Species Captured at the Breitenbush River To-Date

To-Date										
Site	Route	Species	Life stage	Collected	Length (mm)*			Weight (g)*		
					Min	Max	Mean	Min	Max	Mean
Breitenbush River	5ft	CHS	Fry	10	44	57	48.8	1.0	1.9	1.2
		CHS	Parr	20	46	68	58.9	1.4	3.3	2.4
		CHS	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Fry	1	27	27	27.0	N/A	N/A	N/A
		STW	Parr	3	76	120	101.0	5.2	20.0	13.4
		STW	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A

*Fish that were missing heads are not included in length and weight calculations.

June 16-30, 2023										
Site	Route	Species	Life stage	Collected	Length (mm)*			Weight (g)*		
					Min	Max	Mean	Min	Max	Mean
Breitenbush River	5ft	CHS	Fry	10	44	57	48.8	1.0	1.9	1.2
		CHS	Parr	20	46	68	58.9	1.4	3.3	2.4
		CHS	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Fry	1	27	27	27.0	N/A	N/A	N/A
		STW	Parr	3	76	120	101.0	5.2	20.0	13.4
		STW	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A

*Fish that were missing heads are not included in length and weight calculations.

Trapping Efficiency

On 6/21/2023 749 adipose and right ventral fin clipped fish were released above the trap site to evaluate the trapping efficiency of the 5 ft RST. 53 fish were recaptured for an efficiency of 7.1%

Breitenbush River	Release #	Recapture #	Capture Efficiency
5ft Trap	749	53	7.1% (53/749)

Injuries and Copepod Infection

Partial descaling <20% was observed in 3 of the 30 Chinook captured (10.0%), 0 displayed descaling >20% (0.0%), 10 displayed body injury (33.3%), 0 had eye injuries (0.0%), 0 had copepods present in the branchial cavity (0.0%) and 0 had copepods on fins (0.0%). 0 Chinook displayed gas bubble disease (0.0%). There were 0 mortalities (0.0%).

Partial descaling <20% was observed on 1 of the 4 Winter Steelhead captured (25.0%) and 0 displayed descaling >20% (0.0%), 1 displayed body injury (25.0%), 0 had eye injury (0.0%), 0 had copepods present in the branchial cavity (0.0%) and 0 had copepods on fins (0.0%). 0 Winter Steelhead displayed gas bubble disease (0.0%). There were 0 mortalities (0.0%). Injury data is summarized in table 5.

Table 5. Number of Descaled, Bodily/Eye Injured, Copepod Infected and Dead Chinook Salmon and Winter Steelhead for Sampling Period (Breitenbush River).

Site	Species	# Fish Collected	# DSC* <20%	# DSC* >20%	# with Body Injuries	# with Eye Injuries	# with COP* In B.C.	# with COP* on Fins	Mortalities
Breitenbush River	Chinook	30	3	0	10	0	0	0	0
	Winter Steelhead	4	1	0	1	0	0	0	0

*DSC=Descaled, COP=Copepods, B.C.=Branchial Cavity

Collected DNA and Scale Samples

DNA was collected from 29 Spring Chinook and 3 Winter Steelhead. Scale samples were collected from 22 Spring Chinook and 3 Winter Steelhead. The remaining targets were too small to sample.

PIT Tags

7 fish were PIT tagged during this reporting period. More information regarding PIT tagged fish can be found in Appendix D.

VIE Marking

Visible Implant Elastomer (VIE) trials commenced on 6/16/2023. VIE tag color is changed every month to distinctly mark groups of fish by capture date. Since then, 24 Spring Chinook have been marked with fluorescent elastomer. No fish have been recaptured at downstream sites to date.

Date Tagged	Species	Tag Location	VIE Color	# Tagged	# Recaptured to Date
6/16/2023-6/30/2023	Chinook	Head	Pink	23	0
6/16/2023-6/30/2023	Chinook	Right Dorsal*	Pink	1	0

*One fish was accidentally tagged in the wrong location.

Non-Target Species

4 non-target species were captured during this reporting period. A summary of non-target fish capture is provided in table 6.

Table 6. Summary of Non-target Species (Breitenbush River).

Species	5 ft Capture	5 ft Mortality	Season Total	Season Total Mortality
Kokanee	0	0	0	0
Cutthroat Trout	0	0	0	0
<i>O. mykiss</i> (clipped)	3	2	3	2
Sculpin	1	0	1	0
Totals	4	0	4	2

Stream Statistics

Basic stream statistics at the proposed Breitenbush River RST site were calculated from data downloaded from the U.S. Geological Survey stream gauge number 14179000. Instantaneous discharge (cfs) and Gauge height (feet) flow metrics are available at this gauge. During the reporting period, daily maximum values for instantaneous discharge ranged from 210.0 cfs to 290.0 (mean: 240.0 cfs). Figure 7 shows instantaneous discharge.

Stream temperatures will be recorded every 2 hours for the length of the reporting period for the RST (Figure 8).

Catch per unit of effort (CPUE) data are summarized in Table 7. Gage height and capture data for the duration of monitoring efforts at this location are provided in Appendix B.

Table 7. Summary of salmonid CPUE, Breitenbush River.

	Chinook	Winter Steelhead
Description	(5 ft)	(5 ft)
Catch	30	4
Effort (hrs)	334.3	334.3
CPUE (fish/hr)	0.090	0.012

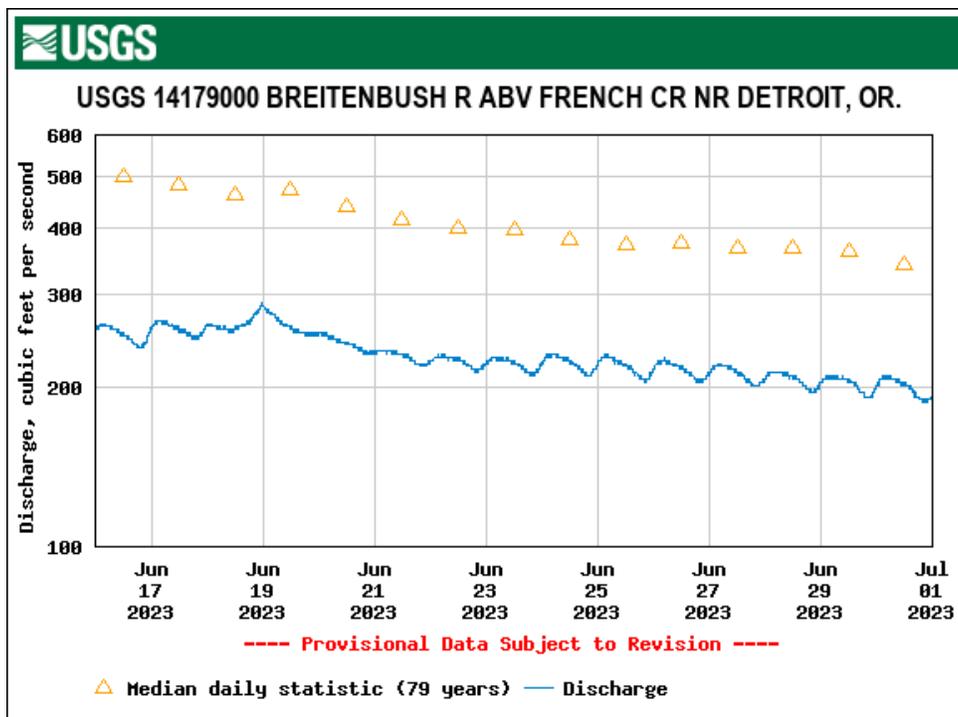


Figure 7. Discharge (cfs); Breitenbush River

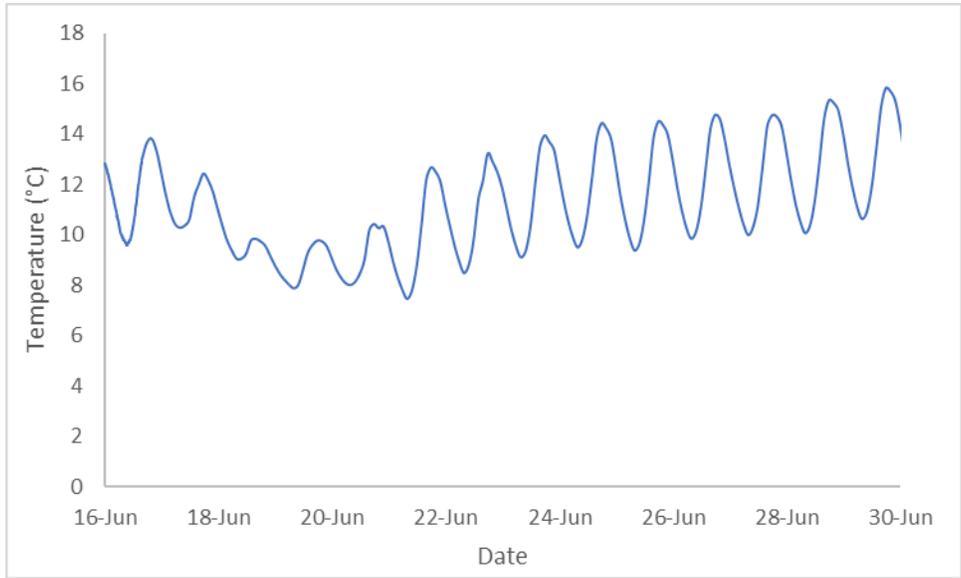


Figure 8. Temperature at RST (Breitenbush River)

*Note: Temperature data was supplemented from USGS gage 14179000 as the trap is not yet deployed nor is a temperature probe.

North Santiam River – Detroit Head of Reservoir

The Detroit Head of Reservoir- North Santiam River RST was installed on April 19th, 2023. This site started sampling on May 4, 2023. All natural origin *O. mykiss* captured at this site will be reported as Winter Steelhead.

Target Species

This reporting period began on June 16th and ended on June 30th. There were a total of 604 Chinook Salmon (CHS) and 4 Winter Steelhead (STW) captured during the 15-day sampling period (Figure 9). Sampling duration was 100% of the reporting period for the RST. Figure 10 shows length frequency data to-date. Table 8 provides life stage, length, and weight data for all Chinook Salmon and Winter Steelhead that have been caught at the Detroit Head of Reservoir site to-date and for the reporting period.

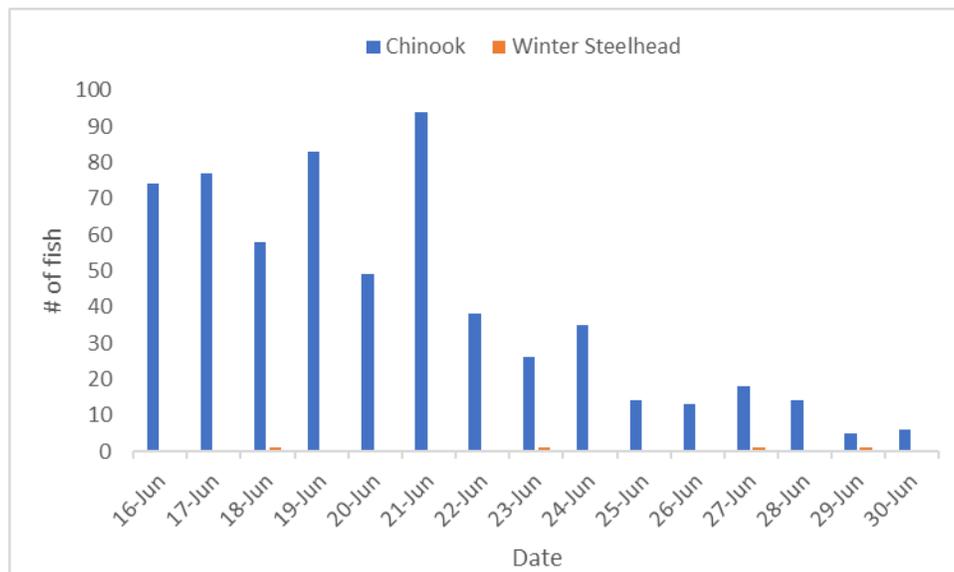


Figure 9. Chinook and Winter Steelhead Captured per day 06/16/2023 to 06/30/2023 (Detroit Head of Reservoir)

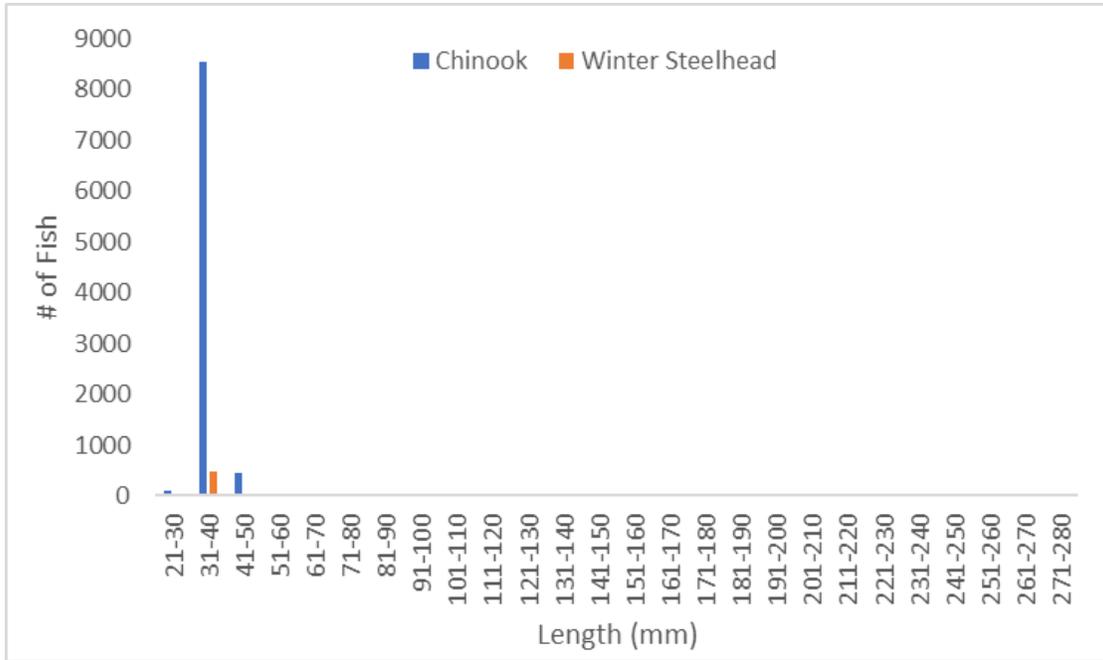


Figure 10. Length Frequency of Juvenile Chinook and Winter Steelhead Sampled Season To-Date (Detroit Head of Reservoir)

Table 8. Descriptive Statistics of Target Species Captured at Detroit Head of Reservoir Season To-Date

To-Date (Since May 04, 2023)										
Site	Route	Species	Life stage	Collected	Length (mm)*			Weight (g)*		
					Min	Max	Mean	Min	Max	Mean
Detroit HOR	5ft	CHS	Fry	9058	28	60	35.5	N/A	N/A	N/A
		CHS	Parr	68	41	70	51.4	1.0	4.8	1.7
		CHS	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Fry	484	25	49	35.5	N/A	N/A	N/A
		STW	Parr	6	62	99	84.5	2.3	10.6	7.5
		STW	Smolt	2	188	408	298	66.5	66.5	66.5

*Fish that were missing heads are not included in length and weight calculations.

June 16-30, 2023										
Site	Route	Species	Life stage	Collected	Length (mm)*			Weight (g)*		
					Min	Max	Mean	Min	Max	Mean
Detroit HOR	5ft	CHS	Fry	542	30	60	40.4	1.0	2.5	1.3
		CHS	Parr	62	41	70	51.0	1.0	4.8	1.6
		CHS	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Fry	1	25	25	25.0	N/A	N/A	N/A
		STW	Parr	3	82	99	91.3	5.6	10.6	8.8
		STW	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A

*Fish that were missing heads are not included in length and weight calculations.

Trapping Efficiency

On 6/20/2023 750 adipose and left ventral fin clipped fish were released above the trap site to evaluate the trapping efficiency of the 5 ft RST. 60 fish were recaptured for an efficiency of 8.0%

Detroit Head of Reservoir	Release #	Recapture #	Capture Efficiency
5ft Trap	750	60	8.0% (60/750)

Injuries and Copepod Infection

Partial descaling <20% was observed in 2 of the 604 Chinook captured (0.3%), 1 displayed descaling >20% (0.2%), 11 displayed body injury (1.8%), 0 had eye injuries (0.0%), 0 had copepods present in the branchial cavity (0.0%) and 0 had copepods on fins (0.0%). 0 Chinook displayed gas bubble disease (0.0%). There was 1 mortality (0.2%).

Partial descaling <20% was observed on 2 of the 4 Winter Steelhead captured (50.0%) and 0 displayed descaling >20% (0.0%), 2 displayed body injury (50.0%), 0 had eye injuries (0.0%), 0 had copepods present in the branchial cavity (0.0%) and 0 had copepods on fins (0.0%). 0 Winter Steelhead displayed gas bubble disease (0.0%). There were 0 mortalities (0.0%). Injury data is summarized in table 9.

Table 9. Number of Descaled, Bodily/Eye Injured, Copepod Infected and Dead Chinook Salmon and Winter Steelhead for Sampling Period (Detroit Head of Reservoir).

Site	Species	# Fish Collected	# DSC* <20%	# DSC* >20%	# with Body Injuries	# with Eye Injuries	# with COP* In B.C.	# with COP* on Fins	Mortalities
Detroit HOR	Chinook	604	2	1	11	0	0	0	1
	Winter Steelhead	4	2	0	2	0	0	0	0

*DSC=Descaled, COP=Copepods, B.C.=Branchial Cavity

Collected DNA and Scale Samples

For the reporting period, DNA was collected from 137 Spring Chinook and 3 Winter Steelhead. Scale samples were collected from 57 Spring Chinook and 3 Winter Steelhead. The other targets captured did not meet length criteria for DNA sampling or were too descaled/damaged to collect samples.

PIT Tags

2 Spring Chinook and 3 Winter Steelhead were PIT tagged during this reporting period. All fish captured did not meet the size criteria for PIT tagging. More information regarding PIT tagged fish can be found in Appendix D.

VIE Marking

Visible Implant Elastomer (VIE) trials commenced at the Detroit Head of Reservoir – North Santiam River site on 5/5/2023. VIE tag color is changed every month to distinctly mark groups of fish by capture date. Since then, 5,176 Chinook and 318 Winter Steelhead have been VIE marked with fluorescent elastomer. No fish with VIE marks have been detected at downstream RST sites to date. Fish still showing an egg sac are not VIE marked.

Date Tagged	Species	Tag Location	VIE Color	# Tagged	# Recaptured to Date
5/01/2023-5/15/2023	Chinook	Right Dorsal	Orange	889	0
5/01/2023-5/15/2023	O. mykiss	Right Dorsal	Orange	60	0
5/16/2023- 5/31/2023	Chinook	Right Dorsal	Orange	2,700	0
5/16/2023- 5/31/2023	O. mykiss	Right Dorsal	Orange	237	0
6/1/2023-6/15/2023	Chinook	Right Dorsal	Pink	1048	0
6/1/2023-6/15/2023	O. mykiss	Right Dorsal	Pink	21	0
6/16/2023-6/30/2023	Chinook	Right Dorsal	Pink	539	0

Non-Target Species

5 non-target species fish were captured during the reporting period; the data is summarized below in table 10.

Table 10. Summary of Non-target Species (Detroit Head of Reservoir).

Species	5 ft Capture	5 ft Mortality	Season Total	Season Total Mortality
Kokanee	1	0	80	1
Chinook (clipped)	1	0	1	0
Cutthroat Trout	0	0	1	0
Sculpin	2	0	7	1
Mountain Whitefish	0	0	2	0
O. mykiss (clipped)	1	0	6	0
Dace	0	0	1	0
Unknown	0	0	1	1
Totals	5	0	99	3

Stream Statistics

Basic stream statistics at the Detroit Head of Reservoir site were calculated from data downloaded from U.S. Geological Survey stream gauge number 14178000. Gauge height (feet) and Discharge (cfs) metrics are provided at gauge 14178000. During the reporting period, daily maximum values for instantaneous discharge ranged from 651.0 cfs to 696.0 cfs (mean: 614.4 cfs) during the reporting period. Figure 11 shows instantaneous discharge.

Stream temperatures were recorded every 2 hours for the length of the reporting period at the Detroit Head of Reservoir RST site. Figure 12 shows temperature during the reporting period.

Catch per unit of effort (CPUE) data are summarized in Table 11. Discharge and capture data for the duration of monitoring efforts at this location are provided in Appendix B.

Table 11. Summary of salmonid CPUE, Detroit Head of Reservoir – North Santiam River.

	Chinook	Winter Steelhead
Description	(5 ft)	(5 ft)
Catch	604	4
Effort (hrs)	362.1	362.1
CPUE (fish/hr)	1.668	0.011

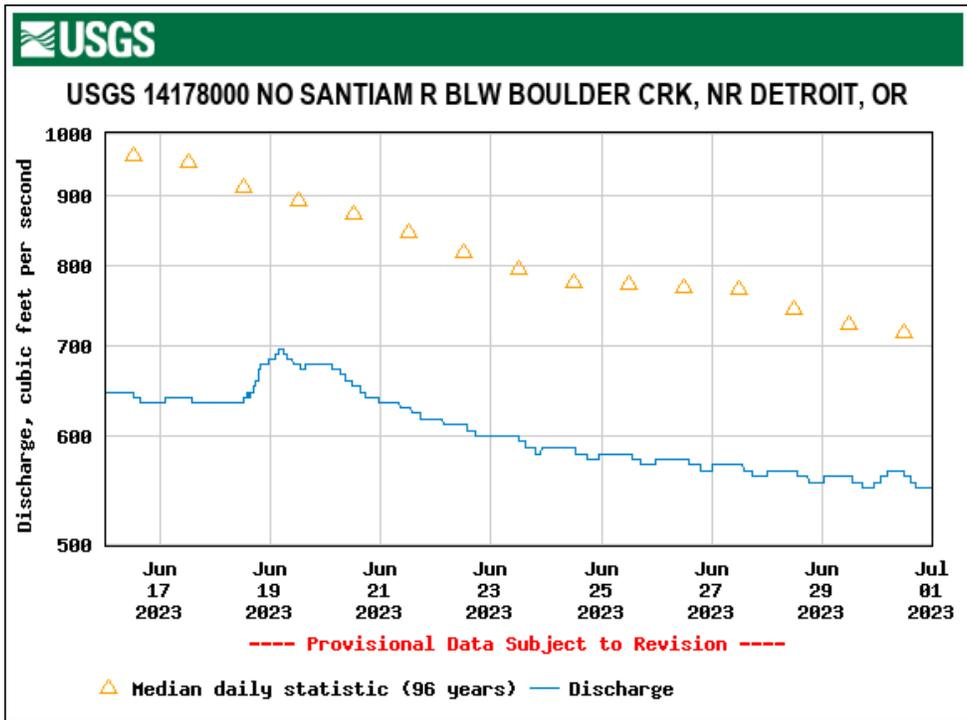


Figure 11. Discharge (cfs); Detroit Head of Reservoir – North Santiam River

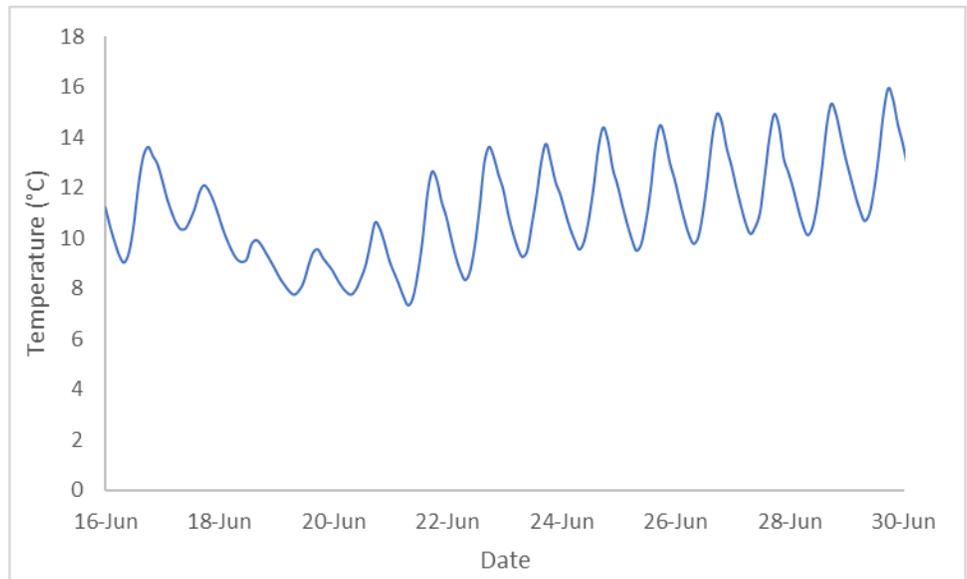


Figure 12. Temperature at RST (Detroit Head of Reservoir – North Santiam River)

Middle Santiam River– Green Peter Head of Reservoir

The Green Peter Head of Reservoir- Middle Santiam River RST was installed on April 26th, 2023. This site started sampling on May 4th, 2023. All natural origin *O. mykiss* captured at this site will be reported as Winter Steelhead.

Target Species

This reporting period began on June 16th and ended on June 30th. There were a total of 0 Chinook Salmon (CHS) and 0 Winter Steelhead (STW) captured during the 15-day sampling period (Figure 13). Sampling duration was 100.0% of the reporting period for the RST. Figure 14 shows length frequency data to-date. Table 12 provides life stage, length, and weight data for all Chinook Salmon and Winter Steelhead that have been caught at the Middle Santiam River- Green Peter Head of Reservoir site to-date and for the reporting period.

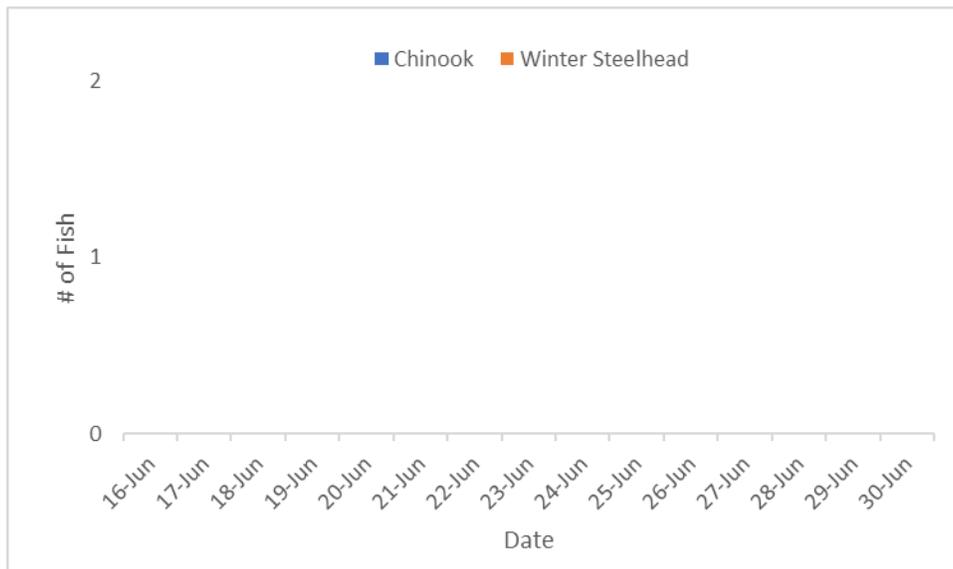


Figure 13. Chinook Captured per day 6/16/2023 to 6/30/2023 (Green Peter Head of Reservoir – Middle Santiam River)

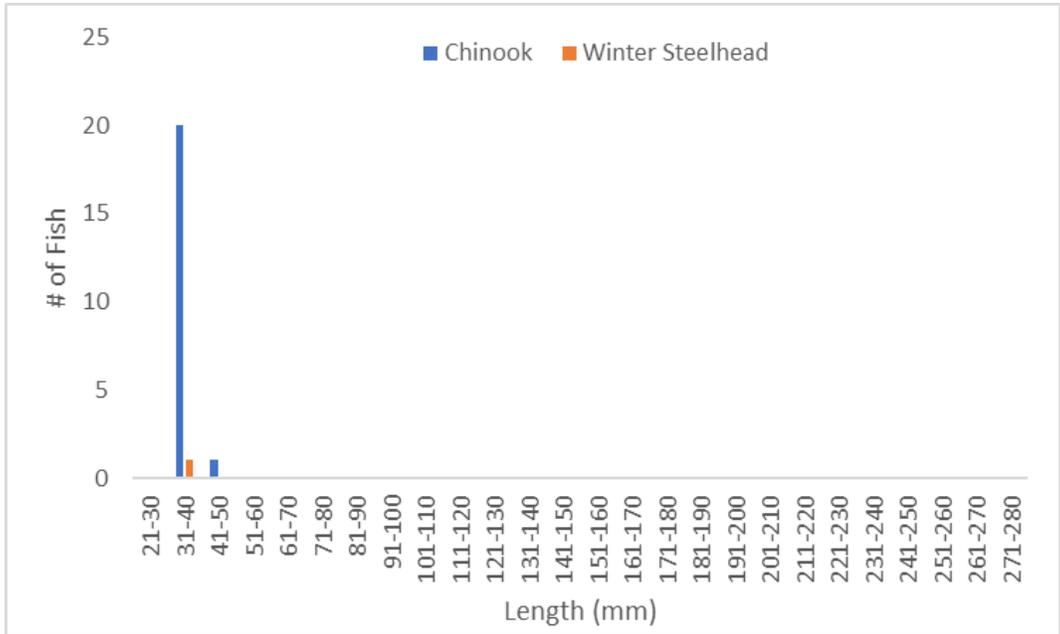


Figure 14. Length Frequency of Juvenile Chinook Sampled Season To-Date (Green Peter Head of Reservoir – Middle Santiam River)

Table 12. Descriptive Statistics of Target Species Captured at Green Peter Head of Reservoir – Middle Santiam River Season To-Date

To-date (since May 4, 2023)										
Site	Route	Species	Life stage	Collected	Length (mm)*			Weight (g)*		
					Min	Max	Mean	Min	Max	Mean
Green Peter Head of Reservoir -Middle Santiam	5ft	CHS	Fry	21	33	45	36.4	N/A	N/A	N/A
		CHS	Parr	0	N/A	N/A	N/A	N/A	N/A	N/A
		CHS	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Fry	1	36	36	36	N/A	N/A	N/A
		STW	Parr	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A

*Fish that were missing heads are not included in length and weight calculations.

June 16-30, 2023										
Site	Route	Species	Life stage	Collected	Length (mm)*			Weight (g)*		
					Min	Max	Mean	Min	Max	Mean
Green Peter Head of Reservoir -Middle Santiam	5ft	CHS	Fry	0	N/A	N/A	N/A	N/A	N/A	N/A
		CHS	Parr	0	N/A	N/A	N/A	N/A	N/A	N/A
		CHS	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Fry	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Parr	0	N/A	N/A	N/A	N/A	N/A	N/A
		STW	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A

*Fish that were missing heads are not included in length and weight calculations.

Trapping Efficiency

On 6/7/2023 750 adipose and left ventral clipped fish were released above the trap site to evaluate the trapping efficiency of the 5 ft RST. 1 fish was recaptured for an efficiency of 0.13%.

On 6/7/2023 1000 adipose clipped and Bismarck brown dyed fish were euthanized and released above the trap site to evaluate the trapping efficiency of the 5 ft RST. 0 fish were recaptured for an efficiency of 0.0%.

Green Peter Head of Reservoir-Middle Santiam River	Release #	Recapture #	Capture Efficiency
5ft Trap	750 (live)	1	0.13% (1/750)
	1000 (dead)	0	0% (0/1000)

Injuries and Copepod Infection

Partial descaling <20% was observed in 0 of the 0 Chinook captured (0.0%), 0 displayed descaling >20% (0.0%), 0 displayed body injury (0.0%), 0 had eye injuries (0.0%), 0 had copepods present in the branchial cavity (0.0%) and 0 had copepods on fins (0.0%). 0 Chinook displayed gas bubble disease (0.0%). There was 1 mortality (0.2%).

Partial descaling <20% was observed on 0 of the 0 Winter Steelhead captured (0.0%) and 0 displayed descaling >20% (0.0%), 0 displayed body injury (0.0%), 0 had eye injuries (0.0%), 0 had copepods present in the branchial cavity (0.0%) and 0 had copepods on fins (0.0%). 0 Winter Steelhead displayed gas bubble disease (0.0%). There were 0 mortalities (0.0%). Injury data is summarized in Table 13.

Table 13. Number of Descaled, Bodily/Eye Injured, Copepod Infected and Dead Chinook Salmon and Winter Steelhead for Sampling Period (Green Peter Head of Reservoir-Middle Santiam River).

Site	Species	# Fish Collected	# DSC* <20%	# DSC* >20%	# with Body Injuries	# with Eye Injuries	# with COP* In B.C.	# with COP* on Fins	Mortalities
Green Peter Head of Reservoir-Middle Santiam	Chinook	0	0	0	0	0	0	0	0
	Winter Steelhead	0	0	0	0	0	0	0	0

*DSC=Descaled, COP=Copepods, B.C.=Branchial Cavity

Collected DNA and Scale Samples

For the reporting period, DNA was collected from 0 Spring Chinook and 0 Winter Steelhead. Scale samples were collected from 0 Spring Chinook and 0 Winter Steelhead. The other targets captured did not meet length criteria for DNA sampling or were too descaled/damaged to collect samples.

PIT Tags

0 Spring Chinook and 0 Winter Steelhead were PIT tagged during this reporting period. All fish captured did not meet the size criteria for PIT tagging. More information regarding PIT tagged fish can be found in Appendix D.

VIE Marking

Visible Implant Elastomer (VIE) trials commenced at the Green Peter Head of Reservoir – Middle Santiam River site on 5/5/2023. VIE tag color and locations are changed every month to distinctly mark groups of fish by capture date. Since then, 15 Chinook and 1 Winter Steelhead have been VIE marked with fluorescent elastomer. No fish with VIE marks have been detected at downstream RST sites to date. Fish still showing an egg sac are not VIE marked.

Date Tagged	Species	Tag Location	VIE Color	# Tagged	# Recaptured to Date
5/01/2023-5/15/2023	Chinook	Right Dorsal	Orange	14	0
5/01/2023-5/15/2023	O. mykiss	Right Dorsal	Orange	1	0
5/16/2023-5/31/2023	Chinook	Right Dorsal	Orange	1	0

Non-Target Species

4 non-target fish were collected during the reporting period; the data is summarized below in Table 14.

Table 14. Summary of Non-target Species (Green Peter Head of Reservoir – Middle Santiam River).

Species	5 ft Capture	5 ft Mortality	Season Total	Season Total Mortality
Kokanee	0	0	5	0
Cutthroat Trout	0	0	0	0
Dace	0	0	8	0
Sculpin	4	0	9	0
Totals	4	0	22	0

Stream Statistics

Basic stream statistics at the Green Peter Head of Reservoir – Middle Santiam River site were calculated from data downloaded from the U.S. Geological Survey stream gauge number 14185800. Gauge height (feet) is the only flow metric available at this gauge. During the reporting period, daily maximum values for gage height ranged from 1.4 ft to 2.0 ft (mean: 1.6 ft). Figure 15 shows gage height.

Stream temperatures were recorded every 2 hours for the length of the report period for the RST (Figure 16). Temperature probes for the trap operated normally throughout this reporting period.

Catch per unit of effort (CPUE) data are summarized in Table 15. Gage height and capture data for the duration of monitoring efforts at this location are provided in Appendix B.

Table 15. Summary of salmonid CPUE, Green Peter Head of Reservoir – Middle Santiam River.

	Chinook	Winter Steelhead
Description	(5 ft)	(5 ft)
Catch	0	0
Effort (hrs)	362.9	362.9
CPUE (fish/hr)	0	0

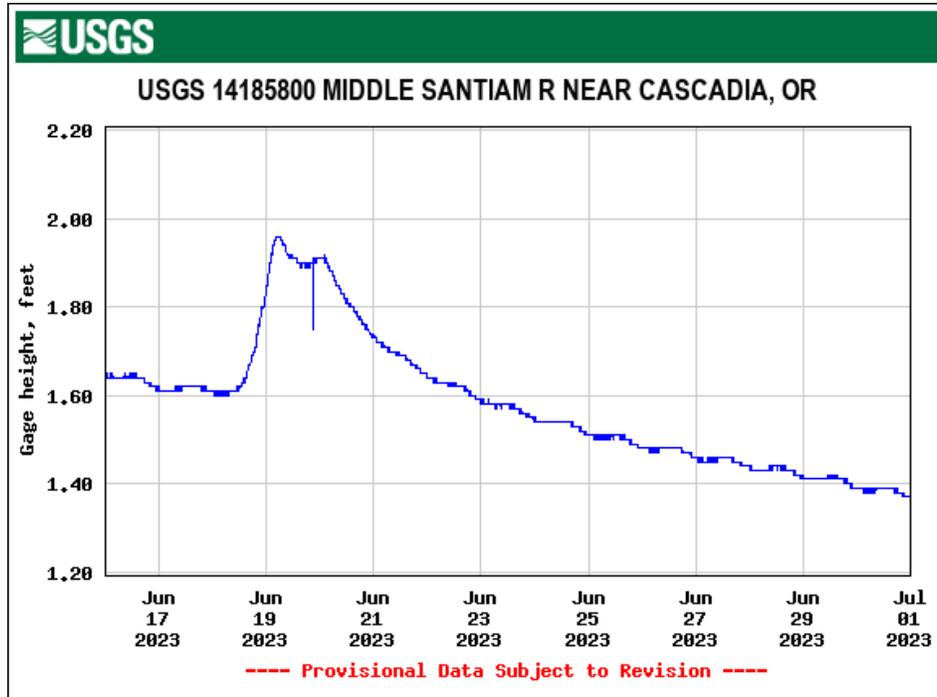


Figure 15. Gage Height (feet); Green Peter Head of Reservoir – Middle Santiam River

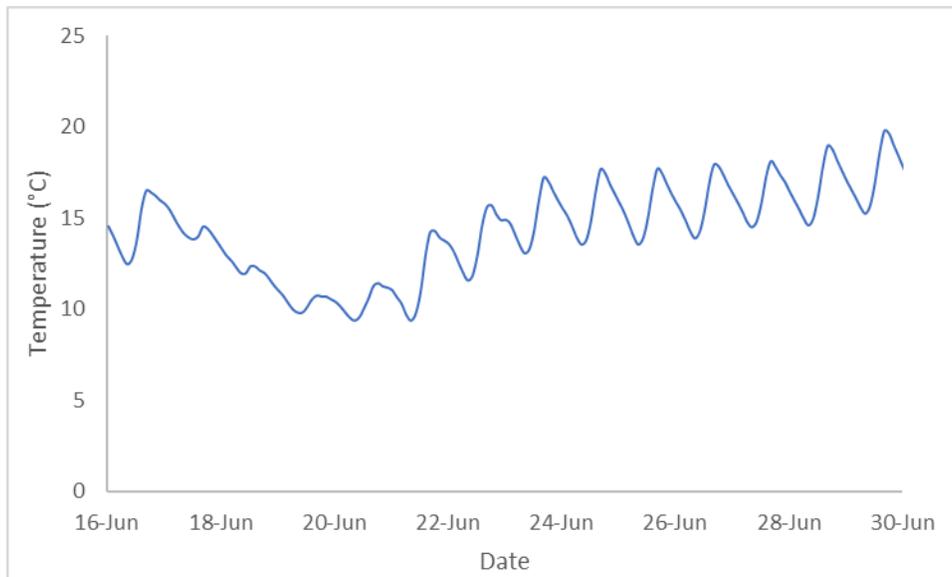


Figure 16. Temperature at RST (Green Peter Head of Reservoir – Middle Santiam River)

Middle Fork Willamette River– Hills Creek Head of Reservoir

The Hills Creek Head of Reservoir RST was installed and began sampling on May 9th, 2023.

Target Species

This reporting period began on June 16th and ended on June 30th. There was a total of 9 Spring Chinook captured during the 15-day sampling period (Figure 17). Sampling duration was 100% of the reporting period for the RST. Figure 18 shows length frequency data to-date. Table 16 provides life stage, length, and weight data for all Chinook Salmon that have been caught at the Middle Fork Willamette River- Hills Creek Head of Reservoir site to-date and for the reporting period.

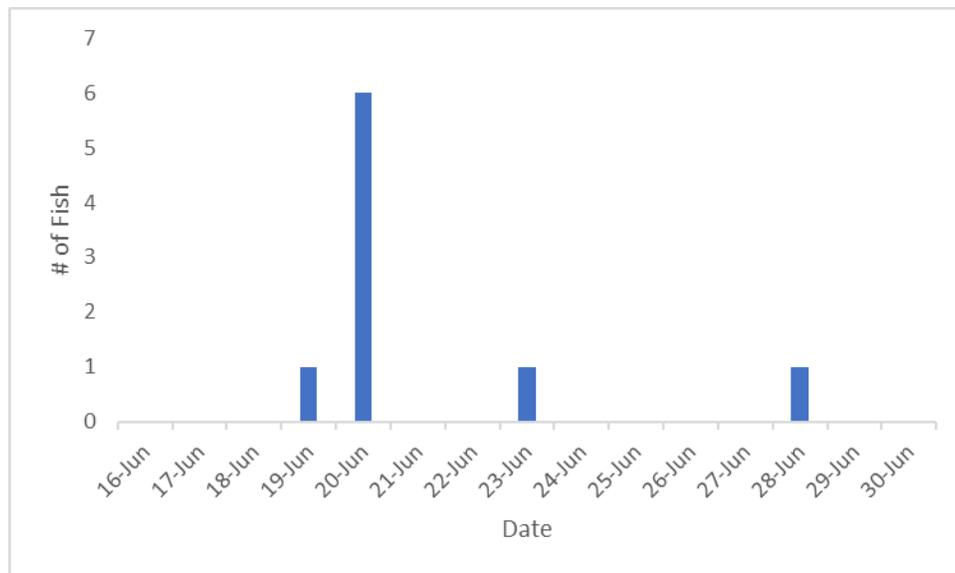


Figure 17. Chinook Captured per day 06/16/2023 to 06/30/2023 (Hills Creek Head of Reservoir)

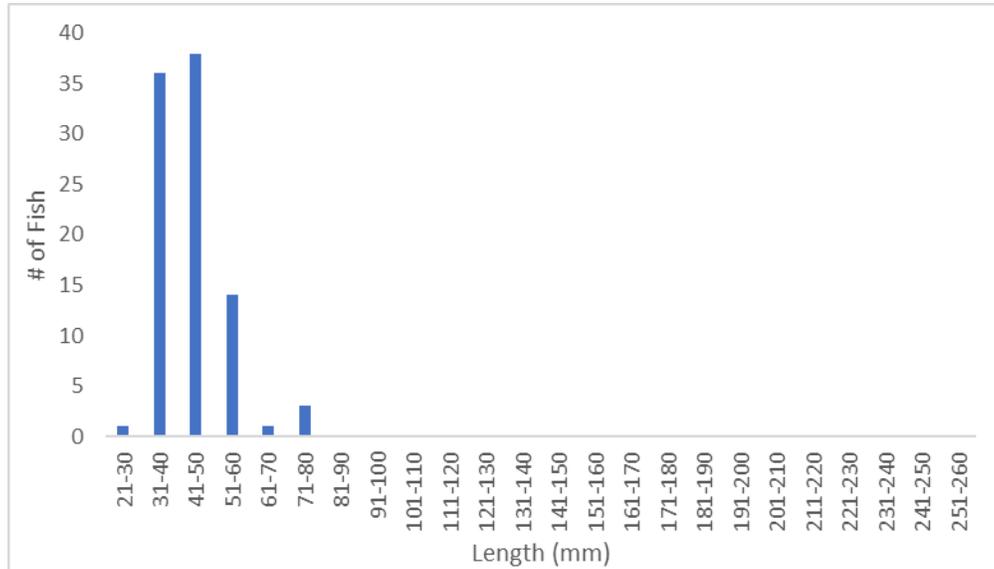


Figure 18. Length Frequency of Juvenile Chinook Sampled Season To-Date (Hills Creek Head of Reservoir)

Table 16. Descriptive Statistics of Target Species Captured at Hills Creek Head of Reservoir Season To-Date

To-Date (Since May 9 th , 2023)										
Site	Route	Species	Life stage	Collected	Length (mm)*			Weight (g)*		
					Min	Max	Mean	Min	Max	Mean
Hills Creek Head of Reservoir	5 ft	CHS	Fry	60	30	50	38.9	<1	2.5	1.4
		CHS	Parr	33	38	76	52.6	1.0	6.0	2.1
		CHS	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A

*Most fry are too small to collect accurate weights and thus some metrics are not available for them.

June 16-30, 2023										
Site	Route	Species	Life stage	Collected	Length (mm)*			Weight (g)*		
					Min	Max	Mean	Min	Max	Mean
Hills Creek Head of Reservoir	5 ft	CHS	Fry	1	35	35	35.0	N/A	N/A	N/A
		CHS	Parr	8	44	76	58.6	1.2	6.0	2.4
		CHS	Smolt	0	N/A	N/A	N/A	N/A	N/A	N/A

*Most fry are too small to collect accurate weights and thus some metrics are not available for them.

Trapping Efficiency

On May 18th, 519 adipose clipped and PIT Tagged fish were released for a trapping efficiency trial at the Hills Creek Head of Reservoir site. 44 fish were recaptured in the RST for a trapping efficiency of 8.5%

Hills Creek Head of Reservoir	Release #	Recapture #	Capture Efficiency
5ft Trap	519	44	8.5% (44/519)

On June 19th, 760 adipose clipped and PIT Tagged fish were released for a trapping efficiency trial at the Hills Creek Head of Reservoir site. 6 fish were recaptured in the RST for a trapping efficiency of 0.79%.

Hills Creek Head of Reservoir	Release #	Recapture #	Capture Efficiency
5ft Trap	760	6	0.7% (6/760)

Injuries and Copepod Infection

9 Chinook were captured for the reporting period. Of the fish captured, partial descaling <20% was observed on 1 fish (11.1%) and descaling >20% was observed on 0 fish (0.0%). 1 fish had bodily injury (11.1%). 0 fish displayed eye injuries (0.0%). 0 fish had copepods in the branchial cavity (0.0%), 0 had copepods on fins (0.0%). There were 0 mortalities for this reporting period (0.0%). Injury data for the reporting period is summarized in Table 17. To date injury data can be found in Appendix A.

Table 17. Number of Descaled, Bodily/Eye Injured, Copepod Infected and Dead Chinook Salmon and Winter Steelhead for Sampling Period (Hills Creek Head of Reservoir).

Site	# CHS Collected	# DSC* <20%	# DSC* >20%	# with Body Injuries	# with Eye Injuries	# with COP* In B.C.	# with COP* on Fins	Mortalities
Hills Creek Head of Reservoir	9	1	0	1	0	0	0	0

*DSC=Descaled, COP=Copepods, B.C.=Branchial Cavity

Collected DNA and Scale Samples

For the reporting period, DNA was collected from 7 Spring Chinook. Scale samples were collected from 7 Spring Chinook. The other targets captured did not meet length criteria for DNA sampling or were too descaled/damaged to collect samples.

PIT Tags

2 Spring Chinook were PIT tagged during this reporting period. Other fish captured did not meet the size criteria for PIT tagging. More information regarding PIT tagged fish can be found in Appendix D.

VIE Marking

Visible Implant Elastomer (VIE) trials commenced at the Hills Creek Head of Reservoir site on 5/10/2023. VIE tag color is changed every month to distinctly mark groups of fish by capture date. Since then, 41 Chinook have been VIE marked with fluorescent elastomer. No fish with VIE marks have been detected at downstream RST sites to date. Fish still showing an egg sac are not VIE marked.

Date Tagged	Tag Location	VIE Color	# Tagged	# Recaptured to Date
5/1/2023-5/15/2023	Left Dorsal	Orange	6	0
5/16/2023-5/31/2023	Left Dorsal	Orange	15	0
6/1/2023-6/15/2023	Left Dorsal	Pink	34	0
6/16/2023-6/30/2023	Left Dorsal	Pink	5	0

Non-Target Species

43 non-target species fish were captured during the reporting period; the data is summarized below in Table 18.

Table 18. Summary of Non-target Species (Hills Creek Head of Reservoir).

Species	5 ft Capture	5 ft Mortality	Season Total	Season Total Mortality
Dace	28	1	87	1
Cutthroat Trout	0	0	2	0
<i>O. mykiss</i>	22	0	26	0
Bull Trout	0	0	1	0
Brook Lamprey	10	2	18	2
Sculpin	6	0	20	1
Largescale Sucker	2	0	64	1
Mountain Whitefish	1	0	2	0
Redside Shiner	2	0	12	0
Totals	43	3	197	3

Stream Statistics

Basic stream statistics at the Hills Creek Head of Reservoir site were calculated from data downloaded from the U.S. Geological Survey stream gauge number 14144800. Gauge height (feet) is the only flow metric available at this gauge. During the reporting period, daily maximum values for gage height ranged from 8.8 ft to 9.1 ft (mean: 8.9 ft). Figure 19 shows gage height.

Stream temperatures were recorded every 2 hours for the length of the report period for the RST (Figure 20). Temperature probes for the trap operated normally throughout this reporting period.

Catch per unit of effort (CPUE) data are summarized in Table 19. Gage height and capture data for the duration of monitoring efforts at this location are provided in Appendix B.

Table 19. Summary of salmonid CPUE, Hills Creek Head of Reservoir.

	Chinook
Description	5 ft
Catch	9
Effort (hrs)	356.9
CPUE (fish/hr)	0.025

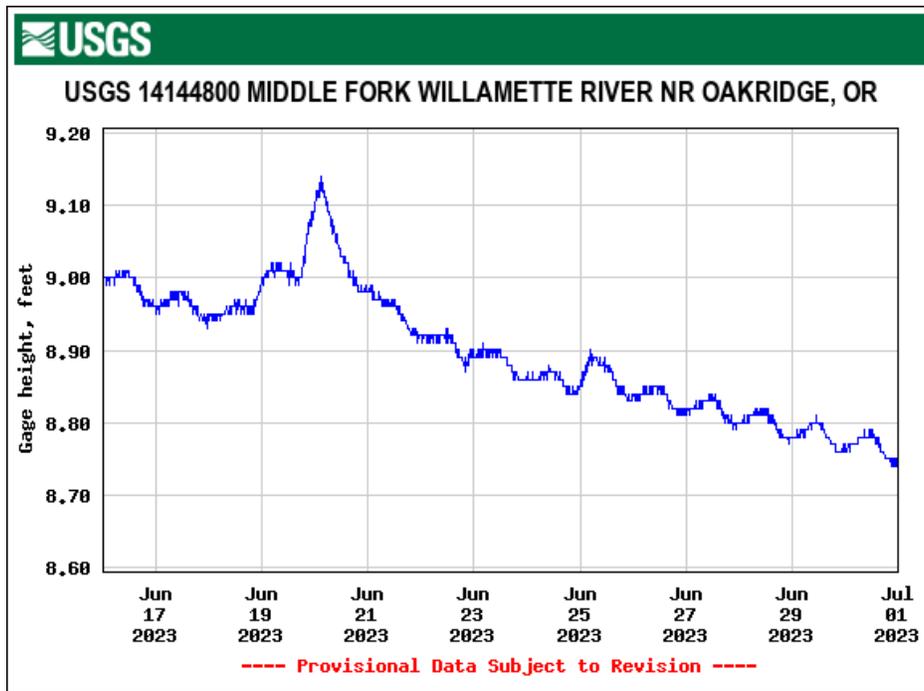


Figure 19. Gage Height (feet); Hills Creek Head of Reservoir, Near Oakridge, OR

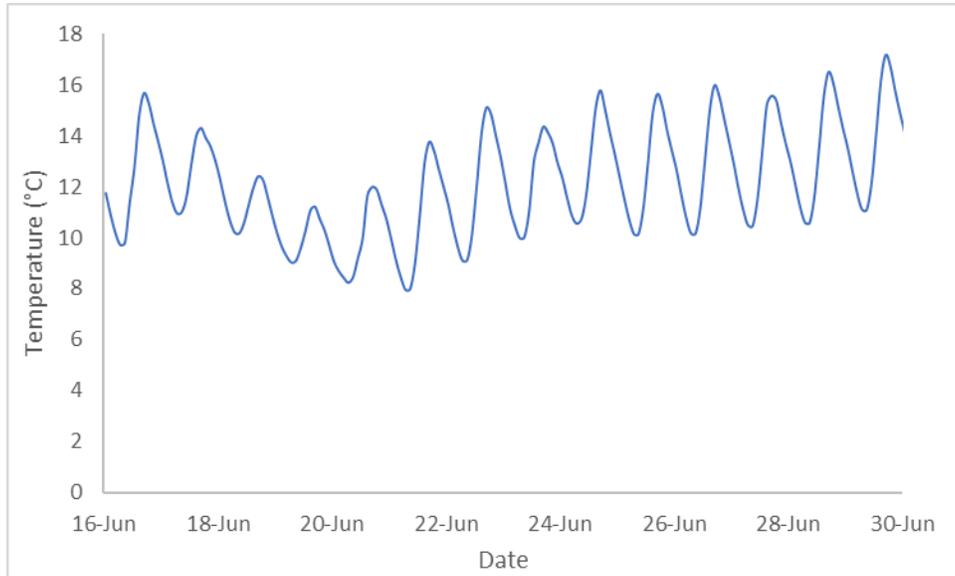


Figure 20. Temperature at RST (Hills Creek Head of Reservoir)

*Note: The temperature logger faulted during the reporting period, temperature for the reporting period was provided from USGS stream gage 14144800

Issues Encountered

Temperatures in the Middle and South Santiam have been high. If warm weather continues we may approach temperature thresholds in July.

Upcoming USACE Support Services

None at this time.

Appendix A
Chinook (CHS) To-Date

Chinook Injuries to-date																							
Site/Trap/Life Stage	Total Fish	MUNK	DS<2	BLO	EYB	FUN	BKD	COP	DS>2	PRD	FID	HBO	BO	HO	BVT	HBP	BRU	TEA	OPD	HIN	FVB	POP	GBD
Breitenbush River	30		3								9						1						
5 ft	30		3								9						1						
Parr	20		3								6						1						
Fry	10										3												
Detroit HOR	9126	1	27		11	1			8	8	52			1	17		55	28	37	25	43	9	
5 ft	9126	1	27		11	1			8	8	52			1	17		55	28	37	25	43	9	
Parr	68		1			1					5							1					
Fry	9058	1	26		11				8	8	47			1	17		55	27	37	25	43	9	
Green Peter HOR	21										1												1
5 ft	21										1												1
Fry	21										1												1
Hills Creek HOR	93		6							1	2												
5 ft	93		6							1	2												
Parr	33		4							1	2												
Fry	60		2																				

Chinook (CHS) During Reporting Period

Chinook Injuries During Reporting Period 6-16-2023 to 6-30-2023																							
Site/Trap/Life Stage	Total Fish	MUNK	DS<2	BLO	EYB	FUN	BKD	COP	DS>2	PRD	FID	HBO	BO	HO	BVT	HBP	BRU	TEA	OPD	HIN	FVB	POP	GBD
Breitenbush River	30		3								9						1						
5 ft	30		3								9						1						
Fry	10										3												
Parr	20		3								6						1						
Detroit HOR	604		2			1			1		7			1					4				
5 ft	604		2			1			1		7			1					4				
Fry	543		1						1		3			1					3				
Parr	61		1			1					4								1				
Hills Creek HOR	9		1								1												
5 ft	9		1								1												
Fry	1																						
Parr	8		1								1												

Steelhead (O. mykiss) To Date

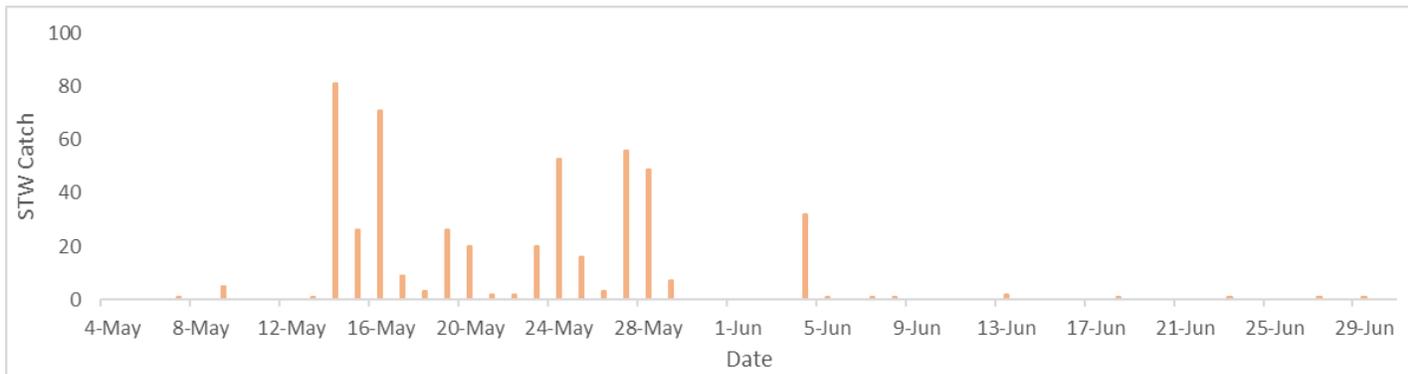
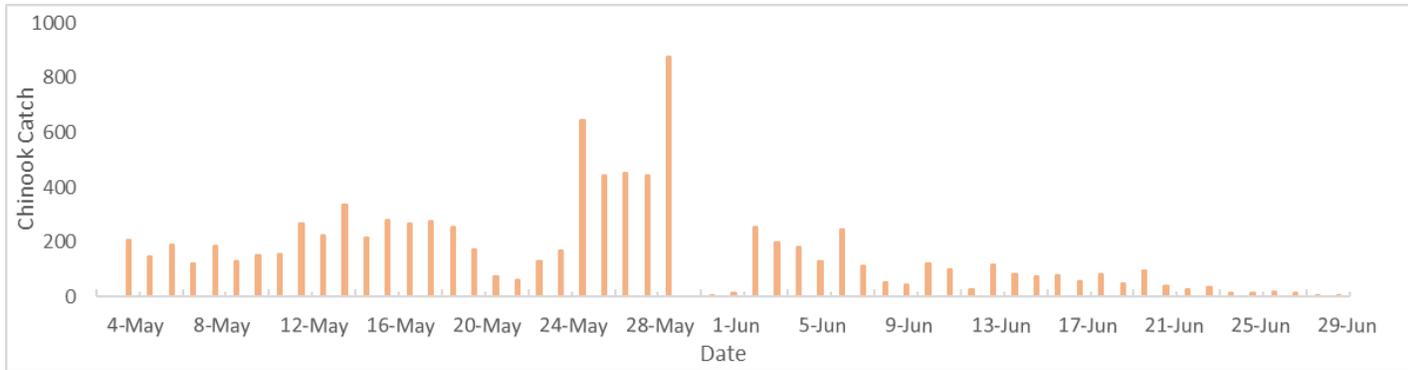
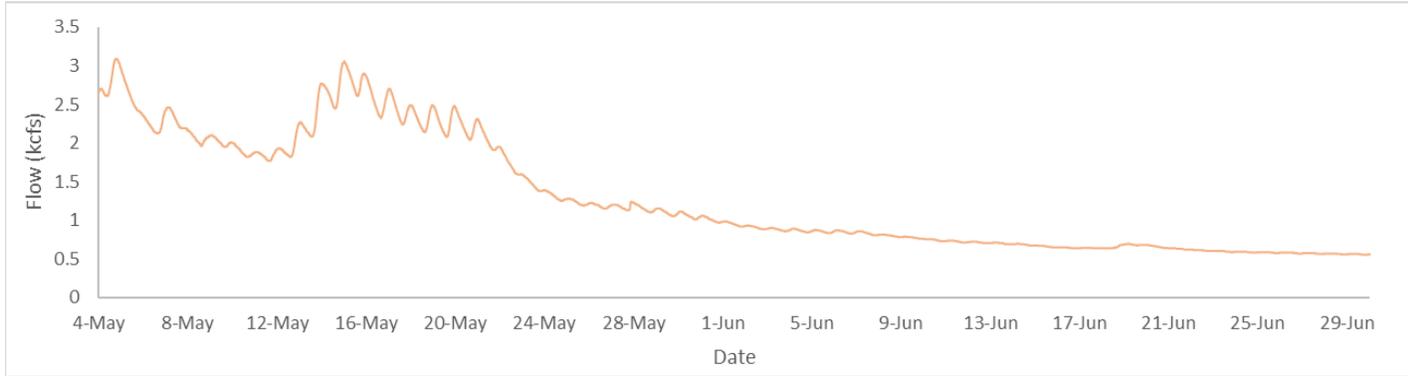
		O. mykiss Injuries to-date																					
Site/Trap/Life Stage	Total Fish	MUNK	DS<2	BLO	EYB	FUN	BKD	COP	DS>2	PRD	FID	HBO	BO	HO	BVT	HBP	BRU	TEA	OPD	HIN	FVB	POP	GBD
Detroit HOR	488	1	3		5	1		1	4	1	7				1		5	2	4	5	2	2	1
5 ft	488	1	3		5	1		1	4	1	7				1		5	2	4	5	2	2	1
Parr	3										1												
Smolt	2		1			1		1	1	1	1							1		1	1	1	
Fry	483	1	2		5				3		5				1		5	1	4	4	1	1	1
Green Peter HOR	1																						
5 ft	1																						
Fry	1																						

Steelhead (O. mykiss) During Reporting Period

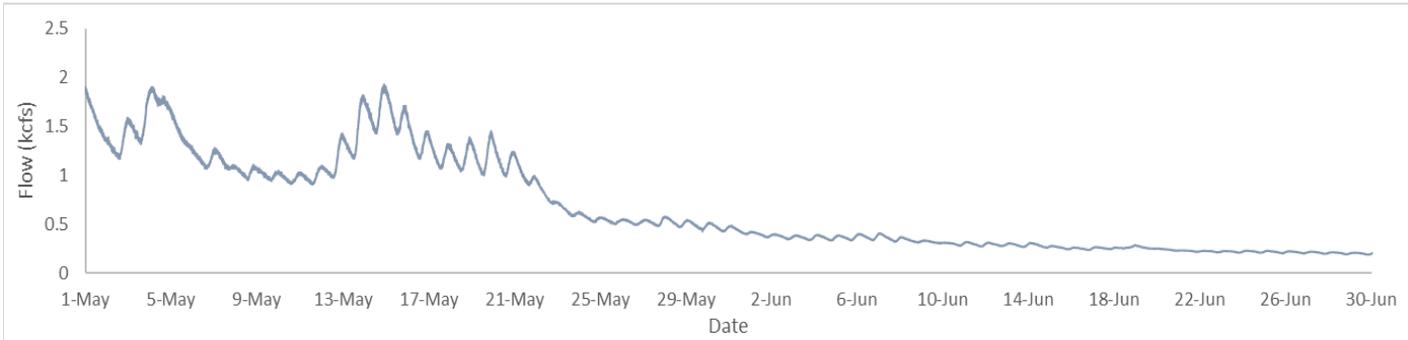
		O. mykiss Injuries During Reporting Period 6-16-2023 to 6-30-2023																					
Site/Trap/Life Stage	Total Fish	MUNK	DS<2	BLO	EYB	FUN	BKD	COP	DS>2	PRD	FID	HBO	BO	HO	BVT	HBP	BRU	TEA	OPD	HIN	FVB	POP	GBD
Breitenbush River	4		1								1												
5 ft	4		1								1												
Fry	1																						
Parr	3		1								1												
Detroit HOR	4		2								2												
5 ft	4		2								2												
Fry	1																						
Parr	3		2								2												

Appendix B

Detroit Head of Reservoir-North Santiam River Operational and Capture Data Since Start of Monitoring

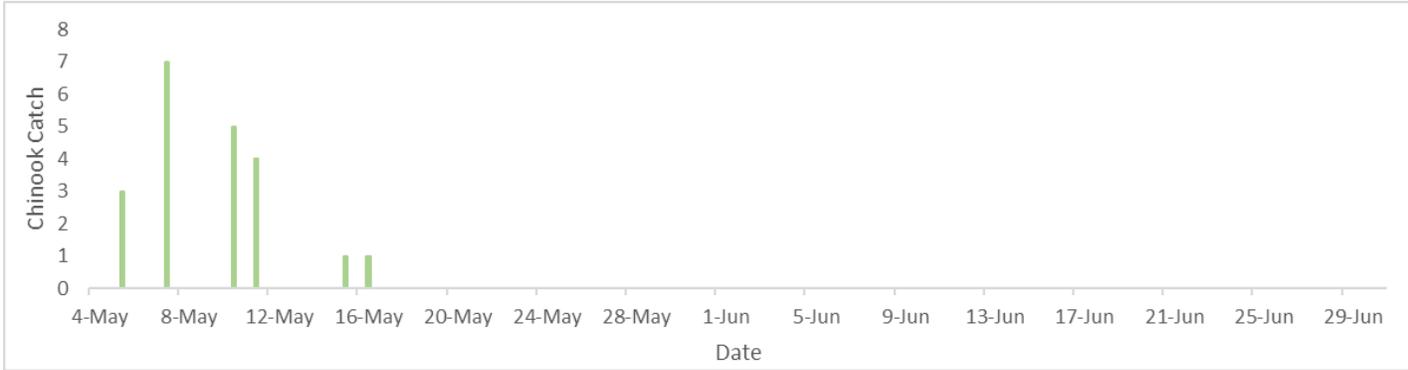


Breitenbush River Operational and Capture Data Since Start of Monitoring

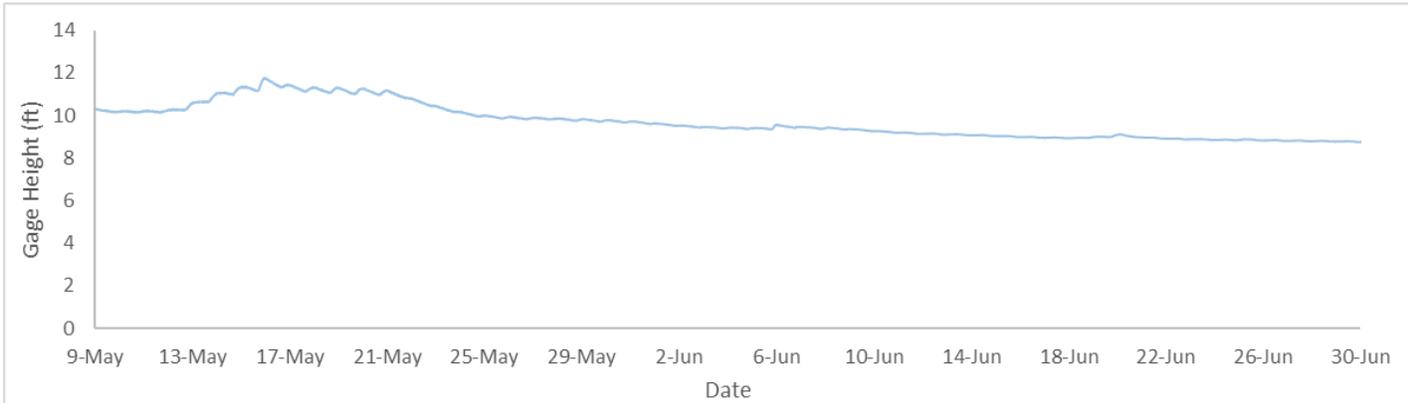


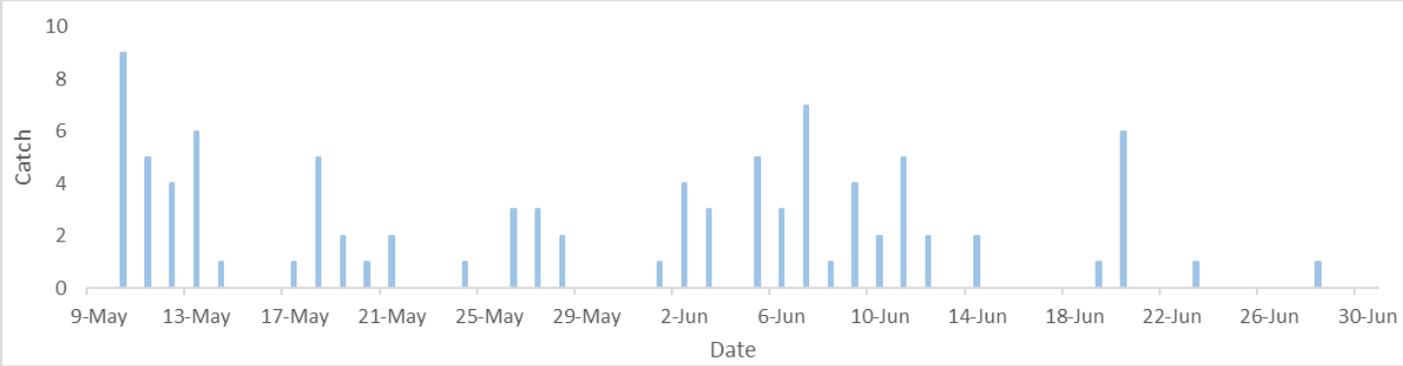
Green Peter Head of Reservoir-Middle Santiam River Operational and Capture Data Since Start of Monitoring





Hills Creek Head of Reservoir-Middle Fork Willamette River Operational and Capture Data Since Start of Monitoring





Appendix C

Summary of PIT Tagged Fish for Reporting Period

Site	Trap	Species	# of PIT Tagged Fish
Breitenbush River	5 ft	Chinook	4
Breitenbush River	5 ft	O. mykiss	3
Detroit Head of Reservoir – North Santiam River	5 ft	Chinook	2
Detroit Head of Reservoir – North Santiam River	5 ft	O. mykiss	3
Green Peter Head of Reservoir – Middle Santiam River	5 ft	Chinook	0
Green Peter Head of Reservoir – Middle Santiam River	5 ft	O. mykiss	0
Hills Creek Head of Reservoir	5 ft	Chinook	2

Summary of EAS VIE Marked Fish for Reporting Period

Site	Trap	VIE Mark Code	Species	# VIE
Breitenbush River	5 ft	HP	Chinook	24
Breitenbush River	5 ft	HP	O. mykiss	0
Detroit Head of Reservoir – North Santiam River	5 ft	RDP	Chinook	539
Detroit Head of Reservoir – North Santiam River	5 ft	RDP	O. mykiss	0
Green Peter Head of Reservoir – Middle Santiam River	5 ft	RDP	Chinook	0
Green Peter Head of Reservoir – Middle Santiam River	5 ft	RDP	O. mykiss	0
Hills Creek Head of Reservoir	5 ft	LDP	Chinook	7

RDO denotes location and color (Right Dorsal Pink, Head Pink)

List of Captured Fish Containing PIT Tags This Season

Site	Trap	PIT Tag	Date	Species
Detroit Head of Reservoir- North Santiam River	5 ft	3DD.003E4BA25E	6/17/2023	Chinook

List of EAS PIT Tagged Fish for Reporting Period

Site	Trap	PIT Tag	Date	Species
Breitenbush River	5 ft	3DD.003BEE0FCE	6/17/2023	Chinook
Breitenbush River	5 ft	3DD.003BEE0FF6	6/20/2023	Chinook
Breitenbush River	5 ft	3DD.003BEE0FAC	6/20/2023	Chinook
Breitenbush River	5 ft	3DD.003BEE0FF3	6/21/2023	Chinook
Breitenbush River	5 ft	3DD.003BEE0DFD	6/22/2023	O. mykiss
Breitenbush River	5 ft	3DD.003BEE0FAF	6/24/2023	O. mykiss
Breitenbush River	5 ft	3DD.003BD39619	6/27/2023	O. mykiss
Detroit Head of Reservoir- North Santiam River	5 ft	3DD.003BD22575	6/16/2023	Chinook

Detroit Head of Reservoir- North Santiam River	5 ft	3DD.003BEE1006	6/18/2023	O. mykiss
Detroit Head of Reservoir- North Santiam River	5 ft	3DD.003BEE0FD8	6/23/2023	O. mykiss
Detroit Head of Reservoir- North Santiam River	5 ft	3DD.003BD395FA	6/27/2023	O. mykiss
Detroit Head of Reservoir- North Santiam River	5 ft	3DD.003BD395F9	6/28/2023	Chinook
Hills Creek Head of Reservoir	5 ft	3DD.003BD397D9	6/19/2023	Chinook
Hills Creek Head of Reservoir	5 ft	3DD.003BD2273E	6/28/2023	Chinook