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Report Period: February 16 to February 28, 2022

Report No.: 2022 Willamette RST Bi-Weekly Report 02/016 – 02/28 by EAS

Re: WILLAMETTE VALLEY FISH PASSAGE MONITORING VIA ROTARY SCREW TRAPS

Project Schedule

Table 1. Project Schedule

| Site | Task | Start | End | Days |
|--------------------------------------|---|---------------------|------------|------|
| Hills Creek RO and PWR | Deployment | 10/12/21 | 10/12/21 | 1 |
| Hills Creek RO | Operation | 10/21/21 | 3/01/22 | 132 |
| Hills Creek PWR | Operation | 10/23/21 | 3/01/22 | 130 |
| Big Cliff Dam | Trap Efficiency Release (1,000 Fish) | 12/22/2021 | 12/22/2021 | 1 |
| Hills Creek | Trap Efficiency Release (1,200 fish, 600 per route) | 1/6/2022 | 1/6/2022 | 1 |
| Cougar Dam | Trap Efficiency Release (1,200 Fish, 600 per route) | 1/19/2022 | 1/19/2022 | 1 |
| Hills Creek | Trap Efficiency Release (1,200 fish, 600 per route) | 2/16/2022 | 2/16/2022 | 1 |
| Hills Creek | Trap Efficiency Release (1,200 fish, 600 per route) | 2/23/2022 | 2/23/2022 | 1 |
| Cougar Dam RST | Operation | 12/01/21 | 12/31/22 | 396 |
| Big Cliff Dam RST | Operation | 12/01/21 | 2/15/22 | 292 |
| Big Cliff Dam RST | Operation | 3/15/22 | 10/15/22 | |
| Fall Creek RST | Operation | 01/13/22 | 05/31/22 | 139 |
| Fall Creek Dam RST | Operation | 03/15/2022 | 07/15/2022 | 122 |
| Lookout RSTs | Operation | 03/15/2022 | 07/31/2022 | 139 |
| Hills Creek RSTs | Trap Removal | 03/01/2022 | 03/01/2022 | 1 |
| Dexter RST | Highline Install | 03/02/2022 | 03/02/2022 | 1 |
| Dexter RST | Trap Install | 03/03/2022 | 03/03/2022 | 1 |
| Dexter RST | Operation | *03/04/2022 | 06/30/2022 | 119 |
| Green Peter RST | Trap Install | 03/02/2022 | 03/02/2022 | 1 |
| Green Peter RST | Operation | *03/03/2022 | 06/30/2022 | 120 |
| South Santiam RST | Operation | When trap available | 06/30/2022 | TBD |
| South Fork McKenzie above Cougar Dam | Highline and Trap Install | *3/7/2022 | 3/7/2022 | 1 |
| South Fork McKenzie above Cougar Dam | Operation | *3/7/2022 | 06/30/2022 | 116 |

*Denotes tentative date

Summary of Rotary Screw Trap Data

Rotary screw traps (RSTs) were operated at four locations in the southern Willamette River watershed: on the Middle Fork Willamette River below Hills Creek Dam (Hills Creek), the South Fork McKenzie River below Cougar Dam (Cougar Dam), the North Santiam River below Big Cliff Dam (Big Cliff) and Fall Creek above Fall Creek reservoir. The locations of the RST's are depicted in Figures 1, 2, 3 and 4 respectively. Sampling sites generally monitor individual routes for fish passage at the dams, including powerhouse (PWR) and regulating outlets (RO) and above reservoir free-flowing streams. Sampling began at the Hills Creek site on October 21, 2021, at the Cougar and Big Cliff sites on December 1, 2021 and Fall Creek on January 13, 2022. Sampling dates and catch summaries are provided in Tables 2 and 3, respectively.



Figure 1. Hills Creek Dam RST Locations



Figure 2. Cougar Dam RST Locations

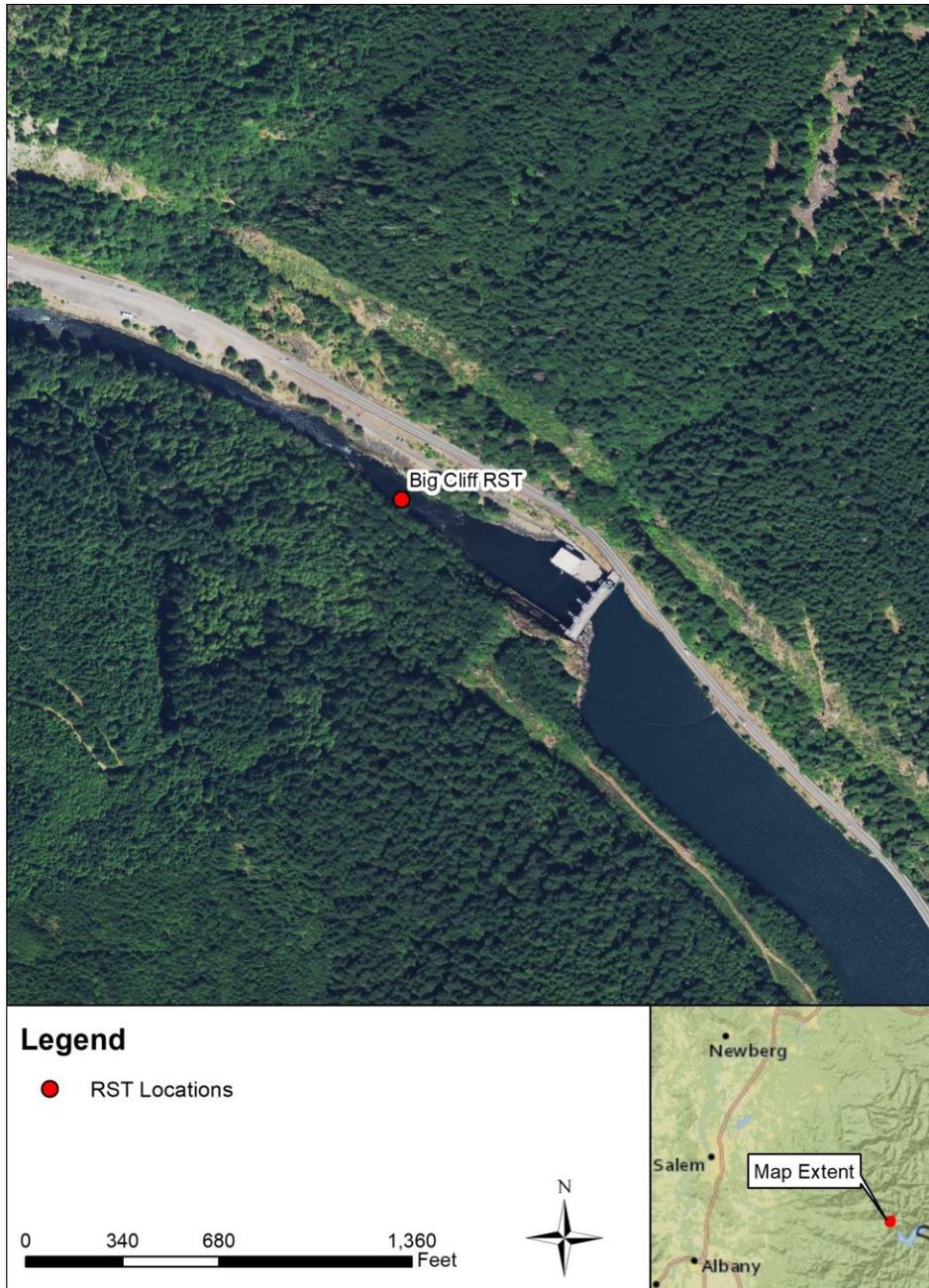


Figure 3. Big Cliff RST Location



Figure 4. Fall Creek RST Location

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 |
|-----------------|-----------------------------|--------------------------------|------------------------------|--------------------------|--------------------|
| Hills Creek RO | 10/21/2021 | 2/16/2022 | 2/28/2022 | 13 | 131 |
| Hills Creek PWR | 10/21/2021 | 2/16/2022 | 2/28/2022 | 13 | 131 |
| Cougar RO | 12/1/2021 | 2/16/2022 | 2/28/2022 | 13 | 90 |
| Cougar PWR | 12/1/2021 | 2/16/2022 | 2/28/2022 | 13 | 90 |
| Big Cliff | 12/1/2021 | 2/16/2022 | 2/28/2022 | 13 | 90 |
| Fall Creek | 1/13/2022 | 2/16/2022 | 2/28/2022 | 13 | 47 |

Table 3. Willamette Valley Rotary Screw Trap Monitoring Catch Summary

| Site | Species | Catch (Reporting Period) | Recaptures (Reporting Period) | Total Catch | Total Recaptures |
|-------------|---------|--------------------------|-------------------------------|-------------|------------------|
| Hills Creek | CHS | 0 | 44 | 133 | 82 |
| Cougar | CHS | 6 | 0 | 175 | 66 |
| Big Cliff | CHS | 0 | 1 | 95 | 40 |
| Fall Creek | CHS | 1 | 0 | 2 | 0 |

Middle Fork Willamette – Hills Creek Dam

Target Species

This reporting period began on February 16 and ended February 28. There were 0 Chinook salmon (CHS) captured during the 13-day sampling period (Figure 5). Sampling durations were 100% for both RO RST and Powerhouse RST. Table 4 provides life stage, length, and weight data for all Chinook salmon that have been caught at the Hills Creek site to-date and Figure 5 shows length frequency data to-date.

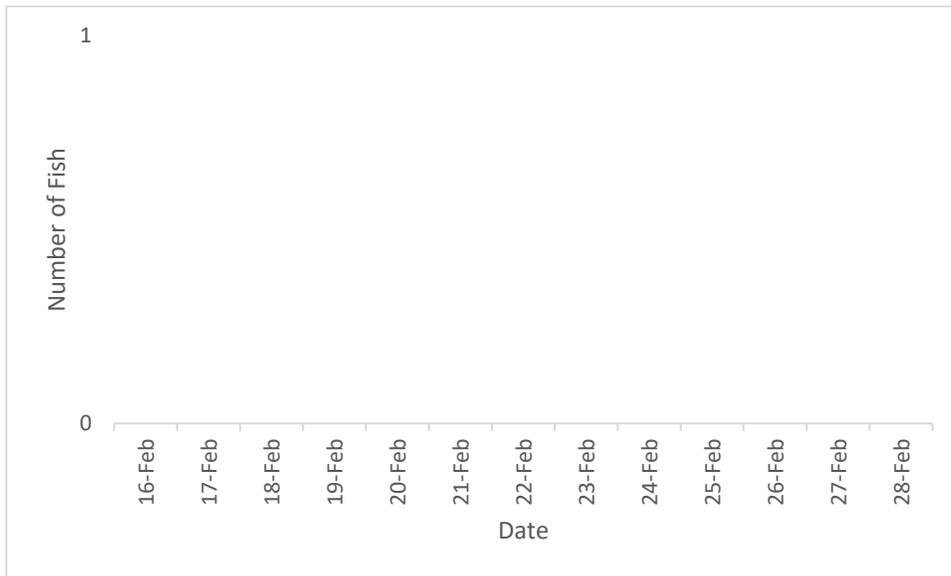
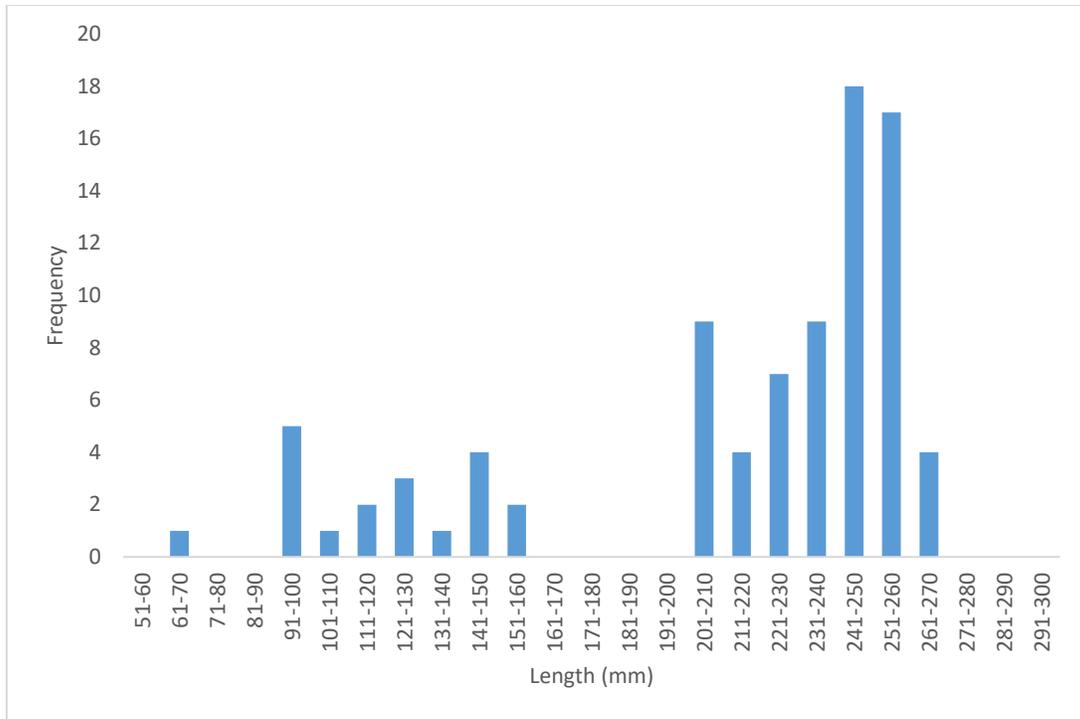


Figure 5. Chinook Captured Per Day 02/16/2022 to 02/28/2022 (Hills Creek)



*Figure does not include fish without heads or fish used for trapping efficiency

Figure 6. Length Frequency of Juvenile Chinook Sampled Season To-Date (Hills Creek)

Trapping Efficiency

During this reporting period, 2 trapping efficiency trials were conducted at Hills Creek Dam. The first being on 2/16/2022 and the second being on 2/25/2022.

During the first Trapping Efficiency trail, a total of 600 juvenile Chinook (parr) were dyed, clipped and released on 02/16/2022 below Hills Creek PWR and 593 below the RO to evaluate the efficiency of the screw trap at those locations. A total of 8 fish were recaptured in the 8ft PWR trap on 2/16/2022 and an additional 4 captured on 2/17/2022 for a total of 12 chinook recaptures in the PH trap. A total of 19 chinook were captured in the 5ft RO trap on 02/17/2022. No PWR route fish were captured in the RO trap. Route-specific trapping efficiency was 2.00% at the PH trap and 3.20% at the RO.

Of the fish recaptured, 1 was dead and an additional 27 were injured of the total 31 recaptures. Injuries were primarily descaling (16) and fin damage (26). Mt. Hood Environmental staff noted that most fish appeared to have minor descaling with some fin damage, but in good condition overall upon retrieval from the hatchery.

EAS staff arrived at Hills Creek late in the day, shortly after MHE staff released the 1,193 fish, to check the traps. Trap checks have a negligible effect on fish captures as sampling does not cease when checking traps.

| Hills Creek Dam | Release # | Recapture # | Capture Efficiency |
|-----------------|-----------|-------------|--------------------|
| PH Route | 600 | 12 | 2.00% (12/600) |
| RO Trap | 593 | 19 | 3.20% (19/593) |

*Live fish captured at the PH trap are released just downstream of the PH trap, upstream of the RO trap and therefore retained in the capture efficiency estimates for the RO Trap if they arrive in the lower trap.

*Any dead fish captured at the PH trap are excluded from the RO trap capture efficiency estimate as they are not alive at time of re-release.

During the second Trapping Efficiency trail, a total of 604 juvenile Chinook (parr) were dyed, clipped and released on 02/25/2022 below Hills Creek PWR and 625 below the RO to evaluate the efficiency of the screw trap at those locations. A total of 5 fish were recaptured in the 8ft PWR trap on 2/26/2022 and an additional 1 captured on 2/27/2022 for a total of 6 chinook recaptures in the PH trap. A total of 6 chinook were captured in the 5ft RO trap on 02/26/2022 and an additional 1 captured on 2/27/2022 for a total of 7 chinook recaptures in the RO trap. No PWR route fish were captured in the RO trap. Route-specific trapping efficiency was 0.99% at the PH trap and 1.12% at the RO.

Of the fish recaptured, 1 was dead and an additional 11 were injured of the total 13 recaptures. Injuries were primarily descaling (11) and fin damage (12). Mt. Hood Environmental staff noted that most fish appeared to have minor descaling with some fin damage, but in good condition overall upon retrieval from the hatchery.

| Hills Creek Dam | Release # | Recapture # | Capture Efficiency |
|-----------------|-----------|-------------|--------------------|
| PH Route | 604 | 6 | 0.99% (6/604) |
| RO Trap | 625 | 7 | 1.12% (7/625) |

*Live fish captured at the PH trap are released just downstream of the PH trap, upstream of the RO trap and therefore retained in the capture efficiency estimates for the RO Trap if they arrive in the lower trap.

*Any dead fish captured at the PH trap are excluded from the RO trap capture efficiency estimate as they are not alive at time of re-release.

Previous trapping efficiency trial results can be found in Appendix C.

Table 4. Descriptive Statistics of Target Species Captured at Hills Creek Dam Season To-Date and for the Reporting Period

| To-Date | | | | | | | | | | |
|-------------|-------|---------|------------|-----------|--------------|-------|-------|-------------|-------|-------|
| Site | Route | Species | Life stage | Collected | Length (mm)* | | | Weight (g)* | | |
| | | | | | Min | Max | Mean | Min | Max | Mean |
| Hills Creek | RO | CHS | Parr | 6 | 90.0 | 141.0 | 110.7 | 7.4 | 23.4 | 13.3 |
| | | CHS | Smolt | 57 | 137.0 | 265.0 | 233.0 | 27.35 | 192.3 | 145.6 |
| Hills Creek | PWR | CHS | Parr | 7 | 69.0 | 127.0 | 98.1 | 3.7 | 24.5 | 11.2 |
| | | CHS | Smolt | 25 | 128.0 | 265.0 | 224.3 | 26.2 | 188.7 | 130.6 |

*Fish that were missing heads are not included in length and weight calculations. One fish was a head only and could not be assigned a life stage

| February 16-28, 2022 | | | | | | | | | | |
|----------------------|-------|---------|------------|-----------|--------------|-----|------|-------------|-----|------|
| Site | Route | Species | Life stage | Collected | Length (mm)* | | | Weight (g)* | | |
| | | | | | Min | Max | Mean | Min | Max | Mean |
| Hills Creek | RO | 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 |
| Hills Creek | PWR | 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 |

Injuries and Copepod Infection

No chinook were captured for the reporting period (Table 5).

Table 5. Number of Descaled, Bodily/Eye Injured, Copepod Infected and Dead Chinook Salmon for Sampling Period. (Hills Creek)

| Site | Route | # CHS Collected | # DSC* <20% | # DSC* >20% | # with Body Injuries | # with Eye Injuries | # with COP* In B.C. | # with COP* on Fins | Mortalities |
|-------------|-------|-----------------|-------------|-------------|----------------------|---------------------|---------------------|---------------------|-------------|
| Hills Creek | RO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hills Creek | PWR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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

Non-Target Species

A total of 7 non-target fish were captured at Hills Creek during the reporting period; the data is summarized below in Table 6.

Table 6. Summary of Non-target Species (Hills Creek).

| Species | RO Capture | RO Mortality | PWR Capture | PWR Mortality | Season Total | Season Total Mortality |
|------------------|------------|--------------|-------------|---------------|--------------|------------------------|
| Bluegill | 0 | 0 | 2 | 0 | 54 | 27 |
| Brook Lamprey | 0 | 0 | 0 | 0 | 1 | 0 |
| Bullhead | 0 | 0 | 0 | 0 | 1 | 0 |
| Bull Trout | 0 | 0 | 0 | 0 | 1 | 0 |
| Crappie | 0 | 0 | 6 | 0 | 61 | 40 |
| Longnose Dace | 0 | 0 | 0 | 0 | 2 | 0 |
| Red-Sided Shiner | 0 | 0 | 0 | 0 | 18 | 2 |
| Sculpin | 0 | 0 | 5 | 0 | 46 | 0 |
| Spotted Bass | 0 | 0 | 0 | 0 | 6 | 1 |
| Sucker | 0 | 0 | 0 | 0 | 2 | 1 |
| Whitefish | 0 | 0 | 0 | 0 | 1 | 1 |
| <i>O. mykiss</i> | 0 | 0 | 0 | 0 | 64 | 22 |
| Totals | 0 | 0 | 7 | 0 | 257 | 94 |

Stream Statistics

Basic stream statistics at the Hills Creek site were calculated from data downloaded from the U.S. Geological Survey stream gage number 14145110. Gage height (feet) is the only metric provided at this gage. During the reporting period, daily maximum values for instantaneous gage height ranged from 1,223.89 feet to 1,224.06 feet (mean: 1,223.93 feet). Figure 7 shows instantaneous gage height.

Stream temperatures were recorded every 2 hours for the both the RO RST and the PWR RST (Figures 8 and 9). Temperature probes operated normally throughout this reporting period.

Flows through the PWR and RO during the reporting period averaged 334.35 and 87.2 cubic feet per second (cfs) respectively (Figure 10). Catch per unit of effort (CPUE) data are summarized in Table 7. Discharge and capture data for the duration of monitoring efforts at this location are provided in Appendix B.

Table 7. Summary of Chinook CPUE, Hills Creek.

| Description | Chinook | |
|----------------|----------|----------|
| | RO (5ft) | PWR(8ft) |
| Catch | 0 | 0 |
| Effort (hrs) | 317.3 | 316.5 |
| CPUE (fish/hr) | 0 | 0 |

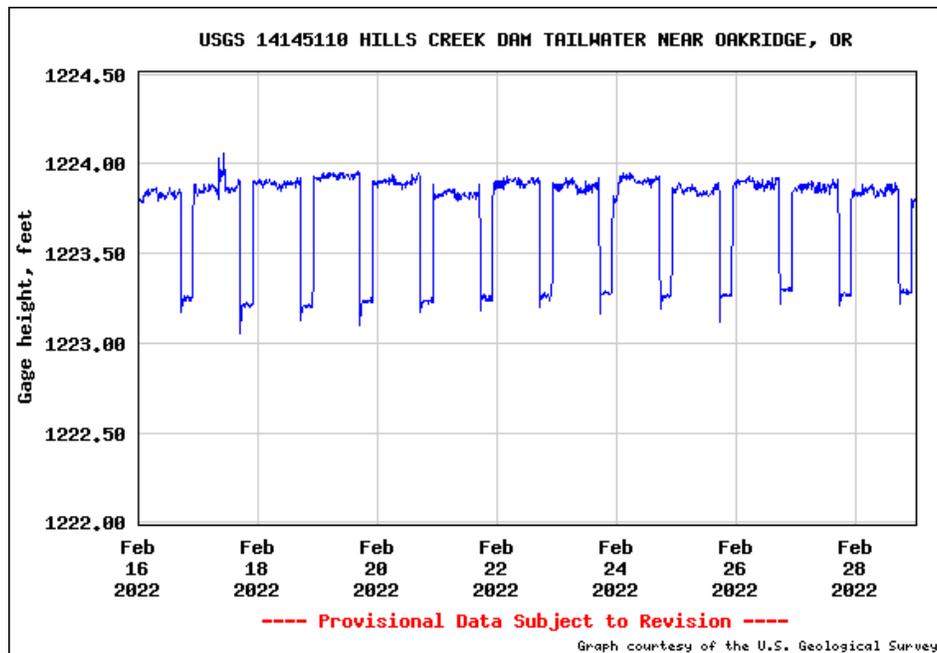


Figure 7. Gage Height (feet); below Hills Creek Dam, Middle Fork Willamette River

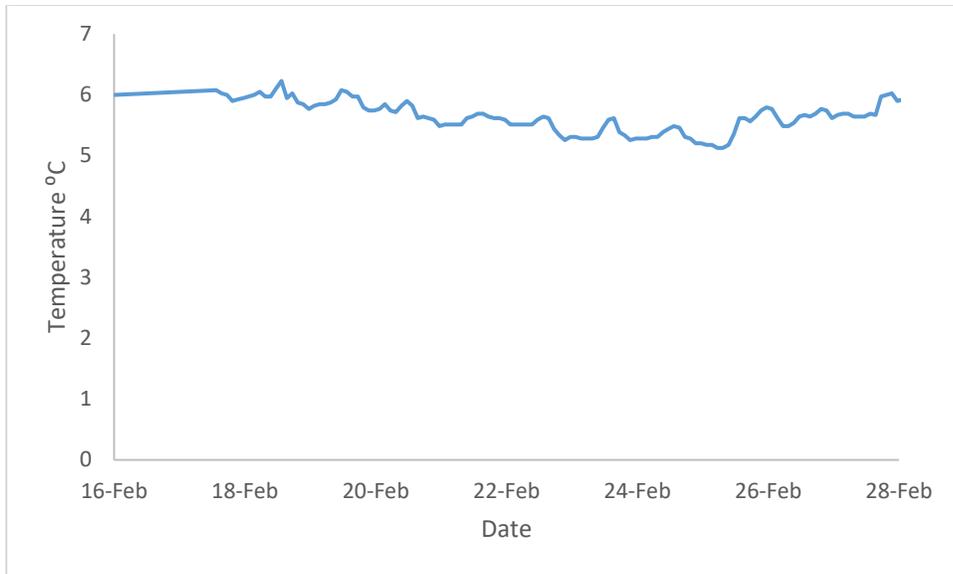


Figure 8. Temperature at RO RST (Hills Creek)

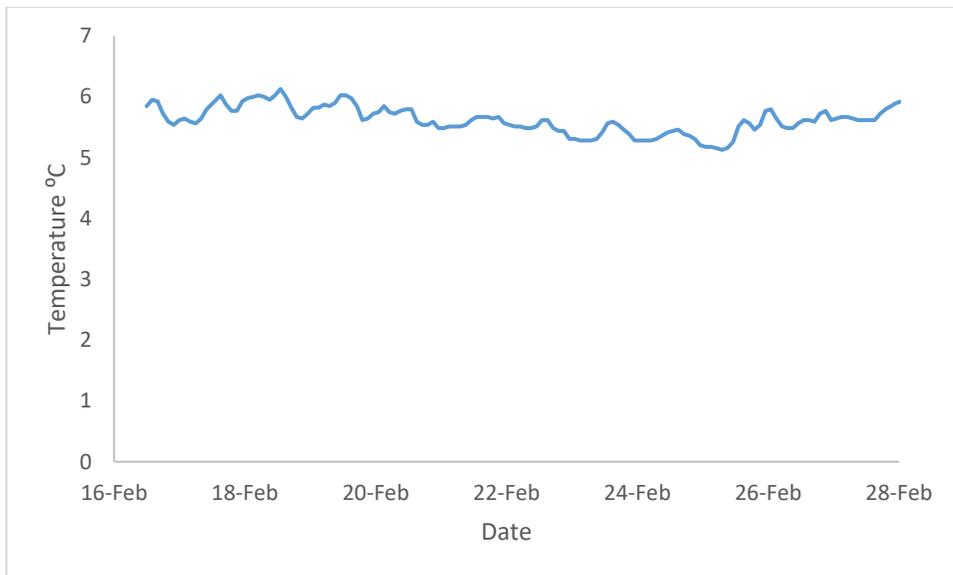


Figure 9. Temperature at Powerhouse RST (Hills Creek)

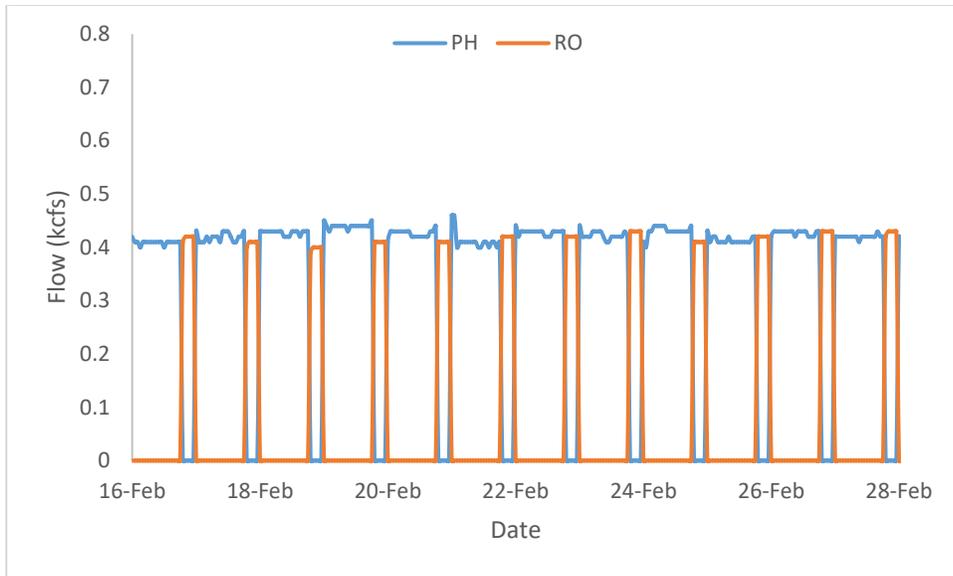
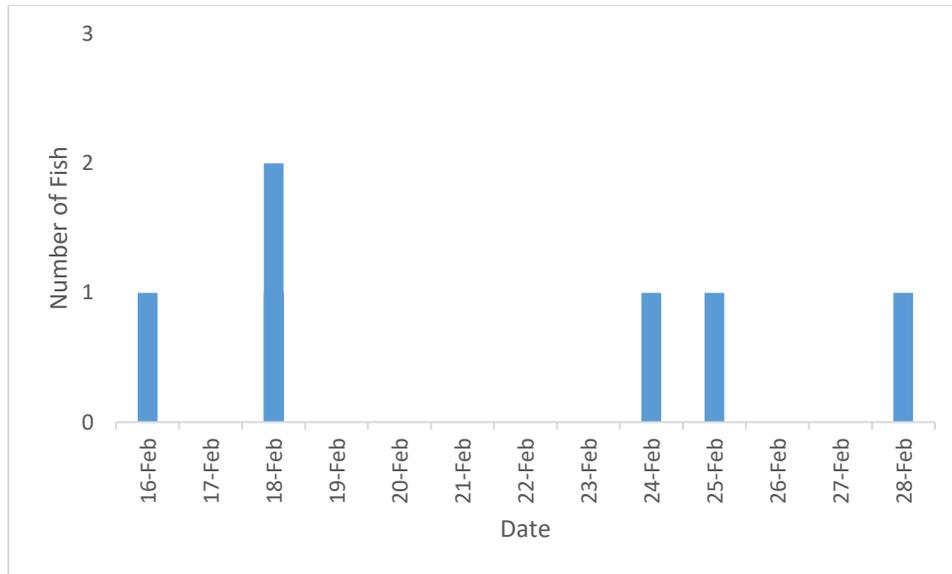


Figure 10. Hourly Flows PWR vs. RO (Hills Creek)

South Fork McKenzie – Cougar Dam

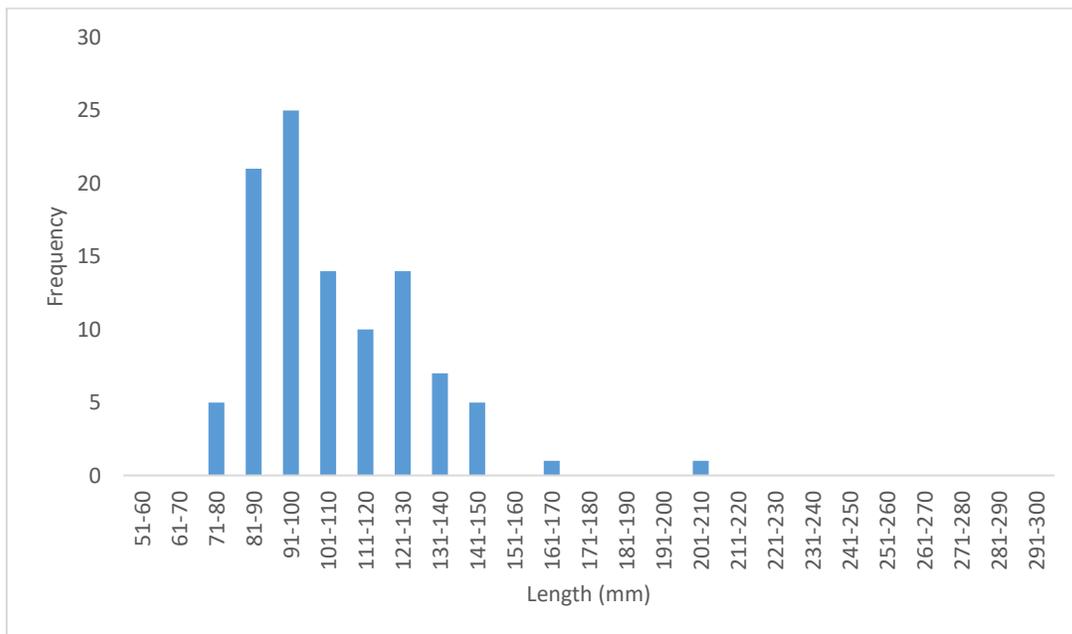
Target Species

This reporting period began on February 16 and ended on February 28. There was a total of 6 Chinook salmon (CHS) captured during the 13-day sampling period (Figure 11). Sampling duration was 100% for both RO RST and Powerhouse RST. Table 8 provides life stage, length, and weight data for all Chinook salmon that have been caught at the Cougar Dam site to-date and for the reporting period. Figure 11 shows the daily capture numbers for chinook and Figure 12 shows length frequency data to-date.



*Recaptured fish for trapping efficiency trials not included.

Figure 11. Chinook Captured Per Day 02/16/2022 to 02/28/2022 (Cougar Dam)



*Figure does not include fish without heads or fish used for trapping efficiency trials.

Figure 12. Length Frequency of Juvenile Chinook Sampled Season To-Date (Cougar Dam)

Trapping Efficiency

A total of 815 juvenile hatchery Chinook (parr) were bismark brown dyed, left and right ventrally clipped and released on 01/19/2022 below Cougar Dam. 405 dyed and left ventrally clipped fish were released below the PWR and 410 dyed and right ventrally clipped fish were released below the RO to evaluate the efficiency of the screw trap at those locations. A total of 37 fish were recaptured in the 8ft PH traps and 25 in the 5ft RO trap on 01/20/2022, with 3 more fish captured in the PH traps and 1 more fish in the RO trap on 01/21/2022 for a total of 40 recaptures in the PH traps and 26 in the RO trap. Route-specific trapping efficiency was 9.88% at the PH traps and 6.34% at the RO.

Of the 66 fish recaptured, 2 were dead and an additional 50 were injured. Injuries were primarily descaling (25) and fin damage (44). Mt. Hood Environmental staff noted that fish appeared to be in good condition upon retrieval from the hatchery.

| Cougar Dam | Release # | Recapture # | Capture Efficiency |
|------------|-----------|-------------|--------------------|
| PH Route | 405 | 40 | 9.88% (40/405) |
| RO Route | 410 | 26 | 6.34% (26/410) |

Table 8. Descriptive Statistics of Target Species Captured at the Cougar Dam Season To-Date

| To-Date | | | | | | | | | | |
|---------|-------|---------|------------|-----------|--------------|-------|-------|-------------|------|------|
| Site | Route | Species | Life stage | Collected | Length (mm)* | | | Weight (g)* | | |
| | | | | | Min | Max | Mean | Min | Max | Mean |
| Cougar | RO | CHS | Parr | 37 | 72.0 | 145.0 | 98.6 | 4.2 | 30.7 | 10.6 |
| | | CHS | Smolt | 12 | 95.0 | 202.0 | 138.7 | 8.8 | 83.9 | 29.7 |
| Cougar | PWR | CHS | Parr | 52 | 74.0 | 142.0 | 103.9 | 4.1 | 31.3 | 12.4 |
| | | CHS | Smolt | 7 | 115.0 | 133.0 | 125.6 | 13 | 28.4 | 21.3 |

| February 16-28, 2022 | | | | | | | | | | |
|----------------------|-------|---------|------------|-----------|--------------|-------|-------|-------------|------|------|
| Site | Route | Species | Life stage | Collected | Length (mm)* | | | Weight (g)* | | |
| | | | | | Min | Max | Mean | Min | Max | Mean |
| Cougar | RO | CHS | Parr | 4 | 85.0 | 113 | 98.3 | 6.7 | 12.9 | 9.5 |
| | | CHS | Smolt | 1 | 114.0 | 114.0 | 114.0 | 15.0 | 15.0 | 15.0 |
| Cougar | PWR | CHS | Parr | 1 | 99.0 | 99.0 | 99.0 | 10.3 | 10.3 | 10.3 |
| | | CHS | 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.

24-Hour Post Collection Holding Trial

A total of 6 Chinook captured in the RSTs were held for ~24 hours in holding tanks and then evaluated for survival rates. All fish (100%) held during this period were released alive.

Injuries and Copepod Infection

Partial descaling <20% was observed on 4 of 5 Chinook collected at the RO RST (80%), and descaling >20% was observed on 0 of 5 Chinook collected at the RO RST (0%). Of the 5 Chinook captured in the RO RST 3 displayed body injuries (60%) and 2 had eye injuries (40%). 2 of the RO RST Chinook had copepods present in the branchial cavity (40%) and 2 had copepods present on fins (40%). Partial descaling <20% was observed on the 1 Chinook collected at the PWR RST (100%). No PWR RST fish had bodily injury or eye injuries (0%). The one PWR RST fish had copepods present in the branchial cavity (100%) and had copepods present on fins (100%). There were 0 chinook mortalities collected in the RO RST (0%) or in the PWR RST (0%). A summary of injuries observed during the reporting period, and for the duration of the season are provided in Appendix A.

Table 9. Number of Descaled, Bodily/Eye Injured, Copepod Infected and Dead Chinook Salmon for Sampling Period. (Cougar Dam).

| Site | Route | # CHS Collected | # DSC* <20% | # DSC* >20% | # with Body Injuries | # with Eye Injuries | # with COP* In B.C. | # with COP* on Fins | Mortalities |
|--------|-------|-----------------|-------------|-------------|----------------------|---------------------|---------------------|---------------------|-------------|
| Cougar | RO | 5 | 4 | 0 | 3 | 2 | 2 | 2 | 0 |
| Cougar | PWR | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |

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

Non-Target Species

A total of 2 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 (Cougar Dam).

| Species | RO Capture | RO Mortality | PWR Capture | PWR Mortality | Season Total Live | Season Total Mortality |
|------------------|------------|--------------|-------------|---------------|-------------------|------------------------|
| Bluegill | 0 | 0 | 0 | 0 | 0 | 0 |
| Brook Lamprey | 0 | 0 | 0 | 0 | 0 | 0 |
| Bullhead | 0 | 0 | 0 | 0 | 0 | 0 |
| Crappie | 0 | 0 | 0 | 0 | 0 | 0 |
| Longnose Dace | 0 | 0 | 0 | 0 | 0 | 0 |
| Kokanee | 0 | 0 | 0 | 0 | 0 | 0 |
| Red-Sided Shiner | 0 | 0 | 0 | 0 | 0 | 0 |
| Sculpin | 0 | 0 | 0 | 0 | 2 | 0 |
| Spotted Bass | 0 | 0 | 0 | 0 | 0 | 0 |
| Sucker | 0 | 0 | 0 | 0 | 0 | 0 |
| Whitefish | 0 | 0 | 0 | 0 | 1 | 0 |
| Cutthroat | 0 | 0 | 1 | 0 | 2 | 0 |
| <i>O. mykiss</i> | 0 | 0 | 1 | 0 | 8 | 0 |
| Totals | 0 | 0 | 2 | 0 | 13 | 0 |

Stream Statistics

Basic stream statistics at the Cougar Dam site were calculated from data downloaded from the U.S. Geological Survey stream gage number 14159410. Gage height (feet) is the only metric provided at this gage. During the reporting period, daily maximum values for instantaneous gage height ranged from 1,253.23 feet to 1,253.41 feet (mean: 1,253.34 feet). Figure 13 shows instantaneous gage height.

Stream temperatures were recorded every 2 hours for the length of the report period for the RO and PWR RST's (Figure 14 and 15 respectively). Temperature probes for the RO and PWR RST operated normally throughout this reporting period.

Flows through the Powerhouse and RO during the reporting period averaged 273.8 and 332.4 cubic feet per second (cfs) respectively (Figure 16). 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, Cougar Dam.

| | Chinook | |
|----------------|----------|----------|
| Description | RO (5ft) | PWR(8ft) |
| Catch | 5 | 1 |
| Effort (hrs) | 312.1 | 622.5 |
| CPUE (fish/hr) | 0.016 | 0.0016 |

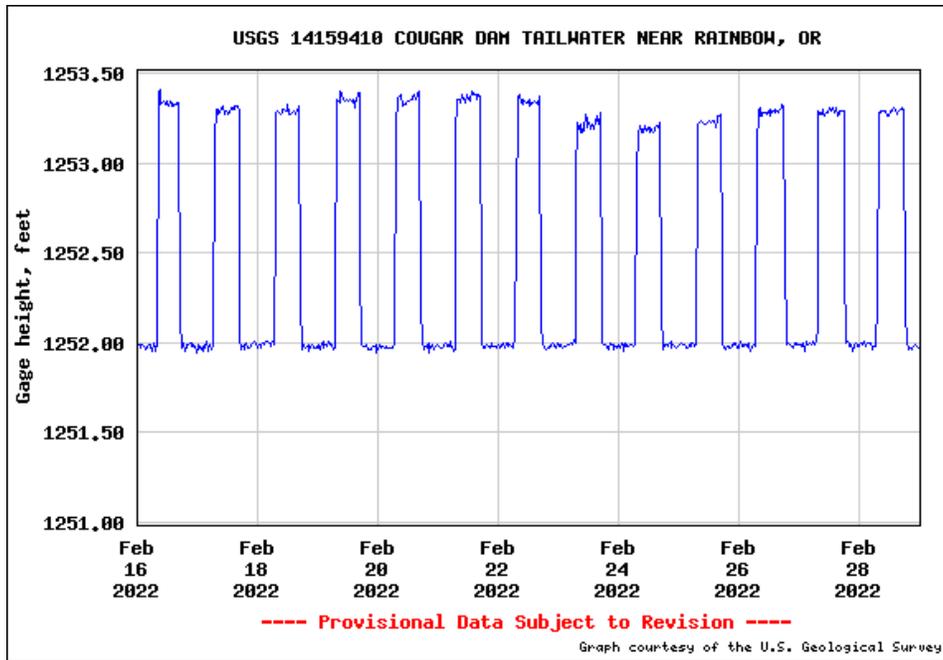


Figure 13. Gage Height (feet); below Cougar Dam, South Fork McKenzie River

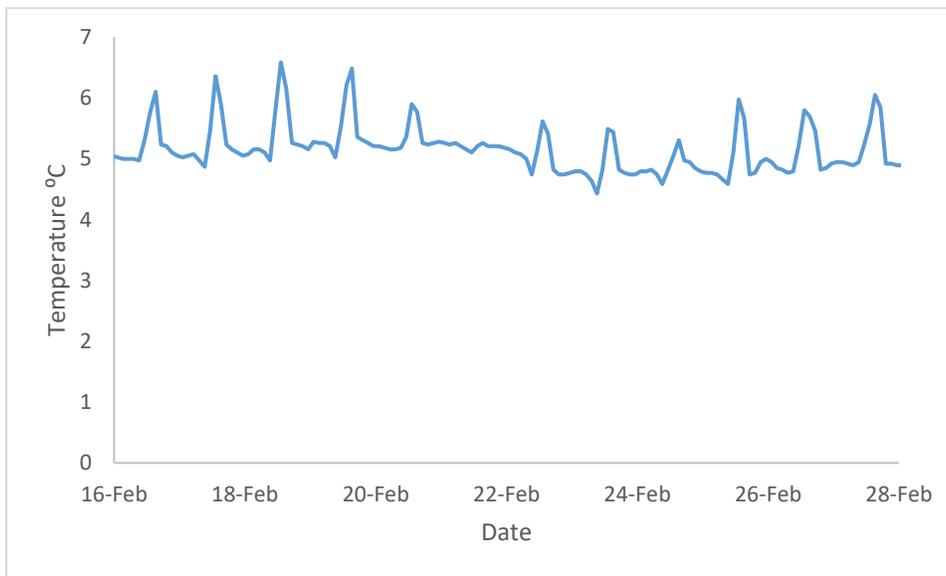


Figure 14. Temperature at RO RST (Cougar Dam)

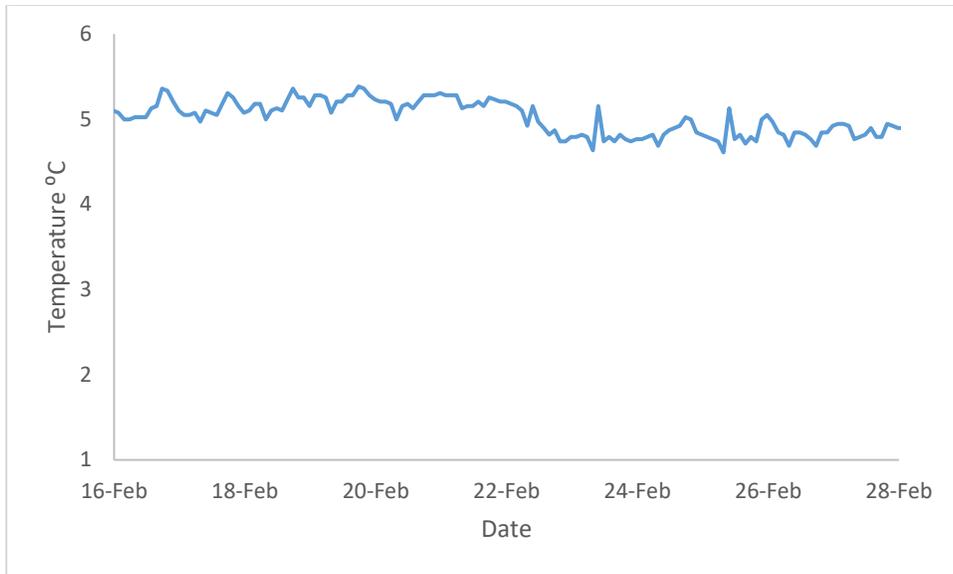


Figure 15. Temperature at PWR RST (Cougar Dam)

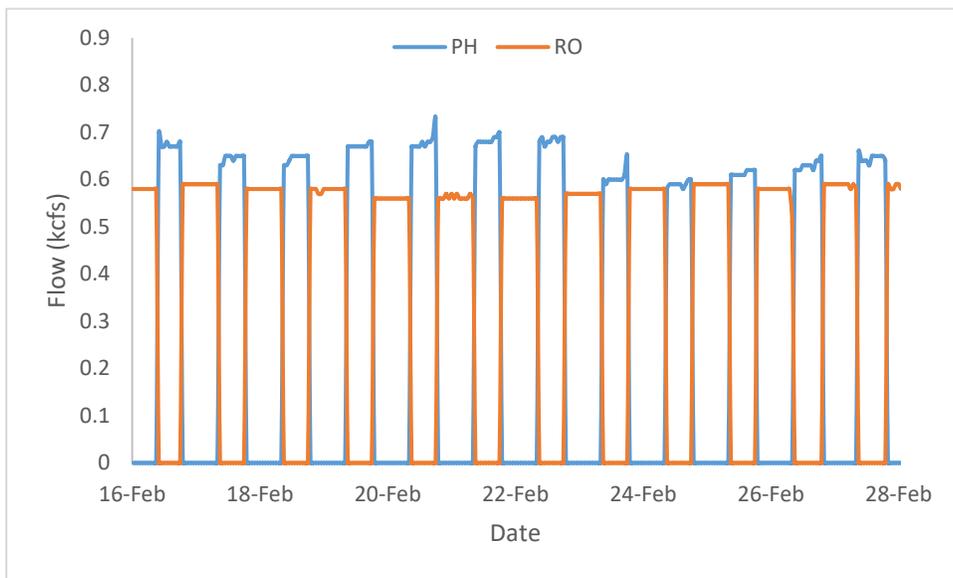


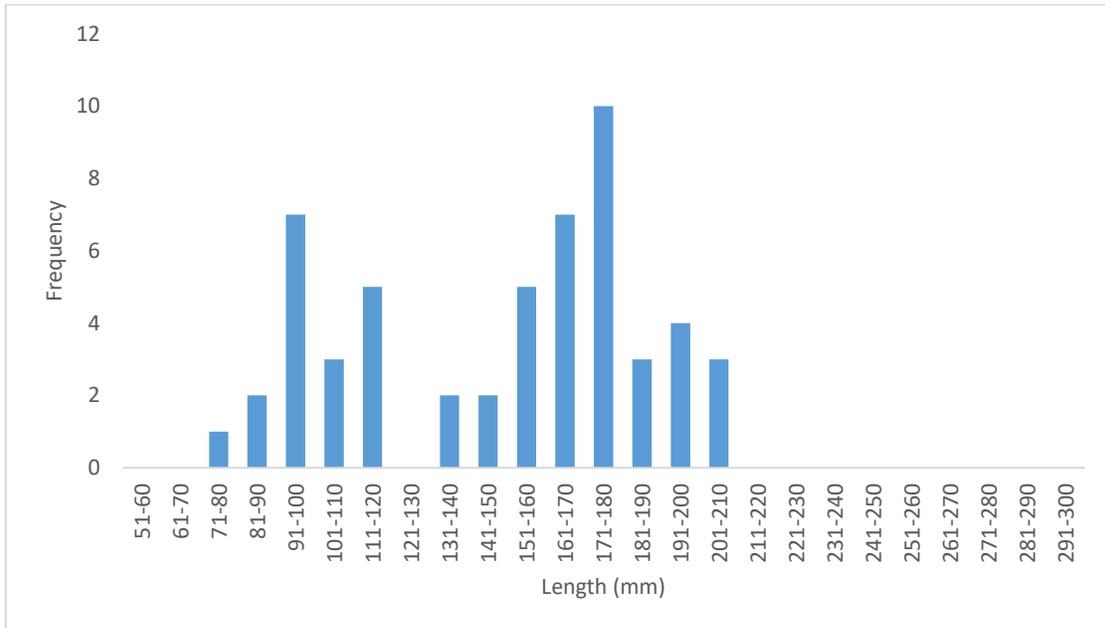
Figure 16. Hourly Flows PWR vs. RO (Cougar Dam)

North Santiam – Big Cliff Dam

During a transitional period between implementation measures of fish passage, rotary screw trap monitoring at Big Cliff Dam is paused from 15 February 2022 to 15 March 2022. In the interim, to-date data is represented below and in Appendix B along with trapping efficiency information.

Target Species

Figure 17 shows length frequency data to-date.



*Figure does not include fish without heads

Figure 17. Length Frequency of Juvenile Chinook Sampled Season To-Date (Big Cliff)

Trapping Efficiency

A total of 996 juvenile hatchery Chinook (parr) were bismark brown dyed, adipose clipped and released on 12/22/2021 below Big Cliff Dam. A total of 39 fish were recaptured in the 8ft trap 12/23/2021, with 1 more fish captured in the 8ft trap 02/15/2022 for a total of 40 recaptures. Trapping efficiency was 4.01%.

Of the initial 39 fish recaptured, no injuries were observed. The fish recaptured on 2/15/2022 was injured. The injured fish had copepods on its fins and in the branchial cavity. Mt. Hood Environmental staff noted that fish appeared to be in good condition upon retrieval from the hatchery.

| Big Cliff Dam | Release # | Recapture # | Capture Efficiency |
|---------------|-----------|-------------|--------------------|
| 8ft Trap | 996 | 40 | 4.01% (40/996) |

Table 12. Descriptive Statistics of Target Species Captured at Big Cliff Dam Season To-Date

| To-Date | | | | | | | | | | |
|-----------|-------|---------|------------|-----------|--------------|-------|-------|-------------|-------|------|
| Site | Route | Species | Life stage | Collected | Length (mm)* | | | Weight (g)* | | |
| | | | | | Min | Max | Mean | Min | Max | Mean |
| Big Cliff | PWR | CHS | Parr | 15 | 78.0 | 115.0 | 99.1 | 6.1 | 20.1 | 11.4 |
| | | CHS | Smolt | 40 | 113.0 | 210.0 | 168.7 | 14.2 | 103.8 | 50.4 |

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

Non-Target Species

Summary of to-date non-target species catch and mortality numbers are listed in Table 13.

Table 13. Summary of Non-target Species (Big Cliff Dam).

| Species | PWR Capture | PWR Mortality | Season Total | Season Total Mortality |
|------------------|-------------|---------------|--------------|------------------------|
| Bluegill | 0 | 0 | 6 | 2 |
| Brook Lamprey | 0 | 0 | 0 | 0 |
| Bullhead | 0 | 0 | 1 | 0 |
| Crappie | 0 | 0 | 0 | 0 |
| Longnose Dace | 0 | 0 | 0 | 0 |
| Kokanee | 0 | 0 | 91 | 36 |
| Red-Sided Shiner | 0 | 0 | 0 | 0 |
| Sculpin | 0 | 0 | 0 | 0 |
| Spotted Bass | 0 | 0 | 0 | 0 |
| Sucker | 0 | 0 | 0 | 0 |
| Whitefish | 0 | 0 | 4 | 0 |
| Cutthroat | 0 | 0 | 2 | 0 |
| <i>O. mykiss</i> | 0 | 0 | 1 | 0 |
| Unknown | 0 | 0 | 1 | 0 |
| Totals | 0 | 0 | 106 | 38 |

Middle Fork Willamette – Fall Creek Above Reservoir

Target Species

The reporting period began February 16 and ended February 28. 1 chinook salmon was captured during the 13-day sampling period (Figure 18). The trap was operated 100% of the reporting period. Table 14 provides life stage, length, and weight data for all Chinook salmon that have been caught at the Fall Creek site to-date and Figure 19 shows length frequency data to-date.

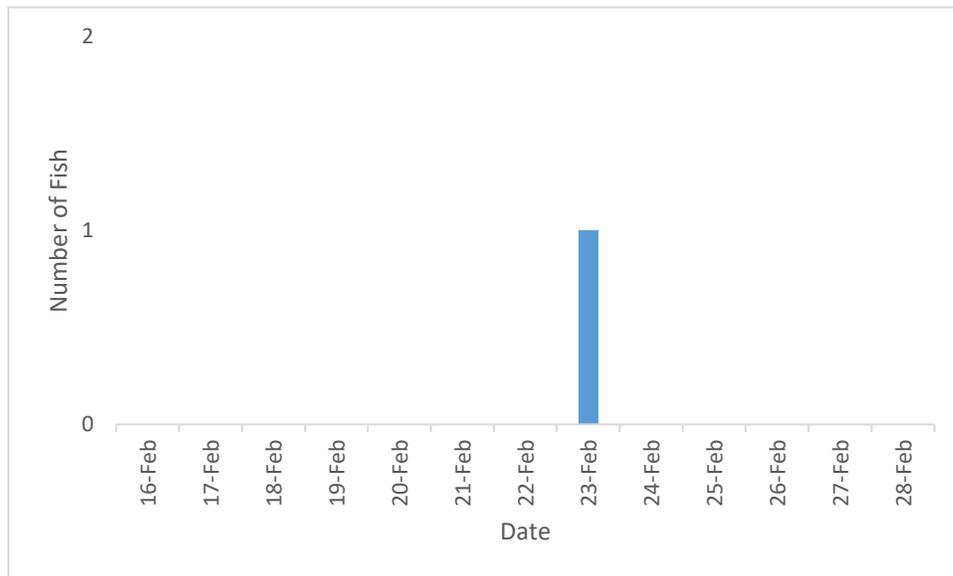


Figure 18. Chinook Captured Per Day 02/16/2022 to 2/28/2022 (Fall Creek)

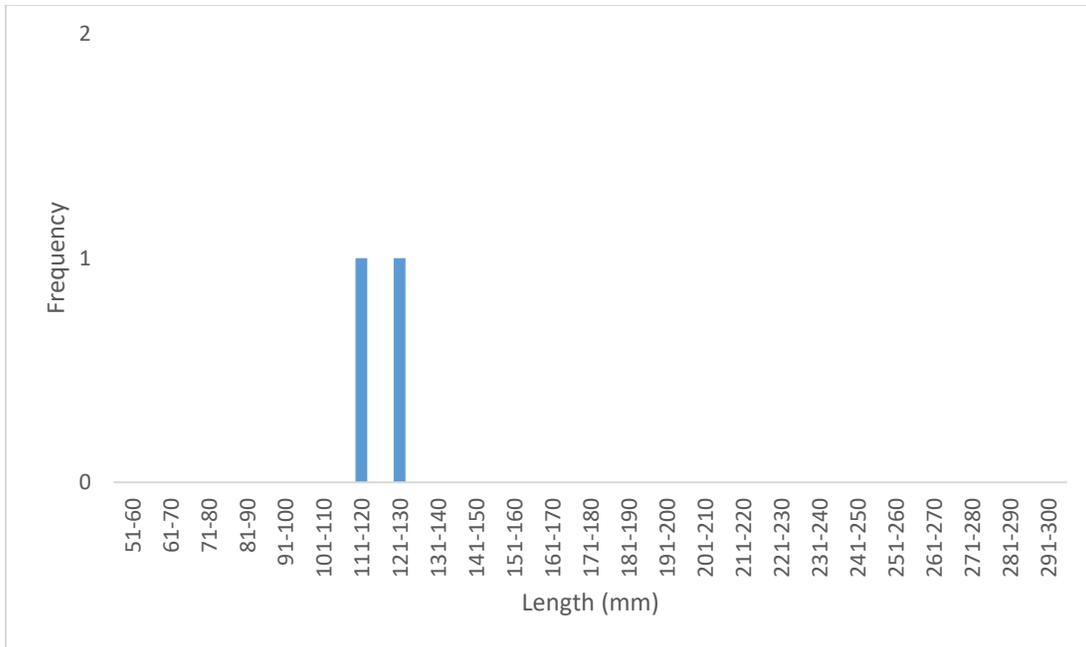


Figure 19. Length Frequency of Juvenile Chinook Sampled Season To-Date (Fall Creek)

Table 14. Descriptive Statistics of Target Species Captured at Fall Creek Above Reservoir, Season To-Date and for the Reporting Period

| To-Date | | | | | | | | | | |
|------------|-------|---------|------------|-----------|--------------|-----|------|-------------|------|------|
| Site | Route | Species | Life stage | Collected | Length (mm)* | | | Weight (g)* | | |
| | | | | | Min | Max | Mean | Min | Max | Mean |
| Fall Creek | n/a | CHS | Smolt | 1 | 130 | 130 | 130 | 21.5 | 21.5 | 21.5 |
| | | CHS | Parr | 1 | 119 | 119 | 119 | 16.1 | 16.1 | 16.1 |

| February 16-28, 2022 | | | | | | | | | | |
|----------------------|-------|---------|------------|-----------|--------------|-----|------|-------------|------|------|
| Site | Route | Species | Life stage | Collected | Length (mm)* | | | Weight (g)* | | |
| | | | | | Min | Max | Mean | Min | Max | Mean |
| Fall Creek | n/a | CHS | Smolt | 1 | 130 | 130 | 130 | 21.5 | 21.5 | 21.5 |
| | | CHS | Parr | 0 | n/a | n/a | n/a | n/a | n/a | n/a |

Injuries and Copepod Infection

1 chinook was captured for the reporting period. It was in good condition but appeared to have a trematoda infection (Table 15).

Table 15. Number of Descaled, Bodily/Eye Injured, Copepod Infected and Dead Chinook Salmon for Sampling Period. (Fall Creek)

| Site | # CHS Collected | # DSC* <20% | # DSC* >20% | # with Body Injuries | # with Eye Injuries | # with COP* In B.C. | # with COP* on Fins | Mortalities |
|------------|-----------------|-------------|-------------|----------------------|---------------------|---------------------|---------------------|-------------|
| Fall Creek | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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

Non-Target Species

A total of 18 non-target fish were captured at Fall Creek during the reporting period; the data is summarized below in Table 16.

Table 16. Summary of Non-target Species (Fall Creek).

| Species | 8ft Capture | 8ft Mortality | Season Total | Season Total Mortality |
|------------------|-------------|---------------|--------------|------------------------|
| Bluegill | 0 | 0 | 0 | 0 |
| Lamprey | 8 | 0 | 36 | 0 |
| Bullhead | 0 | 0 | 0 | 0 |
| Bull Trout | 0 | 0 | 0 | 0 |
| Crappie | 0 | 0 | 0 | 0 |
| Cutthroat Trout | 4 | 0 | 16 | 0 |
| Longnose Dace | 0 | 0 | 2 | 0 |
| Red-Sided Shiner | 0 | 0 | 0 | 0 |
| Sculpin | 0 | 0 | 0 | 0 |
| Spotted Bass | 0 | 0 | 0 | 0 |
| Sucker | 0 | 0 | 0 | 0 |
| Whitefish | 0 | 0 | 0 | 0 |
| <i>O. mykiss</i> | 2 | 0 | 5 | 0 |
| Totals | 14 | 0 | 59 | 0 |

Stream Statistics

Basic stream statistics at the Fall Creek site were calculated from data downloaded from the U.S. Geological Survey stream gage number 14150290. During the reporting period, daily maximum values for instantaneous gage height ranged from 3.31 feet to 3.93 feet (mean: 3.47 feet). Figure 20 shows instantaneous gage height.

Stream temperatures were recorded every 2 hours for the Fall Creek RST (Figure 21). Temperature probes for the Fall Creek RST operated normally throughout this reporting period.

Flows In and Out of reservoir during the reporting period averaged 277.9 and 265.6 cubic feet per second (cfs) respectively (Figure 22).

Catch per unit of effort (CPUE) data are summarized in Table 17. Discharge and capture data for the duration of monitoring efforts at this location are provided in Appendix B.

Table 17. Summary of Chinook CPUE, Fall Creek.

| | Chinook |
|----------------|---------|
| Description | FC(8ft) |
| Catch | 1 |
| Effort (hrs) | 313.6 |
| CPUE (fish/hr) | 0.003 |

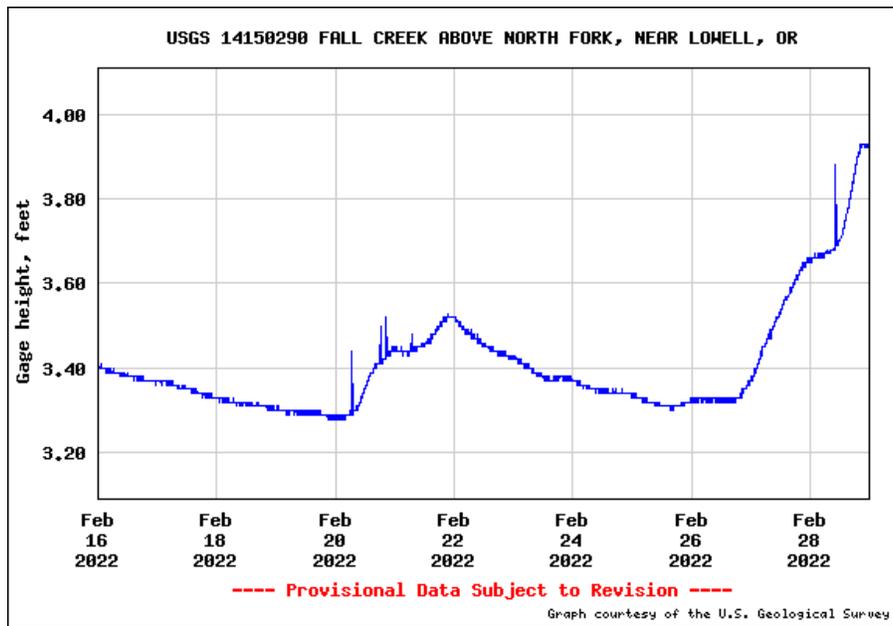


Figure 20. Gage Height (feet); Fall Creek Above North Fork, Near Lowell OR

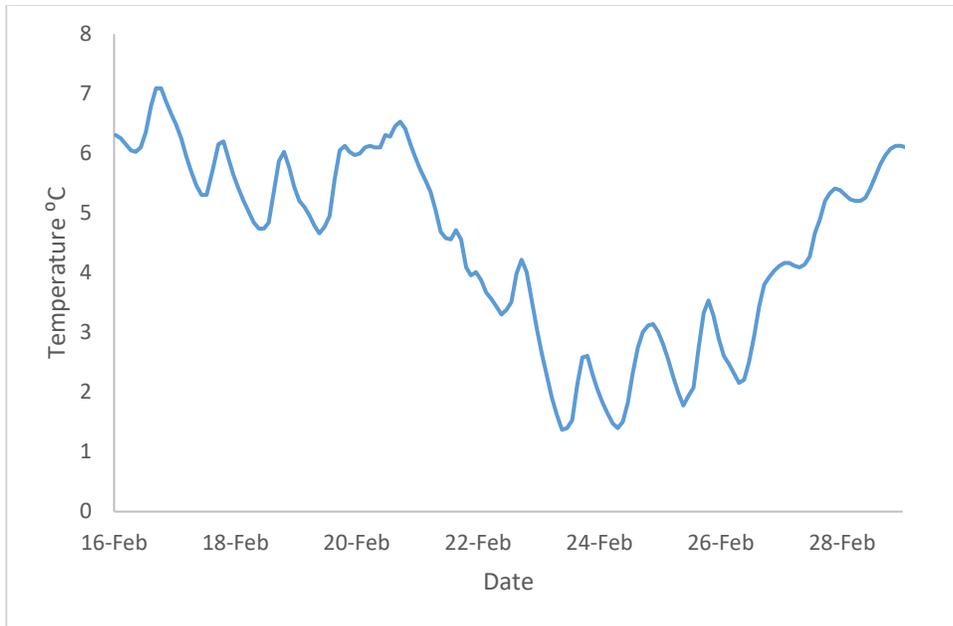


Figure 21. Temperature at RST (Fall Creek)

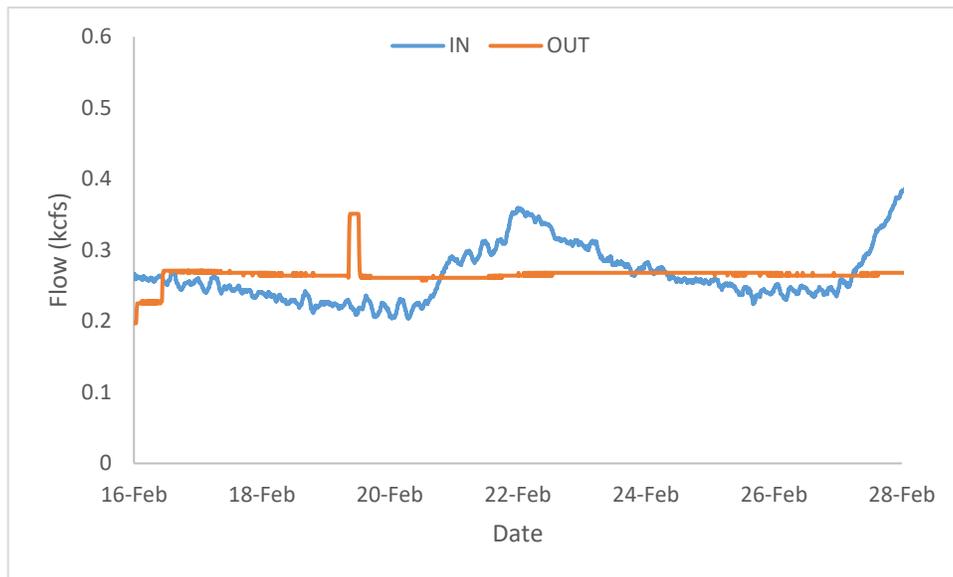


Figure 22. Hourly Flows IN vs OUT (Fall Creek Dam)

Issues Encountered

None.

Upcoming USACE Support Services

USACE Crane support has been requested for trap removals at Hills Creek Dam on March 1, 2022. It has also been requested for trap installs at Dexter Dam and Green Peter Dam on March 2 and 3, respectively.

Appendix A

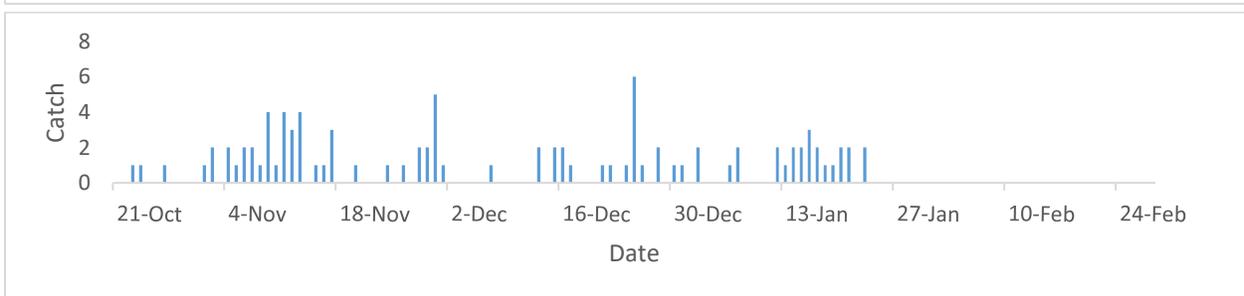
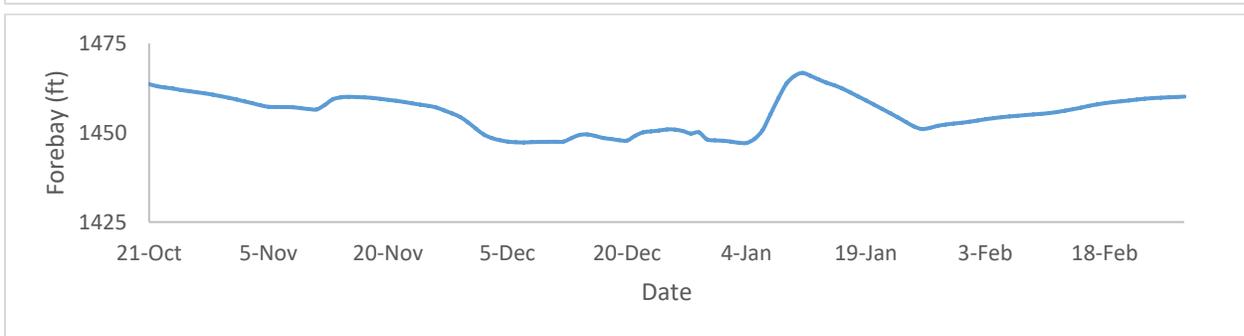
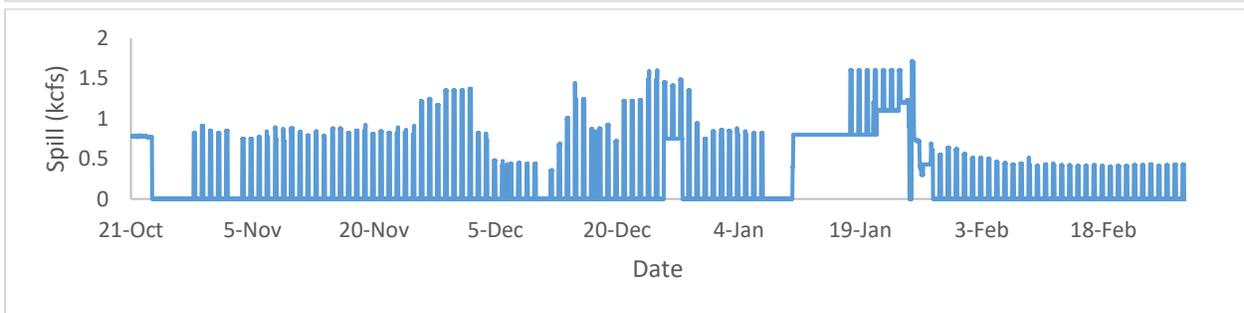
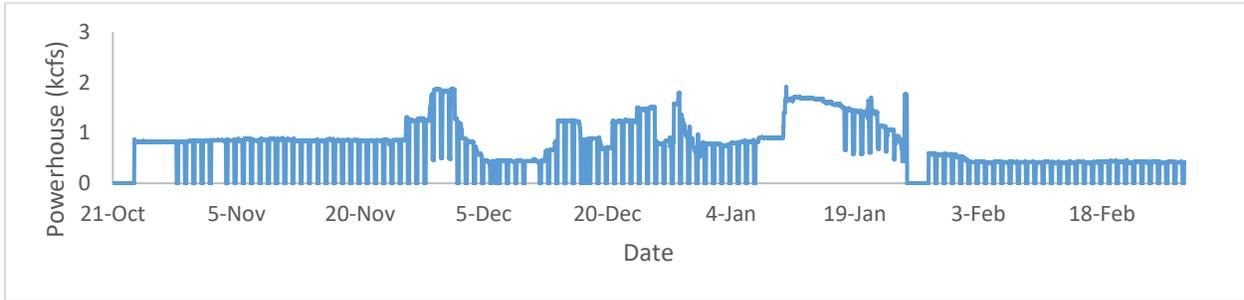
| Injuries to-date | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|------------|------|------|-----|-----|-----|-----|-----|------|-----|-----|-----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Site/Trap/Life Stage | Total Fish | MUNK | DS<2 | BLO | EYB | FUN | BKD | COP | DS>2 | PRD | FID | HBO | BO | HO | BVT | HBP | BRU | TEA | OPD | HIN | FVB | POP | GBD |
| Big Cliff | 55 | | 22 | | 5 | 1 | | 48 | 7 | 1 | 12 | 1 | | | 5 | 2 | 2 | 2 | 8 | 1 | | | |
| 8 ft (PH) | 55 | | 22 | | 5 | 1 | | 48 | 7 | 1 | 12 | 1 | | | 5 | 2 | 2 | 2 | 8 | 1 | | | |
| Parr | 15 | | 4 | | | 1 | | 10 | 1 | | 2 | | | | | 1 | | | 1 | | | | |
| Smolt | 40 | | 18 | | 5 | | | 38 | 6 | 1 | 10 | 1 | | | 5 | 1 | 2 | 2 | 7 | 1 | | | |
| Cougar | 109 | | 42 | | 11 | 1 | | 67 | 16 | | 17 | | 2 | | 3 | 1 | 2 | 2 | 9 | 4 | 2 | | 1 |
| 5 ft (RO) | 49 | | 25 | | 7 | | | 28 | 8 | | 9 | | | | 1 | 1 | 1 | 1 | 4 | 4 | 1 | | 1 |
| Parr | 37 | | 20 | | 6 | | | 17 | 4 | | 6 | | | | 1 | | 1 | 1 | 2 | 2 | | | 1 |
| Smolt | 12 | | 5 | | 1 | | | 11 | 4 | | 3 | | | | | 1 | | | 2 | 2 | 1 | | |
| 8 ft (PH) | 60 | | 17 | | 4 | 1 | | 39 | 8 | | 8 | | 2 | | 2 | | 1 | 1 | 5 | | 1 | | |
| Parr | 52 | | 15 | | 3 | 1 | | 32 | 4 | | 7 | | 1 | | 1 | | 1 | 1 | 5 | | 1 | | |
| Smolt | 8 | | 2 | | 1 | | | 7 | 4 | | 1 | | 1 | | 1 | | | | | | | | |
| Hills Creek | 95 | | 53 | | 10 | | | 70 | 32 | | 20 | | 8 | 1 | 24 | 8 | 3 | 3 | 5 | 3 | 4 | | |
| 5 ft (RO) | 63 | | 35 | | 4 | | | 49 | 21 | | 13 | | 6 | | 18 | 6 | 2 | 2 | 4 | 1 | 1 | | |
| Parr | 6 | | 1 | | | | | 1 | | | | | | | | | 1 | | | | | | |
| Smolt | 57 | | 34 | | 4 | | | 48 | 21 | | 13 | | 6 | | 18 | 6 | 1 | 2 | 4 | 1 | 1 | | |
| 8 ft (PH) | 32 | | 18 | | 6 | | | 21 | 11 | | 7 | | 2 | 1 | 6 | 2 | 1 | 1 | 1 | 2 | 3 | | |
| Parr | 7 | | 4 | | | | | 1 | 1 | | | | | | | | | | | 1 | | | |
| Smolt | 25 | | 14 | | 6 | | | 20 | 10 | | 7 | | 2 | 1 | 6 | 1 | 1 | 1 | 1 | 1 | 3 | | |
| Fall Creek | 2 | | 1 | | | | | | | | | | | | | | | | | | | | |
| 8 ft (RO) | 2 | | 1 | | | | | | | | | | | | | | | | | | | | |
| Parr | 1 | | 1 | | | | | | | | | | | | | | | | | | | | |
| Smolt | 1 | | | | | | | | | | | | | | | | | | | | | | |

| Injuries During Reporting Period (2-16-22 to 2-28-22) | | | | | | | | | | | | | | | | | | | | | | | |
|---|------------|------|------|-----|-----|-----|-----|-----|------|-----|-----|-----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 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 |
| Big Cliff | | | | | | | | | | | | | | | | | | | | | | | |
| 8 ft (PH) | | | | | | | | | | | | | | | | | | | | | | | |
| Parr | | | | | | | | | | | | | | | | | | | | | | | |
| Smolt | | | | | | | | | | | | | | | | | | | | | | | |
| Cougar | 6 | | 5 | | 2 | | | 3 | | | 1 | | | | | | 1 | | 1 | | | | |
| 5 ft (RO) | 5 | | 4 | | 2 | | | 2 | | | 1 | | | | | | 1 | | 1 | | | | |
| Parr | 4 | | 3 | | 1 | | | 1 | | | | | | | | | 1 | | 1 | | | | |
| Smolt | 1 | | 1 | | 1 | | | 1 | | | 1 | | | | | | | | | | | | |
| 8 ft (PH) | 1 | | 1 | | | | | 1 | | | | | | | | | | | | | | | |
| Parr | 1 | | 1 | | | | | 1 | | | | | | | | | | | | | | | |
| Smolt | | | | | | | | | | | | | | | | | | | | | | | |
| Hills Creek | | | | | | | | | | | | | | | | | | | | | | | |
| 5 ft (RO) | | | | | | | | | | | | | | | | | | | | | | | |
| Parr | | | | | | | | | | | | | | | | | | | | | | | |
| Smolt | | | | | | | | | | | | | | | | | | | | | | | |
| 8 ft (PH) | | | | | | | | | | | | | | | | | | | | | | | |
| Parr | | | | | | | | | | | | | | | | | | | | | | | |
| Smolt | | | | | | | | | | | | | | | | | | | | | | | |
| Fall Creek | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 8 ft | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Parr | | | | | | | | | | | | | | | | | | | | | | | |
| Smolt | 1 | | | | | | | | | | | | | | | | | | | | | | |

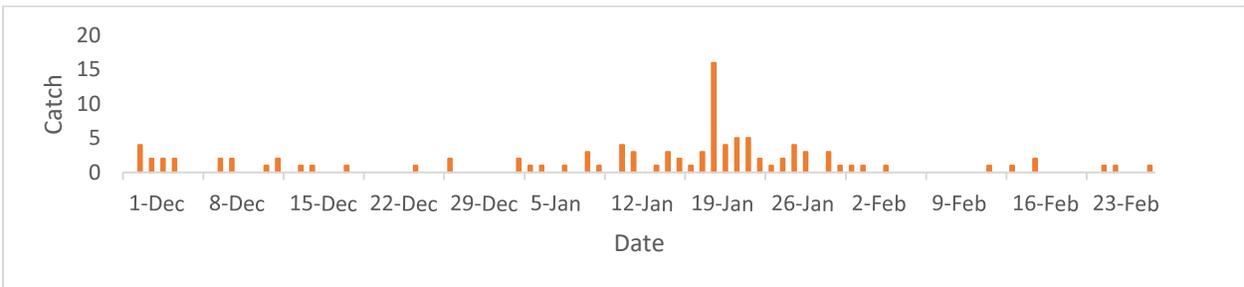
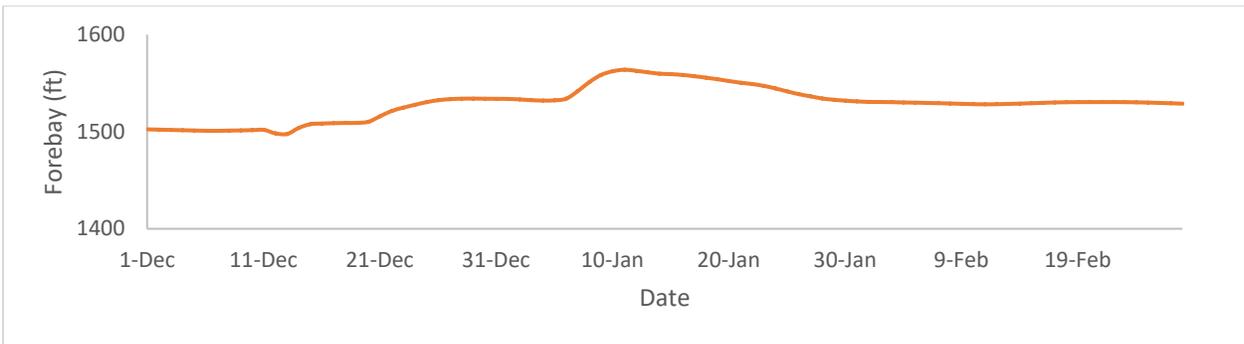
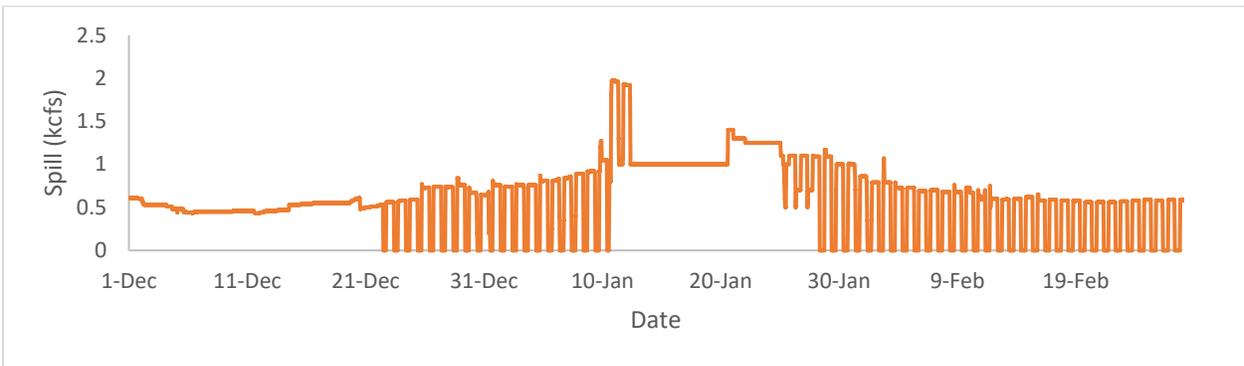
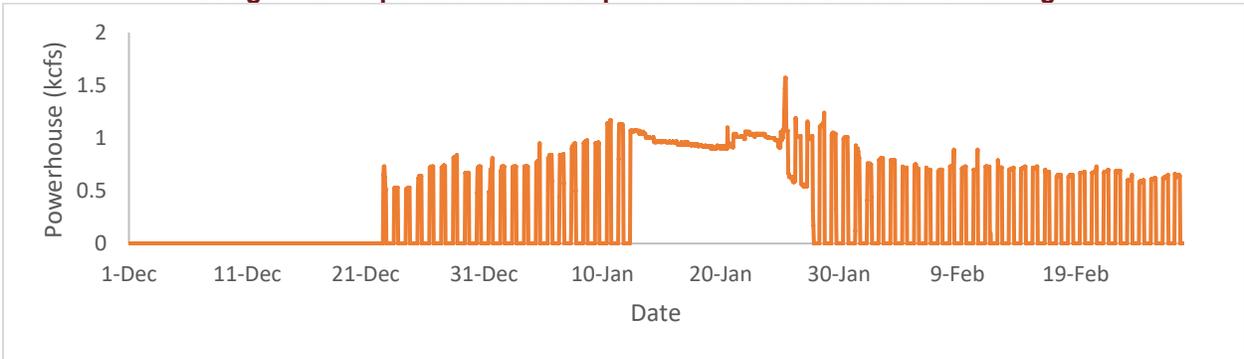
| Injury Code | Description of Injury/Condition |
|--------------------|---|
| NXI | Live fish with no external injuries |
| MUNK | Mortality with no external injuries |
| DS<2 | Descaling <20% |
| BLO | Bloated |
| EYB | Bloody Eye (hemorrhage) |
| BVT | Bleeding from Vent |
| FVB | Fin Blood Vessels Broken |
| GBD | Gas Bubble Disease (fin ray/eye inclusions) |
| POP | Pop Eye (eye popping out of head) |
| HIN | Head Injury |
| OPD | Opercle Damage |
| TEA | Body Injury (tears, scrapes, mechanical damage) |
| BRU | Bruising (any part of the body) |
| HBP | Hole Behind Pectoral Fin |
| DS>2 | Descaling > 20% |
| HO | Head Only |
| BO | Body Only |
| HBO | Head Barely Connected |
| FID | Fin Damage |
| PRD | Predation Marks (vert. claw or teeth marks) |
| COP | Copepods (on gills or fins) |
| BKD | BKD (distended abdomen) |
| FUN | Fungus |

Appendix B

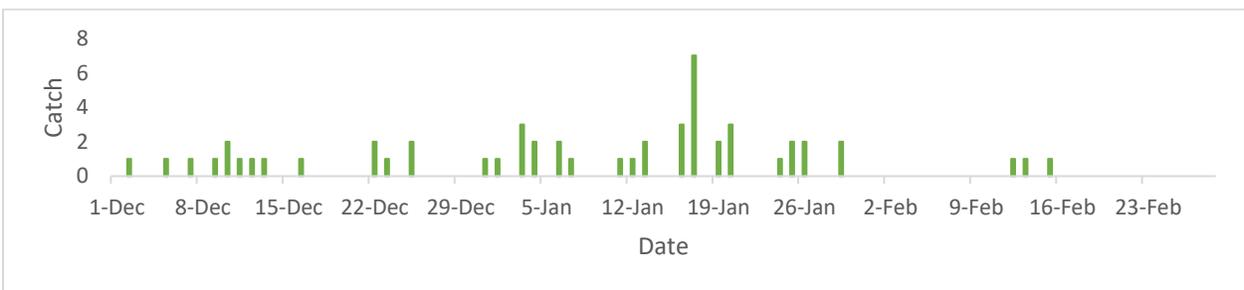
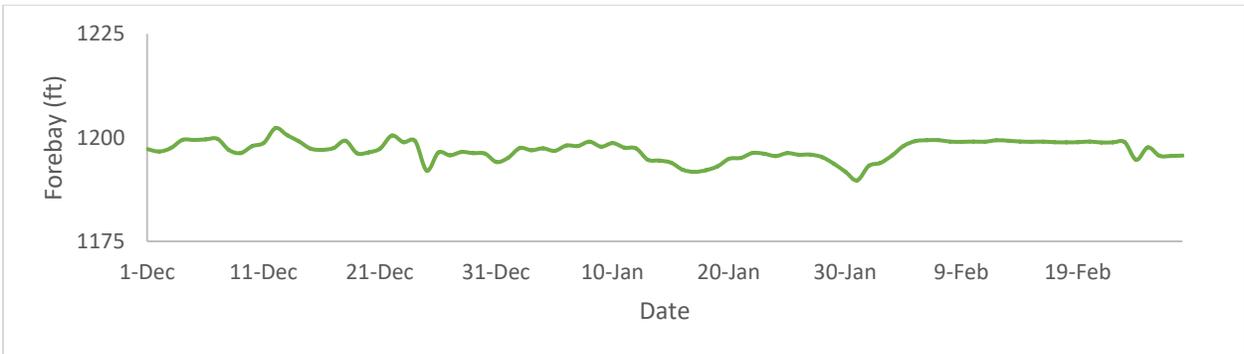
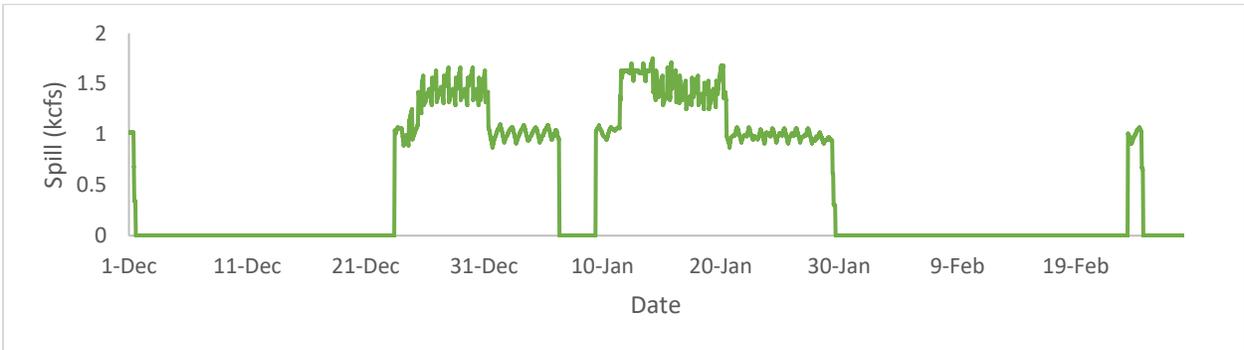
Hills Creek Operational and Capture Data Since Start of Monitoring



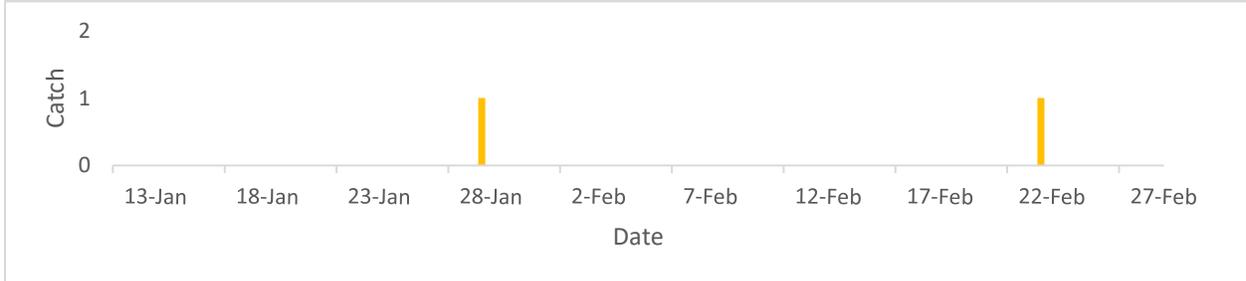
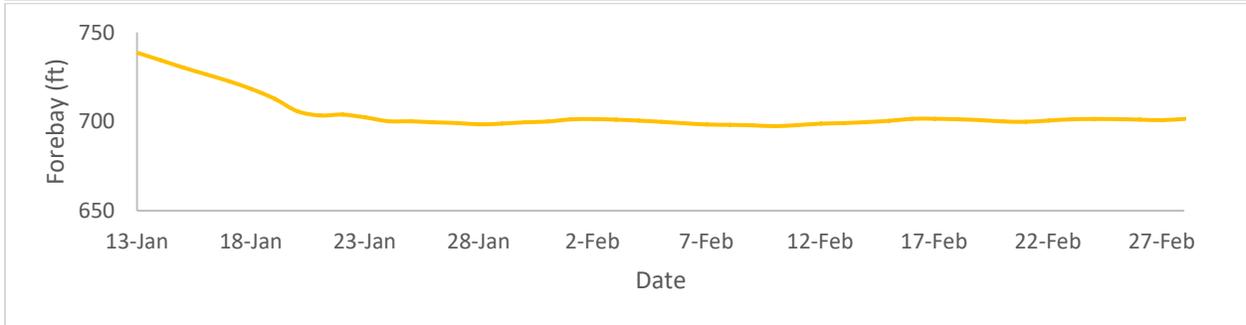
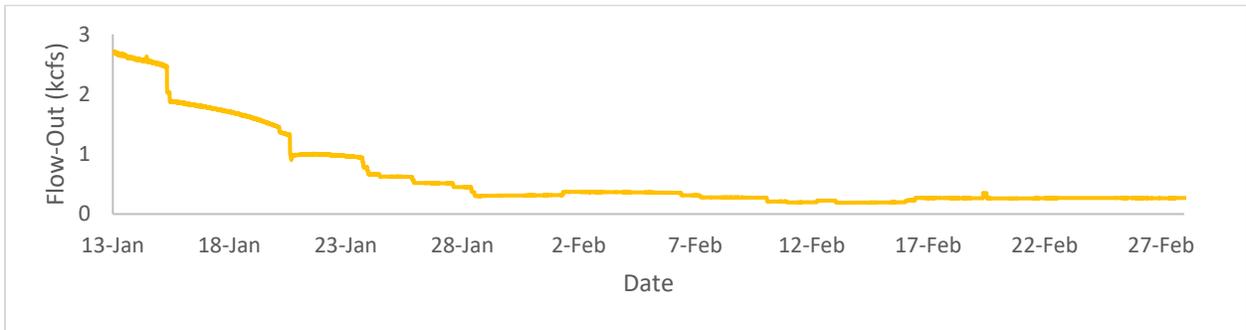
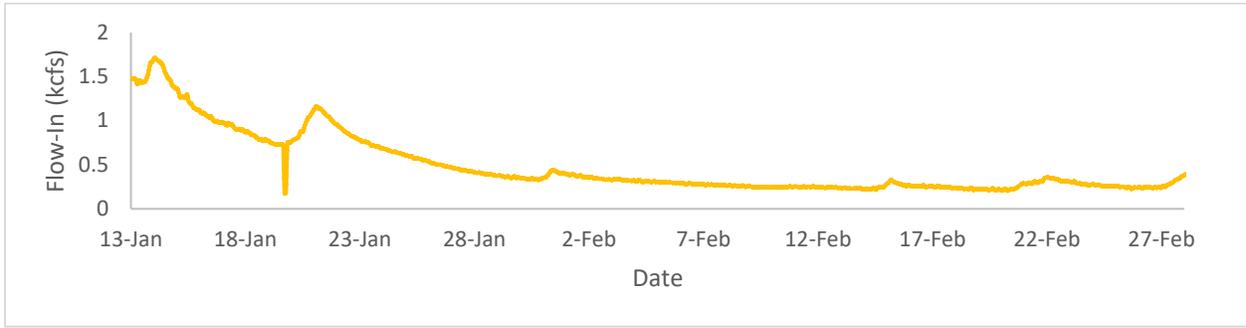
Cougar Dam Operational and Capture Data Since Start of Monitoring



Big Cliff Dam Operational and Capture Data Since Start of Monitoring



Fall Creek Operational and Capture Data Since Start of Monitoring



Appendix C

Hills Creek Trapping Efficiency 1/6/2022

| Hills Creek Dam | Release # | Recapture # | Capture Efficiency |
|-----------------|------------------|-------------|--------------------|
| PH Route | 596 | 20 | 3.36% (20/596) |
| RO Trap | RO Route- 605 | 13 | 2.15% (13/605) |
| | PH Route- 592 | 5 | 0.84% (5/592) |

*Live fish captured at the PH trap are released just downstream of the PH trap, upstream of the RO trap and therefore retained in the capture efficiency estimates for the RO Trap if they arrive in the lower trap.

*Any dead fish captured at the PH trap are excluded from the RO trap capture efficiency estimate as they are not alive at time of re-release.