

# Hatchery and Supplementation Program

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## 2017 Annual Report FINAL

Lewis River Hydroelectric Projects  
FERC Project Nos. 935, 2071, 2111, 2213



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*\* Not yet submitted by contractor or consultant*

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## 1.0 INTRODUCTION

The purpose of this report is to document results from monitoring and evaluation activities associated with implementing the Hatchery and Supplementation (H&S) program in 2017. Monitoring and evaluation (M&E) activities are planned and modified each year in the form of an Annual Operating Plan (AOP). The AOP is reviewed and approved by the Aquatic Coordination Committee (ACC). The following key activities were completed as part of the 2017 AOP:

- Transport of winter steelhead, spring Chinook and coho salmon upstream of Swift Dam
- Screw trapping of emigrating juveniles downstream of Merwin Dam
- Carcass and redd surveys downstream of Merwin Dam
- Collection of NOR broodstock to support winter steelhead supplementation
- Hatchery production of trout and salmon as stipulated in Section 8 of the Lewis River Settlement Agreement.
- Evaluation of total dissolved gases and temperature in the Lewis River Hatchery rearing ponds

This report is required by Section 8.2.4 of the Lewis River Settlement Agreement that states:

*“On an annual basis, the Licensees shall provide to the ACC for review and comment a report compiling all information gathered pursuant to implementation of the Hatchery and Supplementation Plan. The report also will include recommendations for ongoing management of the Hatchery and Supplementation Program. The ACC shall have 60 days to comment on the annual report. Within 60 days of the close of the comment period, the Licensees shall finalize the report after consideration of all comments. The Licensees shall also provide the comprehensive periodic review undertaken pursuant to Section 8.2.6 below to the ACC. The Licensees shall provide final annual reports and the comprehensive periodic review to the Services during the development of any required ESA permit or authorization for hatchery operations, including NOAA Fisheries’ HGMP process. The report may be included as part of the detailed annual reports of the ACC activities required by Section 14.2.6.”*

## 2.0 WINTER STEELHEAD

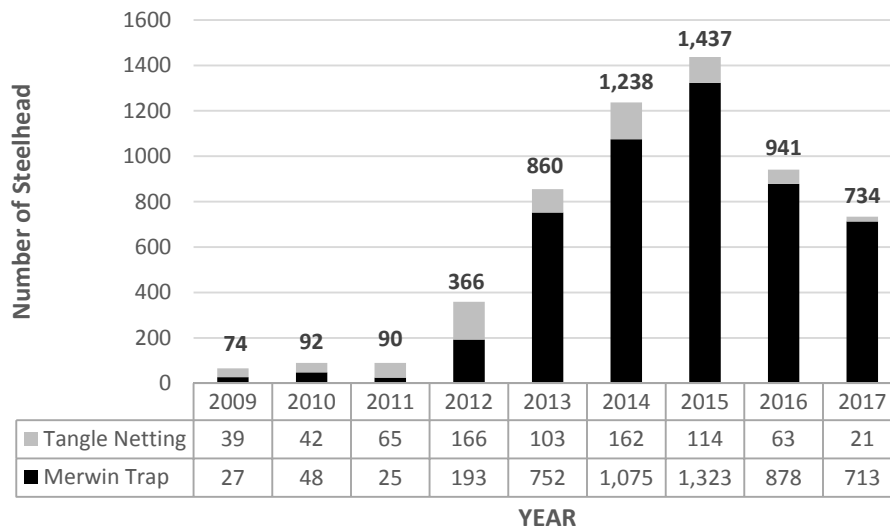
The North Fork Lewis River supports three managed stocks of winter running steelhead:

1. A hatchery produced winter steelhead stock derived from Chambers Creek (Puget Sound) with a peak spawn time of December
2. An endemic natural stock with a peak spawn time in April
3. An integrated stock derived from the endemic population but spawned and reared in the hatchery (program or supplementation stock).

The primary goal of the integrated or supplementation program is to support a self-sustaining population upstream of Swift Dam that, over time, requires no hatchery support. The program is composed of three main elements:

- Collection of broodstock at traps and through in-river netting.
- Spawning and rearing at Merwin Hatchery.
- Transport of returning adults upstream of Swift Dam.

**Figure 1. Total captures of NOR and BWT steelhead by method between 2009 and 2017 (excludes same year recaptures)**



## 2.1 Broodstock Collection

Broodstock collection relies on two methods: (1) trapping at Merwin Dam and (2) in-river tangle netting. Natural origin (NOR) winter steelhead captured from the Merwin Trap and in-river netting are transported to Merwin Hatchery for genetic assignment analysis. Once results are known, these fish are either held for broodstock or released back to river depending on predetermined collection curves. Data for all steelhead transported to Merwin hatchery are provided in Appendix A.

### 2.1.1 Merwin Trap

During the period from January through June 21, 2017, a total of 90 NOR and 623 blank wire tagged<sup>1</sup> (BWT) winter steelhead were captured at the Merwin trap (Table 1). The ratio of females to males was 0.83 and 0.91 for BWT and NOR, respectively. The proportion of BWT steelhead trapped relative to NOR steelhead was 87%, or about 7 to 1.

<sup>1</sup> Adult steelhead that possess a blank wire tag in their snout are referred to as BWT steelhead and represent returns from the hatchery supplementation program using native broodstock.

Table 1. Origin and gender of winter steelhead captured at the Merwin Trap between January 1 and June 21, 2017

Origin	Males	Females
NOR	47	43
HOR (BWT)	340	283
<b>TOTAL</b>	<b>387</b>	<b>326</b>

Figure 2 illustrates the cumulative proportion of both NOR and BWT steelhead captured during the first six months of 2017. As in previous years, BWT returns to the Merwin Trap begin earlier than NOR winter steelhead and achieve 50 percent collection earlier. However, this difference appears to be fading based on results from 2015 and 2016.

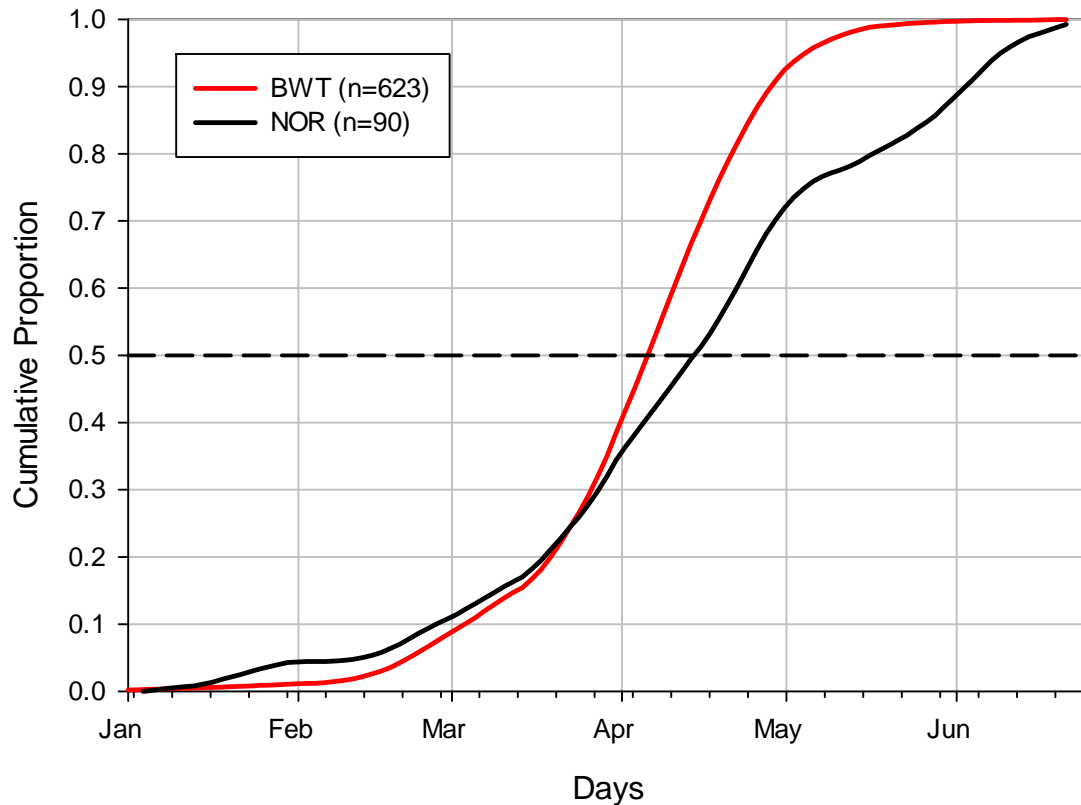


Figure 2. Monthly proportion of NOR and BWT steelhead trapped at the Merwin Collection Facility between January 1 and June 21, 2017.

### 2.1.2 Tangle Netting

Tangle netting efforts began on March 3, 2017 and continued through April 20, 2017. Only five netting days of effort were possible in 2017 due to persistently high river levels that inhibited

our ability to effectively and safely drift the tangle nets. Table 2 provides a summary of steelhead captured for the five days in which we were able to net.

Table 2. Origin, gender and disposition of steelhead captured through tangle netting in 2017 (excludes same year recaptures)

Disposition	Males	Females
NOR shipped to Merwin	7	1
NOR Released on site	1	1
BWT Released on site	6	5
Euthanized (AD Clip)	0	0
Mortality	0	0
<b>TOTAL</b>	<b>14</b>	<b>7</b>

In total, 21 steelhead were handled through the tangle netting program. Of these, 10 (48%) were of natural origin (Figure 3). The remaining 11 steelhead were BWT returns. Twice as many males were captured than females and is consistent with prior years. However, as stated in earlier reports this may be a function of netting bias towards males and not necessarily representative of ratios present in the river.

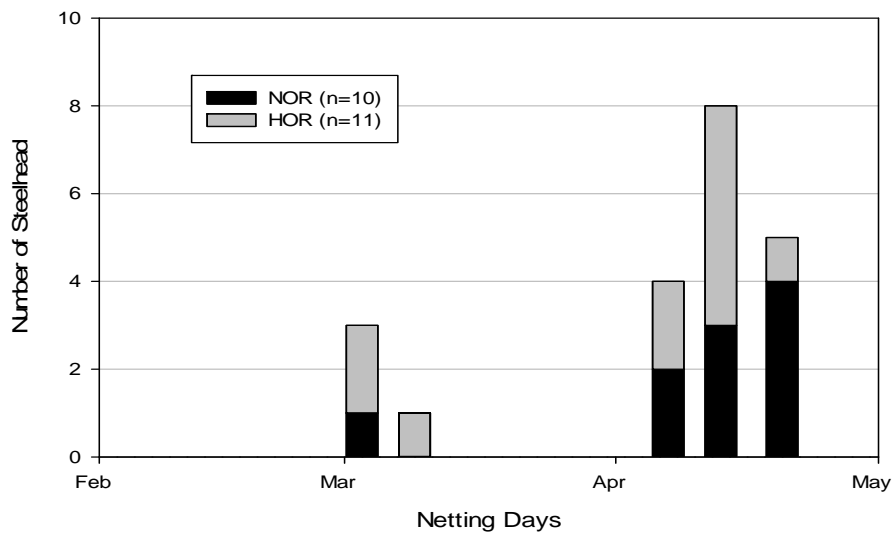


Figure 3. Composition of winter steelhead captured through tangle netting between March 3 and April 20, 2017 (n= 21)

## 2.2 Late Winter Steelhead Broodstock Collection Timing

The ability to conform to predetermined collection curves presents several difficulties in the field. Several variables continue to make broodstock collection challenging including:



- Genetic assignment results may reduce the number of available broodstock.
- Spawning maturity in females is highly variable creating uncertainty when deciding to retain or release male broodstock.
- In-river capture efficiency is affected by river flow volume and turbidity.
- In-river netting tends to capture significantly more males than females.
- The number of kelts increases substantially from mid to late April.
- Individual fecundity is highly variable

The collection curve proposed in the annual operating plan is intended to help ensure that broodstock are collected across their spawning period. Up to 50 steelhead are held for broodstock and spawned over the course of the run.

Between February 15 and May 8, 2017, 70 steelhead were transferred to Merwin Hatchery as potential broodstock. Of these, 48 were spawned, 21 were returned to river and 1 was a mortality. All fish that were spawned were also returned to river. Figure 4 provides the capture timing of actual spawners relative to the proposed collection curve (expressed as a proportion).

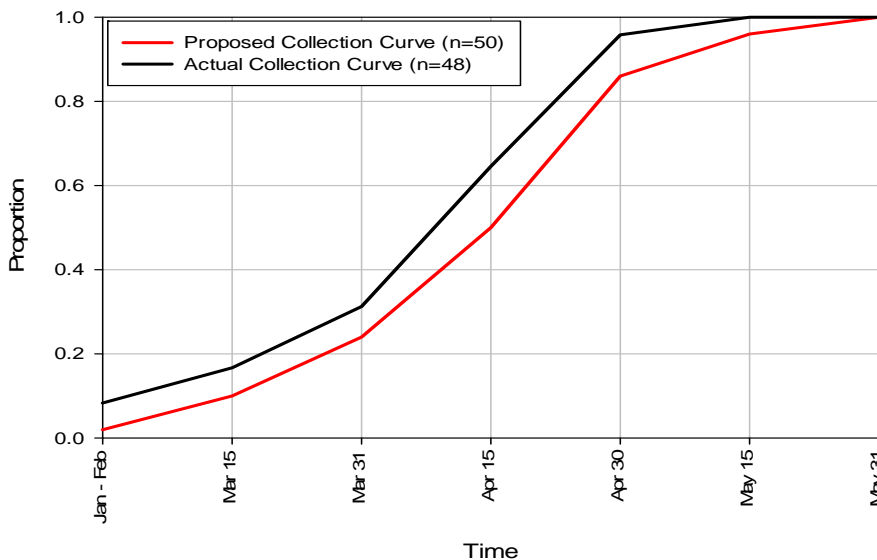


Figure 4. Actual collection timing of steelhead used as broodstock compared to predetermined collection curve during the 2017 season

### 2.3 Genetic Analysis of Potential Broodstock

The H&S Subgroup agreed to use a primary genetic assignment target level of 50 percent or greater to the NF Lewis River or Cedar Creek stock(s) to be considered acceptable broodstock. After April 1, steelhead may be considered broodstock if assignment probability is 50 percent or greater to Cascade Strata. The only exception to these requirements is any steelhead indicating

assignment probabilities to any hatchery stock of more than 5 percent will never be incorporated in the broodstock.

A total of 72 samples were taken from steelhead captured in the Merwin Trap or through in-river tangle netting. All sampled steelhead were assigned a probability percentage as to likelihood of assignment to known baselines established for Lower Columbia River tributaries including the North Fork Lewis River. Probabilities are classified as primary, secondary and tertiary to account for introgression from other basins and provide a more complete picture of diversity present within the samples. Figure 5 provides an illustration of results of sampled NOR steelhead. Appendix B provides the tabular genetic assignments results for each individual unclipped steelhead captured at the Merwin trap and tangle netting.

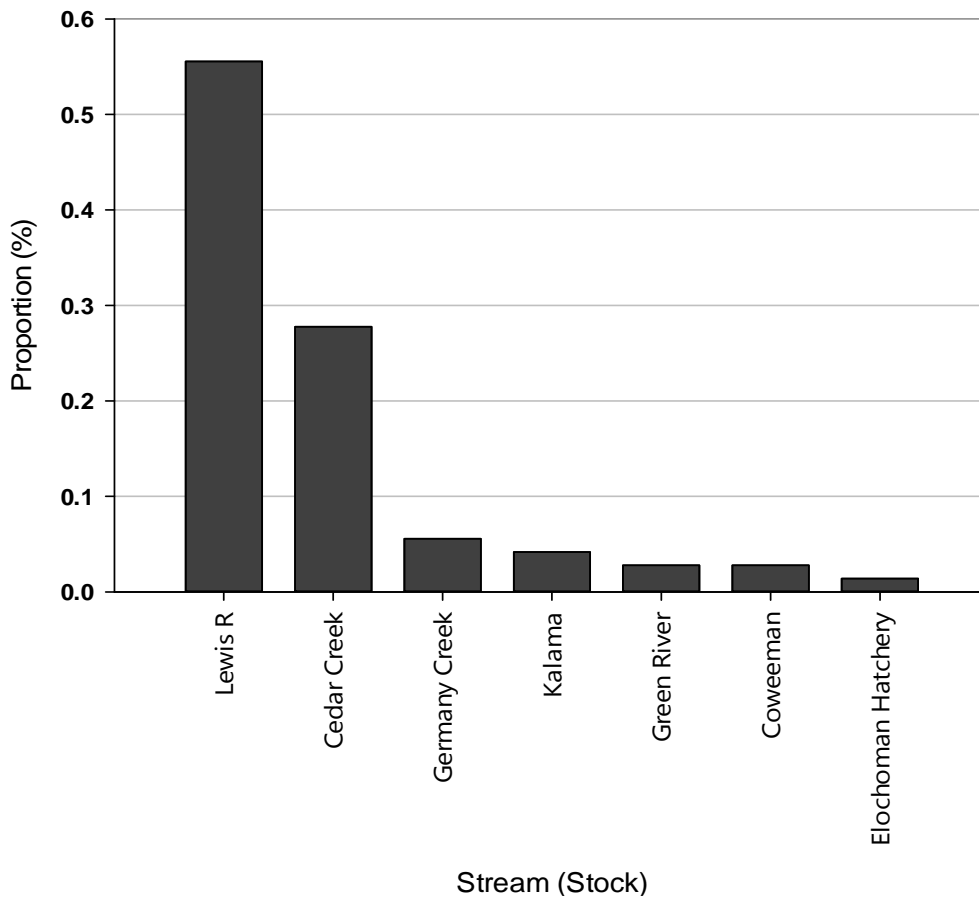


Figure 5. Proportion of primary genetic assignment of NOR late winter steelhead collected from the Merwin Trap and tangle netting January 1 through July 1, 2017 (n=72)

## 2.4 Spawning

A total of 25 females and 24 males were spawned through 10 crosses between April 7 and May 19, 2017 (Table 3). Spawning crosses consisted of 3x3, 2x2 and 1x2 factorial mating crosses (Appendix C). Factorial mating crosses have been used in an effort to improve diversity among a relatively small number of spawning pairs.

Table 3. Number of spawning crosses and parents including the duration of each spawning periods for brood years between 2009 and 2017

Brood Year	Crosses	Females	Males	Spawn Period	Days
2009	10	12	19	Mar 2 - May 21	81
2010	22	22	24	Mar 17 - May 14	56
2011	9	16	19	Mar 30 - May 18	49
2012	12	19	23	Apr 10 - May 29	49
2013	8	8	11	Apr 10 - May 6	26
2014	26	26	25	Apr 7 - May 16	39
2015	25	25	25	Mar 26 - May 22	58
2016	10	17	20	Apr 8 - May 27	49
2017	10	25	24	Apr 7 - May 19	43

## 2.5 Spawn Timing

Steelhead broodstock are captured over a collection period that extends from February through the first week of May. The purpose of this protocol is to collect steelhead over the course of the run so that a representative sample of the total run is spawned to limit any bias in spawn time or other variables. Collection timing, however, does not appear to be a realistic predictor of spawn timing as most fish, regardless of collection time, spawn between April 1 and mid-April. For example, the first steelhead collected as potential broodstock was on February 15, 2017. This fish was held for 62 days until it was eventually spawned on April 18. Conversely, the average hold time of broodstock collected in March and April was only 28 and 12 days, respectively (Table 4).

Table 4. Average spawn date and holding times for steelhead captured in February, March, April and May, 2017

Collection Month	Avg. Spawn Date	Avg. Hold Time (days)	Sample (n)
February	4/15/2017	52	4
March	4/10/2017	28	11

April	4/26/2017	12	32
May	5/8/2017	7	2

Figure 5 illustrates the differences in hold times for fish collected in February versus those collected later in March and April.

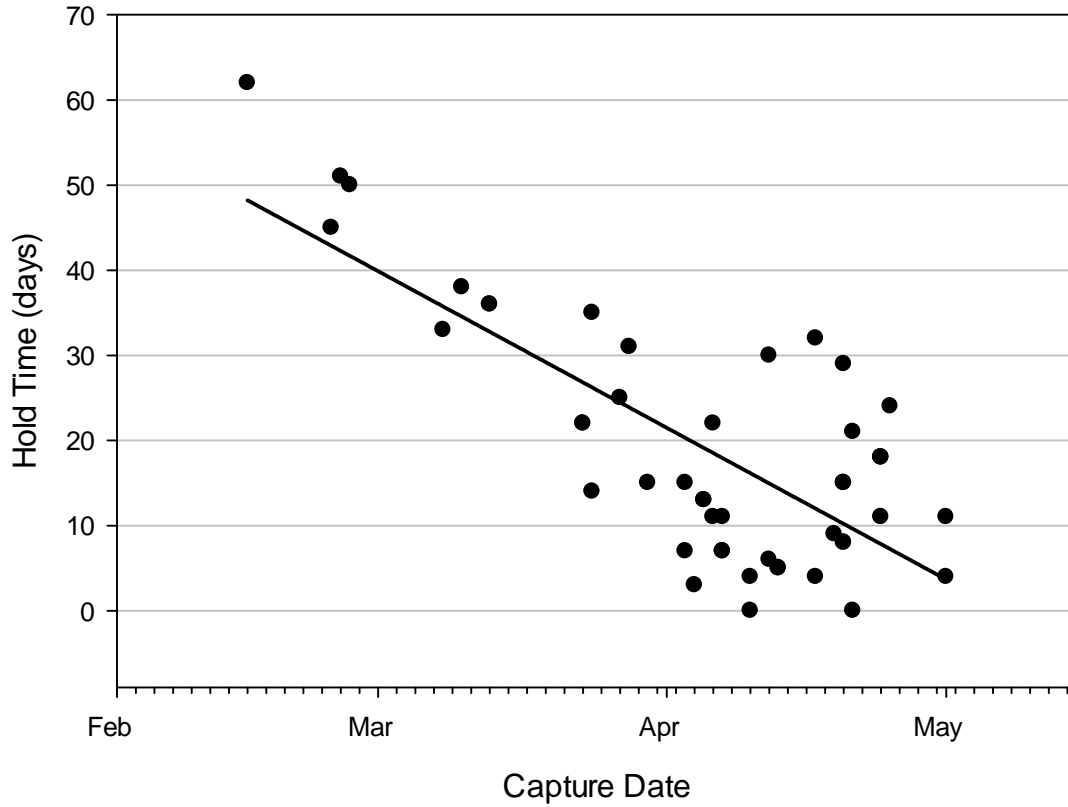


Figure 6. Number of days each broodstock was held prior to spawning at Merwin Hatchery (n=49)

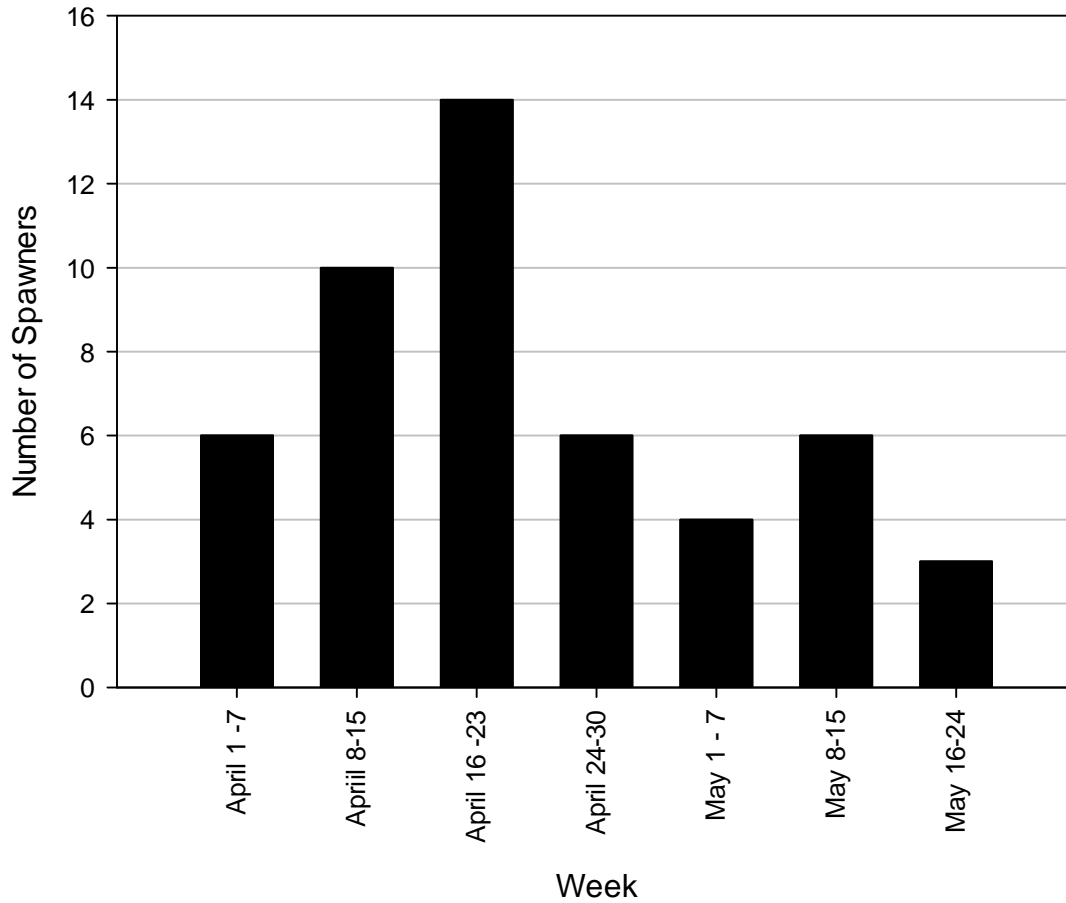


Figure 7. Spawn timing of broodstock held at the Merwin Hatchery (n=49)

### 2.5.1 Tagging

All subyearling steelhead were tagged with blank wire snout tag in December 2017.

### 2.5.2 Release

All fish will be volitionally released on May 1, 2018 at the Merwin boat launch. Volitional release will continue until June 1, 2018. Any fish remaining in the ponds on June 1, 2018 will be forced out and released downstream at the Pekins Ferry Boat Launch (RM 3.1) near the confluence with the East Fork Lewis River. Projected average release size is 8 per pound. A total release number of 51,900 smolts is projected.

### 3.0 MONITORING AND EVALUATION

#### 3.1 Winter Steelhead Redd Surveys (Lower River)

Redd surveys are used to estimate spawning abundance and distribution of winter steelhead in the mainstem North Fork Lewis River. Surveys are conducted weekly throughout the spawning period, which starts on March 1 and extends into mid-June.

In the spring of 2016 and again in 2017, the North Fork Lewis River experienced abnormally high and prolonged turbidity events. Visibility was less than two feet (one foot in 2017) throughout the spawning period. Given the poor visibility and the duration of the event, no redd surveys were conducted. Therefore, an estimate of spawner abundance was not possible for both 2016 and 2017.

If turbidity again precludes redd surveys in 2018, an alternate methodology to estimate abundance will need to be evaluated and implemented in 2019.

##### 3.1.1 Spawning Abundance

Spawning abundance estimates rely on new redd census data, assumed sex ratio and females per redd to calculate total spawner abundance (Freymond and Foley 1986). Females per redd follow WDFW generalized guidelines of 0.81 females per redd and sex ratio is assumed equal (Table 5). Beginning in 2013, we also calculate the spawner abundance using the observed sex ratio of late winter steelhead entering the Merwin Trap. This may be a more accurate estimate of female to male ratio in the river because of the large numbers captured in the trap and is unbiased in terms of capture efficiency for males or females.

Using trap data collected for 2017, a total of 878 steelhead were trapped. These include mainly BWT steelhead, but also include steelhead held for broodstock and steelhead released because of stubby dorsal fins and no wire tag in their snout. Of this total, 432 were male and 446 were female. Therefore, for every female we assume that there are 0.97 males, which (in 2016) is very close to the assumed 1:1 ratio.

**Table 5. Late winter steelhead abundance downstream of Merwin Dam 2008 through 2016 based on redd counts**

Year	Number of Redds observed	Spawner Estimate	Observed sex ratio (females : males)	Spawner Estimate (Corrected)
2008	131	212		
2009	176	286		
2010	248	402		
2011	108	174		
2012	343	556		

2013	456	739	1:1.43	898
2014	364	590	1:0.80	531
2015	384	622	1:1.46	765
2016	NA	NA	1:0.97	NA
2017	NA	NA	1:1.17	NA

### 3.1.2 Distribution

No data are available for distribution in 2016 and 2017 because no redds were visible due to turbidity.

## 3.2 Proportion of Hatchery Origin Spawners (pHOS) on the Spawning Grounds

Program returns (BWT) are treated as hatchery origin (HOR) steelhead despite their genotype assignment to NOR stocks. This is due to the hatchery influence during mating and captive rearing conditions during their first year of life. As these program fish return as adults, there is opportunity for these (HOR) fish to spawn with NOR stocks. It has been shown that reproductive success (fitness) declines rapidly (up to 37 percent per captive reared generation) within a natural population (Araki et. al. 2007). The evolutionary mechanisms for declines in fitness are not fully understood, but hatchery protected rearing environments and controlled mating selection are suspected contributors to this decline (Araki et. al. 2007). Inbreeding between program fish is also a concern because of loss in genetic diversity or effective population size further limits fitness and adaptability of the natural spawning population.

In 2017, the number of steelhead netted was only 21. This was due to persistently high flows during the period which inhibited our ability to effectively capture steelhead and inherent safety issues related to high flows. As a result of the low sample size, any estimate of pHOS is assumed to be highly biased and therefore not a practical indicator. As a result, pHOS is not estimated for 2017. However, through the H&S subgroup planning efforts, a new model has been developed that should provide a more accurate and useful estimate of pHOS. This model will be used in 2018 and reported as part of year-end reporting in the spring of 2019.

## 3.3 Recaptures of Circular Pond Reared Late Winter Steelhead

Recapture information for circular pond reared steelhead is limited to detections downloaded into PTAGIS reporting system. Based on reporting as of February 1, 2018, a total of 355 detections have been entered into PTAGIS. The vast majority of detections occurred on Sand Island for all three release groups (Figure 8).

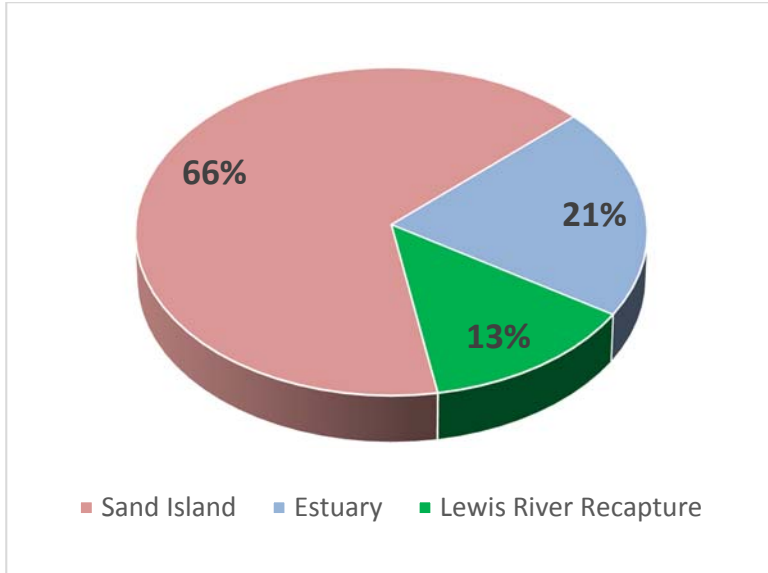


Figure 8. Detection location for all circular tank release groups as of February 1, 2018. Of the 3,179 tagged steelhead released a little over 10 percent have been detected (Table 6).

Table 6. Number of detections from PIT tagged circular tank reared steelhead

	Year			Total
	2013	2014	2015	
Number of Marks	1,206	800	1,173	3,179
Sand Island	62	54	118	234
Estuary Detection	27	13	34	74
Lewis River Recapture	18	26	3	47

	Average			
Sand Island	5.14%	6.75%	10.06%	7.36%
Estuary Detection	2.24%	1.63%	2.90%	2.33%
Lewis River Recapture	1.49%	3.25%	0.26%	1.48%

Percent Detections 11.17%

### 3.4 Upstream Transport of Steelhead, Coho and Spring Chinook

In 2017, a total of 598 blank wire tagged steelhead were transported upstream of Swift Dam (Table 7). All steelhead were transported from the Merwin Trap. One hundred and six (106)



transported steelhead also received a gastric radio tag for distribution studies in the upper basin as part of the Aquatic Monitoring and Evaluation Plan.

This year represents the sixth year of steelhead transportation activities. The target goal of the H&S program is 500 winter steelhead transported each year. We have exceeded this target the last five years.

In 2015, late coho were used for the first time for adult supplementation upstream of Swift Dam. This decision was made by the H&S subgroup and approved by the ACC. The main reason for this change was that both early and late coho are treated as the same population for recovery planning purposes. Also, by using late coho there is more flexibility in the transportation schedule to spread the transportation over a longer period of time. It is anticipated that over the years, survival between early and late coho will differ based on natural processes (e.g., river flow, temperature, turbidity, etc) at the time each group spawns. This difference is considered beneficial as the natural environment will have a larger influence on survival.

Total transported coho for 2017 was 4,878 – less than the target of 7,500.

For the first time since the supplementation program was initiated there was a surplus of returning adult spring Chinook. This allowed for 1,116 spring Chinook to be released upstream of Swift Dam in 2017.

**Table 7. Summary of late winter steelhead, coho and spring Chinook salmon transported and released upstream of Swift Dam**

YEAR	Late Winter Steelhead		Coho (early and late)		Spring Chinook
	TOTAL	Radio Tagged (of total)	TOTAL	Radio Tagged (of total)	
2005			2,006		0
2006			1,848		155
2007			2,000		0
2008			2,000		0
2009			2,058		0
2010			1,822		188
2011			2,000		0
2012	189	39	206		0
2013	741	100	6,962		513
2014	1,033	82	9,179		0
2015*	1,265	83	3,754	99	0
2016	754	82	7,346	0	0
2017	598	106	4,878	0	1,116

\*starting in 2015, late coho (Type N) were also transported

### 3.5 2017 Screw Trap Operations (downstream of Merwin Dam)

Meridian staff operated the Golf Course traps (two rotary screw traps fished side-by-side with 8-foot diameter cones) located near the Lewis River Golf Course downstream of Merwin Dam from March 1 to July 30, 2017. Total trap captures are combined for the purposes of this summary. The traps were checked daily; however they were out of operation from March 16 through March 23 due to high flows and from April 3 through April 6 due to mechanical issues. Estimates of the number of fish that may have passed the trap during these times were not generated. The total number of fish captured by species during the monitoring period is summarized in Table 8. Fork length distributions of focal salmonid fish species are presented in Figure 9. Marked coho, Chinook, rainbow/steelhead, cutthroat, and sockeye were placed upstream of the trap on a daily basis as fish were available from trap captures to estimate trap efficiency (Table 9). Fish  $\geq 60$  mm fork length FL were marked with an alcian blue tattoo or upper caudal fin clip for mark-recapture efficiency tests. All species efficiency tests were combined to generate weekly trap efficiency estimates (Table 10). Focal salmonid fish species outmigration timing is presented in Figure 11 and was calculated by making estimates of the total number of fish that passed the trap on a weekly basis using the adjusted weekly trap efficiency values summarized in Table 10. Total estimates of fish passing the trap during the monitoring period and their associated 95 percent confidence intervals were generated using the Bootstrap Method (Thidenga et al. 1994) and are summarized in Table 11. The sum of discrete interval method of calculating total outmigration described by Volkhardt et al. (2007) for a single partial capture trap was used to make a secondary estimate (Table 11). These total outmigration estimates should only be viewed as the total fish that passed the trap during the study period and not total species outmigration abundance.

Table 8. Summary of total captures for lower river (golf course) tandem screwtraps

SPECIES	TOTAL		
	HOR	<60 mm FL (NOR)	$\geq 60$ mm FL (NOR)
Coho	7,774	6,253	594
Chinook	0	12,221	182
Rainbow/Steelhead	181	67	80
Cutthroat	0	0	45
Sockeye	0	0	1
<b>OTHER</b>	<b>TOTAL</b>		
Lamprey	9		
Longnose Dace	1		
Northern Pikeminnow	119		
Redside Shiner	23		
Sculpin	1,341		
Three-spined Stickleback	13,106		

\* Hatchery fish were identified by either a clipped adipose fin or presence of wire snout tag

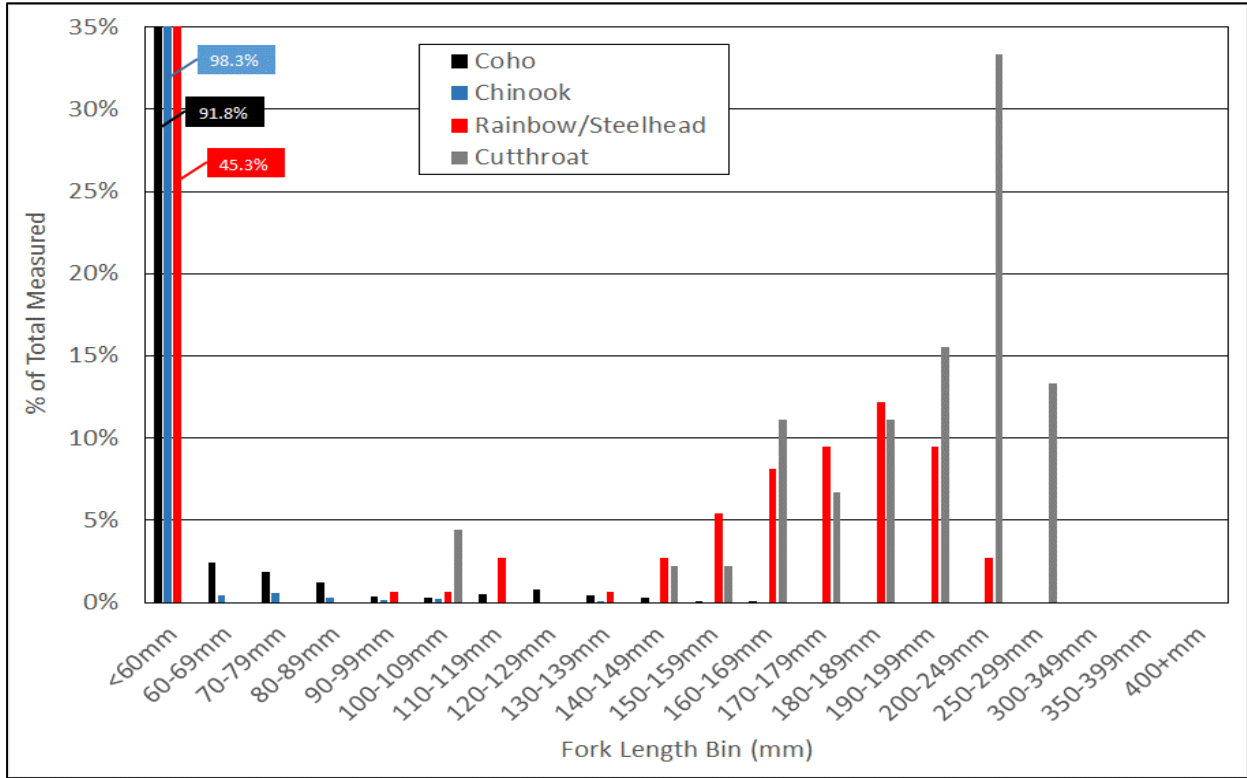


Figure 9. Length frequency distribution of NOR coho, Chinook, steelhead and cutthroat

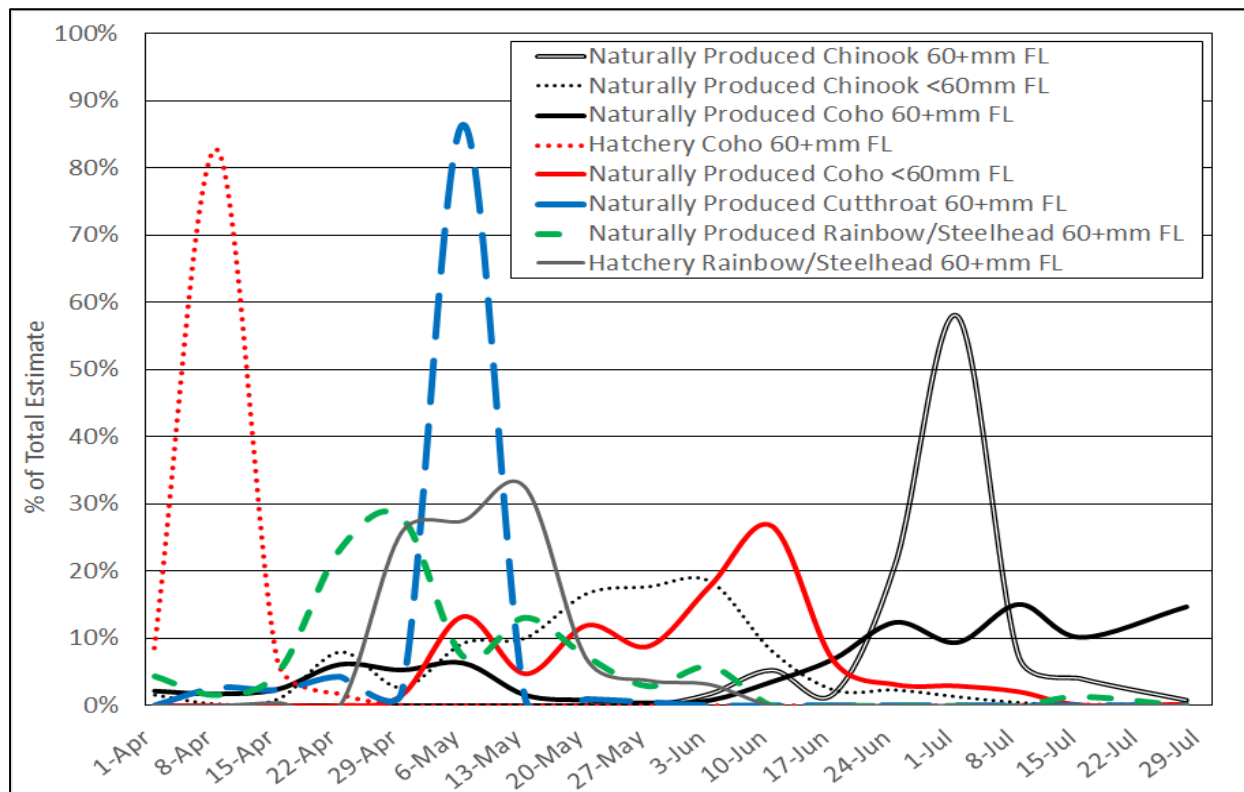


Figure 10. Species migration timing based on total weekly estimates

Table 9. Summary of mark-recapture tests of trap efficiency by species

Species	Total Marked & Released Upstream $\geq 60$ mm FL	Total Recaptured	Trap Efficiency
Coho	2,708	27	0.010
Chinook	181	2	0.011
Steelhead	254	6	0.024
Cutthroat	37	0	NA
Sockeye	1	0	NA
All Salmonids	3,181	35	0.011

Table 10. Summary of weekly mark-recapture tests of trap efficiency

Week	Total Caught ≥60 mm FL	Total Marked & Released Upstream ≥60 mm FL	Total Recaptured	Trap Efficiency	Average Weekly Flow (cfs) <sup>e</sup>	Adjusted Efficiency Based on Flow
1	0	0	NA	NA	7,172	-
2	3	0	NA	NA	9,701	-
3	1	0	NA	NA	18,386	-
4	0	0	MA	NA	12,729	-
5	9	9	0	NA	11,560	-
6	712	202	0	NA	9,679	0.011 <sup>a</sup>
7	6142	1202	11	0.009	5,089	0.009 <sup>f</sup>
8	792	596	10	0.017	8,494	0.016 <sup>b</sup>
9	196	196	1	0.005	9,570	0.011 <sup>a</sup>
10	142	142	2	0.014	8,661	0.016 <sup>b</sup>
11	91	91	1	0.011	6,617	0.011
12	71	71	1	0.014	7,230	0.011 <sup>a</sup>
13	22	19	0	NA	7,764	0.011 <sup>a</sup>
14	12	12	0	NA	6,454	0.011 <sup>a</sup>
15	16	16	1	0.063	5,207	0.011 <sup>a</sup>
16	27	27	0	NA	6,620	0.011 <sup>a</sup>
17	39	39	0	NA	4,741	0.011 <sup>a</sup>
18	143	141	2	0.014	2,749	0.016 <sup>c</sup>
19	169	169	3	0.018	2,281	0.016 <sup>c</sup>
20	103	102	1	0.010	1,904	0.012 <sup>d</sup>
21	72	72	1	0.014	1,767	0.012 <sup>d</sup>
22	95	75	1	0.013	1,524	0.012 <sup>d</sup>
<b>TOTAL</b>	<b>8,857</b>	<b>3,181</b>	<b>35</b>	<b>0.011</b>		<b>0.012<sup>g</sup></b>

<sup>a</sup>Average efficiency measured during entire trapping season.

<sup>b</sup>Average efficiency measured during weeks of 16-Apr and 30-Apr with similar average weekly flow.

<sup>c</sup>Average efficiency measured during weeks of 25-Jun and 2-Jul with similar average weekly flow.

<sup>d</sup>Average efficiency measured during weeks of 9-Jul through 23-Jul with similar average weekly flow.

<sup>e</sup>USGS 14220500 Lewis River at Ariel, WA.

<sup>f</sup>One trap cone raised for the week due to large quantity of hatchery fish captured.

<sup>g</sup>Average adjusted season efficiency.

Table 11. Estimates of total fish passing the trap by species (Bootstrap and Sum of Discrete Interval Method)

<b>Bootstrap Method (Thedinga et. al. 1994)</b>			
Species	Capture Efficiency Applied	Bootstrap Mean Total Estimate	95% CI +/-
Coho (NOR)	0.010 <sup>a</sup>	62,075	25,557
Coho (HOR)	0.010 <sup>a</sup>	811,302	314,270
Chinook (NOR, Incl. WDFW Tagged fish)	0.013 <sup>b</sup>	14,763	5,018
Chinook (WDFW Tagging)	0.013 <sup>b</sup>	2,114	1,494
Steelhead (NOR)	0.012 <sup>b</sup>	6,866	2,652
Steelhead (HOR)	0.012 <sup>b</sup>	14,941	5,093
Cutthroat (NOR)	0.012 <sup>b</sup>	3,420	1,541
<b>Sum of Discrete Interval Method (Volkhardt et. al. 2007)</b>			
Species		Total Estimate	95% CI +/-
Coho (NOR)		45,967	15,698
Coho (HOR)		808,227	384,804
Chinook (NOR, Incl. WDFW Tagged fish)		12,169	6,978
Chinook (WDFW Tagging)		1,822	1,306
Steelhead (NOR)		6,257	3,499
Steelhead (HOR)		14,540	8,649
Cutthroat (NOR)		3,368	1,837

<sup>a</sup>Coho specific efficiency.

<sup>b</sup>Average adjusted season efficiency during individual species' periodicity.

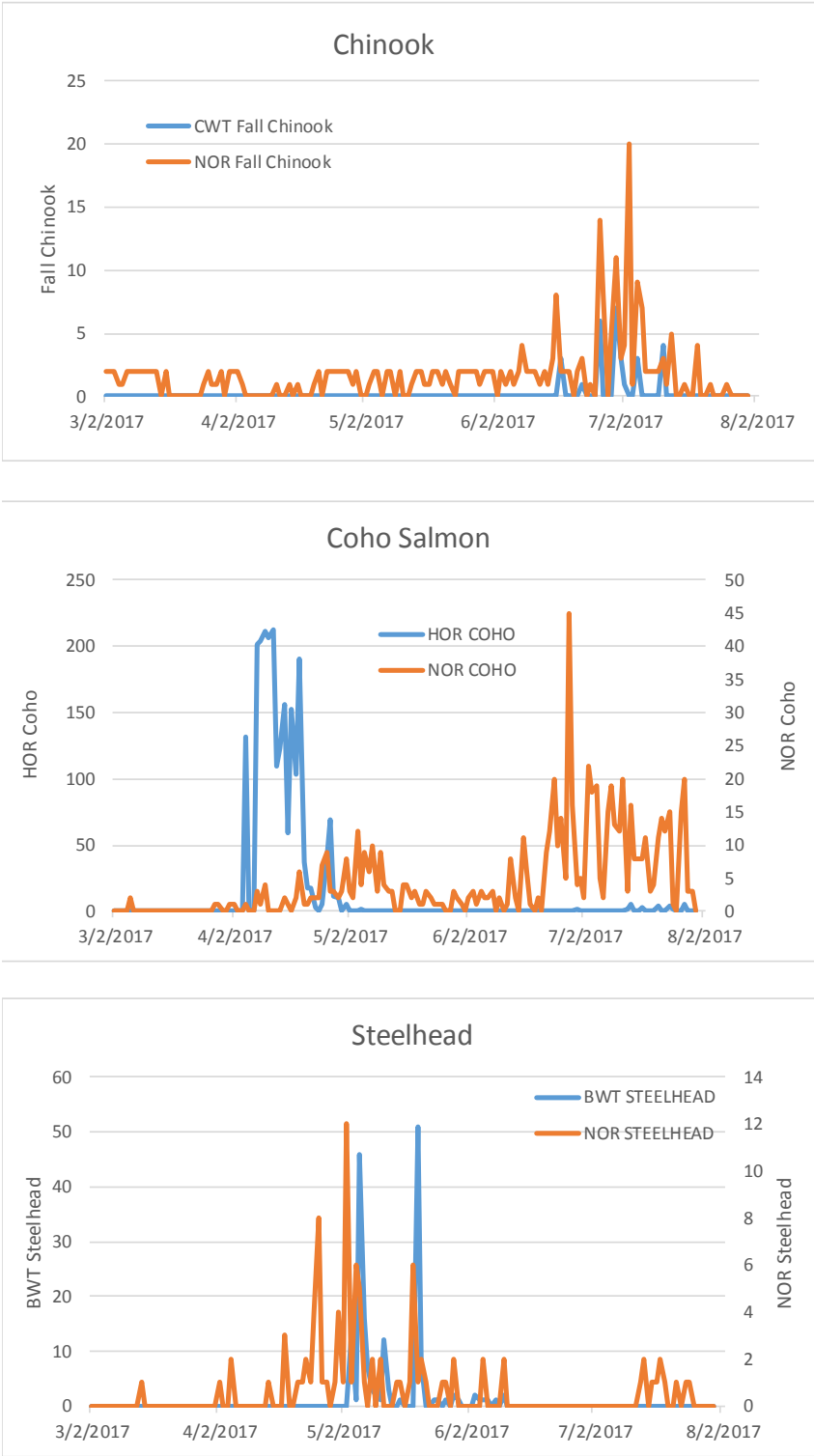


Figure 11. Capture timing of fall Chinook, coho salmon and steelhead in the lower river screwtraps 2017

## 3.6 Mainstem Carcass and Redd Surveys

\*NOTE: Mainstem and tributary carcass survey data for spring Chinook and coho are surveyed beginning in the fall season of each year and extend until the end of January. This schedule does not typically provide adequate time to input, review and analyze collected data and present the results in formal reporting by April 1 of each year. Therefore, reporting for mainstem and tributary surveys of coho and spring Chinook may be delayed one year from the survey period. However, placeholder titles in each report iteration are never removed until the data are available, analyzed or deemed inadequate. This is especially true of tributary coho estimates whereby estimates of adult coho abundance are grouped into the larger lower Columbia River DPS. These results will be presented when WDFW completes their final analysis for years 2012 – 2016.

### 3.6.1 Coho Salmon Mainstem Surveys – 2016

See Attachment D

### 3.6.2 Coho Salmon Tributary Surveys: 2012 – 2016 (WDFW to provide)

PacifiCorp is awaiting analysis and results from tributary GRTS sampling conducted since 2012 by PacifiCorp or its contractors. All data have been provided to WDFW for analysis.

### 3.6.3 Fall Chinook Salmon Mainstem Surveys – 2016 to Present (WDFW to provide)

PacifiCorp is awaiting final reports for activities associated with the fall Chinook adult and juvenile sampling conducted by WDFW through PacifiCorp contracts.

## 3.7 Recaptures of Steelhead Kelts at Swift Creek Cove - 2017

On September 7, 2017, PacifiCorp biologists seined the mouth of Swift Creek to collect and identify steelhead kelts. The purpose of this activity was to identify whether any of the kelts were holdovers from plants in 2017. Of the twelve steelhead kelts handled, all fish were from the 2017 release group (Table 9). In addition, two bull trout were also seined with the steelhead.



Date	Species	PIT Tag	Length (mm)	Release Date into Swift Reservoir	Notes
9/7/2017	Steelhead	3DD.003BE8C369	705	3/30/2017	
9/7/2017	Steelhead	3DD.003BE8CAC8	800	No information Avail.	AD CLIP??
9/7/2017	Steelhead	3DD.003BE8CD7F	585	5/1/2017	
9/7/2017	Steelhead	3DD.003BE8C372	715	5/1/2017	RT 425
9/7/2017	Steelhead	3DD.003BE8CDD5	658	5/15/2017	
9/7/2017	Steelhead	3DD.003BE8CCFC	655	4/12/2017	
9/7/2017	Steelhead	3DD.003BE8CDBF	775	5/1/2017	
9/7/2017	Steelhead	3DD.003BE8D34B	805	3/10/2017	
9/7/2017	Steelhead	3DD.003BE8D952	615	4/10/2017	
9/7/2017	Steelhead	3DD.003BE8CD6A	627	4/20/2017	
9/7/2017	Steelhead	3DD.003BE8CD65	746	4/24/2017	
9/7/2017	Steelhead	3DD.003BA35D4C	655	4/6/2017	
9/7/2017	Bull Trout	AC776B8	511		Genetic Vial TN15-128
9/7/2017	Bull Trout	AC776B9	527		Genetic Vial TN15-129

## 4.0 RECOMMENDATIONS FOR ONGOING MANAGEMENT

The annual operating plan (AOP) for the Hatchery and Supplementation program continues to be updated and used as an adaptive management tool to address both ongoing and new priorities as they relate to hatchery operations, supplementation activities and development of effective monitoring designs.

In 2017, the Hatchery and Supplementation subgroup began to add substantial detail and focus to several objectives. This work will continue into 2018, but will also provide the foundation for consistent monitoring designs that will be helpful moving forward and have some application to other monitoring plans such as the Aquatic Monitoring and Evaluation Plan. Additionally, a comprehensive review of the H&S plan will take place in 2018. Recommendations from this review will be applied to the redrafting of the H&S Plan due in 2019.

## 5.0 REFERENCES

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# APPENDIX A: Wild Winter Steelhead Collection Log - 2017

Trap Date	Capture Location	Gender	Fork Length (cm)	Pit Tag # Prefix 3DD003	DNA Sample #	DNA Results	Scale Card # Position	Comments
2/15/2017	Merwin Trap	M	61	BE8D2BA	MH-1	LR Cedar .6192	30338 - 1	4/18/17 Spawnd w/ Female MH-26, TN-4
2/21/2017	Merwin Trap	M	55	BE802B3	MH-2	LR Cedar .3545 LR Merwin .1005	30338-2	
2/24/2017	Merwin Trap	M	60	BE8D2EF	MH-3	LR Merwin .866	30338-3	4/10/17 Spawnd w/ Female MH-7, MH-34
2/26/2017	Merwin Trap	M	98	BE8D2BF	MH-4	LR Merwin .8595	30338-4	4/7/17 Spawnd w/ Female MH-5, MH-27, MH-31
2/25/2017	Merwin Trap	F	71	BE8D2AB	MH-5	LR Cedar .7978	30338-5	4/7/17 Spawnd w/ Male MH-4, MH-8, MH-15
3/1/2017	Merwin Trap	M	57	BE8D2C6	MH-6	LR Cedar .0093	30339-1	
3/3/2017	Tangle Net	M	69	BE8CABC	TN-1	LR Merwin .3655 LR Cedar .1374	4605-1	Mark / Release from Tangle Netting
3/8/2017	Merwin Trap	F	73	BE8D2A3	MH-7	LR Cedar .3767 LR Merwin .3651	30339-2	4/10/17 Spawnd w/ Male MH-3, MH-24
3/10/2017	Merwin Trap	M	77	BE8D2B2	MH-8	LR Cedar .7707 LR Merwin .1482	30339-3	4/7/17 Spawnd w/ Female MH-5, MH-27, MH-31
3/13/2017	Merwin Trap	M	61	BE8D2E8	MH-9	LR Merwin .0073 KalamW .8516	30339-4	4/18/17 Spawnd w/ Female MH-37, MH-29, MH-28
3/13/2017	Merwin Trap	M	80	BE8D2BB	MH-10	LR Merwin .0513 KalamW .6142	30339-5	4/18/17 Spawnd w/ Female MH-26, TN-4
3/14/2017	Merwin Trap	M	47	BE8D2C8	MH-11	LR Merwin .904	30339-7	
3/23/2017	Merwin Trap	F	70	BE8D2E5	MH-12	LR Merwin .8384 LR Cedar .1587	30343-1	4/14/17 Spawnd w/ Male TN-5, MH-23, MH-35
3/23/2017	Merwin Trap	F	72	BE8D2CD	MH-13	LR Cedar .527 KalamSU .3028	30343-2	
3/23/2017	Merwin Trap	F	59	BE8D2B4	MH-14	LR Merwin .5267 LR Cedar .3647	30343-3	4/14/17 Spawnd w/ Male TN-5, MH-23, MH-35
3/24/2017	Merwin Trap	M	63	BE8D2E9	MH-15	LR Merwin .8294 LR Cedar .0804	30343-4	4/7/17 Spawnd w/ Female MH-5, MH-27, MH-31
3/24/2017	Merwin Trap	F	68	BE8D2CB	MH-16	LR Cedar .5176 LR Merwin .3917	30343-5	4/28/17 Spawnd w/ Male MH-42, TN-10, TN-11
3/24/2017	Merwin Trap	M	62	BE8D2B9	MH-17	LR Merwin .4849 KalamSu .202	30343-6	NO WDFW GENETIC SAMPLE KY ERROR
3/24/2017	Merwin Trap	M	50	BE8D2AC	MH-18	LR Merwin .5266 EiochR .2095	30343-7	
3/24/2017	Merwin Trap	M	58	BE8D202	MH-19	LR Merwin .5319 EiochR .1974 LR Cedar .1005	30343-8	
3/25/2017	Merwin Trap	F	67	BE8D2F3	MH-20	LR Merwin .9741 LR Cedar .0245	30344-1	Mortality 4/25/17
3/27/2017	Merwin Trap	F	74	BE8D2CA	MH-21	KalamW .9896	30344-2	4/21/17 Spawnd w/ Male MH-3, MH-23, TN-5
3/28/2017	Merwin Trap	F	45	BE8D2F5	MH-22	LR Merwin .8770 LR Cedar .0384	30344-3	4/28/17 Spawnd w/ Male MH-42, TN-10, TN-11
3/30/2017	Merwin Trap	M	48	BE8D2CC	MH-23	LR Merwin .8535 LR Cedar .0646	30344-4	4/14/17 Spawnd w/ Female MH-12, MH-14, MH-33
4/3/2017	Merwin Trap	M	65	BE8D2A4	MH-24	LR Merwin .7725 LR Cedar .1881	30344-5	4/10/17 Spawnd w/ Female MH-7, MH-34
4/3/2017	Merwin Trap	M	73	BE8D2E0	MH-25	EiochHat .7766	30344-6	
4/3/2017	Merwin Trap	F	60	BE8D2C7	MH-26	LR Merwin .9625 LR Cedar .032	30344-7	4/18/17 Spawnd w/ Male MH-1, MH-10
4/4/2017	Merwin Trap	F	64	BE8D2F4	MH-27	LR Cedar .6184 LR Merwin .2818	30344-8	4/7/17 Spawnd w/ Male MH-4, MH-8, MH-15
4/5/2017	Merwin Trap	F	74	BE8D2C9	MH-28	LR Merwin .6357 LR Cedar .0635	30344-9	4/18/17 Spawnd w/ Male TN-7, TN-6, MH-9
4/5/2017	Merwin Trap	F	61	BE8D2EA	MH-29	LR Merwin .9084 LR Cedar .0788	46424-1	4/18/17 Spawnd w/ Male TN-7, TN-6, MH-9
4/6/2017	Merwin Trap	F	62	BE8D2E6	MH-30	LR Cedar .6848 LR Merwin .1566	46424-2	
4/6/2017	Merwin Trap	F	71	BE8D2E2	MH-31	LR Cedar .7905 LR Merwin .1258	46424-3	4/7/17 Spawnd w/ Male MH-4, MH-8, MH-15
4/6/2017	Merwin Trap	F	53	BE8D2C3	MH-32	LR Cedar .2884 GrRLC .3779	46424-4	4/28/17 Spawnd w/ Male MH-42, TN-10, TN-11
4/7/2017	Merwin Trap	F	70	BE8D2AE	MH-33	LR Cedar .5432	46424-5	4/14/17 Spawnd w/ Male TN-5, MH-23, MH-35
4/7/2017	Tangle Net	F	48	BE8D2E4	TN-4	LR Cedar .1703 Coweeman .4846	46424-8	4/18/17 Spawnd w/ Male MH-1, MH-10
4/7/2017	Tangle Net	M	59	BE8D2DE	TN-5	LR Merwin .8726 LR Cedar .0842	46424-9	
4/10/2017	Merwin Trap	F	57	BE8D2D4	MH-34	LR Cedar .7251 LR Merwin .1711	46425-2	4/10/17 Spawnd w/ Male MH-3, MH-24
4/10/2017	Merwin Trap	M	76	BE8D2E7	MH-35	LR Merwin .9402	46425-1	4/14/17 Spawnd w/ Female MH-12, MH-14, MH-33
4/12/2017	Merwin Trap	F	50	BE8D296	MH-36	LR Merwin .9407	46425-3	5/12/17 Spawnd w/ Male MH-49, MH-45, MH-58
4/12/2017	Merwin Trap	F	61	BE8D2EC	MH-37	LR Merwin .7532	46425-4	4/18/17 Spawnd w/ Male TN-7, TN-6, MH-9
4/13/2017	Tangle Net	M	79	BE8CAE0	TN-6	LR Cedar .8737 LR Merwin .0913	8219-1	4/18/17 Spawnd w/ Female MH-37, MH-29, MH-28
4/13/2017	Tangle Net	M	78	BE8CAEF	TN-7	LR Merwin .5379 LR Cedar .4205	8219-2	4/18/17 Spawnd w/ Female MH-37, MH-29, MH-28
4/17/2017	Merwin Trap	F	66	BE8D2D9	MH-38	LR Merwin .4153 GrRLC .2015	46425-5	5/19/17 Spawnd w/ Male MH-51, TN-8
4/17/2017	Merwin Trap	F	61	BE8D2D8	MH-39	LR Cedar .5631	46425-6	4/21/17 Spawnd w/ Male MH-3, MH-23, TN-5
4/18/2017	Merwin Trap	M	63	BE8D2BD	MH-40	LR Cedar .2435 GermCr.335	46425-7	
4/18/2017	Merwin Trap	M	39	BE8D2BE	MH-41	LR Merwin .9901	46425-8	
4/19/2017	Merwin Trap	M	63	BE8D2DC	MH-42	LR Cedar .9949	46426-1	4/28/17 Spawnd w/ Female MH-32, MH-16, MH-22
4/20/2017	Merwin Trap	M	71	BE8D2C4	MH-43	LR Merwin .5957	46426-2	5/5/17 Spawnd w/ Female MH-60, MH-50
4/20/2017	Merwin Trap	M	68	BE8D2C5	MH-44	LR Merwin .9521	46426-3	5/5/17 Spawnd w/ Female MH-60, MH-50
4/20/2017	Tangle Net	M	57	BE8CB22	TN-8	LR Cedar .6528	8219-3	5/19/17 Spawnd w/ Female MH-38
4/20/2017	Tangle Net	M	69	BE8CADC	TN-9	LR Merwin .6243 GermCr.2326	8219-4	
4/20/2017	Tangle Net	M	93	BE8CB25	TN-10	LR Merwin .8755	8219-5	4/28/17 Spawnd w/ Female MH-32, MH-16, MH-22
4/20/2017	Tangle Net	M	70	BE8CB05	TN-11	LR Merwin .4918 LR Cedar .3503	8219-6	4/28/17 Spawnd w/ Female MH-32, MH-16, MH-22
4/21/2017	Merwin Trap	M	80	BE8D2C1	MH-45	LR Merwin .5673	46426-4	5/12/17 Spawnd w/ Female MH-47, MH-48, MH-36
4/21/2017	Merwin Trap	F	71	BE8D2F1	MH-46	LR Merwin .9235	46426-5	4/21/17 Spawnd w/ Male MH-3, MH-23, TN-5
4/24/2017	Merwin Trap	F	65	BE8D2BC	MH-47	LR Merwin .9936	46426-6	5/12/17 Spawnd w/ Female MH-49, MH-45, MH-58
4/24/2017	Merwin Trap	F	59	BE8D2B6	MH-48	LR Cedar .5003 LR Merwin .3938	46426-7	5/12/17 Spawnd w/ Male MH-49, MH-45, MH-58
4/24/2017	Merwin Trap	M	48	BE8D2DA	MH-49	LR Merwin .9835	46426-8	5/12/17 Spawnd w/ Female MH-47, MH-48, MH-36
4/24/2017	Merwin Trap	F	36	BE8D2DB	MH-50	LR Merwin .982	46426-9	5/5/17 Spawnd w/ Male MH-43, MH-44
4/25/2017	Merwin Trap	M	62	BE8D2DF	MH-51	LR Merwin .9655	46427 -1	5/19/17 Spawnd w/ Female MH-38
4/25/2017	Merwin Trap	M	50	BB92583	MH-52	LR Merwin .5677 LR Cedar .1933	CC	Cedar Creek Trap 4/6/17
4/26/2017	Merwin Trap	M	66	BE8D2D0	MH-53	GrRLC .5831 LR Merwin .301	46427-2	
4/26/2017	Merwin Trap	M	65	BE8D2F0	MH-54	GermCr.2984	46427-3	
4/28/2017	Merwin Trap	F	51	BE8D2A0	MH-55	Coweeman .8533	46427-4	
4/28/2017	Merwin Trap	M	59	BE8D2A9	MH-56	LR Merwin .9265	46427-5	
5/1/2017	Merwin Trap	F	71	BE8D2E3	MH-57	GermCr.5886	46427-6	
5/1/2017	Merwin Trap	M	73	BE8D2CF	MH-58	LR Merwin .9782	46427-7	5/12/17 Spawnd w/ Female MH-47, MH-48, MH-36
5/1/2017	Merwin Trap	F	57	BE8D2B8	MH-59	LR Merwin .8336	46427-8	
5/1/2017	Merwin Trap	F	64	BE8D2D1	MH-60	LR Cedar .4581 LR Merwin .4223	46427-9	5/5/17 Spawnd w/ Male MH-43, MH-44
5/8/2017	Merwin Trap	M	45	BE8D2A5	MH-61	LR Merwin .8456	46428-1	

# APPENDIX B - Genetic Assignment Results from Late Winter Steelhead Captures at Merwin Trap (MT) and Tangle Netting (TN) – 2017

Genetic ID	Primary	P1	Secondary	P2	Tertiary	P3	4th	P4	5th	P5	Spawned?
MH17-001	LR Cedar	0.62	KalamW	0.37	GermCr	0.00					yes
MH17-002	LR Cedar	0.35	EF LewisR	0.30	GermCr	0.13	LR Merwin	0.10	Gr RLC	0.07	
MH17-003	LR Merwin	0.87	LR Cedar	0.10	BigCr	0.03					yes
MH17-004	LR Merwin	0.86	LR Cedar	0.10	KalamSu	0.01					yes
MH17-005	LR Cedar	0.80	LR Merwin	0.09	KalamW	0.04					yes
MH17-006	GermCr	0.80	SandyR	0.16	KalamW	0.01	ElochHat	0.01	LR Cedar	0.01	
MH17-007	LR Cedar	0.38	LR Merwin	0.37	Gr RLC	0.13	KalamW	0.05	SFTout	0.04	yes
MH17-008	LR Cedar	0.77	LR Merwin	0.15	GermCr	0.04	KalamW	0.02	EF LewisR	0.00	yes
MH17-009	KalamW	0.85	GermCr	0.08	MillCr	0.04	SFTout	0.01	LR Merwin	0.01	yes
MH17-010	KalamW	0.61	Cowman	0.13	LR Cedar	0.07	LR Merwin	0.05	EF LewisR	0.04	yes
MH17-011	LR Merwin	0.90	Gr RLC	0.05	ElochR	0.04					
MH17-012	LR Merwin	0.84	LR Cedar	0.16							yes
MH17-013	LR Cedar	0.53	KalamSu	0.30	SandyR	0.05	KalamW	0.04	LR Merwin	0.04	
MH17-014	LR Merwin	0.53	LR Cedar	0.36	Cowman	0.11					yes
MH17-015	LR Merwin	0.83	LR Cedar	0.08	MillCr	0.05	KalamSu	0.01	EF LewisR	0.01	yes
MH17-016	LR Cedar	0.52	LR Merwin	0.39	GermCr	0.05	ElochHat	0.02	KalamW	0.01	
MH17-017	LR Merwin	0.49	KalamSu	0.20	LR Cedar	0.17	ElochR	0.12	KalamW	0.00	
MH17-018	LR Merwin	0.53	ElochR	0.21	LR Cedar	0.17	GermCr	0.07	Gr RLC	0.02	
MH17-019	LR Merwin	0.53	ElochR	0.20	LR Cedar	0.18	GermCr	0.07	Gr RLC	0.03	
MH17-020	LR Merwin	0.97	LR Cedar	0.02							
MH17-021	KalamW	0.99	KalamSu	0.01							yes
MH17-022	LR Merwin	0.88	Gr RLC	0.07	LR Cedar	0.04	GermCr	0.01			
MH17-023	LR Merwin	0.85	LR Cedar	0.06	EF LewisR	0.05	KalamW	0.02			yes
MH17-024	LR Merwin	0.77	LR Cedar	0.19	Gr RLC	0.04					yes
MH17-025	ElochHat	0.78	LR Cedar	0.15	Cowman	0.05	KalamW	0.01			
MH17-026	LR Merwin	0.96	LR Cedar	0.03							yes
MH17-027	LR Cedar	0.62	LR Merwin	0.28	Cowman	0.10					yes
MH17-028	LR Merwin	0.64	Cowman	0.18	LR Cedar	0.06	KalamSu	0.04	KalamW	0.02	yes
MH17-029	LR Merwin	0.91	LR Cedar	0.08	Cowman	0.01					yes
MH17-030	LR Cedar	0.68	LR Merwin	0.16	Cowman	0.11	ElochR	0.03	GermCr	0.02	
MH17-031	LR Cedar	0.79	LR Merwin	0.13	KalamW	0.05	Cowman	0.01	Gr RLC	0.01	yes
MH17-032	Gr RLC	0.38	LR Cedar	0.29	SFTout	0.29	KalamW	0.02	LR Merwin	0.02	
MH17-033	LR Cedar	0.54	Cowman	0.27	KalamSu	0.11	KalamW	0.04	GermCr	0.03	yes
MH17-034	LR Cedar	0.73	LR Merwin	0.17	Gr RLC	0.07	Cowman	0.03			yes
MH17-035	LR Merwin	0.94	KalamW	0.03	LR Cedar	0.02	Cowman	0.01			yes
MH17-036	LR Merwin	0.94	KalamW	0.03	LR Cedar	0.02	Cowman	0.01			yes
MH17-037	LR Merwin	0.75	Cowman	0.20	LR Cedar	0.05					yes
MH17-038	LR Merwin	0.42	Gr RLC	0.20	KalamW	0.20	GermCr	0.06	ElochR	0.05	yes
MH17-039	LR Cedar	0.57	SandyR	0.15	SFTout	0.09	Gr RLC	0.06	ElochR	0.05	yes
MH17-040	GermCr	0.34	LR Cedar	0.24	SandyR	0.18	Gr RLC	0.12	EF LewisR	0.03	
MH17-041	LR Merwin	0.99									
MH17-042	LR Cedar	0.99									yes
MH17-043	LR Merwin	0.60	SandyR	0.34	EF LewisR	0.05	LR Cedar	0.00			yes
MH17-044	LR Merwin	0.95	MillCr	0.02	ElochR	0.01	Cowman	0.00			yes
MH17-045	LR Merwin	0.57	LR Cedar	0.40	Cowman	0.01	GermCr	0.01	ElochR	0.01	yes
MH17-046	LR Merwin	0.92	EF LewisR	0.02	ElochR	0.02	LR Cedar	0.01	MillCr	0.01	yes
MH17-047	LR Merwin	0.99									yes
MH17-048	LR Cedar	0.50	LR Merwin	0.39	KalamW	0.09	Cowman	0.01			yes
MH17-049	LR Merwin	0.98	LR Cedar	0.01							yes
MH17-050	LR Merwin	0.98	LR Cedar	0.01							yes
MH17-051	LR Merwin	0.97	LR Cedar	0.01	Cowman	0.01	EF LewisR	0.01			yes
MH17-052	LR Merwin	0.57	LR Cedar	0.19	Gr RLC	0.19	KalamW	0.02	Cowman	0.01	
MH17-053	Gr RLC	0.58	LR Merwin	0.30	SandyR	0.08	EF LewisR	0.01	LR Cedar	0.01	
MH17-054	LR Cedar	0.59	GermCr	0.30	KalamW	0.03	SandyR	0.02	Gr RLC	0.02	
MH17-055	Cowman	0.85	MillCr	0.05	KalamW	0.04	LR Cedar	0.02	LR Merwin	0.02	
MH17-056	LR Merwin	0.93	LR Cedar	0.06							
MH17-057	GermCr	0.59	LR Cedar	0.14	Cowman	0.11	ElochR	0.08	ElochHat	0.05	
MH17-058	LR Merwin	0.98	LR Cedar	0.01	Cowman	0.01					yes
MH17-059	LR Merwin	0.83	LR Cedar	0.15	KalamW	0.00					
MH17-060	LR Cedar	0.46	LR Merwin	0.42	SFTout	0.04	Cowman	0.02	GermCr	0.02	yes
MH17-061	LR Merwin	0.84	MillCr	0.12	Cowman	0.02	LR Cedar	0.01			
TN17-001	GermCr	0.42	LR Merwin	0.37	LR Cedar	0.14	ElochHat	0.07			
TN17-002	LR Merwin	0.97	LR Cedar	0.03							
TN17-003	LR Cedar	0.76	MillCr	0.13	LR Merwin	0.04	Gr RLC	0.03	KalamSu	0.02	
TN17-004	Cowman	0.48	KalamW	0.20	LR Cedar	0.17	SFTout	0.05	LR Merwin	0.04	yes
TN17-005	LR Merwin	0.87	LR Cedar	0.08	KalamW	0.02	Cowman	0.01			yes
TN17-006	LR Cedar	0.87	LR Merwin	0.09	LRhatW	0.03					yes
TN17-007	LR Merwin	0.54	LR Cedar	0.42	EF LewisR	0.01	Cowman	0.01	KalamSu	0.01	yes
TN17-008	LR Cedar	0.65	Cowman	0.20	LR Merwin	0.11	GermCr	0.02	KalamW	0.01	yes
TN17-009	LR Merwin	0.62	GermCr	0.23	MillCr	0.10	ElochR	0.02	Cowman	0.02	
TN17-010	LR Merwin	0.88	CowlitZ	0.07	LR Cedar	0.02	GermCr	0.01	Cowman	0.01	yes
TN17-011	LR Merwin	0.49	LR Cedar	0.35	GermCr	0.12	Cowman	0.02	ElochR	0.01	yes

## APPENDIX C – NOR Late Winter Steelhead Spawning Crosses -2017

CROSS	DATE	FEMALE	MALES		
1	7-Apr	MH-27	MH-4	MH-8	MH-15
		MH-31	MH-4	MH-8	MH-15
		MH-5	MH-4	MH-8	MH-15
2	10-Apr	MH-7	MH-3	MH-24	
		MH-34	MH-3	MH-24	
3	14-Apr	MH-33	TN-5	MH-23	MH-35
		MH-12	TN-5	MH-23	MH-35
		MH-14	TN-5	MH-23	MH-35
4	18-Apr	TN-4	MH-1	MH-10	
		MH-26	MH-1	MH-10	
5	18-Apr	MH-28	TN-7	TN-6	MH-9
		MH-29	TN-7	TN-6	MH-9
		MH-37	TN-7	TN-6	MH-9
6	21-Apr	MH-21	MH-3	MH-23	TN-5
		MH-39	MH-3	MH-23	TN-5
		MH-46	MH-3	MH-23	TN-5
7	28-Apr	MH-16	MH-42	TN-10	TN-11
		MH-22	MH-42	TN-10	TN-11
		MH-32	MH-42	TN-10	TN-11
8	5-May	MH-50	MH-43	MH-44	
		MH-60	MH-43	MH-44	
9	12-May	MH-36	MH-49	MH-45	MH-58
		MH-47	MH-49	MH-45	MH-58
		MH-48	MH-49	MH-45	MH-58
10	19-May	MH-38	MH-51	TN-8	

## APPENDIX D – Estimates of 2017 coho escapement from tagged carcass surveys in the lower Lewis River mainstem

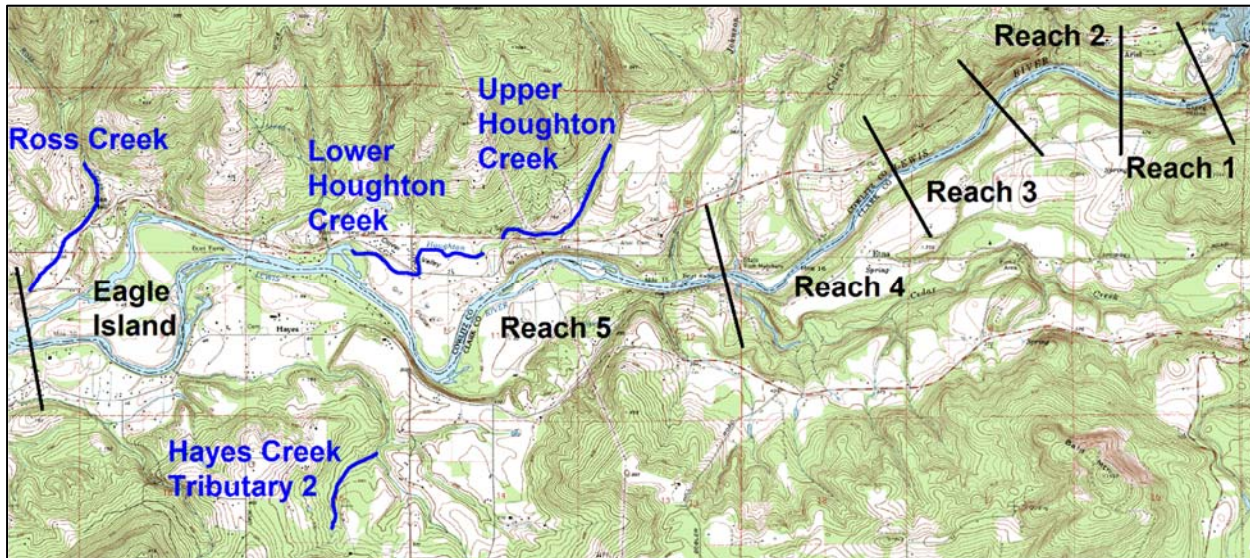
**To:** Erik Lesko, PacifiCorp  
**From:** Jason Shappart, Meridian Environmental, Inc.  
**Date:** July 18, 2017  
**Re:** North Fork Lewis River Downstream of Merwin Dam – 2016 Coho Salmon Spawning Survey Results (October 2016 through January 2017)

---

### Introduction

As a component of its existing FERC license, PacifiCorp conducts annual coho salmon spawning surveys from mid-October through January to facilitate estimating coho salmon spawning escapement in the North Fork Lewis River downstream of Merwin Dam (PacifiCorp 2017). Meridian Environmental, Inc. (Meridian) has performed these surveys under a contract with PacifiCorp since 2013. The mainstem North Fork Lewis River spawning survey area is divided into five index reaches as defined by the Washington Department of Fish and Wildlife (WDFW), extending from the boat barrier downstream of Merwin Dam to the downstream end of Eagle Island (Figure 1), encompassing 10.84 river miles (mainstem channel and Eagle Island side channel). The North Fork Lewis River tributary spawning survey reaches are defined annually by WDFW using a GRTS sample design. In 2016, WDFW designated two survey reaches within Houghton Creek, and one reach each in Ross and Hayes creeks (Figure 1). All surveys were conducted on a weekly basis as environmental conditions allowed (flow, turbidity, etc.) following methods described in PacifiCorp's revised Monitoring and Evaluation Plan (PacifiCorp 2017). This memorandum summarizes the results of the coho salmon spawning surveys from mid-October 2016 through January 2017.

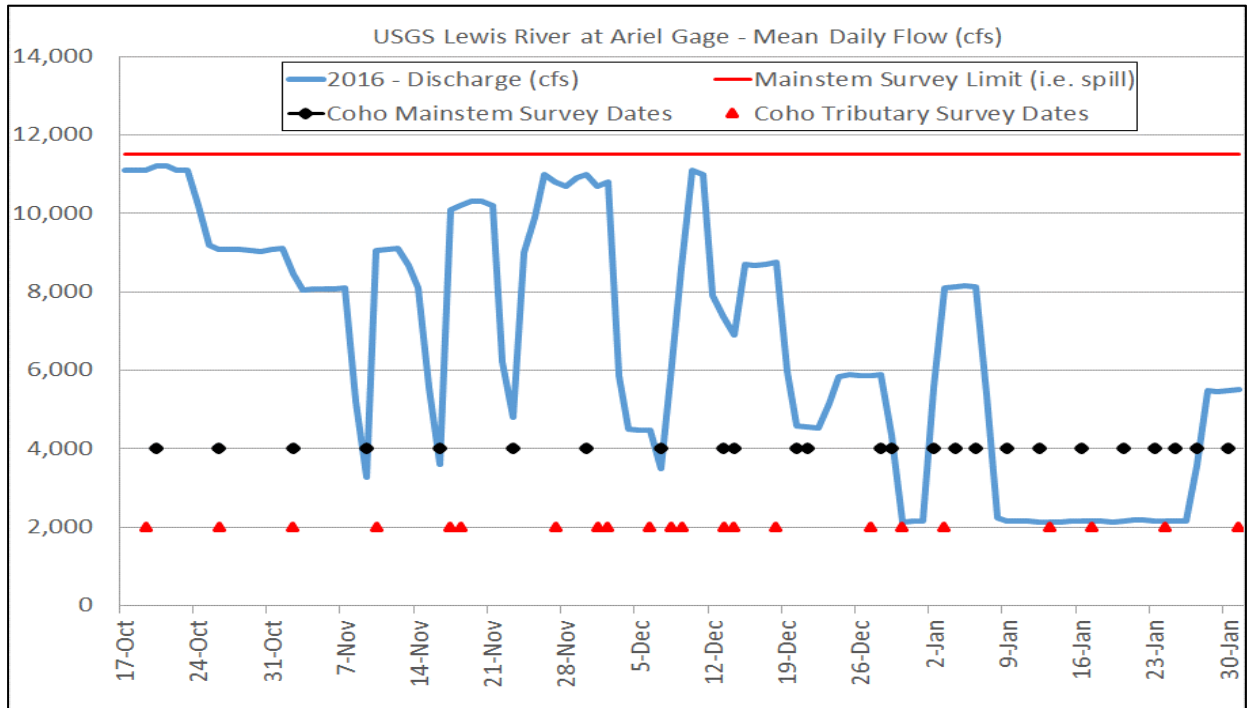




**Figure 1. 2016 North Fork Lewis River and tributaries downstream of Merwin Dam – coho spawning survey reach map.**

## **Survey Conditions**

In 2016, southwest Washington experienced one of the wettest Octobers on record, with substantial rainfall persisting through January (Figure 2). Despite these conditions, Meridian biologists were able to fully survey the GRTS tributary and North Fork Lewis River mainstem reaches during the majority of the survey season. On each survey occasion, all five mainstem North Fork Lewis River reaches were surveyed via jet boat during a single day. All tributary surveys were conducted on foot (walking surveys). Unlike prior years, the 2016 mainstem North Fork Lewis River surveys were conducted during river drawdown periods (in addition to non-drawdown periods). PacifiCorp conducts river drawdowns, generally on Wednesdays during the coho and fall Chinook spawning survey season, at the request of WDFW to facilitate WDFW's ability to recover fall Chinook carcasses. From 2013 to 2015, Meridian purposefully avoided conducting coho surveys during the Wednesday drawdowns at the request of WDFW. However, additional data analyses suggested that coho carcass recovery rates may be improved during lower flows. As a result, in 2016, Meridian conducted coho surveys during drawdown days to improve carcass detection probability and increase carcass re-sight probability.



**Figure 2. USGS Lewis River at Ariel gage – mean daily flow (cfs) during the 2016 coho spawning survey season and survey day timing.**

## Results

### Tributary Surveys

Meridian biologists counted a total of 33 coho redds and 49 live coho spawners in the Ross Creek survey reach, and 10 redds and 10 live coho spawners in the upper Houghton Creek reach. However, only 12 coho carcasses were observed in these two reaches, of which one was coded-wire tagged. No redds or carcasses were observed in the lower Houghton Creek or Hayes Tributary 2 survey reaches.



**Table 1. Summary of tributary coho salmon spawning surveys downstream of Merwin Dam (mid-October 2016 through January 2017).**

Stream	Reach Length (miles)	Total Weeks (mid-Oct through Jan)	Total Weeks Surveyable	Total New Redds	Total Live Holders	Total Live Spawners	Hatchery Male Carcass	Hatchery Female Carcass	Unmarked Male Carcass	Unmarked Female Carcass	Total Carcass	% Pre-spawn Mortality (Females)	Carcass Wanded for CWT	CWT Positive Carcass
Hayes Trib 2	0.5	16	9	0	0	0	0	0	0	0	0	NA	0	0
Lower Houghton	1.0	16	13	0	1	0	0	0	0	0	0	NA	0	0
Ross Creek	1.0	16	15	33	9	49	2	1	5	2	10	0%	10	1
Upper Houghton	1.0	16	16	10	7	10	2	0	0	0	2	NA	2	0

The same Ross Creek and upper Houghton Creek reaches were surveyed in prior years (2013 to 2015). The Ross Creek redd count in 2016 equaled the highest previous redd count since 2013 (Table 2). Houghton Creek had the highest redd count from 2013 to 2016 (Table 2).

**Table 2. Ross Creek and Houghton Creek coho spawning survey count summary 2013-2016)**

Year	Total Weeks Surveyable	Total Live Spawners	Total Carcasses	Total Redds
Ross Creek				
2013	13	44	20	18
2014	14	14	68	33
2015	10	10	5	2
2016	15	49	10	33
Houghton Creek				
2013	15	52	2	8
2014	13	13	14	8
2015	10	0	0	0
2016	16	10	2	10

**North Fork Lewis River Surveys**

As in prior years, the biologists conducting the coho redd surveys in the mainstem North Fork Lewis River found it difficult to differentiate coho redds from fall Chinook redds due

to the very large number of fall Chinook spawning in the North Fork Lewis River. A total of 69 coho carcasses were observed in the entire mainstem North Fork Lewis River survey area over the 25 survey occasions / 16 week period (Table 3). Two of these carcasses contained coded-wire tags. A total of 54 percent of the carcasses were of hatchery origin. Of the 69 carcasses observed, 65 coho were tagged and released to complete the mark-re-sight estimate of total carcasses. A total of 20 (31 percent) of the tagged carcasses were re-sighted over the 25 sampling occasions. Carcass tagging results were used to make estimates of spawner escapement (i.e., total carcasses); see report from Leigh Ann Starceвич, PhD, Biometrician, West Inc., 2017. Coho escapement to the North Fork Lewis River mainstem between the downstream end of Eagle Island and the boat barrier downstream of Merwin Dam was estimated in 2016 as 124, bootstrap 95 percent-CI: 103 to 169 (Starceвич 2017). The coefficient of variation for estimated escapement was 0.14.

**Table 3. Summary of North Fork Lewis River mainstem coho salmon spawning surveys downstream of Merwin Dam (mid-October 2016 through January 2017).**

NF Lewis River	Reach Length (miles)	Total Weeks (mid-Oct through Jan)	Total Weeks Surveyable	Total Live Holders	Total Live Spawners	Hatchery Male Carcass	Hatchery Female Carcass	Unmarked Male Carcass	Unmarked Female Carcass	Total Carcass	Total Carcass Tagged	Total Carcass Recoveries	% Pre-spawn Mortality (Females)	Carcass Wanded for CWT	CWT Positive Carcass
Reach 1	0.57	16	16	1	24	3	3	1	1	8	7	4	0%	8	1
Reach 2	0.68	16	16	6	44	0	2	0	1	3	3	1	50%	3	0
Reach 3	0.97	16	16	0	108	2	1	0	2	5	4	1	0%	5	1
Reach 4	1.32	16	16	56	78	2	3	6	3	14	14	7	33%	14	0
Reach 5	7.3	16	15	0	25	12	9	13	5	39	37	7	14%	39	0
Total	10.84	16	16	63	279	19	18	20	12	69	65	20	18%	69	2

## Discussion and Conclusions

Incorporating surveys on drawdown days in 2016 nearly doubled the proportion of tagged carcasses that were resighted compared to the highest resight proportion in previous years (2013 to 2015) when surveys were conducted on non-drawdown days (Table 4). It is important to note that the same crew conducted all surveys during all four years covering the same reaches and season. These data suggest that conducting coho surveys on drawdown days increases detection probability of coho carcasses, which ultimately increases precision and confidence in estimates of coho escapement. Therefore, we recommend to continue conducting coho spawning surveys during drawdown days in the future. In addition, these results suggest that the majority of potential adult coho spawners entered the Merwin adult trap and were transported above Swift Dam to spawn upstream (i.e., over 7,000 adult coho captured and transported upstream to spawn during the 2016 spawning survey season).

**Table 4. 2016 and 2013 total coho redd estimates.**

Year	Total Carcasses Tagged	Total Carcasses Resighted	% Carcasses Resighted	Survey on Drawdown Days	Total Weeks Surveyable	Average Daily Flow during Surveys (cfs)
2013	328	41	13%	No	15	4,700
2014	431	18	4%	No	15	7,765
2015	12	2	17%	No	12	5,632
2016	65	20	31%	Yes	16	4,587

## References

- PacifiCorp and Cowlitz PUD. 2017. Aquatic monitoring and evaluation plan for the Lewis River – first revision, objective 15 - determine spawner abundance, timing and distribution of transported anadromous adults, dated February 28, 2017. Prepared by PacifiCorp and Public Utility District No. 1 of Cowlitz County.
- Starcevich, L.A. 2017. Estimates of 2016 coho adult escapement from tagged carcass surveys in the lower North Fork Lewis River, dated July 14, 2017. Prepared for Meridian Environmental, Inc. by Leigh Ann Starcevich, PhD, Biometrician, West Inc., Environmental & Statistical Consultants, Corvallis, Oregon



**Date:** July 14, 2017  
**To:** Jason Shappart (Meridian Environmental, Inc.)  
**From:** Leigh Ann Starcevich (WEST, Inc.)  
**Re:** Estimates of 2016 Coho Adult Escapement from Tagged Carcass Surveys in the Lower North Fork Lewis River

## Introduction

Coho salmon spawning surveys (including carcass tagging) are conducted annually by Meridian Environmental, Inc. (Meridian) for PacifiCorp to provide the basis for estimating escapement in the mainstem North Fork Lewis River downstream of Merwin Dam to the downstream end of Eagle Island. The area of interest is divided into 5 reaches ranging from 0.57 to 7.30 miles long, previously defined by Washington Department of Fish and Wildlife (WDFW).

Coho carcass surveys were conducted on 25 occasions between October 20, 2016 and January 30, 2017. A subset of observed coho carcasses were identified and tagged with a uniquely-numbered plastic disk behind the gills (two tags per carcass) so that re-sighting probabilities of tagged carcasses do not differ from untagged carcasses. The tagged carcasses were returned to the river in the same location where found as suggested by WDFW. On successive survey occasions, carcasses were counted by reach. In previous years, after tagging, carcasses were placed in the current to re-distribute, and tails and tags from resighted tagged carcasses were removed and carcasses deposited adjacent to the river to prevent subsequent sightings. This year, resighted tagged carcasses were recorded but not destroyed so that carcasses were available for multiple resightings. After each resight, the tagged carcass was returned to the river in the same location where found.

## Statistical Methods

Analysis tools developed for a similar analysis used by California Department of Fish and Wildlife (Bergman et al. 2012) were applied to the carcass data from the Lower Lewis River surveys. In the R statistical environment (2014), the *rma* package (McDonald 2015) was used to apply the super-population parameterization (Schwarz and Arnason 1996) of the Jolly-Seber model to estimate the total escapement in the population while accounting for subsampling of coho for marking. Escapement is quantified by Schwarz and Arnason (1996) as the total number of gross “births” in the area of interest, which includes coho present at the beginning of the study, those that move into the study area during the monitoring period, and those that do not survive to the end of the monitoring period.

Intercept-only models were used for capture and survival probabilities because preliminary modeling indicated that the 2016 data were too sparse for time-dependent

models. A nonparametric bootstrap (Manly 2007) was used to obtain the standard error and 95%-confidence intervals on total escapement.

## Results

The results of the 2016 carcass survey are provided in Table 1. A total of 69 carcasses were observed in the initial survey and 65 of these carcasses were marked. Of the 65 marked carcasses, 20 were re-sighted 1 to 9 times over 25 sampling occasions (Figure 1). Escapement (i.e. the total number of carcasses) was estimated in 2016 as 124 (bootstrap 95%-CI: 103, 169). The capture probability was estimated as 0.45 (95%-CI: 0.23, 0.68). The coefficient of variation for estimated escapement was 0.14.

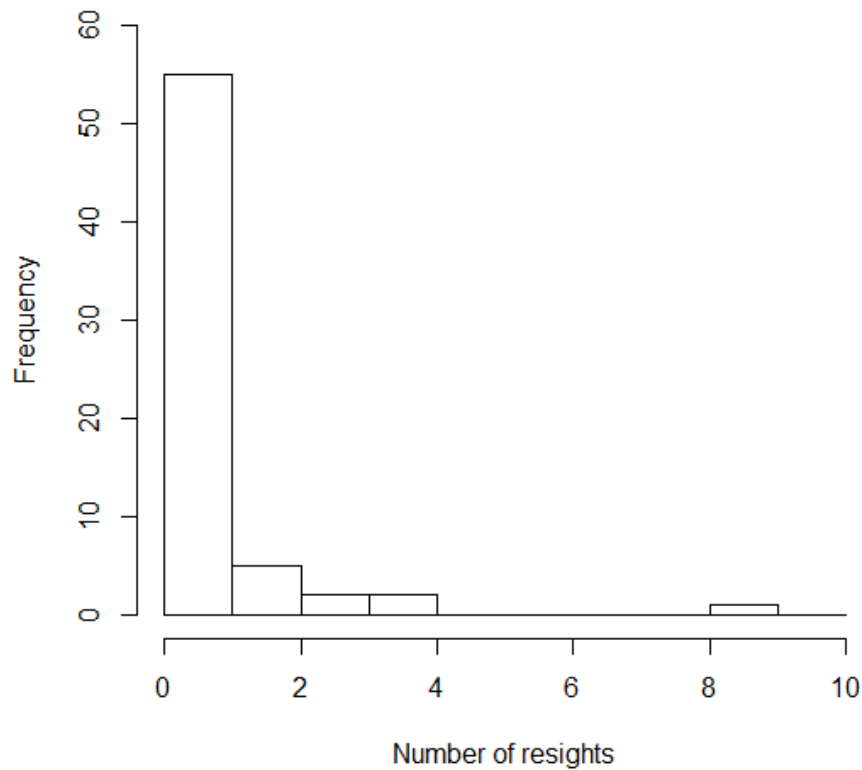


Figure 1: Frequency of carcass resights



*Table 1. Estimated coho spawner escapement by year to the mainstem North Fork Lewis River from Merwin Dam to the downstream end of Eagle Island, with 95%-confidence intervals.*

Year	Number of marked carcasses	Number (%) of captured carcasses	Est. Gross Population Size	Bootstrap SE	95%-Confidence Interval	CV
2016	65	20 (30.8%)	124	17	(103, 169)	0.14

## Discussion

Note that the mark-resight methods applied in this analysis do not require that all encountered carcasses be marked. The coefficient of variation for the 2016 estimate was 0.14 which was comparable to that of the 2013 estimate of escapement (0.15) and lower than the coefficient of variation for the 2014 escapement estimate (0.27). Several factors may influence the precision of the escapement estimates. First, only 4.2% of the marked carcasses were resighted in 2014 compared to a resighting rate of 12.5% in 2013 and 30.8% in 2016. Second, 27 sampling occasions were used in 2013 and 25 sampling occasions in 2016 compared to 23 occasions in 2014.

The estimate of population size of 124 was well below the 2013 estimate of 1970 and the 2014 estimate of 7805 spawners. The coho return in 2016 was substantially smaller than either 2013 or 2014. A total of 279 live coho spawners were observed during the 2016 survey. While the number of successful spawners of those observed is unknown, this observed number is over twice the estimate obtained from mark-resight analysis of carcasses. However, some of the live coho spawners observed may have potentially been captured in the Lewis River Hatchery or Merwin Trap and removed from the river or transported upstream of Swift Dam to spawn; and therefore, unavailable as carcasses within their the North Fork Lewis River downstream of Merwin Dam. The estimated capture rate was likely influenced by carcasses resighted multiple times (9 times for one carcass). If the manner of placement of marked carcasses resulted in higher probabilities, total carcasses may be underestimated.



## Literature Cited

Bergman, J. M., R. M. Nielson, and A. Low. 2012. Central Valley in-river Chinook salmon escapement monitoring plan. Fisheries Branch Administrative Report Number: 2012-1. California Department of Fish and Wildlife. Sacramento, CA.

Manly, B. 2007. *Randomization, Bootstrap, and Monte Carlo Methods in Biology*, 3<sup>rd</sup> edition. Chapman and Hall, Boca Raton, Florida, USA.

McDonald T. 2015. mra: Analysis of Mark-Recapture Data. R package version 2.16.4. <http://CRAN.R-project.org/package=mra>.

R Core Team (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

Schwarz, C.J., and A.N. Arnason. 1996. A general method for analysis of capture-recapture experiments in open populations. *Biometrics* 52:860-873.

APPENNDIX E - Lewis River Fall Chinook Escapement Report  
2017 (WDFW to provide)



# APPENDIX F - WDFW Lewis River Hatchery Complex Operations Program Report – 2017

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE  
FISH PROGRAM  
HATCHERIES DIVISION

LEWIS RIVER COMPLEX OPERATIONS PROGRAM  
FOR  
JANUARY 1, 2017 TO DECEMBER 31, 2017



FUNDED BY  
PACIFICORP ENERGY  
&  
COWLITZ P.U.D.

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OPERATIONS PROGRAM  
LEWIS RIVER HATCHERY

FOR

January 1, 2017 TO DECEMBER 31, 2017



*Washington*  
*Department of*  
**FISH and**  
**WILDLIFE**

WRITTEN AND COMPILED BY:  
LEWIS RIVER HATCHERY STAFF

## Introduction

The Lewis River Salmon Hatchery is located approximately eight miles east of Woodland, WA. on the North Fork of the Lewis River. Originally constructed in 1909 on Johnson Creek, the hatchery was moved to its present site in 1923.

### Program Goals

- 1,250,000 yearling Spring Chinook at 8 to 12 fpp released into the North Fork Lewis River.
- 1,100,000 yearling Early Coho at 16 fpp released into the North Fork Lewis River.
- 900,000 yearling Late Coho at 16 fpp released into the North Fork Lewis River.

Approximately 29,000 gallons of water per minute can be delivered to the hatchery system by eight pumps that are located at two separate intakes. Four booster pumps permit further distribution of water to other areas of the facility as needed. Three gas stabilization towers and one packed column are available to remove supersaturated gases from the water supply when necessary.

There is approximately 312,000 cubic feet of available rearing space. This space consists of 14 super raceways and 12 standard raceways. Adult holding space consists of 4 large concrete ponds with a common center channel totaling 53,000 cubic feet.

The incubation facility houses fifty stacks (16 trays/stack) of vertical incubators and four shallow troughs.

The Lewis Hatchery facility also includes three residences, hatchery/office building, freezer building, two three bay storage buildings, two small storage buildings, public restroom, two intake structures, two generator/pump control buildings, two compressor buildings a two-story adult handling facility and a domestic water pump house.

Lewis River hatchery is staffed with a FHS 4, FHS 3, three FHS 2s and a FHT.

## TRAPPING

The Merwin Fish Collection Facility (F.C.F.) and the Lewis Ladder Trap operate continuously year around. Once the fish are captured, staff identify, numerate, and sort for hatchery brood stock, watershed escapement goals, tribal harvest agreements, food banks, and nutrient enhancement.

### 2017 Lewis River Winter Steelhead

The last 2017 brood winter steelhead was trapped at the Lewis Ladder was on March 2, and the last one trapped at the Merwin F.C.F was on May 24, 2017. Brood stock was collected at the Merwin F.C.F. and shipped to Merwin Hatchery.

Total Trapped (F.C.F.)	1,460
Total Trapped (Lewis)	108
Trap Mortality	37
Recycled	141
Brood stock Shipped	162
Food Banks/Tribes	1,228

### 2018 Brood Lewis River Summer Steelhead

The first summer steelhead was trapped at Merwin F.C.F. on April 11, 2017. The first summer steelhead trapped at the Lewis Ladder was on July 25, 2017. Steelhead utilized for brood stock were collected from the Merwin F.C.F. and shipped to Merwin Hatchery from June 27 through September 2017.

Total Trapped (F.C.F.)	2,922
Total Trapped (Lewis)	205
Recycled	566
Trap Mortality	10
Brood stock Shipped	340
Food Banks/Tribes	2,211



### 2018 Brood Lewis River Winter Steelhead

The first winter steelhead was trapped at Merwin F.C.F. on October 25, 2017. The first winter steelhead trapped at the Lewis Ladder was on November 28, 2017. Steelhead utilized for brood stock were collected from the Merwin F.C.F and shipped to Merwin Hatchery from December 4<sup>th</sup> through December 26<sup>th</sup>, 2017.

Total Trapped (F.C.F.)	1,759
Total Trapped (Lewis)	35
Recycled	0
Trap Mortality	1
Brood stock Shipped	93
Food Banks/Tribes	1,700

### 2016 Brood Lewis River (Type N) Coho

The last late Coho captured at Merwin F.C.F. was on February 1, 2017. The last late Coho captured at the Lewis Ladder was on January 23, 2017.

Adults Trapped (F.C.F.)	4,971
Jacks Trapped (F.C.F.)	145
Adults Trapped (Lewis)	12,985
Jacks Trapped (Lewis)	774
Trap Mortality (Adults)	152
Trap Mortality (Jacks)	18
Spawned (Adults)	1,790
Spawned (Jacks)	64
Food Banks/Tribes (Adults)	4,386
Food Banks/Tribes (Jacks)	467
Nutrient Enhancement (Adults)	10,175
Nutrient Enhancement (Jacks)	431
Brood stock Shipped (Adults)	9
Brood stock Shipped (Jacks)	0
Shipped to Swift (Adults)	3,243
Shipped to Swift (Jacks)	3

### **2017 Brood Lewis River Spring Chinook**

The first spring Chinook trapped at the Merwin F.C.F. was February 23, 2017. The first arrival at the Lewis Ladder was July 25, 2017. Brood stock was collected at both trapping sites and shipped to Speelyai Hatchery.

Adults Trapped (F.C.F.)	2,308
Jacks Trapped (F.C.F.)	535
Adults Trapped (Lewis)	10
Jacks Trapped (Lewis)	3
Trap Mortality (Adults)	1
Trap Mortality (Jacks)	0
Nutrient Enhancement (Adults)	39
Nutrient Enhancement (Jacks)	7
Brood stock Shipped (Adults)	1,469
Brood stock Shipped (Jacks)	227
Shipped to Swift (Adults)	809
Shipped to Swift (Jacks)	304

### **2017 Brood Lewis River (Type S) Early Coho**

The first early Coho trapped at Merwin F.C.F. was on August 8. The first early Coho trapped at the Lewis Ladder was on August 31, 2017. Brood stock for hatchery production may be collected at both trapping sites then shipped to Speelyai Hatchery. Early Coho not kept as brood stock are transported to the upper Lewis River at Eagle Cliff and released.

Adults Trapped (F.C.F.)	1,609
Jacks Trapped (F.C.F.)	109
Adults Trapped (Lewis)	8,065
Jacks Trapped (Lewis)	1,592
Trap Mortality (Adults)	81
Trap Mortality (Jacks)	8
Food Banks/Tribes (Adults)	5,917
Food Banks (Jacks)	1,409
Nutrient Enhanced (Adults)	837
Nutrient Enhanced (Jacks)	213
Broodstock Shipped (Adults)	1,320
Broodstock Shipped (Jacks)	55
Shipped to Swift (Adults)	1,519
Shipped to Swift (Jacks)	16

**2017 Brood Lewis River (Type N) Late Coho**

The first late Coho trapped at the Merwin F.C.F. and the Lewis Ladder was on October 10, 2017. All brood stock is held and spawned at the Lewis River Hatchery. The spawned carcasses were all nutrient enhanced. Late Coho not kept as brood stock are transported to the upper Lewis River at Eagle Cliff and released.

Adults Trapped (F.C.F.)	2,524
Jacks Trapped (F.C.F.)	217
Adults Trapped (Lewis)	6,655
Jacks Trapped (Lewis)	2,191
Trap Mortality (Adults)	154
Trap Mortality (Jacks)	38
Spawned (Adults)	2,845
Spawned (Jacks)	82
Food Banks/Tribes (Adults)	2,696
Food Banks/Tribe (Jacks)	2,076
Nutrient Enhanced (Adults)	3,111
Nutrient Enhanced (Jacks)	229
Shipped to Swift (Adults)	2,496
Shipped to Swift (Jacks)	1
On Hand (Adults)	722
On Hand (Jacks)	64

**INCIDENTAL TRAPPING**

**2017 Brood Lewis River Wild Winter Steelhead**

Brood stock was collected at the Merwin F.C.F. and then shipped to Merwin Hatchery for spawning. No fish were trapped in the Lewis Ladder. The last wild winter steelhead was trapped at the Merwin F.C.F. on June 21, 2017. Fish not used for brood stock were returned to the Lewis River.

Adults Trapped (F.C.F.)	87
Adults Trapped (Lewis)	0
Mortality	0
Returned to Stream	26
Brood stock Shipped	61

**2018 Brood Lewis River Wild Summer Steelhead**

The first wild summer steelhead was trapped at Merwin F.C.F. on June 14, 2017. The Lewis Ladder trapped its first and only wild summer steelhead on October 25, 2017. All fish were returned to the Lewis River.

Adults Trapped (F.C.F.)	16
Adults Trapped (Lewis)	1
Mortality	0
Returned to Stream	17

**2018 Brood Lewis River Wild Winter Steelhead**

The first 2018 brood wild winter was trapped at the Merwin F.C.F. on December 9, 2017. All fish were returned to the Lewis River.

Adults Trapped (F.C.F.)	5
Adults Trapped (Lewis)	0
Mortality	0
Returned to Stream	5

**2017 Brood Lewis River Wild Spring Chinook**

The first wild spring Chinook was trapped at Merwin F.C.F. on April 6, 2017. All fish trapped at the Merwin F.C.F. were shipped to Speelyai to be spawned.

Adults Trapped (F.C.F.)	33
Jacks Trapped (F.C.F.)	4
Adults Trapped (Lewis)	2
Jacks Trapped (Lewis)	0
Mortality (Adults)	1
Mortality (Jacks)	0
Brood stock Shipped (Adults)	33
Brood stock Shipped (Jacks)	4
Returned to Stream (Adults)	1
Returned to Stream (Jacks)	0

**2017 Brood Lewis River Sockeye (Unknown Origin)**

The first Sockeye was trapped at Merwin F.C.F. on June 26, 2017. No Sockeye were captured in the Lewis Ladder in 2017. All live fish were returned to the Lewis River

Adults Trapped (F.C.F.)	19
Adults Trapped (Lewis)	0
Mortality	0
Returned to Stream (Adults)	20

**2017 Brood Lewis River Wild Fall Chinook**

The first wild fall Chinook was trapped at Merwin F.C.F. on August 28, 2017. The first arrival at the Lewis Ladder was August 2, 2017. All fish were returned to the Lewis River.

Adults Trapped (F.C.F.)	188
Jacks Trapped (F.C.F.)	61
Adults Trapped (Lewis)	9
Jacks Trapped (Lewis)	0
Mortality	0
Mortality (Jacks)	0
Returned to Stream (Adults)	197
Returned to Stream (Jacks)	61

**2017 Brood Fall Chinook (Unknown Hatchery Origin)**

These fall Chinook are adipose clipped indicating that they are of hatchery origin. We identify them as unknown because the Lewis River does not have a hatchery fall Chinook program. The fish are strays from another hatchery program(s). The first fall Chinook was trapped at Merwin F.C.F. on August 3, 2017. The first arrival at the Lewis Ladder was August 2, 2017.

Adults Trapped (F.C.F.)	324
Jacks Trapped (F.C.F.)	9
Adults Trapped (Lewis)	91
Jacks Trapped (Lewis)	5
Mortality (Adult)	28
Mortality (Jack)	1
Food Banks/Tribes (Adults)	382
Food Banks/Tribes (Jacks)	12
Returned to Stream (Adults)	5
Returned to Stream (Jacks)	1

### 2017 Brood Lewis River Wild Early Coho

The first wild early Coho was trapped at Merwin F.C.F. was August 25, 2017. The first arrival at the Lewis Ladder was August 2, 2017. All wild early Coho were planted in to the Lewis River at Eagle Cliff above the Swift Reservoir.

Adults Trapped (F.C.F.)	1,969
Jacks Trapped (F.C.F.)	17
Adults Trapped (Lewis)	211
Jacks Trapped (Lewis)	3
Mortality	0
Returned to Stream at Swift (Adults)	2,180
Returned to Stream at Swift (Jacks)	20

### 2017 Lewis River Chum (Unknown Origin)

The Merwin F.C.F. captured one Chum for the year on September 12, 2017. The chum was returned to the Lewis River.

Adults Trapped (F.C.F.)	1
Adults Trapped (Lewis)	0
Returned to Stream	1

### 2017 Brood Lewis River Wild Late Coho

The first wild late Coho was trapped at Merwin F.C.F. on October 12, 2017. The first arrival at the Lewis Ladder was October 12, 2017. Most of the wild late Coho captured at Lewis were used as brood stock at Lewis River Hatchery as the integrated portion of the hatchery's late Coho program. Live fish not used for brood stock were returned to the Lewis River above Swift reservoir.

Adults Trapped (F.C.F.)	176
Jacks Trapped (F.C.F.)	2
Adults Trapped (Lewis)	211
Jacks Trapped (Lewis)	26
Mortality (Adults)	13
Mortality (Jacks)	2
Spawned (Adults)	88
Spawned (Jacks)	
Returned to Stream at Swift (Adults)	238
Returned to Stream at Swift (Jacks)	26

# ADULT TRAPPING - LEWIS RIVER LADDER 2017

SPECIES	ESTIMATED TRAPPED/RECEIVED		RETURNED TO STREAM			RECYCLED FISH TRAPPED			RECYCLED FISH RETURNED TO STR.			SHIPPED / PLANTED			MORTALITIES			CARCASS DISTRIBUTION			LETHAL SPAWNED				LIVE SPAWNED				ESTIMATED ON-HAND			MARKS RECOVERED			ESTIMATED EGGS TAKEN						
	A	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	VF	NVF	J	M	VF	NVF	J	A	A	J	M	F	J	TAKEN						
CO:NO:LEW:16:H	186	8													17	17		59	93	8															5	11					
CO:NO:LEW:16:W	9	1	6	3	1																																				
SH:SU:LEW:17:H	0																																								
SH:WI:MEHA:17:H	55														1			27	27																						
SH:WI:LEW:17:H	0																																								
SH:WI:LEW:17:W	0																																								
CK:SP:LEHA:17:H	10	3	5	1	2													4		1																					
CK:SP:LEW:17:W	2		1												1																										
SH:SU:MEHA:18:H	205		23	39														60	83																	261	221	270			
SH:SU:LEW:18:W	1		1																																						
SO:NA:LEW:17:W	0																																								
CT:AC:LEW:17:W	2			2																																					
CO:SO:LEHA:17:H	8,065	1,592	402	353	7							629	685	55	36	29	7	2,925	3,006	1,523																					
CO:SO:LEW:17:W	211	3	139	72	3										1	3		54	28	4																					
CK:FA:UNKN:17:H	91	5	4	1	1																																				
CK:FA:LEW:17:W	9		7	2																																					
CH:NA:LEW:17:W	0																																								
CO:NO:LEW:17:H	6,655	2,191	248	205	1										99	51	37	1,568	632	2,022	1,369	1,469	7	82													526	351	307	3,683,019	
CO:NO:LEW:17:W	176	2	32	44											3	9	2				52	36	0															1,079,505			
SH:WI:MEHA:18:H	35																	17	18																						
SH:WI:LEW:18:W	0																																								
<b>TOTALS</b>	<b>15,712</b>	<b>3,805</b>	<b>868</b>	<b>722</b>	<b>15</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>629</b>	<b>685</b>	<b>55</b>	<b>157</b>	<b>110</b>	<b>46</b>	<b>4,714</b>	<b>3,887</b>	<b>3,558</b>	<b>1,421</b>	<b>1,505</b>	<b>7</b>	<b>82</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>792</b>	<b>583</b>	<b>577</b>	<b>4,762,524</b>

## Egg Take and Incubation

### 2016 Brood Lewis River Late Coho (Integrated and Segregated)

Egg inventory and distribution was as follows:

Total Egg Take (green)	3,217,383
Egg Loss	177,825
Short/Over	19,087
Adjusted Egg Take	3,236,470
Total Eyed Eggs	1,508,745
Shipped	2,083,900
Fecundity	3,506

Once a strong eye developed, the eggs were shocked and picked to remove dead eggs. After the morbid eggs are removed, the eyed eggs were re-inventoried and laid down to hatch or ship. Total eggs loss (roughly 11.8%) was 177,825. All 974,745 of the eyed eggs for the Lewis River program were integrated and kept on station.

A total of 2,647,152, both green and eyed, segregated eggs were shipped out. Washougal Hatchery received 1,549,900 green eggs in December of 2016. The remaining egg shipments were shipped as eyed eggs during January and February 2017. The eggs were distributed as followed: Fish First 460,000; Clark PUD 46,000; Columbia Springs 13,000; Ridgefield High School 10,000; The Steve Syverson Project 5,000.

### 2017 Brood Lewis River Early Coho

No fish were spawned at Lewis River Hatchery for this stock. All adult fish were shipped to Speelyai Hatchery. Eggs were incubated to the eyed stage at Speelyai Hatchery. 1,387,034 eyed eggs were transferred to the Lewis River Hatchery in November 2017.



**2017 Brood Lewis River Late Coho (Integrated & Segregated)**

Egg inventory and distribution was as follows:

Total Egg Take (green)	4,762,524
Egg Loss	0
Short/Over	0
Shipped	3,049,300
Fecundity	3,254

Over 4.7 million green eggs were taken in 2017. The first spawn of late Coho took place on November 20 and the last December 27. The Washougal Hatchery received 1.9 million (segregated) green eggs and the Grays River Hatchery received 1.15million (segregated) green eggs. The remaining green eggs were laid down for incubation at Lewis River Hatchery. At the time of this report the LRH had 1.71 million green eggs on hand and of those eggs approximately one million are integrated for the Lewis River late Coho production. The remaining 700K, once eyed, will be distributed and shipped out to Fish First, Clark PUD, Ridgefield High School, Columbia Springs, and the Steve Syverson project.

**2017 Brood Kalama River Fall Chinook**

Egg inventory and distribution was as follows:

Total Egg Take (green)	1,550,049
Egg Loss	241,988
Short/Over	-56,824
Shipped	1,251,237

An active rebuild project at Kalama Falls Hatchery reduced their adult holding space and management decided to utilize some extra space at Lewis River Hatchery for holding and spawn a portion of the Fall Chinook program. Adult Chinook were shipped to Lewis form Modrow Trap on the Kalama River. The first spawn of the Kalama Fall Chinook took place on September 27<sup>th</sup> and the last October 31. There were five egg takes. The eggs were incubated until eyed, pick of morbid eggs, then shipped back to Kalama Falls Hatchery.

## REARING PROGRAM

### 2016 Brood Lewis River Spring Chinook

On May 25, 2017, the Lewis River Hatchery received 413,110 spring Chinook from Speelyai Hatchery. The 2016 brood year spring Chinook were adipose clipped (AD) and snout tagged (CWT) prior to the transfer. Approximately 75K were AD+CWT, 75K CWT only (double index group) and the rest were AD clip only. Rearing of the 2016 spring Chinook went very well. These fish were healthy from the time of reception to release and this was expressed in the very low percentage of rearing mortality. Starting October 5, 2017 all of the 2016 spring Chinook at Lewis River Hatchery were volitionally released.

#### Final Stock Inventory

Fish Received	413,110
Pounds Received	2,167
Rearing Mortality (2.6%)	10,886
Planted	402,224
Pounds Planted	38,206
Feed Fed (lbs.)	25,652
Net Gain (lbs.)	36,039
Conversion	0.72:1
CV	5.91

### 2015 Brood Lewis River Early Coho

Lewis River Hatchery volitionally released 701,236 early Coho averaging 14.7 fpp between April 3 and 10, 2017. Approximately 75K identified with an AD+CWT, 75K was CWT only (double index group) and the rest with an AD clip only. At time of release, the fish appeared healthy, smolted, and ready to emigrate.

#### Final Stock Inventory

Beginning Balance	1,128,814
Pounds Pondered	764
Rearing Mortality (16.0%)	-133,422
Adjustment	-294,156
Fish Planted	701,236
Pounds Planted	47,843
Feed Fed (lbs.)	41,648
Net Gain (lbs.)	47,079
Conversion	0.88:1
CV	7.94

**2015 Brood Lewis River Late Coho**

Lewis River Hatchery volitionally released 965,206 Late Coho averaging 15.4fpp between April 4 and 17, 2017. Approximately 75K identified with an AD+CWT, 75K was CWT only (double index group) and the rest with an AD clip only. At time of release, the fish appeared healthy and ready to emigrate.

**Final Stock Inventory**

Beginning Balance	1,010,348
Pounds Pondered	764
Rearing Mortality (4.7%)	-52,692
Adjustment	-17,142
Fish Planted	965,206
Pounds Planted	62,729
Feed Fed (lbs.)	54,267
Net Gain (lbs.)	61,965
Conversion	0.88:1
CV	6.92

### 2016 Brood Lewis River Early Coho

The last take of early Coho left the incubation room and was ponded into a small raceway on January 20, 2017. The condition of the fry prior to ponding was good with fry loss (mortality between eyed and ponding) being less than two percent. Unfortunately, like most years, within a few weeks after ponding the Coho became ill. An Agency pathologist diagnosed the fish with Bacterial Coldwater Disease, gill fungus and Costia. Formalin drip treatments and salt blocks were used on and off throughout the first three months of rearing to fight the Costia and gill fungus. Getting accurate mortality numbers and vacuuming the raceways without sucking up some fry was nearly impossible until the river cleared up in early April. In addition, just prior to marking, a family of otters discovered the Coho in the standard raceways. Hatchery staff erected an electric fence barrier in an attempt to detour the predators. The electric fence was effective at first but eventually the otter(s) would find ways to penetrate the fence. The Otter issue was not fully resolved until all the Coho were adipose clipped, tagged, and moved into the larger raceways of 13, 14, and 16. With the turbid water for the first few months of rearing plus the hungry family of otter, a shortage of over 200K was calculated after inventorying from marking. Approximately 75K was identified with an AD+CWT, 75K was CWT only (double index) and the rest AD clip only. The 2016 early Coho are scheduled for release starting April 2018.

#### Stock Inventory This Period

Beginning Balance	1,513,894
Pounds Ponded	1,038
Rearing Mortality (9.7%)	-126,783
Adjustment	-212,644
Fish on Hand	1,174,467
Pounds on Hand	47,219
Feed Fed (lbs.)	42,581
Net Gain (lbs.)	46,181
Conversion	0.92:1

### 2016 Brood Lewis River Late Coho

All 974,745 fry were moved from the incubation room to standard raceways outside between March 14, and April 24, 2017. Fry loss (mortality between eyed stage and ponding) was very low at 0.5%. The 2016 late Coho did not battle the pathogens like the early Coho, which was mainly due to the river water clearing up considerable by the time the fry came out of incubation. The fry were healthy, and loss was minimal going into the marking season until the family of otters showed up. Hatchery staff erected a temporary electric fence in an attempt to keep the otter out of the raceways. After being marked and moved to larger raceways a shortage of just over 50K was realized. Marking of these fish took place in June 2017. Approximately 75K was identified with an AD+CWT, 75K was CWT only (double index) and the rest AD clip only. The 2016 late Coho are scheduled for release starting April 2017.

#### Stock Inventory This Period

Beginning Balance	974,745
Pounds Ponded	741
Rearing Mortality (5.0%)	-58,069
Rearing Adjustment	-50,693
Fish on Hand	865,983
Pounds on Hand	35,616
Feed Fed (lbs.)	30,262
Net Gain (lbs.)	34,875
Conversion	0.87:1

### 2017 Brood Lewis River Early Coho

On December 29, 2017 the first take of early Coho, 136,319, were transferred from the incubation room to raceway two. The fry loss for the first take was around 1.5%. The remaining takes will be ponded in January and February of 2018.

#### Stock Inventory This Period

Beginning Balance	136,319
Pounds Ponded	334
Rearing Mortality (1.7%)	-2,299

# RAINFALL REPORT

Hatchery: Lewis River

Year: 2017

Water Source: Lewis River

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1	1	0	0	0	0.1	0	0	0	0	0	0.2	0.2	
2	0	0.1	0.2	0	0.3	0	0	0	0	0	0.3	0.8	
3	0	0.6	0.5	0	0	0	0	0	0	0	0.1	0.2	
4	0	0.8	0.3	0.1	0.4	0	0	0	0	0	1.1	0	
5	0	1.6	0.6	0.4	0.3	0	0	0	0	0	0.1	0	
6	0	0.3	0.5	0.5	0.1	0	0	0	0	0	0	0	
7	0.5	0.3	0.8	0.7	0	0.3	0	0	0	0.1	0	0	
8	0.8	1.3	0.4	0.4	0	0.6	0	0	0	0	0.5	0	
9	0.9	0.9	0.8	0.3	0	0.7	0	0	0.1	0	0.7	0	
10	0.3	0.3	0.4	0.1	0.1	0.4	0	0	0	0.4	0.2	0	
11	0	0	0.1	0.6	0.9	0	0	0	0	0.6	0	0	
12	0	0	1.4	0.6	0.4	0	0	0.3	0	0.6	0.7	0	
13	0	0	2	0.4	0.5	0.1	0	0.2	0	0	0.5	0	
14	0	0.5	0	0.3	0.1	0.1	0	0	0	0	0.4	0	
15	0	1.4	0.5	0	0.9	0.9	0	0	0	0	1.2	0.05	
16	0.3	1.3	0	0.1	0.2	0.2	0	0	0	0	0.8	0.2	
17	1.4	0.2	0.9	0.8	0	0	0	0	0.5	0.1	0.3	0.1	
18	0.9	0.5	0.2	0.1	0	0	0	0	1	0.8	0	0.6	
19	0.1	0.8	0	0.65	0	0	0	0	1.6	0.7	1.6	0.9	
20	0.4	0.6	0.1	0.3	0	0	0	0	0.5	0.8	0.3	0	
21	0.8	0	0.2	0	0	0	0	0	0	3.5	0.6	0	
22	0.1	0	0.4	0.4	0	0	0	0	0	0.2	0.3	0.7	
23	0	0.1	0.8	1	0	0	0	0	0	0	0.6	0	
24	0	0.1	0.3	0.7	0	0	0	0	0	0	0	0.6	
25	0	0.2	0.1	0.4	0	0	0	0	0	0	0.4	0.1	
26	0	1.5	0.8	0.3	0	0	0	0	0	0	0.7	0.1	
27	0	0.4	0.4	0.2	0	0	0	0	0	0	0	0.2	
28	0	0.1	0.75	0	0	0	0	0	0	0	0.7	2.2	
29	0		0.7	0.4	0	0	0	0	0.3	0	0	1.3	
30	0		0.1		0	0	0	0	0.2	0	0.2	0.1	
31	0		0		0.2		0	0		0.1		0	
<b>TOTAL</b>	<b>7.50</b>	<b>13.90</b>	<b>14.25</b>	<b>9.75</b>	<b>4.50</b>	<b>3.30</b>	<b>0.00</b>	<b>0.50</b>	<b>4.20</b>	<b>7.90</b>	<b>12.50</b>	<b>8.35</b>	<b>Year Total</b> <b>86.7</b>

YEARLY TEMPERATURE REPORT

HATCHERY: LEWIS RIVER

YEAR: 2017

WATER SOURCE: N.F. LEWIS RIVER

DAY	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	44	43	40	40	41	40	42	42	46	44	49	48	56	53	60	54	59	56	62	61	56	56	49	49
2	44	43	40	40	41	41	42	42	46	44	51	48	56	53	60	55	59	57	62	61	56	56	49	49
3	43	43	40	40	41	40	43	42	47	45	49	48	56	53	60	55	58	57	62	61	56	56	49	49
4	43	43	40	40	41	40	42	42	47	45	50	48	56	53	60	55	58	57	62	61	56	55	49	48
5	43	42	40	40	41	40	43	42	46	45	51	48	57	53	60	55	58	57	63	61	56	55	49	48
6	43	42	40	40	40	40	43	42	49	45	52	49	57	53	58	55	58	57	63	61	55	55	49	49
7	42	42	40	40	41	40	43	42	52	40	52	49	55	53	60	55	58	57	62	61	56	55	49	49
8	42	42	40	40	41	41	43	43	45	47	51	49	57	53	60	55	58	57	62	61	55	55	49	48
9	42	42	41	40	42	40	44	43	45	47	52	49	57	53	59	55	59	57	63	60	55	55	48	48
10	42	41	40	40	42	41	44	42	45	50	51	50	57	53	60	55	60	58	62	60	55	55	48	47
11	42	41	40	40	42	41	44	42	46	47	52	50	57	53	60	55	60	58	62	61	55	55	48	47
12	42	41	40	40	42	41	44	42	47	45	52	50	57	53	58	55	60	58	61	60	55	53	47	47
13	42	41	40	40	42	41	43	42	46	46	53	50	57	53	58	55	60	58	62	60	55	53	47	46
14	42	41	40	40	42	41	44	42	47	46	52	50	58	53	58	55	60	58	62	60	53	53	46	46
15	41	41	40	40	44	41	44	42	47	46	52	50	58	53	62	55	60	58	62	60	53	53	46	45
16	41	41	40	40	42	41	44	43	47	46	52	51	57	53	63	55	60	58	62	61	53	52	45	45
17	41	41	41	40	42	41	44	44	48	46	53	52	57	53	58	55	60	59	62	61	53	52	45	45
18	42	41	41	40	42	41	44	44	48	46	54	52	58	53	58	55	60	59	62	61	52	52	43	43
19	42	41	41	40	42	42	44	44	48	46	55	52	58	53	59	55	60	58	61	61	52	51	45	44
20	42	41	41	41	42	42	44	43	48	46	53	51	58	53	58	55	60	60	61	60	52	51	44	44
21	41	41	41	40	42	42	45	43	51	47	54	51	58	53	59	55	61	60	60	59	51	51	44	44
22	42	41	41	40	42	42	49	43	51	47	55	51	59	54	58	56	61	61	60	59	51	51	44	44
23	42	41	41	40	42	42	49	43	50	47	55	52	59	54	59	56	62	60	59	58	51	50	44	44
24	42	41	41	40	42	42	46	45	48	47	55	52	59	54	59	55	62	60	58	57	50	50	44	44
25	41	40	41	40	42	42	46	45	50	47	55	52	59	54	59	55	62	61	57	57	51	50	44	44
26	41	40	41	40	42	42	46	44	49	47	55	52	59	54	60	55	62	61	57	56	53	50	44	44
27	41	40	41	40	43	42	46	44	50	47	55	52	58	54	58	56	63	61	57	56	50	50	44	44
28	41	40	41	40	42	42	46	44	50	47	55	52	59	54	58	56	63	61	57	56	49	50	44	44
29	41	40			42	42	46	44	50	48	56	53	59	54	58	56	62	61	57	56	49	50	45	44
30	41	40			44	42			49	48	56	53	59	54	58	56	62	62	57	55	49	49	44	44
31	41	40			43	42			50	48			62	54	59	56			56	55			44	44
AVG.	41.90323	41.19355	40.46429	40.03571	41.90323	41.19355	44.37931	42.93103	48	46.19355	52.9	50.46667	57.70968	53.32258	59.16129	55.19355	60.16667	58.73333	60.48387	59.25806	53.1	52.63333	46.09677	45.80645
MIN	41	40	40	40	40	40	42	42	45	40	49	48	55	53	58	54	58	56	56	55	49	49	43	43
MAX	44	43	41	41	44	42	49	45	52	50	56	53	62	54	63	56	63	62	63	61	56	56	49	49

Washington DEPARTMENT OF FISH AND WILDLIFE NPDES Chemical Operational Log. Records of Disease Control Chemicals Used

YEAR 2017

Keep records on station for at least five years

Facility: Lewis River Hatchery

NPDES Permit Number: WAG 13-1040

Brood Stock Species	Pond/ Raceway	Date of Application	Chemical Name	Dosage	Duration	Method Application	Amount used	Reason for use	Flow	Water Temp	Estimated Concentration Discharge	Method Disposal	location any disposed spent chemical dip	Name
CO:SO:LEHA:16:H	2	1/26/2017	Formalin	1:6000	1 hr	DRIP	2 gal	Profalactic	200 gpm	41				ML
CO:SO:LEHA:16:H	3	1/26/2017	Formalin	1:6000	1 hr	DRIP	2 gal	Profalactic	200 gpm	41				ML
CO:SO:LEHA:16:H	4 thru 6	2/6/2017	Formalin	1:6000	1 hr	DRIP	3 gal	Profalactic	100 gpm	40				ML
CO:SO:LEHA:16:H	2 thru 7	2/10/2017	Formalin	1:6000	1 hr	DRIP	8 gal	Profalactic	200 gpm	40				ML
CO:SO:LEHA:16:H	2 thru 7	2/21/2017	Formalin	1:6000	1 hr	DRIP	11 gal	Profalactic	200 gpm	40				DMG
CO:SO:LEHA:16:H	2 thru 7	2/22/2017	Formalin	1:6000	1 hr	DRIP	11 gal	Profalactic	200 gpm	40				DMG
CO:SO:LEHA:16:H	2 thru 7	2/27/2017	Formalin	1:6000	1 hr	DRIP	12 gal	Profalactic	200 gpm	40.5				DMG
CO:SO:LEHA:16:H	6 thru 7	2/28/2017	Formalin	1:6000	1 hr	DRIP	4 gal	Profalactic	200 gpm	40.5				JT
CO:SO:LEHA:16:H	2 thru 7	3/14/2017	Formalin	1:6000	2 hr	DRIP	24 gal	Costia	200 gpm	41				JT
CO:SO:LEHA:16:H	2 thru 7	3/15/2017	Formalin	1:6000	2 hr	DRIP	24 gal	Costia	200 gpm	41				JT
CO:SO:LEHA:16:H	2 thru 7	3/16/2017	Formalin	1:6000	2 hr	DRIP	24 gal	Costia	200 gpm	41				ML
CO:SO:LEHA:16:H	2 thru 7	3/28/2017	Formalin	1:6000	2 hr	DRIP	36 gal	Costia	300 gpm	42.5				SC
CO:SO:LEHA:16:H	2 thru 7	29-Mar	Formalin	1:6000	2 hr	DRIP	36 gal	Costia	300 gpm	42				SC
CO:SO:LEHA:16:H	2 thru 7	3/30/2017	Formalin	1:6000	2 hr	DRIP	36 gal	Costia	300 gpm	42				DMG
CO:NO:LEWI:16:H	8	5/6/2017	Formalin	1:6000	1 hr	DRIP	3 gal	Profalactic	300 gpm	45				SC
CO:NO:LEWI:16:H	8	5/7/2017	Formalin	1:6000	1 hr	DRIP	3 gal	Profalactic	300 gpm	45				DMG
CK:SP:LEWI:16:H	13/1-13/3	6/22/2017	Formalin	1:8000	1 hr	DRIP	75 gal	Profalactic	2500 gpm	52				JT
CK:FA:KALAMA:17:H	15/4	8/6/2017	Formalin	1:6000	1 hr	DRIP	40 gal	Profalactic	4000 gpm	58				JT
CK:FA:KALAMA:17:H	15/4	8/8/2017	Formalin	1:6000	1 hr	DRIP	40 gal	Profalactic	4000 gpm	58				ML
CK:FA:KALAMA:17:H	15/4	9/11/2017	Formalin	1:6000	1 hr	DRIP	40 gal	Profalactic	4000 gpm	58				ML
CK:FA:KALAMA:17:H	15/4	9/13/2017	Formalin	1:6000	1 hr	DRIP	40 gal	Profalactic	4000 gpm	59				ML

Notes:



Washington DEPARTMENT OF FISH AND WILDLIFE NPDES Chemical Operational Log. Records of Disease Control Chemicals Used

YEAR 2017

Keep records on station for at least five years

Facility: Lewis River Hatchery

NPDES Permit Number: WAG 13-1040

Brood Stock Species	Pond/ Raceway	Date of Application	Chemical Name	Dosage	Duration	Method Application	Amount used	Reason for use	Flow	Water Temp	Estimated Concentration Discharge	Method Disposal	location any disposed spent chemical dip	Name
CK:FA:KALAMA:17:H	15-4	9/15/2017	Formalin	1:6000	1 HR	DRIP	40 Gal	Profalactic	4000 gpm	59				MLC
CK:FA:KALAMA:17:H	15-4	9/18/2017	Formalin	1:6000	1 HR	DRIP	40 Gal	Profalactic	4000 gpm	59				DMG
CK:FA:KALAMA:17:H	15-4	9/20/2017	Formalin	1:6000	1 HR	DRIP	40 Gal	Profalactic	4000 gpm	59				DMG
CK:FA:KALAMA:17:H	15-4	9/22/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	60				ML
CK:FA:KALAMA:17:H	15-4	9/25/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	62				JT
CK:FA:KALAMA:17:H	15-4	9/27/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	63				JT
CK:FA:KALAMA:17:H	15-4	9/29/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	63				JT
CK:FA:KALAMA:17:H	15-4	10/2/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	63				ML
CK:FA:KALAMA:17:H	15-4	10/4/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	62				ML
CK:FA:KALAMA:17:H	15-4	10/6/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	62				ML
CK:FA:KALAMA:17:H	15-4	10/9/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	62				JT
CK:FA:KALAMA:17:H	15-4	10/11/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	62				ML
CK:FA:KALAMA:17:H	15-4	13-Oct	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	61				DMG
CK:FA:KALAMA:17:H	15-4	10/16/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	61				DMG
CK:FA:KALAMA:17:H	15-4	10/18/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	61				JT
CK:FA:KALAMA:17:H	15-4	10/20/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	61				JT
CK:FA:KALAMA:17:H	15-4	10/23/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	60				DMG
CK:FA:KALAMA:17:H	15-4	10/25/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	60				ML
CK:FA:KALAMA:17:H	15-4	10/27/2017	Formalin	1:6000	1 HR	DRIP	50 Gal	Profalactic	5000 gpm	56				ML

Notes:

## MAINTENANCE AND CAPITAL PROJECTS – 2017

### MAINTENANCE

1. Replaced chlorine barrel in domestic water plant.
2. Installed temporary electric fence around raceways 1 – 12.
3. Serviced all vehicles.
4. Greased crowdlers and hoists on adult sorter.
5. Lift and pressure washed screen on DSI.
6. Repainted safety bolsters around pond 15.
7. Installed sump pull down cables on Ponds 13 and 16.
8. Serviced all air compressors.
9. Replaced heater in visitor center.
10. Serviced and repaired HVAC systems at all residences
11. Pruned all fruit trees.
12. Installed new pressure relief valve on breakroom water heater.
13. Plumed breakroom water heater.
14. Replace refrigerator and microwave in breakroom.
15. Serviced gator and lawn equipment.

### CAPITAL

1. New motor control center in USI.
2. New pesculator gate hoist.
3. New walk-in freezer.
4. Rebuilt PA lift pumps.

OPERATIONS PROGRAM

MERWIN HATCHERY

FOR

January 1, 2017 TO DECEMBER 31, 2017



*Washington*  
*Department of*  
**FISH and**  
**WILDLIFE**

WRITTEN AND COMPILED BY:

MERWIN HATCHERY STAFF

## Introduction

The Merwin Hatchery is a PacifiCorp owned and funded facility that is operated by the State of Washington's Department of Fish and Wildlife. The facility has been in operation since October of 1993.

Merwin Hatchery is located 11 miles east of Woodland off state route 503 adjacent to the PacifiCorp Merwin Dam and Lake Merwin.

## Program Goals

- 50,000 Rainbow Trout at 2.5 fpp stocked into Swift Reservoir.
- 175,000 summer Steelhead at 4.8 fpp stocked into N.F. Lewis River.
- 100,000 winter Steelhead at 4.8 fpp stocked into N.F. Lewis River.
- 50,000 wild winter Steelhead at 6 fpp stocked into N.F. Lewis River.

Approximately 5,000 gallons of water per minute can be delivered to the hatchery by three-intake pumps located midway on Merwin Dam, which draft water from Lake Merwin. Two screened intakes located at depths of approximately fifteen feet and ninety feet below the surface of the reservoir enable some temperature manipulation for fish rearing.

Ozone water sterilization is part of the design criteria to meet fish health needs not only at the hatchery but also for fish stocks and the Lewis River Hatchery downstream of our effluent discharge area. Two ozone generators fed by compressed air (or liquid oxygen in the event of compressor failure), supply ozone gas to a water/ozone contact chamber. A maximum flow of 3,800 gallons per minute can be sterilized and supplied to the hatchery building, raceways and rearing ponds. The facility has the capability to ozone treat all effluent water from the adult holding area and incubation room in the event of a viral outbreak.

There is approximately 216,470 cubic feet of rearing space. These areas consist of four one-quarter acre rearing ponds, ten 9.5 x 80 x 2.5 fingerling raceways, four 7.5 x 33 x 4 adult holding ponds, six 4.5 x 34 x 2 intermediate raceways, one 3x14x2 deep trough, four 16 c.f. fry troughs and 15 double stack Mari Source incubators.

The hatchery complex has an operations building housing the office, feed room, shop, lab, day room, locker room, shower room, mud room, crew rest room and public restrooms. Other buildings associated with this facility are; the hatchery building with attached covered adult holding ponds, water treatment facility including the ozone generator building/ contactor structure, one three bay storage building, chemical storage building and three residences.

## Trapping

During this reporting period, trapping was conducted at the Merwin Dam Fish Collection Facility, Lewis River Hatchery, Cedar Creek Trap and the lower river, depending on the species.

### 2018 Brood Lewis River Summer Steelhead

A total of 339 adults were received for spawning purposes. All of these fish were trapped at the Merwin Dam Fish Collection Facility. Disposition is as follows:

Adults Spawnd _____	168
Non-Viable females _____	0
Mortality (38.69%) _____	65
Nutrient Enhancement _____	0

### 2018 Brood Lewis River Winter Steelhead

A total of 134 adults were received for spawning purposes. These fish were trapped at the Merwin Dam Fish Collection Facility. Disposition is as follows:

Adults Spawnd _____	64
Non Viable females _____	0
Mortality (0.0%) _____	0
Nutrient Enhancement _____	0

### 2017 Brood Lewis River Wild Winter Steelhead

A total of 69 adults were received for spawning purposes. These fish were collected at various sites, to include: the Merwin Dam Fish Collection Facility, and tangle net fishing in the lower river. Disposition is as follows:

Adults Spawnd _____	51
Non Viable Females _____	0
Mortality (1.96%) _____	1
Nutrient Enhancement _____	0
Culled (hatchery genetics) _____	0
Return to river _____	68

**2017 Brood Lewis River Late Winter Steelhead Hatchery Origin**

This stock is a result of live spawning wild winter steelhead broodstock at Merwin Hatchery. The adult wild steelhead were collected from the Merwin F.C.F., tangle netting in the lower river, and the Lewis River Ladder. These fish are reared at Merwin Hatchery and blank wire tagged as juveniles. Then, are transported upstream by PacifiCorp staff as part of a supplementation project when they return as adults. A portion of the returning adults were planted downstream for a survey of trap efficiency, these fish were then hauled upstream once recaptured.

Below is a list of fish trapped in the 2017 season. The first arrival at Merwin F.C.F. was on October 30<sup>th</sup>, 2016. All upstream fish were planted at Eagle Cliff release site at the upper end of Swift Reservoir. Downstream plants were at Island Boat Ramp and Merwin boat ramp.

Adults Trapped (F.C.F.) _____	645
Mortality _____	0
Planted upstream _____	494
Planted downstream _____	151
Recaptured & planted upstream _____	115
Total planted upstream _____	610

### MERWIN HATCHERY ADULT COLLECTION

SPECIES	ESTIMATED		RETURNED		RECYCLED FISH			RECYCLED FISH			SHIPPED /			MORTALITIES			CARCASS			LETHAL			LIVE			ESTIMATED			MARKS RECOVERED			ESTIMATED			
	TRAPPED/RECEIVED		TO STREAM		TRAPPED			RETURNED TO STR.			PLANTED						DISTRIBUTION			SPAWNED			SPAWNED			ON-HAND						EGGS			
	A	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	VE	BYE	J	M	VE	BYE	J	A	J	M	F	J	TANKS	
SHISUMEHA18H	339	0	0	0	0	0	0	0	0	0	0	0	0	22	43	0	70	56	0	84	84	0	0	0	0	0	0	0	0	0	0	0	0	0	344,400
SHISUMEHA15H	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	26	0	32	32	0	0	0	0	0	0	0	0	0	0	0	0	130,800	
SHWLEHA17H	69	0	37	31	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	26	25	0	0	0	0	0	0	0	0	50,810	

ADULT TRAPPING - MERWIN DAM FISH COLLECTION FACILITY 2017

SPECIES	ESTIMATED TRAPPED/RECEIVED		RETURNED TO STREAM			RECYCLED FISH TRAPPED			RECYCLED FISH PLANTED UPSTREAM			PLANTED UPSTREAM			SHIPPED			MORTALITIES			CARCASS DISTRIBUTION			PLANTED HORSESHOE LK			ESTIMATED ON-HAND		MARKS RECOVERED			ESTIMATED EGGS TAKEN
	A	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	A	J	M	F	J	
	CK:SP:LEHA:17:H	2,308	535										372	431	302	613	856	227		1		17	18	6							15	
CK:SP:LEWI:17:W	33	4													20	13	4															
CK:FA:LEWI:17:W	188	61	83	105	61																											
CK:FA:UNKN:17:H	324	9																14	10	1	153	147	8							1		
CO:SO:LEHA:17:H	1,609	109										363	401	9	3	3		5	11	1	329	494	99						30	91	18	
CO:SO:LEWI:17:W	1,989	17	83	86	3	11	13		11	13		829	1,136	17				1	3													
CO:NO:LEWI:16:H	16														8	1		2	1		2	2										
CO:NO:LEWI:16:W	5											4	1																			
CO:NO:LEWI:17:H	2,524	217										982	1,061		66	103	5	2	2	1	156	152	211						94	94	12	
CO:NO:LEWI:17:W	211	26	2	3		1			1			73	89	26	21	27		1														
SH:SU:MEHA:18:H	2,022		637	914		426	670								174	166		4	6		1,100	958										
SH:SU:LEWI:18:W	16		3	13																												
SH:WI:MEHA:17:H	880														62	68		10	21		306	400		21	30							
SH:WI:MEHA:18:H	1,759														46	47		1			761	904										
SH:WL:LEWI:17:H	622		79	72		63	52		63	52		339	283																			
SH:WL:LEWI:18:H	11											7	4																			
SH:WL:LEWI:17:W	86		15	10											31	30																
SH:WL:LEWI:18:W	5		1	4																												
SO:NA:UNKN:17:U	16		8	8																												
CH:NA:LEWI:17:W	1			1																												
PK:OD:UNKN:17:W	5		4	1																												
RB:NA:GOLD:17:U	16																				12	4										
CT:AC:LEWI:17:W	51											51																				
TOTALS	15,557	978	915	1,217	64	501	735	0	75	65	0	3,020	3,406	354	1,044	1,314	236	40	55	3	2,836	3,079	324	21	30	0			139	203	35	



## **Egg Take and Incubation**

### **2017 Brood Goldendale Rainbow**

Merwin Hatchery received 75,000 eyed eggs from Goldendale Hatchery on December 6, 2016.

### **2018 Brood Lewis River Summer Steelhead**

The first eggs were taken on November 20, 2017. Disposition of this stock to date is as follows:

Total Egg Take	358,708
Egg Loss (12.7%)	45,701
Eggs Destroyed	30,090
Shipped	0
Fecundity	4,270

### **2018 Brood Lewis River Winter Steelhead**

The first eggs were taken on December 28, 2017. All of these eggs are incubating and none of the egg takes have been shocked or picked. Disposition of this stock to date is as follows:

Estimated Total Egg Take	140,800
Egg Loss	0
Eggs Destroyed	0
Fecundity	4,400

### **2017 Brood Lewis River Wild Winter Steelhead**

These fish were spawned from April 7<sup>th</sup> - May 19<sup>th</sup>, 2017. Disposition is as follows:

Total Egg Take	86,406
Egg Loss (6.86%)	5,928
Eggs Destroyed	0
Fecundity	3,456

## REARING PROGRAM

### 2016 Brood Lewis River Summer Steelhead

The rearing of this brood went very well year and all program goals were achieved. During this rearing cycle these fish were diagnosed with ichthyophthirius and furunculosis. They were therapeutically treated accordingly with normal mortality rates. 17,702 fish were transferred to South Fork Toutle Acclimation Site on March 3<sup>rd</sup>, 2017. Hatchery staff began releasing the fish on station in April 2017. All of these fish were trucked and planted at river mile 5 on the North Fork of the Lewis River.

#### Final Stock Inventory

Fish Pondered _____	301,804
Pounds Pondered _____	121
Fish Planted _____	175,647
Pounds @ Release (5.5 fpp) _____	31,936
Fish Transferred _____	17,702
Pounds Transferred (6.6 fpp) _____	2,682
Rearing Mortality (7.70%) _____	23,234
Destroyed _____	0
Transferred _____	0
Shortage _____	0
Feed Fed (lbs) _____	42,464
Net Gain (lbs) _____	34,618
Conversion _____	1.23:1
Average CV @ Release _____	8.4

### 2016 Brood Lewis River Summer Steelhead @ Echo Net Pens

61,515 adipose only clipped summer steelhead were shipped from Merwin Hatchery to Echo Net Pen site on March 7<sup>th</sup>, 2017. These fish were released on April 15<sup>th</sup>, 2017.

#### Stock Inventory This Period

Fish Received _____	61,515
Pounds Received (7.5 fpp) _____	8,427
Fish Planted _____	61,515
Pounds @ Release (6.0 fpp) _____	10,253
Rearing Mortality (0.0%) _____	0
Feed Fed (lbs.) _____	1,584
Net Gain (lbs.) _____	1,826
Conversion _____	0.87:1
Average CV @ Release _____	7.3

### 2016 Brood Lewis River Winter Steelhead

The rearing of this brood went very well this year and all programs goals were achieved. During this rearing cycle these fish were diagnosed with ichthyophthirius and furunculosis. They were therapeutically treated accordingly with average mortality rates. Hatchery staff began releasing the remaining fish on hand in April 2017. All fish on site were trucked and planted at river mile 5 on the North Fork of the Lewis River.

#### Final Stock Inventory

Fish Pondered _____	123,966
Pounds Pondered _____	50
Fish Planted _____	116,436
Pounds @ release (5.5 fpp) _____	21,170
Rearing Mortality (3.7 %) _____	4,550
Destroyed _____	0
Transferred _____	0
Shortage _____	0
Feed Fed (lbs) _____	19,756
Net Gain (lbs) _____	21,120
Conversion _____	0.94:1
Average CV @ Release _____	7.4

### 2016 Brood Lewis River Wild Winter Steelhead

The overall rearing of this brood went well and all program goals were achieved. After genetic assessment, one female spawned this quarter did not meet the genetic criteria for program. As a result, 5,461 unfed fry were planted at the Merwin Boat launch on the North Fork of the Lewis in July 2016. During this rearing cycle these fish were diagnosed with ichthyophthirius, and bacterial cold water disease. They were therapeutically treated accordingly with average loss. Hatchery staff released these fish in May 2016. All of these fish that were volitional release were planted at the Merwin Boat Launch on the North Fork of the Lewis River. The remaining forced out fish were planted at river mile 5 on the North Fork of the Lewis River.

#### Final Stock Inventory

Fish Pondered _____	61,506
Pounds Pondered _____	25
Fish Planted _____	51,816
Pounds @ Release (8.8 fpp) _____	5,888
Rearing Mortality (14.9 %) _____	9,180
Planted as unfed fry _____	5,461
Transferred _____	0
Shortage _____	0
Feed Fed (lbs) _____	6,296
Net Gain (lbs) _____	5,863
Conversion _____	1.07:1
Average CV @ Release _____	8.8

### 2017 Brood Lewis River Summer Steelhead

The overall rearing of this brood has gone really well and program goals will be achieved. Due to lower than expected rearing loss and a higher than average fecundity, 30,800 fish were planted into Battle Ground Lake on October 11<sup>th</sup>, 2017. During this rearing cycle, these fish were diagnosed with ichthyophthirius. They were therapeutically treated accordingly with average loss. Hatchery staff will start the release of the remaining fish on hand in April 2018.

#### Stock Inventory this period

Fish Pondered _____	299,088
Pounds Pondered _____	120
Fish on hand _____	247,369
Pounds on hand (8.0 fpp) _____	30,921
Rearing Mortality (7.0%) _____	20,976
Destroyed _____	0
Eggs Transferred _____	0
Fish Transferred _____	0
Fish Planted _____	30,800
Pounds Planted (52 fpp) _____	594
Feed Fed (lbs) _____	25,121
Net Gain (lbs) _____	31,515
Conversion _____	0.80:1

### 2017 Brood Lewis River Winter Steelhead

The overall rearing of this brood has gone really well and program goals will be achieved. During this rearing cycle, these fish were diagnosed with ichthyophthirius and bacterial cold water disease. They were therapeutically treated accordingly with average loss. 92,710 fish were reared shipped to Beaver Creek Hatchery on October 19<sup>th</sup>, 2017. Hatchery staff will start the release of the fish on hand in April 2018.

#### Stock Inventory this period

Fish Pondered _____	220,822
Pounds Pondered _____	88
Fish on hand _____	104,809
Pounds on hand (8.5 fpp) _____	12,330
Rearing Mortality (3.6%) _____	21,007
Destroyed _____	0
Eggs Transferred _____	0
Fish Transferred _____	92,710
Pounds Transferred (35 fpp) _____	2,649
Feed Fed (lbs) _____	12,810
Net Gain (lbs) _____	14,891
Conversion _____	0.86:1

**2017 Brood Lewis River Wild Winter Steelhead**

The overall rearing of this brood has gone really well and program goals will be achieved. However, ponding loss was higher than average for this stock this year (9.1 %) and the fecundity was significantly lower than average (3,456). During this rearing cycle these fish were diagnosed with ichthyophthirius. They were therapeutically treated accordingly with average loss. Hatchery staff will start the release of the fish on hand in May 2016.

**Stock Inventory this period**

Fish Ponded _____	73,753
Pounds Ponded _____	30
Rearing Mortality (24.7%) _____	18,247
Unfed Fry Plant _____	0
Fish Transferred _____	0
Fish on Hand _____	52,368
Pounds on Hand (20 fpp) _____	2,618
Feed Fed (lbs) _____	2,308
Net Gain (lbs) _____	2,588
Conversion _____	.89:1

**2018 Brood Lewis River Summer Steelhead**

Spawning operations were completed in three egg-takes and went well this period. All takes are still in the incubators with the last take yet to hatch. Female fecundities and eyed egg loss were average this year. 30,090 surplus eyed eggs were culled. Currently there are a combination of 282,917 alevin and eggs on hand.

**2018 Brood Lewis River Winter Steelhead**

Spawning operations were completed in two egg-takes and went excellent this period. Currently there are 140,800 eggs on hand; these eggs have not been picked yet.

**2017 Brood Goldendale Rainbow**

We received 75,000 eyed eggs from Goldendale Hatchery in December 2017. These fish will be ponded to IR#6.

**Stock Inventory this period**

Fish Ponded _____	0
Pounds Ponded _____	0
Rearing Mortality _____	0
Shortage _____	0
Fish on Hand _____	Approx. 75K

### 2016 Brood Goldendale Rainbow

The rearing of this stock has gone really well. During this rearing cycle these fish were diagnosed with ichthyophthirius. They were therapeutically treated accordingly with average loss. A total of 58,000 fish were transferred to Speelyai Hatchery in June 2017. A portion of the remaining fish on hand will be panted to Swift Power Canal in April 2018 and used for the Merwin Park Fishing Derby in June 2018 or Merwin Special Kids Derby (MSKD) in July 2018. Also, 2000 fish will be held over for the 2019 MSKD.

#### Stock Inventory this period

Fish Poned _____	76,790
Pounds Poned _____	22
Fish Planted _____	0
Rearing Mortality (12.4%) _____	9,555
Destroyed _____	0
Transferred _____	58,000
Pounds Transferred (100 fpp) _____	580
Shortage _____	0
Feed Fed (lbs) _____	404
Net Gain (lbs) _____	558
Conversion _____	.72:1
Fish on Hand (Derby fish 2018/2019) _____	6,601
Fish on Hand for Swift Power Canal Plant _____	3,302

### 2017 Merwin Special Kids Derby and Forest Service Derby

For the purpose of this report, we have listed all these fish under one section. Ten 2014 Brood Goldendale Rainbow were planted into Merwin Reservoir for the Forest Service Derby in June 2017. The remaining 2014 brood were caught at the derby in July 2017 or planted into Merwin Reservoir following the derby. The disposition of the 2014 and 2015 brood is as follows: 2,000 fish were kept for the 2018 MSKD derby.

#### Stock Inventory This Period 2014 Derby Goldendale Rainbow

Beginning Balance _____	1,911
Rearing Mortality (8.0%) _____	153
Fish Caught 2017 Derby _____	477
After MSKD Merwin Plant _____	1,447
Shortage _____	0
On Hand (Derby fish 2017) _____	0

#### Stock Inventory This Period 2015 Derby Goldendale Rainbow

Beginning Balance _____	5,076
Rearing Mortality (7.0%) _____	354
Fish Caught 2017 Derby _____	167
After MSKD Merwin Plant _____	1,234
Forest Service Derby Plant _____	1,500
Shortage _____	0
On Hand (Derby fish 2018) _____	1,801

HATCHERY: MERWIN HATCHERY YR: 2017 WATER SOURCE: MERWIN

YEAR TOTAL: 106.14 INCHES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.15	0	0.1	0.15	0.25	0.1	0	0	0	0	0.2	0.3
2	0	0.1	0.3	0	0.4	0	0	0	0	0	0.35	1.1
3	0	0.7	0.75	0	0	0	0	0	0	0	0.15	0.15
4	0	1	0.4	0.2	0.2	0	0	0	0	0	1.4	0
5	0	2	0.7	0.4	0.3	0	0	0	0	0	0.15	0
6	0	0.45	0.65	0.5	0	0	0	0	0	0.15	0	0
7	0	0.35	1.1	0.7	0	0.4	0	0	0	0.2	0	0
8	1	1.5	0.65	0.5	0	0.75	0	0	0	0	0.55	0
9	1.2	1	1.05	0.35	0	0.85	0	0	0.01	0	0.9	0
10	0.3	0.4	0	0.2	0.01	0.25	0	0	0	0.3	0.35	0
11	0	0	0.4	0.7	1	0	0	0	0	0.75	0.3	0
12	0	0	0.15	0.65	0.45	0.1	0	0.2	0	1	0.55	0
13	0	0	1.85	0.5	0.4	0.15	0	0.35	0	0.05	0.7	0
14	0	0.65	2.2	0.45	0.35	0.2	0	0	0	0	0.6	0
15	0	1.75	0.85	0	1	1.55	0	0	0	0	1.4	0.1
16	0	1.5	0	0.15	0.4	0.25	0	0	0	0	1	0.3
17	2.1	0.15	0.8	0.6	0.1	0.15	0	0	0.75	0.25	0.25	0.4
18	1.3	0.6	0.45	0.1	0	0.1	0	0	0.75	1.15	0	1.1
19	0.15	0.95	0	0.65	0	0	0	0	2.6	0.9	2	1.25
20	0.4	0.85	0.2	0.45	0	0	0	0	0.5	1.2	0.5	0
21	0.9	0.12	0.35	0	0	0	0	0	0.1	4.6	0.7	0.1
22	0.15	0	0.45	0.45	0	0	0	0	0	0	0.25	0.85
23	0	0.45	1	1.2	0	0	0	0	0	0	0	0
24	0.01	0.2	0.4	1	0	0	0	0	0	0	0.75	0.25
25	0.01	0.6	1	0.45	0	0	0	0	0.01	0.2	0.15	0
26	0.1	0.8	0.5	0.35	0	0	0	0	0	0	0.9	0
27	0	0.7	0	0.2	0	0	0	0	0	0	0.1	0.2
28	0	0.25	1.05	0	0	0	0	0	0	0	0.15	3.1
29	0		0.6	0.45	0	0	0	0	0.4	0	0	1.3
30	0		0.15	0.01	0.01	0	0	0	0.3	0	0.25	0.05
31	0				0.15		0	0		0.1		0
Total	7.8	17.07	18.1	11.36	5.02	4.85	0	0.55	5.42	10.85	14.6	10.55

TOTAL  
RAINFALL  
106.14

\* SNOW

**YEARLY TEMPERATURE REPORT**

**HATCHERY MERWIN HATCHERY**

**YEAR: 2017**

**WATER SOURCE: N.F. LEWIS RIVER  
MERWIN RESERVOIR**

DAY	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	44	43	40	40	42	41	43	42	46	46	51	50	56	54	58	56	61	59	63	62	57	57	50	49
2	44	43	40	40	42	41	42	42	46	45	51	50	56	54	58	56	61	59	63	62	57	56	50	49
3	44	42	40	40	42	40	42	42	46	46	51	50	56	54	58	56	61	59	63	62	57	56	49	49
4	43	42	40	40	41	40	43	42	46	46	52	51	56	54	57	56	60	60	63	62	56	56	49	49
5	43	42	40	40	41	40	44	42	46	45	52	51	56	55	57	56	61	60	63	62	56	56	50	49
6	42	42	40	40	41	40	44	43	47	45	52	51	57	55	57	57	61	60	63	62	57	56	50	49
7	42	42	40	40	41	41	44	42	47	46	53	51	56	55	58	57	61	60	63	62	56	56	49	49
8	42	42	40	40	41	41	44	43	47	46	52	52	56	55	58	57	62	60	63	62	56	55	49	48
9	42	42	40	40	42	41	44	43	47	46	53	52	56	55	59	57	62	61	63	62	56	55	49	48
10	42	42	40	40	41	40	44	43	47	46	53	52	57	55	58	57	62	61	63	61	55	55	48	48
11	42	41	40	39	42	41	46	44	47	47	53	52	57	55	58	57	62	61	62	62	55	55	48	48
12	42	41	40	40	43	41	46	44	47	46	54	52	56	55	58	57	65	61	63	62	55	54	48	47
13	42	41	40	40	43	41	44	43	47	47	53	52	57	55	58	57	64	61	63	62	55	54	47	46
14	42	41	40	40	42	41	44	43	47	47	53	52	56	55	59	56	63	61	63	62	54	54	47	47
15	41	41	41	40	42	41	44	44	47	47	53	52	57	55	59	56	62	62	63	62	54	54	47	46
16	41	41	40	40	41	41	46	44	48	47	54	53	57	55	60	57	63	62	62	61	54	53	46	45
17	42	41	41	40	42	41	46	45	49	47	54	53	57	55	60	57	63	62	62	61	53	53	45	45
18	42	41	41	40	42	41	46	44	49	47	55	54	58	55	60	57	63	62	61	61	53	52	45	45
19	41	41	42	40	42	41	46	45	48	47	54	54	57	55	59	57	64	62	61	61	53	52	45	44
20	42	41	42	41	42	42	45	44	48	47	55	53	56	55	60	57	63	62	61	60	53	52	45	44
21	41	41	42	40	43	42	47	44	49	48	55	53	56	55	59	57	63	62	61	59	53	51	45	44
22	41	41	41	40	42	42	48	46	49	48	56	53	57	56	60	57	63	63	60	59	52	51	44	44
23	41	41	41	40	43	42	46	46	49	48	55	53	57	55	60	57	63	62	59	58	51	50	44	44
24	41	41	41	40	43	42	46	46	51	48	55	53	58	56	60	57	63	62	60	58	51	50	44	44
25	41	41	41	40	43	43	46	46	50	49	55	54	58	56	59	57	63	62	59	57	52	51	44	44
26	41	41	41	41	44	42	46	45	50	48	56	54	58	56	60	58	63	61	58	57	52	50	44	44
27	41	41	41	41	43	42	46	45	50	49	55	53	58	56	60	58	63	62	60	58	51	50	44	44
28	41	40	41	41	43	42	45	45	50	49	55	54	57	56	59	58	63	62	58	58	51	50	44	44
29	41	40			43	42	46	45	51	49	55	54	58	56	61	58	63	62	58	57	50	50	44	44
30	41	40			43	42	46	45	51	49	55	54	58	56	60	58	63	63	57	57	50	50	44	44
31	41	40			42	42			51	50			58	56	61	59			57	57			44	44
Avg	41.83871	41.25806	40.57143	40.10714	42.16129	41.25806	44.96667	43.9	48.16129	47.12903	53.66667	52.4	56.87097	55.16129	58.96774	57	62.46667	61.2	61.22581	60.25806	53.83333	53.13333	46.48387	46.0645161
MIN	41	40	40	39	41	40	42	42	46	45	51	50	56	54	57	56	60	59	57	57	50	50	44	44
MAX	44	43	42	41	44	43	48	46	51	50	56	54	58	56	61	59	65	63	63	62	57	57	50	49



## DISEASES AND TREATMENTS

DATE: 1/1/17 - 12/31/17

HATCHERY: MERWIN HATCHERY

DATE	BROOD YEAR/ SPECIES	POND NUMBERS	TREATMENT CHEMICAL	DISEASE
January-July	2017 Summer, Winter & Wild Winter Steelhead	(Eggs) Incubators	Formalin	Fungus
June - November	2018 Summer Steelhead Brood	SP 1 & 2	Formalin	Fungus
June - July	2017 Winter Steelhead	IR-6	Aquiflor	Bacterial Cold Water Disease
September- October	2015 Goldendale Rainbow	RW's 9 & 10	Formalin	Ichthyophthirius
September- October	2016 Goldendale Rainbow	RW's 1 & 2	Formalin	Ichthyophthirius
September- October	2017 Winter Steelhead	RW's 3, 4, & RP-13	Formalin	Ichthyophthirius
September- October	2017 Summer Steelhead	RW 2 & RP 11,12, & 14	Formalin	Ichthyophthirius
September- October	2017 Wild Winter Steelhead	RW's 7 & 8	Formalin	Ichthyophthirius
December	2017 Goldendale Rainbow	(Eggs) Incubators	Formalin	Fungus
November - December	2018 Summer & Winter Steelhead	(Eggs) Incubators	Formalin	Fungus
December	2018 Winter Steelhead Brood	AP-2	Formalin	Fungus

## MAINTENANCE AND CAPITAL PROJECTS

### Maintenance

1. Cleaned all dielectric tubes and inspected all fuses and rings on Ozone Generator #1
2. Replaced all dielectric tubes, rings, and fuses on Ozone Generator #2
3. Routine maintenance on both Kaser compressors and Kaser filters
4. Yearly calibration for ambient ozone sensors and generators
5. Trees pruned
6. Replaced some of the worn out bird netting panels around facility rearing vessels
7. New rear tire for GMC planting truck
8. Routine maintenance for both Ford and GMC planting trucks
9. Replaced hydraulic clutch for John Deer Z-trak mower
10. Removed broken bolt on valve cover and machined new tap for John Deer Z-trak
11. Replaced rear wheel bearings on John Deer Gator
12. Replaced front shocks on John Deer Gator
13. Repair service for Hatchery building walk in freezer compressor
14. Repair service & routine maintenance on all residence's heat pumps
15. Repair service for residence garage overhead door
16. Repair broken water line in adult area
17. Repaired restroom urinal
18. Repainted fuel storage tank
19. Repainted lines in front parking lot
20. Repaired worn out bird netting anchors around facility rearing vessels
21. Repaired broken curbing ramp
22. Routine service for both Ford-250 pickup and F-350 flatbed
23. Removal of old fruit trees & stumps, planted new lawn and fruit trees on west end of facility
24. Replaced digital scale with a new monitor
25. New raceway sprinkler system purchased
26. New adult area formalin line purchased
27. Push mower purchased
28. Replaced eye wash stations and updated eye wash solution
29. Purchased new spill kits
30. New spiral hose and cam-lock fittings purchased
31. New life rings and cabinets

### Capital

1. Replace Residence #3 heat pump work was done by Entek

OPERATIONS PROGRAM  
SPEELYAI HATCHERY

FOR

January 1, 2017 TO DECEMBER 31, 2017



*Washington*  
*Department of*  
**FISH and**  
**WILDLIFE**

WRITTEN AND COMPILED BY:

SPEELYAI HATCHERY STAFF

## Introduction

The Speelyai Hatchery is a PacifiCorp owned and funded facility that is operated by the Washington Department of Fish and Wildlife. It has been in operation since 1958.

Speelyai Hatchery is located 21 miles east of Woodland, just off Highway 503. The hatchery is adjacent to Speelyai Creek on the north shore of Lake Merwin.

## Program Goals

- 45,000 Rainbow at 2.5fpp stocked in Swift Reservoir.
- 5000 Rainbow at 2.5fpp stocked in Swift Power Canal
- 45,000 Kokanee at 8fpp released into Merwin Reservoir.
- 48,000 Kokanee at 6.9fpp released into Merwin Reservoir.
- 1,325,000 spring Chinook reared to 90fpp for transfer to Lewis River Hatchery.
- 100,000 spring Chinook reared to 45-55fpp for upstream acclimation.

Approximately 9,200 gallons of water per minute can be delivered to the hatchery system by gravity flow from Speelyai Creek.

There are approximately 166,450 cubic feet of available rearing space. This space consists of four 17'x3'x3' intermediate troughs, twenty-four 10'x 80'x4' raceways, four 115'x10'x5' raceways, and one large asphalt pond that serves as an adult holding/spawning pond for Spring Chinook and Type S Coho stocks.

Incubation consists of fifty stacks of FAL vertical incubators, two deep troughs, and a shallow trough.

The Speelyai hatchery site also includes two residences, a hatchery building, a two bay storage building, a shop/garage, a domestic pump house, a small storage building, and two chemical storage buildings.

The Speelyai hatchery staff is also responsible for ten 20'x20'x20' net pens located at Speelyai Bay in Merwin Reservoir.

## Adult Holding

### 2017 Lewis River Spring Chinook, Hatchery Origin

The first fish were received on February 23, 2017. Brood stock was collected at the Merwin Dam Fish Collection Facility. Disposition is as follows:

Adults Received	1,531
Jacks Received	123
Mortality (9.7%)	148
Adults Spawned	894
Non-Viable	6
Nutrient Enhancement	0
Landfill	1,654

Both ELISA and PCR (Polymerase Chain Reaction) testing that checks DNA extracts for bacterium in salmonid eggs were used. ELISA results showed that all females tested were in the "Below Low" range. All mortality was disposed of at the Cowlitz County Landfill.

### 2017 Lewis River Spring Chinook, Wild Origin

The first fish were received on April 6, 2017. Brood stock was collected at the Merwin Dam Fish Collection Facility and Lewis River hatchery trap. Disposition is as follows:

Adults Received	34
Jacks Received	6
Mortality (2.9%)	1
Adults Spawned	32
Non-Viable	1
Landfill	40
Nutrient Enhancement	0

Wild origin spring Chinook were integrated with hatchery origin spring Chinook at a rate of 1:1. The offspring of these will be used in upstream reintroduction. All carcasses were disposed of at the Cowlitz County Landfill.

**2017 Lake Merwin Kokanee**

Adult collection started September 20, 2017. Fish were collected from the hatchery effluent Kokanee trap and held in raceway 12. All carcasses were disposed of at the Cowlitz County landfill. Disposition is as follows:

Adults Trapped	756
Mortality (0.0%)	0
Returned to Stream	0
Adults Spawned	756
Non-Viable	0

**2017 Lewis River Type S Coho**

The first fish were received on September 12, 2017. Brood stock was collected at the Merwin Dam Fish Collection Facility and Lewis River trap. Disposition is as follows:

Adults Received	1,336
Jacks Received	51
Mortality (5.7%)	76
Adults Spawned	1,187
Non-Viable	0
Nutrient Enhancement	1,308
Landfill	79

All mortality was disposed of at the Cowlitz County Landfill. Spawned and surplus fish were given to the Clark/Skamania Fly Fishers Association for Nutrient Enhancement.

# SPEELYAI HATCHERY ADULT COLLECTION

SPECIES	ESTIMATED TRAPPED / RECEIVED		RETURNED TO STREAM			SHIPPED / PLANTED			MORTALITIES			CARCASS DISTRIBUTION			LETHAL SPAWNED			LIVE SPAWNED			ESTIMATED ON HAND		MARKS RECOVERED			ESTIMATED EGGS TAKE	
	A	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	NVF	J	M	F	J	A	J	M	F		J
OKSIPILEHAI7H	1,531	123				261		37	85	63	32	222	0	26	419	475	0	28				0	0	292	174	37	1,300,800
OKSIPILEHAI7W	34	6							1	0	3	0	0	0	22	10	1	3				0	0	N/A	N/A	N/A	99,400
OKSIPILEHAI7H	1,336	51							38	35	3	11	62	15	577	510	0	33				0	0	54	84	11	1,467,900
OKSIPILEHAI7W	756	0							0	0	0	0	0	0	378	378	0	0				0	0	N/A	N/A	N/A	295,000

**Egg Take and Incubation**

**2017 Lewis River Spring Chinook, Hatchery Origin**

Egg Inventory and distribution is as follows:

Total Egg Take _____	1,357,500
Egg Loss (5.1%) _____	69,900
Destroyed _____	0
Shipped _____	0
Ponded _____	1,287,600
Fecundity _____	3,017

**2017 Lewis River Spring Chinook, Mixed Origin**

Egg Inventory and distribution is as follows:

Total Egg Take _____	101,800
Egg Loss (7.9%) _____	8,000
Destroyed _____	0
Shipped _____	0
Ponded _____	93,800
Fecundity _____	2,909

**2017 Lewis River Type S Coho, Hatchery Origin**

Egg Inventory and distribution is as follows:

Total Egg Take _____	1,512,300
Egg Loss (8.3%) _____	125,266
Shipped _____	1,387,084
Fecundity _____	2,479



**2017 Lake Merwin Kokanee, Mixed Origin**

Egg Inventory and distribution is as follows:

Total Egg Take	287,285
Egg Loss (27.1%)	77,875
Fecundity	762

At the time of this report, the 2016 Kokanee are still in incubation and will be ponded in January 2017.

**Rearing Program**

**2015 Lake Merwin Kokanee**

On March 14, 2017, the remaining total of 33,490 Kokanee were released from Speelyai hatchery at an average size of 8.32 F/LB.

**Final Stock Inventory**

Beginning Balance	127,600
Rearing Mortality (14.1%)	18,045
Fish Shipped	0
Pounds Shipped	0
Fish Planted	110,405
Pounds Planted	8,179
Beginning Pounds	31
Feed Fed (lbs.)	7,476
Net gain (lbs.)	8,148
Conversion	0.92:1
Population Adjustment	850

**2015 Goldendale Rainbow**

The power canal received 2,650 fish at 2.35 F/LB on April 21<sup>st</sup> and another 2,560 at 2.56 F/LB on May 26<sup>th</sup>. The remaining 51,440 at 2.56 F/LB were planted into Swift reservoir on May 30<sup>th</sup> and May 31<sup>st</sup>.

**Final Stock Inventory**

Beginning Balance	57,148
Rearing Mortality (0.70%)	398
Beginning Pounds	3,006
Pounds Planted	22,221
Feed Fed (lbs.)	13,464
Net Gain (lbs.)	19,215
Conversion	0.70:1
Population Adjustment	0

**2016 Lewis River Spring Chinook, Hatchery Origin**

Coded-wire tagging and mass marking was completed on April 21, 2017. On May 25th, all 413,110 hatchery origin spring Chinook were shipped to Lewis River Hatchery at an average size 135 F/LB.

**Final Stock Inventory**

Beginning Balance	436,100
Rearing Mortality (3.0%)	13,201
Fish Shipped	413,110
Pounds Shipped	3,062
Fish Planted	0
Pounds Planted	0
Beginning Pounds	363
Feed Fed (lbs.)	1,921
Net gain (lbs.)	2,699
Conversion	0.71:1
Population Adjustment	-9,789

**2016 Lewis River Spring Chinook, Mixed Origin**

From July 17 to August 11, 2017, 20,789 fish were transferred to the Muddy River, 10,232 were transferred to Clear Creek, and 22,449 were transferred to Crab Creek. The average size at transfer was 49.2 F/LB into their respective acclimation sites.

**Final Stock Inventory**

Beginning Balance	53,300
Rearing Mortality (3.6%)	1,899
Fish Shipped	0
Pounds Shipped	0
Fish Planted	53,470
Pounds Planted	1,086
Beginning Pounds	44
Feed Fed (lbs.)	716
Net gain (lbs.)	1,042
Conversion	0.69:1
Population Adjustment	2,069

**2016 Cowlitz River Spring Chinook, Hatchery Origin**

From May 24<sup>th</sup> through June 7<sup>th</sup>, a total of 310,000 spring Chinook were received from Grays River hatchery. These fish were reared until late October at which time they were transferred to net pens in Cathlamet.

**Final Stock Inventory**

Beginning Balance	310,000
Rearing Mortality (11.2%)	34,680
Fish Shipped	275,320
Pounds Shipped	11,765
Fish Planted	0
Pounds Planted	0
Beginning Pounds	1,824
Feed Fed (lbs.)	9,005
Net gain (lbs.)	9,941
Conversion	0.91:1
Population Adjustment	0

**2016 Lake Merwin Kokanee**

On October 30, 2017, a total of 40,920 Kokanee at an average size 12.0 F/LB were released from the raceways into Speelyai bay. At the time of this report there are 44,780 fish on hand at an average 11.4 F/LB scheduled to be released from raceways into Speelyai bay in March 2018.

**Stock Inventory this period**

Beginning Balance	94,300
Rearing Mortality (12.6%)	8,600
Fish Planted	40,920
Pounds Planted	3,404
Beginning Pounds	23
Feed Fed (lbs.)	6,536
Net gain (lbs.)	7,309
Conversion	0.89:1
Population Adjustment	0

### 2016 Goldendale Rainbow

On June 28, 2017, 58,000 fish were received from Merwin Hatchery at an average 100 F/LB. At the time of this report there are 50,570 fish at an average size 9.30 F/LB. These fish are currently being reared in Pond 13 and are on schedule to be planted into Swift reservoir and the power canal in June 2017

### 2017 Lewis River Spring Chinook, Hatchery Origin

At the time of this report, a total of 1,239,200 Chinook have been ponded and are at an average size of 842 F/LB. There are an additional 48,400 in incubation to be ponded in early January and are included in the disposition below. Mass marking and coded-wire tagging are scheduled to begin in April 2018.

#### Stock Inventory this period

Beginning Balance	1,287,600
Ponding Mortality (2.4%)	31,300
Pounds Ponded	1,096
Pounds on Hand	2,649
Feed Fed (lbs.)	855
Net gain (lbs.)	1,553
Conversion	0.55:1

### 2017 Lewis River Spring Chinook, Mixed Origin

At the time of this report, a total of 25,300 Chinook have been ponded and are at an average size of 878 F/LB. There are an additional 68,500 in incubation to be ponded in early January and are included in the disposition below.

#### Stock Inventory

Beginning Balance	93,800
Ponding Mortality (2.4%)	1,900
Pounds Ponded	80
Pounds on Hand	156
Feed Fed (lbs.)	52
Net gain (lbs.)	76
Conversion	0.68:1

**2017 Lake Merwin Kokanee**

At the time of this report there are 209,000 fish in incubation to be ponded in early January 2018.

**2017 Beaver Creek Winter Steelhead, Hatchery Origin**

On May 22<sup>nd</sup>, 44,000 fish were received from Grays River hatchery at 858 F/LB. These fish were mass marked in September and shipped to Beaver Creek hatchery on October 17<sup>th</sup>.

**Final Stock Inventory**

Beginning Balance	44,000
Rearing Mortality (24.4%)	10,715
Fish Shipped	27,550
Pounds Shipped	11,765
Fish Planted	0
Pounds Planted	1,219
Beginning Pounds	51
Feed Fed (lbs.)	948
Net gain (lbs.)	1,168
Conversion	0.81:1
Population Adjustment	0

HATCHERY:

Speelyai

YEAR: 2017

WATER SOURCE:

Speelyai Creek

DAY	JAN			FEB			MAR			APR			MAY			JUN			JUL			AUG			SEP			OCT			NOV			DEC		
	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN	MAX	MIN	RAIN			
1	46.4	43.7		47.7	45.3		47.7	46.0	0.3	50.9	47.5	0.05	50.4	49.8	0.51	53.2	52.2	0.2	55.2	53.8		55.9	54.5		56.8	52.7		53.2	51.4	0.38	49.5	47.5	0.08	49.3	48.2	0.2
2	45.9	43.3		46.2	45.0		48.0	46.6	0.08	49.6	47.3	0.14	50.5	49.6	0.24	53.1	52.4		54.9	54.0		56.0	54.7		56.8	52		54.1	51.4	0.08	51.1	49.3	0.18	49.6	48.9	0.5
3	45.9	44.1		46.2	43.9		47.8	46.9	0.56	50.7	46.9		50.9	49.6	0.35	53.4	52.3		54.9	53.8		56.3	55.1		57.2	52.9		53.4	49.5		50.4	48.9	0.49	49.6	48.2	1.02
4	44.6	43.9		45.7	43.9	1.25	47.7	46.6	1.05	51.3	46.6		52.3	50.9		52.7	52.3		55.0	53.6		56.7	54.3		56.7	53.2		52.7	48.9		49.6	48.9	0.15	49.3	47.8	0.13
5	45.3	42.1		47.3	45.5	1.60	48.2	46.2	0.42	50.7	48.0	0.15	53.1	51.8	0.59	53.0	51.4		55.6	53.2		56.7	54.9		56.3	53.1		52.7	48.7		49.3	47.7	1.12	49.3	46.6	
6	43.9	41.9		46.4	45.0	1.74	47.7	44.8	0.92	50.7	48.7	0.47	52.9	50.9	0.35	53.1	51.8		55.9	53.6		56.7	54.7		56.1	53.6		52.7	49.3		49.1	47.7	0.19	48.0	46.4	
7	43.7	42.4		46.4	45.5	0.42	46.2	44.6	0.95	51.4	48.9	0.28	51.3	50.5	0.01	54.0	52.5		55.6	54.1		55.8	54.5		55.2	53.2		52.7	49.1	0.1	49.3	46.9		48.4	46.4	
8	44.6	43.3		46.9	45.5	0.47	46.2	45.0	1.65	49.8	48.4	0.49	52.0	50.0		54.0	53.1	0.46	55.4	54.1		55.6	54.7		55.6	53.1		52.4	50.7	0.1	48.9	46.9		47.8	46.4	
9	45.5	44.4	1.18	46.8	46.0	1.95	46.4	45.2	0.8	49.5	47.7	0.4	52.3	50.7		54.0	52.7	0.58	55.2	53.6		56.8	55.4		55.0	53.6		53.2	48.6		48.7	48.2	0.53	46.9	45.7	
10	45.3	44.4	1.10	48.9	46.0	0.82	47.7	46.4	1.8	51.1	47.7	0.39	52.7	51.1	0.01	52.9	52.3	0.76	55.4	54.3		56.8	55.4		54.9	53.2	0.05	52.2	48.4		49.1	48.6	1.05	46.9	45.7	
11	46.4	44.6	0.35	48.0	46.8	0.31	49.5	46.6	0.01	51.1	47.8	0.24	52.7	51.1	0.54	53.0	52.0	0.23	55.2	54.3		56.9	55.4		55.8	53.0		51.6	49.1	0.4	49.5	48.7	0.25	46.9	45.3	
12	45.3	43.7		48.0	45.9	0.03	47.7	46.6	0.5	51.1	47.7	0.71	51.3	51.0	0.2	52.9	52.0	0.01	54.7	53.6		55.6	55.6		56.3	51.8		51.3	49.8	0.97	50.0	49.3	0.49	46.2	45.3	
13	44.4	43.5		48.0	45.9		50.0	47.5	0.08	51.4	49.1	0.49	51.3	51.7	0.64	52.7	52.3	0.05	55.0	53.6		56.1	54.9	0.15	56.1	52.0		50.7	49.6	0.08	50.7	49.6	0.7	48.0	45.3	
14	45.0	43.3		48.0	46.2		48.4	47.8	1.48	50.4	48.6	0.68	50.9	50.5	0.47	52.5	51.8		55.0	54.3		55.6	54.3	0.06	54.9	51.1		51.3	47.3		50.2	49.3	0.54	47.7	46.2	
15	44.6	43.5		48.6	46.2	0.83	48.7	47.8	3.04	50.7	47.8	0.62	50.9	50.2	0.1	52.3	51.4	0.24	55.2	54.1		55.0	53.8		54.9	50.4		50.2	47.1		50.4	49.3	0.67	47.3	46.2	
16	44.6	43.5		48.4	47.5	1.98	48.4	46.9	1.18	49.3	47.8		50.9	50.0	1.45	52.5	52.0	2.12	55.2	54.3		55.2	53.4		54.3	50.2		51.6	47.8		49.5	48.2	1.63	47.5	46.4	0.23
17	45.7	43.5		48.6	47.7	1.32	49.1	46.6		50.0	49.3	0.12	50.9	50.0	0.27	52.7	52.3	0.15	54.9	53.8		55.8	54.0		54.5	51.1		51.1	48.0		49.1	48.4	0.8	48.2	47.3	0.3
18	46.2	45.1	2.66	48.9	47.3		48.0	46.6	1.08	50.2	50.0	0.45	51.1	49.8	0.02	53.1	52.3	0.11	55.2	53.6		55.8	54.5		53.2	52.0	1.11	50.4	48.0	0.25	49.3	48.4	0.26	48.6	47.8	0.3
19	46.6	45.7	1.16	48.9	47.1	0.86	48.9	46.2	0.49	50.2	49.8	0.13	52.0	50.0		53.6	52.2	0.01	55.2	53.8		55.2	54.5		52.7	51.8	1.1	51.4	49.8	1.1	49.3	46.6		49.1	48.4	1.24
20	47.1	45.7	0.05	48.0	47.1	1.09	49.5	46.0		50.0	49.6	0.75	52.3	50.0		57.7	53.1		55.0	54.0		55.8	54.3		53.0	51.8	2.09	51.6	50.7	1.05	49.3	46.6	2.69	49.3	47.7	1.25
21	46.8	45.9	0.33	47.7	47.1	0.76	48.7	47.1	0.39	49.8	49.6	0.27	52.5	51.8		54.5	53.8		55.0	54.1		55.2	54.3		53.1	51.6	0.38	50.9	49.8	1.04	50.0	48.2	0.59	47.8	44.8	
22	46.9	45.7	1.00	48.4	46.4	0.24	49.6	47.7	0.43	50.5	49.6	0.01	53.1	51.8		54.1	52.7		55.0	53.6		55.4	54.1		53.2	50.5		52.7	49.6	2.49	50.5	48.2	1.12	44.8	46.2	0.07
23	47.5	45.7	0.07	48.0	46.2	0.04	49.3	47.7	0.39	50.7	50.0	0.29	53.8	52.5		54.1	52.7		55.8	54.5		55.8	54.3		53.2	50.4		52.7	49.6	0.1	51.6	50.5	0.63	46.8	46.2	0.7
24	47.1	45.1		48.2	45.7	0.09	50.2	47.7	1.32	50.4	50.0	1.83	53.2	52.9		54.7	53.2		55.8	55.2		55.9	54.5		54.0	50.2		52.5	49.5		52.0	49.8	0.6	46.2	44.6	
25	46.6	45.1	0.06	47.3	45.7	0.24	48.7	47.8	0.5	50.0	49.6	1.01	52.9	51.8		55.2	53.6		55.8	54.5		55.6	54.5		53.8	50.2		52.5	49.5		52.0	48.4	0.02	45.0	42.1	
26	47.3	46.2	0.06	48.2	45.0	0.19	49.8	47.8	0.06	49.8	49.6	0.42	52.5	51.4		55.8	54.5		55.9	54.7		55.0	53.6		53.8	51.8		52.2	51.1	0.12	50.0	48.7	0.77	46.2	44.4	
27	47.8	45.3		46.6	44.2	0.72	48.2	47.8	1.53	50.0	49.8	0.36	53.2	51.8		55.4	54.2		55.6	54.9		55.4	53.8		54.5	51.8		52.3	50.9		50.5	49.1	0.55	45.9	44.6	0.32
28	47.3	45.7		46.4	45.7	0.65	49.5	47.8	0.5	50.2	50.0	0.19	53.6	52.5		54.7	53.8		55.6	54.3		55.8	54.3		55.4	52.2		51.6	50.9		50.2	48.9	0.08	46.4	45.9	0.61
29	47.7	45.9					49.3	48.0	1.26	50.0	49.8		54.0	52.5		54.8	53.8		55.6	54.3		56.1	54.3		55.4	52.5		52.2	49.1		49.3	48.9	0.64	46.6	45.7	4.38
30	47.8	45.7	0.02				49.3	47.8	0.54	50.4	49.6		53.8	52.9		54.8	53.8		55.6	54.2		56.8	52.9		53.4	51.4	0.26	51.1	48.6		50.0	48.2	0.08	48.2	46.0	1.1
31	47.7	46.4	0.02				49.6	47.5	0.39				53.6	52.5					55.8	54.3		56.3	52.9					49.6	47.7					48.2	45.9	0.05
Avg / Tot	46.0	44.5	8.06	47.6	45.9	17.60	48.5	46.8	23.70	50.4	48.8	10.94	52.2	51.1	5.75	53.8	52.7	4.92	55.3	54.1		55.9	54.4	0.21	54.9	51.9	4.99	52.0	49.3	8.26	49.9	48.5	16.90	47.6	46.2	12.4
Acc. Rain		8.06		25.66			49.36			60.30			66.05			70.97			70.97			71.18			76.17			84.43			101.33			113.73		

## DISEASES AND TREATMENTS

**DATE:** 1/1/17 - 12/31/17

**HATCHERY:** SPEELYAI HATCHERY

DATE	BROOD YEAR/ SPECIES	POND NUMBERS	TREATMENT CHEMICAL	DISEASE
1/29 - 6/2	2016 Lewis River Spring Chinook	Raceways	Formalin Drip	Costia
6/7 - 6/9	2016 Kokanee	Raceways	Formalin Drip	Costia
5/31 - 9/6	2016 Cowlitz River Spring Chinook	Raceways	Formalin Drip	Costia
5/31 - 6/2	2017 Beaver Creek Steelhead	Raceways	Formalin Drip	Costia
3/15 - 9/19	2017 Lewis River Spring Chinook Brood	Raceways 25-28	Formalin Drip	Fungus
9/15 - 10/29	2017 Lewis River Type S Coho Brood	Adult Pond	Hydrogen Peroxide	Fungus
9/30 - 10/7	2017 Kokanee Brood	Raceway 12	Formalin Drip	Fungus
1/1 - 1/30	2017 Type N Coho	Incubation	Formalin Drip	Fungus
9/1 - 11/28	2017 Spring Chinook	Incubation	Formalin Drip	Fungus
10/9 - 12/3	2017 Kokanee	Incubation	Formalin Drip	Fungus
10/12 - 11/22	2017 Type S Coho	Incubation	Formalin Drip	Fungus
6/8 - 6/10	2017 Beaver Creek Steelhead	Raceways	Potassium Permanganate	Parasites



## MAINTENANCE AND CAPITAL PROJECTS

### Maintenance

1. Replace UV bulbs on domestic water system.
2. Annual preventative maintenance to fork-lift.
3. Annual preventative maintenance to generator.
4. Annual preventative maintenance to three-phase compressor.
5. Annual preventative maintenance to residential HVAC.
6. Continual patching of potholes in entry road.
7. Annual preventative maintenance to tractor.
8. Annual maintenance completed on traveling screens at intake structure.

### Capital

1. No capital projects.

**Complex Staff Jan. 2017-Dec. 2017**

**Complex Manager-**

**FHS4-**

**FHS4-**

**FHS3-**

**FHS3**

**FHS3**

**FHS2-**

**FHS2-**

**FHS2-**

**FHS2-**

**FHS2-**

**FHS2-**

**FHS2-**

**FHS2-**

**FHS2-**

**MHCC Student-Work Study**

**MHCC Student-Work Study**

**Aaron Roberts**

**Michael Chamberlain**

**Kevin Young**

**Shawn Collins**

**Luke Miller**

**Jesse Cody**

**Jay VonBargen**

**Bruce Kincaid Jr. (Out on L&I)**

**Jim Trammell**

**Dwayne Fossen**

**Bryan Coyle**

**Grant Sill**

**Mathew Lyons**

**Doni Grove**

**Chris Roe**

**Adam Kostick**

**Sam Williams**

## 2017 LEWIS RIVER COMPLEX

DISTRIBUTION	CK:SP:LEHA:H:17			CK:SP:LEWE:W:17			CK:FA:UNKN:H:17			CK:FA:KAHA:H:17			CO:SO:LEHA:H:17			CO:SO:LEWE:W:17			CO:NO:LEWE:H:17			CO:NO:LEWE:W:17			CO:NO:LEWE:H:16			SH:SU:MEHA:H:18			SH:WE:MEHA:H:18			SH:WE:MEHA:H:17			KO:NA:MERL:M:17			RBS:NA:UNKN:H:17			Total	
	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J		
AMERICAN CANADIAN																																						0						
CAP	1	2	1				3	6																152	253													418						
Landfill	726	545	86	23	11	6	15	13	1	355	87	16	79	79	17	1	3			101	53	38	3	9	2	30	28	1	188	195		12	11		62	78		378	378					3,630
NW Harvest							85	65	6				2,325	2,663	1,063					1,397	641	1,356				152	162		188	221									11	6		10,341		
Forest Service																																									0			
Nutrient Enhancement							102	94	3	290	591	11	933	1,164	261					1,562	1,499	244	53	36	0	50	85	7													6,985			
Salvation Army																																										0		
Shoshone Bannock																																										0		
Schools																																										1		
Covditz Tribe	11	13	4				16	10	3				584	344	340					133	119	672				786	519		590	698		344	432								5,618			
Chinook Tribe	1																									60	76														137			
Faith Harvest							1													1	1	43				2	4			3									1		56			
Yakima Tribe	8	3	2																																							13		
N. County FB																																										0		
NW Indian V.A.																																										0		
Wanapum Tribe																																											0	
<b>TOTAL</b>	747	563	93	23	11	6	222	188	13	645	678	27	3,921	4,250	1,681	1	3	0	3,194	2,313	2,353	56	45	2	80	113	8	1,340	1,210	0	790	933	0	406	510	0	378	378	0	12	6	0	27,199	

## Executive Summary

Adult returns overall were good. The Early and Late Coho returns were good and egg take goals were met. PacifiCorp was able to plant 3,735 Early Coho and 2,761 Late Coho into the upper watershed. Our 2017 spring Chinook return was projected to be 700 our actual return was 2,318 adults and 538 jacks. We were not able to meet broodstock goals due to some miss identified males and females which is very easy to do especially first part of the run. Unfortunately under the assumption of a 50/50 male to female ratio being collected we actually ended up with 65% males and 35% females which did not allow us to achieve our egg take goals. This situation has been addressed between PacifiCorp and WDFW for next year and together we will succeed to meet our program goals. Summer Steelhead returns were low in comparison to past years as they were that way region wide. We still had a respectful return of 3,127 fish. We were able to recycle 1,551 adults downstream to provide anglers a second chance of fishing opportunity. Hatchery winter Steelhead returns were very good this year with a return of 1,794 and was the best in the region. The Late Winter Steelhead return was good with 622 returned and planted into the upper watershed.

We did take some ELISA samples on the Spring Chinook this year for our February release groups. We also continued our alternative PCR (Polymerase Chain Reaction) testing that checks DNA extracts for bacterium in salmonid kidney. No results were given from the PCR testing instead the data was used to create a reference database, so no fish were identified as BKD low or high and segregated. We did identify Below Low-High Elisa results and there was no culling because we were unable to meet our egg take goal. Our spring Chinook that were held for brood were injected with Draxen for BKD or LA-200 (Oxytetracycline) for Furunculosis.

All facilities kept up with routine maintenance and had some minor projects done this year. There were only a few capital projects done in 2017. Thanks to our outstanding WDFW staff and the local staff from PacifiCorp, all three stations are looking and operating well.

As we move forward into re-licensing, we will be presented with many new challenges, both with upstream re-introduction, facilities modifications and continuing changes to our program goals to better provide higher quality smolts and better adult returns. Staff here on the Lewis River system is some of the best in the industry, and committed to facing these challenges with both professionalism and dedication. Their efforts are much appreciated.

### Mitigation Summary

<b>Stock</b>	<b>Mitigation Target</b>	<b>Actual Production</b>
<b>Spring Chinook</b>	<b>1,250,000@ 8-12 FFP</b>	<b>402,224 @ 10.5 FPP</b>
<b>Early Coho</b>	<b>1,100,000@ 16 FFP</b>	<b>701,236 @ 14.7 FPP</b>
<b>Late Coho</b>	<b>900,000@ 16 FFP</b>	<b>965,206 @ 15.4 FPP</b>
<b>Summer Steelhead</b>	<b>175,000@ 4.8 FFP</b>	<b>175,647 @ 5.5 FPP</b>
<b>Winter Steelhead</b>	<b>100,000@ 4.8 FFP</b>	<b>116,436 @ 5.6 FPP</b>
<b>Wild Winter Steelhead</b>	<b>50,000@ 6-8 FFP</b>	<b>51,816 @ 8.7 FPP</b>
<b>Kokanee</b>	<b>12,500 Pounds</b>	<b>7,435 pounds</b>
<b>Rainbow</b>	<b>50,000@ 2.5 FFP</b>	<b>56,650 @ 2.5 FPP</b>
<b>Wild Spring Chinook</b>	<b>100,000 @ 45-55 FFP</b>	<b>53,470 @ 49.2 FPP</b>