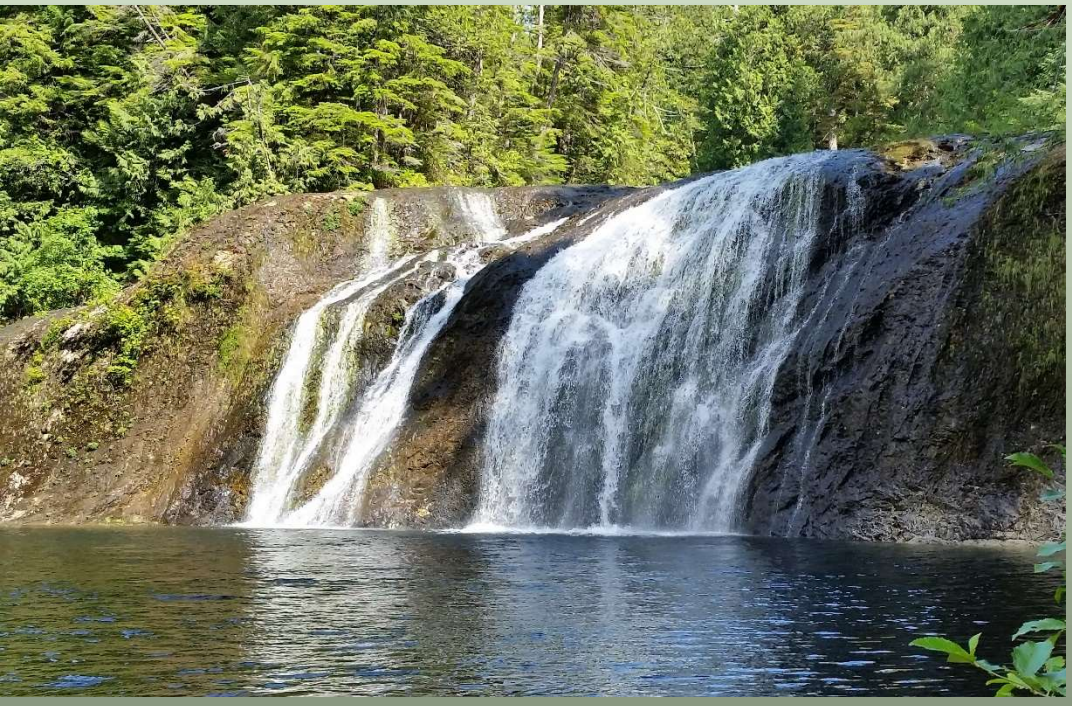






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ANCIENT SPIRIT, MODERN MIND

Sarita and Pachena Watershed Renewal:

2019 Sarita River Chinook Salmon Outmigration Assessment

Prepared by

LGL Limited

24 Sept 2019

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Sarita and Pachena Watershed Renewal: 2019 Sarita River Chinook Salmon Outmigration Assessment

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EXECUTIVE SUMMARY

The Sarita Watershed is located on the west coast of Vancouver Island within the traditional territories (the Haa-houlthee) and now the Treaty Lands of the Huu-ay-aht First Nations. The watershed has been heavily logged and most (greater than 90%) of the forest is second growth while approximately 2% is old growth. Past forestry practices have resulted in the degradation of the fish and aquatic habitat in the watershed and estuary.

Within the Sarita River, the most abundant salmon species in recent years have been Chum Salmon (*Oncorhynchus keta*); however, historical information suggests that Chinook Salmon (*O. tshawytscha*) abundance was significantly higher than in recent years. The Chinook Salmon management concerns have been and are being addressed through habitat restoration activities as well as stocking programs.

Monitoring out-migrating salmonids is an important activity for validating assumptions regarding the effectiveness of watershed restoration programs at increasing fish production, directing fisheries management strategies, and the effect of land use policies on fish populations. The estimation of out-migrating juvenile Chinook Salmon abundance by the Huu-ay-aht First Nations and LGL Limited, from natural river spawner production, commenced as a pilot study in 2017 using rotary screw traps and continued as a full study in 2018. As was the case for 2018, the objectives of the 2019 Sarita River juvenile Chinook Salmon outmigration assessment were to estimate juvenile, river produced, Chinook Salmon abundance, outmigration timing, and body size as well as egg to fry survival.

Two rotary screw traps were operated, in tandem, along a continuous line and pulley system, immediately above the high tide elevation near the Mine Pool in the lower Sarita River. The rotary screw traps were operated continuously from late February to early May aside from short-term and unscheduled trap outage that occurred due to high flows. All captured fish were identified to species and enumerated. all juvenile Chinook Salmon were examined for marks, marked and released upstream for subsequent recapture. Juvenile Chinook Salmon abundance was estimated using a time-stratified Bailey estimator approach as well as a pooled Petersen estimator with Chapman modification approach for comparison. Relative abundance was recorded for all other juvenile salmonid species. A subset of juvenile Chinook Salmon, Coho Salmon, Rainbow Trout, and Coastal Cutthroat Trout were sampled for fork length and weight.

The 2019 estimated, river-produced, juvenile Chinook Salmon abundance with 95% confidence intervals was 140,138 (128,469 - 151,807) using the time-stratified Bailey estimator. The egg to fry survival for the 2018 Chinook Salmon river spawners brood year was estimated to be 6.69% based on an estimated 2,093,624 eggs deposited in the gravels in 2018. Juvenile Chinook Salmon outmigration peaked during the fourth week of March. The median outmigration date occurred on March 17 and the outmigration was 95% complete by April 4.

In addition to the outmigration of Chinook Salmon produced from river spawners, approximately 304,000 hatchery reared juvenile Chinook Salmon were released to the Sarita River on May 10 and 28, 2019 at Blenheim Bridge after termination of the rotary screw trap (RST) sampling program. Two rearing groups were released: the large traditional group had individual weights of approximately 6.7 g, and the small semi-natural group had individual weights of approximately 2.6 g. Of the 304,000 juvenile Chinook Salmon released, a total of just under 200,000 fish were implanted with coded wire tags and adipose fin clipped representing both rearing groups, while the remaining 104,000 fish were adipose fin clipped.

Recommendations are proposed for future juvenile Chinook Salmon outmigration abundance assessments. The recommendations are centered around four themes: rotary screw trap operations and

timing, juvenile salmonid size distribution, juvenile Chinook Salmon abundance estimate assumption testing, and juvenile Chinook Salmon survival estimates.

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ABBREVIATIONS

The following abbreviations are used in this report:

ATU	accumulated thermal units
CI	confidence interval
CL	confidence limit
CPUE	catch per unit effort
CU	Conservation Unit
DFO	Fisheries and Oceans Canada
HFN	Huu-ay-aht First Nations
MOE	Ministry of Environment
QA	quality assurance
QC	quality control
RPM	rotations per minute
RST	rotary screw trap
SE	standard error
UTM	Universal Transverse Mercator
VIE	visible implant elastomer
WSC	Water Survey of Canada

1 Introduction

1.1 Background

The Sarita, Pachena, and Sugsaw watersheds are located on the west coast of Vancouver Island within the traditional territories (the Haa-houlthee) and Treaty Lands of the Huu-ay-aht First Nations (HFN). Until the 1990s, road building and timber harvesting throughout much of the watersheds had been carried out on steep unstable slopes and up to the edge of watercourses. Roads were often poorly built and stream crossings poorly designed. These practices resulted in numerous landslides, the mobilization of sediments to watercourses, increased peak and annual flows, changes in stream channel morphology, loss of fish habitat, fish passage restrictions, and the degradation of the Sarita River estuary. In recent years, forest practices have improved; however, the legacy of poor forest practices remains (LGL 2017).

In 2017, HFN and LGL Limited developed a framework for renewal of the Sarita and Pachena watersheds (LGL 2017). The purpose of the Renewal Framework was to provide direction that will ultimately lead to the development of a comprehensive Renewal Plan. The Renewal Framework incorporated a two-pronged strategy that prioritized both long term objectives (10 years or greater) intended to restore ecosystem processes, and short-term objectives required for the management and conservation of high value species or the protection and enhancement important fish and wildlife habitat. Monitoring and adaptive management are key parts of the Renewal Plan.

The Renewal Framework identified several assessments and inventories that can be conducted while the Renewal Plan is being prepared to address known information gaps relating to the condition of the Sarita and Pachena watersheds, the condition of fish and wildlife habitats, and the status of fish, wildlife, and species at risk in the watersheds (LGL 2017). The purpose of these assessments and inventories was to specify where and what kinds of renewal actions were required to achieve short and long-term renewal goals; such as restoring watershed processes, fish habitat and productivity, estuary productivity, wildlife habitat and populations, and species at risk.

Within the Sarita River, the most abundant salmon species in recent years have been Chum Salmon (*Oncorhynchus keta*); however, historical information suggests that Chinook Salmon (*O. tshawytscha*) abundance was significantly higher than in recent years (Barry 2010). The Chinook Salmon management concerns have been and are being addressed through habitat restoration activities as well as stocking programs. The Fisheries and Oceans Canada (DFO) Nitinat River Hatchery has been releasing juvenile Chinook Salmon into the Sarita River since 1985. However, the estimation of out-migrating juvenile Chinook Salmon abundance, from natural reproduction, did not commence until the spring of 2017 using rotary screw traps (RSTs). Rotary screw traps are an effective way to assess out-migrating juvenile salmon in rivers and when paired with mark-recapture techniques can produce accurate abundance estimates (Volkhardt et al. 2007). An RST mark-recapture program is also a powerful tool for validating assumptions regarding the effectiveness of watershed restoration programs, fisheries management strategies, and the effect of land-use policies on fish populations (Volkhardt et al. 2007). In addition to serving as a tool to monitor wild populations, RST mark-recapture programs are useful for evaluating hatchery programs and wild/hatchery fish interactions to inform management decisions (Volkhardt et al. 2007). Therefore, obtaining annual outmigration Chinook Salmon abundance estimates in the Sarita Watershed was one of the assessment steps needed to support and achieve the long-term Renewal Plan objectives.

1.2 Study Area

The study area for this assessment was the Sarita Watershed, which is located on the west coast of Vancouver Island adjacent to Barkley Sound (Figure 1) and 30 km southwest of Port Alberni. The Sarita Watershed is approximately 19,247 ha in area and drains into Trevor Channel on the west coast of

Vancouver Island. The main watercourses of the Sarita Watershed include the Sarita River, South Sarita River, Sabrina Creek, and Frederick Creek. Smaller tributaries of the Sarita Watershed include: Central, Hunter, Thompson, and Miller creeks (Figure 1). Sarita Lake (147 ha) is located halfway up the watershed and fish passage is blocked by falls approximately 1 km downstream of Sarita Lake. Other lakes within the watershed include Frederick Lake (41 ha) and Bewlay Lake (11 ha).

The Sarita Watershed supports a diversity of fish species (Table 1). Sarita River Chinook Salmon are a coastal stock with an ocean-type life-history adapted to coastal hydrology. For ocean-type Chinook Salmon, there are two sub-yearling types: juveniles that migrate immediately after emergence, and a second group that spends some time rearing and growing in freshwater, typically migrating downstream in April through June in the year of emergence (Groot and Margolis 1991; Anderson and Topping 2018). The Sarita River spawning population belongs to the Southwest Vancouver Island Conservation Unit (CU) under the Wild Salmon Policy, one of three west coast Vancouver Island Chinook Salmon groups defined by similarities among genetics, run timing, and the oceanic provenances occupied as described by Holtby and Ciruna (2006) and updated by DFO (2013).

1.3 Objectives

The objectives of the 2019 Sarita River juvenile Chinook Salmon outmigration assessment were to:

- Estimate juvenile, river produced, Chinook Salmon abundance, outmigration timing, and body size;
- Estimate egg to fry survival of juvenile, river produced, Chinook Salmon for the 2018 brood year;
- Estimate relative abundance and outmigration timing of all other juvenile salmonids; and
- Estimate juvenile Coho Salmon (*O. kisutch*), Rainbow Trout (*O. mykiss*), and Coastal Cutthroat Trout (*O. clarkii clarkii*) body size.

2 Methods

2.1 Trap Site Selection and Operation

Based upon the effectiveness of the 2018 RST site (Burns 2018), the same location was selected for 2019 based upon (1) ease of accessibility, (2) lowest point in the watershed conducive to operating RSTs with adequate thalweg constriction to provide sufficient trap efficiency, and (3) downstream of the known Chinook Salmon spawning zone (Burns et al. 2018). Access to the site was off the Bamfield Main Road through the Sarita Mine Pool Gate access road at ƛaƛačis (former IR1).

Two RSTs, 1.2 m (small) and 1.8 m (large) diameter traps were operated immediately above the high tide elevation at the upstream end of the Mine Pool (UTM: 10U 354230 5417200) in the Sarita River to capture juvenile salmonid outmigrants (Figure 2; Photos 1 and 2). The RSTs were operated between February 22 and May 9 in tandem and connected to each other along a continuous line and pulley system that spanned the width of the river to allow for fine tuning of the trap location and orientation in changing water conditions, with the large RST on the outside edge of the small RST. To ensure RST rotation during periods of reduced discharge, the large trap was motorized with a 12-V motor that drew 6.9 A at full load and powered by two high amperage deep-cycle batteries wired in parallel (Photo 3).

The RSTs were operated continuously (24 h per day) unless unscheduled trap outages occurred due to high discharge and/or trap malfunctions.

2.2 Fish Capture and Sampling

Every morning, weather (sunny, sunny with clouds, cloudy, rain, snow), water clarity (good, moderate, poor), and water temperature (°C) were recorded. Water temperature was measured using a hand-held thermometer. Trap revolutions per minute were recorded for each RST. The RSTs were cleaned and any downtime (e.g., cone was stopped to remove woody debris) was recorded.

During the morning, each RST live box was checked for fish. Fish were safely removed from the live box with a dip net and transferred in 19 L buckets to a shore-side field processing station. During fish data collection at the shore-side field processing station, the 19 L fish buckets were aerated. All captured fish were identified to species, life history stage, and enumerated. Then all fish, except Chinook Salmon with marks, were released downstream of the RSTs.

Depending upon the species, life history stage was assigned based upon the species ecological life history, fork length criteria, and coloration (Table 2).

Chinook Salmon were enumerated by two different life history stages: fry or parr. There are two fry sub-yearling types: juveniles that migrate immediately after emergence, and a second group that spends some time rearing and growing in freshwater, typically migrating downstream in April through June in the year of emergence. These two sub-yearling types were collectively classified as fry. There is one parr yearling type that rears in the river for over a year.

Coho Salmon were enumerated by two different life history stages: fry or parr/smolt. Defining characteristics of Coho Salmon fry were a bright orange-brown color, elongated white anal fin ray, small eye and small size (less than 70 mm fork length), and having emerged from the gravel the same year. Parr/smolt Coho Salmon were larger in size (greater than 70 mm fork length), with either faded parr marks or silver sides, black tips on the caudal fin, large eye compared to the size of the head, and have reared in the river for over a year. All captured Coho Salmon were measured for fork length (to the nearest millimetre).

Rainbow (Steelhead) and Coastal Cutthroat trout were enumerated by three different life history classes: fry, parr/smolt, and adult. Life history classes were revised since 2018 because 2019 results provided additional watershed specific fork length data to support further refinements. Trout fry were characterized by having fine parr marks, a size of less than 90 mm in length and having emerged from the gravel the same year. Trout parr and smolts counts were combined because individuals had intermediary characteristics of both and were defined as having fork lengths between 90 to 300 mm fork length. Trout parr/smolts were assigned as either Rainbow or Coastal Cutthroat Trout based on mouth size and presence or absence of red coloration on the ventral surface of the gill covers. All captured Rainbow and Coastal Cutthroat trout were measured for fork length (to the nearest millimetre).

All Chinook juveniles captured were marked. Mark type was stratified by week to determine weekly trap efficiency and support the time-stratified juvenile Chinook Salmon abundance estimate (Topping and Anderson 2017). For each week, all juvenile Chinook Salmon were marked with visible implant elastomer (VIE) tags from Monday to Wednesday. The VIE tag color varied by week. From Thursday to Sunday of each week, all juvenile Chinook Salmon were marked with Bismarck brown dye.

The Bismarck brown dye marking procedure involved preparing a solution of 21 mg/L of dye in a 19 L aerated bucket, immersing the Chinook Salmon in the solution for a period of 50 min, and transferring the dyed Chinook Salmon into an aerated recovery bucket.

The VIE marking procedure involved preparing a solution of anesthetic (9 parts ethanol to 1-part clove oil), immersing the Chinook Salmon in a bucket using 6 ml of the anesthetic solution to 10 L of water, injecting

the tag at the base of the dorsal fin (NMT 2017), and transferring the tagged Chinook Salmon into an aerated recovery bucket.

All Chinook Salmon fry were enumerated and examined for marks. The total of each mark type (Bismarck brown dye or VIE tag) and VIE tag color was recorded. Then the first 30 individuals captured each week were measured for fork length (to the nearest millimetre) and weight (0.01 g). All captured Chinook Salmon with no marks were subsequently marked and released 1,000 m upstream of the RSTs at the Hunter Creek pool (UTM: 10U 355268 5417221). The release site was selected to maximize mixing of marked and unmarked fish while minimizing in river predation between release and recapture. All captured Chinook Salmon with marks were released downstream of the RSTs.

2.3 Data Quality Assurance and Control

In order to ensure consistently accurate data collection, a quality assurance (QA) and quality control (QC) program was established at the onset of the field program. The program involved a practice session held in the field prior to a new crew conducting the fieldwork to review data collection procedures. Data were entered in a field rugged iPad® to reduce the likelihood of transcription errors. Throughout the course of the assessment, a qualified and experienced Fisheries Biologist reviewed the data to ensure consistency in data collection procedures. Whenever clarification was required on specific points, the Field Technician was contacted by the Fisheries Biologist for editing and data were accepted only after the necessary changes were made.

2.4 Analysis

2.4.1 Environmental Conditions

Continuous water temperature (°C) and discharge (m^3/s) data for the duration of the sampling period was obtained from the real-time Water Survey of Canada (WSC) continuous data logger for the Sarita River (Station number: 08HB014; WSC 2019). Mean daily water temperature and discharge were then calculated for each sampling day.

2.4.2 Juvenile Salmonid Relative Abundance and Size Distribution

Catch per unit effort (CPUE) was calculated as an index of relative abundance for each sampling day for all juvenile salmonids, by life history stage, trap (i.e., small and large trap). Catch per unit effort was defined as the number of fish captured per 24 hours of RST operation:

$$CPUE = \frac{M}{E}\ x\ 24 \quad (1)$$

Where *M* is the number of fish caught in one RST, and *E* is RST fishing effort (h).

Median and 95% outmigration dates were calculated for Chinook Salmon. Median and 95% catch dates were calculated for Coho and Chum salmon, by life history stage, as a proxy for median and 95% outmigration date, as daily juvenile abundance estimates were not determined. Median outmigration/catch date was the date that 50% of juvenile outmigrants were estimated to have passed the RSTs.

Fork length statistics were calculated for Chinook Salmon, Coho Salmon, and Rainbow Trout, by life history stage. Mean fork length and condition (K) with 95% confidence limits (CLs) were calculated for juvenile Chinook Salmon by statistical week.

2.4.3 Juvenile Chinook Salmon Abundance Estimate

2.4.3.1 Overview

Juvenile, river produced, Chinook Salmon abundance was estimated using a single partial-capture trap design (Volkhardt et al. 2007) by estimating (1) missed catch, (2) efficiency strata, (3) time-stratified abundance, and (4) total abundance (Topping and Anderson 2017). Extrapolated outmigration abundance estimates prior to the trapping season could not be reliability calculated because the leading edge of juvenile Chinook Salmon catch was missed, possibility due to earlier onset of outmigration than that observed in 2018 (see Results and Discussion). The tailing end of juvenile Chinook Salmon catch was not missed; however, outmigration abundance estimates were not extrapolated after the trapping season because it was predicted that most of the outmigration of river produced juvenile Chinook Salmon terminated during the trapping season based upon previous results in 2017 and 2018 (see Results).

2.4.3.2 Mark Type and Marker Tests

Marking was stratified weekly, using different marks (i.e., Bismarck brown dye and VIE tag) over the outmigration period in order to accommodate for temporal changes in trap efficiency (Volkhardt et al. 2007). A G-test (Sokal and Rohlf 1981) was used to determine whether recapture rates between the two types of mark types, and, for VIE tags, between taggers were statistically different ($\alpha = 0.05$). The results of this analysis informed which mark type should be used for subsequent abundance analysis.

2.4.3.3 Time-Stratified Bailey Abundance Estimator

The time-stratified Bailey estimator of juvenile Chinook Salmon abundance was calculated using the following process as outlined in Topping and Anderson (2017) with modifications.

Missed Catch

Missed catch for a given period *t* with trap outages was estimated as:

$$\widehat{n_t} = \bar{R} * T_t \quad (2)$$

Where *R* is the mean catch rate (fish/24 h) from adjacent fished periods (2 days before and 2 days after trap outage); and T_t is time (24 h) during the missed fishing period.

Efficiency Strata

Data from the two traps (large and small) were combined into a single catch. Since the recapture rate for VIE tags was significantly lower than that for Bismarck brown dye, and the recapture rate for VIE tags by marker was significantly different (see Results), it was assumed that there were issues with VIE mark application and retention. Thus, for our analyses, only the Bismarck brown dye marks were considered when assessing trap efficiencies. Counts of Bismarck brown dye fish released and recaptured were correlated (and plotted) with increasing lag times to determine how many days it took for fish released above the trap to travel back down to the trap site.

Recapture data (m) were lagged by one day (m') so that they lined up with the corresponding release data (given the typical one-day travel time of tagged fish from the release site above the trap). The daily trap data were then divided into weekly strata, running from Thursday to Wednesday. Each week was considered a unique stratum, except in weeks when there were fewer than 5 recaptures and thus were pooled into adjacent weeks (Topping and Anderson 2017). G-tests were subsequently used to determine if trap efficiencies varied significantly between adjacent weeks (Sokal and Rohlf 1981). Where G-tests were statistically significant ($\alpha = 0.05$), the week was treated as separate strata, otherwise data from the pair of weeks was pooled together.

Time-Stratified Abundance and Total Abundance

To estimate the total abundance of juvenile Chinook Salmon that passed the traps during a given stratum ($\widehat{U}_h$), the stratum-specific total number of maiden fish ($\hat{u}_h$) was divided by the stratum-specific trap efficiency (p_h):

$$\widehat{U}_h = \hat{u}_h / p_h \tag{3}$$

and

$$p_h = \frac{m'_{dye,h}+1}{M_{dye,h}+1} \tag{4}$$

Where $m'_{dye,h}$ is the total number of dyed fish recaptured during stratum h (lagged by one day); and $M_{dye,h}$ is the total number of dyed fish released during stratum h.

Due to issues with VIE mark application and retention (see Results) the VIE tags needed to be excluded from the analyses because we had fish that were released upstream of the traps that were not marked with Bismarck brown dye, but were marked with VIE tags, and which needed to be excluded from $\hat{u}_h$. We may have also had VIE tagged fish that were released above the trap, but whose mark was lost, and hence were counted *in situ* as a maiden fish. To avoid having to estimate VIE tag loss rates, we ignored the VIE tags recaptures at each trap and considered them to be 'unmarked' (i.e., NOT marked with Bismarck brown dye). We then used the stratum-specific trap efficiencies to estimate the daily (t) number of 'unmarked fish' that were likely not maidens (i.e., that had been caught once before, released above the trap, and recaptured):

$$m_{VIE,t} = M_{VIE,t-1} \cdot p_h p_h \tag{5}$$

Where $M_{VIE,t-1}$ was the number of VIE-tagged fish released on the prior day (t-1).

Then $m_{VIE,t}$ had a variance of:

$$V(m_{VIE,t}) = \left(M_{VIE,t-1}\right)^2 \cdot \frac{p_h \cdot (1-p_h)}{M_{dye,h}} \tag{6}$$

Hence, the number of maiden fish on a given day (u_t) was:

$$\hat{u}_t = n_t - m_{dye,t} - m_{VIE,t} \tag{7}$$

Where n_t was the total catch for a day t, and $m_{dye,t}$ was the number of Bismarck brown dyed fish recaptured on day t. Summing over the w days in stratum h, the variance of $\widehat{U}_h$ was:

$$V(\widehat{U}_h) = V(\hat{u}_h)\left(\frac{(M_{dye,h}+1)(M_{dye,h}m'_{dye,h}+3M_{dye,h}+2)}{(m'_{dye,h}+1)^2(m'_{dye,h}+2)}\right) + \left(\frac{(M_{dye,h}+1)(M_{dye,h}-m'_{dye,h})\hat{u}_h(\hat{u}_h+m'_{dye,h}+1)}{(m'_{dye,h}+1)^2(m'_{dye,h}+2)}\right) + \sum_{t=1}^{w} V(m_{VIE,t}) \tag{8}$$

Where the righthand side of the equation has three variances summed together: 1) the variance associated with the in-filling of missing trapping days (see Topping and Anderson 2007); 2) the variance

associated with the expansion of unmarked fish based on the trapping efficiencies; and 3) the variance associated with the estimation of 'unmarked fish' that were not maidens.

2.4.3.4 Pooled Petersen Estimator with Chapman Modification

A pooled Petersen estimator with Chapman modification (Seber 1982) was used to compare to the time-stratified Bailey estimator of juvenile Chinook Salmon abundance. Using the Bismarck brown dye mark data, the pooled Petersen estimator with Chapman modification was calculated as follows:

$$N = \frac{(M+1)(C+1)}{R+1} - 1 \quad (9)$$

Where *C* is the total number of marked and unmarked fish caught in second sample, *M* is the number of fish caught, marked, and released in first sample, *R* is the number of recaptures in the second sample (i.e., fish that were marked and released in the first sample), and *N* is the population estimate.

The variance, standard error, and approximate 95% confidence interval for the population estimate (*N*) were calculated as follows:

$$Variance\ of\ N = \frac{(M+1)(C+1)(M-R)(C-R)}{(R+1)^2(R+2)} \quad (10)$$

$$SE = \sqrt{Variance of N} \quad (11)$$

$$N \pm 1.96 * SE \quad (12)$$

Where *SE* is the standard error.

2.4.4 Egg to Fry Survival of Juvenile Chinook Salmon

Egg-to-migrant survival for river produced Chinook Salmon was calculated by dividing the 2019 RST juvenile Chinook Salmon abundance estimate by the 2018 estimated egg deposition. Egg deposition was estimated using the following data: 2018 adult escapement estimate, proportion of adult females in the 2018 escapement estimate, and mean 10-year long-term fecundity. The 2018 escapement estimate was estimated to be 2,012 adults based upon the area-under-the-curve model from snorkel survey data throughout the spawning period (DFO South Coast Salmon Bulletin #12) plus broodstock removals (Rob Brouwer, DFO, personal communication). A total of 280 adults were retained for brood stock, minus 117 jacks, resulting in an escapement estimate of 1,615 adult river spawners used for the egg to fry survival estimate. The 2018 proportion of adult females was estimated at 33%, which was based upon the 2018 adult capture data (including both individuals tagged and released for subsequent re-sight plus individuals retained for the DFO Nitinat River Hatchery brood stock) from weekly seines throughout the spawning period. The mean long-term fecundity was estimated at 3,928 eggs per female measured from 2010 to 2018 at the DFO Nitinat River Hatchery (DFO, unpublished data).

3 Results

3.1 RST Operation and Environmental Conditions

The RSTs operated throughout the majority of the possible fishing hours. The small RST operated between February 22 and May 9 for a total of 1,776 of 1,848 possible fishing hours (96% of the total time; Table 3). The large RST operated between March 19 and May 6 for a total of 1,104 of 1,176 possible fishing hours (94% of the total time; Table 3). There was a delayed start in operation of the large RST due to insufficient water depth for the large RST drum to rotate freely. Over the sampling period, the small and large RSTs were suspended for a total of 3 days, each. Trapping was suspended once due to a high discharge event

from April 6 to 8 (Figure 3). The sampling period terminated on May 6 for the large trap and May 9 for the small trap due to reduced flow and insufficient water depth for the RST drums to rotate freely.

Environmental conditions were variable throughout the sampling period. Mean daily discharge for the duration of the sampling period was 7.8 m^3/s with a mean daily range of 1.8 to 50.4 m^3/s (Figure 3). The large discharge event between April 6 and April 8 peaked at 50.4 m^3/s. Mean daily temperature for the duration of the sampling period was 7.6°C with a mean daily range of 3.7 to 14.4°C (Figure 3).

3.2 Juvenile Salmonid Relative Abundance and Size Distribution

3.2.1 Chinook Salmon

Chinook Salmon fry abundance was trimodal with peak outmigration during the fourth week of February, second week of March, and fourth week of March (Figure 4). The small RST caught more fish than the larger RST (Figure 4). Some fish out-migrated before the sampling period, which was evident by the third highest peak outmigration during the first week the program in late February. The median outmigration date occurred on March 17 (Figure 4), which was similar to the 2018 median outmigration date. The outmigration was 95% complete by April 4 (Figure 4), which was similar to the 2018 95% outmigration date. Daily outmigration declined gradually after the high discharge event between April 6 to 8. Small numbers of fry (daily outmigration of < 30 individuals) were caught during the last 18 days of trapping; however, the 2017 RST data (Johnson et al. 2018) demonstrates that Chinook Salmon fry outmigration can occur at least until the end of May.

The mean fork length of Chinook Salmon fry was 42.7 mm with a range of 30.0 to 85.0 mm over the sampling period (Table 4). The mean weekly fork lengths were similar from the initiation of the program until the first week in April after the first week April the mean weekly fork length gradually increased until the termination of the program in early May (Figure 5). No Chinook Salmon parr were captured during the sampling program. Mean weekly condition was variable throughout the sampling period with no clear trends (Figure 6).

This analysis excludes hatchery reared juvenile Chinook Salmon from the DFO Nitinat River Hatchery. Approximately 304,000 juvenile Chinook Salmon were released to the Sarita River on May 10 and 28 at Blenheim Bridge after termination of the RST sampling program. Two rearing groups were stocked, the large traditional group had individual average weights of approximately 6.7 g, while the small semi-natural group had individual average weights of approximately 2.6 g[1]. Of the 304,000 juvenile Chinook Salmon stocked, a total of 204,000 fish were implanted with coded wire tags and adipose fin clipped representing both rearing groups, while the remaining 100,000 fish were adipose fin clipped only.

3.2.2 Coho Salmon

3.2.2.1 Fry

Coho Salmon fry relative abundance was unimodal with peak catch during the fourth week of March (Figure 7). The small RST caught more fish than the large RST (Figure 7). Minimal fish outmigration was assumed before the sampling period commenced as there was a 14-day period of low catch (daily catch of < 10 individuals) after initiating the program on February 22. The median catch date occurred on March 28 (Figure 7). The outmigration was 95% completed 20 days later on April 17 (Figure 7). Small numbers of fry (daily catch of < 2 individuals) were caught during the last 14 days of trapping; however, the 2017 RST

[1] See New and Brouwer 2015 (unpublished) for a description of traditional (conventional) and semi-natural (enriched) rearing strategies at Nitinat River Hatchery.

data (Johnson et al. 2018) demonstrates that Coho Salmon fry outmigration can occur at least until the end of May.

The mean fork length of Coho Salmon fry was 38.9 mm with a range of 30.0 to 61.0 mm over the sampling period (Table 5).

3.2.2.2 Parr/Smolt

Coho Salmon parr/smolt relative abundance was sporadic throughout the sampling period. Peak catch was variable depending upon trap type. For the small RST peak catch was observed during the first week of May (Figure 8). For the large RST peak catch was observed during the fourth week of May (Figure 8). The small RST caught more fish than the larger RST (Figure 8). Minimal fish outmigration was assumed to have occured before the sampling period commenced as there was only three individuals caught between February 22 and March 22. The median catch date occurred on May 1 (Figure 8). The outmigration was 95% complete only four days later on May 4 (Figure 8). No fish were caught during the last four days of trapping; however, the 2017 RST data (Johnson et al. 2018) demonstrated that Coho Salmon parr/smolt outmigration can occur at least until the end of May.

The mean fork length of Coho Salmon parr/smolt was 103.7 mm with a range of 72.0 to 140.0 mm over the sampling period (Table 5).

3.2.3 Chum Salmon

Chum Salmon fry relative abundance was unimodal with peak catches observed during the fourth week of March and first week of April (Figure 9). The small RST caught more fish than the large RST (Figure 9). Some fish migrated before the sampling period, which was evident by the catch of fish on the first day of trapping. The median catch date occurred on March 25 (Figure 9). The outmigration was 95% complete by April 5 (Figure 9). Daily catch declined quickly after the second week in April. Minimal fry (daily catch of < 2 individuals) were caught during the last 14 days of trapping; however, the 2017 RST data (Johnson et al. 2018) demonstrates that minimal outmigration can occur at least until mid-May.

3.2.4 Other Species

Several other salmonid and non-salmonid species were caught during the sampling period. Rainbow Trout fry and parr were caught; however, their relative abundance was too low to reliably characterize outmigration timing and duration. Other species caught included Prickly Sculpin (*Cottus asper*), Coastrange Sculpin (*Cottus aleuticus*), Staghorn Sculpin (*Leptocottus armatus*), Starry Flounder (*Platichthys stellatus*), Threespine Stickleback (*Gasterosteus aculeatus*), and Eulachon (*Thaleichthys pacificus*). Eulachon are a new species record for the Sarita River and have a federal conservation status of an Endangered or Threatened species depending upon population discreteness and evolutionary significance (DFO 2019). Genetic tissue samples were submitted to the DFO Molecular Genetics Laboratory to run a population assignment analysis. The results showed that the Sarita River individuals could not be assigned to any of the Eulachon populations in the DFO baseline with a greater than 50% probability. If Eulachon are captured in future studies, their genetic samples should be retained and shipped to the DFO Molecular Genetics Laboratory to be added to the DFO baseline genetic dataset.

3.3 Juvenile Chinook Salmon Abundance Estimate

3.3.1 Mark Type and Marker Tests

G-tests revealed highly significant differences in recapture rates of VIE tags between the two taggers (Tagger 1: 3.4%; Tagger 2: 7.0%; G = 16.1, $P < 0.0001$) and between the types of tags (VIE tags: 5.4%;

Bismarck brown dye: 8.3%; G = 118.9, $P < 0.0001$). Given these results it was assumed that there were inconsistencies within the VIE mark application and retention. Thus, for our analyses, only the Bismarck brown dye marks were considered when assessing trap efficiencies.

3.3.2 Efficiency Strata Tests

Efficiency trials showed that the best fit between the Bismarck brown dye marks release and recapture distributions was observed when the recapture date was lagged by one day (Appendix E; corr = 0.82).

Because efficiency trial periods with fewer than five total recaptures were pooled into adjacent weeks, data from weeks 6 through 11 were combined into a single stratum. G-tests subsequently showed that weeks 2 and 3 should not be considered as separate strata (Table 6).

3.3.3 Abundance Estimates

The estimated 2019 juvenile Chinook Salmon abundance was 140,138 (95% CL: 128,469 - 151,807) using the time-stratified Bailey estimator. Abundance estimates of stratum-specific abundance are shown in Table 7. The 2019 pooled Petersen abundance estimator, with Chapman modification, was slightly greater at 146,553 (95% CL: 136,306 – 156,800) juvenile Chinook Salmon (Table 8).

3.4 Chinook Salmon Egg to Fry Survival Estimate

The egg to fry survival for the 2018 brood year was estimated to be 6.69%. This calculation was based on the estimated number of juvenile Chinook Salmon passing the RST (N = 140,138) and the 533 adult females (using 2018 escapement data and reported sex ratios), and an estimated potential egg deposition above the RSTs of 2,093,624 eggs (using 10-year average of 3,928 eggs/female).

4 Discussion and Recommendations

The following sections discuss four central themes related to the outmigration assessment results. Recommendations are suggested within each theme for future assessments.

4.1 Rotary Screw Trap Operations and Timing

Juvenile Chinook Salmon migrated before the sampling period commenced, which was evident by the high catch of fish on the first day of trapping. The earlier onset of outmigration, compared to 2018, could be explained by either 1) the high discharge event in mid February prior to RST installation, which initiated outmigration, or 2) earlier onset of fry development due to increased accumulated thermal units (ATUs) in 2018/2019 compared to 2017/2018. While initiation of the program was planned for February 15, as per the 2018 recommendation, a high discharge event prevent safe and effective RST installation during this time. Commencement of sampling prior to February 15 is recommended for future years to assist in capturing earlier outmigrant fish and to accurately estimate abundance.

In general, juvenile salmonid abundance was greater in the small trap than the larger trap. The larger trap was placed in the thalweg over the program period to allow the increased current velocity to rotate the drum; however, the low discharge over the course of the program resulted in inadequate water velocity for the large RST drum to rotate at sufficient RPMs during certain periods. Furthermore, the large RST was in operation for 28 days less than the small RST due to insufficient water depth for the RST drum to rotate freely.

The sampling period terminated on May 9 due to reduced flow and insufficient water depth for the RST drums to rotate freely. Minimal juvenile Chinook Salmon fry were caught during the last 18 days of trapping; however, the 2017 RST data (Johnson et al. 2018) demonstrated that some outmigration occurs

at least until the end of May. Ocean-type juvenile Chinook Salmon outmigration in other Vancouver Island rivers is known to occur until early June with a small mode of larger juvenile Chinook Salmon during late May (Groot and Margolis 1991). However, we did not operate the RSTs for a longer sampling period to confirm if larger Chinook Salmon fry out-migrate later in May and June.

Given the sinuous channel morphology and unconfined banks in the lower Sarita River suitable sites for RST operation are limited; however, the current location is the most appropriate site. Continuous erosion of the river-right bank adjacent to the RST site has impacted pool depth and may impact the efficiency of the site during future RST sampling. While seasonal discharge and pool depth will dictate if there is sufficient water depth for the RST drums to rotate freely at this site, continuation of sampling after May 9 would assist in capturing later outmigrant fish to accurately estimate abundance. If RSTs are operated longer in the future, operations have to be suspended for two days following each Chinook smolt hatchery release to avoid overcrowding mortalities in the live well.

Recommendation 1: Commence sampling on February 7 of each assessment year.

Recommendation 2: Terminate sampling on May 31 of each assessment year, if water depth is sufficient for RST operation.

4.2 Juvenile Salmonid Size Distribution

The temporal distribution of Chinook Salmon body size shows that fry emergence occurred throughout the sampling period up to the week of April 3 as indicated by similar weekly mean fork lengths. After the week of April 3 in-river juvenile growth increased as indicated by increasing weekly mean fork lengths. No Chinook Salmon parr (rearing in river for over one year) were captured during the sampling period.

Recommendation 3: Continue to measure juvenile Chinook Salmon, Coho Salmon, and trout species fork lengths as per the 2019 methods.

4.3 Juvenile Chinook Salmon Abundance Estimate Assumption Testing

A time-stratified mark-recapture approach was used to estimate juvenile abundance in this assessment. There are six basic assumptions that must be met to ensure that mark-recapture data provide an unbiased estimate (Seber 1982; Volkhardt et al. 2007). The six assumptions are (1) the population is closed, (2) all fish have an equal probability of capture in the first sample, (3) marking does not affect catchability, (4) all fish (marked and unmarked) have an equal probability of being caught in the second sample, (5) fish do not lose their marks, and (6) all recovered marks are reported. The field methods used to estimate abundance were designed to minimize any violations of these assumptions, and violation of several assumptions were directly tested. Each of these assumptions are discussed in the following paragraphs.

Assumption one (the population is closed) is technically violated during outmigrant abundance studies because fish are actively leaving the river to the estuary. However, it was assumed that the loss of marked and unmarked fish was equal, and the violation of this assumption was therefore kept to a minimum (Arnason et al. 1996).

Assumptions two and four (all marked and unmarked fish have an equal probability of capture) are most likely violated in outmigrant abundance studies when capture probabilities change over time due to changing river discharge conditions. To account for variable RST efficiencies over time and to mitigate any associated bias, RST efficiency trials were conducted weekly and changes in trap efficiency, or capture probabilities, are tested and accounted for by time-stratifying (e.g., weekly) the data (Volkhardt et al. 2007). For future assessments, juvenile Chinook Salmon abundance should continue to be estimated using a stratified mark-recapture approach and single partial-capture trap design (Volkhardt et al. 2007) by estimating (1) missed catch, (2) efficiency strata, (3) time-stratified abundance, (4) extrapolated

outmigration outside the trapping season, and (5) total abundance (Topping and Anderson 2017). To balance the need to recapture enough numbers of fish to estimate abundance while also stratifying weekly efficiency trails, a one-mark approach is proposed. During the first 4 days of the week mark all fish with Bismarck Brown dye for the weekly efficiency trails. This allows for sufficient time (i.e., three days), based upon the 2019 lag-time analysis results, for the marked fish to migrate past the RSTs for subsequent recapture in the same week.

Violations of assumption two and four due to size-biased capture effects were not tested, since changes in probability of capture for different fish sizes was assumed to be negligible because all fish had similar fork lengths throughout the assessment period.

Violations of assumption four due to release site effects (i.e., distance between release site and RSTs) were not specifically tested because only one released site was utilized in 2018 and 2019. Proper selection of a release site for RST efficiency trials is critical to obtain an unbiased estimate of outmigrant abundance. Among the many considerations associated with release sites are mixing of marked and unmarked fish between release and recapture, potential for mark loss, and potential for mortality of marked fish (Lamperth et al. 2014). Mixing of marked and unmarked fish is likely to be improved by maximizing the distance between the release site and the trap site. However, longer outmigration distances for marked fish also increase the likelihood of predation, mark loss and fish mortality, especially when the marked fish are fry-sized migrants. Mark-released fish may also select and occupy habitat between the release site and trap for an extended period and not pass the trap for a second time before the dye mark fades.

Definitive conclusions about the most appropriate release site is difficult to measure. Volkhardt et al. 2007 recommends at least two riffle/pool sequences between the RST and the release site. In 2019, a potential release site was investigated 500 m upstream (UTM: 10U 354708 5417245) instead of 1,000 m upstream at the current release location, as per the 2018 recommendation. The potential release location was determined not to be suitable due to bank stability concerns and site accessibility; therefore, the current release location should be used for future years.

Violation of assumption three and five (marking does not affect catchability and fish do not lose their marks) were tested between Chinook Salmon fry marked with Bismarck brown dye or VIE tags. The VIE tag method proved to be difficult in marking fry sized fish by 1) observations of immediate tag loss in the post-tagging recovery bins, 2) subsequent RST recapture of fish with observations of tag scars but no VIE tag present, and 3) statistical analysis revealed highly significant differences in recapture rates of VIE tags between taggers and between the tag type. As a result, the VIE tag data was removed from the analysis and only the Bismarck Brown dye was used for the time-stratified mark-recapture abundance estimate.

Bismarck brown dye tag loss was tested using ten Chinook Salmon fry. Using the marking protocol in the methods section, all ten fish maintained an easily recognizable mark after five days and retained the mark for at least seven days. There were no mortalities after the 7-day period, after which time they were released. The results suggest the mark was retained for at least seven days. Results from the 2019 lag-time analysis results suggest fish move passed the trap within 3 days after release. Therefore, it is likely that assumption five was realized.

Assumption six (all recovered marks are reported) was not directly tested; however, all fish were thoroughly examined during sampling and the marks used (Bismarck brown dye, VIE tags) are easily detectable. Therefore, it was assumed that violations of assumption six were negligible.

> *Recommendation 4: Continue to estimate juvenile Chinook Salmon abundance using a stratified mark recapture approach and single partial-capture trap design by estimating (1) missed catch, (2) efficiency strata, (3) time-stratified abundance, (4) extrapolated outmigration outside the trapping season, and (5) total abundance.*

Recommendation 5: Conduct a one-mark approach for juvenile Chinook Salmon using a Bismarck brown dye. During the first 4 days of the week mark all fish with Bismarck brown dye for the weekly efficiency trails.

Recommendation 6: Continue to use the existing Hunter Creek pool release site.

4.4 Juvenile Chinook Salmon Survival Estimates

Chinook Salmon egg to fry survival for the 2018 brood year was estimated to be 6.69%, which is greater than 2017 brood egg to fry estimate of 1.98%. During 2017, most of the spawning was restricted to the lower Sarita River downstream of Blenheim Bridge due to low discharge and restricted upstream passage during the spawning period (Burns et al. 2018). In contrast, spawning was distributed throughout the Sarita River (upstream and downstream of Blenheim Bridge) in 2018 as evidenced by greater discharge and unrestricted upstream passage during the spawning period. Downstream of Blenheim Bridge, the South Sarita River contributes significant bedload to the Sarita River and has a flashy peak discharge during rain events, compared to upstream of Blenheim Bridge where Sarita Lake moderates discharge during rain events. Juvenile production and survival can be lower in years when incubating embryos experienced high magnitude peak flows, most likely due to redd scour (Anderson and Topping 2018), which supports the hypothesis that juvenile Chinook Salmon egg to fry survival is greater in reaches upstream of Blenheim Bridge when spawning is distributed throughout all reaches. Long-term Chinook Salmon egg to fry survival time series data are required to further support this working hypothesis and direct restoration and enhancement efforts.

Recommendation 7: Continue to estimate Chinook Salmon egg to fry survival.

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TABLES

Table 1. Fish species present in the Sarita Watershed.

Fish Species*
Chinook Salmon
Chum Salmon
Coastrange Sculpin
Coho Salmon
Coastal Cutthroat Trout
Dolly Varden
Eulachon
Kokanee
Lamprey (*Lampetra sp*.)
Pink Salmon
Prickly Sculpin
Rainbow Trout / Steelhead
Sockeye Salmon
Staghorn Sculpin
Starry Flounder
Threespine Stickleback

*Source: MOE 2018

Table 2. Life history stage classification and fork length criteria.

Fish Species	Life Stage	Forth Length Criteria*
Chinook Salmon	Fry	≤ 100 mm
	Parr	> 100 mm
Chum Salmon	Fry	NA
Coho Salmon	Fry	≤ 70 mm
	Parr/Smolt	> 70 mm
Coastal Cutthroat Trout	Fry	≤ 90 mm
	Parr/Smolt	> 90 and ≤ 300 mm
	Adult	> 300 mm
Pink Salmon	Fry	NA
Rainbow Trout / Steelhead	Fry	≤ 90 mm
	Parr/Smolt	> 90 and ≤ 300 mm
	Adult	> 300 mm
Sockeye Salmon	Fry	NA

NA = not applicable

*Subject to change with additional watershed specific data

Table 3. Summary of rotary screw trap operations.

Trap Type	Start Date	End Date	Total Time Fished (h)	Total Possible Time Fished (h)	Percent Fished (%)	Number of Fished (days)	Number of Outages (days)
Large	19-Mar-19	6-May-19	1,104	1,176	94	46	3
Small	22-Feb-19	9-May-19	1,776	1,848	96	74	3

Table 4. Chinook Salmon fork length, weight, and condition summary statistics.

	Statistic					
Parameter	n	Mean	95% Lower CI	95% Upper CI	Min	Max
Fork Length (mm)	294	42.7	42.0	43.4	30.0	85.0
Weight (g)	292	0.65	0.59	0.72	0.2	6.1
Condition (K)	293	0.76	0.74	0.78	0.47	1.18

Table 5. Fork length summary statistics for Coho Salmon and Rainbow Trout.

		Fork Length (mm)					
Species	Life History Stage	n	Mean	95% Lower CI	95% Upper CI	Min	Max
Coho Salmon	Fry	272	38.9	38.5	39.2	30	61
	Parr/Smolt	245	103.7	101.8	105.5	72	140
Rainbow Trout	Fry	48	67.6	64.1	71.0	40	90
	Parr/Smolt	36	147.5	136.5	158.5	94	240

Table 6. G-Test results comparing weekly stratum rotary screw trap efficiency trials.

Week	$M_{dye,h}$	$m'_{dye,h}$	p	G-Test	*P*
1	814	115	0.141		
				1 vs 2	< 0.0001
2	561	43	0.077		
				2 vs 3	0.52
3	1,132	81	0.072		
				-	-
2-3	1,693	124	0.073		
				2-3 vs 4	0.023
4	1,144	65	0.057		
				4 vs 5	< 0.0001
5	3,246	247	0.076		
				5 vs 6-11	0.0013
6-11	1,266	128	0.101		

Table 7. Estimates of stratum-specific and total Chinook Salmon abundance.

Week	$\hat{u}_h$	$M_{dye,h}$	$m'_{dye,h}$	$\hat{U}_h$	Var($\hat{U}_h$)	se($\hat{U}_h$)	95% Lower CI	95% Upper CI
1	1,171	814	115	8,227	545,625	739	6,780	9,675
2-3	2,333	1,693	124	31,617	7,742,422	2,783	26,163	37,071
4	1,504	1,144	65	26,092	9,996,087	3,162	19,895	32,289
5	3,942	3,246	247	51,612	10,502,456	3,241	45,260	57,963
6-11	2,300	1,266	128	22,590	6,657,945	2,580	17,533	27,647
Total	11,250	8,163	679	**140,138**	35,444,534	5,954	**128,469**	**151,807**

Table 8. Chinook Salmon annual abundance estimates.

	Abundance Estimate Method	
Year	**Pooled Petersen**	**Time-Stratified Bailey**
2018	77,174 (65,408 - 88,940)	NA
2019	146,553 (136,306 - 156,800)	140,138 (128,469 - 151,807)

NA = Not Applicable

Table 9. Chinook Salmon annual brood year egg to fry survival estimates.

Brood Year	Egg to Fry Survival (%)
2017	1.98
2018	6.69

FIGURES

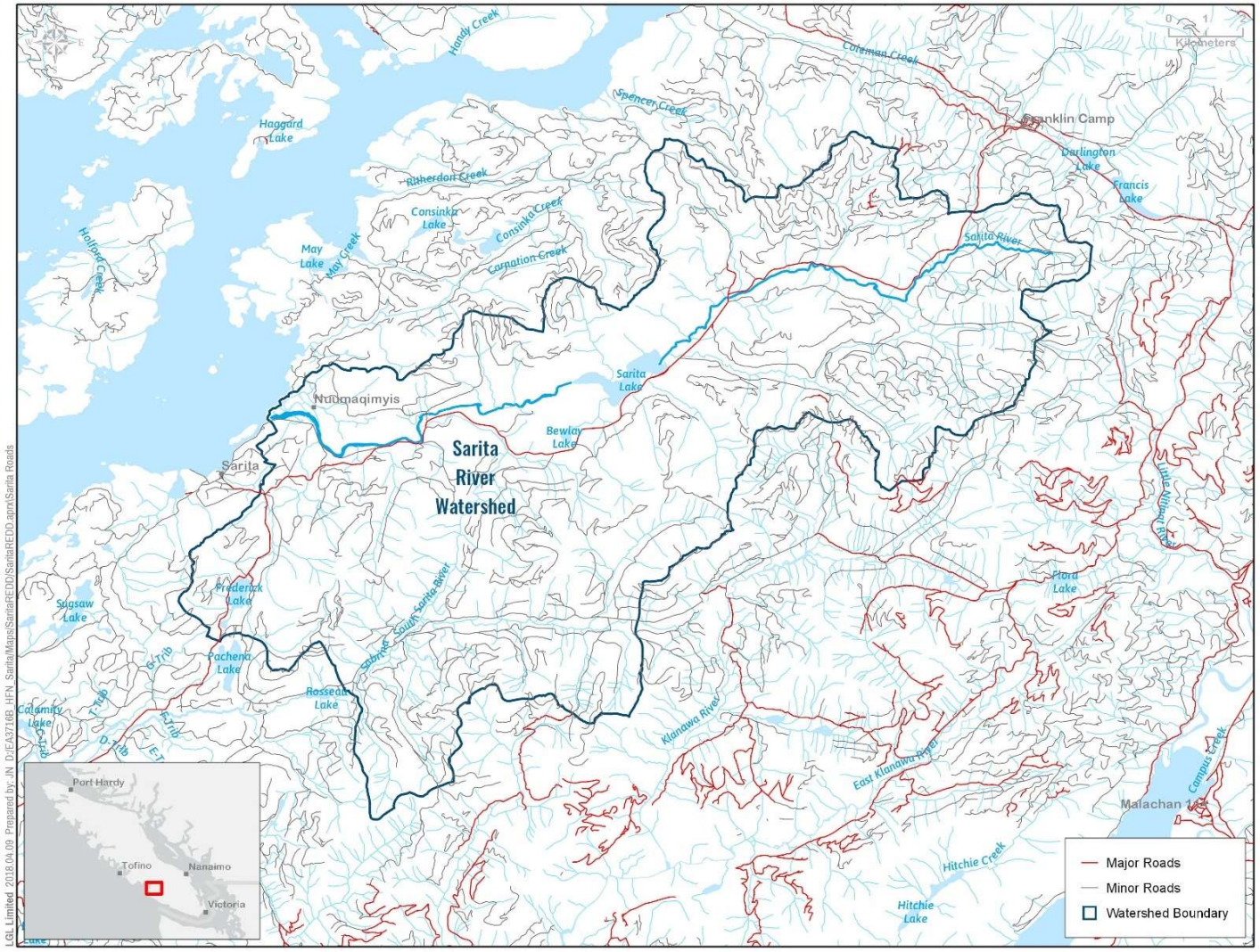


Figure 1. Location of the Sarita Watershed.

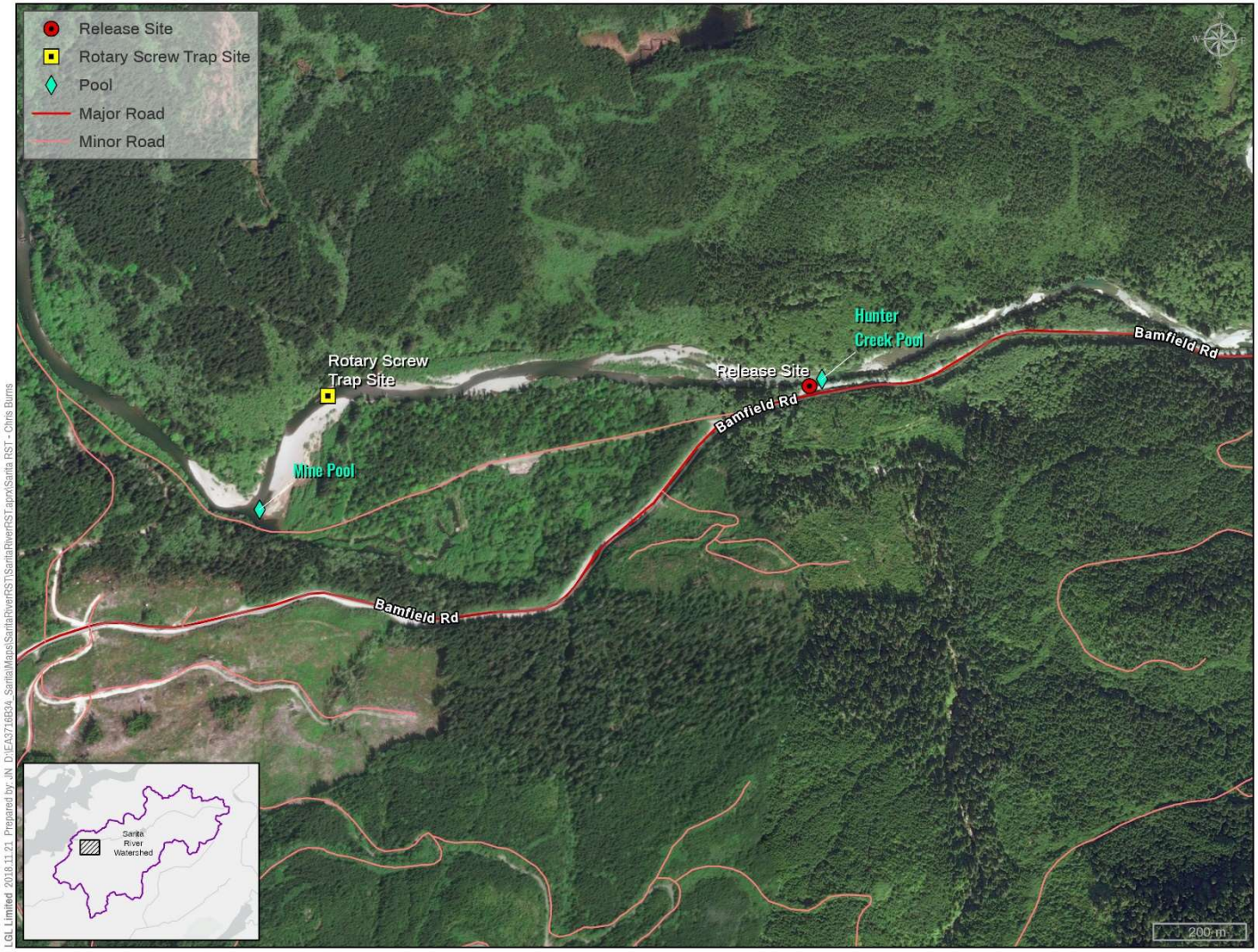


Figure 2. Location of the rotary screw traps and release location.

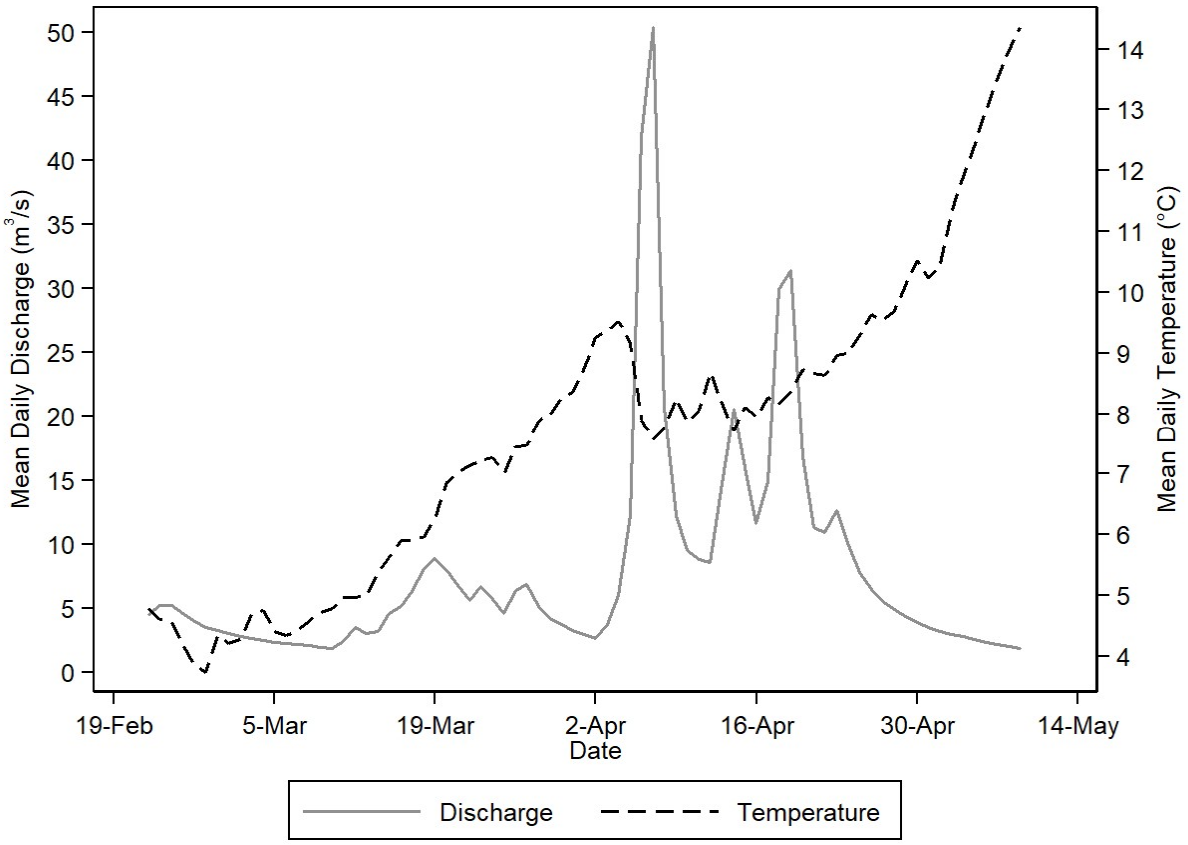
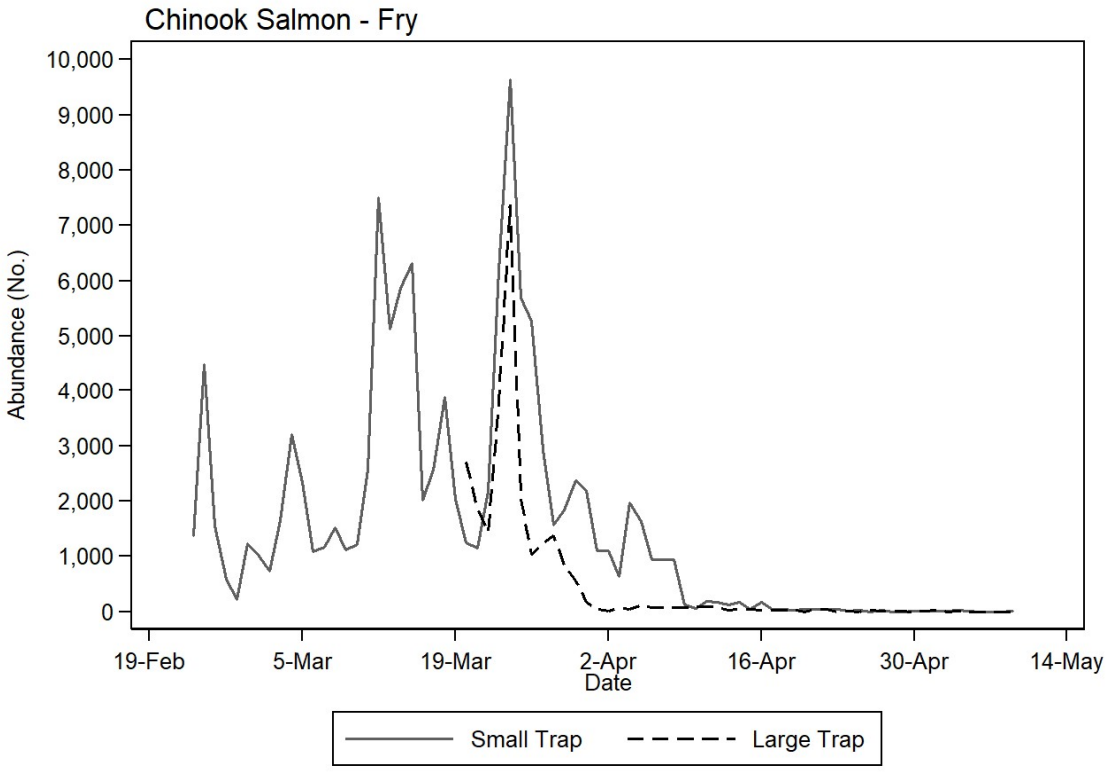


Figure 3. Mean daily discharge and water temperature during the sampling period.



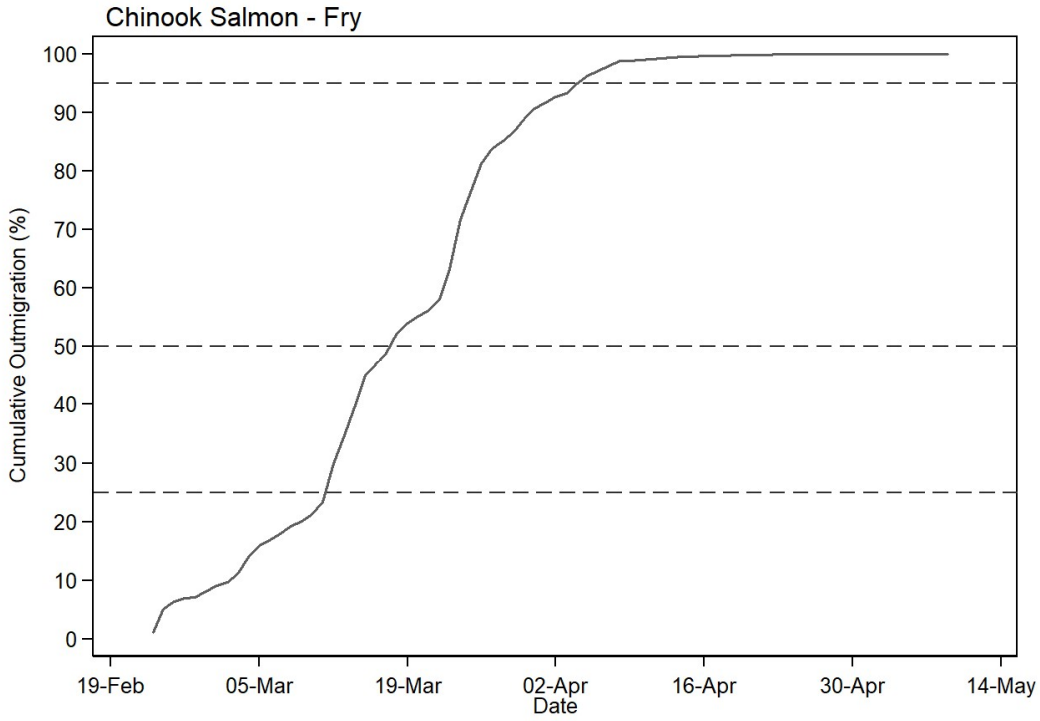


Figure 4. Abundance and cumulative migration of Chinook Salmon fry during the sampling period.

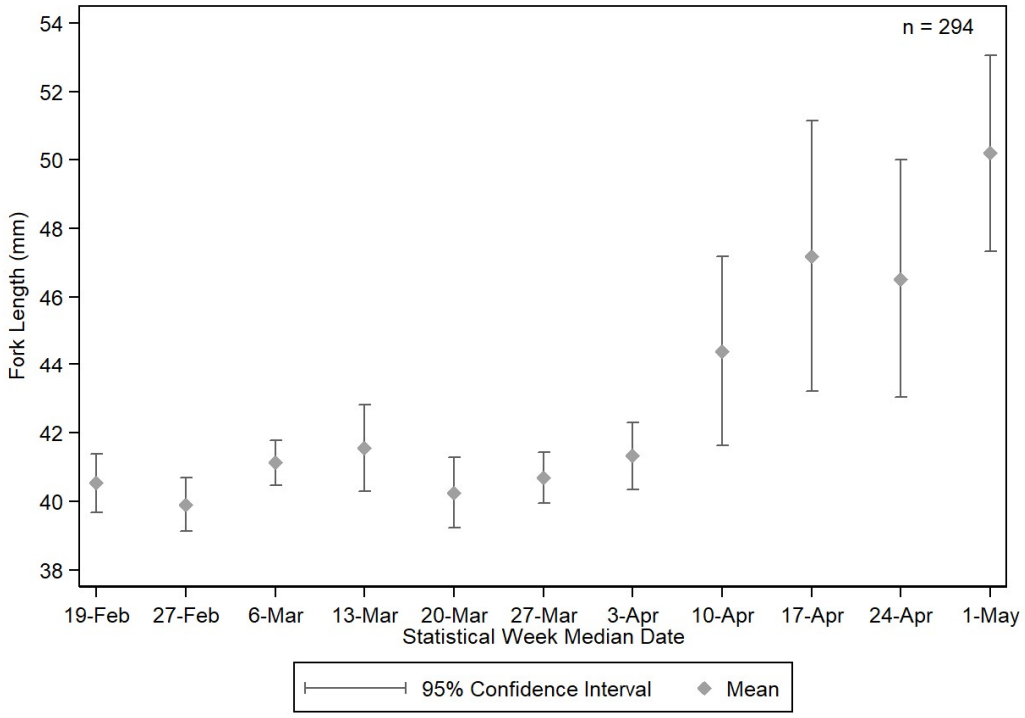


Figure 5. Mean fork length of Chinook Salmon fry by statistical week during the sampling period.

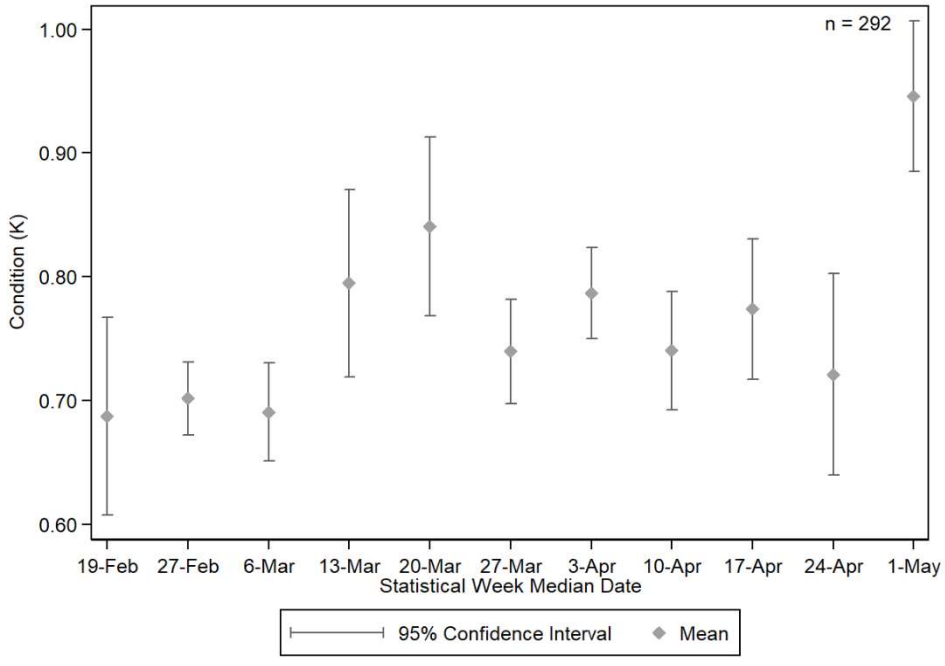


Figure 6. Mean condition of Chinook Salmon fry by statistical week during the sampling period.

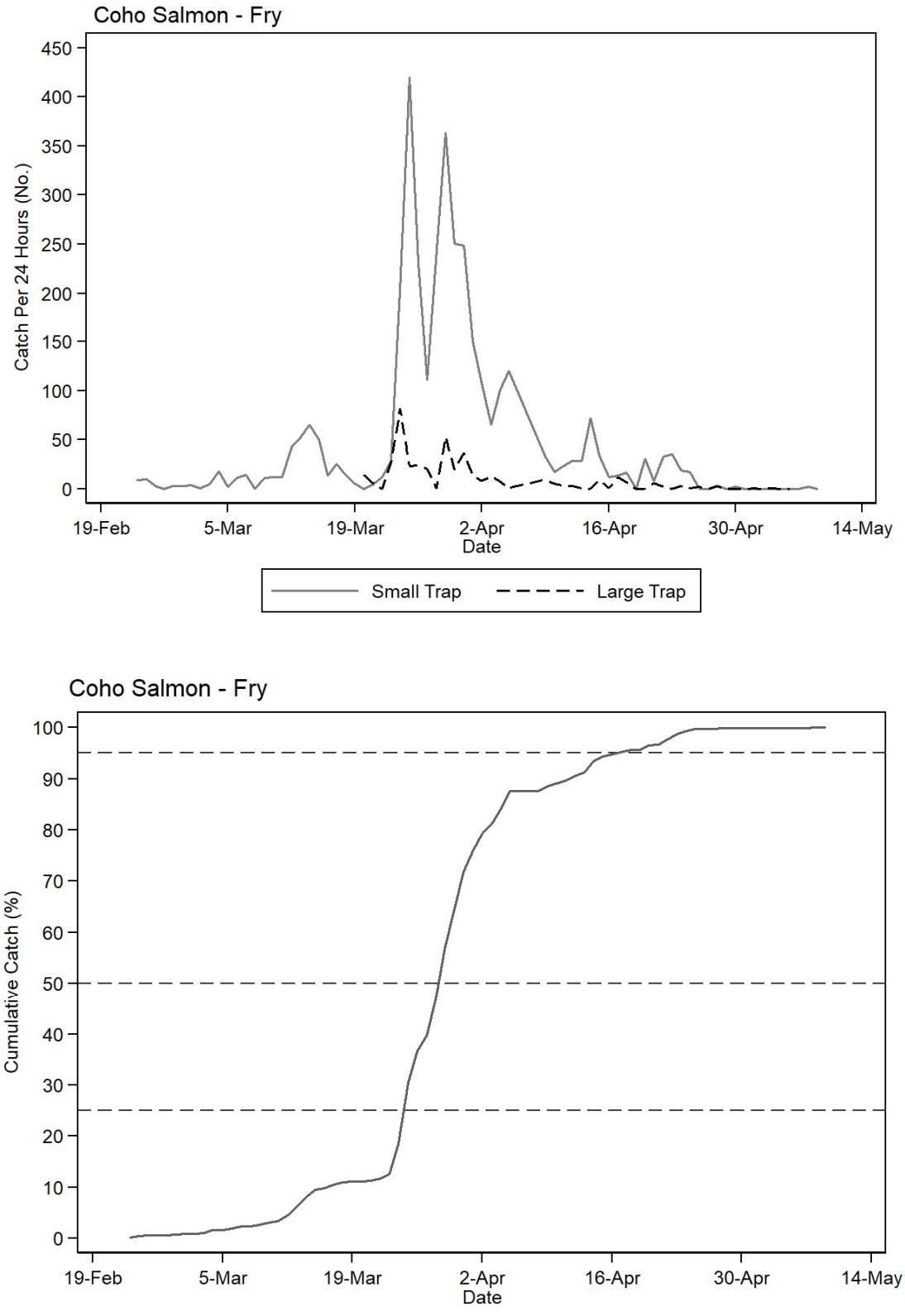


Figure 7. Relative abundance and cumulative catch of Coho Salmon fry during the sampling period.

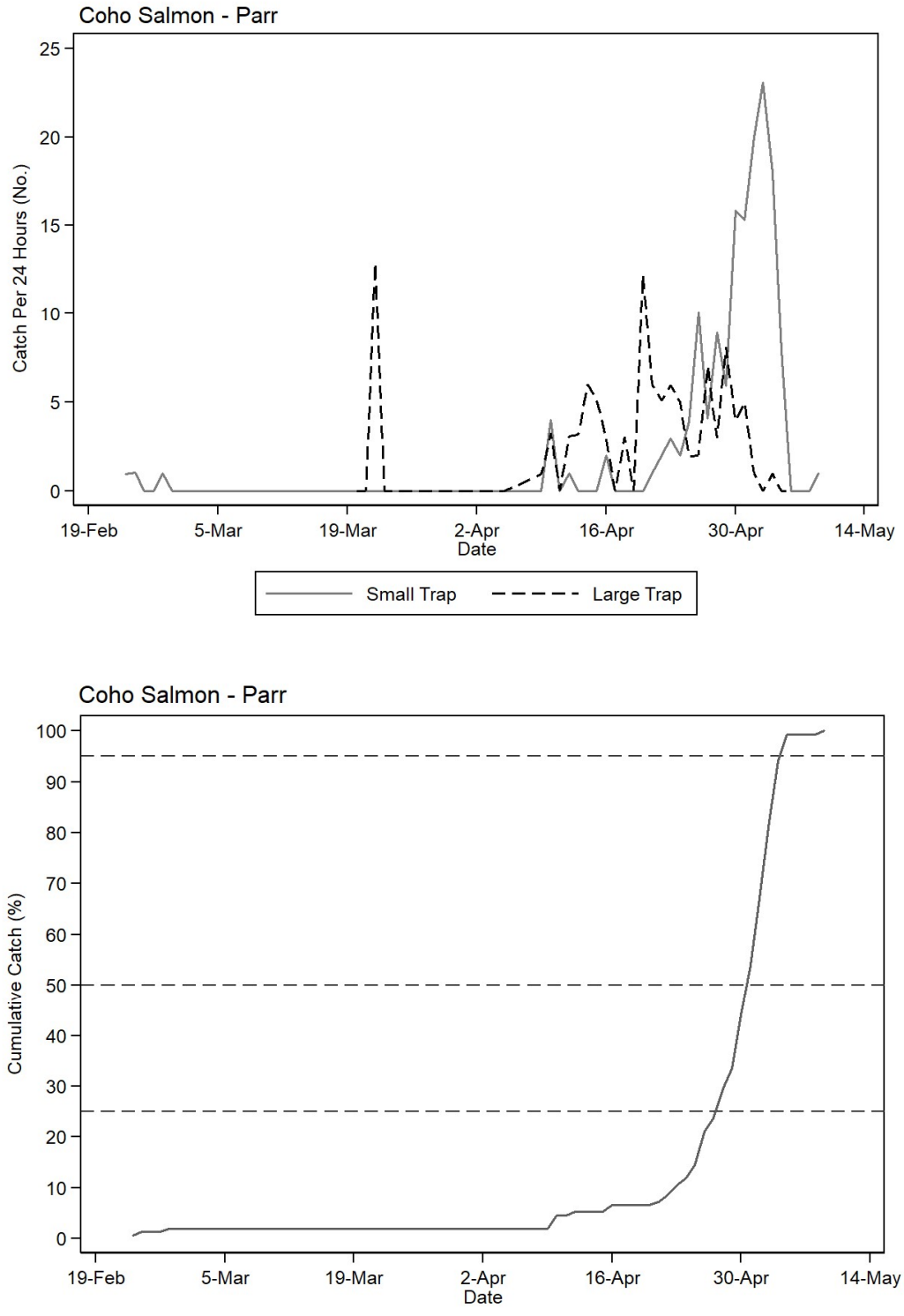


Figure 8. Relative abundance and cumulative catch of Coho Salmon parr during the sampling period.

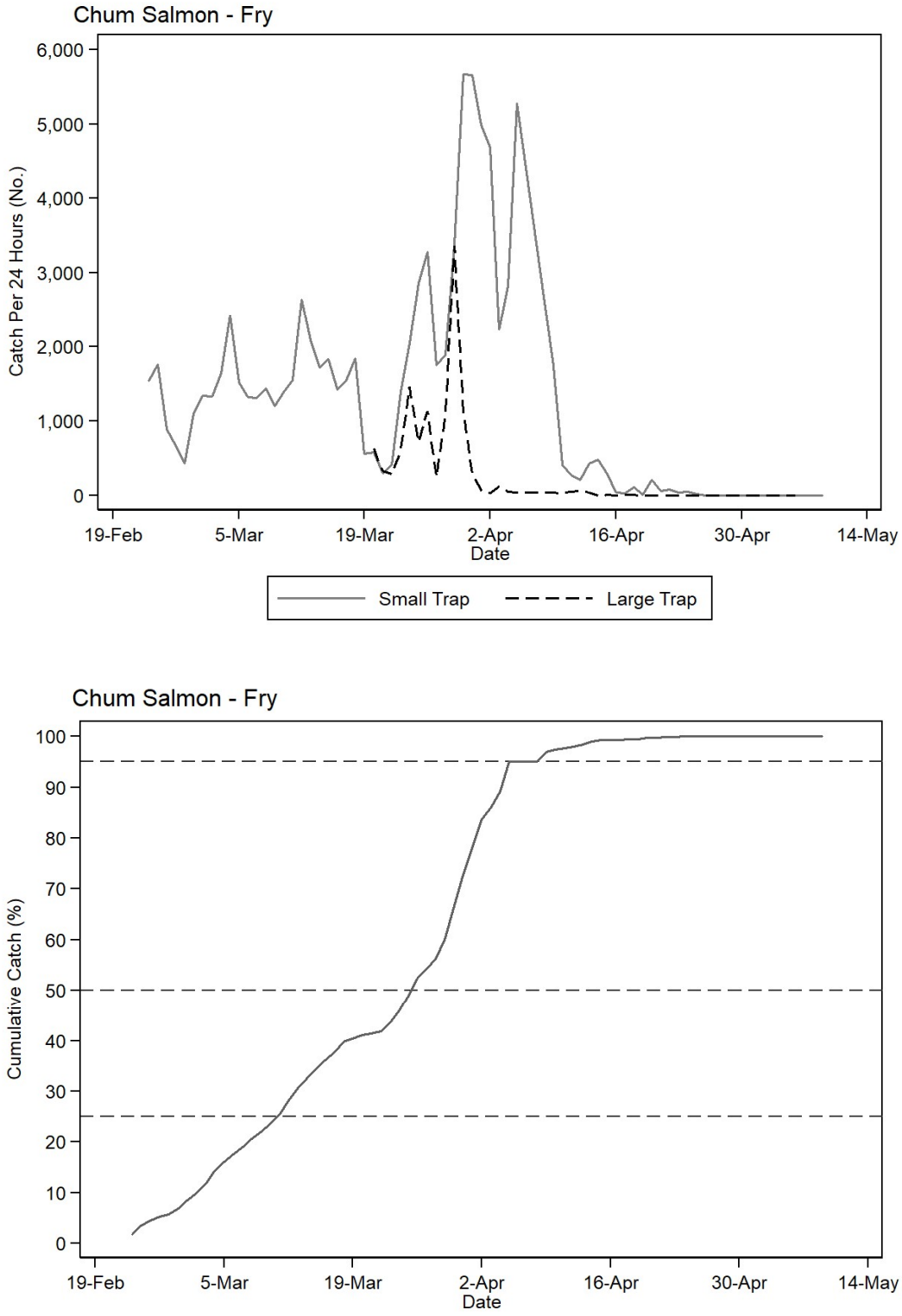


Figure 9. Relative abundance and cumulative catch of Chum Salmon fry during the sampling period.

PHOTOS



Photo 1. Rotary screw traps fishing in tandem.

Photo 2. Rotary screw traps secured to guy line spanning the river.



Photo 3. Large rotary screw trap outfitted with a 12-V motor to rotate the drum.

APPENDICES

APPENDIX A

DAILY ROTARY SCREW TRAP OPERATION AND EFFORT DATA

Appendix A.1. Daily small rotary screw trap operation and effort data, 2019.

Capture Date	Capture Time (24 h)	Fished In (h)	Fished Out (h)	Trap RPM	Weather Conditions	Water Clarity	Water Temperature
February 22, 2019	11:30:00	-	-	6.0	Sunny	Clear	5.0
February 23, 2019	12:10:00	24.7	-	7.0	Rain	Clear	5.0
February 24, 2019	10:50:00	22.7	-	7.0	Sunny	Clear	4.0
February 25, 2019	09:20:00	22.5	-	7.0	Sunny	Clear	4.0
February 26, 2019	09:20:00	24.0	-	6.0	Sunny	Clear	3.0
February 27, 2019	09:30:00	24.2	-	3.0	Overcast	Clear	0.0
February 28, 2019	09:25:00	23.9	-	4.0	Sunny	Clear	3.0
March 1, 2019	09:20:00	23.9	-	6.0	Sunny	Clear	3.0
March 2, 2019	09:25:00	24.1	-	5.0	Sunny	Clear	2.0
March 3, 2019	09:15:00	23.8	-	5.0	Overcast	Clear	3.0
March 4, 2019	09:15:00	24.0	-	5.0	Sunny	Clear	2.0
March 5, 2019	09:58:00	24.7	-	4.0	Sunny	Clear	2.0
March 6, 2019	09:30:00	23.5	-	5.0	Partial Clouds	Clear	2.0
March 7, 2019	09:25:00	23.9	-	3.0	Partial Clouds	Clear	2.5
March 8, 2019	09:25:00	24.0	-	2.5	Sunny	Clear	2.0
March 9, 2019	09:30:00	24.1	-	1.5	Sunny	Clear	2.0
March 10, 2019	10:05:00	24.6	-	1.5	Sunny	Clear	3.2
March 11, 2019	09:20:00	23.3	-	1.5	Rain	Clear	3.5
March 12, 2019	09:35:00	24.3	-	4.0	Sunny	Clear	3.0
March 13, 2019	09:25:00	23.8	-	3.0	Sunny	Clear	3.0
March 14, 2019	09:40:00	24.3	-	3.0	Rain	Clear	4.0
March 15, 2019	09:30:00	23.8	-	5.0	Partial Clouds	Clear	4.0
March 16, 2019	10:00:00	24.5	-	5.0	Sunny	Clear	4.0
March 17, 2019	09:45:00	23.8	-	6.0	Sunny	Clear	4.0
March 18, 2019	09:25:00	23.7	-	6.5	Sunny	Clear	4.0
March 19, 2019	09:25:00	24.0	-	5.5	Sunny	Clear	4.5
March 20, 2019	09:35:00	24.2	-	7.0	Sunny	Clear	5.0
March 21, 2019	10:25:00	24.8	-	6.0	Overcast	Clear	5.3
March 21, 2019	10:25:00	24.0	-	6.0	Overcast	Clear	5.3

Capture Date	Capture Time (24 h)	Fished In (h)	Fished Out (h)	Trap RPM	Weather Conditions	Water Clarity	Water Temperature
March 22, 2019	09:50:00	23.4	-	6.0	Sunny	Clear	6.0
March 23, 2019	11:00:00	25.2	-	8.0	Overcast	Clear	6.0
March 24, 2019	11:40:00	24.7	-	8.0	Sunny	Clear	5.5
March 25, 2019	11:00:00	23.3	-	6.0	Overcast	Clear	5.5
March 26, 2019	09:20:00	22.3	-	7.0	Partial Clouds	Clear	6.0
March 27, 2019	09:20:00	24.0	-	7.0	Sunny	Clear	5.0
March 28, 2019	09:20:00	24.0	-	7.5	Partial Clouds	Clear	6.0
March 29, 2019	08:00:00	22.7	-	6.0	Sunny	Clear	6.0
March 30, 2019	09:45:00	25.8	-	3.5	Sunny	Clear	6.5
March 31, 2019	09:30:00	23.8	-	3.0	Sunny	Clear	6.0
April 1, 2019	09:20:00	23.8	-	2.0	Sunny	Clear	6.7
April 2, 2019	09:30:00	24.2	-	2.3	Sunny	Clear	7.0
April 3, 2019	09:30:00	24.0	-	2.0	Rain	Clear	8.5
April 4, 2019	09:45:00	24.3	-	5.0	Sunny	Clear	8.0
April 5, 2019	09:30:00	23.8	-	7.0	Rain	Clear	8.5
April 6, 2019	09:30:00	-	24.0	0.1	Rain	Clear	0.0
April 7, 2019	09:30:00	-	24.0	0.1	Rain	Clear	0.0
April 8, 2019	10:00:00	-	24.5	0.1	Overcast	Clear	7.0
April 9, 2019	09:20:00	23.3	-	6.0	Sunny	Clear	7.0
April 10, 2019	09:15:00	23.9	-	7.5	Rain	Clear	7.0
April 11, 2019	10:15:00	25.0	-	6.0	Overcast	Clear	7.0
April 12, 2019	09:50:00	23.6	-	6.0	Sunny	Clear	7.0
April 13, 2019	09:30:00	23.7	-	7.5	Rain	Clear	7.5
April 14, 2019	09:50:00	24.3	-	8.5	Overcast	Clear	6.8
April 15, 2019	09:20:00	23.5	-	8.5	Partial Clouds	Clear	6.9
April 16, 2019	09:15:00	23.9	-	7.5	Overcast	Clear	6.9
April 17, 2019	09:50:00	24.6	-	8.5	Rain	Clear	7.6
April 18, 2019	09:20:00	23.5	-	8.9	Rain	Clear	7.6
April 19, 2019	09:50:00	24.5	-	8.0	Overcast	Clear	8.0
March 22, 2019	09:50:00	23.4	-	6.0	Sunny	Clear	6.0

Capture Date	Capture Time (24 h)	Fished In (h)	Fished Out (h)	Trap RPM	Weather Conditions	Water Clarity	Water Temperature
April 20, 2019	09:27:00	23.6	-	8.5	Sunny	Clear	7.0
April 21, 2019	09:20:00	23.9	-	8.5	Overcast	Clear	7.5
April 22, 2019	09:25:00	24.1	-	7.5	Rain	Clear	7.8
April 23, 2019	09:40:00	24.3	-	7.5	Overcast	Clear	8.2
April 24, 2019	09:30:00	23.8	-	7.5	Sunny	Clear	7.5
April 25, 2019	10:00:00	24.5	-	6.0	Sunny	Clear	8.5
April 26, 2019	09:50:00	23.8	-	6.0	Sunny	Clear	8.5
April 27, 2019	09:15:00	23.4	-	7.5	Sunny	Clear	8.0
April 28, 2019	09:25:00	24.2	-	7.5	Sunny	Clear	8.0
April 29, 2019	09:40:00	24.3	-	7.7	Sunny	Clear	8.0
April 30, 2019	09:55:00	24.3	-	7.5	Sunny	Clear	9.0
May 1, 2019	09:25:00	23.5	-	5.5	Overcast	Clear	9.0
May 2, 2019	09:25:00	24.0	-	4.5	Overcast	Clear	10.0
May 3, 2019	09:20:00	23.9	-	5.0	Sunny	Clear	10.0
May 4, 2019	09:20:00	24.0	-	5.0	Sunny	Clear	11.0
May 5, 2019	09:35:00	24.3	-	3.5	Sunny	Clear	11.0
May 6, 2019	09:40:00	24.1	-	3.5	Sunny	Clear	11.5
May 7, 2019	09:25:00	23.8	-	3.8	Sunny	Clear	12.0
May 8, 2019	09:20:00	23.9	-	3.3	Sunny	Clear	12.8
May 9, 2019	09:35:00	24.3	-	2.5	Sunny	Clear	13.0

Note: Dashes indicate no data

Appendix A.2. Daily large rotary screw trap operation and effort data, 2019.

Capture Date	Capture Time (24 h)	Fished In (h)	Fished Out (h)	Trap RPM	Weather Conditions	Water Clarity	Water Temperature
February 25, 2019	10:50:00	-	-	0.1	Sunny	Clear	4.0
February 26, 2019	09:10:00	22.3	-	0.1	Sunny	Clear	3.0
February 27, 2019	09:30:00	24.3	-	0.1	Overcast	Clear	3.0
March 19, 2019	11:00:00	-	-	5.5	Sunny	Clear	5.0
March 20, 2019	09:15:00	22.3	-	3.5	Sunny	Clear	5.0
March 21, 2019	09:15:00	24.0	-	3.0	Overcast	Clear	5.3
March 21, 2019	09:15:00	24.0	-	3.0	Overcast	Clear	5.3
March 22, 2019	09:30:00	24.3	-	1.0	Sunny	Clear	6.0
March 23, 2019	11:00:00	25.5	-	4.0	Overcast	Clear	6.0
March 24, 2019	09:30:00	22.5	-	4.0	Sunny	Clear	5.5
March 25, 2019	09:20:00	23.8	-	2.0	Overcast	Clear	5.5
March 26, 2019	01:05:00	15.8	-	3.0	Partial Clouds	Clear	6.0
March 27, 2019	11:40:00	34.6	-	3.0	Sunny	Clear	5.0
March 28, 2019	11:00:00	23.3	-	2.0	Partial Clouds	Clear	6.0
March 29, 2019	09:45:00	22.8	-	2.0	Sunny	Clear	6.0
March 30, 2019	14:07:00	28.4	-	1.5	Sunny	Clear	6.5
March 31, 2019	01:15:00	11.1	-	1.2	Sunny	Clear	6.0
April 1, 2019	12:40:00	35.4	-	1.1	Sunny	Clear	6.7
April 2, 2019	12:35:00	23.9	-	0.8	Sunny	Clear	7.0
April 3, 2019	12:15:00	23.7	-	1.0	Rain	Clear	8.5
April 4, 2019	12:35:00	24.3	-	3.0	Sunny	Clear	8.0
April 5, 2019	13:25:00	24.8	-	2.5	Rain	Clear	8.5
April 6, 2019	09:30:00	-	20.1	0.1	Rain	Clear	0.0
April 7, 2019	09:30:00	-	24.0	0.1	Rain	Clear	0.0
April 8, 2019	10:00:00	-	24.5	0.1	Overcast	Clear	7.0
April 9, 2019	11:25:00	25.4	-	2.6	Sunny	Clear	7.0
April 10, 2019	09:30:00	22.1	-	2.6	Rain	Clear	7.0

Capture Date	Capture Time (24 h)	Fished In (h)	Fished Out (h)	Trap RPM	Weather Conditions	Water Clarity	Water Temperature
April 11, 2019	11:50:00	26.3	-	4.0	Overcast	Clear	7.0
April 12, 2019	11:10:00	23.3	-	3.5	Sunny	Clear	7.0
April 13, 2019	09:55:00	22.8	-	3.3	Rain	Clear	7.5
April 14, 2019	09:55:00	24.0	-	3.3	Overcast	Clear	6.8
April 15, 2019	09:30:00	23.6	-	1.2	Partial Clouds	Clear	6.9
April 16, 2019	09:30:00	24.0	-	3.3	Overcast	Clear	6.9
April 17, 2019	10:00:00	24.5	-	3.8	Rain	Clear	7.6
April 18, 2019	09:30:00	23.5	-	3.8	Rain	Clear	7.6
April 19, 2019	10:15:00	24.8	-	3.5	Overcast	Clear	8.0
April 20, 2019	09:50:00	23.6	-	4.0	Sunny	Clear	7.0
April 21, 2019	09:45:00	23.9	-	3.5	Overcast	Clear	7.5
April 22, 2019	09:15:00	23.5	-	3.3	Rain	Clear	7.8
April 23, 2019	09:25:00	24.2	-	3.5	Overcast	Clear	8.2
April 24, 2019	09:20:00	23.9	-	3.5	Sunny	Clear	0.0
April 25, 2019	09:44:00	24.4	-	3.0	Sunny	Clear	8.5
April 26, 2019	09:35:00	23.9	-	3.0	Sunny	Clear	8.5
April 27, 2019	09:25:00	23.8	-	2.8	Sunny	Clear	8.0
April 28, 2019	09:40:00	24.3	-	3.0	Sunny	Clear	8.0
April 29, 2019	09:20:00	23.7	-	2.7	Sunny	Clear	8.0
April 30, 2019	09:40:00	24.3	-	1.0	Sunny	Clear	9.0
May 1, 2019	09:45:00	24.1	-	1.3	Overcast	Clear	9.0
May 2, 2019	09:40:00	23.9	-	1.3	Overcast	Clear	10.0
May 3, 2019	09:30:00	23.8	-	1.0	Sunny	Clear	10.0
May 4, 2019	09:30:00	24.0	-	1.0	Sunny	Clear	11.0
May 5, 2019	09:45:00	24.3	-	0.9	Sunny	Clear	11.0
May 6, 2019	09:40:00	23.9	-	0.9	Sunny	Clear	11.5

Note: Dashes indicate no data

APPENDIX B
ROTARY SCREW TRAP CATCH DATA

Appendix B.2. Small rotary screw trap catch data, 2019.

Date	Coastrange Sculpin	Coho Salmon - Fry	Coho Salmon - Parr	Prickly Sculpin	Rainbow Trout - Fry	Rainbow Trout - Smolt	Rainbow Trout - Adult	Threespine Stickleback
February 23, 2019	4	9	1	7	0	0	0	0
February 24, 2019	5	9	1	5	0	0	0	0
February 25, 2019	0	3	0	3	0	0	0	0
February 26, 2019	0	0	0	0	0	0	0	0
February 27, 2019	3	3	1	0	0	0	0	0
February 28, 2019	0	3	0	1	2	0	0	0
March 1, 2019	1	4	0	7	0	0	0	0
March 2, 2019	5	1	0	1	1	0	0	0
March 3, 2019	8	5	0	2	0	0	0	1
March 4, 2019	3	18	0	1	1	0	0	0
March 5, 2019	9	2	0	0	0	0	0	0
March 6, 2019	1	11	0	1	0	0	0	0
March 7, 2019	4	14	0	0	0	0	0	0
March 8, 2019	2	0	0	4	0	0	0	0
March 9, 2019	1	11	0	0	0	0	0	0
March 10, 2019	1	12	0	0	0	0	0	0
March 11, 2019	1	12	0	2	0	0	0	0
March 12, 2019	0	43	0	2	0	0	0	0
March 13, 2019	4	52	0	1	1	0	0	0
March 14, 2019	2	66	0	1	1	0	0	0
March 15, 2019	1	50	0	5	0	0	0	0
March 16, 2019	7	14	0	0	0	0	0	0
March 17, 2019	4	25	0	1	1	0	0	0
March 18, 2019	0	14	0	1	1	0	0	0
March 19, 2019	4	5	0	1	1	0	0	0
March 20, 2019	0	0	0	0	0	0	0	0
March 21, 2019	34	5	0	0	1	0	0	0
March 22, 2019	0	12	0	0	0	0	0	1

Date	Coastrange Sculpin	Coho Salmon - Fry	Coho Salmon - Parr	Prickly Sculpin	Rainbow Trout - Fry	Rainbow Trout - Smolt	Rainbow Trout - Adult	Threespine Stickleback
March 23, 2019	0	30	0	17	1	0	0	0
March 24, 2019	1	208	0	17	1	0	0	0
March 25, 2019	0	408	0	1	0	0	0	0
March 26, 2019	0	215	0	2	1	0	0	0
March 27, 2019	19	111	0	19	2	1	0	0
March 28, 2019	21	245	0	0	1	0	0	0
March 29, 2019	6	343	0	17	0	2	0	0
March 30, 2019	12	269	0	20	1	0	0	0
March 31, 2019	15	246	0	12	0	0	0	0
April 1, 2019	8	149	0	9	0	0	0	0
April 2, 2019	8	109	0	7	0	0	0	0
April 3, 2019	8	65	0	14	0	0	0	0
April 4, 2019	14	102	0	20	4	0	0	0
April 5, 2019	10	119	0	15	3	1	0	2
April 6, 2019	-	-	-	-	-	-	-	-
April 7, 2019	-	-	-	-	-	-	-	-
April 8, 2019	-	-	-	-	-	-	-	-
April 9, 2019	0	33	0	1	0	0	0	0
April 10, 2019	7	17	4	6	2	0	0	0
April 11, 2019	3	24	0	6	0	0	0	0
April 12, 2019	3	28	1	4	0	0	0	1
April 13, 2019	9	28	0	12	0	0	0	0
April 14, 2019	4	73	0	2	0	1	0	0
April 15, 2019	3	33	0	0	0	0	0	0
April 16, 2019	2	12	2	2	0	0	0	0
April 17, 2019	6	14	0	4	0	0	0	0
April 18, 2019	0	16	0	2	0	0	0	0
April 19, 2019	0	0	0	1	0	0	0	0
April 20, 2019	5	30	0	3	0	0	0	0

Date	Coastrange Sculpin	Coho Salmon - Fry	Coho Salmon - Parr	Prickly Sculpin	Rainbow Trout - Fry	Rainbow Trout - Smolt	Rainbow Trout - Adult	Threespine Stickleback
April 21, 2019	16	8	1	7	0	0	0	0
April 22, 2019	11	33	2	10	1	0	0	0
April 23, 2019	7	36	3	7	0	0	0	0
April 24, 2019	9	19	2	17	0	0	0	0
April 25, 2019	9	18	4	12	0	0	0	0
April 26, 2019	8	0	10	10	2	0	0	0
April 27, 2019	8	0	4	13	0	1	0	1
April 28, 2019	0	3	9	0	0	4	0	0
April 29, 2019	8	0	6	8	0	1	0	0
April 30, 2019	9	2	16	21	0	3	0	1
May 1, 2019	25	0	15	10	2	2	0	0
May 2, 2019	6	0	20	9	0	6	0	1
May 3, 2019	7	0	23	4	0	1	0	1
May 4, 2019	20	0	18	18	0	4	0	0
May 5, 2019	11	0	8	16	2	0	1	4
May 6, 2019	4	0	0	4	3	0	0	3
May 7, 2019	0	0	0	12	2	0	0	0
May 8, 2019	0	2	0	0	0	0	0	1
May 9, 2019	9	0	1	12	0	0	0	0

Note: Dashes indicate no data

Date	Eulachon	Lamprey	Staghorn Sculpin	Starry Flounder	Chum Salmon - Fry
February 23, 2019	0	0	0	0	1,587
February 24, 2019	1	0	0	0	1,666
February 25, 2019	0	0	0	0	831
February 26, 2019	0	0	0	0	675
February 27, 2019	0	0	0	0	432
February 28, 2019	0	0	0	0	1,096
March 1, 2019	0	0	0	0	1,333
March 2, 2019	0	0	0	0	1,332
March 3, 2019	0	0	0	0	1,631
March 4, 2019	0	0	0	0	2,424
March 5, 2019	0	0	0	0	1,564
March 6, 2019	0	0	0	0	1,300
March 7, 2019	0	0	0	0	1,308
March 8, 2019	0	0	0	1	1,442
March 9, 2019	0	0	0	0	1,209
March 10, 2019	0	0	0	0	1,431
March 11, 2019	0	0	0	0	1,499
March 12, 2019	0	0	0	0	2,675
March 13, 2019	0	0	0	0	2,083
March 14, 2019	0	0	0	0	1,745
March 15, 2019	0	0	0	0	1,818
March 16, 2019	0	0	0	0	1,448
March 17, 2019	0	0	0	0	1,533
March 18, 2019	0	0	4	0	1,820
March 19, 2019	0	0	0	0	557
March 20, 2019	0	0	0	0	583
March 21, 2019	0	1	0	0	310
March 22, 2019	0	0	0	0	397
March 23, 2019	0	0	0	0	1,460

Date	Eulachon	Lamprey	Staghorn Sculpin	Starry Flounder	Chum Salmon - Fry
March 24, 2019	0	0	0	0	2,107
March 25, 2019	0	0	0	0	2,785
March 26, 2019	0	0	0	0	3,058
March 27, 2019	0	0	0	0	1,752
March 28, 2019	0	0	0	0	1,896
March 29, 2019	0	0	0	0	3,183
March 30, 2019	0	0	0	0	6,084
March 31, 2019	0	0	0	0	5,598
April 1, 2019	0	0	0	0	4,956
April 2, 2019	0	0	0	0	4,713
April 3, 2019	0	0	0	0	2,237
April 4, 2019	0	0	0	0	2,855
April 5, 2019	0	0	0	0	5,217
April 6, 2019	-	-	-	-	-
April 7, 2019	-	-	-	-	-
April 8, 2019	-	-	-	-	-
April 9, 2019	0	0	0	0	1,690
April 10, 2019	0	0	0	0	406
April 11, 2019	0	0	0	0	285
April 12, 2019	0	0	0	0	207
April 13, 2019	0	0	0	0	422
April 14, 2019	0	0	0	0	490
April 15, 2019	0	0	0	0	284
April 16, 2019	0	0	0	0	40
April 17, 2019	0	0	0	0	33
April 18, 2019	0	0	0	0	110
April 19, 2019	0	0	0	0	6
April 20, 2019	0	0	0	0	207
April 21, 2019	0	0	0	0	63

Date	Eulachon	Lamprey	Staghorn Sculpin	Starry Flounder	Chum Salmon - Fry
April 22, 2019	0	0	0	0	83
April 23, 2019	0	0	0	0	39
April 24, 2019	1	0	0	0	47
April 25, 2019	0	0	0	0	16
April 26, 2019	0	0	0	0	1
April 27, 2019	0	0	0	0	0
April 28, 2019	0	0	0	0	0
April 29, 2019	0	0	0	0	0
April 30, 2019	0	0	0	0	0
May 1, 2019	0	0	0	0	0
May 2, 2019	0	0	0	0	1
May 3, 2019	0	0	0	0	0
May 4, 2019	0	0	0	0	0
May 5, 2019	0	0	0	0	0
May 6, 2019	0	0	0	0	0
May 7, 2019	0	0	0	0	0
May 8, 2019	0	0	0	0	0
May 9, 2019	0	0	0	0	0

Note: Dashes indicate no data

Appendix B.2. Large rotary screw trap catch data, 2019.

Date	Coastrange Sculpin	Coho Salmon - Fry	Coho Salmon - Parr	Prickly Sculpin	Rainbow Trout - Fry	Rainbow Trout - Smolt	Threespine Stickleback	Eulachon	Chum Salmon - Fry
February 23, 2019	-	-	-	-	-	-	-	-	-
February 24, 2019	-	-	-	-	-	-	-	-	-
February 25, 2019	-	-	-	-	-	-	-	-	-
February 26, 2019	0	2	0	0	0	0	1	0	1,702
February 27, 2019	1	0	0	0	0	0	0	1	170
February 28, 2019	-	-	-	-	-	-	-	-	-
March 1, 2019	-	-	-	-	-	-	-	-	-
March 2, 2019	-	-	-	-	-	-	-	-	-
March 3, 2019	-	-	-	-	-	-	-	-	-
March 4, 2019	-	-	-	-	-	-	-	-	-
March 5, 2019	-	-	-	-	-	-	-	-	-
March 6, 2019	-	-	-	-	-	-	-	-	-
March 7, 2019	-	-	-	-	-	-	-	-	-
March 8, 2019	-	-	-	-	-	-	-	-	-
March 9, 2019	-	-	-	-	-	-	-	-	-
March 10, 2019	-	-	-	-	-	-	-	-	-
March 11, 2019	-	-	-	-	-	-	-	-	-
March 12, 2019	-	-	-	-	-	-	-	-	-
March 13, 2019	-	-	-	-	-	-	-	-	-
March 14, 2019	-	-	-	-	-	-	-	-	-
March 15, 2019	-	-	-	-	-	-	-	-	-
March 16, 2019	-	-	-	-	-	-	-	-	-
March 17, 2019	-	-	-	-	-	-	-	-	-
March 18, 2019	-	-	-	-	-	-	-	-	-
March 19, 2019	-	-	-	-	-	-	-	-	-
March 20, 2019	5	13	0	0	1	0	0	0	581
March 21, 2019	0	6	0	3	1	0	1	0	332

Date	Coastrange Sculpin	Coho Salmon - Fry	Coho Salmon - Parr	Prickly Sculpin	Rainbow Trout - Fry	Rainbow Trout - Smolt	Threespine Stickleback	Eulachon	Chum Salmon - Fry
March 22, 2019	0	0	13	17	0	0	0	0	291
March 23, 2019	2	29	0	10	0	0	0	0	609
March 24, 2019	0	77	0	16	0	0	0	0	1,368
March 25, 2019	0	23	0	15	0	0	0	0	712
March 26, 2019	16	16	0	21	0	0	0	0	745
March 27, 2019	6	29	0	13	0	0	0	0	361
March 28, 2019	6	0	0	5	0	0	0	0	1,040
March 29, 2019	12	50	0	29	0	0	0	0	3,192
March 30, 2019	3	23	0	10	0	0	0	0	1,323
March 31, 2019	6	17	0	8	0	0	0	0	140
April 1, 2019	0	21	0	3	0	0	0	0	98
April 2, 2019	2	8	0	5	0	0	0	0	32
April 3, 2019	2	13	0	5	0	0	0	0	121
April 4, 2019	11	8	0	12	0	0	0	0	54
April 5, 2019	2	1	0	5	0	0	0	0	42
April 6, 2019	-	-	-	-	-	-	-	-	-
April 7, 2019	-	-	-	-	-	-	-	-	-
April 8, 2019	-	-	-	-	-	-	-	-	-
April 9, 2019	5	10	1	6	3	1	0	0	43
April 10, 2019	18	5	3	5	2	1	0	0	26
April 11, 2019	6	4	0	10	1	0	0	0	55
April 12, 2019	6	3	3	8	1	1	0	0	58
April 13, 2019	15	1	3	13	0	1	0	0	43
April 14, 2019	3	0	6	5	1	0	0	0	2
April 15, 2019	7	9	5	0	0	0	0	0	6
April 16, 2019	5	1	3	2	0	0	0	0	3
April 17, 2019	1	12	0	0	0	0	0	0	8
April 18, 2019	0	7	3	4	0	0	0	0	10
April 19, 2019	0	0	0	1	0	0	0	0	0

Date	Coastrange Sculpin	Coho Salmon - Fry	Coho Salmon - Parr	Prickly Sculpin	Rainbow Trout - Fry	Rainbow Trout - Smolt	Threespine Stickleback	Eulachon	Chum Salmon - Fry
April 20, 2019	0	0	12	5	0	0	0	0	0
April 21, 2019	0	6	6	5	2	0	0	0	5
April 22, 2019	7	2	5	8	0	0	0	0	1
April 23, 2019	9	0	6	11	0	0	0	0	0
April 24, 2019	8	3	5	12	0	1	0	0	0
April 25, 2019	3	1	2	2	0	0	0	0	0
April 26, 2019	12	2	2	5	0	0	0	0	0
April 27, 2019	2	0	7	3	0	0	0	0	0
April 28, 2019	0	3	3	0	0	0	0	0	1
April 29, 2019	4	0	8	11	1	0	0	0	0
April 30, 2019	6	0	4	12	0	1	0	0	0
May 1, 2019	0	0	5	18	1	0	0	0	1
May 2, 2019	16	1	1	14	0	0	0	0	0
May 3, 2019	0	0	0	2	0	0	0	0	0
May 4, 2019	9	1	1	10	0	1	0	0	1
May 5, 2019	0	0	0	9	0	0	0	0	0
May 6, 2019	10	0	0	3	0	0	0	0	0
May 7, 2019	-	-	-	-	-	-	-	-	-
May 8, 2019	-	-	-	-	-	-	-	-	-
May 9, 2019	-	-	-	-	-	-	-	-	-

Note: Dashes indicate no data

APPENDIX C

CHINOOK SALMON CATCH, MARK, AND MORTALITY DATA

Appendix C.1. Chinook Salmon catch, mark, and unmarked catch data, 2019.

Date	Trap Name	No. Unmarked Live	No. Unmarked Dead	Mark Type	Mark Colour	No. Marked Live
February 27, 2019	Large	20	5	Brown Dye	-	2
February 28, 2019	Large	0	0	VIE Tag	Yellow	3
March 20, 2019	Large	153	1	Brown Dye	-	3
March 21, 2019	Large	143	1	Brown Dye	-	7
March 21, 2019	Large	0	0	VIE Tag	Pink	4
March 22, 2019	Large	100	9	Brown Dye	-	15
March 23, 2019	Large	292	1	Brown Dye	-	15
March 24, 2019	Large	560	1	Brown Dye	-	32
March 24, 2019	Large	0	0	VIE Tag	Pink	1
March 25, 2019	Large	154	0	Brown Dye	-	21
March 26, 2019	Large	78	0	Brown Dye	-	10
March 26, 2019	Large	0	0	VIE Tag	Orange	2
March 27, 2019	Large	93	1	Brown Dye	-	8
March 28, 2019	Large	139	0	Brown Dye	-	13
March 28, 2019	Large	0	0	VIE Tag	Orange	1
March 29, 2019	Large	83	1	Brown Dye	-	9
March 30, 2019	Large	56	1	Brown Dye	-	6
March 31, 2019	Large	18	0	Brown Dye	-	9
April 1, 2019	Large	4	0	Brown Dye	-	1
April 2, 2019	Large	1	0	Brown Dye	-	1
April 3, 2019	Large	5	1	Brown Dye	-	0
April 4, 2019	Large	5	0	-	-	0
April 5, 2019	Large	12	0	Brown Dye	-	1
April 6, 2019	Large	0	0	-	-	0
April 7, 2019	Large	0	0	-	-	0
April 8, 2019	Large	0	0	-	-	0
April 9, 2019	Large	6	1	-	-	0
April 10, 2019	Large	9	0	VIE Tag	Red	1
April 11, 2019	Large	10	0	-	-	0
April 12, 2019	Large	8	0	-	-	0
April 13, 2019	Large	2	0	-	-	0
April 14, 2019	Large	3	1	-	-	0
April 15, 2019	Large	5	0	-	-	0
April 16, 2019	Large	3	0	-	-	0
April 17, 2019	Large	2	0	VIE Tag	Orange	1
April 18, 2019	Large	2	0	-	-	0
April 19, 2019	Large	3	0	-	-	0
April 21, 2019	Large	4	0	-	-	0
April 22, 2019	Large	4	0	Brown Dye	-	1
April 24, 2019	Large	1	0	-	-	0

Date	Trap Name	No. Unmarked Live	No. Unmarked Dead	Mark Type	Mark Colour	No. Marked Live
April 26, 2019	Large	3	0	-	-	0
April 27, 2019	Large	1	0	-	-	0
April 28, 2019	Large	1	0	-	-	0
April 29, 2019	Large	1	0	Brown Dye	-	1
May 1, 2019	Large	1	0	-	-	0
May 2, 2019	Large	3	0	-	-	0
May 4, 2019	Large	1	0	-	-	0
February 23, 2019	Small	190	3	-	-	0
February 24, 2019	Small	627	5	Brown Dye	-	19
February 25, 2019	Small	200	18	Brown Dye	-	72
February 26, 2019	Small	76	7	Brown Dye	-	12
February 26, 2019	Small	0	0	VIE Tag	Yellow	1
February 27, 2019	Small	30	1	Brown Dye	-	1
February 28, 2019	Small	95	0	Brown Dye	-	9
March 1, 2019	Small	78	0	Brown Dye	-	9
March 2, 2019	Small	53	4	Brown Dye	-	6
March 2, 2019	Small	0	0	VIE Tag	Yellow	1
March 3, 2019	Small	123	4	Brown Dye	-	5
March 4, 2019	Small	246	1	Brown Dye	-	15
March 5, 2019	Small	180	0	Brown Dye	-	5
March 5, 2019	Small	0	0	VIE Tag	Orange	6
March 6, 2019	Small	84	0	Brown Dye	NULL	2
March 6, 2019	Small	0	0	VIE Tag	Orange	10
March 7, 2019	Small	83	1	VIE Tag	Orange	8
March 8, 2019	Small	102	7	Brown Dye	-	4
March 9, 2019	Small	79	1	Brown Dye	-	5
March 10, 2019	Small	86	1	Brown Dye	-	2
March 11, 2019	Small	184	1	Brown Dye	-	5
March 12, 2019	Small	538	2	Brown Dye	-	14
March 12, 2019	Small	0	0	VIE Tag	Red	9
March 13, 2019	Small	367	2	Brown Dye	-	33
March 13, 2019	Small	0	0	VIE Tag	Red	12
March 14, 2019	Small	333	1	Brown Dye	-	18
March 14, 2019	Small	0	0	VIE Tag	Red	4
March 15, 2019	Small	357	3	Brown Dye	-	26
March 16, 2019	Small	115	0	Brown Dye	-	3
March 17, 2019	Small	145	1	Brown Dye	-	7
March 18, 2019	Small	220	1	Brown Dye	-	8
March 19, 2019	Small	116	0	Brown Dye	-	5
March 20, 2019	Small	70	1	Brown Dye	-	2
March 20, 2019	Small	0	0	VIE Tag	Pink	1
March 21, 2019	Small	88	0	Brown Dye	-	4

Date	Trap Name	No. Unmarked Live	No. Unmarked Dead	Mark Type	Mark Colour	No. Marked Live
March 21, 2019	Small	0	0	VIE Tag	Pink	1
March 22, 2019	Small	162	3	Brown Dye	-	18
March 22, 2019	Small	0	0	VIE Tag	Pink	1
March 23, 2019	Small	468	2	Brown Dye	-	9
March 24, 2019	Small	732	1	Brown Dye	-	29
March 25, 2019	Small	433	0	Brown Dye	-	34
March 26, 2019	Small	401	0	Brown Dye	-	22
March 26, 2019	Small	0	0	VIE Tag	Orange	4
March 27, 2019	Small	223	0	Brown Dye	-	10
March 27, 2019	Small	0	0	VIE Tag	Orange	4
March 28, 2019	Small	159	0	Brown Dye	-	11
March 28, 2019	Small	0	0	VIE Tag	Orange	1
March 29, 2019	Small	186	0	Brown Dye	-	8
March 29, 2019	Small	0	0	VIE Tag	Orange	3
March 30, 2019	Small	238	2	Brown Dye	-	14
March 31, 2019	Small	220	1	Brown Dye	-	25
March 31, 2019	Small	0	0	VIE Tag	Orange	1
April 1, 2019	Small	112	0	Brown Dye	-	1
April 2, 2019	Small	112	0	Brown Dye	-	3
April 3, 2019	Small	64	1	Brown Dye	-	38
April 4, 2019	Small	198	0	Brown Dye	-	3
April 5, 2019	Small	164	0	Brown Dye	-	7
April 6, 2019	Small	0	0	-	-	0
April 7, 2019	Small	0	0	-	-	0
April 8, 2019	Small	0	0	-	-	0
April 9, 2019	Small	12	0	-	-	0
April 10, 2019	Small	6	0	-	-	0
April 11, 2019	Small	19	0	-	-	0
April 12, 2019	Small	17	0	-	-	0
April 13, 2019	Small	12	0	-	-	0
April 14, 2019	Small	16	1	-	-	0
April 15, 2019	Small	4	0	-	-	0
April 16, 2019	Small	17	0	-	-	0
April 17, 2019	Small	5	0	-	-	0
April 18, 2019	Small	4	0	-	-	0
April 19, 2019	Small	2	0	-	-	0
April 20, 2019	Small	4	0	-	-	0
April 21, 2019	Small	4	0	-	-	0
April 22, 2019	Small	4	0	-	-	0
April 23, 2019	Small	5	0	-	-	0
April 24, 2019	Small	1	0	-	-	0
April 25, 2019	Small	2	0	-	-	0

Date	Trap Name	No. Unmarked Live	No. Unmarked Dead	Mark Type	Mark Colour	No. Marked Live
April 26, 2019	Small	0	0	-	-	0
April 27, 2019	Small	2	0	-	-	0
April 30, 2019	Small	1	0	-	-	0
May 1, 2019	Small	1	0	-	-	0
May 2, 2019	Small	1	0	-	-	0
May 3, 2019	Small	1	0	-	-	0
May 4, 2019	Small	2	0	-	-	0
May 5, 2019	Small	1	0	-	-	0
May 9, 2019	Small	1	0	-	-	0

Note: Dashes indicate no data

Date	Trap Name	No. Marked Dead	Fishing (Yes/No)	Estimated No. Unmarked Catch	Total No.	Stratum (Week)	Migration (No.)
February 27, 2019	Large	0	Yes	0	25	1	177
February 28, 2019	Large	0	Yes	0	0	2	0
March 20, 2019	Large	0	Yes	0	154	4	2,702
March 21, 2019	Large	0	Yes	0	144	5	1,895
March 21, 2019	Large	0	Yes	0	0	5	0
March 22, 2019	Large	0	Yes	0	109	5	1,434
March 23, 2019	Large	0	Yes	0	293	5	3,855
March 24, 2019	Large	0	Yes	0	561	5	7,382
March 24, 2019	Large	0	Yes	0	0	5	0
March 25, 2019	Large	0	Yes	0	154	5	2,026
March 26, 2019	Large	0	Yes	0	78	5	1,026
March 26, 2019	Large	0	Yes	0	0	5	0
March 27, 2019	Large	0	Yes	0	94	5	1,237
March 28, 2019	Large	0	Yes	0	139	6	1,376
March 28, 2019	Large	0	Yes	0	0	6	0
March 29, 2019	Large	0	Yes	0	84	6	832
March 30, 2019	Large	0	Yes	0	57	6	564
March 31, 2019	Large	0	Yes	0	18	6	178
April 1, 2019	Large	0	Yes	0	4	6	40
April 2, 2019	Large	0	Yes	0	1	6	10
April 3, 2019	Large	0	Yes	0	6	6	59
April 4, 2019	Large	0	Yes	0	5	7	50
April 5, 2019	Large	0	Yes	0	12	7	119
April 6, 2019	Large	0	No	8	8	7	79
April 7, 2019	Large	0	No	8	8	7	79
April 8, 2019	Large	0	No	8	8	7	79

Date	Trap Name	No. Marked Dead	Fishing (Yes/No)	Estimated No. Unmarked Catch	Total No.	Stratum (Week)	Migration (No.)
April 9, 2019	Large	0	Yes	0	7	7	69
April 10, 2019	Large	0	Yes	0	9	7	89
April 11, 2019	Large	0	Yes	0	10	8	99
April 12, 2019	Large	0	Yes	0	8	8	79
April 13, 2019	Large	0	Yes	0	2	8	20
April 14, 2019	Large	0	Yes	0	4	8	40
April 15, 2019	Large	0	Yes	0	5	8	50
April 16, 2019	Large	0	Yes	0	3	8	30
April 17, 2019	Large	0	Yes	0	2	8	20
April 18, 2019	Large	0	Yes	0	2	9	20
April 19, 2019	Large	0	Yes	0	3	9	30
April 21, 2019	Large	0	Yes	0	4	9	40
April 22, 2019	Large	0	Yes	0	4	9	40
April 24, 2019	Large	0	Yes	0	1	9	10
April 26, 2019	Large	0	Yes	0	3	10	30
April 27, 2019	Large	0	Yes	0	1	10	10
April 28, 2019	Large	0	Yes	0	1	10	10
April 29, 2019	Large	0	Yes	0	1	10	10
May 1, 2019	Large	0	Yes	0	1	10	10
May 2, 2019	Large	0	Yes	0	3	11	30
May 4, 2019	Large	0	Yes	0	1	11	10
February 23, 2019	Small	0	Yes	0	193	1	1,369
February 24, 2019	Small	0	Yes	0	632	1	4,482
February 25, 2019	Small	0	Yes	0	218	1	1,546
February 26, 2019	Small	0	Yes	0	83	1	589
February 26, 2019	Small	0	Yes	0	0	1	0
February 27, 2019	Small	0	Yes	0	31	1	220
February 28, 2019	Small	0	Yes	0	95	2	1,234
March 1, 2019	Small	0	Yes	0	78	2	1,013
March 2, 2019	Small	0	Yes	0	57	2	740
March 2, 2019	Small	0	Yes	0	0	2	0
March 3, 2019	Small	0	Yes	0	127	2	1,649
March 4, 2019	Small	0	Yes	0	247	2	3,208
March 5, 2019	Small	1	Yes	0	180	2	2,338
March 5, 2019	Small	0	Yes	0	0	2	0
March 6, 2019	Small	0	Yes	0	84	2	1,091
March 6, 2019	Small	0	Yes	0	0	2	0
March 7, 2019	Small	0	Yes	0	84	3	1,167
March 8, 2019	Small	0	Yes	0	109	3	1,514
March 9, 2019	Small	0	Yes	0	80	3	1,111
March 10, 2019	Small	0	Yes	0	87	3	1,208

Date	Trap Name	No. Marked Dead	Fishing (Yes/No)	Estimated No. Unmarked Catch	Total No.	Stratum (Week)	Migration (No.)
March 11, 2019	Small	0	Yes	0	185	3	2,569
March 12, 2019	Small	0	Yes	0	540	3	7,500
March 12, 2019	Small	0	Yes	0	0	3	0
March 13, 2019	Small	0	Yes	0	369	3	5,125
March 13, 2019	Small	0	Yes	0	0	3	0
March 14, 2019	Small	0	Yes	0	334	4	5,860
March 14, 2019	Small	0	Yes	0	0	4	0
March 15, 2019	Small	0	Yes	0	360	4	6,316
March 16, 2019	Small	0	Yes	0	115	4	2,018
March 17, 2019	Small	0	Yes	0	146	4	2,561
March 18, 2019	Small	0	Yes	0	221	4	3,877
March 19, 2019	Small	0	Yes	0	116	4	2,035
March 20, 2019	Small	0	Yes	0	71	4	1,246
March 20, 2019	Small	0	Yes	0	0	4	0
March 21, 2019	Small	0	Yes	0	88	5	1,158
March 21, 2019	Small	0	Yes	0	0	5	0
March 22, 2019	Small	0	Yes	0	165	5	2,171
March 22, 2019	Small	0	Yes	0	0	5	0
March 23, 2019	Small	0	Yes	0	470	5	6,184
March 24, 2019	Small	0	Yes	0	733	5	9,645
March 25, 2019	Small	0	Yes	0	433	5	5,697
March 26, 2019	Small	0	Yes	0	401	5	5,276
March 26, 2019	Small	0	Yes	0	0	5	0
March 27, 2019	Small	0	Yes	0	223	5	2,934
March 27, 2019	Small	0	Yes	0	0	5	0
March 28, 2019	Small	0	Yes	0	159	6	1,574
March 28, 2019	Small	0	Yes	0	0	6	0
March 29, 2019	Small	0	Yes	0	186	6	1,842
March 29, 2019	Small	0	Yes	0	0	6	0
March 30, 2019	Small	0	Yes	0	240	6	2,376
March 31, 2019	Small	0	Yes	0	221	6	2,188
March 31, 2019	Small	0	Yes	0	0	6	0
April 1, 2019	Small	0	Yes	0	112	6	1,109
April 2, 2019	Small	0	Yes	0	112	6	1,109
April 3, 2019	Small	0	Yes	0	65	6	644
April 4, 2019	Small	0	Yes	0	198	7	1,960
April 5, 2019	Small	0	Yes	0	164	7	1,624
April 6, 2019	Small	0	No	95	95	7	941
April 7, 2019	Small	0	No	95	95	7	941
April 8, 2019	Small	0	No	95	95	7	941
April 9, 2019	Small	0	Yes	0	12	7	119

Date	Trap Name	No. Marked Dead	Fishing (Yes/No)	Estimated No. Unmarked Catch	Total No.	Stratum (Week)	Migration (No.)
April 10, 2019	Small	0	Yes	0	6	7	59
April 11, 2019	Small	0	Yes	0	19	8	188
April 12, 2019	Small	0	Yes	0	17	8	168
April 13, 2019	Small	0	Yes	0	12	8	119
April 14, 2019	Small	0	Yes	0	17	8	168
April 15, 2019	Small	0	Yes	0	4	8	40
April 16, 2019	Small	0	Yes	0	17	8	168
April 17, 2019	Small	0	Yes	0	5	8	50
April 18, 2019	Small	0	Yes	0	4	9	40
April 19, 2019	Small	0	Yes	0	2	9	20
April 20, 2019	Small	0	Yes	0	4	9	40
April 21, 2019	Small	0	Yes	0	4	9	40
April 22, 2019	Small	0	Yes	0	4	9	40
April 23, 2019	Small	0	Yes	0	5	9	50
April 24, 2019	Small	0	Yes	0	1	9	10
April 25, 2019	Small	0	Yes	0	2	10	20
April 26, 2019	Small	0	Yes	0	0	10	0
April 27, 2019	Small	0	Yes	0	2	10	20
April 30, 2019	Small	0	Yes	0	1	10	10
May 1, 2019	Small	0	Yes	0	1	10	10
May 2, 2019	Small	0	Yes	0	1	11	10
May 3, 2019	Small	0	Yes	0	1	11	10
May 4, 2019	Small	0	Yes	0	2	11	20
May 5, 2019	Small	0	Yes	0	1	11	10
May 9, 2019	Small	0	Yes	0	1	12	10

Note: Dashes indicate no data

Appendix C.2. Chinook Salmon mark release data, 2019.

Date	VIE Marker	Mark Type	Mark Colour	No. Marked	No. Released Live	Stratum (Week)
February 23, 2019	-	Brown Dye	-	190	190	1
February 24, 2019	-	Brown Dye	-	627	624	1
February 25, 2019	1	VIE Tag	Yellow	190	185	1
February 26, 2019	1	VIE Tag	Yellow	65	64	1
February 27, 2019	1	VIE Tag	Yellow	45	40	1
February 28, 2019	-	Brown Dye	-	95	94	2
March 1, 2019	-	Brown Dye	-	78	78	2
March 2, 2019	-	Brown Dye	-	53	53	2
March 3, 2019	-	Brown Dye	-	112	112	2
March 4, 2019	-	Brown Dye	-	146	144	2
March 4, 2019	2	VIE Tag	Orange	83	60	2
March 5, 2019	-	Brown Dye	-	80	80	2
March 5, 2019	2	VIE Tag	Orange	93	93	2
March 6, 2019	2	VIE Tag	Orange	90	90	2
March 7, 2019	-	Brown Dye	-	82	82	3
March 8, 2019	-	Brown Dye	-	102	102	3
March 9, 2019	-	Brown Dye	-	79	76	3
March 10, 2019	-	Brown Dye	-	86	83	3
March 11, 2019	-	Brown Dye	-	84	84	3
March 11, 2019	2	VIE Tag	Red	96	93	3
March 12, 2019	-	Brown Dye	-	438	438	3
March 12, 2019	2	VIE Tag	Red	100	100	3
March 13, 2019	2	VIE Tag	Red	100	98	3
March 13, 2019	-	Brown Dye	-	267	267	3
March 14, 2019	-	Brown Dye	-	333	332	4
March 15, 2019	-	Brown Dye	-	0	0	4
March 15, 2019	-	Brown Dye	-	357	357	4
March 16, 2019	-	Brown Dye	-	100	99	4
March 17, 2019	-	Brown Dye	-	100	100	4
March 18, 2019	2	VIE Tag	Pink	99	99	4
March 18, 2019	-	Brown Dye	-	120	120	4
March 19, 2019	2	VIE Tag	Pink	100	100	4
March 19, 2019	-	Brown Dye	-	16	16	4
March 20, 2019	1	VIE Tag	Pink	100	97	4
March 20, 2019	-	Brown Dye	-	123	120	4
March 21, 2019	-	Brown Dye	-	231	230	5
March 22, 2019	-	Brown Dye	-	262	261	5
March 23, 2019	-	Brown Dye	-	760	757	5
March 24, 2019	-	Brown Dye	-	1000	998	5
March 25, 2019	-	Brown Dye	-	487	487	5
March 25, 2019	1	VIE Tag	Orange	100	94	5

Date	VIE Marker	Mark Type	Mark Colour	No. Marked	No. Released Live	Stratum (Week)
March 26, 2019	-	Brown Dye	-	301	300	5
March 26, 2019	1	VIE Tag	Orange	100	94	5
March 27, 2019	-	Brown Dye	-	216	213	5
March 27, 2019	1	VIE Tag	Orange	100	98	5
March 28, 2019	-	Brown Dye	-	298	288	6
March 29, 2019	-	Brown Dye	-	269	267	6
March 30, 2019	-	Brown Dye	-	294	292	6
April 1, 2019	-	Brown Dye	-	116	115	6
April 2, 2019	-	Brown Dye	-	113	113	6
April 3, 2019	-	Brown Dye	-	69	67	6
April 4, 2019	-	Brown Dye	-	203	201	7
April 5, 2019	-	Brown Dye	-	176	176	7
April 9, 2019	2	VIE Tag	Red	18	18	7
April 10, 2019	2	VIE Tag	Red	14	14	7
April 11, 2019	-	Brown Dye	-	29	28	8
April 12, 2019	-	Brown Dye	-	25	24	8
April 13, 2019	-	Brown Dye	-	14	14	8
April 14, 2019	-	Brown Dye	-	18	18	8
April 15, 2019	2	VIE Tag	Orange	9	7	8
April 16, 2019	2	VIE Tag	Orange	19	19	8
April 17, 2019	2	VIE Tag	Orange	7	7	8
April 18, 2019	-	Brown Dye	-	6	6	9
April 19, 2019	-	Brown Dye	-	5	4	9
April 20, 2019	-	Brown Dye	-	4	4	9
April 21, 2019	-	Brown Dye	-	6	6	9
April 22, 2019	2	VIE Tag	Pink	6	6	9
April 23, 2019	2	VIE Tag	Pink	3	3	9
April 23, 2019	-	Brown Dye	-	2	2	9
April 24, 2019	2	VIE Tag	Pink	2	2	9
April 25, 2019	-	Brown Dye	-	2	2	10
April 26, 2019	-	Brown Dye	-	3	3	10
April 27, 2019	-	Brown Dye	-	3	3	10
April 28, 2019	-	Brown Dye	-	1	1	10
April 29, 2019	2	VIE Tag	Yellow	2	1	10
April 30, 2019	2	VIE Tag	Yellow	1	1	10
May 1, 2019	2	VIE Tag	Yellow	2	2	10
May 2, 2019	-	Brown Dye	-	4	4	11
May 2, 2019	-	Brown Dye	-	4	3	11
May 3, 2019	-	Brown Dye	-	1	1	11
May 4, 2019	-	Brown Dye	-	3	3	11
May 4, 2019	-	Brown Dye	-	3	3	11
May 5, 2019	-	Brown Dye	-	1	1	11

Note: Dashes indicate no data

Appendix C.3. Rotary Screw trap fish mortality data, 2019.

Date	Species	Mortality Type	No. Mortalities
February 23, 2019	Chinook Salmon	No Sampling	3
February 23, 2019	Chum Salmon	No Sampling	12
February 24, 2019	Chinook Salmon	No Sampling	5
February 24, 2019	Chum Salmon	No Sampling	36
February 25, 2019	Chinook Salmon	No Sampling	5
February 25, 2019	Chum Salmon	No Sampling	18
February 26, 2019	Chinook Salmon	No Sampling	7
February 27, 2019	Chinook Salmon	No Sampling	6
February 27, 2019	Chum Salmon	No Sampling	19
February 28, 2019	Chum Salmon	No Sampling	1
March 1, 2019	Chum Salmon	No Sampling	3
March 2, 2019	Chinook Salmon	No Sampling	4
March 2, 2019	Chum Salmon	No Sampling	11
March 3, 2019	Chinook Salmon	No Sampling	4
March 3, 2019	Chum Salmon	No Sampling	8
March 4, 2019	Chinook Salmon	No Sampling	1
March 4, 2019	Chum Salmon	No Sampling	12
March 5, 2019	Chum Salmon	No Sampling	7
March 5, 2019	Chum Salmon	No Sampling	1
March 6, 2019	Chinook Salmon	No Sampling	1
March 6, 2019	Chum Salmon	No Sampling	1
March 7, 2019	Chinook Salmon	No Sampling	1
March 7, 2019	Chum Salmon	No Sampling	5
March 7, 2019	Chum Salmon	No Sampling	6
March 8, 2019	Chinook Salmon	No Sampling	7
March 8, 2019	Chum Salmon	No Sampling	12
March 8, 2019	Chum Salmon	No Sampling	2
March 9, 2019	Chum Salmon	No Sampling	2
March 9, 2019	Chum Salmon	No Sampling	2
March 11, 2019	Chinook Salmon	No Sampling	1
March 11, 2019	Chum Salmon	No Sampling	3
March 12, 2019	Chinook Salmon	No Sampling	2
March 12, 2019	Chum Salmon	No Sampling	4
March 13, 2019	Chinook Salmon	No Sampling	2
March 13, 2019	Chum Salmon	No Sampling	9
March 13, 2019	Coho Salmon	No Sampling	1
March 14, 2019	Chinook Salmon	No Sampling	1
March 14, 2019	Chum Salmon	No Sampling	3
March 15, 2019	Chinook Salmon	No Sampling	3
March 15, 2019	Chinook Salmon	No Sampling	3
March 15, 2019	Chum Salmon	No Sampling	6
March 16, 2019	Chinook Salmon	No Sampling	1

Date	Species	Mortality Type	No. Mortalities
March 16, 2019	Chum Salmon	No Sampling	2
March 17, 2019	Chum Salmon	No Sampling	1
March 18, 2019	Chinook Salmon	No Sampling	1
March 18, 2019	Chum Salmon	No Sampling	1
March 20, 2019	Chinook Salmon	No Sampling	2
March 20, 2019	Chum Salmon	No Sampling	2
March 20, 2019	Coho Salmon	No Sampling	1
March 21, 2019	Chinook Salmon	No Sampling	1
March 21, 2019	Chum Salmon	No Sampling	1
March 21, 2019	Coastrange Sculpin	No Sampling	1
March 22, 2019	Chinook Salmon	No Sampling	12
March 22, 2019	Chum Salmon	No Sampling	5
March 22, 2019	Coho Salmon	No Sampling	1
March 23, 2019	Chinook Salmon	No Sampling	3
March 23, 2019	Chum Salmon	No Sampling	6
March 23, 2019	Coho Salmon	No Sampling	2
March 23, 2019	Prickly Sculpin	No Sampling	1
March 24, 2019	Chinook Salmon	No Sampling	3
March 24, 2019	Chum Salmon	No Sampling	2
March 24, 2019	Coho Salmon	No Sampling	1
March 26, 2019	Chum Salmon	No Sampling	12
March 26, 2019	Chum Salmon	No Sampling	15
March 27, 2019	Chinook Salmon	No Sampling	1
March 27, 2019	Chum Salmon	No Sampling	5
March 28, 2019	Chum Salmon	No Sampling	6
March 29, 2019	Chinook Salmon	No Sampling	1
March 29, 2019	Chinook Salmon	No Sampling	12
March 30, 2019	Chinook Salmon	No Sampling	3
March 30, 2019	Chum Salmon	No Sampling	23
March 30, 2019	Chum Salmon	Biosampled and Marked	1
March 30, 2019	Coho Salmon	No Sampling	1
March 31, 2019	Chinook Salmon	No Sampling	1
March 31, 2019	Chum Salmon	No Sampling	16
April 2, 2019	Chinook Salmon	No Sampling	2
April 2, 2019	Chum Salmon	No Sampling	4
April 2, 2019	Chum Salmon	No Sampling	8
April 3, 2019	Chinook Salmon	Biosampled and Marked	2
April 3, 2019	Chinook Salmon	No Sampling	1
April 3, 2019	Chum Salmon	Biosampled and Marked	8
April 3, 2019	Chum Salmon	No Sampling	12
April 3, 2019	Chum Salmon	No Sampling	3

Date	Species	Mortality Type	No. Mortalities
April 3, 2019	Chum Salmon	Biosampled and Marked	8
April 4, 2019	Chinook Salmon	Biosampled and Marked	2
April 4, 2019	Chum Salmon	Biosampled and Marked	13
April 4, 2019	Chum Salmon	No Sampling	4
April 4, 2019	Chum Salmon	No Sampling	1
April 6, 2019	Chum Salmon	No Sampling	10
April 6, 2019	Chum Salmon	Biosampled and Marked	2
April 6, 2019	Chum Salmon	No Sampling	1
April 9, 2019	Chinook Salmon	No Sampling	1
April 9, 2019	Chum Salmon	No Sampling	3
April 9, 2019	Chum Salmon	No Sampling	3
April 11, 2019	Chinook Salmon	Biosampled and Marked	1
April 11, 2019	Chum Salmon	Biosampled and Marked	2
April 12, 2019	Chinook Salmon	Biosampled and Marked	1
April 12, 2019	Chum Salmon	Biosampled and Marked	6
April 13, 2019	Chum Salmon	No Sampling	3
April 13, 2019	Coho Salmon	No Sampling	1
April 14, 2019	Chinook Salmon	No Sampling	1
April 14, 2019	Chinook Salmon	No Sampling	1
April 14, 2019	Chum Salmon	No Sampling	7
April 14, 2019	Chum Salmon	No Sampling	1
April 15, 2019	Chum Salmon	No Sampling	1
April 15, 2019	Chum Salmon	No Sampling	4
April 15, 2019	Chum Salmon	Biosampled and Marked	1
April 15, 2019	Coho Salmon	No Sampling	2
April 16, 2019	Chinook Salmon	No Sampling	1
April 19, 2019	Chinook Salmon	Biosampled and Marked	1
April 19, 2019	Chum Salmon	No Sampling	4
April 20, 2019	Chum Salmon	No Sampling	2
April 21, 2019	Chum Salmon	No Sampling	3
April 23, 2019	Chum Salmon	No Sampling	1
April 29, 2019	Coho Salmon	No Sampling	1
May 2, 2019	Chinook Salmon	No Sampling	1
May 5, 2019	Chinook Salmon	No Sampling	1
May 5, 2019	Coho Salmon	No Sampling	1

Date	Species	Mortality Type	No. Mortalities
May 5, 2019	Threespine Stickleback	No Sampling	1
May 6, 2019	Coho Salmon	No Sampling	1
May 6, 2019	Coho Salmon	No Sampling	1

APPENDIX D
BIOLOGICAL DATA

Appendix D.1. Fish Species fork length data, 2019.

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
February 23, 2019	Chinook Salmon	Fry	44	0.4
February 23, 2019	Chinook Salmon	Fry	43	0.4
February 23, 2019	Chinook Salmon	Fry	41	0.4
February 23, 2019	Chinook Salmon	Fry	40	0.4
February 23, 2019	Chinook Salmon	Fry	40	0.4
February 23, 2019	Chinook Salmon	Fry	40	0.4
February 23, 2019	Chinook Salmon	Fry	40	0.4
February 23, 2019	Chinook Salmon	Fry	39	0.4
February 23, 2019	Chinook Salmon	Fry	42	0.5
February 23, 2019	Chinook Salmon	Fry	41	0.5
February 23, 2019	Chinook Salmon	Fry	41	0.5
February 23, 2019	Chinook Salmon	Fry	38	0.4
February 23, 2019	Chinook Salmon	Fry	40	0.5
February 23, 2019	Chinook Salmon	Fry	40	0.6
February 23, 2019	Chinook Salmon	Fry	39	0.6
February 26, 2019	Chinook Salmon	Fry	39	0.3
February 26, 2019	Chinook Salmon	Fry	38	0.3
February 26, 2019	Chinook Salmon	Fry	40	0.4
February 26, 2019	Chinook Salmon	Fry	40	0.4
February 26, 2019	Chinook Salmon	Fry	40	0.4
February 26, 2019	Chinook Salmon	Fry	43	0.5
February 26, 2019	Chinook Salmon	Fry	36	0.3
February 26, 2019	Chinook Salmon	Fry	39	0.4
February 26, 2019	Chinook Salmon	Fry	39	0.4
February 26, 2019	Chinook Salmon	Fry	39	0.4
February 26, 2019	Chinook Salmon	Fry	42	0.5
February 26, 2019	Chinook Salmon	Fry	42	0.5
February 26, 2019	Chinook Salmon	Fry	42	0.5
February 26, 2019	Chinook Salmon	Fry	35	0.3
February 26, 2019	Chinook Salmon	Fry	44	0.6
February 26, 2019	Chinook Salmon	Fry	41	0.5
February 26, 2019	Chinook Salmon	Fry	41	0.5
February 26, 2019	Chinook Salmon	Fry	41	0.5
February 26, 2019	Chinook Salmon	Fry	41	0.5
February 26, 2019	Chinook Salmon	Fry	41	0.5
February 26, 2019	Chinook Salmon	Fry	38	0.4
February 26, 2019	Chinook Salmon	Fry	38	0.4
February 26, 2019	Chinook Salmon	Fry	38	0.4
February 26, 2019	Chinook Salmon	Fry	38	0.4
February 26, 2019	Chinook Salmon	Fry	40	0.5
February 26, 2019	Chinook Salmon	Fry	40	0.5

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
February 26, 2019	Chinook Salmon	Fry	40	0.5
February 26, 2019	Chinook Salmon	Fry	40	0.5
February 26, 2019	Chinook Salmon	Fry	44	0.7
February 26, 2019	Chinook Salmon	Fry	38	0.5
March 4, 2019	Chinook Salmon	Fry	40	0.3
March 4, 2019	Chinook Salmon	Fry	39	0.3
March 4, 2019	Chinook Salmon	Fry	42	0.4
March 4, 2019	Chinook Salmon	Fry	42	0.4
March 4, 2019	Chinook Salmon	Fry	45	0.5
March 4, 2019	Chinook Salmon	Fry	41	0.4
March 4, 2019	Chinook Salmon	Fry	40	0.4
March 4, 2019	Chinook Salmon	Fry	40	0.4
March 4, 2019	Chinook Salmon	Fry	40	0.4
March 4, 2019	Chinook Salmon	Fry	40	0.4
March 4, 2019	Chinook Salmon	Fry	40	0.4
March 4, 2019	Chinook Salmon	Fry	43	0.5
March 4, 2019	Chinook Salmon	Fry	42	0.5
March 4, 2019	Chinook Salmon	Fry	44	0.6
March 4, 2019	Chinook Salmon	Fry	41	0.5
March 4, 2019	Chinook Salmon	Fry	41	0.5
March 4, 2019	Chinook Salmon	Fry	41	0.5
March 4, 2019	Chinook Salmon	Fry	41	0.5
March 4, 2019	Chinook Salmon	Fry	41	0.5
March 4, 2019	Chinook Salmon	Fry	43	0.6
March 4, 2019	Chinook Salmon	Fry	40	0.5
March 4, 2019	Chinook Salmon	Fry	40	0.5
March 4, 2019	Chinook Salmon	Fry	40	0.5
March 4, 2019	Chinook Salmon	Fry	40	0.5
March 4, 2019	Chinook Salmon	Fry	37	0.4
March 4, 2019	Chinook Salmon	Fry	42	0.6
March 4, 2019	Chinook Salmon	Fry	42	0.6
March 4, 2019	Chinook Salmon	Fry	44	0.7
March 4, 2019	Chinook Salmon	Fry	44	0.7
March 4, 2019	Chinook Salmon	Fry	39	0.5
March 11, 2019	Chinook Salmon	Fry	39	0.3
March 11, 2019	Chinook Salmon	Fry	44	0.5
March 11, 2019	Chinook Salmon	Fry	37	0.3
March 11, 2019	Chinook Salmon	Fry	40	0.4
March 11, 2019	Chinook Salmon	Fry	43	0.5
March 11, 2019	Chinook Salmon	Fry	45	0.6
March 11, 2019	Chinook Salmon	Fry	39	0.4
March 11, 2019	Chinook Salmon	Fry	39	0.4
March 11, 2019	Chinook Salmon	Fry	42	0.5

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
March 11, 2019	Chinook Salmon	Fry	42	0.5
March 11, 2019	Chinook Salmon	Fry	43	0.6
March 11, 2019	Chinook Salmon	Fry	43	0.6
March 11, 2019	Chinook Salmon	Fry	43	0.6
March 11, 2019	Chinook Salmon	Fry	43	0.6
March 11, 2019	Chinook Salmon	Fry	43	0.6
March 11, 2019	Chinook Salmon	Fry	40	0.5
March 11, 2019	Chinook Salmon	Fry	40	0.5
March 11, 2019	Chinook Salmon	Fry	42	0.6
March 11, 2019	Chinook Salmon	Fry	48	0.9
March 11, 2019	Chinook Salmon	Fry	44	0.7
March 11, 2019	Chinook Salmon	Fry	44	0.7
March 11, 2019	Chinook Salmon	Fry	41	0.6
March 11, 2019	Chinook Salmon	Fry	43	0.7
March 11, 2019	Chinook Salmon	Fry	43	0.7
March 11, 2019	Chinook Salmon	Fry	48	1
March 11, 2019	Chinook Salmon	Fry	38	0.5
March 11, 2019	Chinook Salmon	Fry	38	0.5
March 11, 2019	Chinook Salmon	Fry	35	0.4
March 11, 2019	Chinook Salmon	Fry	45	0.9
March 11, 2019	Chinook Salmon	Fry	33	0.6
March 18, 2019	Chinook Salmon	Fry	44	0.6
March 18, 2019	Chinook Salmon	Fry	44	0.6
March 18, 2019	Chinook Salmon	Fry	41	0.5
March 18, 2019	Chinook Salmon	Fry	38	0.4
March 18, 2019	Chinook Salmon	Fry	43	0.6
March 18, 2019	Chinook Salmon	Fry	43	0.6
March 18, 2019	Chinook Salmon	Fry	40	0.5
March 18, 2019	Chinook Salmon	Fry	40	0.5
March 18, 2019	Chinook Salmon	Fry	40	0.5
March 18, 2019	Chinook Salmon	Fry	40	0.5
March 18, 2019	Chinook Salmon	Fry	40	0.5
March 18, 2019	Chinook Salmon	Fry	37	0.4
March 18, 2019	Chinook Salmon	Fry	42	0.6
March 18, 2019	Chinook Salmon	Fry	42	0.6
March 18, 2019	Chinook Salmon	Fry	42	0.6
March 18, 2019	Chinook Salmon	Fry	44	0.7
March 18, 2019	Chinook Salmon	Fry	36	0.4
March 18, 2019	Chinook Salmon	Fry	41	0.6
March 18, 2019	Chinook Salmon	Fry	38	0.5
March 18, 2019	Chinook Salmon	Fry	35	0.4
March 18, 2019	Chinook Salmon	Fry	40	0.6
March 18, 2019	Chinook Salmon	Fry	44	0.8

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
March 18, 2019	Chinook Salmon	Fry	37	0.5
March 18, 2019	Chinook Salmon	Fry	45	0.9
March 18, 2019	Chinook Salmon	Fry	43	0.8
March 18, 2019	Chinook Salmon	Fry	39	0.6
March 18, 2019	Chinook Salmon	Fry	34	0.4
March 18, 2019	Chinook Salmon	Fry	38	0.6
March 18, 2019	Chinook Salmon	Fry	38	0.6
March 18, 2019	Chinook Salmon	Fry	40	0.7
March 20, 2019	Chinook Salmon	Fry	40	
March 28, 2019	Chinook Salmon	Fry	38	0.3
March 28, 2019	Chinook Salmon	Fry	41	0.4
March 28, 2019	Chinook Salmon	Fry	40	0.4
March 28, 2019	Chinook Salmon	Fry	40	0.4
March 28, 2019	Chinook Salmon	Fry	43	0.5
March 28, 2019	Chinook Salmon	Fry	43	0.5
March 28, 2019	Chinook Salmon	Fry	45	0.6
March 28, 2019	Chinook Salmon	Fry	39	0.4
March 28, 2019	Chinook Salmon	Fry	39	0.4
March 28, 2019	Chinook Salmon	Fry	39	0.4
March 28, 2019	Chinook Salmon	Fry	42	0.5
March 28, 2019	Chinook Salmon	Fry	42	0.5
March 28, 2019	Chinook Salmon	Fry	42	0.5
March 28, 2019	Chinook Salmon	Fry	41	0.5
March 28, 2019	Chinook Salmon	Fry	41	0.5
March 28, 2019	Chinook Salmon	Fry	41	0.5
March 28, 2019	Chinook Salmon	Fry	38	0.4
March 28, 2019	Chinook Salmon	Fry	38	0.4
March 28, 2019	Chinook Salmon	Fry	43	0.6
March 28, 2019	Chinook Salmon	Fry	43	0.6
March 28, 2019	Chinook Salmon	Fry	43	0.6
March 28, 2019	Chinook Salmon	Fry	40	0.5
March 28, 2019	Chinook Salmon	Fry	42	0.6
March 28, 2019	Chinook Salmon	Fry	39	0.5
March 28, 2019	Chinook Salmon	Fry	41	0.6
March 28, 2019	Chinook Salmon	Fry	43	0.7
March 28, 2019	Chinook Salmon	Fry	38	0.5
March 28, 2019	Chinook Salmon	Fry	40	0.6
March 28, 2019	Chinook Salmon	Fry	40	0.6
March 28, 2019	Chinook Salmon	Fry	37	0.5
April 1, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	45	0.6
April 2, 2019	Chinook Salmon	Fry	45	0.6
April 2, 2019	Chinook Salmon	Fry	45	0.6

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 2, 2019	Chinook Salmon	Fry	39	0.4
April 2, 2019	Chinook Salmon	Fry	35	0.3
April 2, 2019	Chinook Salmon	Fry	43	0.6
April 2, 2019	Chinook Salmon	Fry	43	0.6
April 2, 2019	Chinook Salmon	Fry	43	0.6
April 2, 2019	Chinook Salmon	Fry	45	0.7
April 2, 2019	Chinook Salmon	Fry	47	0.8
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	40	0.5
April 2, 2019	Chinook Salmon	Fry	42	0.6
April 2, 2019	Chinook Salmon	Fry	43	0.7
April 2, 2019	Chinook Salmon	Fry	46	0.9
April 2, 2019	Chinook Salmon	Fry	40	0.6
April 2, 2019	Chinook Salmon	Fry	39	0.7
April 9, 2019	Chinook Salmon	Fry	45	0.5
April 9, 2019	Chinook Salmon	Fry	47	0.6
April 9, 2019	Chinook Salmon	Fry	44	0.5
April 9, 2019	Chinook Salmon	Fry	43	0.5
April 9, 2019	Chinook Salmon	Fry	45	0.6
April 9, 2019	Chinook Salmon	Fry	39	0.4
April 9, 2019	Chinook Salmon	Fry	42	0.5
April 9, 2019	Chinook Salmon	Fry	42	0.5
April 9, 2019	Chinook Salmon	Fry	44	0.6
April 9, 2019	Chinook Salmon	Fry	44	0.6
April 9, 2019	Chinook Salmon	Fry	44	0.6
April 9, 2019	Chinook Salmon	Fry	30	0.2
April 9, 2019	Chinook Salmon	Fry	45	0.7
April 9, 2019	Chinook Salmon	Fry	45	0.7
April 9, 2019	Chinook Salmon	Fry	45	0.7
April 9, 2019	Chinook Salmon	Fry	42	0.6
April 9, 2019	Chinook Salmon	Fry	41	0.6

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 9, 2019	Chinook Salmon	Fry	43	0.7
April 9, 2019	Chinook Salmon	Fry	45	0.9
April 10, 2019	Chinook Salmon	Fry	45	0.5
April 10, 2019	Chinook Salmon	Fry	45	0.5
April 10, 2019	Chinook Salmon	Fry	46	0.6
April 10, 2019	Chinook Salmon	Fry	45	0.6
April 10, 2019	Chinook Salmon	Fry	45	0.6
April 10, 2019	Chinook Salmon	Fry	34	0.3
April 10, 2019	Chinook Salmon	Fry	45	0.7
April 10, 2019	Chinook Salmon	Fry	40	0.5
April 10, 2019	Chinook Salmon	Fry	49	1
April 10, 2019	Chinook Salmon	Fry	41	0.6
April 10, 2019	Chinook Salmon	Fry	53	1.3
April 10, 2019	Chinook Salmon	Fry	38	0.5
April 12, 2019	Chinook Salmon	Fry	80	5.7
April 15, 2019	Chinook Salmon	Fry	44	0.5
April 15, 2019	Chinook Salmon	Fry	45	0.6
April 15, 2019	Chinook Salmon	Fry	48	0.8
April 15, 2019	Chinook Salmon	Fry	47	0.8
April 15, 2019	Chinook Salmon	Fry	40	0.5
April 15, 2019	Chinook Salmon	Fry	42	0.6
April 15, 2019	Chinook Salmon	Fry	48	0.9
April 15, 2019	Chinook Salmon	Fry	46	0.9
April 15, 2019	Chinook Salmon	Fry	40	0.6
April 16, 2019	Chinook Salmon	Fry	38	0.3
April 16, 2019	Chinook Salmon	Fry	45	0.5
April 16, 2019	Chinook Salmon	Fry	40	0.4
April 16, 2019	Chinook Salmon	Fry	43	0.5
April 16, 2019	Chinook Salmon	Fry	48	0.7
April 16, 2019	Chinook Salmon	Fry	45	0.6
April 16, 2019	Chinook Salmon	Fry	42	0.5
April 16, 2019	Chinook Salmon	Fry	48	0.8
April 16, 2019	Chinook Salmon	Fry	48	0.8
April 16, 2019	Chinook Salmon	Fry	49	0.9
April 16, 2019	Chinook Salmon	Fry	40	0.5
April 16, 2019	Chinook Salmon	Fry	50	1
April 16, 2019	Chinook Salmon	Fry	48	0.9
April 16, 2019	Chinook Salmon	Fry	45	0.8
April 16, 2019	Chinook Salmon	Fry	46	0.9
April 17, 2019	Chinook Salmon	Fry	35	0.5
April 18, 2019	Chinook Salmon	Fry	50	1
April 19, 2019	Chinook Salmon	Fry	76	4.3
April 19, 2019	Chinook Salmon	Fry	85	6.1

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 21, 2019	Chinook Salmon	Fry	64	2.6
April 21, 2019	Chinook Salmon	Fry	65	2.8
April 22, 2019	Chinook Salmon	Fry	38	0.3
April 22, 2019	Chinook Salmon	Fry	38	0.3
April 22, 2019	Chinook Salmon	Fry	47	0.6
April 22, 2019	Chinook Salmon	Fry	50	0.9
April 22, 2019	Chinook Salmon	Fry	48	0.8
April 22, 2019	Chinook Salmon	Fry	45	0.7
April 22, 2019	Chinook Salmon	Fry	44	0.7
April 22, 2019	Chinook Salmon	Fry	47	0.9
April 23, 2019	Chinook Salmon	Fry	44	0.4
April 23, 2019	Chinook Salmon	Fry	38	0.3
April 23, 2019	Chinook Salmon	Fry	44	0.7
April 23, 2019	Chinook Salmon	Fry	39	0.5
April 23, 2019	Chinook Salmon	Fry	63	2.9
April 25, 2019	Chinook Salmon	Fry	40	0.3
April 25, 2019	Chinook Salmon	Fry	45	0.5
April 26, 2019	Chinook Salmon	Fry	50	0.8
April 26, 2019	Chinook Salmon	Fry	42	0.5
April 26, 2019	Chinook Salmon	Fry	45	0.7
April 27, 2019	Chinook Salmon	Fry	45	0.5
April 27, 2019	Chinook Salmon	Fry	37	0.3
April 27, 2019	Chinook Salmon	Fry	52	1.3
April 28, 2019	Chinook Salmon	Fry	45	1
April 29, 2019	Chinook Salmon	Fry	48	1
April 30, 2019	Chinook Salmon	Fry	50	1.1
May 1, 2019	Chinook Salmon	Fry	47	1
May 1, 2019	Chinook Salmon	Fry	54	1.7
May 2, 2019	Chinook Salmon	Fry	50	1
May 2, 2019	Chinook Salmon	Fry	49	1
May 2, 2019	Chinook Salmon	Fry	53	1.3
May 2, 2019	Chinook Salmon	Fry	55	1.9
May 3, 2019	Chinook Salmon	Fry	54	1.6
May 4, 2019	Chinook Salmon	Fry	36	0.4
May 4, 2019	Chinook Salmon	Fry	53	1.3
May 4, 2019	Chinook Salmon	Fry	56	1.6
May 5, 2019	Chinook Salmon	Fry	48	1.1
May 9, 2019	Chinook Salmon	Fry	55	-
February 23, 2019	Coho Salmon	Fry	39	-
February 23, 2019	Coho Salmon	Fry	39	-
February 23, 2019	Coho Salmon	Fry	35	-
February 23, 2019	Coho Salmon	Fry	36	-
February 23, 2019	Coho Salmon	Fry	37	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
February 23, 2019	Coho Salmon	Fry	38	-
February 23, 2019	Coho Salmon	Fry	35	-
February 23, 2019	Coho Salmon	Fry	31	-
February 23, 2019	Coho Salmon	Fry	31	-
February 27, 2019	Coho Salmon	Fry	36	-
February 27, 2019	Coho Salmon	Fry	38	-
February 27, 2019	Coho Salmon	Fry	33	-
February 28, 2019	Coho Salmon	Fry	38	-
February 28, 2019	Coho Salmon	Fry	38	-
February 28, 2019	Coho Salmon	Fry	36	-
March 1, 2019	Coho Salmon	Fry	39	-
March 1, 2019	Coho Salmon	Fry	39	-
March 1, 2019	Coho Salmon	Fry	38	-
March 1, 2019	Coho Salmon	Fry	37	-
March 2, 2019	Coho Salmon	Fry	32	-
March 3, 2019	Coho Salmon	Fry	32	-
March 3, 2019	Coho Salmon	Fry	30	-
March 3, 2019	Coho Salmon	Fry	38	-
March 3, 2019	Coho Salmon	Fry	34	-
March 3, 2019	Coho Salmon	Fry	36	-
March 4, 2019	Coho Salmon	Fry	31	-
March 4, 2019	Coho Salmon	Fry	32	-
March 4, 2019	Coho Salmon	Fry	34	-
March 4, 2019	Coho Salmon	Fry	38	-
March 4, 2019	Coho Salmon	Fry	38	-
March 4, 2019	Coho Salmon	Fry	40	-
March 4, 2019	Coho Salmon	Fry	40	-
March 4, 2019	Coho Salmon	Fry	39	-
March 4, 2019	Coho Salmon	Fry	39	-
March 4, 2019	Coho Salmon	Fry	37	-
March 4, 2019	Coho Salmon	Fry	31	-
March 4, 2019	Coho Salmon	Fry	31	-
March 4, 2019	Coho Salmon	Fry	30	-
March 4, 2019	Coho Salmon	Fry	36	-
March 4, 2019	Coho Salmon	Fry	40	-
March 4, 2019	Coho Salmon	Fry	42	-
March 4, 2019	Coho Salmon	Fry	40	-
March 4, 2019	Coho Salmon	Fry	39	-
March 4, 2019	Coho Salmon	Fry	35	-
March 5, 2019	Coho Salmon	Fry	35	-
March 5, 2019	Coho Salmon	Fry	33	-
March 6, 2019	Coho Salmon	Fry	39	-
March 6, 2019	Coho Salmon	Fry	40	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
March 6, 2019	Coho Salmon	Fry	45	-
March 6, 2019	Coho Salmon	Fry	35	-
March 6, 2019	Coho Salmon	Fry	38	-
March 6, 2019	Coho Salmon	Fry	35	-
March 6, 2019	Coho Salmon	Fry	39	-
March 6, 2019	Coho Salmon	Fry	39	-
March 6, 2019	Coho Salmon	Fry	38	-
March 6, 2019	Coho Salmon	Fry	38	-
March 11, 2019	Coho Salmon	Fry	39	-
March 11, 2019	Coho Salmon	Fry	40	-
March 11, 2019	Coho Salmon	Fry	39	-
March 11, 2019	Coho Salmon	Fry	39	-
March 11, 2019	Coho Salmon	Fry	35	-
March 11, 2019	Coho Salmon	Fry	40	-
March 11, 2019	Coho Salmon	Fry	38	-
March 11, 2019	Coho Salmon	Fry	37	-
March 11, 2019	Coho Salmon	Fry	39	-
March 11, 2019	Coho Salmon	Fry	39	-
March 11, 2019	Coho Salmon	Fry	38	-
March 11, 2019	Coho Salmon	Fry	37	-
March 12, 2019	Coho Salmon	Fry	43	-
March 12, 2019	Coho Salmon	Fry	38	-
March 12, 2019	Coho Salmon	Fry	34	-
March 12, 2019	Coho Salmon	Fry	39	-
March 12, 2019	Coho Salmon	Fry	39	-
March 12, 2019	Coho Salmon	Fry	38	-
March 12, 2019	Coho Salmon	Fry	38	-
March 12, 2019	Coho Salmon	Fry	36	-
March 12, 2019	Coho Salmon	Fry	40	-
March 12, 2019	Coho Salmon	Fry	37	-
March 12, 2019	Coho Salmon	Fry	37	-
March 12, 2019	Coho Salmon	Fry	38	-
March 12, 2019	Coho Salmon	Fry	38	-
March 12, 2019	Coho Salmon	Fry	39	-
March 12, 2019	Coho Salmon	Fry	38	-
March 12, 2019	Coho Salmon	Fry	40	-
March 12, 2019	Coho Salmon	Fry	32	-
March 12, 2019	Coho Salmon	Fry	40	-
March 19, 2019	Coho Salmon	Fry	38	-
March 19, 2019	Coho Salmon	Fry	39	-
March 19, 2019	Coho Salmon	Fry	36	-
March 19, 2019	Coho Salmon	Fry	38	-
March 19, 2019	Coho Salmon	Fry	35	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
March 20, 2019	Coho Salmon	Fry	40	-
March 20, 2019	Coho Salmon	Fry	41	-
March 20, 2019	Coho Salmon	Fry	39	-
March 20, 2019	Coho Salmon	Fry	38	-
March 20, 2019	Coho Salmon	Fry	40	-
March 20, 2019	Coho Salmon	Fry	40	-
March 20, 2019	Coho Salmon	Fry	40	-
March 20, 2019	Coho Salmon	Fry	38	-
March 20, 2019	Coho Salmon	Fry	38	-
March 20, 2019	Coho Salmon	Fry	36	-
March 20, 2019	Coho Salmon	Fry	37	-
March 20, 2019	Coho Salmon	Fry	40	-
March 20, 2019	Coho Salmon	Fry	40	-
March 20, 2019	Coho Salmon	Fry	37	-
March 20, 2019	Coho Salmon	Fry	36	-
March 20, 2019	Coho Salmon	Fry	40	-
March 20, 2019	Coho Salmon	Fry	38	-
March 21, 2019	Coho Salmon	Fry	38	-
March 21, 2019	Coho Salmon	Fry	40	-
March 21, 2019	Coho Salmon	Fry	39	-
March 21, 2019	Coho Salmon	Fry	37	-
March 21, 2019	Coho Salmon	Fry	45	-
March 21, 2019	Coho Salmon	Fry	38	-
March 21, 2019	Coho Salmon	Fry	38	-
March 28, 2019	Coho Salmon	Fry	40	-
March 28, 2019	Coho Salmon	Fry	42	-
March 28, 2019	Coho Salmon	Fry	43	-
March 28, 2019	Coho Salmon	Fry	37	-
March 28, 2019	Coho Salmon	Fry	38	-
March 28, 2019	Coho Salmon	Fry	38	-
March 28, 2019	Coho Salmon	Fry	39	-
March 28, 2019	Coho Salmon	Fry	40	-
March 28, 2019	Coho Salmon	Fry	37	-
March 28, 2019	Coho Salmon	Fry	39	-
March 28, 2019	Coho Salmon	Fry	38	-
March 28, 2019	Coho Salmon	Fry	39	-
March 28, 2019	Coho Salmon	Fry	38	-
March 28, 2019	Coho Salmon	Fry	37	-
March 28, 2019	Coho Salmon	Fry	40	-
March 28, 2019	Coho Salmon	Fry	41	-
March 28, 2019	Coho Salmon	Fry	41	-
March 28, 2019	Coho Salmon	Fry	40	-
March 28, 2019	Coho Salmon	Fry	38	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
March 28, 2019	Coho Salmon	Fry	41	-
March 28, 2019	Coho Salmon	Fry	37	-
March 28, 2019	Coho Salmon	Fry	42	-
March 28, 2019	Coho Salmon	Fry	40	-
March 28, 2019	Coho Salmon	Fry	40	-
March 28, 2019	Coho Salmon	Fry	41	-
March 28, 2019	Coho Salmon	Fry	37	-
March 28, 2019	Coho Salmon	Fry	42	-
March 28, 2019	Coho Salmon	Fry	39	-
March 28, 2019	Coho Salmon	Fry	41	-
March 28, 2019	Coho Salmon	Fry	38	-
April 2, 2019	Coho Salmon	Fry	41	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	39	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	42	-
April 2, 2019	Coho Salmon	Fry	39	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	35	-
April 2, 2019	Coho Salmon	Fry	42	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	39	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	39	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	42	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	39	-
April 2, 2019	Coho Salmon	Fry	38	-
April 2, 2019	Coho Salmon	Fry	38	-
April 2, 2019	Coho Salmon	Fry	40	-
April 2, 2019	Coho Salmon	Fry	42	-
April 9, 2019	Coho Salmon	Fry	39	-
April 9, 2019	Coho Salmon	Fry	39	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 9, 2019	Coho Salmon	Fry	40	-
April 9, 2019	Coho Salmon	Fry	40	-
April 9, 2019	Coho Salmon	Fry	39	-
April 9, 2019	Coho Salmon	Fry	39	-
April 9, 2019	Coho Salmon	Fry	31	-
April 9, 2019	Coho Salmon	Fry	40	-
April 9, 2019	Coho Salmon	Fry	38	-
April 9, 2019	Coho Salmon	Fry	37	-
April 9, 2019	Coho Salmon	Fry	39	-
April 9, 2019	Coho Salmon	Fry	38	-
April 9, 2019	Coho Salmon	Fry	39	-
April 9, 2019	Coho Salmon	Fry	42	-
April 9, 2019	Coho Salmon	Fry	36	-
April 9, 2019	Coho Salmon	Fry	40	-
April 9, 2019	Coho Salmon	Fry	38	-
April 9, 2019	Coho Salmon	Fry	40	-
April 9, 2019	Coho Salmon	Fry	38	-
April 9, 2019	Coho Salmon	Fry	37	-
April 9, 2019	Coho Salmon	Fry	40	-
April 9, 2019	Coho Salmon	Fry	44	-
April 9, 2019	Coho Salmon	Fry	38	-
April 9, 2019	Coho Salmon	Fry	38	-
April 9, 2019	Coho Salmon	Fry	39	-
April 9, 2019	Coho Salmon	Fry	38	-
April 9, 2019	Coho Salmon	Fry	41	-
April 9, 2019	Coho Salmon	Fry	38	-
April 9, 2019	Coho Salmon	Fry	40	-
April 9, 2019	Coho Salmon	Fry	40	-
April 14, 2019	Coho Salmon	Fry	61	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	42	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	44	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	41	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	45	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	42	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	42	-
April 15, 2019	Coho Salmon	Fry	44	-
April 15, 2019	Coho Salmon	Fry	41	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	44	-
April 15, 2019	Coho Salmon	Fry	42	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	38	-
April 15, 2019	Coho Salmon	Fry	42	-
April 15, 2019	Coho Salmon	Fry	42	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	39	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	40	-
April 15, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	39	-
April 22, 2019	Coho Salmon	Fry	36	-
April 22, 2019	Coho Salmon	Fry	43	-
April 22, 2019	Coho Salmon	Fry	35	-
April 22, 2019	Coho Salmon	Fry	43	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	39	-
April 22, 2019	Coho Salmon	Fry	38	-
April 22, 2019	Coho Salmon	Fry	35	-
April 22, 2019	Coho Salmon	Fry	43	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	38	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	42	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	39	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	44	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	44	-
April 22, 2019	Coho Salmon	Fry	40	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 22, 2019	Coho Salmon	Fry	45	-
April 22, 2019	Coho Salmon	Fry	40	-
April 22, 2019	Coho Salmon	Fry	40	-
April 30, 2019	Coho Salmon	Fry	36	-
April 30, 2019	Coho Salmon	Fry	38	-
May 2, 2019	Coho Salmon	Fry	40	-
May 4, 2019	Coho Salmon	Fry	40	-
May 8, 2019	Coho Salmon	Fry	40	-
May 8, 2019	Coho Salmon	Fry	38	-
February 23, 2019	Coho Salmon	Parr	108	-
April 9, 2019	Coho Salmon	Parr	84	-
April 10, 2019	Coho Salmon	Parr	80	-
April 10, 2019	Coho Salmon	Parr	84	-
April 10, 2019	Coho Salmon	Parr	86	-
April 10, 2019	Coho Salmon	Parr	82	-
April 10, 2019	Coho Salmon	Parr	102	-
April 10, 2019	Coho Salmon	Parr	99	-
April 10, 2019	Coho Salmon	Parr	102	-
April 12, 2019	Coho Salmon	Parr	72	-
April 12, 2019	Coho Salmon	Parr	96	-
April 12, 2019	Coho Salmon	Parr	81	-
April 12, 2019	Coho Salmon	Parr	98	-
April 13, 2019	Coho Salmon	Parr	72	-
April 13, 2019	Coho Salmon	Parr	92	-
April 13, 2019	Coho Salmon	Parr	90	-
April 14, 2019	Coho Salmon	Parr	73	-
April 14, 2019	Coho Salmon	Parr	81	-
April 14, 2019	Coho Salmon	Parr	95	-
April 14, 2019	Coho Salmon	Parr	119	-
April 14, 2019	Coho Salmon	Parr	125	-
April 14, 2019	Coho Salmon	Parr	120	-
April 15, 2019	Coho Salmon	Parr	72	-
April 15, 2019	Coho Salmon	Parr	79	-
April 15, 2019	Coho Salmon	Parr	85	-
April 15, 2019	Coho Salmon	Parr	95	-
April 15, 2019	Coho Salmon	Parr	110	-
April 16, 2019	Coho Salmon	Parr	84	-
April 16, 2019	Coho Salmon	Parr	76	-
April 16, 2019	Coho Salmon	Parr	81	-
April 16, 2019	Coho Salmon	Parr	86	-
April 16, 2019	Coho Salmon	Parr	110	-
April 18, 2019	Coho Salmon	Parr	80	-
April 18, 2019	Coho Salmon	Parr	87	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 18, 2019	Coho Salmon	Parr	121	-
April 19, 2019	Coho Salmon	Parr	75	-
April 19, 2019	Coho Salmon	Parr	115	-
April 20, 2019	Coho Salmon	Parr	75	-
April 20, 2019	Coho Salmon	Parr	79	-
April 20, 2019	Coho Salmon	Parr	73	-
April 20, 2019	Coho Salmon	Parr	109	-
April 20, 2019	Coho Salmon	Parr	84	-
April 20, 2019	Coho Salmon	Parr	87	-
April 20, 2019	Coho Salmon	Parr	91	-
April 20, 2019	Coho Salmon	Parr	95	-
April 20, 2019	Coho Salmon	Parr	95	-
April 20, 2019	Coho Salmon	Parr	96	-
April 20, 2019	Coho Salmon	Parr	106	-
April 20, 2019	Coho Salmon	Parr	110	-
April 20, 2019	Coho Salmon	Parr	118	-
April 20, 2019	Coho Salmon	Parr	120	-
April 21, 2019	Coho Salmon	Parr	73	-
April 21, 2019	Coho Salmon	Parr	85	-
April 21, 2019	Coho Salmon	Parr	92	-
April 21, 2019	Coho Salmon	Parr	112	-
April 21, 2019	Coho Salmon	Parr	111	-
April 21, 2019	Coho Salmon	Parr	116	-
April 21, 2019	Coho Salmon	Parr	118	-
April 22, 2019	Coho Salmon	Parr	84	-
April 22, 2019	Coho Salmon	Parr	93	-
April 22, 2019	Coho Salmon	Parr	110	-
April 22, 2019	Coho Salmon	Parr	100	-
April 22, 2019	Coho Salmon	Parr	106	-
April 22, 2019	Coho Salmon	Parr	116	-
April 22, 2019	Coho Salmon	Parr	122	-
April 23, 2019	Coho Salmon	Parr	78	-
April 23, 2019	Coho Salmon	Parr	84	-
April 23, 2019	Coho Salmon	Parr	83	-
April 23, 2019	Coho Salmon	Parr	94	-
April 23, 2019	Coho Salmon	Parr	93	-
April 23, 2019	Coho Salmon	Parr	97	-
April 23, 2019	Coho Salmon	Parr	103	-
April 23, 2019	Coho Salmon	Parr	104	-
April 23, 2019	Coho Salmon	Parr	126	-
April 24, 2019	Coho Salmon	Parr	85	-
April 24, 2019	Coho Salmon	Parr	100	-
April 24, 2019	Coho Salmon	Parr	103	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 24, 2019	Coho Salmon	Parr	104	-
April 24, 2019	Coho Salmon	Parr	102	-
April 24, 2019	Coho Salmon	Parr	100	-
April 24, 2019	Coho Salmon	Parr	106	-
April 25, 2019	Coho Salmon	Parr	100	-
April 25, 2019	Coho Salmon	Parr	105	-
April 25, 2019	Coho Salmon	Parr	115	-
April 25, 2019	Coho Salmon	Parr	125	-
April 26, 2019	Coho Salmon	Parr	100	-
April 26, 2019	Coho Salmon	Parr	100	-
April 26, 2019	Coho Salmon	Parr	105	-
April 26, 2019	Coho Salmon	Parr	106	-
April 26, 2019	Coho Salmon	Parr	120	-
April 26, 2019	Coho Salmon	Parr	120	-
April 26, 2019	Coho Salmon	Parr	140	-
April 26, 2019	Coho Salmon	Parr	140	-
April 27, 2019	Coho Salmon	Parr	92	-
April 27, 2019	Coho Salmon	Parr	97	-
April 27, 2019	Coho Salmon	Parr	103	-
April 27, 2019	Coho Salmon	Parr	104	-
April 27, 2019	Coho Salmon	Parr	107	-
April 27, 2019	Coho Salmon	Parr	105	-
April 27, 2019	Coho Salmon	Parr	108	-
April 27, 2019	Coho Salmon	Parr	110	-
April 27, 2019	Coho Salmon	Parr	119	-
April 27, 2019	Coho Salmon	Parr	124	-
April 27, 2019	Coho Salmon	Parr	140	-
April 28, 2019	Coho Salmon	Parr	85	-
April 28, 2019	Coho Salmon	Parr	95	-
April 28, 2019	Coho Salmon	Parr	109	-
April 28, 2019	Coho Salmon	Parr	108	-
April 28, 2019	Coho Salmon	Parr	109	-
April 28, 2019	Coho Salmon	Parr	107	-
April 28, 2019	Coho Salmon	Parr	105	-
April 28, 2019	Coho Salmon	Parr	107	-
April 28, 2019	Coho Salmon	Parr	118	-
April 28, 2019	Coho Salmon	Parr	117	-
April 28, 2019	Coho Salmon	Parr	120	-
April 28, 2019	Coho Salmon	Parr	118	-
April 29, 2019	Coho Salmon	Parr	75	-
April 29, 2019	Coho Salmon	Parr	85	-
April 29, 2019	Coho Salmon	Parr	84	-
April 29, 2019	Coho Salmon	Parr	93	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
April 29, 2019	Coho Salmon	Parr	97	-
April 29, 2019	Coho Salmon	Parr	95	-
April 29, 2019	Coho Salmon	Parr	104	-
April 29, 2019	Coho Salmon	Parr	105	-
April 29, 2019	Coho Salmon	Parr	110	-
April 29, 2019	Coho Salmon	Parr	108	-
April 29, 2019	Coho Salmon	Parr	118	-
April 29, 2019	Coho Salmon	Parr	118	-
April 29, 2019	Coho Salmon	Parr	119	-
April 29, 2019	Coho Salmon	Parr	119	-
April 29, 2019	Coho Salmon	Parr	124	-
April 30, 2019	Coho Salmon	Parr	81	-
April 30, 2019	Coho Salmon	Parr	85	-
April 30, 2019	Coho Salmon	Parr	84	-
April 30, 2019	Coho Salmon	Parr	96	-
April 30, 2019	Coho Salmon	Parr	112	-
April 30, 2019	Coho Salmon	Parr	93	-
April 30, 2019	Coho Salmon	Parr	106	-
April 30, 2019	Coho Salmon	Parr	113	-
April 30, 2019	Coho Salmon	Parr	109	-
April 30, 2019	Coho Salmon	Parr	112	-
April 30, 2019	Coho Salmon	Parr	111	-
April 30, 2019	Coho Salmon	Parr	108	-
April 30, 2019	Coho Salmon	Parr	112	-
April 30, 2019	Coho Salmon	Parr	114	-
April 30, 2019	Coho Salmon	Parr	115	-
April 30, 2019	Coho Salmon	Parr	119	-
April 30, 2019	Coho Salmon	Parr	118	-
April 30, 2019	Coho Salmon	Parr	120	-
April 30, 2019	Coho Salmon	Parr	128	-
April 30, 2019	Coho Salmon	Parr	137	-
May 1, 2019	Coho Salmon	Parr	79	-
May 1, 2019	Coho Salmon	Parr	91	-
May 1, 2019	Coho Salmon	Parr	93	-
May 1, 2019	Coho Salmon	Parr	91	-
May 1, 2019	Coho Salmon	Parr	106	-
May 1, 2019	Coho Salmon	Parr	113	-
May 1, 2019	Coho Salmon	Parr	105	-
May 1, 2019	Coho Salmon	Parr	107	-
May 1, 2019	Coho Salmon	Parr	110	-
May 1, 2019	Coho Salmon	Parr	113	-
May 1, 2019	Coho Salmon	Parr	109	-
May 1, 2019	Coho Salmon	Parr	109	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
May 1, 2019	Coho Salmon	Parr	112	-
May 1, 2019	Coho Salmon	Parr	114	-
May 1, 2019	Coho Salmon	Parr	113	-
May 1, 2019	Coho Salmon	Parr	114	-
May 1, 2019	Coho Salmon	Parr	111	-
May 1, 2019	Coho Salmon	Parr	114	-
May 1, 2019	Coho Salmon	Parr	110	-
May 1, 2019	Coho Salmon	Parr	120	-
May 2, 2019	Coho Salmon	Parr	102	-
May 2, 2019	Coho Salmon	Parr	100	-
May 2, 2019	Coho Salmon	Parr	108	-
May 2, 2019	Coho Salmon	Parr	108	-
May 2, 2019	Coho Salmon	Parr	100	-
May 2, 2019	Coho Salmon	Parr	108	-
May 2, 2019	Coho Salmon	Parr	103	-
May 2, 2019	Coho Salmon	Parr	113	-
May 2, 2019	Coho Salmon	Parr	109	-
May 2, 2019	Coho Salmon	Parr	110	-
May 2, 2019	Coho Salmon	Parr	106	-
May 2, 2019	Coho Salmon	Parr	105	-
May 2, 2019	Coho Salmon	Parr	105	-
May 2, 2019	Coho Salmon	Parr	115	-
May 2, 2019	Coho Salmon	Parr	121	-
May 2, 2019	Coho Salmon	Parr	130	-
May 2, 2019	Coho Salmon	Parr	115	-
May 2, 2019	Coho Salmon	Parr	120	-
May 2, 2019	Coho Salmon	Parr	124	-
May 2, 2019	Coho Salmon	Parr	115	-
May 2, 2019	Coho Salmon	Parr	132	-
May 3, 2019	Coho Salmon	Parr	78	-
May 3, 2019	Coho Salmon	Parr	85	-
May 3, 2019	Coho Salmon	Parr	84	-
May 3, 2019	Coho Salmon	Parr	95	-
May 3, 2019	Coho Salmon	Parr	91	-
May 3, 2019	Coho Salmon	Parr	100	-
May 3, 2019	Coho Salmon	Parr	95	-
May 3, 2019	Coho Salmon	Parr	93	-
May 3, 2019	Coho Salmon	Parr	94	-
May 3, 2019	Coho Salmon	Parr	97	-
May 3, 2019	Coho Salmon	Parr	98	-
May 3, 2019	Coho Salmon	Parr	100	-
May 3, 2019	Coho Salmon	Parr	105	-
May 3, 2019	Coho Salmon	Parr	103	-

Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
May 3, 2019	Coho Salmon	Parr	106	-
May 3, 2019	Coho Salmon	Parr	110	-
May 3, 2019	Coho Salmon	Parr	108	-
May 3, 2019	Coho Salmon	Parr	117	-
May 3, 2019	Coho Salmon	Parr	110	-
May 3, 2019	Coho Salmon	Parr	113	-
May 3, 2019	Coho Salmon	Parr	120	-
May 3, 2019	Coho Salmon	Parr	110	-
May 3, 2019	Coho Salmon	Parr	130	-
May 4, 2019	Coho Salmon	Parr	87	-
May 4, 2019	Coho Salmon	Parr	95	-
May 4, 2019	Coho Salmon	Parr	90	-
May 4, 2019	Coho Salmon	Parr	102	-
May 4, 2019	Coho Salmon	Parr	97	-
May 4, 2019	Coho Salmon	Parr	97	-
May 4, 2019	Coho Salmon	Parr	108	-
May 4, 2019	Coho Salmon	Parr	107	-
May 4, 2019	Coho Salmon	Parr	105	-
May 4, 2019	Coho Salmon	Parr	106	-
May 4, 2019	Coho Salmon	Parr	108	-
May 4, 2019	Coho Salmon	Parr	112	-
May 4, 2019	Coho Salmon	Parr	113	-
May 4, 2019	Coho Salmon	Parr	112	-
May 4, 2019	Coho Salmon	Parr	120	-
May 4, 2019	Coho Salmon	Parr	120	-
May 4, 2019	Coho Salmon	Parr	122	-
May 4, 2019	Coho Salmon	Parr	124	-
May 4, 2019	Coho Salmon	Parr	128	-
May 5, 2019	Coho Salmon	Parr	99	-
May 5, 2019	Coho Salmon	Parr	87	-
May 5, 2019	Coho Salmon	Parr	99	-
May 5, 2019	Coho Salmon	Parr	101	-
May 5, 2019	Coho Salmon	Parr	113	-
May 5, 2019	Coho Salmon	Parr	114	-
May 5, 2019	Coho Salmon	Parr	119	-
May 5, 2019	Coho Salmon	Parr	139	-
May 6, 2019	Coho Salmon	Parr	100	-
May 6, 2019	Coho Salmon	Parr	108	-
May 9, 2019	Coho Salmon	Parr	100	-
March 13, 2019	Rainbow Trout	Fry	57	-
March 14, 2019	Rainbow Trout	Fry	40	-
March 17, 2019	Rainbow Trout	Fry	65	-
March 18, 2019	Rainbow Trout	Fry	79	-

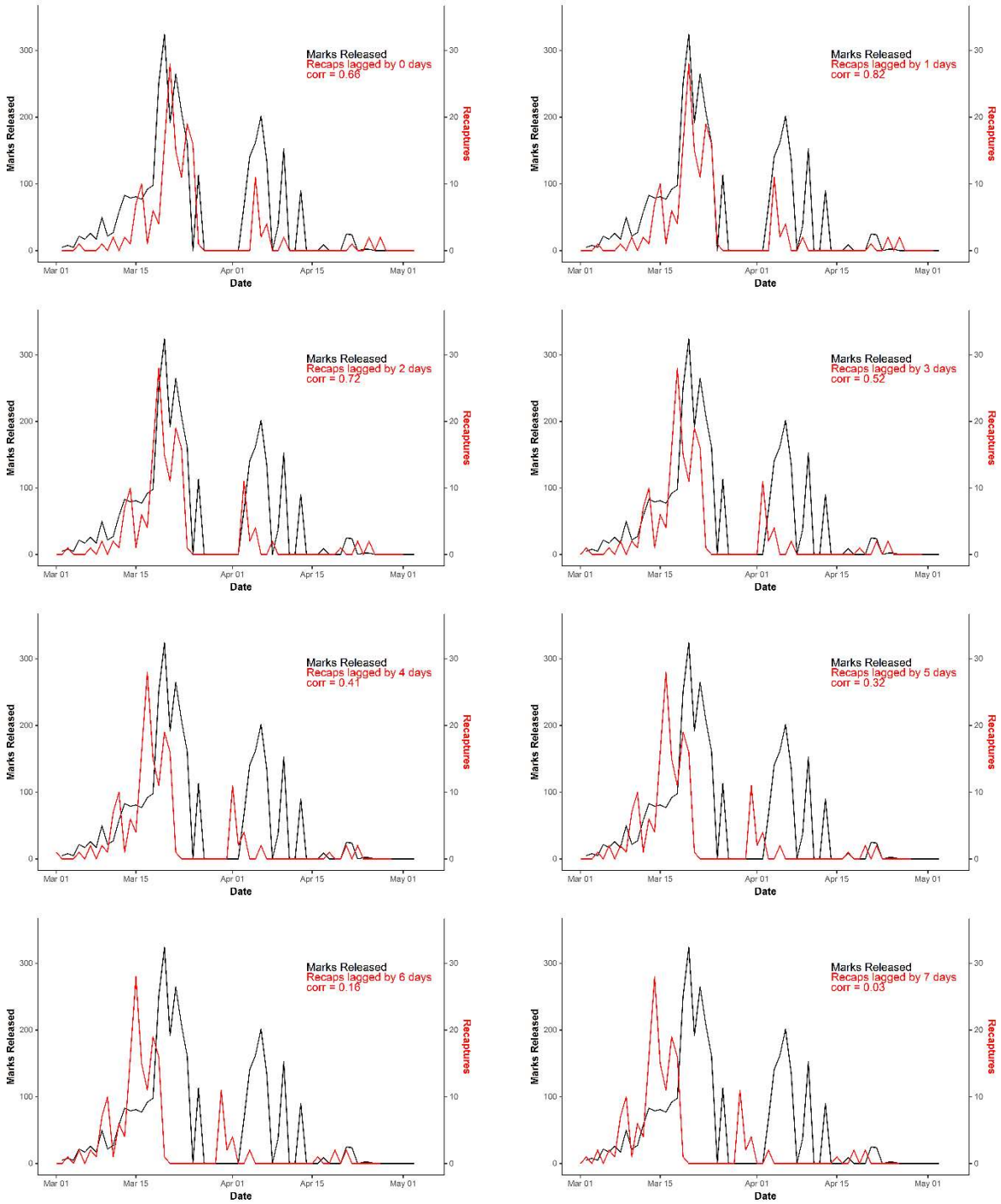
Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
March 19, 2019	Rainbow Trout	Fry	53	-
March 20, 2019	Rainbow Trout	Fry	55	-
March 20, 2019	Rainbow Trout	Fry	58	-
March 21, 2019	Rainbow Trout	Fry	72	-
March 23, 2019	Rainbow Trout	Fry	55	-
March 24, 2019	Rainbow Trout	Fry	56	-
March 26, 2019	Rainbow Trout	Fry	81	-
March 27, 2019	Rainbow Trout	Fry	52	-
March 27, 2019	Rainbow Trout	Fry	80	-
March 28, 2019	Rainbow Trout	Fry	75	-
March 30, 2019	Rainbow Trout	Fry	54	-
April 4, 2019	Rainbow Trout	Fry	60	-
April 4, 2019	Rainbow Trout	Fry	70	-
April 4, 2019	Rainbow Trout	Fry	85	-
April 4, 2019	Rainbow Trout	Fry	90	-
April 6, 2019	Rainbow Trout	Fry	70	-
April 6, 2019	Rainbow Trout	Fry	85	-
April 6, 2019	Rainbow Trout	Fry	85	-
April 10, 2019	Rainbow Trout	Fry	54	-
April 10, 2019	Rainbow Trout	Fry	65	-
April 10, 2019	Rainbow Trout	Fry	54	-
April 10, 2019	Rainbow Trout	Fry	70	-
April 10, 2019	Rainbow Trout	Fry	65	-
April 10, 2019	Rainbow Trout	Fry	65	-
April 10, 2019	Rainbow Trout	Fry	81	-
April 12, 2019	Rainbow Trout	Fry	68	-
April 12, 2019	Rainbow Trout	Fry	58	-
April 12, 2019	Rainbow Trout	Fry	58	-
April 12, 2019	Rainbow Trout	Fry	77	-
April 14, 2019	Rainbow Trout	Fry	69	-
April 21, 2019	Rainbow Trout	Fry	50	-
April 21, 2019	Rainbow Trout	Fry	68	-
April 22, 2019	Rainbow Trout	Fry	63	-
April 26, 2019	Rainbow Trout	Fry	75	-
April 26, 2019	Rainbow Trout	Fry	75	-
April 29, 2019	Rainbow Trout	Fry	75	-
May 1, 2019	Rainbow Trout	Fry	58	-
May 1, 2019	Rainbow Trout	Fry	77	-
May 5, 2019	Rainbow Trout	Fry	58	-
May 6, 2019	Rainbow Trout	Fry	58	-
May 6, 2019	Rainbow Trout	Fry	75	-
May 6, 2019	Rainbow Trout	Fry	86	-
May 7, 2019	Rainbow Trout	Fry	77	-

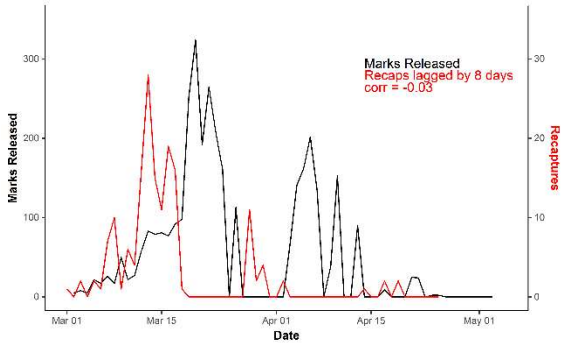
Date	Species	Life History Stage	Fork Length (mm)	Weight (g)
May 7, 2019	Rainbow Trout	Fry	87	-
March 27, 2019	Rainbow Trout	Parr	96	-
March 29, 2019	Rainbow Trout	Parr	94	-
March 29, 2019	Rainbow Trout	Parr	146	-
April 5, 2019	Rainbow Trout	Parr	100	-
April 9, 2019	Rainbow Trout	Parr	111	-
April 10, 2019	Rainbow Trout	Parr	166	-
April 12, 2019	Rainbow Trout	Parr	111	-
April 13, 2019	Rainbow Trout	Parr	179	-
April 14, 2019	Rainbow Trout	Parr	113	-
April 24, 2019	Rainbow Trout	Parr	150	-
April 27, 2019	Rainbow Trout	Parr	164	-
April 28, 2019	Rainbow Trout	Parr	133	-
April 28, 2019	Rainbow Trout	Parr	147	-
April 28, 2019	Rainbow Trout	Parr	178	-
April 28, 2019	Rainbow Trout	Parr	190	-
April 29, 2019	Rainbow Trout	Parr	140	-
April 30, 2019	Rainbow Trout	Parr	149	-
April 30, 2019	Rainbow Trout	Parr	155	-
April 30, 2019	Rainbow Trout	Parr	167	-
April 30, 2019	Rainbow Trout	Parr	187	-
May 1, 2019	Rainbow Trout	Parr	113	-
May 1, 2019	Rainbow Trout	Parr	123	-
May 1, 2019	Rainbow Trout	Parr	128	-
May 2, 2019	Rainbow Trout	Parr	95	-
May 2, 2019	Rainbow Trout	Parr	145	-
May 2, 2019	Rainbow Trout	Parr	158	-
May 2, 2019	Rainbow Trout	Parr	160	-
May 2, 2019	Rainbow Trout	Parr	195	-
May 2, 2019	Rainbow Trout	Parr	240	-
May 3, 2019	Rainbow Trout	Parr	158	-
May 4, 2019	Rainbow Trout	Parr	118	-
May 4, 2019	Rainbow Trout	Parr	155	-
May 4, 2019	Rainbow Trout	Parr	160	-
May 4, 2019	Rainbow Trout	Parr	169	-
May 4, 2019	Rainbow Trout	Parr	180	-
May 5, 2019	Rainbow Trout	Parr	137	-
February 24, 2019	Eulachon	Adult	144	-
February 27, 2019	Eulachon	Adult	165	-
April 24, 2019	Eulachon	Adult	140	17.3

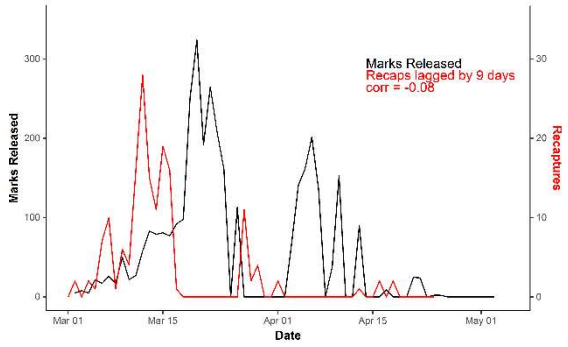
APPENDIX E

MARK RELEASE AND RECAPTURE DISTRIBUTION RESULTS

Appendix E.1. Mark release and recapture distribution results.




Marks Released
Recaps lagged by 8 days
corr = -0.03
Marks Released
Recaptures
Date
Mar 01
Mar 15
Apr 01
Apr 15
May 01
0
100
200
300
0
10
20
30


Marks Released
Recaps lagged by 9 days
corr = -0.08
Marks Released
Recaptures
Date
Mar 01
Mar 15
Apr 01
Apr 15
May 01
0
100
200
300
0
10
20
30