U.S. Fish and Wildlife Service
Office of Subsistence Management
Fisheries Resource Monitoring Program

# Neva Lake Sockeye Salmon Stock Assessment, 2019

**Annual Report for Study 18-607**

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(Cover photo:  The Neva Lake weir, June 19, 2019.)

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## ABSTRACT

In 2019, we estimate that the escapement of adult and jack Sockeye Salmon (*Oncorhynchus nerka*) into Neva Lake was 4,389 fish. The escapement was estimated using counts from a remotely monitored video weir at the outlet of the lake from June 20 to September 30. Motion-triggered video clips from each camera were viewed simultaneously so passing fish could be seen from multiple angles and counted as accurately and efficiently as possible. The run timing in 2019 was later than normal, with the midpoint of the run on August 17, compared to the historical midpoint of August 1. Low water levels in the Neva Lake outlet stream likely contributed to the delayed run timing. All of the fish sampled in 2019 were freshwater age 1, suggesting that smolt densities are well within the carrying capacity of the lake. The age composition was dominated by age 1.1 and 1.3 fish, with unusually few age 1.2 fish sampled.



Key words: Sockeye Salmon, Neva Lake, escapement, video weir, remote monitoring, age composition

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## INTRODUCTION

The Sockeye Salmon return to Neva Lake has long been an important subsistence fishery for Tlingit families living in Excursion Inlet, Hoonah, and other areas of northern Southeast Alaska (de Laguna 1960; Schroeder and Kookesh 1990; Goldschmidt and Haas 1998; Ratner and Dizard 2005; Langdon 2006; Figure 1).

Little was known about the health of the Neva Lake Sockeye Salmon run prior to 2002. From 2002 to 2019, the U.S. Forest Service has funded, through the U.S. Fish and Wildlife Service, Office of Subsistence Management, Fishery Resource Monitoring Program, a project to estimate the escapement and age, sex, and length composition of Sockeye Salmon into Neva Lake. This has been a cooperative project with the Hoonah Indian Association employing the field personnel, the Alaska Department of Fish and Game (ADF&G) processing the scale (age), sex, and length data, and the U. S. Forest Service taking the lead in project planning, implementation, analysis, and reporting.

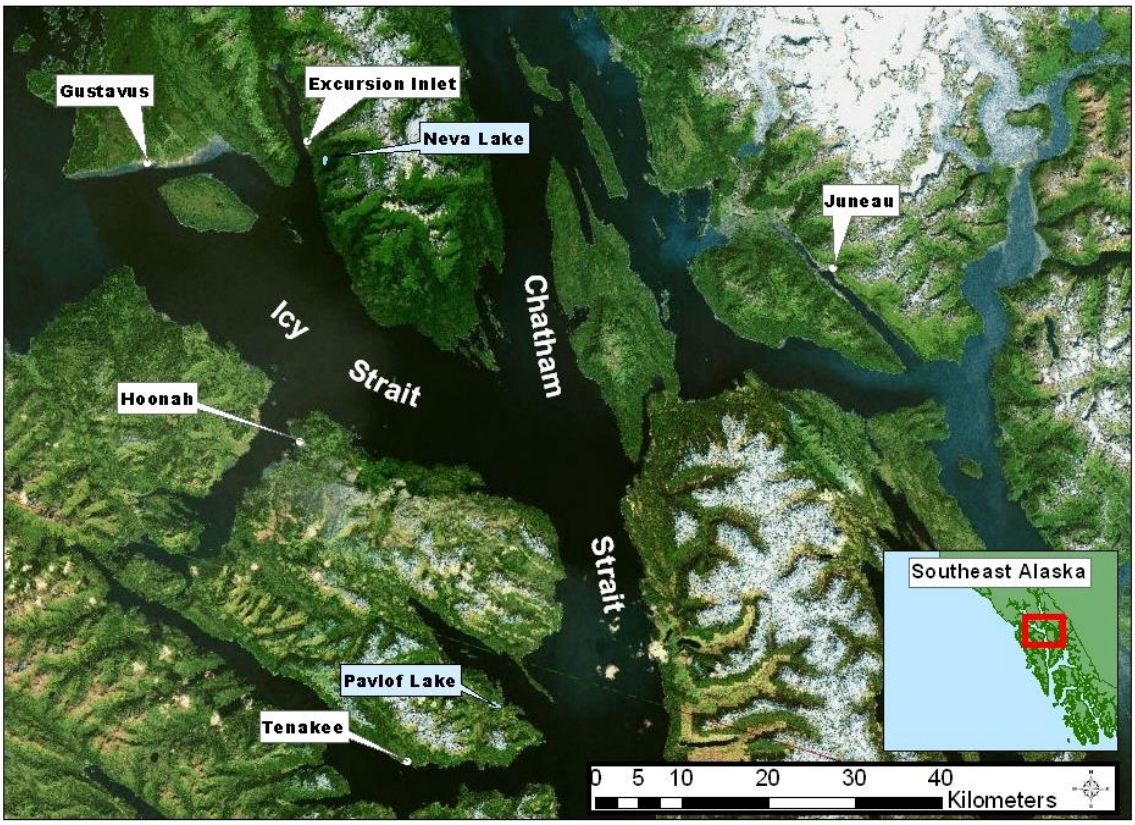



Figure 1. Map of northern southeast Alaska showing Neva Lake and surrounding area.

From 2002 to 2008, the total Sockeye escapement was estimated using weir-to-spawning area mark-recapture studies (Van Alen 2004, 2005, 2008b, and 2009). The weir was a standard channel and picket weir with trap set across Neva Creek just below the outlet of Neva Lake. In 2002 to 2005 and 2008, the mark-recapture estimates validated the weir counts that were used to estimate the daily migration of Sockeye Salmon into the lake. In 2008, video technology (see Appendix F in Van Alen 2008a) was used to passively and remotely estimate the proportion of marked (adipose-clipped) fish entering the main inlet stream so these fish did not have to be physically captured and sampled (Van Alen 2009). In 2009, a "video weir" was installed at the outlet of the lake (upstream from the picket weir) and video technology was used to estimate the proportion of marked fish entering the lake and to get a second count of the daily escapement (Van Alen and Mahara 2011b). In 2010 through 2019 the upstream picket weir was not operated at all (Van Alen and Mahara 2011b, 2011c, 2012; Van Alen, Eide, and Mahara 2013; Van Alen and Musslewhite 2014, 2015, 2016, 2017; Musslewhite 2019). Instead, the fish were counted, and counts were validated, as they swam unimpeded through a double video weir placed at the outlet of the lake. This report summarizes the project results through 2019.

Neva Lake is located on the mainland on the east side of Excursion Inlet (Figure 1). The lake is about 2 km southeast of the unincorporated community of Excursion Inlet, about 22 km east of Gustavus, and about 40 km across Icy Strait from Hoonah. The lake is at an elevation of 44m,

has a surface area of 36.1ha, and has a maximum depth of 19m (Figure 2). The main inlet stream flows into the northeast portion of the lake. Neva Creek, the outlet of Neva Lake, flows 1.2 km to South Creek, then 1 km to Excursion Inlet on the south side of the Ocean Beauty Seafoods cannery complex.

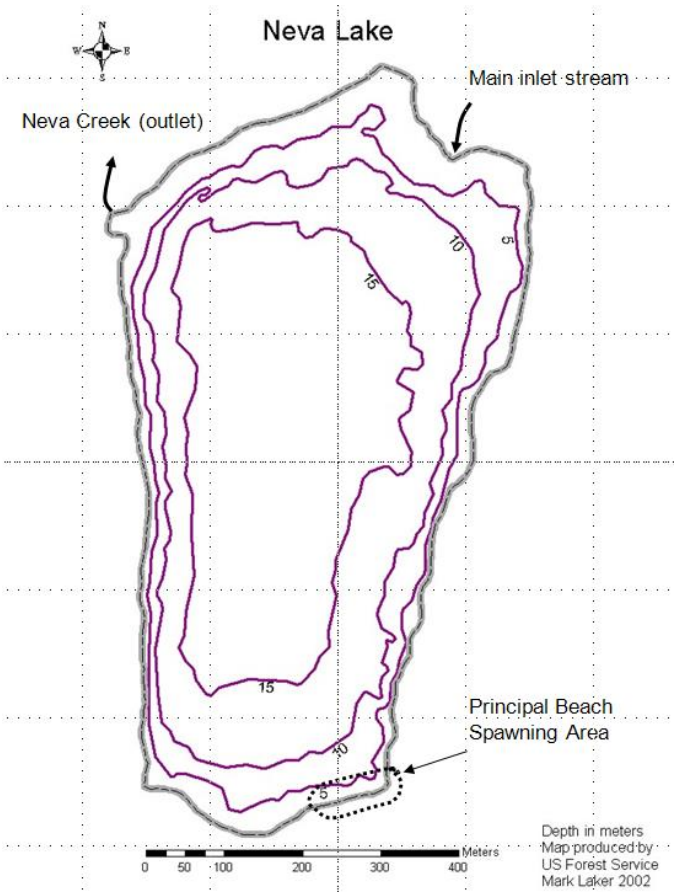



Figure 2. Bathymetric map of Neva Lake showing the outlet stream, the main inlet stream, and the principal beach spawning area.

Subsistence fishing of Neva Sockeye Salmon is regulated under both Federal and State permit systems. Federal subsistence fishing permits can only be used by rural residents in the area and only used for fishing in freshwater, but any resident of the State of Alaska can subsistence fish in fresh or marine waters under the authority of a State subsistence/personal use permit. However, the Federal Subsistence Board may issue regulations to ensure a priority for rural residents when fishing in Federal waters (i.e. freshwater). In 2019, the Federal Subsistence Board restricted the harvest of Sockeye Salmon in the Federal waters of Neva Lake, Neva Creek and South Creek to qualified rural residents (OSM 2019; 84 Fed. Reg. 39744-39754 [August 12, 2019]).

The daily and annual harvest limits on the Federal permits is the same as those listed on the State permits. At Neva Lake/South Creek, daily and annual harvest limits were 10 Sockeye Salmon per household prior to 2002, 25 Sockeye Salmon per household in 2003, 40 per household from

2004 through 2015, and back to 10 per household since 2016. In 2004, the State extended the subsistence fishing season from June1-July 31 to June 1 - August 15. Harvest and effort data is available from State permits starting in 1985 and from Federal permits starting in 2002 (Table 1). Project personnel observed more subsistence Sockeye taken in 2002, 2003, and 2005 than that reported on permits (Van Alen 2008a) so actual effort and harvest numbers might be higher (Ratner and Dizard 2005). There was no reported subsistence effort at Neva from 1985 to 1989.

Table 1. Subsistence effort and harvest of salmon at Neva from 1985 to 2018 as reported on State and Federal subsistence fishing permits.

| | State Subsistence/Personal Use Permits[a] | | | | | | Federal Subsistence Permits[b] | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Permits Fished | Chinook | Sockeye | Coho | Pink | Chum | Permits Fished | Sockeye | Coho |
| 1985 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 1986 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 1987 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 1988 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 1989 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 1990 | 1 | 0 | 25 | 0 | 0 | 0 | | | |
| 1991 | 2 | 0 | 40 | 0 | 0 | 0 | | | |
| 1992 | 16 | 0 | 348 | 0 | 0 | 14 | | | |
| 1993 | 8 | 0 | 127 | 0 | 0 | 201 | | | |
| 1994 | 5 | 0 | 151 | 0 | 52 | 0 | | | |
| 1995 | 6 | 0 | 90 | 0 | 247 | 28 | | | |
| 1996 | 19 | 0 | 411 | 0 | 216 | 872 | | | |
| 1997 | 9 | 0 | 126 | 5 | 13 | 1156 | | | |
| 1998 | 4 | 0 | 25 | 0 | 89 | 50 | | | |
| 1999 | 5 | 0 | 50 | 0 | 46 | 73 | | | |
| 2000 | 22 | 0 | 197 | 0 | 23 | 53 | | | |
| 2001 | 7 | 0 | 157 | 30 | 15 | 23 | | | |
| 2002 | 6 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 6 | 0 | 87 | 12 | 0 | 0 | 0 | 0 | 0 |
| 2004 | 23 | 0 | 397 | 0 | 6 | 3 | 0 | 0 | 0 |
| 2005 | 14 | 0 | 276 | 0 | 23 | 10 | 1 | 34 | 0 |
| 2006 | 11 | 0 | 140 | 0 | 23 | 12 | 0 | 0 | 0 |
| 2007 | 11 | 0 | 219 | 31 | 0 | 0 | 2 | 50 | 36 |
| 2008 | 26 | 0 | 601 | 113 | 5 | 14 | 0 | 0 | 0 |
| 2009 | 39 | 0 | 780 | 34 | 31 | 8 | 0 | 0 | 0 |
| 2010 | 26 | 1 | 329 | 29 | 6 | 1 | 1 | 13 | 2 |
| 2011 | 31 | 0 | 448 | 110 | 59 | 1 | 1 | 10 | 10 |
| 2012 | 38 | 0 | 607 | 42 | 66 | 23 | 1 | 20 | 18 |
| 2013 | 39 | | 510 | | | | 1 | 21 | 36 |
| 2014 | 36 | 0 | 459 | 66 | 4 | 4 | 2 | 6 | 32 |
| 2015 | 40 | 0 | 312 | 58 | 195 | 2 | 0 | 0 | 0 |
| 2016 | 24 | 0 | 136 | 23 | 0 | 3 | 2 | 8 | 0 |
| 2017 | 18 | 0 | 110 | 37 | 40 | 0 | 1 | 0 | 10 |
| 2018 | 14 | 0 | 103 | 2 | 0 | 0 | 2 | 10 | 0 |

[a]State subsistence data from ADF&G January 2020.

[b]Federal subsistence fishing permits were not issued before 2002.

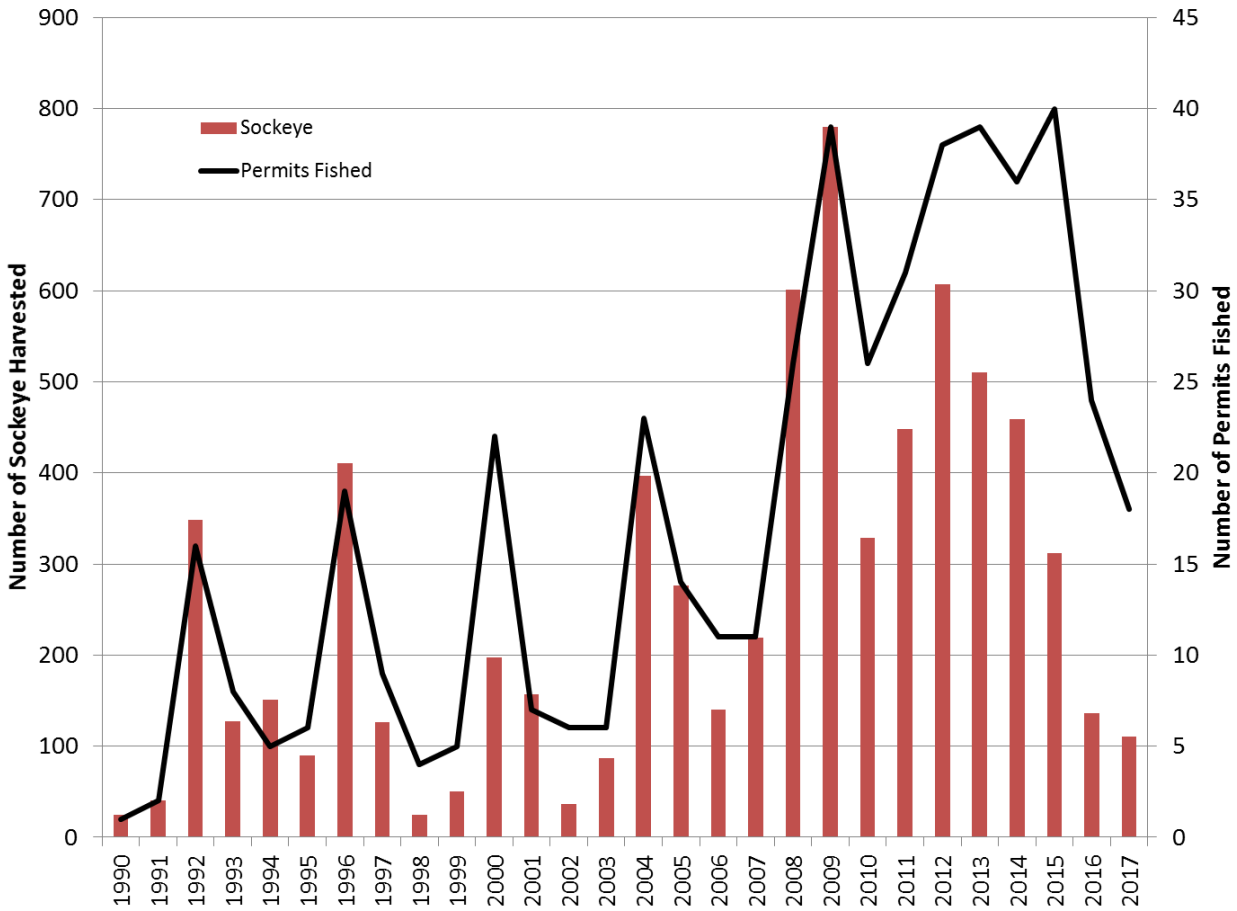



Figure 3. Subsistence effort and harvest of Sockeye Salmon at Neva from 1990 to 2017 as reported on permits returned to ADF&G.

Until recently, the effort and Sockeye harvest has peaked every four to five years – 1992, 1996, 2000, 2004, 2009, and 2013 (Table 1; Figure 3). Since 2013, both harvest and effort have declined, likely due to harvest restrictions and declining abundance.

Subsistence fishing in the Neva area takes place in both freshwater and saltwater (Van Alen 2004, 2005, 2008b). Most of the subsistence harvest of Neva Sockeye Salmon is done with seines or gill nets in the intertidal area at the outlet of South Creek from early July to the end of the State season on August 15. (Figure 4). A pool in the lower part of Neva Creek is a traditional site for taking Sockeye Salmon with a gaff (Langdon 2006).

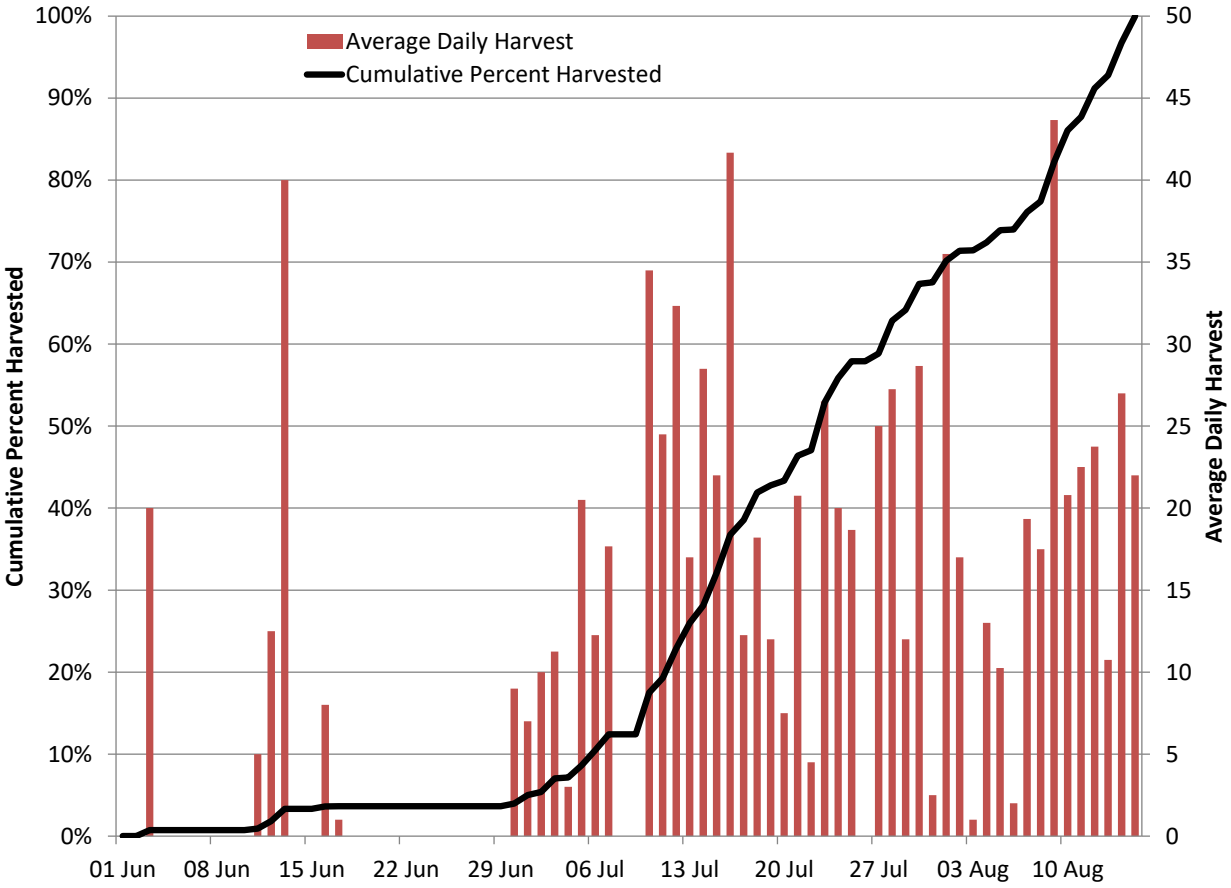



Figure 4. Cumulative percent harvest, and average daily harvest, of Sockeye Salmon reported on State subsistence/personal use permits at Neva during the June 1 to August 15 State subsistence season, 2005 to 2011.

The harvest of Neva-origin Sockeye Salmon in sport and commercial fisheries is unknown. The Alaska Department of Fish and Game (ADF&G) Division of Sport Fish estimates sport effort, catch, and harvest from an annual statewide mail survey sent to both resident and non-resident license holders (Jennings et. al. 2015). In recent years, an average of less than one surveyed angler reported fishing at Neva or South Creeks, which does not provide enough data to make a statistically valid estimate of effort or catch. (Teske 2018, pers. comm.).

Commercial purse seine openings in Excursion Inlet and Icy Strait harvest Sockeye Salmon bound for Neva Lake and other systems in northern inside waters. Between 2004 and 2017, the commercial purse seine harvest of Sockeye Salmon in subdistrict 114-80 (Excursion Inlet) has ranged from 53 to 2,968 fish, with no harvest reported in eight of the fourteen years (ADF&G 2018).

## OBJECTIVES

1) Count (census) the annual escapement of adult and jack Sockeye Salmon into Neva Lake using double-redundant video weirs.

2) Determine, with 90% certainty, if at least 90% of the Sockeye Salmon spawners in Neva Lake are freshwater age-1.

## METHODS

### Sockeye Escapement Assessment

In 2019, as in 2010 through 2018, we used a "double redundant" two-weir, four-camera video system to estimate the escapement of Sockeye Salmon into Neva Lake (Figure 5). Starting in 2016, the underwater video chute cameras and surveillance cameras were wirelessly linked to an off-site computer so project personnel could remotely monitor the project site and simultaneously review the motion-triggered video files of fish passing through the weir.

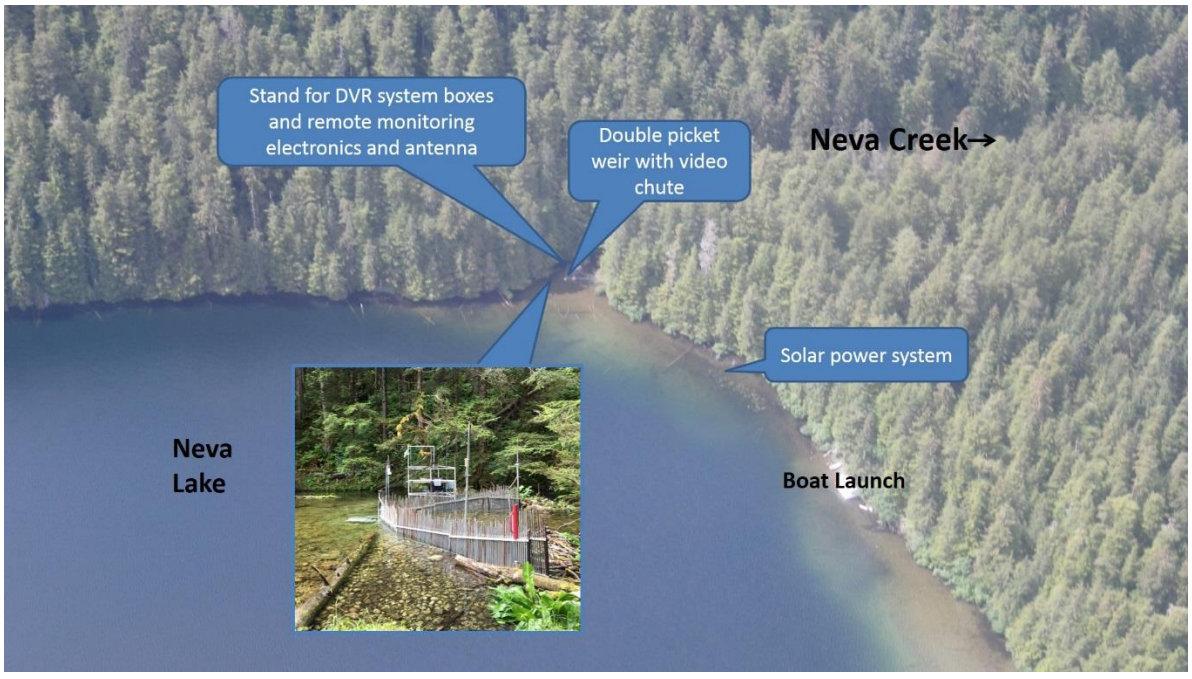



Figure 5. Annotated photo of the outlet (north) end of Neva Lake showing the basic layout of the weirs and solar panels.

The video fish counting system consisted of three stations: a weir station, a repeater station, and a recording station. The weir station was designed to capture video of fish passing through the weir and transmit it to a repeater station located on a nearby mountain; the repeater then relayed the video to the recording station. At the recording station, a computer with video surveillance software was used to receive, record, and review video from the weir. The stations were connected using Ubiquiti wireless bridges to form a local area network (LAN) controlled by a single router. The entire system could be accessed and controlled over the internet using a wireless link from Excursion Inlet to Hoonah.

### *Weir Station*

Fish entering Neva Lake through the double weirs passed through an aluminum video chute (Figure 6, Figure 7, Appendix A) equipped with underwater video cameras and lit by LED lights (Figure 8 and Figure 9). The 70cm long chute had two underwater cameras on each side, two white LED strip lights on the ceiling, and a visor to shade the chute's interior from light reflections. The lights were separately powered through a remotely operated relay that could turn the lights on and off as needed. For most of the season, one of the strip lights was left on continuously, and the second light was automatically turned on between the hours of 6 pm and 8 am. The interior of the aluminum chutes were primed and painted with green marine paint. A meter stick and label (i.e., "Neva 2019 Left" – for left camera) was in the field of view of each camera.

Figure 6. Photo of the double “V” video picket weir setup at the outlet of Neva Lake, June 19, 2019.

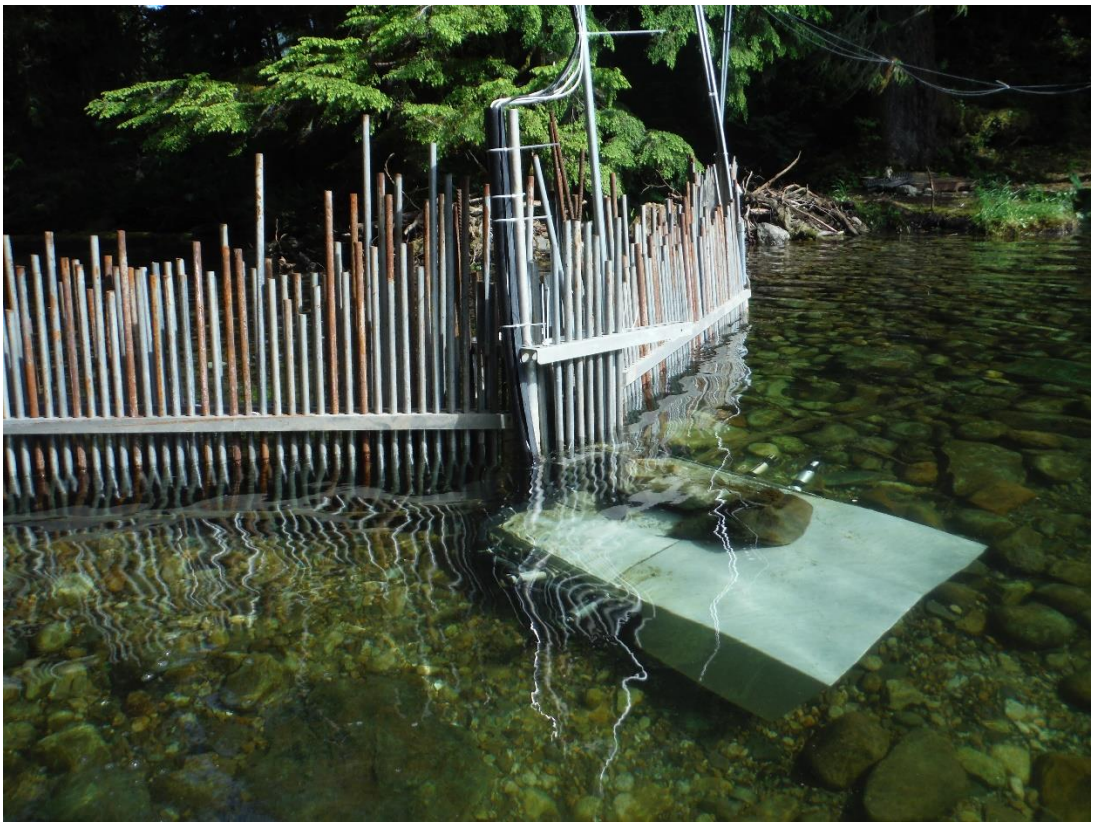


Figure 7. Photo of video chute used at Neva Lake weir, 2019.

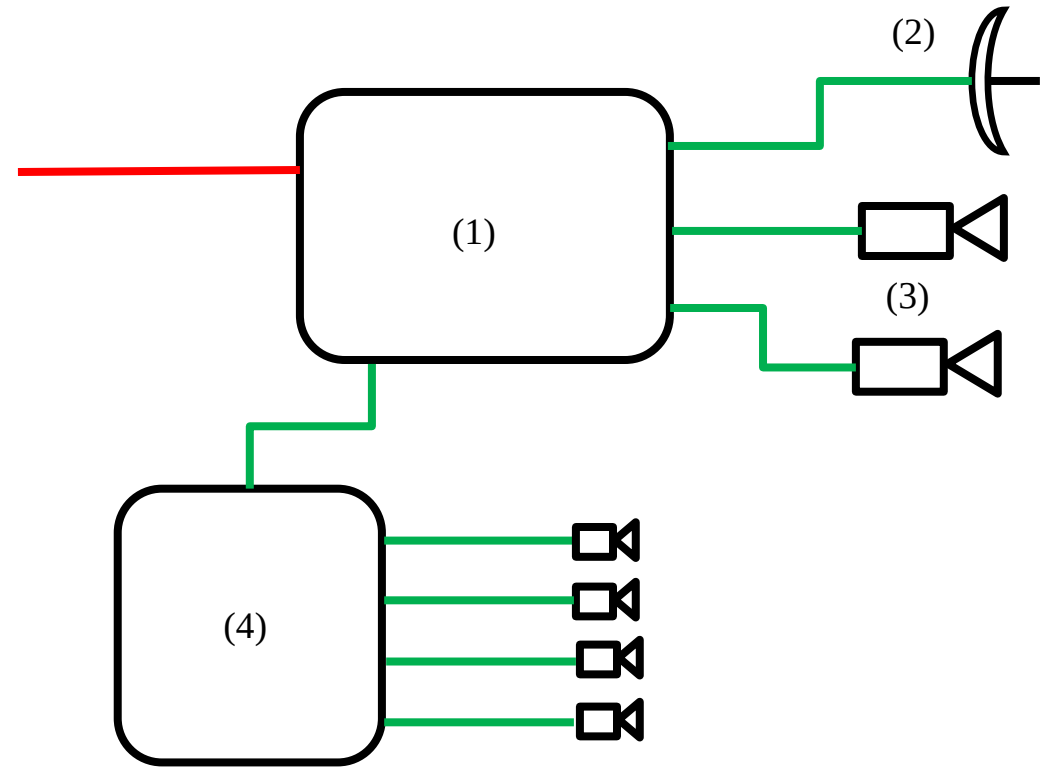
Figure 8. Shop photo of the upstream side of the “kite” video chute and weir connection, Neva weir.

Figure 9. Shop photo of the inside of the “kite” video chute with adjustable camera mounts, chute height, and entrance, Neva weir.

The cameras were on opposite sides of the chute, with two on each side, and were aimed to view the entire chute, from entrance to exit. We used an Axis F34 camera system, which uses a central control unit connected to four small “bullet” cameras on separate 12m cables. The cameras were fitted with screw-on lens caps then covered in several layers of adhesive shrink tubing for waterproofing. The Axis cameras were 2 megapixel digital IP (internet protocol) cameras, which provided much more resolution than the analog cameras used in past years. The control unit was accessible using a built-in web server, which allowed us to make configuration changes and view video over the network. It also provides slots for two SD (secure digital) memory cards, which were used to store a separate backup of motion-triggered video clips.

The Axis F34 camera system and other electronics used to encode and transmit video from the weir site (Figure 10, Figure 11) were contained in a weatherproof metal system box mounted on a structure constructed of surplus weir parts, located next to the weir. They were connected to a Netonix Ethernet switch, which provided power-over-Ethernet (POE), and served as both a network device and a power source for the system’s components. Also mounted on the metal structure was a Ubiquiti PowerBeam 400 wireless bridge, which connected the station to the repeater site on a nearby ridge. Two Amcrest surveillance cameras were mounted nearby to provide aboveground views of the weir site. All of these devices had built-in user interfaces that could be accessed over the internet using a web browser. Using the web-page style interfaces, we could turn devices on and off, view cameras, adjust settings, and collect diagnostic information from anywhere with internet access.

Figure 10. Photo of field configuration of the weir station system box at the Neva Lake weir station, June 19, 2019.




(1) Netonix WS-12-250-DC managed Ethernet switch
(2) Ubiquiti PowerBeam 400 wireless bridge
(3) Amcrest IP3M IP site surveillance cameras
(4) Axis F34 video system w/ four underwater cameras

Figure 11. Schematic of weir station system box used at Neva weir, 2019.

Electric power for the weir station was provided by an array of twelve 145-watt solar panels located on the lakeshore about 250 feet from the weir site (Figure 12). The solar panels were wired to form four separate arrays of three panels each, wired in series. Two junction boxes were used to connect the four arrays, and each junction box contained a Victron BlueSolar charge controller, which charged a bank of two 12V absorbed glass matt (AGM) batteries wired to provide 24V. This configuration created two independent systems, each using six panels to charge two batteries. Power from the battery banks was transmitted to the weir station over a pair of 100-meter long suspended power lines, with a third cable serving as a common ground line.

At the weir site, a power distribution box (Figure 13) was used to supply power from the solar system to the video system components. The two powerlines were connected to a diode battery combiner, and the 24-volt power was stepped down to 12 volts with a voltage converter. A marine wiring bus was used to distribute power to the video boxes, the chute lights, and the remote monitoring system. A Tycon TP-DIN monitor provided the ability to remotely monitor and control the power system through its web interface.

Figure 12. Solar panels, batteries, and charge controllers were supported on weir picket "quadrapods" set on the shore of Neva Lake about 100 meters to the East of the weirs where there is more sun exposure.

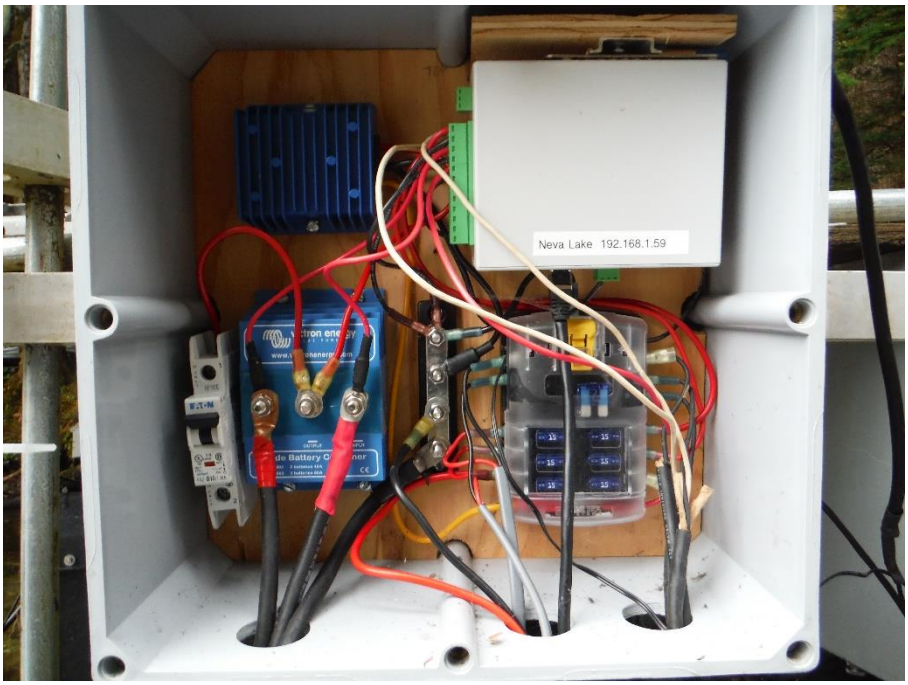



Figure 13. Power distribution box used at the Neva video weir, 2019.

### *Mountaintop Repeater Station*

Since the recording station was not within line of sight of the weir station, we had to use an intermediate repeater station to relay data between the two stations. A repeater station was located on a mountain ridge overlooking both the weir site on Neva Lake and the recording station in Excursion Inlet village. The repeater was located at 58.39628°, -135.37795°, at an elevation of 2,778 feet (Figure 14). The repeater is about 2.2 km from the weir site, and about 4.8 km from the recording station.

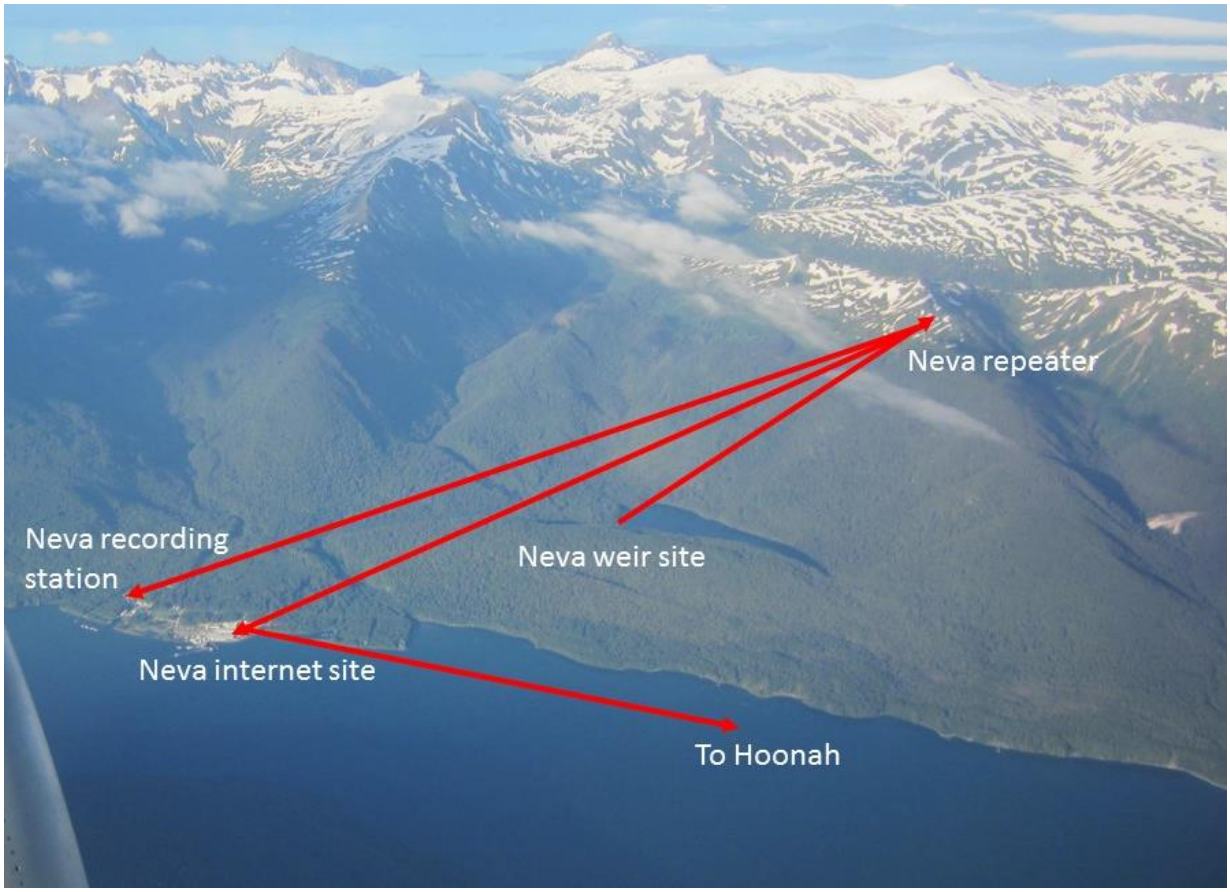
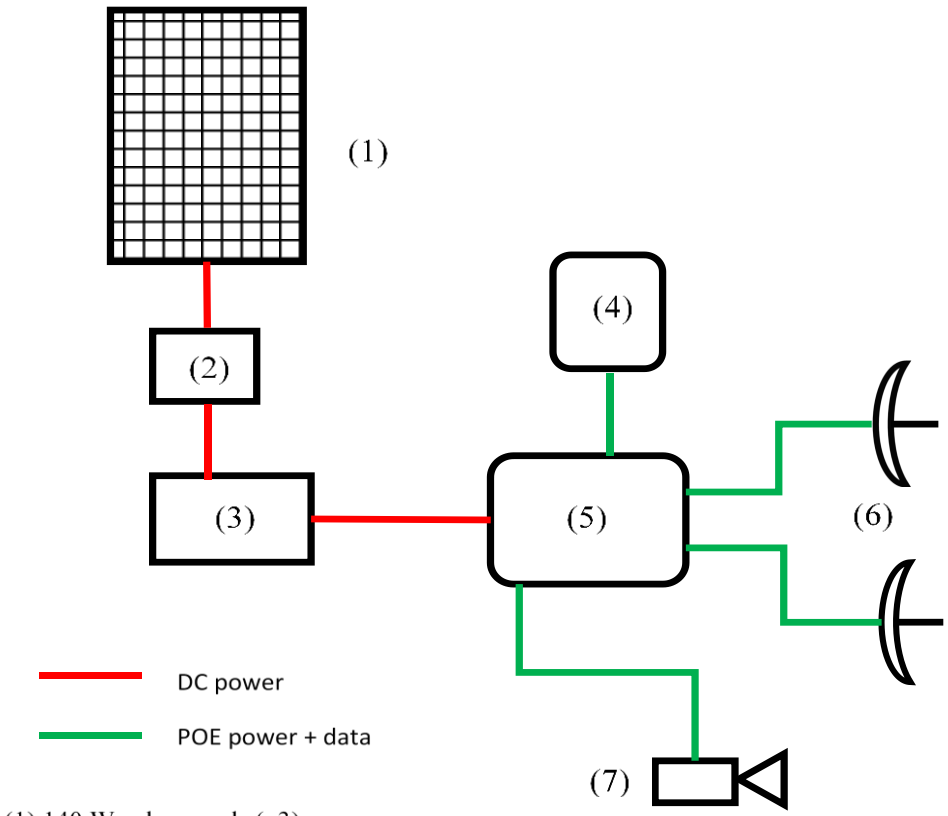



Figure 14. Neva Lake remote monitoring system stations and wireless transmission paths.

The repeater used a pair of Ubiquiti PowerBeam 400 wireless bridges to relay the signal from the weir site to the recording station, one receiving the signal from the weir and another transmitting to Excursion Inlet village (Figure 15). The radios were connected to a Netonix Ethernet switch, which also provided power with POE. A Tycon TP-DIN monitor was used to monitor and record solar panel input voltage and battery bank voltage. An Amcrest surveillance camera was attached to the repeater structure to provide a live view of the site. Power for the station was supplied by three 145-watt solar panels, regulated by a Morningstar MPPT charge controller charging a bank of six 12-volt 100 amp-hour batteries. The battery bank was connected to the Netonix switch, which distributed power to the various devices with POE.




(1) 140 W solar panels (x3)
(2) Morningstar SunSaver SS-MPPT-15 solar controller
(3) Battery bank (6 x 12V/100 Ah AGM batteries)
(4) Tycon TP-DIN remote monitor
(5) Netonix WS-12-250-DC managed Ethernet switch
(6) Ubiquiti PowerBeam 400-ISO wireless bridges
(7) Amcrest IP3M IP surveillance camera

Figure 15. Schematic of Neva repeater station.

The electronics and battery bank for the repeater were enclosed in a large plastic toolbox which was lined with rigid foam insulation and sealed with a gasketed lid. The electronics box, solar panels, and wireless bridge antennas were all mounted on an aluminum structure which was anchored to the ground with ground line (Figure 16). The structure, electronics box, and solar panels were lifted to the site by helicopter, and installed in the summer of 2016.

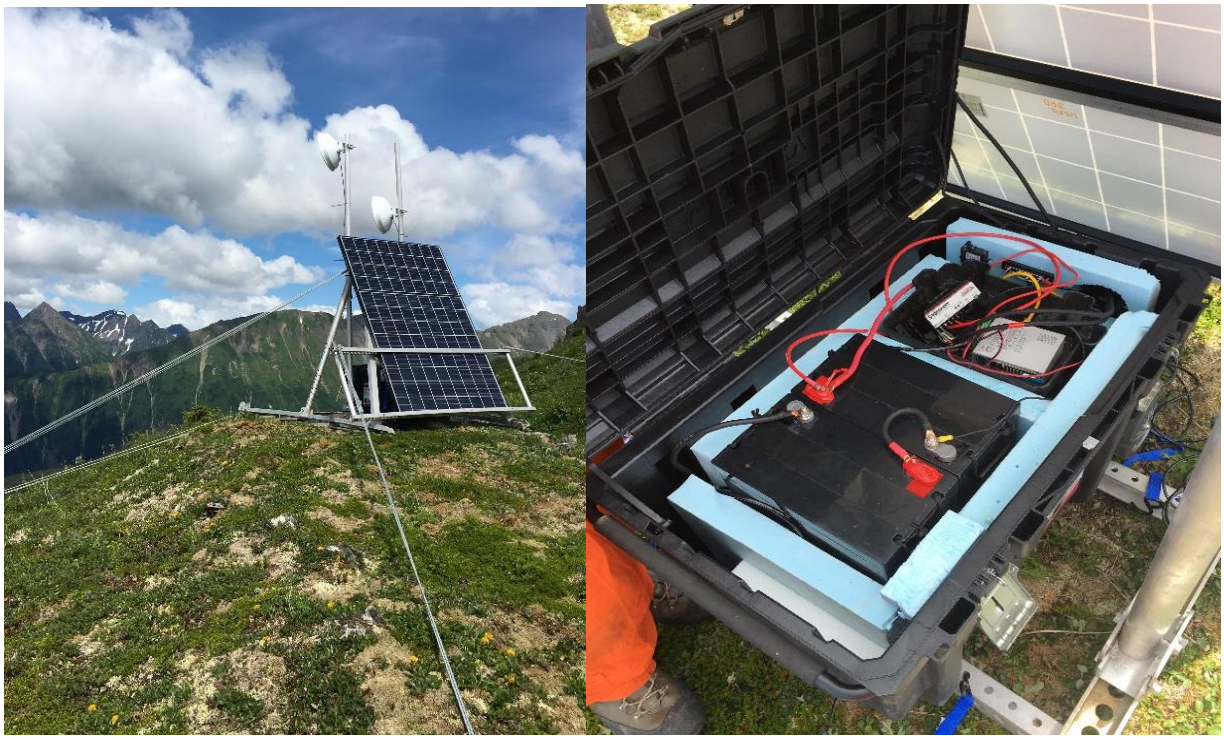


Figure 16. Neva repeater installation (left) and electronics storage box (right), 2016.

***Recording Station***

The recording station was located in a cabin in Excursion Inlet village, a small community centered on the Ocean Beauty Seafoods processing plant. This station was used to receive and record the video feed relayed from the weir station, and review the video to count fish passing through the weir. A Ubiquiti PowerBeam 400 wireless bridge mounted on the cabin received the signal from the repeater, and the video was recorded on a personal computer. A LinkSys WRT54G router in the cabin was used to route traffic on all of the networked devices over the entire LAN (i.e. at all three of the stations).

Video from the weir site was recorded and reviewed using Blue Iris, a software package designed for video surveillance applications. The computer was located in the main living space of the cabin, and constantly displayed live video from all of the cameras at the weir site, including both the underwater and above ground cameras (Figure 17, Figure 18). Using the software's motion-detection feature, video was recorded to the computer's hard drive whenever the motion detection was triggered. The video from the four cameras in the video chutes were grouped so that video from all four cameras was recorded if motion was detected in any of them. All video was backed up hourly to an external hard drive. In addition, Blue Iris has a "webserver" feature that allows access from the internet to view live video and stored video clips.

Figure 17. Blue Iris display of live video from the weir site, as seen in the field crew's cabin in Excursion Inlet.

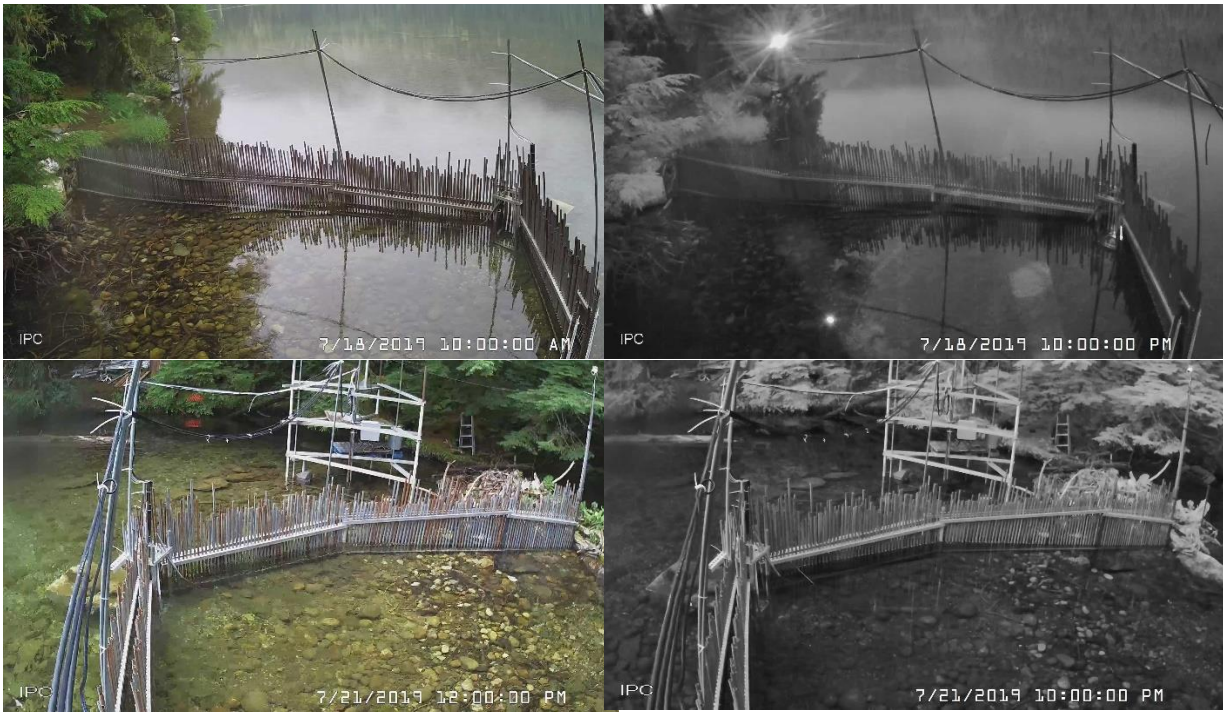



Figure 18. Daytime (left) and nighttime (right) video images from the site surveillance cameras at the Neva Lake weir, 2019.

Internet access to the entire system was provided by a wireless link across Icy Strait to Hoonah. Two Ubiquiti AirFiber AF5X radios were used; one mounted on a radio tower on the Ocean Beauty Seafoods office building, and another at a telecommunications tower on Hoonah Mountain 32km away. At the Hoonah Mountain site, the AirFiber radio was connected to the network of a local internet service provider. The mountaintop repeater was used to relay data between the internet-connected AirFiber station, the recording station, and the weir station (Figure 14). With the monitoring system connected to the internet, all of the system's devices could be remotely controlled and configured from anywhere with internet access. The internet connection was also used to maintain communication with the field crew, through email, video chat, and online data file sharing.

Each morning, project personnel would use the Blue Iris software to review the motion-triggered footage from the previous day. Reviewers were instructed to record hourly counts on the daily data sheet in this year's bound data notebook. Video review focused on getting complete and consistent counts of adult and jack Sockeye Salmon into the lake. Other species were usually counted but these counts were not validated and are incomplete. The time period for each hourly count was based on the time stamp from the Blue Iris software, which was derived from an internet time server and synchronized for all cameras. In previous years, project personnel

reviewed video and recorded counts from all cameras in the chutes independently, but the synchronized review of video from all four cameras made it possible to make a single hourly count of Sockeye instead.

For the majority of the season, the recording station was located in the Excursion Inlet cabin where project personnel lived and worked. However, the Ocean Beauty Seafoods plant closes at the end of the fishing season, making the cabin no longer available for use. The computer used for recording video was moved to the Hoonah Indian Association office in Hoonah on August 30, where it was configured to connect to the monitoring system network over the internet. For the remainder of the season, the crew recorded and reviewed video in Hoonah rather than Excursion Inlet.

**Age, Sex, and Length**

The age-sex-length (ASL) sample target for Neva Lake was 60 to 120 Sockeye Salmon, with roughly equal numbers to be sampled from both main inlet stream spawners and from beach spawners. A beach seine was used to capture the fish when they schooled off the mouth of the main inlet stream in August and September and when they moved onto the principal beach spawning areas at the Southeast corner of the lake in September and October.

Adult and jack Sockeye Salmon were measured from the mid-eye to fork-of-tail length in millimeters in an aluminum fish-measuring trough. Sex and length measurements were recorded on mark-sense AWL (age-weight-length) forms supplied by Alaska Department of Fish and Game (ADF&G). Three scales were plucked from the left side of the fish, two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (INPFC 1963). The scales were then mounted on numbered gummed “scale cards” so that the scales could be matched with the same fish on the mark-sense form (see ADF&G 2001 for specific sampling procedures).

The scales were aged by personnel at the ADF&G Commercial Fisheries Division Aging Lab in Juneau, Alaska. Ages were reported in European notation where a period separates the number of fresh water and marine annuli (Koo 1962; ADF&G 2010). The total age of the fish is the sum of these two numbers plus one for the winter the egg/alevin was in the redd.

## RESULTS

### Weir counts, Escapement Estimates, and Run Timing

The weir was installed on June 19, 2019, and the camera system was operational from June 20 to September 30, 2019. Project personnel reviewed the video footage daily and recorded the hourly passage of each species of fish through the weirs. Separate counts were made for adult and jack Sockeye Salmon.

Fish counting was done using the Blue Iris program on the personal computer and simultaneous replay of video from each of the four chute cameras. The SD card backups were used to maintain continuous video recording while the computer system was being moved to Hoonah in late August, and to provide a backup when the Blue Iris recordings were not available.

The raw hourly and daily counts of Sockeye Salmon through the video weirs totaled 4,350 fish, including 4,298 adults and 52 jacks (Table 2, Table 3). The first Sockeye Salmon was seen at the weir on June 21, but no additional Sockeye Salmon were seen until July 23. In the past, Sockeye Salmon have been counted through the weir well into October, so we used the historical proportion of fish passing through the weir after September 30 to estimate the number that entered the lake after the weir was dismantled for the season. We estimate that an additional 39 Sockeye Salmon entered the lake after the weir was removed for the season (Table 4), for a total escapement estimate of 4,389 for the season. Also counted at the weirs were 1,078 Coho Salmon, 103 Pink Salmon, 1,211 Dolly Varden, and 33 Cutthroat Trout.

The run timing in 2019 was later than normal, as the first pulse of Sockeye Salmon was not counted until July 23, approximately the historical 37% completion date. The mid-point of the run was on August 17, and 80% of the Sockeye Salmon had entered Neva Lake between July 28 and September 12 (Table 5, Figure 19). In previous seasons, most of the Sockeye Salmon migrated into the lake during evening hours, but in 2019 passage through the weir was distributed roughly evenly throughout the day (Table 3).

Table 2. Daily numbers of fish counted at the Neva Creek video weirs, June 20 to September 30, 2019.

| Date | Adult Sockeye Salmon | Jack Sockeye Salmon | Total Sockeye Salmon | Coho Salmon | Pink Salmon | Dolly Varden | Cutthroat |
|---|---|---|---|---|---|---|---|
| 20-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21-Jun | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 22-Jun | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 23-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 27-Jun | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| 28-Jun | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 29-Jun | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 30-Jun | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| 1-Jul | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| 2-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3-Jul | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| 4-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5-Jul | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 6-Jul | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 7-Jul | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 8-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12-Jul | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 13-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15-Jul | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 16-Jul | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 17-Jul | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 18-Jul | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| 19-Jul | 0 | 0 | 0 | 0 | 0 | 4 | 0 |
| 20-Jul | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 21-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22-Jul | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 23-Jul | 9 | 0 | 9 | 0 | 0 | 2 | 0 |
| 24-Jul | 45 | 0 | 45 | 0 | 0 | 7 | 0 |
| 25-Jul | 136 | 2 | 138 | 0 | 0 | 28 | 6 |
| 26-Jul | 47 | 2 | 49 | 0 | 0 | 9 | 1 |
| 27-Jul | 15 | 0 | 15 | 0 | 0 | 2 | 0 |
| 28-Jul | 485 | 21 | 506 | 0 | 0 | 70 | 3 |
| 29-Jul | 132 | 0 | 132 | 0 | 0 | 53 | 1 |
| 30-Jul | 43 | 0 | 43 | 0 | 0 | 4 | 0 |
| 31-Jul | 23 | 1 | 24 | 0 | 0 | 18 | 0 |

(continued)

Table 2. (page 2 of 3)

| Date | Adult Sockeye Salmon | Jack Sockeye Salmon | Total Sockeye Salmon | Coho Salmon | Pink Salmon | Dolly Varden | Cutthroat |
|---|---|---|---|---|---|---|---|
| 1-Aug | 11 | 0 | 11 | 0 | 0 | 18 | 0 |
| 2-Aug | 4 | 0 | 4 | 0 | 0 | 4 | 0 |
| 3-Aug | 336 | 0 | 336 | 0 | 1 | 43 | 1 |
| 4-Aug | 20 | 0 | 20 | 0 | 1 | 3 | 0 |
| 5-Aug | 3 | 0 | 3 | 0 | 0 | 0 | 0 |
| 6-Aug | 49 | 0 | 49 | 0 | 0 | 1 | 0 |
| 7-Aug | 18 | 0 | 18 | 0 | 0 | 1 | 0 |
| 8-Aug | 45 | 0 | 45 | 0 | 0 | 7 | 0 |
| 9-Aug | 14 | 0 | 14 | 0 | 0 | 1 | 0 |
| 10-Aug | 5 | 0 | 5 | 0 | 0 | 0 | 0 |
| 11-Aug | 2 | 0 | 2 | 0 | 0 | 0 | 0 |
| 12-Aug | 7 | 0 | 7 | 0 | 0 | 1 | 1 |
| 13-Aug | 28 | 0 | 28 | 0 | 0 | 0 | 0 |
| 14-Aug | 5 | 0 | 5 | 0 | 0 | 0 | 1 |
| 15-Aug | 9 | 0 | 9 | 0 | 0 | 0 | 0 |
| 16-Aug | 64 | 0 | 64 | 0 | 0 | 1 | 0 |
| 17-Aug | 1292 | 2 | 1294 | 1 | 0 | 2 | 0 |
| 18-Aug | 3 | 0 | 3 | 0 | 0 | 2 | 0 |
| 19-Aug | 16 | 0 | 16 | 0 | 0 | 0 | 0 |
| 20-Aug | 4 | 0 | 4 | 0 | 0 | 0 | 0 |
| 21-Aug | 4 | 0 | 4 | 0 | 0 | 0 | 0 |
| 22-Aug | 4 | 0 | 4 | 0 | 0 | 1 | 0 |
| 23-Aug | 178 | 2 | 180 | 0 | 4 | 42 | 0 |
| 24-Aug | 142 | 0 | 142 | 0 | 11 | 10 | 4 |
| 25-Aug | 72 | 0 | 72 | 4 | 11 | 15 | 0 |
| 26-Aug | 54 | 0 | 54 | 0 | 13 | 8 | 0 |
| 27-Aug | 204 | 0 | 204 | 13 | 21 | 14 | 5 |
| 28-Aug | 17 | 4 | 21 | 1 | 6 | 3 | 0 |
| 29-Aug | 9 | 1 | 10 | 0 | 3 | 5 | 3 |
| 30-Aug | 9 | 0 | 9 | 2 | 3 | 24 | 1 |
| 31-Aug | 8 | 2 | 10 | 3 | 3 | 0 | 0 |
| 1-Sep | 3 | 1 | 4 | 1 | 1 | 0 | 0 |
| 2-Sep | 2 | 0 | 2 | 2 | 3 | 8 | 1 |
| 3-Sep | 7 | 0 | 7 | 0 | 0 | 4 | 0 |
| 4-Sep | 10 | 0 | 10 | 1 | 3 | 1 | 0 |
| 5-Sep | 2 | 0 | 2 | 1 | 1 | 2 | 0 |
| 6-Sep | 3 | 0 | 3 | 0 | 1 | 6 | 0 |
| 7-Sep | 7 | 0 | 7 | 0 | 1 | 0 | 0 |
| 8-Sep | 5 | 0 | 5 | 0 | 0 | 1 | 0 |
| 9-Sep | 1 | 0 | 1 | 0 | 0 | 2 | 0 |
| 10-Sep | 10 | 0 | 10 | 0 | 1 | 12 | 0 |

Table 2. (page 3 of 3)

| Date | Adult Sockeye Salmon | Jack Sockeye Salmon | Total Sockeye Salmon | Coho Salmon | Pink Salmon | Dolly Varden | Cutthroat |
|---|---|---|---|---|---|---|---|
| 11-Sep | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 12-Sep | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 13-Sep | 371 | 12 | 383 | 316 | 2 | 142 | 0 |
| 14-Sep | 22 | 0 | 22 | 36 | 2 | 5 | 0 |
| 15-Sep | 0 | 0 | 0 | 11 | 0 | 0 | 0 |
| 16-Sep | 3 | 0 | 3 | 7 | 0 | 4 | 0 |
| 17-Sep | 0 | 0 | 0 | 4 | 0 | 7 | 0 |
| 18-Sep | 3 | 1 | 4 | 3 | 1 | 2 | 0 |
| 19-Sep | 6 | 0 | 6 | 3 | 1 | 17 | 0 |
| 20-Sep | 160 | 0 | 160 | 449 | 6 | 18 | 0 |
| 21-Sep | 62 | 0 | 62 | 130 | 0 | 30 | 0 |
| 22-Sep | 12 | 0 | 12 | 20 | 0 | 243 | 2 |
| 23-Sep | 10 | 0 | 10 | 10 | 0 | 84 | 0 |
| 24-Sep | 9 | 0 | 9 | 22 | 0 | 83 | 0 |
| 25-Sep | 4 | 0 | 4 | 18 | 1 | 93 | 0 |
| 26-Sep | 2 | 0 | 2 | 7 | 1 | 1 | 0 |
| 27-Sep | 6 | 0 | 6 | 6 | 0 | 12 | 0 |
| 28-Sep | 2 | 0 | 2 | 5 | 0 | 2 | 0 |
| 29-Sep | 3 | 0 | 3 | 2 | 0 | 0 | 0 |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total[a] | 4,298 | 52 | 4,350 | 1,078 | 103 | 1,211 | 33 |

[a]The weirs were operational from 10:00 on June 20 through 9:40 on 30 September.

Table 3. Daily and hourly counts of Sockeye Salmon adults and jacks through the double video weirs at the outlet of Neva Lake, 2019.

| | Hour | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | 00-01 | 01-02 | 02-03 | 03-04 | 04-05 | 05-06 | 06-07 | 07-08 | 08-09 | 09-10 | 10-11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 | 22-23 | 23-24 | Total |
| 20-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21-Jun | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 22-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30-Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23-Jul | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 9 |
| 24-Jul | 5 | 2 | 0 | 10 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 4 | 18 | 45 |
| 25-Jul | 1 | 18 | 1 | 11 | 4 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 3 | 0 | 18 | 22 | 4 | 2 | 1 | 16 | 1 | 33 | 138 |
| 26-Jul | 18 | 3 | 5 | 6 | 3 | 1 | 0 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 6 | 49 |
| 27-Jul | 4 | 2 | 5 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 15 |
| 28-Jul | 1 | 3 | 2 | 2 | 0 | 1 | 1 | 124 | 40 | 50 | 134 | 30 | 4 | 5 | 47 | 4 | 10 | 12 | 0 | 0 | 1 | 5 | 16 | 14 | 506 |
| 29-Jul | 18 | 38 | 16 | 8 | 11 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 3 | 10 | 0 | 0 | 3 | 0 | 3 | 0 | 1 | 3 | 13 | 132 |
| 30-Jul | 24 | 5 | 9 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 43 |
| 31-Jul | 2 | 6 | 9 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 24 |

(continued)

Table 3. (page 2 of 3)

| | Hour | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | 00-01 | 01-02 | 02-03 | 03-04 | 04-05 | 05-06 | 06-07 | 07-08 | 08-09 | 09-10 | 10-11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 | 22-23 | 23-24 | Total |
| 1-Aug | 6 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 2-Aug | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 3-Aug | 1 | 1 | 3 | 10 | 57 | 126 | 106 | 12 | 2 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 336 |
| 4-Aug | 3 | 0 | 7 | 5 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| 5-Aug | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 6-Aug | 0 | 0 | 1 | 7 | 13 | 8 | 7 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 2 | 49 |
| 7-Aug | 1 | 0 | 1 | 1 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 18 |
| 8-Aug | 3 | 2 | 3 | 4 | 8 | 10 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 45 |
| 9-Aug | 8 | 2 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| 10-Aug | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 11-Aug | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 12-Aug | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 1 | 7 |
| 13-Aug | 3 | 5 | 8 | 2 | 8 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 |
| 14-Aug | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 5 |
| 15-Aug | 0 | 0 | 0 | 0 | 1 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 9 |
| 16-Aug | 4 | 9 | 12 | 7 | 6 | 4 | 7 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 1 | 64 |
| 17-Aug | 1 | 3 | 2 | 2 | 13 | 34 | 52 | 0 | 17 | 3 | 1 | 64 | 226 | 195 | 239 | 204 | 134 | 47 | 50 | 1 | 3 | 3 | 0 | 0 | 1294 |
| 18-Aug | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 19-Aug | 2 | 11 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| 20-Aug | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 21-Aug | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 22-Aug | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 4 |
| 23-Aug | 0 | 2 | 0 | 0 | 0 | 5 | 10 | 9 | 25 | 31 | 13 | 6 | 0 | 7 | 4 | 5 | 0 | 2 | 5 | 4 | 9 | 0 | 9 | 34 | 180 |
| 24-Aug | 48 | 35 | 17 | 11 | 6 | 3 | 1 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 6 | 0 | 2 | 7 | 142 |
| 25-Aug | 3 | 9 | 4 | 4 | 5 | 2 | 1 | 0 | 2 | 8 | 5 | 1 | 0 | 1 | 3 | 1 | 1 | 2 | 0 | 0 | 12 | 1 | 1 | 6 | 72 |
| 26-Aug | 11 | 16 | 9 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 0 | 3 | 54 |
| 27-Aug | 7 | 9 | 38 | 45 | 45 | 46 | 7 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 204 |
| 28-Aug | 11 | 1 | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 |
| 29-Aug | 1 | 2 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 30-Aug | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 |
| 31-Aug | 3 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 10 |

(continued)

Table 3. (page 3 of 3)

| | Hour | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | 00-01 | 01-02 | 02-03 | 03-04 | 04-05 | 05-06 | 06-07 | 07-08 | 08-09 | 09-10 | 10-11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 | 22-23 | 23-24 | Total |
| 1-Sep | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 2-Sep | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 7 |
| 4-Sep | 2 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 5-Sep | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 6-Sep | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 7-Sep | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 8-Sep | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 9-Sep | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 10-Sep | 0 | 2 | 1 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 12-Sep | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 13-Sep | 0 | 5 | 3 | 3 | 4 | 2 | 3 | 14 | 13 | 5 | 8 | 3 | 4 | 5 | 15 | 23 | 34 | 30 | 42 | 50 | 29 | 43 | 34 | 11 | 383 |
| 14-Sep | 4 | 3 | 3 | 3 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 22 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 3 |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 4 |
| 19-Sep | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 6 |
| 20-Sep | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 32 | 36 | 14 | 0 | 0 | 10 | 32 | 16 | 16 | 160 |
| 21-Sep | 46 | 4 | 1 | 0 | 6 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 |
| 22-Sep | 0 | 2 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 12 |
| 23-Sep | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 10 |
| 24-Sep | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 9 |
| 25-Sep | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| 27-Sep | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 |
| 28-Sep | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 29-Sep | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | 0 |
| Total | 258 | 230 | 193 | 174 | 226 | 264 | 223 | 182 | 106 | 120 | 164 | 112 | 240 | 219 | 324 | 272 | 234 | 134 | 105 | 66 | 88 | 112 | 104 | 199 | 4350 |
| Percent | 6% | 5% | 4% | 4% | 5% | 6% | 5% | 4% | 2% | 3% | 4% | 3% | 6% | 5% | 7% | 6% | 5% | 3% | 2% | 2% | 2% | 3% | 2% | 5% | |

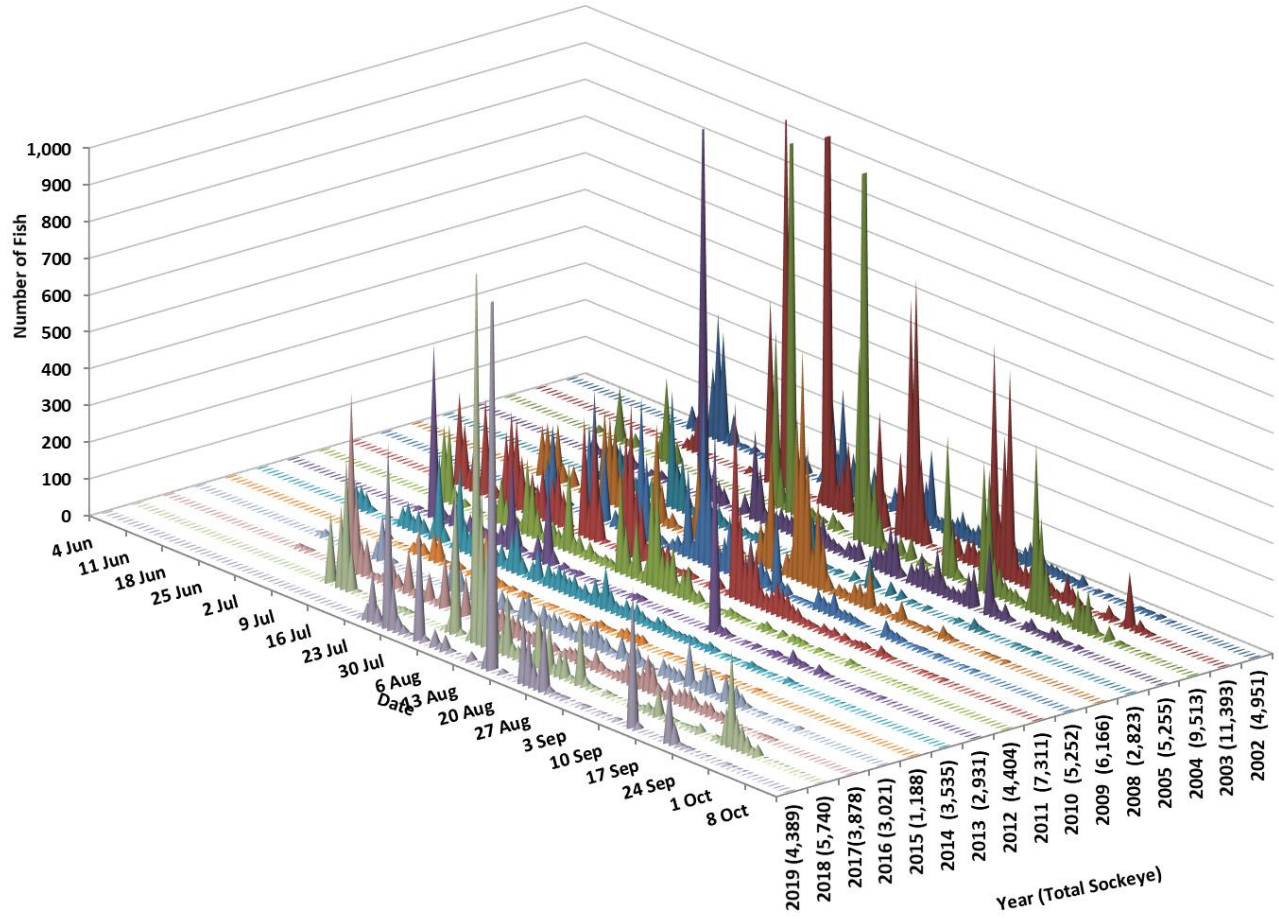



Figure 19. Estimated daily escapement of Sockeye Salmon into Neva Lake, June 4 to October 13, 2002 to 2005 and 2008 to 2019.

Table 4. Estimated daily escapement of adult and jack Sockeye Salmon into Neva Lake, from June 4 to October 13, 2002 to 2005 and 2008 to 2019.

| Date | 2002 | 2003 | 2004 | 2005 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 Jun | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 Jun | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0.0 | 5 | 0.5 | 0.0 | 0 | 0 | 0 | 0 |
| 17 Jun | 1 | 0 | 0 | 0.2 | 0 | 0 | 0 | 1.1 | 0.6 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 |
| 18 Jun | 2 | 0 | 0 | 0.5 | 0 | 0 | 0 | 2.2 | 1.2 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 |
| 19 Jun | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 |
| 20 Jun | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 Jun | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 14.0 | 1 | 0 | 40 | 0 | 0 | 2 | 0 | 1 |
| 22 Jun | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 60 | 0 | 0 | 0 | 0 | 0 |
| 23 Jun | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 62 | 0 | 0 | 0 | 0 | 0 |
| 24 Jun | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 248 | 0 | 0 | 49 | 0 | 0 | 0 | 0 | 0 |
| 25 Jun | 0 | 6 | 149 | 0 | 0 | 0 | 0 | 170 | 1 | 0 | 19 | 0 | 1 | 0 | 0 | 0 |
| 26 Jun | 1 | 2 | 17 | 49 | 0 | 0 | 0 | 54 | 35 | 0 | 2 | 0 | 5 | 0 | 0 | 0 |
| 27 Jun | 62 | 0 | 22 | 18 | 0 | 0 | 0 | 156 | 201 | 5 | 4 | 0 | 12 | 0 | 0 | 0 |
| 28 Jun | 35 | 0 | 40 | 27 | 0 | 133 | 1 | 43 | 208 | 13 | 10 | 0 | 22 | 0 | 0 | 0 |
| 29 Jun | 0 | 6 | 1 | 44 | 4 | 147 | 8 | 261 | 46 | 6 | 5 | 0 | 0 | 13 | 0 | 0 |
| 30 Jun | 31 | 2 | 4 | 66 | 0 | 142 | 14 | 11 | 26 | 2 | 10 | 0 | 0 | 12 | 0 | 0 |
| 1 Jul | 188 | 0 | 4 | 34 | 0 | 156 | 14 | 36 | 25 | 468 | 52 | 0 | 0 | 12 | 0 | 0 |
| 2 Jul | 340 | 26 | 0 | 31 | 15 | 55 | 19 | 4 | 2 | 119 | 68 | 0 | 0 | 0 | 0 | 0 |
| 3 Jul | 295 | 43 | 77 | 60 | 11 | 0 | 0 | 195 | 6 | 31 | 39 | 0 | 15 | 1 | 0 | 0 |
| 4 Jul | 28 | 99 | 225 | 23 | 137 | 58 | 2 | 253 | 6 | 22 | 58 | 34 | 5 | 1 | 0 | 0 |
| 5 Jul | 84 | 32 | 89 | 0 | 78 | 0 | 110 | 239 | 2 | 77 | 42 | 0 | 0 | 0 | 0 | 0 |
| 6 Jul | 12 | 6 | 63 | 0 | 151 | 22 | 205 | 146 | 2 | 29 | 9 | 7 | 0 | 0 | 0 | 0 |
| 7 Jul | 14 | 3 | 2 | 18 | 111 | 29 | 2 | 35 | 49 | 8 | 57 | 5 | 0 | 0 | 0 | 0 |
| 8 Jul | 8 | 0 | 0 | 0 | 97 | 16 | 0 | 112 | 125 | 46 | 239 | 1 | 48 | 11 | 0 | 0 |
| 9 Jul | 21 | 0 | 0 | 27 | 55 | 0 | 21 | 85 | 70 | 24 | 43 | 26 | 126 | 482 | 0 | 0 |
| 10 Jul | 8 | 0 | 0 | 9 | 38 | 244 | 0 | 140 | 3 | 42 | 4 | 58 | 0 | 231 | 9 | 0 |
| 11 Jul | 11 | 0 | 0 | 2 | 10 | 235 | 0 | 55 | 34 | 27 | 21 | 36 | 18 | 94 | 188 | 0 |
| 12 Jul | 11 | 0 | 0 | 65 | 20 | 213 | 0 | 128 | 33 | 38 | 233 | 8 | 2 | 101 | 7 | 0 |
| 13 Jul | 4 | 0 | 0 | 4 | 48 | 101 | 250 | 162 | 203 | 28 | 87 | 77 | 0 | 17 | 218 | 0 |
| 14 Jul | 37 | 19 | 0 | 2 | 17 | 137 | 344 | 98 | 157 | 56 | 66 | 72 | 0 | 19 | 356 | 0 |
| 15 Jul | 40 | 3 | 0 | 2 | 0 | 30 | 35 | 27 | 78 | 60 | 59 | 12 | 0 | 25 | 118 | 0 |
| 16 Jul | 21 | 0 | 0 | 0 | 0 | 22 | 209 | 1 | 21 | 249 | 61 | 2 | 0 | 14 | 11 | 0 |
| 17 Jul | 10 | 0 | 0 | 1185 | 313 | 4 | 5 | 2 | 99 | 90 | 60 | 56 | 1 | 67 | 5 | 0 |
| 18 Jul | 43 | 496 | 0 | 105 | 131 | 0 | 44 | 319 | 63 | 19 | 72 | 21 | 0 | 41 | 0 | 0 |
| 19 Jul | 52 | 361 | 1 | 88 | 146 | 53 | 30 | 94 | 47 | 6 | 40 | 4 | 2 | 14 | 0 | 0 |
| 20 Jul | 5 | 45 | 0 | 61 | 66 | 265 | 4 | 336 | 51 | 12 | 61 | 14 | 2 | 118 | 0 | 0 |
| 21 Jul | 2 | 1135 | 0 | 49 | 22 | 109 | 24 | 127 | 239 | 68 | 26 | 11 | 1 | 18 | 4 | 0 |
| 22 Jul | 31 | 92 | 2 | 7 | 40 | 22 | 45 | 11 | 43 | 33 | 107 | 20 | 47 | 51 | 0 | 0 |
| 23 Jul | 4 | 7 | 0 | 0 | 42 | 41 | 380 | 3 | 54 | 229 | 130 | 144 | 238 | 24 | 1 | 9 |
| 24 Jul | 239 | 0 | 3 | 10 | 75 | 14 | 222 | 7 | 19 | 43 | 47 | 63 | 66 | 79 | 11 | 45 |
| 25 Jul | 103 | 1 | 474 | 57 | 8 | 6 | 119 | 24 | 47 | 5 | 12 | 26 | 4 | 14 | 16 | 138 |
| 26 Jul | 273 | 6 | 111 | 0 | 51 | 0 | 53 | 340 | 25 | 20 | 47 | 20 | 8 | 27 | 14 | 49 |
| 27 Jul | 94 | 4 | 24 | 239 | 28 | 61 | 26 | 412 | 19 | 8 | 90 | 10 | 342 | 148 | 1 | 15 |
| 28 Jul | 110 | 67 | 1402 | 146 | 16 | 213 | 10 | 196 | 29 | 12 | 17 | 17 | 11 | 7 | 0 | 506 |
| 29 Jul | 39 | 1914 | 256 | 38 | 15 | 23 | 29 | 158 | 24 | 16 | 64 | 0 | 26 | 3 | 3 | 132 |
| 30 Jul | 23 | 231 | 199 | 57 | 20 | 77 | 45 | 51 | 18 | 1 | 43 | 15 | 28 | 9 | 2 | 43 |
| 31 Jul | 49 | 76 | 60 | 41 | 23 | 0 | 35 | 32 | 264 | 5 | 68 | 16 | 11 | 109 | 2 | 24 |
| 1 Aug | 96 | 142 | 34 | 59 | 14 | 1 | 236 | 61 | 131 | 7 | 58 | 5 | 54 | 4 | 0 | 11 |
| 2 Aug | 25 | 192 | 29 | 47 | 23 | 0 | 51 | 59 | 40 | 2 | 46 | 0 | 39 | 12 | 12 | 4 |
| 3 Aug | 8 | 9 | 21 | 50 | 41 | 0 | 146 | 68 | 159 | 1 | 57 | 3 | 10 | 227 | 46 | 336 |
| 4 Aug | 17 | 11 | 5 | 94 | 17 | 6 | 488 | 19 | 26 | 0 | 32 | 8 | 1 | 73 | 418 | 20 |
| 5 Aug | 64 | 367 | 44 | 5 | 4 | 18 | 280 | 13 | 64 | 0 | 45 | 9 | 62 | 26 | 19 | 3 |
| 6 Aug | 7 | 125 | 29 | 97 | 0 | 5 | 107 | 18 | 310 | 6 | 26 | 4 | 76 | 62 | 2 | 49 |
| 7 Aug | 23 | 79 | 7 | 70 | 0 | 0 | 61 | 29 | 292 | 0 | 70 | 5 | 32 | 69 | 37 | 18 |
| 8 Aug | 361 | 311 | 0 | 84 | 0 | 0 | 92 | 16 | 103 | 10 | 39 | 6 | 14 | 39 | 1,100 | 45 |
| 9 Aug | 206 | 103 | 1 | 78 | 0 | 116 | 158 | 2 | 106 | 18 | 113 | 10 | 62 | 55 | 427 | 14 |
| 10 Aug | 146 | 7 | 522 | 41 | 0 | 125 | 85 | 2 | 131 | 17 | 58 | 14 | 40 | 59 | 303 | 5 |
| 11 Aug | 116 | 4 | 1633 | 33 | 0 | 345 | 17 | 10 | 38 | 5 | 32 | 9 | 51 | 43 | 33 | 2 |
| 12 Aug | 206 | 224 | 197 | 25 | 216 | 55 | 42 | 76 | 78 | 2 | 27 | 2 | 46 | 31 | 69 | 7 |
| 13 Aug | 37 | 143 | 198 | 13 | 125 | 7 | 118 | 34 | 91 | 1 | 48 | 13 | 25 | 34 | 67 | 28 |
| 14 Aug | 35 | 653 | 95 | 43 | 125 | 63 | 28 | 7 | 31 | 1 | 36 | 22 | 42 | 88 | 168 | 5 |

(continued)

| Date | 2002 | 2003 | 2004 | 2005 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 Aug | 80 | 716 | 26 | 42 | 16 | 81 | 78 | 19 | 36 | 7 | 49 | 13 | 23 | 8 | 41 | 9 |
| 16 Aug | 41 | 233 | 24 | 61 | 13 | 437 | 53 | 532 | 7 | 3 | 34 | 11 | 59 | 7 | 37 | 64 |
| 17 Aug | 52 | 84 | 41 | 0 | 7 | 630 | 15 | 251 | 10 | 0 | 23 | 4 | 35 | 28 | 24 | 1,294 |
| 18 Aug | 74 | 8 | 53 | 0 | 14 | 372 | 231 | 130 | 16 | 1 | 18 | 23 | 58 | 9 | 42 | 3 |
| 19 Aug | 45 | 3 | 16 | 57 | 0 | 106 | 36 | 169 | 9 | 2 | 36 | 30 | 76 | 23 | 43 | 16 |
| 20 Aug | 40 | 6 | 64 | 65 | 0 | 239 | 35 | 152 | 10 | 2 | 35 | 28 | 43 | 33 | 157 | 4 |
| 21 Aug | 56 | 48 | 4 | 65 | 27 | 144 | 8 | 59 | 24 | 3 | 22 | 26 | 39 | 35 | 70 | 4 |
| 22 Aug | 79 | 83 | 25 | 133 | 7 | 46 | 10 | 47 | 18 | 3 | 17 | 28 | 18 | 47 | 140 | 4 |
| 23 Aug | 47 | 67 | 11 | 124 | 0 | 13 | 10 | 59 | 13 | 13 | 20 | 6 | 9 | 24 | 30 | 180 |
| 24 Aug | 29 | 17 | 5 | 29 | 87 | 32 | 10 | 92 | 10 | 555 | 19 | 3 | 63 | 18 | 67 | 142 |
| 25 Aug | 40 | 64 | 2 | 0 | 33 | 28 | 10 | 76 | 4 | 24 | 22 | 2 | 23 | 52 | 73 | 72 |
| 26 Aug | 27 | 67 | 2 | 52 | 0 | 20 | 53 | 71 | 2 | 23 | 23 | 4 | 49 | 28 | 16 | 54 |
| 27 Aug | 35 | 45 | 379 | 50 | 0 | 53 | 41 | 44 | 17 | 11 | 13 | 9 | 50 | 15 | 16 | 204 |
| 28 Aug | 40 | 50 | 133 | 93 | 38 | 58 | 31 | 39 | 27 | 2 | 14 | 4 | 25 | 14 | 179 | 21 |
| 29 Aug | 27 | 15 | 30 | 61 | 0 | 40 | 66 | 20 | 11 | 2 | 26 | 7 | 30 | 21 | 29 | 10 |
| 30 Aug | 46.5 | 621 | 10 | 47 | 28 | 116 | 24 | 19 | 2 | 9 | 18 | 1 | 9 | 31 | 15 | 9 |
| 31 Aug | 66 | 173 | 9 | 120 | 0 | 12 | 28 | 15 | 21 | 4 | 3 | 2 | 5 | 60 | 11 | 10 |
| 1 Sep | 26 | 385 | 2 | 56 | 13 | 29 | 26 | 9 | 6 | 14 | 10 | 5 | 46 | 63 | 3 | 4 |
| 2 Sep | 80 | 567 | 0 | 31 | 7 | 32 | 20 | 25 | 22 | 4 | 8 | 2 | 37 | 41 | 15 | 2 |
| 3 Sep | 27 | 109 | 348 | 36 | 0 | 8 | 14 | 14 | 20 | 7 | 9 | 6 | 36 | 54 | 10 | 7 |
| 4 Sep | 31 | 49 | 334 | 33 | 14 | 20 | 7 | 26 | 17 | 14 | 4 | 6 | 35 | 99 | 5 | 10 |
| 5 Sep | 27.8 | 57 | 104 | 39 | 0 | 54 | 0 | 8 | 7 | 18 | 9 | 7 | 8 | 81 | 3 | 2 |
| 6 Sep | 24.6 | 55 | 81 | 91 | 0 | 11 | 0 | 23 | 2 | 8 | 19 | 3 | 123 | 32 | 4 | 3 |
| 7 Sep | 21.4 | 49 | 49 | 111 | 0 | 13.5 | 0 | 9 | 13 | 8 | 13 | 13 | 22 | 17 | 64 | 7 |
| 8 Sep | 18.2 | 69 | 37 | 0 | 0 | 10.2 | 45 | 16 | 5.2 | 38 | 10 | 6 | 28 | 50 | 10 | 5 |
| 9 Sep | 15 | 76 | 38 | 0 | 6.6 | 9.8 | 25 | 19 | 8 | 19 | 5 | 2.9 | 78 | 19 | 16 | 1 |
| 10 Sep | 35 | 38 | 23 | 197 | 15.0 | 18.5 | 24 | 21 | 5 | 17 | 8 | 5.2 | 70 | 39 | 28 | 10 |
| 11 Sep | 5 | 25 | 14 | 46 | 4.6 | 6.4 | 17 | 8 | 3.3 | 8 | 3.1 | 1.8 | 11 | 49 | 20 | 1 |
| 12 Sep | 5 | 24 | 72 | 22 | 6.3 | 7.6 | 7 | 7 | 3.9 | 5.7 | 3.6 | 2.1 | 16 | 50 | 78 | 1 |
| 13 Sep | 13 | 75 | 456 | 47 | 30.2 | 34.9 | 8 | 29.4 | 17.8 | 26.3 | 16.6 | 9.8 | 71 | 37 | 12 | 383 |
| 14 Sep | 3 | 48 | 262 | 17 | 16.9 | 19.8 | 10 | 16.7 | 10.1 | 14.9 | 9.4 | 5.6 | 40 | 20 | 20 | 22 |
| 15 Sep | 12 | 31 | 143 | 0 | 9.5 | 11.6 | 13 | 9.8 | 5.9 | 8.7 | 5.5 | 3.3 | 55 | 37 | 12 | 0 |
| 16 Sep | 5.3 | 11 | 51 | 0 | 3.8 | 4.4 | 8 | 3.7 | 2.2 | 3.3 | 2.1 | 1.2 | 37 | 38 | 7 | 3 |
| 17 Sep | 7.8 | 16 | 61 | 21 | 6.0 | 6.5 | 5 | 5.4 | 3.3 | 4.9 | 3.1 | 1.8 | 17 | 19 | 10 | 0 |
| 18 Sep | 6.0 | 4 | 27 | 35 | 4.0 | 5.0 | 13 | 4.2 | 2.5 | 3.7 | 2.4 | 1.4 | 6 | 26 | 12 | 4 |
| 19 Sep | 4.8 | 7 | 37 | 12 | 3.4 | 4.0 | 8 | 3.4 | 2.0 | 3.0 | 1.9 | 1.1 | 6 | 18 | 16 | 6 |
| 20 Sep | 3.3 | 13 | 12 | 12 | 2.3 | 2.8 | 7 | 2.3 | 1.4 | 2.1 | 1.3 | 0.8 | 9 | 8 | 29 | 160 |
| 21 Sep | 12.1 | 39 | 107 | 13 | 9.7 | 10.1 | 2 | 8.5 | 5.2 | 7.6 | 4.8 | 2.9 | 3 | 6 | 3 | 62 |
| 22 Sep | 10.0 | 17 | 77 | 34 | 7.8 | 8.3 | 5 | 7.0 | 4.3 | 6.3 | 4.0 | 2.4 | 2 | 3 | 5 | 12 |
| 23 Sep | 11.7 | 2 | 114 | 32 | 9.0 | 9.8 | 7.9 | 8.2 | 5.0 | 7.4 | 4.7 | 2.8 | 9 | 7 | 16 | 10 |
| 24 Sep | 6.0 | 17 | 47 | 12 | 4.6 | 5.0 | 4.0 | 4.2 | 2.6 | 3.8 | 2.4 | 1.4 | 7 | 4 | 16 | 9 |
| 25 Sep | 14.2 | 152 | 14 | 13 | 10.9 | 11.8 | 9.5 | 9.9 | 6.0 | 8.9 | 5.6 | 3.3 | 2 | 6 | 102 | 4 |
| 26 Sep | 2.1 | 16 | 6 | 4.5 | 1.7 | 1.8 | 1.4 | 1.5 | 0.9 | 1.3 | 0.8 | 0.5 | 5 | 9 | 265 | 2 |
| 27 Sep | 7.2 | 34 | 41 | 15.3 | 5.7 | 6.0 | 4.8 | 5.0 | 3.0 | 4.5 | 2.9 | 1.7 | 2 | 11 | 93 | 6 |
| 28 Sep | 1.8 | 16 | 3 | 3.9 | 1.4 | 1.5 | 1.2 | 1.3 | 0.8 | 1.1 | 0.7 | 0.4 | 3.3 | 9 | 73 | 2 |
| 29 Sep | 2.5 | 12 | 14 | 5.3 | 2.0 | 2.1 | 1.7 | 1.7 | 1.1 | 1.6 | 1.0 | 0.6 | 4.6 | 0.0 | 47 | 3 |
| 30 Sep | 1.2 | 3 | 10 | 2.7 | 1.0 | 1.0 | 0.8 | 0.9 | 0.5 | 0.8 | 0.5 | 0.3 | 2.3 | 1.4 | 23 | 0 |
| 1 Oct | 0.7 | 2 | 5 | 1.4 | 0.5 | 0.6 | 0.4 | 0.5 | 0.3 | 0.4 | 0.3 | 0.2 | 1.2 | 0.8 | 35 | 8.7 |
| 2 Oct | 0.9 | 5 | 4 | 1.8 | 0.7 | 0.7 | 0.6 | 0.6 | 0.4 | 0.5 | 0.3 | 0.2 | 1.6 | 1.0 | 6 | 6.2 |
| 3 Oct | 0.0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1 | 5.0 |
| 4 Oct | 0.9 | 2 | 7 | 1.8 | 0.7 | 0.7 | 0.6 | 0.6 | 0.4 | 0.5 | 0.3 | 0.2 | 1.6 | 1.0 | 5 | 4.9 |
| 5 Oct | 0.7 | 3 | 4 | 1.4 | 0.5 | 0.6 | 0.4 | 0.5 | 0.3 | 0.4 | 0.3 | 0.2 | 1.2 | 0.8 | 4 | 3.7 |
| 6 Oct | 0.3 | 0 | 3 | 0.6 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.5 | 0.3 | 5 | 2.8 |
| 7 Oct | 0.4 | 0 | 4 | 0.8 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.1 | 0.7 | 0.4 | 2 | 2.2 |
| 8 Oct | 0.2 | 2 | 0 | 0.4 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.4 | 0.2 | 1 | 1.7 |
| 9 Oct | 0.0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4 | 1.4 |
| 10 Oct | 0.7 | 3.1 | 4 | 1.5 | 0.3 | 0.6 | 0.5 | 0.5 | 0.3 | 0.4 | 0.3 | 0.2 | 1.2 | 0.8 | 1.5 | 1.2 |
| 11 Oct | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.4 |
| 12 Oct | 0.2 | 0.8 | 1 | 0.4 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.3 | 0.2 | 0.5 | 0.4 |
| 13 Oct | 0.2 | 0.8 | 1 | 0.4 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.3 | 0.2 | 0.3 | 0.2 |
| Total | **4,951** | **11,393** | **9,513** | **5,255** | **2,823** | **6,166** | **5,252** | **7,311** | **4,404** | **2,931** | **3,535** | **1,188** | **3,009** | **3,898** | **5,740** | **4,389** |
| Weir Count | 4,471 | 11,388 | 9,513 | 5,212 | 2,657 | 5,950 | 5,217 | 7,182 | 4,313 | 2,812 | 3,460 | 1,134 | 2,990 | 3,891 | 5,737 | 4,350 |
| Difference | 532 | 5 | 0 | 43 | 166 | 216 | 35 | 130 | 91 | 119 | 75 | 54 | 19 | 7 | 3 | 39 |

Shaded cells with whole numbers entries are the estimated best guess and shaded cells with values to one decimal place are interpolated (see below).
Missing values prior to 16 June were assumed to be zero.
Missing values between 16 and 21 June were filled-in using the EM algorithm applied to counts in June.
Missing values after 6 September were filled-in using the EM algorithm applied to counts in September and October.

Notes for 2002:

The 4,951 total is the Darroch estimates of 3,738 adults and 1,213 jacks (Van Alen 2004). Missing values on 30 August and 5 to 8 September were linerally interpolated and the remaining 295 fish were listed on 3 July when fish had passed through pulled pickets on the weir.

Notes for 2003:

The 11,393 total is the Darroch estimates with adults and jacks combined and three release and two recovery strata (Van Alen 2005). The 287 fish difference between the weir count that the Darroch estimate were added to the 98 fish actually counted on 1 September since many fish were known to have passed uncounted through pulled pickets on this date. These fish were apportioned between adults and jacks in the same proportion as the 98 fish counted.

Notes for 2008:

The 2,823 total is the sum of the Peterson mark-recapture estimate of 2,655 adults (SE=159, CV=6%) and 168 jacks (SE=53, CV=32%). We used the estimated daily proportions from an 2002 to 2005 EM fill-in to estimate the daily counts after 8 September (Van Alen 2009).

Table 5. Estimated cumulative daily proportion of adult and jack Sockeye Salmon escapement into Neva Lake, from June 4 to October 12, 2002 to 2005 and 2008 to 2019.

| Date | 2002 | 2003 | 2004 | 2005 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 5 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 6 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 7 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 8 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 9 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 10 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 11 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 12 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 13 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 14 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 15 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 16 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 17 Jun | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 18 Jun | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 19 Jun | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 20 Jun | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 21 Jun | 0.001 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.002 | 0.011 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 |
| 22 Jun | 0.001 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.002 | 0.028 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.003 |
| 23 Jun | 0.001 | 0.001 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.001 | 0.002 | 0.046 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.004 |
| 24 Jun | 0.001 | 0.001 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.037 | 0.001 | 0.002 | 0.060 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.007 |
| 25 Jun | 0.001 | 0.001 | 0.018 | 0.000 | 0.000 | 0.000 | 0.000 | 0.060 | 0.001 | 0.002 | 0.065 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.010 |
| 26 Jun | 0.002 | 0.001 | 0.020 | 0.009 | 0.000 | 0.000 | 0.000 | 0.067 | 0.009 | 0.002 | 0.066 | 0.000 | 0.002 | 0.001 | 0.000 | 0.000 | 0.012 |
| 27 Jun | 0.014 | 0.001 | 0.022 | 0.013 | 0.000 | 0.000 | 0.000 | 0.089 | 0.055 | 0.004 | 0.067 | 0.000 | 0.006 | 0.001 | 0.000 | 0.000 | 0.018 |
| 28 Jun | 0.021 | 0.001 | 0.026 | 0.018 | 0.000 | 0.022 | 0.000 | 0.095 | 0.102 | 0.008 | 0.070 | 0.000 | 0.013 | 0.001 | 0.000 | 0.000 | 0.025 |
| 29 Jun | 0.021 | 0.002 | 0.026 | 0.026 | 0.001 | 0.045 | 0.002 | 0.130 | 0.112 | 0.010 | 0.071 | 0.000 | 0.013 | 0.004 | 0.000 | 0.000 | 0.031 |
| 30 Jun | 0.027 | 0.002 | 0.027 | 0.039 | 0.001 | 0.068 | 0.004 | 0.132 | 0.118 | 0.011 | 0.074 | 0.000 | 0.013 | 0.007 | 0.000 | 0.000 | 0.035 |
| 1 Jul | 0.065 | 0.002 | 0.027 | 0.045 | 0.001 | 0.094 | 0.007 | 0.137 | 0.124 | 0.171 | 0.089 | 0.000 | 0.013 | 0.010 | 0.000 | 0.000 | 0.052 |
| 2 Jul | 0.134 | 0.004 | 0.027 | 0.051 | 0.007 | 0.103 | 0.011 | 0.137 | 0.124 | 0.211 | 0.108 | 0.000 | 0.013 | 0.010 | 0.000 | 0.000 | 0.063 |
| 3 Jul | 0.194 | 0.008 | 0.035 | 0.063 | 0.011 | 0.103 | 0.011 | 0.164 | 0.126 | 0.222 | 0.119 | 0.000 | 0.018 | 0.010 | 0.000 | 0.000 | 0.072 |
| 4 Jul | 0.199 | 0.017 | 0.059 | 0.067 | 0.059 | 0.112 | 0.011 | 0.199 | 0.127 | 0.229 | 0.135 | 0.029 | 0.020 | 0.011 | 0.000 | 0.000 | 0.085 |
| 5 Jul | 0.216 | 0.019 | 0.068 | 0.067 | 0.087 | 0.112 | 0.032 | 0.231 | 0.128 | 0.256 | 0.147 | 0.029 | 0.020 | 0.011 | 0.000 | 0.000 | 0.095 |
| 6 Jul | 0.219 | 0.020 | 0.075 | 0.067 | 0.140 | 0.116 | 0.071 | 0.251 | 0.128 | 0.265 | 0.150 | 0.034 | 0.020 | 0.011 | 0.000 | 0.000 | 0.104 |
| 7 Jul | 0.222 | 0.020 | 0.075 | 0.071 | 0.180 | 0.120 | 0.071 | 0.256 | 0.139 | 0.268 | 0.166 | 0.039 | 0.020 | 0.011 | 0.000 | 0.000 | 0.110 |
| 8 Jul | 0.223 | 0.020 | 0.075 | 0.071 | 0.214 | 0.123 | 0.071 | 0.271 | 0.168 | 0.284 | 0.234 | 0.040 | 0.036 | 0.013 | 0.000 | 0.000 | 0.123 |
| 9 Jul | 0.227 | 0.020 | 0.075 | 0.076 | 0.233 | 0.123 | 0.075 | 0.283 | 0.183 | 0.292 | 0.246 | 0.061 | 0.078 | 0.137 | 0.000 | 0.000 | 0.141 |
| 10 Jul | 0.229 | 0.020 | 0.075 | 0.077 | 0.247 | 0.162 | 0.075 | 0.302 | 0.184 | 0.306 | 0.247 | 0.110 | 0.078 | 0.196 | 0.002 | 0.000 | 0.154 |
| 11 Jul | 0.231 | 0.020 | 0.075 | 0.078 | 0.250 | 0.201 | 0.075 | 0.310 | 0.192 | 0.316 | 0.253 | 0.141 | 0.084 | 0.220 | 0.034 | 0.000 | 0.165 |
| 12 Jul | 0.233 | 0.020 | 0.075 | 0.090 | 0.258 | 0.235 | 0.075 | 0.327 | 0.199 | 0.329 | 0.319 | 0.147 | 0.084 | 0.246 | 0.036 | 0.000 | 0.178 |
| 13 Jul | 0.234 | 0.020 | 0.075 | 0.091 | 0.275 | 0.252 | 0.123 | 0.349 | 0.245 | 0.338 | 0.343 | 0.212 | 0.084 | 0.251 | 0.074 | 0.000 | 0.198 |
| 14 Jul | 0.242 | 0.022 | 0.075 | 0.091 | 0.281 | 0.274 | 0.189 | 0.363 | 0.281 | 0.357 | 0.362 | 0.273 | 0.084 | 0.256 | 0.136 | 0.000 | 0.219 |
| 15 Jul | 0.250 | 0.022 | 0.075 | 0.092 | 0.281 | 0.279 | 0.195 | 0.366 | 0.299 | 0.378 | 0.379 | 0.283 | 0.084 | 0.262 | 0.156 | 0.000 | 0.227 |
| 16 Jul | 0.254 | 0.022 | 0.075 | 0.092 | 0.281 | 0.282 | 0.235 | 0.367 | 0.304 | 0.463 | 0.396 | 0.284 | 0.084 | 0.266 | 0.158 | 0.000 | 0.237 |
| 17 Jul | 0.256 | 0.022 | 0.075 | 0.317 | 0.391 | 0.283 | 0.236 | 0.367 | 0.326 | 0.493 | 0.413 | 0.332 | 0.085 | 0.283 | 0.159 | 0.000 | 0.269 |
| 18 Jul | 0.265 | 0.066 | 0.075 | 0.337 | 0.438 | 0.283 | 0.244 | 0.410 | 0.340 | 0.500 | 0.433 | 0.349 | 0.085 | 0.293 | 0.159 | 0.000 | 0.285 |
| 19 Jul | 0.275 | 0.097 | 0.075 | 0.354 | 0.490 | 0.291 | 0.250 | 0.423 | 0.351 | 0.502 | 0.444 | 0.353 | 0.085 | 0.297 | 0.159 | 0.000 | 0.296 |
| 20 Jul | 0.276 | 0.101 | 0.075 | 0.366 | 0.513 | 0.334 | 0.251 | 0.469 | 0.363 | 0.506 | 0.462 | 0.364 | 0.086 | 0.327 | 0.159 | 0.000 | 0.310 |
| 21 Jul | 0.277 | 0.201 | 0.075 | 0.375 | 0.521 | 0.352 | 0.255 | 0.487 | 0.417 | 0.529 | 0.469 | 0.374 | 0.086 | 0.332 | 0.160 | 0.000 | 0.327 |
| 22 Jul | 0.283 | 0.209 | 0.075 | 0.376 | 0.535 | 0.356 | 0.264 | 0.488 | 0.427 | 0.540 | 0.499 | 0.390 | 0.102 | 0.345 | 0.160 | 0.000 | 0.337 |
| 23 Jul | 0.284 | 0.210 | 0.075 | 0.376 | 0.550 | 0.362 | 0.336 | 0.489 | 0.439 | 0.619 | 0.536 | 0.512 | 0.181 | 0.351 | 0.160 | 0.002 | 0.365 |
| 24 Jul | 0.332 | 0.210 | 0.076 | 0.378 | 0.576 | 0.365 | 0.379 | 0.489 | 0.443 | 0.633 | 0.549 | 0.565 | 0.203 | 0.371 | 0.162 | 0.013 | 0.382 |
| 25 Jul | 0.353 | 0.210 | 0.126 | 0.389 | 0.579 | 0.366 | 0.401 | 0.493 | 0.454 | 0.635 | 0.553 | 0.586 | 0.204 | 0.375 | 0.164 | 0.044 | 0.392 |
| 26 Jul | 0.408 | 0.210 | 0.137 | 0.389 | 0.597 | 0.366 | 0.411 | 0.539 | 0.460 | 0.642 | 0.566 | 0.603 | 0.207 | 0.382 | 0.167 | 0.055 | 0.406 |
| 27 Jul | 0.427 | 0.211 | 0.140 | 0.434 | 0.607 | 0.375 | 0.416 | 0.596 | 0.464 | 0.644 | 0.591 | 0.612 | 0.321 | 0.420 | 0.167 | 0.059 | 0.428 |
| 28 Jul | 0.449 | 0.217 | 0.287 | 0.462 | 0.613 | 0.410 | 0.418 | 0.622 | 0.470 | 0.649 | 0.596 | 0.626 | 0.324 | 0.422 | 0.167 | 0.174 | 0.449 |
| 29 Jul | 0.457 | 0.385 | 0.314 | 0.469 | 0.618 | 0.414 | 0.424 | 0.644 | 0.476 | 0.654 | 0.614 | 0.626 | 0.333 | 0.422 | 0.168 | 0.204 | 0.468 |
| 30 Jul | 0.462 | 0.405 | 0.335 | 0.480 | 0.625 | 0.426 | 0.432 | 0.651 | 0.480 | 0.654 | 0.627 | 0.639 | 0.342 | 0.425 | 0.168 | 0.214 | 0.477 |
| 31 Jul | 0.472 | 0.411 | 0.341 | 0.488 | 0.633 | 0.426 | 0.439 | 0.655 | 0.540 | 0.656 | 0.646 | 0.652 | 0.346 | 0.453 | 0.168 | 0.219 | 0.488 |
| 1 Aug | 0.491 | 0.424 | 0.345 | 0.499 | 0.638 | 0.426 | 0.484 | 0.664 | 0.570 | 0.658 | 0.662 | 0.656 | 0.364 | 0.454 | 0.168 | 0.222 | 0.500 |
| 2 Aug | 0.496 | 0.441 | 0.348 | 0.508 | 0.646 | 0.426 | 0.494 | 0.672 | 0.579 | 0.659 | 0.675 | 0.656 | 0.377 | 0.457 | 0.170 | 0.223 | 0.507 |
| 3 Aug | 0.498 | 0.442 | 0.350 | 0.518 | 0.661 | 0.426 | 0.521 | 0.681 | 0.615 | 0.660 | 0.691 | 0.659 | 0.380 | 0.515 | 0.178 | 0.299 | 0.520 |
| 4 Aug | 0.501 | 0.443 | 0.351 | 0.536 | 0.667 | 0.427 | 0.614 | 0.684 | 0.621 | 0.660 | 0.700 | 0.666 | 0.380 | 0.534 | 0.251 | 0.304 | 0.536 |
| 5 Aug | 0.514 | 0.475 | 0.355 | 0.537 | 0.668 | 0.430 | 0.668 | 0.685 | 0.635 | 0.660 | 0.713 | 0.673 | 0.401 | 0.540 | 0.255 | 0.304 | 0.547 |
| 6 Aug | 0.515 | 0.486 | 0.358 | 0.555 | 0.668 | 0.431 | 0.688 | 0.688 | 0.706 | 0.662 | 0.720 | 0.677 | 0.426 | 0.556 | 0.255 | 0.316 | 0.559 |

(continued)

Table 5. (page 2 of 2)

| Date | 2002 | 2003 | 2004 | 2005 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 Aug | 0.520 | 0.493 | 0.359 | 0.568 | 0.668 | 0.431 | 0.700 | 0.692 | 0.772 | 0.662 | 0.740 | 0.681 | 0.437 | 0.574 | 0.261 | 0.320 | 0.571 |
| 8 Aug | 0.593 | 0.520 | 0.359 | 0.584 | 0.668 | 0.431 | 0.717 | 0.694 | 0.795 | 0.665 | 0.751 | 0.686 | 0.442 | 0.584 | 0.453 | 0.330 | 0.596 |
| 9 Aug | 0.635 | 0.529 | 0.359 | 0.599 | 0.668 | 0.450 | 0.747 | 0.694 | 0.819 | 0.671 | 0.783 | 0.694 | 0.462 | 0.598 | 0.527 | 0.333 | 0.616 |
| 10 Aug | 0.664 | 0.530 | 0.414 | 0.607 | 0.668 | 0.470 | 0.763 | 0.695 | 0.849 | 0.677 | 0.800 | 0.706 | 0.476 | 0.613 | 0.580 | 0.334 | 0.634 |
| 11 Aug | 0.687 | 0.530 | 0.586 | 0.613 | 0.668 | 0.526 | 0.767 | 0.696 | 0.858 | 0.679 | 0.809 | 0.714 | 0.492 | 0.624 | 0.586 | 0.335 | 0.656 |
| 12 Aug | 0.729 | 0.550 | 0.606 | 0.618 | 0.745 | 0.535 | 0.775 | 0.706 | 0.876 | 0.679 | 0.816 | 0.715 | 0.508 | 0.632 | 0.598 | 0.336 | 0.673 |
| 13 Aug | 0.737 | 0.562 | 0.627 | 0.620 | 0.789 | 0.536 | 0.797 | 0.711 | 0.896 | 0.680 | 0.830 | 0.726 | 0.516 | 0.641 | 0.610 | 0.343 | 0.685 |
| 14 Aug | 0.744 | 0.620 | 0.637 | 0.629 | 0.834 | 0.546 | 0.802 | 0.712 | 0.903 | 0.680 | 0.840 | 0.745 | 0.530 | 0.663 | 0.639 | 0.344 | 0.702 |
| 15 Aug | 0.760 | 0.682 | 0.640 | 0.637 | 0.839 | 0.559 | 0.817 | 0.715 | 0.911 | 0.682 | 0.854 | 0.756 | 0.538 | 0.665 | 0.646 | 0.346 | 0.713 |
| 16 Aug | 0.768 | 0.703 | 0.642 | 0.648 | 0.844 | 0.630 | 0.827 | 0.787 | 0.913 | 0.683 | 0.864 | 0.765 | 0.557 | 0.667 | 0.652 | 0.360 | 0.730 |
| 17 Aug | 0.779 | 0.710 | 0.647 | 0.648 | 0.846 | 0.733 | 0.830 | 0.822 | 0.915 | 0.683 | 0.870 | 0.768 | 0.569 | 0.674 | 0.657 | 0.655 | 0.743 |
| 18 Aug | 0.793 | 0.711 | 0.652 | 0.648 | 0.851 | 0.793 | 0.874 | 0.839 | 0.919 | 0.684 | 0.875 | 0.788 | 0.588 | 0.677 | 0.664 | 0.656 | 0.757 |
| 19 Aug | 0.803 | 0.711 | 0.654 | 0.659 | 0.851 | 0.810 | 0.881 | 0.863 | 0.921 | 0.684 | 0.885 | 0.813 | 0.613 | 0.683 | 0.671 | 0.660 | 0.767 |
| 20 Aug | 0.811 | 0.712 | 0.661 | 0.671 | 0.851 | 0.849 | 0.888 | 0.883 | 0.923 | 0.685 | 0.895 | 0.836 | 0.628 | 0.691 | 0.699 | 0.661 | 0.779 |
| 21 Aug | 0.822 | 0.716 | 0.661 | 0.684 | 0.861 | 0.872 | 0.889 | 0.891 | 0.929 | 0.686 | 0.901 | 0.858 | 0.641 | 0.700 | 0.711 | 0.661 | 0.788 |
| 22 Aug | 0.838 | 0.723 | 0.664 | 0.709 | 0.863 | 0.880 | 0.891 | 0.898 | 0.933 | 0.687 | 0.906 | 0.882 | 0.647 | 0.712 | 0.735 | 0.662 | 0.798 |
| 23 Aug | 0.847 | 0.729 | 0.665 | 0.733 | 0.863 | 0.882 | 0.893 | 0.906 | 0.936 | 0.692 | 0.912 | 0.887 | 0.650 | 0.718 | 0.741 | 0.703 | 0.804 |
| 24 Aug | 0.853 | 0.731 | 0.666 | 0.738 | 0.894 | 0.887 | 0.895 | 0.919 | 0.938 | 0.881 | 0.917 | 0.889 | 0.671 | 0.723 | 0.752 | 0.736 | 0.824 |
| 25 Aug | 0.861 | 0.736 | 0.666 | 0.738 | 0.906 | 0.891 | 0.897 | 0.929 | 0.939 | 0.889 | 0.924 | 0.891 | 0.678 | 0.736 | 0.765 | 0.752 | 0.830 |
| 26 Aug | 0.867 | 0.742 | 0.666 | 0.748 | 0.906 | 0.895 | 0.907 | 0.939 | 0.939 | 0.897 | 0.930 | 0.894 | 0.695 | 0.743 | 0.768 | 0.764 | 0.836 |
| 27 Aug | 0.874 | 0.746 | 0.706 | 0.758 | 0.906 | 0.903 | 0.915 | 0.945 | 0.943 | 0.901 | 0.934 | 0.902 | 0.711 | 0.747 | 0.771 | 0.811 | 0.844 |
| 28 Aug | 0.882 | 0.750 | 0.720 | 0.775 | 0.919 | 0.913 | 0.921 | 0.950 | 0.949 | 0.901 | 0.938 | 0.905 | 0.719 | 0.751 | 0.802 | 0.816 | 0.853 |
| 29 Aug | 0.887 | 0.752 | 0.723 | 0.787 | 0.919 | 0.919 | 0.933 | 0.953 | 0.952 | 0.902 | 0.945 | 0.911 | 0.729 | 0.756 | 0.807 | 0.818 | 0.858 |
| 30 Aug | 0.897 | 0.806 | 0.724 | 0.796 | 0.929 | 0.938 | 0.938 | 0.955 | 0.952 | 0.905 | 0.950 | 0.912 | 0.732 | 0.764 | 0.809 | 0.820 | 0.867 |
| 31 Aug | 0.910 | 0.821 | 0.725 | 0.819 | 0.929 | 0.940 | 0.943 | 0.957 | 0.957 | 0.907 | 0.951 | 0.914 | 0.734 | 0.780 | 0.811 | 0.822 | 0.873 |
| 1 Sep | 0.915 | 0.855 | 0.725 | 0.829 | 0.934 | 0.945 | 0.948 | 0.959 | 0.958 | 0.911 | 0.954 | 0.918 | 0.749 | 0.796 | 0.812 | 0.823 | 0.881 |
| 2 Sep | 0.932 | 0.905 | 0.725 | 0.835 | 0.936 | 0.950 | 0.952 | 0.962 | 0.963 | 0.913 | 0.956 | 0.920 | 0.762 | 0.806 | 0.814 | 0.824 | 0.889 |
| 3 Sep | 0.937 | 0.915 | 0.762 | 0.842 | 0.936 | 0.951 | 0.955 | 0.964 | 0.968 | 0.915 | 0.959 | 0.925 | 0.774 | 0.820 | 0.816 | 0.825 | 0.896 |
| 4 Sep | 0.943 | 0.919 | 0.797 | 0.848 | 0.941 | 0.954 | 0.956 | 0.968 | 0.972 | 0.920 | 0.960 | 0.930 | 0.785 | 0.846 | 0.817 | 0.828 | 0.904 |
| 5 Sep | 0.949 | 0.924 | 0.808 | 0.856 | 0.941 | 0.963 | 0.956 | 0.969 | 0.973 | 0.926 | 0.962 | 0.936 | 0.788 | 0.866 | 0.818 | 0.828 | 0.909 |
| 6 Sep | 0.954 | 0.929 | 0.816 | 0.873 | 0.941 | 0.965 | 0.956 | 0.972 | 0.974 | 0.929 | 0.968 | 0.938 | 0.829 | 0.875 | 0.818 | 0.829 | 0.916 |
| 7 Sep | 0.958 | 0.933 | 0.821 | 0.894 | 0.941 | 0.967 | 0.956 | 0.973 | 0.977 | 0.931 | 0.971 | 0.949 | 0.836 | 0.879 | 0.829 | 0.830 | 0.921 |
| 8 Sep | 0.962 | 0.939 | 0.825 | 0.894 | 0.941 | 0.969 | 0.964 | 0.975 | 0.978 | 0.944 | 0.974 | 0.954 | 0.845 | 0.892 | 0.831 | 0.831 | 0.926 |
| 9 Sep | 0.965 | 0.946 | 0.829 | 0.894 | 0.944 | 0.970 | 0.969 | 0.978 | 0.980 | 0.951 | 0.976 | 0.957 | 0.871 | 0.897 | 0.834 | 0.832 | 0.931 |
| 10 Sep | 0.972 | 0.949 | 0.832 | 0.932 | 0.949 | 0.973 | 0.974 | 0.981 | 0.981 | 0.957 | 0.978 | 0.961 | 0.895 | 0.907 | 0.839 | 0.834 | 0.939 |
| 11 Sep | 0.973 | 0.951 | 0.833 | 0.941 | 0.950 | 0.974 | 0.977 | 0.982 | 0.982 | 0.959 | 0.979 | 0.963 | 0.898 | 0.919 | 0.842 | 0.834 | 0.942 |
| 12 Sep | 0.974 | 0.953 | 0.841 | 0.945 | 0.953 | 0.976 | 0.978 | 0.983 | 0.983 | 0.961 | 0.980 | 0.964 | 0.904 | 0.932 | 0.856 | 0.834 | 0.945 |
| 13 Sep | 0.977 | 0.960 | 0.889 | 0.954 | 0.963 | 0.981 | 0.980 | 0.987 | 0.987 | 0.970 | 0.984 | 0.973 | 0.927 | 0.942 | 0.858 | 0.922 | 0.955 |
| 14 Sep | 0.977 | 0.964 | 0.916 | 0.957 | 0.969 | 0.984 | 0.982 | 0.989 | 0.989 | 0.975 | 0.987 | 0.977 | 0.940 | 0.947 | 0.862 | 0.927 | 0.961 |
| 15 Sep | 0.980 | 0.967 | 0.931 | 0.957 | 0.973 | 0.986 | 0.984 | 0.990 | 0.990 | 0.978 | 0.989 | 0.980 | 0.959 | 0.956 | 0.864 | 0.927 | 0.966 |
| 16 Sep | 0.981 | 0.968 | 0.937 | 0.957 | 0.974 | 0.987 | 0.986 | 0.991 | 0.991 | 0.980 | 0.989 | 0.981 | 0.971 | 0.966 | 0.865 | 0.927 | 0.968 |
| 17 Sep | 0.982 | 0.969 | 0.943 | 0.961 | 0.976 | 0.988 | 0.987 | 0.992 | 0.992 | 0.981 | 0.990 | 0.983 | 0.977 | 0.971 | 0.867 | 0.927 | 0.971 |
| 18 Sep | 0.983 | 0.970 | 0.946 | 0.968 | 0.978 | 0.989 | 0.989 | 0.992 | 0.992 | 0.982 | 0.991 | 0.984 | 0.979 | 0.977 | 0.869 | 0.928 | 0.973 |
| 19 Sep | 0.984 | 0.970 | 0.950 | 0.970 | 0.979 | 0.990 | 0.991 | 0.993 | 0.993 | 0.983 | 0.991 | 0.985 | 0.981 | 0.982 | 0.871 | 0.930 | 0.974 |
| 20 Sep | 0.985 | 0.971 | 0.951 | 0.972 | 0.980 | 0.990 | 0.992 | 0.993 | 0.993 | 0.984 | 0.992 | 0.985 | 0.984 | 0.984 | 0.877 | 0.966 | 0.976 |
| 21 Sep | 0.988 | 0.975 | 0.962 | 0.975 | 0.983 | 0.992 | 0.992 | 0.994 | 0.994 | 0.987 | 0.993 | 0.988 | 0.985 | 0.986 | 0.877 | 0.980 | 0.978 |
| 22 Sep | 0.990 | 0.976 | 0.970 | 0.981 | 0.986 | 0.993 | 0.993 | 0.995 | 0.995 | 0.989 | 0.994 | 0.990 | 0.985 | 0.986 | 0.878 | 0.983 | 0.980 |
| 23 Sep | 0.992 | 0.976 | 0.982 | 0.987 | 0.989 | 0.995 | 0.995 | 0.996 | 0.996 | 0.991 | 0.996 | 0.992 | 0.988 | 0.988 | 0.881 | 0.985 | 0.983 |
| 24 Sep | 0.993 | 0.978 | 0.987 | 0.989 | 0.991 | 0.995 | 0.996 | 0.997 | 0.997 | 0.993 | 0.996 | 0.993 | 0.991 | 0.989 | 0.883 | 0.987 | 0.985 |
| 25 Sep | 0.996 | 0.991 | 0.989 | 0.992 | 0.995 | 0.997 | 0.997 | 0.998 | 0.998 | 0.996 | 0.998 | 0.996 | 0.991 | 0.991 | 0.901 | 0.988 | 0.988 |
| 26 Sep | 0.996 | 0.993 | 0.989 | 0.993 | 0.995 | 0.998 | 0.998 | 0.998 | 0.998 | 0.996 | 0.998 | 0.997 | 0.993 | 0.993 | 0.947 | 0.989 | 0.992 |
| 27 Sep | 0.998 | 0.996 | 0.994 | 0.996 | 0.997 | 0.999 | 0.999 | 0.999 | 0.999 | 0.998 | 0.999 | 0.998 | 0.994 | 0.996 | 0.964 | 0.990 | 0.995 |
| 28 Sep | 0.998 | 0.997 | 0.994 | 0.996 | 0.998 | 0.999 | 0.999 | 0.999 | 0.999 | 0.998 | 0.999 | 0.998 | 0.995 | 0.998 | 0.976 | 0.990 | 0.996 |
| 29 Sep | 0.999 | 0.998 | 0.995 | 0.997 | 0.998 | 0.999 | 0.999 | 0.999 | 0.999 | 0.999 | 0.999 | 0.999 | 0.996 | 0.998 | 0.985 | 0.991 | 0.997 |
| 30 Sep | 0.999 | 0.998 | 0.997 | 0.998 | 0.999 | 0.999 | 0.999 | 1.000 | 1.000 | 0.999 | 0.999 | 0.999 | 0.997 | 0.999 | 0.989 | 0.991 | 0.998 |
| 1 Oct | 0.999 | 0.999 | 0.997 | 0.998 | 0.999 | 0.999 | 0.999 | 1.000 | 1.000 | 0.999 | 1.000 | 0.999 | 0.997 | 0.999 | 0.995 | 0.993 | 0.999 |
| 2 Oct | 0.999 | 0.999 | 0.997 | 0.999 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999 | 1.000 | 0.999 | 0.998 | 0.999 | 0.996 | 0.995 | 0.999 |
| 3 Oct | 0.999 | 0.999 | 0.997 | 0.999 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999 | 1.000 | 0.999 | 0.998 | 0.999 | 0.996 | 0.996 | 0.999 |
| 4 Oct | 0.999 | 0.999 | 0.998 | 0.999 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999 | 1.000 | 0.999 | 0.998 | 0.999 | 0.997 | 0.997 | 0.999 |
| 5 Oct | 1.000 | 0.999 | 0.999 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999 | 0.999 | 0.997 | 0.998 | 0.999 |
| 6 Oct | 1.000 | 0.999 | 0.999 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999 | 1.000 | 0.998 | 0.998 | 0.999 |
| 7 Oct | 1.000 | 0.999 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999 | 1.000 | 0.999 | 0.999 | 1.000 |
| 8 Oct | 1.000 | 1.000 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999 | 1.000 | 0.999 | 0.999 | 1.000 |
| 9 Oct | 1.000 | 1.000 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.999 | 1.000 | 1.000 | 1.000 | 1.000 |
| 10 Oct | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 11 Oct | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 12 Oct | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 13 Oct | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

The boxes and lines delineate the median, second and third quartiles, and 80% fish passage dates.

## Age, Sex, and Length Composition

In 2019, we sampled scales from 79 Sockeye Salmon for age, sex, and length (mid-eye-to-fork) data. Project personnel captured all 79 fish beach seining off the mouth of the main inlet stream on August 28. A second sampling session was attempted on September 30, but no samples were successfully collected as heavy rain made it impossible to keep scales on the gummed scale cards. Both freshwater and marine ages could be determined from only 31 of the 79 fish sampled due to scales that were regenerated, resorbed, or obscured (Table 6). The freshwater ages alone were readable from 37 of the remaining 48 fish, and all were freshwater age 1.

Table 6. Age composition (A) and average length at age (B) of Sockeye Salmon at Neva Lake, 2019.

(A) Age composition

| Age | Males | Females | Unknown | All fish | Percent |
|---|---|---|---|---|---|
| 1.1 | 14 | - | | 14 | 18% |
| 1.2 | - | 2 | - | 2 | 3% |
| 1.3 | 6 | 9 | - | 15 | 19% |
| Freshwater 1 | 29 | 7 | 1 | 37 | 47% |
| Unageable | 11 | - | - | 11 | 14% |
| **All fish** | 60 | 18 | 1 | 79 | |

(B) Average length (mm)

| Age | Males | Females | Unknown | All fish |
|---|---|---|---|---|
| 1.1 | 354 | | | 354 |
| 1.2 | | 490 | | 490 |
| 1.3 | 532 | 543 | | 539 |
| Freshwater 1 | 504 | 526 | 555 | 510 |
| Unageable | 460 | | | 460 |
| **All fish** | 461 | 531 | 555 | 479 |

The majority of fish were age 1.1 (brood year 2016) or 1.3 (brood year 2014). Usually, age 1.2 fish make a substantial proportion of the escapement, but only about 6.5% of fish that could be aged were age 1.2. The parent year (brood year 2015) for age 1.2 fish returning in 2019 had the lowest escapement on record.

The average length of age 1.3 fish sampled in 2019 was 539 mm, which was significantly (two tailed t-test, $p=0.003$) shorter than the historical average of 565 mm (Table 6). The 354 mm average length of age 1.1 fish, however, was not significantly different from the historical average of 363 mm ($p=0.166$). No comparison could be made for age 1.2 fish, as only two were sampled in 2019.

Comparing the age compositions of the Neva Lake Sockeye escapements from 2002 to 2019 shows that freshwater-age-1 fish have typically dominated the runs, with age-1.2 and 1.3 being the most abundant (Table 7). However, freshwater-age-2 fish were 30% , 32%, 73%, and 20% of the Sockeye Salmon aged in 2006, 2010, 2012, and 2014, respectively.

Table 7. Age composition of the Sockeye Salmon escapement into Neva Lake, 2002 through 2019.

| | | Age | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Sample Size | 1.1 | 1.2 | 1.3 | 2.1 | 2.2 | 2.3 | 3.1 | 3.2 |
| 2002 | 606 | 22% | 45% | 28% | | 4% | | | |
| 2003 | 1054 | 20% | 71% | 5% | 2% | 2% | 1% | | |
| 2004 | 480 | 10% | 70% | 16% | | 4% | | | |
| 2005 | 444 | 3% | 43% | 40% | 2% | 11% | 2% | | |
| 2006 | 205 | | 19% | 51% | | 28% | 2% | | |
| 2007 | 115 | 15% | 61% | 16% | 6% | | 3% | | |
| 2008 | 360 | 6% | 58% | 25% | 3% | 7% | 1% | | |
| 2009 | 290 | 9% | 33% | 49% | 2% | 6% | 1% | | |
| 2010 | 87 | 9% | 35% | 24% | 5% | 26% | 1% | | |
| 2011 | 90 | | 33% | 52% | 2% | 6% | 7% | | |
| 2012 | 91 | 1% | 7% | 19% | | 16% | 2% | | 55% |
| 2013 | 147 | 1% | 90% | 2% | | 3% | | 2% | 2% |
| 2014 | 92 | 4% | 22% | 53% | | 10% | 1% | | 10% |
| 2015 | 59 | | 90% | | | 2% | 5% | | 3% |
| 2016 | 20 | 40% | 5% | 50% | | 5% | | | |
| 2017 | 2 | 50% | | 50% | | | | | |
| 2018 | 6 | 33% | 67% | | | | | | |
| 2019 | 31 | 45% | 6% | 48% | | | | | |

## DISCUSSION

In 2019, we estimate that 4,389 Sockeye Salmon escaped into Neva Lake. This was the cumulative maximum daily count of 4,350 fish through the video chutes plus 39 fish that were estimated to have entered the lake after the weir was pulled for the season. This was a decline from 2018, but still well above the lower escapements seen in recent years (Table 8), which prompted a reduction in subsistence harvest limits and made it more difficult for users to meet their subsistence needs.

Table 8. Annual estimates of the escapement of Sockeye Salmon into Neva Lake, 2002 to 2019.

| Year | Total | Escapement Estimate Method |
|---|---|---|
| 2002 | 4,951 | picket weir to spawning area mark-recapture |
| 2003 | 11,393 | picket weir to spawning area mark-recapture |
| 2004 | 9,513 | picket weir to spawning area mark-recapture |
| 2005 | 5,255 | picket weir to spawning area mark-recapture |
| 2006 | 5,931 | picket weir to spawning area mark-recapture |
| 2007 | 5,993 | picket weir to spawning area mark-recapture |
| 2008 | 2,823 | picket weir to video and spawning area mark-recapture |
| 2009 | 6,166 | picket weir to video weir mark-recapture |
| 2010 | 5,252 | redundant video weirs |
| 2011 | 7,311 | redundant video weirs |
| 2012 | 4,404 | redundant video weirs |
| 2013 | 2,931 | redundant video weirs |
| 2014 | 3,535 | redundant video weirs |
| 2015 | 1,188 | redundant video weirs |
| 2016 | 3,009 | redundant video weirs w/syncronized cameras |
| 2017 | 3,878 | redundant video weirs w/syncronized cameras |
| 2018 | 5,747 | redundant video weirs w/syncronized cameras |
| 2019 | 4,389 | redundant video weirs w/syncronized cameras |

In 2019, the video counts appear to be reliable estimates of the daily escapement of Sockeye Salmon into the lake. With the ability to view synchronized video from all chute cameras at the same time using the Blue Iris program on the computer, project personnel were able to reliably track and count each Sockeye Salmon that swam through the chute and into the lake. However, it was difficult to distinguish between adult and jack Sockeye Salmon in the video review and jacks were often counted as adults.

The counts of Dolly Varden, Coho Salmon, and other species should be regarded as a rough indicator of abundance, rather than absolute counts. Some individuals of these two species were seen to pass back and forth through the weir many times, confounding attempts to reliably count each fish only once. The video reviewers were instructed to focus on accurate counts of Sockeye Salmon, and count other species as practical, so during some periods other species were not consistently counted. The author re-reviewed portions of the video after the season and found the counts of Sockeye Salmon were consistent with the counts made in-season.

As in previous years, beavers frequently attempted to plug the video chute with rocks, wood, and vegetation, which obstructed fish passage through the chute. While they were stationed in Excursion Inlet, the project crew could remove any beaver-placed debris within hours, but once they moved to Hoonah, frequent visits to the site were not feasible. To exclude beavers from the chute, we placed a cage of weir channel and pickets around the chute (Figure 20). The beaver excluder worked well, and no beavers placed debris in the chute after it was installed. It also was an improvement over the beaver excluder used in 2018, which created a much larger fenced cage around the chute. After installing the 2018 beaver excluder, we observed more fish circling in the cage or passing downstream back through the chute, which complicated counting. The beaver excluder used this year did not result in as much circling or moving downstream.

Figure 20. Beaver-excluding fencing around the Neva Lake weir video chute, 2019.

The timing of Sockeye Salmon passing through the weir was later than usual, which appeared to be the result of a dry summer. The June-September total rainfall in Juneau was 17.26 inches, which was 4.95 inches below normal (National Weather Service 2019). Relatively few fish were counted through the month of July, which is typically the peak of passage into the lake. We observed that water levels in Neva Creek were likely too low to allow passage through beaver

dams and other obstacles for much of the season. Pulses of Sockeye Salmon entering the lake tended to be associated with rain events when they did occur (Figure 21).

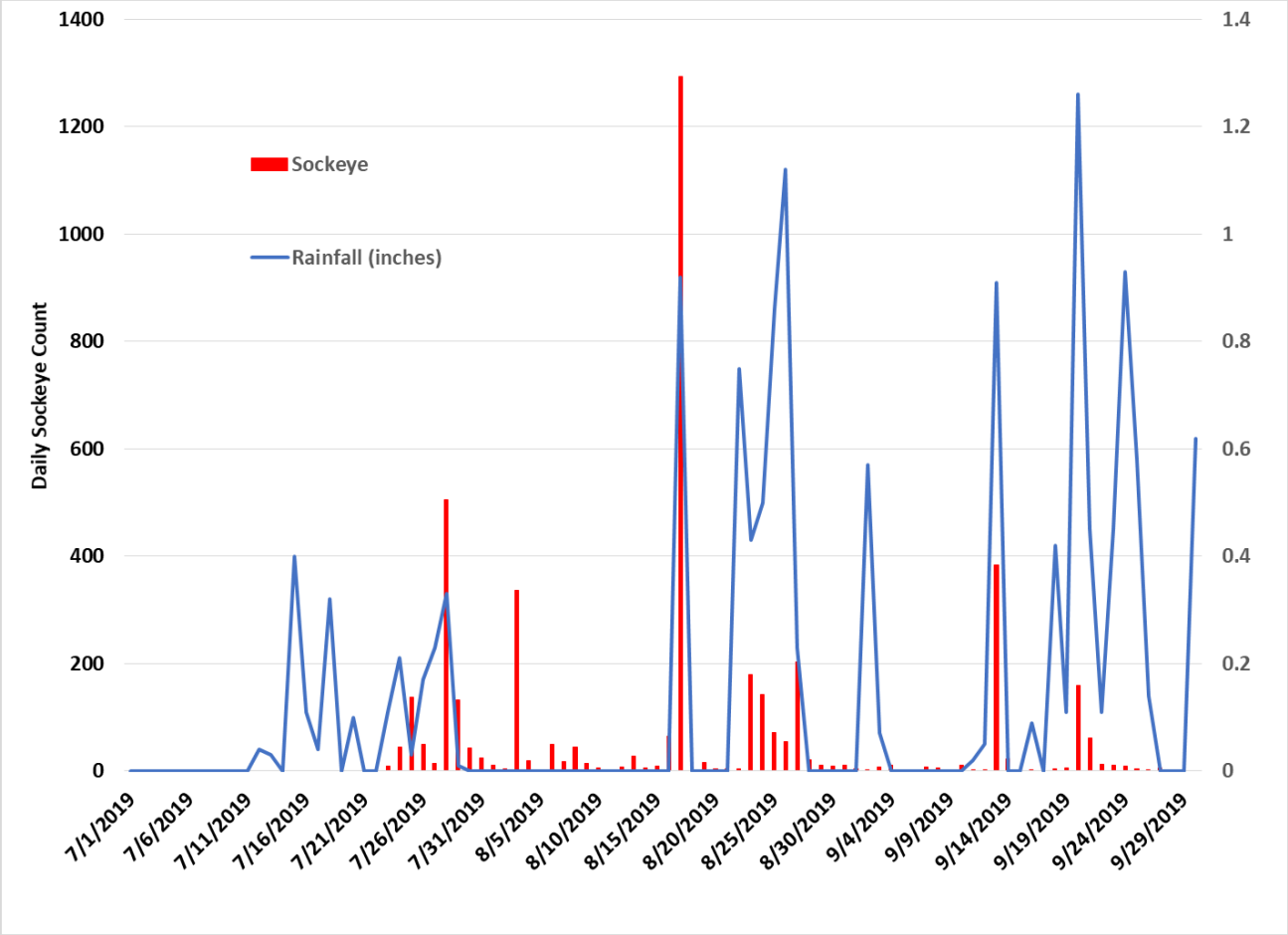



Figure 21. Number of Sockeye Salmon counted at the Neva Lake weir and daily rainfall at the National Weather Service Station, Juneau.

The daily timing of fish movement was also different from in previous years. Typically, most fish enter the lake during night hours, but in 2019, there was no obvious diurnal pattern. We observed that fish entered in the lake in short but intense bursts, usually following rain events. For example, over a quarter of the entire run entered the lake on August 17, between 11 am and 7 pm after around an inch of rainfall ended a long dry period.

In previous years, scale sampling was intended to determine the age structure (i.e. freshwater and saltwater ages) of Neva Lake Sockeye Salmon. In the past few years, complete ages could be determined for only a small fraction of fish sampled, which prevented making meaningful estimates of age structure (Table 7). In many cases, the outer circuli of most sampled scales were resorbed, preventing the determination of marine ages. The exact reasons for this are unclear, but a similar pattern has been seen in other Sockeye Salmon stocks in the region, and may be related to poor marine growth in the later years at sea (Iris Frank, ADF&G, pers. Comm.). The length of

age 1.3 of fish sampled in 2019 was significantly shorter than the historical average, while that of age 1.1 fish was close to average, which also suggests poor growth in later marine years.

Under current rates of scale ageability, the number of scale samples needed for valid estimates of age composition would be prohibitive. In response, we have adjusted the study objectives to assessing the freshwater life history of returning fish, rather than the complete age structure. The age at outmigration is related to the growth rate of rearing juveniles (Groot and Margolis 1991; Honnold and Schrof 2004), so the proportion of fish smolting at age 1 is an indirect measure of rearing conditions. All of the Sockeye Salmon sampled were freshwater age 1, suggesting that the population of rearing juveniles is within the carrying capacity of Neva Lake, and production is likely not being limited by the quantity or quality of rearing habitat in the lake.

While the scale age data suggested that rearing habitat is not limiting the production of Neva Lake Sockeye Salmon, the near-absence of age 1.2 fish was notable. This age class usually makes up a substantial portion of the overall return, so the overall return would have been much higher if this age class had returned in typical numbers.

## CONCLUSIONS

1. The Sockeye Salmon run into Neva Lake is an important subsistence resource for rural residents from Hoonah, Excursion Inlet, and Gustavus and non-rural residents from Juneau. Subsistence harvests have declined in recent years due to lower abundance and reduced harvest limits.

2. This project was the result of the cooperative effort between the Alaska Department of Fish and Game, the Hoonah Indian Association, and the U.S. Forest Service to estimate the escapement and age composition of Sockeye Salmon into Neva Lake. This report for the Fisheries Resource Monitoring Program study 18-607 summarizes the 2019 escapement and age composition, as well as results back to the project's inception in 2002.

3. We estimate that 4,389 Sockeye Salmon escaped into Neva Lake in 2019. This was the tenth highest escapement in 16 years of monitoring.

4. The 2019 run timing was later than normal, likely due to a dry summer and low stream flows. In 2019, the midpoint of the run was on August 17 and 80% of the run had entered into Neva Lake between July 28 and September 12. On average, from 2002 through 2018, the midpoint is on August 1, and 80% of the Sockeye Salmon have migrated into Neva Lake between July 6 and September 3.

5. All of the ageable fish sampled in 2019 were freshwater age 1, suggesting that smolt densities are well within the carrying capacity of the lake. The age composition was dominated by age 1.1 and 1.3 fish, with unusually few age 1.2 fish sampled.

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We thank Iris Frank at ADF&G for processing the salmon age, sex, and length data that we needed to understand the composition of the Sockeye Salmon stock that escaped into Neva Lake.

We thank the Southeast Alaska Regional Advisory Council and the Federal Subsistence Board for recognizing the importance of this project to maintaining healthy Sockeye Salmon runs into Neva Lake. Lastly, we thank the residents of Hoonah who have long valued the wise management of Neva Lake Sockeye Salmon.

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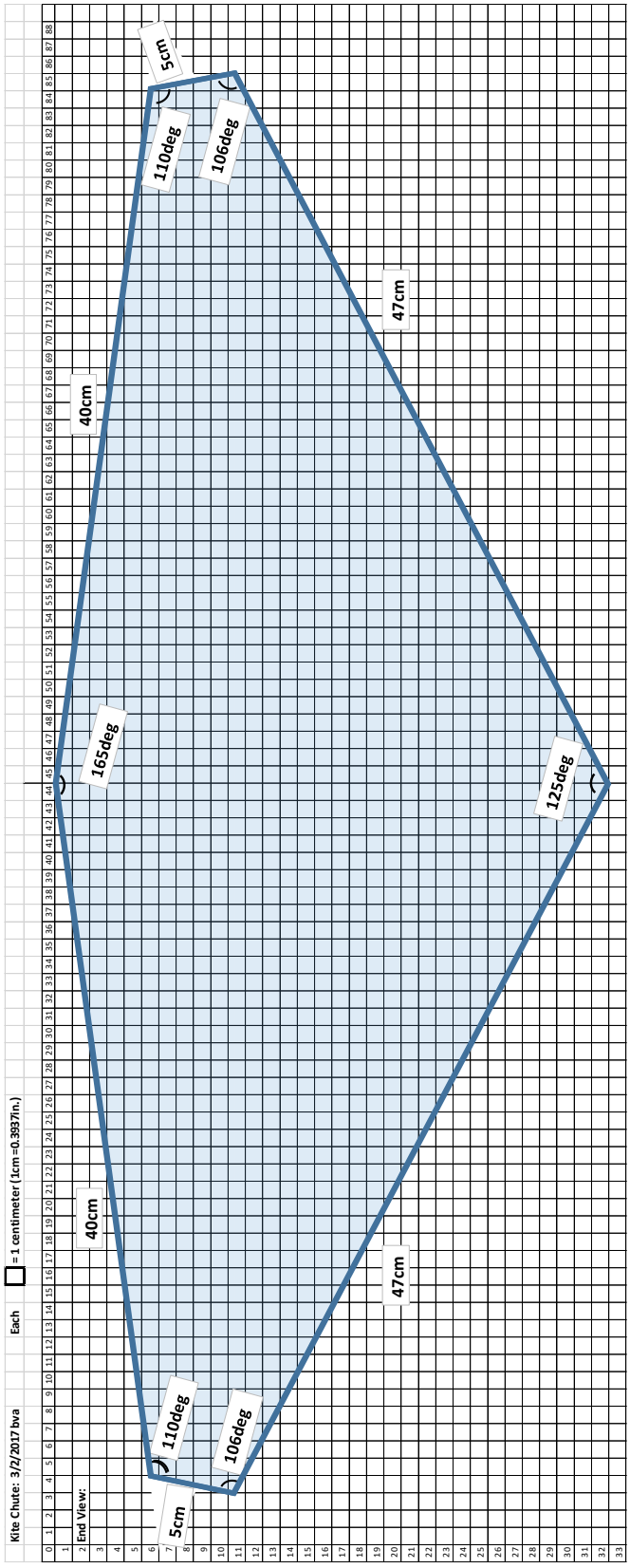
# APPENDICES

Appendix A. End view of the 70cm long “kite” chute used at Neva Lake video weir.



Appendix B. Parts list for the remote monitoring system used at Neva Lake, 2019.

| Component | Description | Approx. cost each (plus shipping) |
|---|---|---|
| **Weir station** | | |
| Wireless bridge | Ubiquiti Networks PowerBeam M5 400 | $100 |
| Managed network switch | Netonix WS-12-250-DC | $380 |
| Underwater camera system | Axis F34 w/ F1005-E cameras | $400 |
| Solar charge controller | Victron BlueSolar MPPT 100/30 | $200 |
| IP video cameras (2) | Amcrest IP3M-954EW | $110 |
| Solar panels (12) | Kyocera KD-145SX-UPU, 145 watt | $431 |
| Batteries (4) | 12 volt, 80 amp-hour absorbed glass mat (AGM) | $240 |
| | | |
| **Repeater station** | | |
| Wireless bridges (2) | Ubiquiti Networks PowerBeam M5 400 ISO | $120 |
| Managed network switch | Netonix WS-12-250-DC | $380 |
| Remote system monitor | Tycon Power Systems TP-DIN-Monitor-WEB | $125 |
| Solar charge controller | Morningstar SunSaver SS-MPPT-15L | $210 |
| IP video camera | Amcrest IP3M-954EW | $110 |
| Batteries (6) | 12 volt, 115 amp-hour absorbed glass mat (AGM) | $240 |
| Solar panels (3) | Kyocera KD-145SX-UPU, 145 watt | $431 |
| | | |
| **Recording station** | | |
| Wireless bridge (to repeater) | Ubiquiti Networks PowerBeam M5 400 | $100 |
| Router | Linksys WRT-54G wireless broadband router | $40 |
| Computer workstation | Hewlett-Packard EliteDesk 800 | $500 |
| Surveillance software | Perspective Software Blue Iris v. 4.3.9.7 | $60 |

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