Annual Report

Fish Passage Operations

at the Landsburg Dam Fish Passage Facility

Return Year 2023

Julia R. Unrein

November, 2024

Landsburg Fish Passage Manager

Aquatic Resources Section

Water Resources Planning and Program Management Division

Seattle Municipal Tower, 700 5th Ave, Suite 4900,
PO Box 34018, Seattle, WA 98124-4018

Summary

2023 was the second year since 2003 that the Landsburg Fish Ladder (LFL) was operated in Passive Mode throughout the year, allowing all species to volitionally pass above the diversion dam. During Passive Mode, fish passage is monitored using the Vaki RiverWatcher Camera system and recorded videos are analyzed to collect species, sex, and adipose fin status data. This report covers salmon counts from March 9, 2023 through March 6, 2024, representing the Return Year 2023 and includes the period during which Coho salmon return to the Cedar (September through February). For all non-salmon species, counts are reported for January 1, 2023 through December 31, 2023. A total of 4261 passage events were recorded by the Fish Camera system from March 9, 2023 to March 6, 2024. The camera was operational for 284 of 364 days during this reporting period. Total counts for Sockeye, Chinook and Coho for all years of operation are available in the in the final fish ladder table for 2023 (2023 All Species Table_20240903.xlsx)

Introduction

The LFL was constructed in 2003 as part of the Cedar River Watershed Habitat Conservation Plan (HCP) and Landsburg Mitigation Agreement (LMA) to provide upstream passage for migrating salmon and steelhead above the Landsburg Diversion Dam (Dam). Located at river kilometer 35.1 (river mile 21.8) on the Cedar River and its outlet at Lake Washington (WA), the LFL has provided access to over 20 km of mainstem Cedar River habitat for 18 years.

The primary purpose of the HCP is to ensure safe and high-quality drinking water for the greater Seattle Area while protecting and restoring 83 species of fish and wildlife and their habitat in the Cedar River Municipal Watershed. The LFL provides upstream passage for ESA-listed Chinook salmon (*Oncorhynchus tshawytscha*) and Steelhead (*Oncorhynchus mykiss*) as well as other native species such as Coho Salmon (*Oncorhynchus kisutch*), Rainbow Trout (*Oncorhynchus mykiss*), Cutthroat Trout (*Oncorhynchus clarkii*), and Mountain Whitefish (*Prosopium williamsoni*) above the Dam. Sockeye salmon (*Oncorhynchus nerka* were introduced into the Cedar River in the 1930's and due to the City of Seattle's concerns over their potential impacts to water quality and ESA-listed Chinook salmon, their passage above the Dam is monitored. If water quality concerns stemming from large returns of adult Sockeye exist in a given year, the City can limit Sockeye passage above the Dam by sorting Sockeye (Landsburg Mitigation Agreement, 2000). In recent years, the number of adult Sockeye returning to the Cedar River has declined significantly (Unrein, 2021a) and monthly water quality monitoring indicates the small numbers of returning Sockeye adults do not currently pose a risk to drinking water quality (SPU, unpublished data). Additionally, Sockeye redd superimposition on Chinook redds in the Lower Cedar River has been low (less than 7%) in years when Sockeye escapement has been under 50,000 fish (Burton, 2019) and there is no current concern that the small numbers of Sockeye passing above the Dam significantly impact Chinook.

In 2023, due to low numbers of Sockeye expected at the LFL from the Ballard Locks estimates, the City allowed all salmon species to volitionally pass through the fish ladder above the Landsburg Dam. This reduces stress due to handling and potentially lowers prespawn mortality (PSM). In early summer 2023, a regional forecast called for a dry and warm fall, which has contributed to increased enroute mortality of Sockeye through Lake Washington in past years. 2022 had similar conditions and resulted in only 5 female and 13 male Sockeye sorted at the LFL. Furthermore, the PSM for these fish averaged 67% and was higher than those captured at the Weir (Unrein 2023a). The 2023 Sockeye counts at the Ballard

Locks were 23,901, which was about half of the 2022 return (43,289). The Cedar Sockeye escapement estimate was 8,573 and lower than in the 10,319 fish estimated in 2022 (Washington Department of Fish and Wildlife, WDFW, https://wdfw.wa.gov/fishing/management/hatcheries/escapement)

Continuous monitoring of fish at the LFL provides valuable species and size information of local and migratory fish populations. These data are important for documenting the recolonization of Cedar River habitat above the Landsburg Dam. Data collected on fish at the LFL is provided to local, State and Federal agencies, Tribal entities, and other interested stakeholder groups.

Methods

Passive Mode Operations

The LFL provides volitional fish passage upstream of the diversion dam during Passive mode. During Passive mode, the LFL does not trap, hold, or require handling of any fish species.

During Passive mode, migrating fish are monitored by the Vaki Riverwatcher camera system (Fish Camera) at the fish ladder exit (Figure 1). When a fish or object passes the scanner plates on the downstream portion of the camera tunnel, it triggers the camera to capture a 10 second video. These videos are analyzed to determine species, direction of movement, time of detection, and total size of passing object or fish. Sex and adipose fin status are recorded, where determinable. When the facility is in Sorting mode, the adult guide panel is moved across the Ladder to block fish from continuing upstream to the Fish Ladder exit. When the guide panel blocks the fish ladder, the fish are directed into Pond 1 and are manually sorted every 24 hours. Sorted Sockeye are held in Pond 2 until transported to the Hatchery for broodstock or released back into the Cedar River.

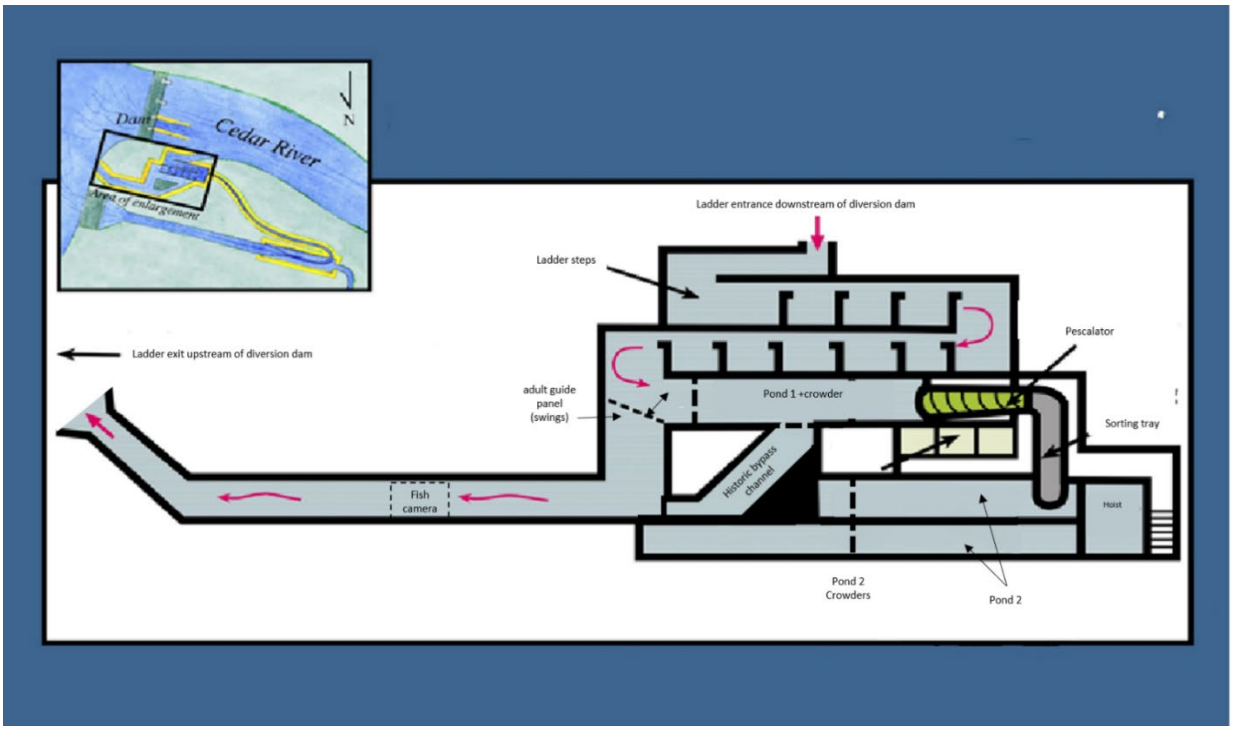

Figure 1. Plan view of the Landsburg Fish Passage Facility. *Pink arrows indicate upstream movement of fish through the facility.*

Fish Species Assignment

Time of year, size, morphological characteristics, and behavior are used to identify fish to species. Fish larger than 490 mm Total Length (TL) are assumed to be adult salmon, but adult Sockeye, Coho and Chinook can be similar in size (Figure 2) and sometimes morphology, so species identification can be difficult if only silhouettes are available or the video quality is poor.

In 2023, a new method of species assignment was implemented for unidentified fish that utilizes size and return timing to assign these fish when morphological characteristics are not clear, videos are poor quality, water turbidity is high, or when video data are missing. This circumstance arose in late September 2023 when the camera only collected silhouettes for 5 days and all three species co-occurred. We reviewed confirmed fish species data from 2023-2024 (Figure 3) and developed the following criteria to assign species when visual identification could not be made:

Jun 1-Aug 15: 100% unidentified fish above 490 mm TL are assigned as Sockeye
Aug 16-Sep 15: 100% unidentified fish larger than 875 mm TL assigned as Chinook, otherwise Sockeye
Sep 16-Nov 15: 100% unidentified fish above 490 mm TL are assigned as Unknown Salmon
Nov 16-Feb 28: 100% unidentified fish above 490 mm TL are assigned as Coho

The previous method for assigning unidentifiable salmon only assigned fish larger than 490 mm into Coho or Sockeye as most Chinook return when the camera system is operational and/or during Sorting Mode (see prior method described in Unrein 2023b).

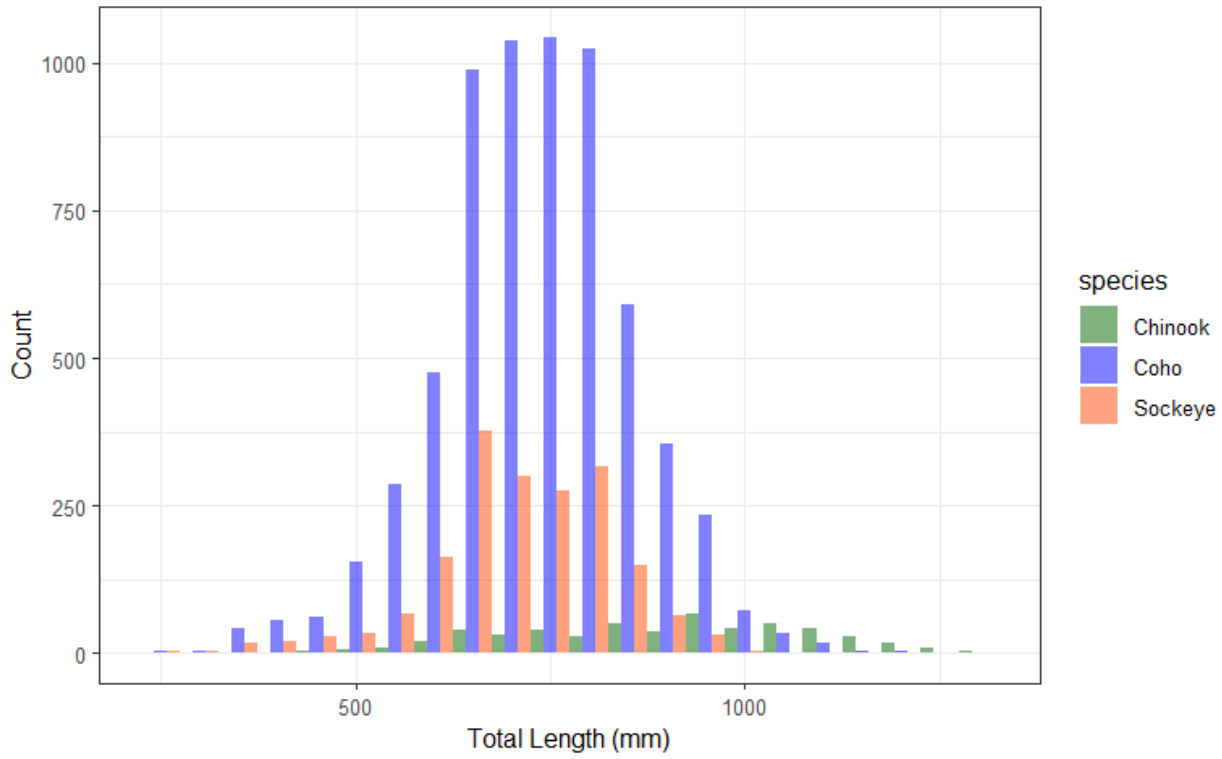

Figure 2. Histogram of Chinook, Coho and Sockeye Salmon Size Total Length (mm) as measured from the Fish Camera in 2023.

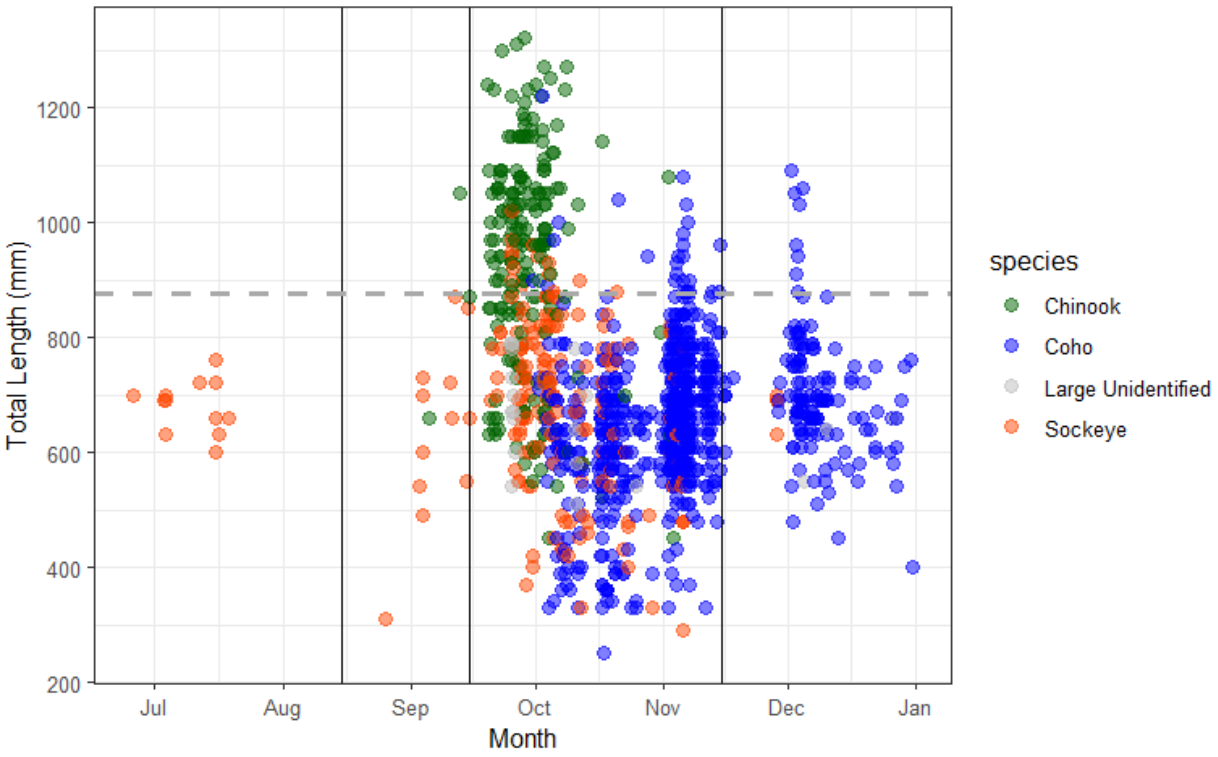

Figure 3. Size distribution of salmon and large unidentified fish (> 490 mm Total Length) between June 1, 2023 and February 28, 2024. *Vertical lines at August 15, September 15 and November 15 indicate temporal cutoffs for species assignments. Horizontal dashed line indicate size thresholds for the species assignments.*

Steelhead return to the LFL in spring and are not confounded by the return of fall-returning salmon. The term presumptive is used to categorize Steelhead counted from the fish camera system, as there can be overlap in size and timing of large resident Rainbow Trout and Steelhead returns to the LFL and therefore these cannot be distinguished with certainty. Presumptive Steelhead are identified based on time of year (March-July), size (>58 cm) Total Length (TL), as well as morphological features such as silvery coloration, an elongated, narrower, snout and a truncate caudal fin.

2023 Fish Returns

Sockeye Salmon Returns

A total of 181 Sockeye salmon passed above the Landsburg Dam in 2023, which is slightly higher than the 117 Sockeye that returned to the LFL in 2022 (Unrein, 2023b). This year was the 5th lowest Sockeye return to the LFL (Table 1, Figure 4) and lower than the 5-year (263 Sockeye), 10-year (662 Sockeye) and overall average return counts (1,028 Sockeye) (Figure 5).

61% of the total Sockeye returning to the LFL were male (111 of 181) and 28% were female (51 of 181); this trend of more males returning to the LFL than females has been observed in all years of the LFL operation. Note a total of 19 Sockeye could not be sexed from fish camera videos (10%).

The Fish Camera recorded the first Sockeye in 2023 on May 25, and 24 Sockeye passed the LFL prior to the typical start of Sorting mode in mid-September. A total of 13 Sockeye were recorded passing after October 31st. The last Sockeye observed from the camera was on November 28. The median migration date (October 3) was later than 2022 (September 12) and similar to the 5-year average (September 28). The duration of the Sockeye return to the LFL in 2023 (187 days) was longer than 2022 (118 days) and the 5-year (155 days), 10-year (147 days) and overall average (137 days) (Figure 4). For years 2015 and 2018, the Fish Camera was offline before and during the sorting season so these years are incomplete for Sockeye run timing and were not included in these averages.

Table 1. Sockeye Counts at the Landsburg Fish Ladder Return Years 2003-2023. In 2020 and 2023, all counts were obtained with the fish camera system. Totals starting in 2009 include fish counted by the fish camera (greyed cells). Prior to 2009, Sorting Mode extended from September to February. Therefore, these years do not include fish migrating before or after Sorting Mode as salmonids were not identified to species from fish camera videos. Sex and Origin data were obtained from Fish Camera videos, when discernable, beginning in 2019. Estimates are counts of unidentified fish, recorded by the fish camera during the salmon return season June 1-February 28, that are assigned as Sockeye (See Methods Section: Species Assignment from Unidentified Fish). Numbers do not include presorting mortalities (Data accessed from EQuIS Database 8/02/2024).

	Sorted			Fish Camera					
Return Year	Female	Males	Sorted Total	Female	Male	Unknown	Count Total	Estimates	Total w/ Estimates
2003	283	718	1,001	N/A	N/A	N/A	1,001	N/A	1,001
2004	256	620	876	N/A	N/A	N/A	876	N/A	876
2005	393	845	1,238	N/A	N/A	N/A	1,238	N/A	1,238
2006	980	1,434	2,414	N/A	N/A	N/A	2,414	N/A	2,414
2007	228	603	831	N/A	N/A	N/A	831	N/A	831
2008	11	48	59	N/A	N/A	N/A	59	N/A	59
2009	62	174	236	N/A	N/A	4	240	1	241
2010	1,532	2,174	3,706	N/A	N/A	746	4,452	50	4,502
2011	390	525	915	N/A	N/A	33	948	15	963
2012	461	898	1,359	N/A	N/A	115	1,474	0	1,474
2013	533	794	1,327	N/A	N/A	107	1,434	3	1,437
2014	262	372	634	N/A	N/A	45	679	6	685
2015	288	384	672	N/A	N/A	80	752	0	752
2016	421	594	1,015	N/A	N/A	45	1,060	0	1,060
2017	1,227	1,417	2,644	N/A	N/A	18	2,662	0	2,662
2018	45	106	151	N/A	N/A	0	151	0	151
2019	35	51	86	8	9	10	113	0	113
2020	N/A	N/A	N/A	77	133	7	217	1	218
2021	174	438	612	26	42	5	685	0	685
2022	5	15	20	30	62	5	117	0	117
2023	N/A	N/A	N/A	51	111	19	181	0	181
Grand Total	**7,586**	**12,210**	**19,796**	**192**	**357**	**1,239**	**21,584**	**76**	**21,660**

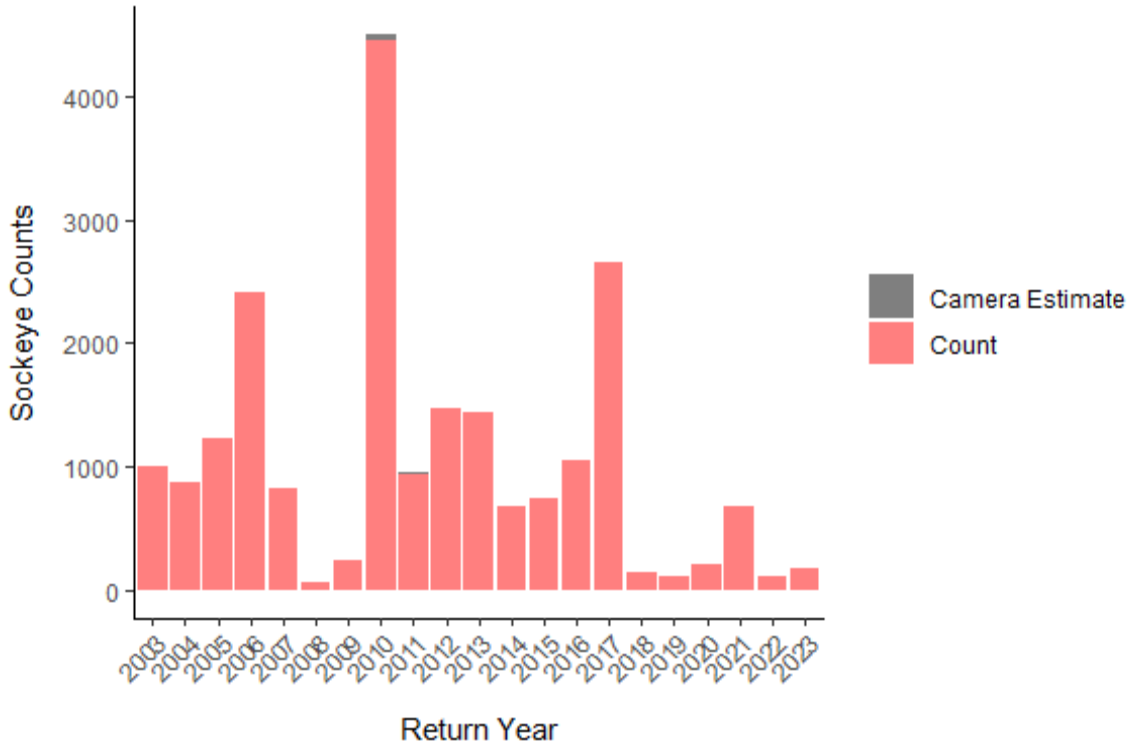

Figure 4. Annual Sockeye counts at the Landsburg Fish Ladder Return Years 2003-2023.

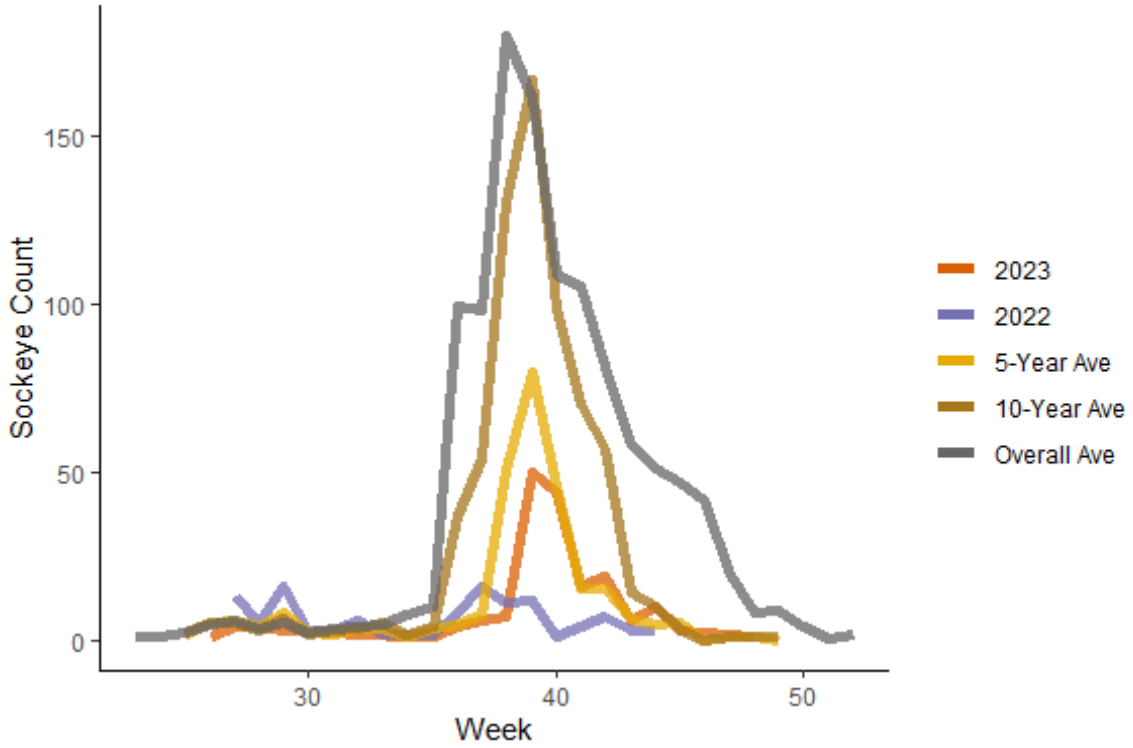

Figure 5. Weekly counts of Sockeye returning to the Landsburg Fish Ladder for Return Years 2023, 2022 and historical 5-, 10-year, and all year averages during June – December.

Chinook Salmon Returns

A total of 204 Chinook Salmon passed above the Landsburg Diversion Dam in 2023 (Table 2, Figure 6). There were 52 females (25%), 123 males (60%), and 29 of unknown sex (14%).

Chinook returns to the LFL were almost double the 2022 return (106 Chinook, Table 2, Figure 6) and were higher than the 5-year (144 Chinook), 10-year (171 Chinook) and overall average counts (176 Chinook) (Figure 7). The %HOR for Chinook passing the LFL in 2023 (47%) was higher than in 2022 (40%) and lower than in 2021 (52%) (Unrein 2023b). The %HOR was the same for females and males (46% Table 2).

Chinook returned to the LFL from September 5 to November 3. The median return date was September 28, which was similar to the 5-year average (September 30), 10-year (September 30) and overall average (October 1). The duration of the Chinook migration was 59 days was also similar to the 5-year (60 days), 10-year (55 days) and overall average (55 days) (Figure 6).

Table 2. Chinook counts at the Landsburg Fish Ladder Return Years 2003-2023. Count totals starting in 2009 include fish counted by the Fish Camera (greyed cells). Prior to 2009, Sorting Mode extended from September to February, therefore these years do not include fish migrating before or after Sorting Mode as salmonids were not identified to species from fish camera videos. Sex and Origin data were obtained from Fish Camera videos, when discernable, beginning in 2019. In 2020 and 2023, all counts were obtained with the Fish Camera. Counts do not include recycled Chinook salmon or mortalities. (Data accessed from EQuIS Database 8/02/2024).

	Sorted					Fish Camera					Combined	
	Female		Male			Female		Male				
Return Year	HOR	NOR	HOR	NOR	Sorted Total	HOR	NOR	HOR	NOR	Unknown	Total	% HOR
2003	10	6	45	18	**79**	N/A	N/A	N/A	N/A	0	**79**	**69.62**
2004	15	7	19	10	**51**	N/A	N/A	N/A	N/A	0	**51**	**66.67**
2005	5	12	24	28	**69**	N/A	N/A	N/A	N/A	0	**69**	**42.03**
2006	12	20	70	80	**182**	N/A	N/A	N/A	N/A	0	**182**	**45.05**
2007	20	79	73	222	**394**	N/A	N/A	N/A	N/A	0	**394**	**23.60**
2008	11	39	14	83	**147**	N/A	N/A	N/A	N/A	0	**147**	**17.01**
2009	6	24	35	73	**138**	N/A	N/A	N/A	N/A	0	**138**	**29.71**
2010	12	33	39	85	**169**	N/A	N/A	N/A	N/A	9	**178**	**30.18**
2011	11	35	66	99	**211**	N/A	N/A	N/A	N/A	0	**211**	**36.49**
2012	21	26	72	158	**277**	N/A	N/A	N/A	N/A	0	**277**	**33.57**
2013	20	64	42	136	**262**	N/A	N/A	N/A	N/A	7	**269**	**23.66**
2014	10	15	76	96	**197**	N/A	N/A	N/A	N/A	2	**199**	**43.65**
2015	37	46	67	108	**258**	N/A	N/A	N/A	N/A	0	**258**	**40.31**
2016	9	21	93	96	**219**	N/A	N/A	N/A	N/A	2	**221**	**46.58**
2017	19	30	42	84	**175**	N/A	N/A	N/A	N/A	0	**175**	**34.86**
2018	6	22	29	80	**137**	N/A	N/A	N/A	N/A	0	**137**	**25.55**
2019	8	25	46	47	**126**	N/A	N/A	N/A	N/A	6	**132**	**42.86**
2020	N/A	N/A	N/A	N/A	**N/A**	43	20	70	49	4	**186**	**62.09**
2021	10	8	36	35	**89**	N/A	N/A	N/A	2	1	**92**	**50.55**
2022	6	8	25	33	**72**	3	5	11	14	1	**106**	**42.86**
2023	N/A	N/A	N/A	N/A	**N/A**	24	28	59	64	29	**204**	**47.43**
Grand Total	**248**	**520**	**913**	**1,571**	**3,252**	**70**	**53**	**140**	**129**	**61**	**3,705**	
Average %												**40.68**

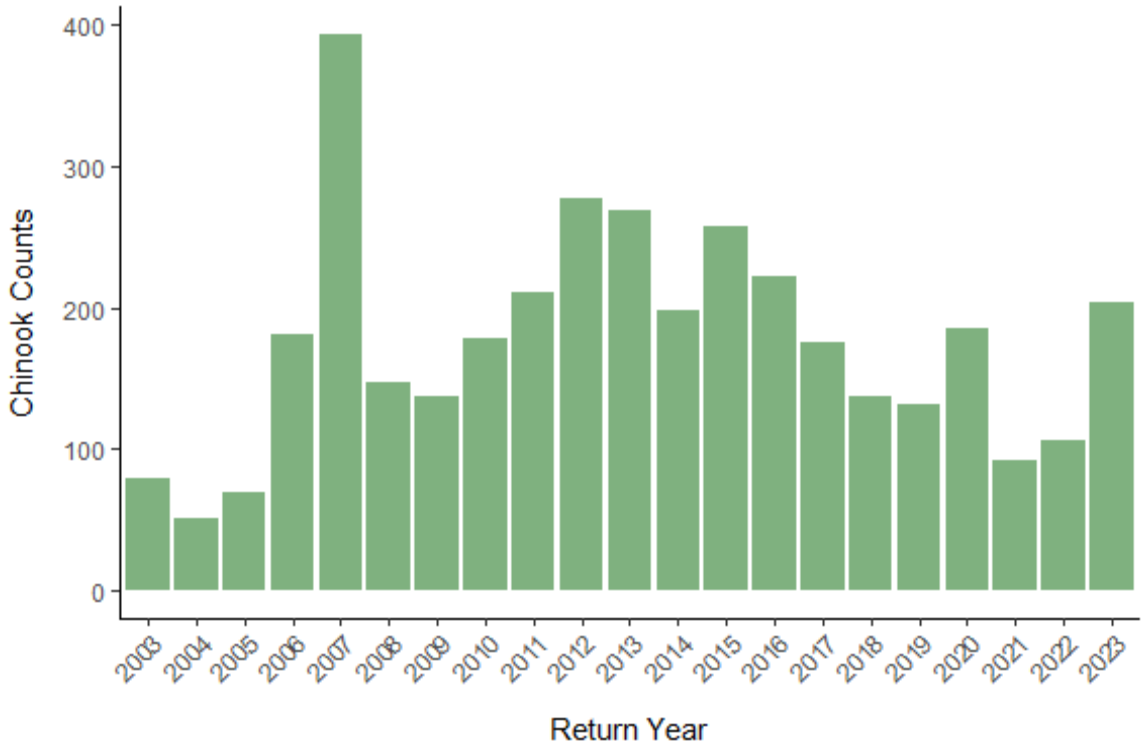

Figure 6. Annual Chinook counts at the Landsburg Fish Ladder for Return Years 2003-2023.

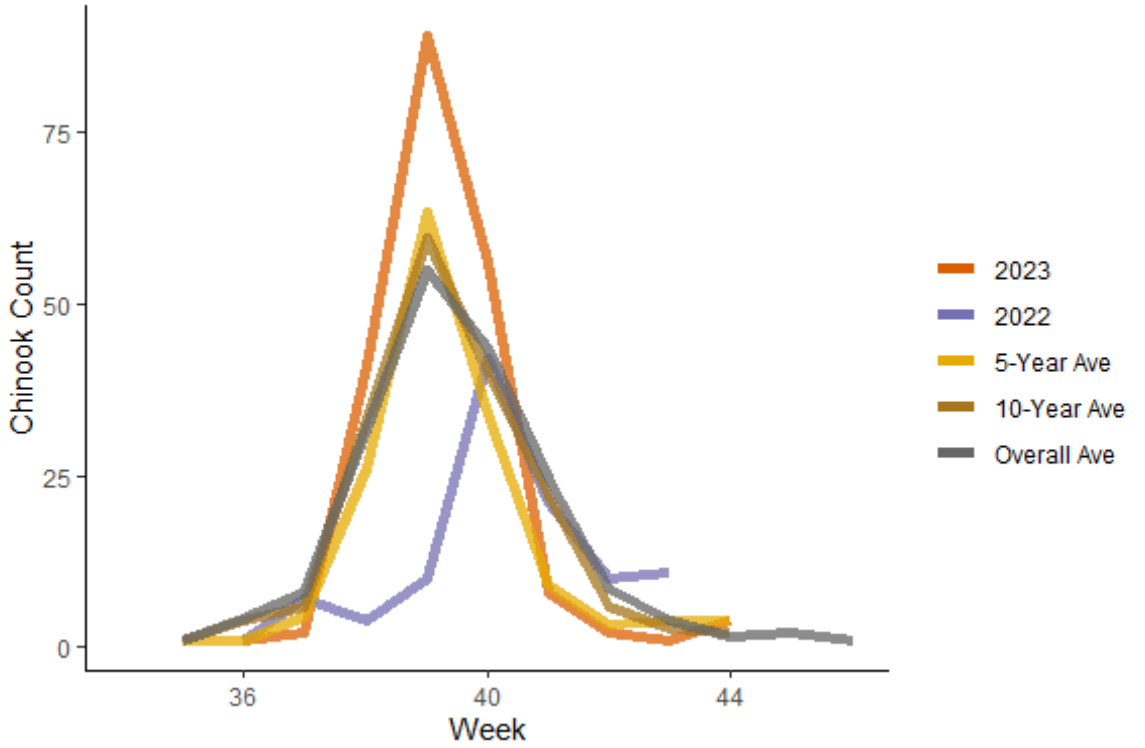

Figure 7. Weekly counts of Chinook returning to the Landsburg Fish Ladder for Return Years 2023, 2022 and historical 5-, 10-year, and all year averages from mid-August – mid-November.

Coho Salmon Returns

A total of 853 Coho salmon passed above the Landsburg Diversion Dam during Return Year 2023 (Table 3, Figure 8). There were 418 females (49%), 424 males (50%), with 8 (1%) were of unknown sex and origin. Additionally, 3 unidentified fish were assigned as Coho which were recorded by the Fish Camera (Table 3).

Coho counts were slightly higher than 2022 (748 Coho) but lower than 2021 (1,501 Coho) (Table 3, Figure 8). This year's counts were similar to the 5-year average (1,032 Coho) but higher than the 10-year (992 Coho) and overall average counts (644 Coho) (Figure 9). The %HOR averaged 2% in 2023 (1% female and 2% male) (Table 3).

The first Coho was recorded on September 30 and the last on January 27, 2024. The median migration date was November 4 and was 7 days earlier than the 5-year average (November 11) and 10-year average (November 11), respectively, and 24 days earlier than the overall average (November 28). The duration of the Coho migration to the LFL (119 days) was similar to the 5-year (121 days) and around 10 days shorter than the 10-year (132 days) and overall average (128 days). For years 2010, 2011, 2015, 2017, 2018, 2019 and 2020, the fish camera was offline for more than 30 days of the Coho season, therefore these years are incomplete for Coho run timing and were not included in these averages.

Table 3. Coho Counts at the Landsburg Fish Ladder Return Years 2003-2023. Count Totals starting in 2009 include fish counted by the fish camera (greyed cells), prior to 2009, Sorting Node extended from September to February, therefore these years do not include fish migrating before or after sorting mode as salmonids were not identified to species from fish camera videos. Sex and Origin data were obtained from Fish Camera videos, when discernable, beginning in 2019. In 2020 and 2023, all counts were obtained with the Fish Camera. Estimates are counts of unidentifiable fish, that were recorded by the fish camera during the salmon return season between June 1 and February 28, that were assigned as Coho (See Methods Section: Species Assignment from Unidentified Fish). Areas highlighted in yellow indicate the Fish Camera system was off-line for more than 30 days between September 15-February 28; these counts are considered incomplete. Counts do not include recycled Coho or mortalities. (Data accessed from EQuIS Database 8/02/2024).

	Sorted					Fish Camera							Combined		
	Female		Male			Female		Male							
Return Year	HOR	NOR	HOR	NOR	Sorted Total	HOR	NOR	HOR	NOR	Unknown	Count Total	Estimates	Total w/ Estimates	% HOR	Days Offline
2003	3	18	1	25	**47**	N/A	N/A	N/A	N/A	0	**47**	0	**47**	**8.51**	**N/A**
2004	2	32	0	65	**99**	N/A	N/A	N/A	N/A	0	**99**	0	**99**	**2.02**	**N/A**
2005	2	64	4	100	**170**	N/A	N/A	N/A	N/A	0	**170**	0	**170**	**3.53**	**N/A**
2006	3	77	6	105	**191**	N/A	N/A	N/A	N/A	0	**191**	0	**191**	**4.71**	**N/A**
2007	0	52	1	88	**141**	N/A	N/A	N/A	N/A	0	**141**	0	**141**	**0.71**	**N/A**
2008	1	183	8	170	**362**	N/A	N/A	N/A	N/A	0	**362**	0	**362**	**2.49**	**N/A**
2009	11	272	9	381	**673**	N/A	N/A	N/A	N/A	6	**679**	0	**679**	**2.97**	**16**
2010	3	41	5	72	**121**	N/A	N/A	N/A	N/A	16	**137**	0	**137**	**6.61**	**56**
2011	1	24	0	90	**115**	N/A	N/A	N/A	N/A	253	**368**	17	**385**	**0.87**	**53**
2012	0	130	1	187	**318**	N/A	N/A	N/A	N/A	692	**1,010**	79	**1,089**	**0.31**	**2**
2013	1	185	0	228	**414**	N/A	N/A	N/A	N/A	945	**1,359**	360	**1,719**	**0.24**	**16**
2014	0	16	7	34	**57**	N/A	N/A	N/A	N/A	560	**617**	211	**828**	**12.28**	**7**
2015	0	64	0	73	**137**	N/A	N/A	N/A	N/A	148	**285**	27	**312**	**0.00**	**70**
2016	7	253	52	356	**668**	N/A	N/A	N/A	N/A	576	**1,244**	39	**1,283**	**8.83**	**11**

	Sorted					Fish Camera									Combined
	Female		Male			Female		Male							
Return Year	HOR	NOR	HOR	NOR	Sorted Total	HOR	NOR	HOR	NOR	Unknown	Count Total	Estimates	Total w/ Estimates	% HOR	Days Offline
2017	0	37	1	74	**112**										
2018	2	104	3	180											
2019	0	100	3	125											
2020	N/A	N/A	N/A	N/A											
2021	2	106	1	139											
2022	0	24	0	20											**20**
2023	N/A	N/A	N/A	N/A											**28**
Grand Total	**38**	**1,782**	**102**	**2,512**	**4,434**										
Average %															

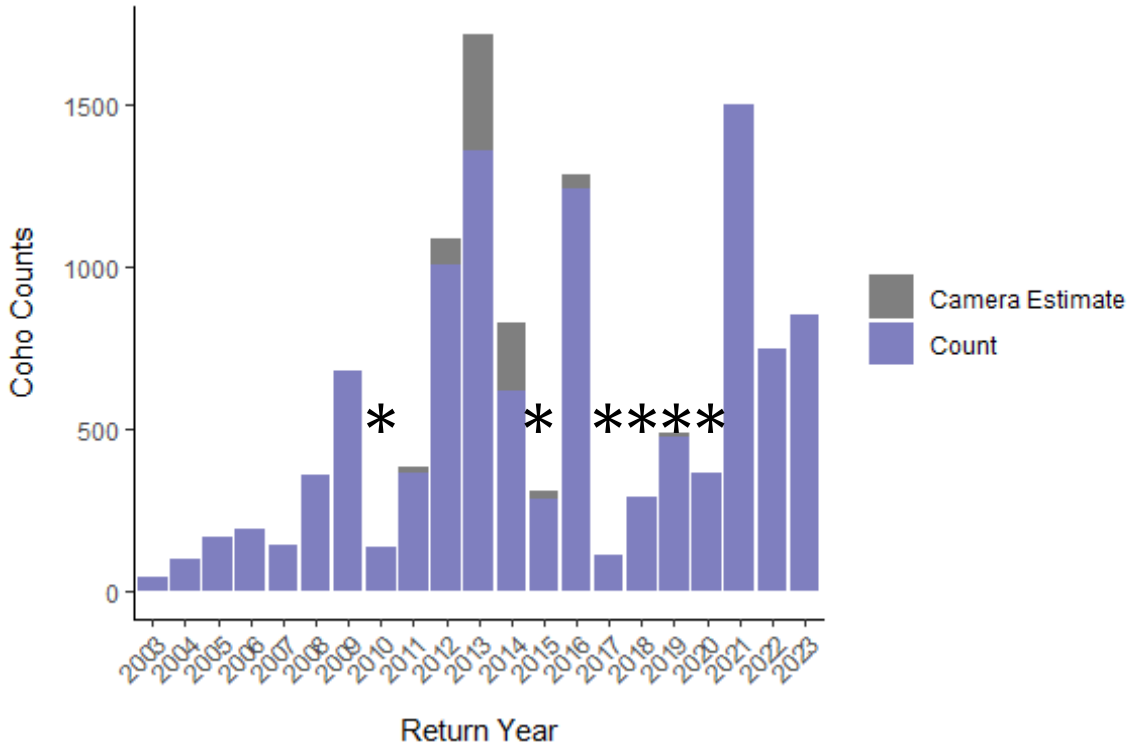

Figure 8. Annual Coho Counts at the Landsburg Fish Ladder Return Years 2003-2023. *Asterisks indicate where Coho counts are considered incomplete due to the fish camera being offline > 30 days during the Coho return season between September 15-February 28.*

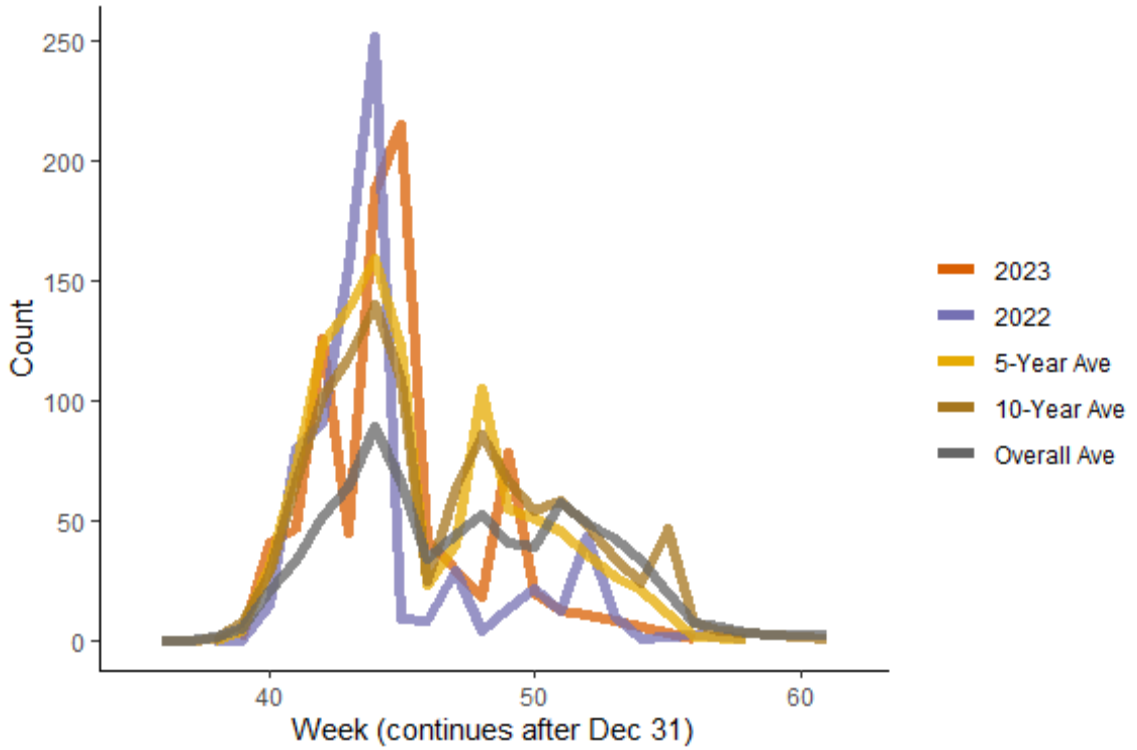

Figure 9. Weekly counts of Coho returning to the Landsburg Fish Ladder for Return Years 2023, 2022 and historical 5-, 10-year, and all year averages during the period Mid-September – February. *Years with incomplete Coho counts (camera offline for more than 30 days during the Coho season) are not included in averages.*

Unknown Salmon Returns

Unidentified salmon larger than 490 mm TL that could not be assigned to species are enumerated for Return Years starting in 2009 in Table 4. From 2003-2008, Sorting Mode extended through the salmon return season from September-February, therefore the species counts are considered complete for these years.

Table 4. Unknown Salmon Counts at the Landsburg Fish Ladder Return Years 2003-2023. Unknown Salmon are assigned to unidentifiable fish larger than 490 mm Total Length recorded by the Fish Camera between September 16-November 15. (Data accessed from EQuIS Database 8/02/2024).

Return Year	Unknown Salmon
2009	0
2010	7
2011	0
2012	10
2013	3
2014	12
2015	0
2016	9
2017	0
2018	0
2019	1
2020	22
2021	3
2022	0
2023	17
Total	**84**

Other Species

Mountain Whitefish were observed regularly throughout the year and a total of 1,757 were counted from fish camera videos from January 1, 2023 - December 31, 2023. This was almost double the number observed in 2022 (990) and slightly higher than 2021 (1,635). Whitefish counts are typically bimodal, peaking in March - April and again, as a smaller peak, in October - November (Figure 10). In both 2022 and 2023, the spring peak occurred later than expected, with 2023 peaking in April and May (Figure 10) and June in 2022 (Unrein 2023b). The fall peak was also later for both 2022 and 2023 with peaks in December and November and December, respectively (Unrein, 2023b).

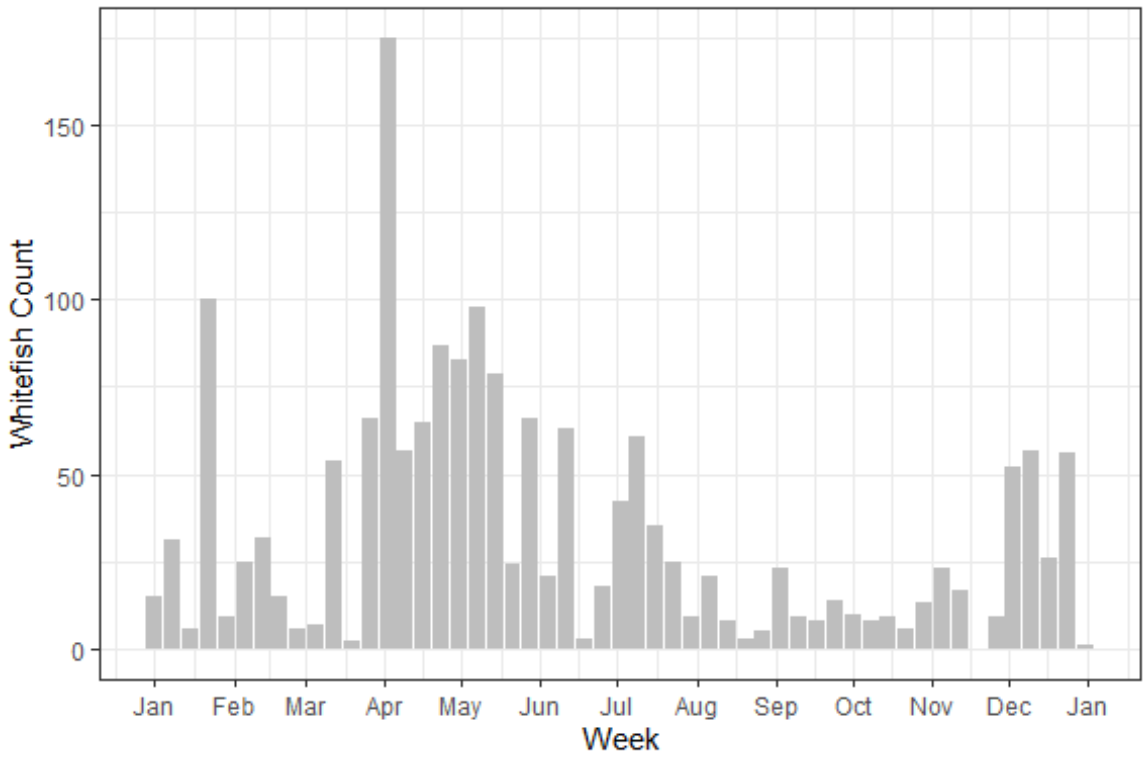

Figure 10. Weekly counts of Mountain Whitefish returning to the Landsburg Fish Ladder between January 1, 2023 and December 31, 2023.

Three presumptive Steelhead were observed in 2023. These were seen on May 18 (Unknown sex, adipose present, 690 mm TL), May 27 (male, adipose present, 790 mm TL) and June 5 (female, adipose present, 720 mm TL). Steelhead are rarely observed at the LFL. A total of 32 have been recorded by the fish camera since 2004 (Table 5).

Table 5. Presumptive Steelhead recorded at the Fish Ladder by the Fish Camera from Return Years 2004-2023.

Return Year	Presumptive Steelhead	Months Observed
2004	2	May, June
2005	1	May
2006	5	March, April
2007	4	March-June
2008	0	
2009	2	April, May
2010	2	
2011	3	March, June
2012	0	
2013	0	
2014	1	July
2015	3	March, May, June
2016	0	
2017	0	
2018	-	Camera offline
2019	1	June, Camera partially offline Spring 2019
2020	2	May
2021	2	April, June, Camera intermittently offline Spring 2021
2022	1	May
2023	3	May, June
Total	**32**	**March-July**

From January 1, 2023, through December 31, 2023, 573 Trout (*Oncorhynchus* spp.) were counted at the LFL. It is common for Trout to exit and re-enter the LFL. As in past years, Trout were observed recycling in the local camera area. Of the 573 Trout, 64 were large sized, presumptive spawners, (total length >490 mm). These were seen primarily January – March (28 fish), and again from November - December 2023 (30 fish) (Figure 11). These large Trout return to the LFL generally start in November and extend through early spring.

A single Peamouth Chub (*Mylocheilus caurinus*) was recorded on May 14. Peamouth were recorded for the first time at the LFL in 2021. No Bull Trout (*Salvelinus confluentus*) were observed in 2023. Only 2 Bull Trout have been counted since 2003 (Unrein, 2023b).

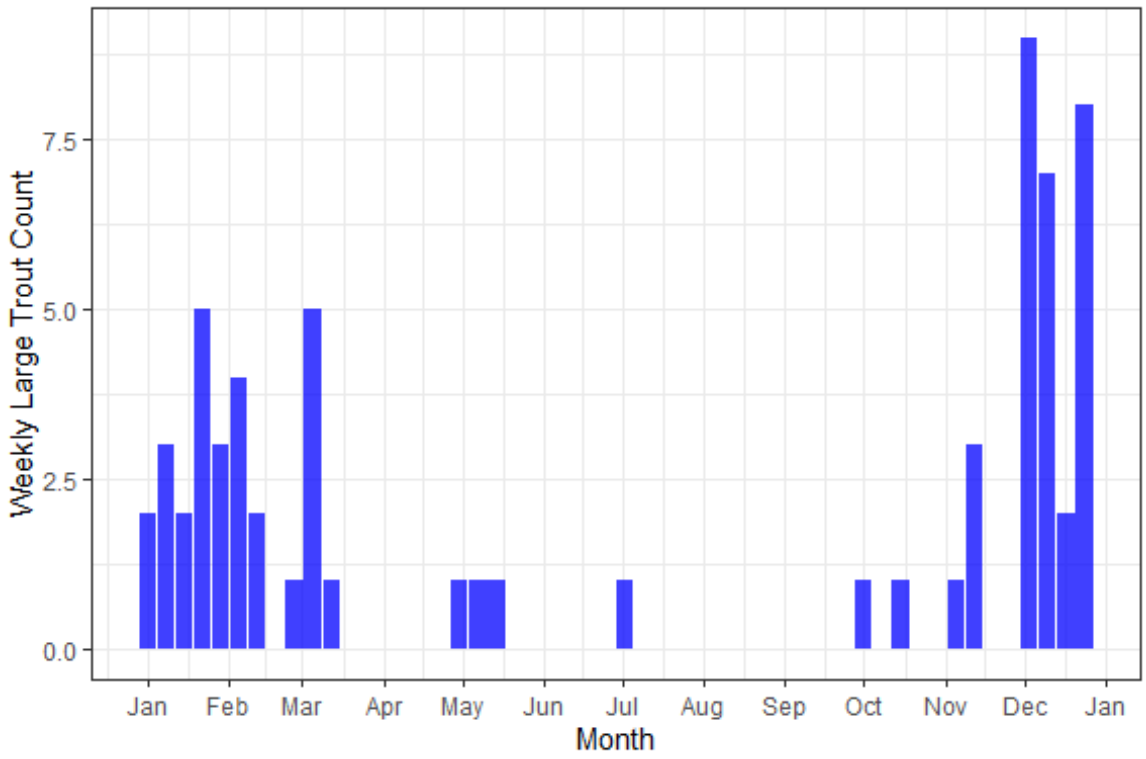

Figure 11. Weekly counts of large Trout (> 490 mm Total Length) recorded at the Landsburg Fish Ladder between January 1, 2023 and December 31, 2023.

Facility Upgrades and Maintenance

Adult Guide Panel Modification

In June 2023, the Adult Guide Panel was replaced with a new panel that includes a sliding door aperture (Landsburg Fish Ladder Projects Mar 2024 Salmon Forum Meeting.pdf). This aperture spans the height of the guide panel and can be opened from the upper walkway grating by LFL staff to allow passive fish passage during the sorting season without dewatering the ladder to change the guide panel position. This provides flexibility to easily switch the ladder between Sorting Mode and Passive Mode as needed. The new Adult Guide Panel was installed and positioned across the ladder in the Sorting Mode position on June 8, 2023, with the sliding aperture open. This allowed fish to pass volitionally while also allowing LFL staff to periodically conduct remote inspections, test operation of the aperture door, and monitor debris levels. During this time, Pond 1 had stop logs in place downstream of the V-trap so fish could not enter the pond. The Guide Panel was positioned back against the wall of the fish ladder (Passive Mode) on November 9, 2023. To utilize the Adult Guide Panel with the aperture during Sorting Mode an isolation panel must be installed downstream of the V-trap to prevent fish from entering Pond 1 when staff are not sorting daily. This panel is currently in the design phase and is scheduled for fabrication in 2025.

Acknowledgements

Thank you to our Axton Hughes who assisted with Annual Forebay Cleaning, Fish Ladder Operations & Maintenance as well as facility projects and data analysis. The Adult Guide Panel project could not have been possible without input and support from SPU Structural Engineer, Rick Lippold. The Landsburg Operators also provided invaluable support and coordination to the fish ladder work for which we are very grateful.

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