Upper Sustut River Steelhead Enumeration 2017

Skeena Fisheries Branch
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
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Acknowledgments

This vital enumeration project would not be possible without the tireless dedication of the Steffey family of Moose Valley, BC; Ron, Wanda, Clayton, Leaf, Brome and Hawk install, staff, maintain, repair and remove the Sustut weir annually. Their commitment to excellence has maintained this project's integrity in spite of often difficult and technically challenging conditions. Their hard work and thoughtfulness is of great benefit to the Sustut River ecosystem, the Province of BC and all its citizens.

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Mark Beere coordinated funding and sample analysis for this study. Bryce O'Connor provided valuable feedback and edits. This annual report has been built upon the efforts of previous authors who include Paddy Hirshfield, Dean Peard, Ron Diewert, Regina and Ron Saimoto, Cory Williamson, Chuck Parken and Krista Morten.

Executive Summary

From August 1 to September 30, 2017, a fish weir was operated on the upper Sustut River. This weir has been used for twenty four years to count migrating summer-run Steelhead (*Oncorhynchus mykiss*) and provides annual monitoring information for this species. One thousand and five (1005) Steelhead were counted passing the weir in 2017. This total is slightly below the estimated carrying capacity (1036) and 29% higher than the average annual count for this project (n=781). For management purposes, the population status for 2017 is above the Conservation Concern Threshold and is inside the Routine Management Zone.

The first Steelhead migrated through the weir on August 8. Although this was one day earlier than the 24-year average, the overall run-timing of Steelhead was later than normal. Approximately 55% of the run crossed the weir in the last seven days of the project.

Of the 1005 Steelhead that migrated past the weir, 668 (66%) were female and 337 (34%) were male resulting in a F:M sex ratio of 1.99:1. Over the course of the project, 170 Steelhead, 108 females and 62 males, were sampled for fork length and scale age. Females ranged from 640 to 910mm in length, with a mean of 750mm. Males were, on average, larger than females (range 670 to 920 mm, mean 820mm). The dominant age class was 4.2. In total, ten different life histories were observed. Six percent of Steelhead were repeat spawners.

All Steelhead crossing the weir were observed for the presence of gillnet scars or tags. Gillnet scars were present on 1.4% (n=14) of all Steelhead that passed through the weir in 2017. Ten of the Steelhead observed with net scars were female and four were male, a ratio of 2.5:1.

One tagged Steelhead was observed at the weir in 2017. It was captured, sampled and tagged with tag number 49323 at the Tyee test fishery on August 19, 2017. On September 30, 2017 at approximately 12:00pm, after travelling 557km in 43 days (an average of 12.9km/day), Steelhead 49323 was sampled at the weir and was noted by weir technicians as having severe gillnet scarring.

Mean daily air temperature at the weir ranged between 1.9°C and 16.8°C, averaging 8.5°C. Mean daily water temperature at the weir ranged between 5.3°C and 14.5°C, averaging 9.56°C. Water levels ranged from a low of 0.13 m to a high of 0.33 m and averaged 0.19 m. Comparison of current water levels to those observed prior to 2015 is not possible due to relocation of the staff gauge in 2015.

Recommendations of this report include suggestions to enhance management and conservation of the upper Sustut River Steelhead population and improvements to study design.

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1.0 Introduction

The Sustut River is a lake-headed tributary of the Skeena River located in north central British Columbia (Figure 1) which supports populations of more than a dozen species of fish, most notably including Steelhead and Rainbow Trout (*Oncorhynchus mykiss*), Chinook Salmon (*O. tshawytscha*), Sockeye Salmon (*O. nerka*), Coho Salmon (*O. kisutch*), Bull Trout (*Salvelinus confluentus*) and Mountain Whitefish (*Prosopium williamsoni*). The Sustut River originates in the Omineca Mountains approximately 200 km north of Smithers, B.C., drains approximately 3,574 km^2, and flows for approximately 108 km from the outlet of Sustut Lake to the Skeena River. It has seven main tributaries including the Bear and Asitka Rivers, as well as Birdflat, Red, Two Lake, Moosevale and Johanson Creeks. The mainstem sections of the upper Sustut River and Johanson Creek from their respective lake outlets to their confluence form the primary spawning areas for Steelhead in the upper Sustut River (Bustard, 1993).

Upper Sustut River Steelhead comprise a unique population within the Skeena River watershed. Overwintering, spawning and rearing occur at high elevations in the Sustut Lake (1306m) and Johanson Lake (1448m) watersheds. The short growth season in this high elevation, mountainous region prolongs the rearing component of their life-history. The mean smolt age for upper Sustut River Steelhead is 4.5 years (Tautz *et al.*, 1992). In comparison, most British Columbia Steelhead populations produce smolts that range from two to three years of age (McPhail, 2007). Populations which exist near the edges of their respective species' biological thresholds are known to be valuable indicators of population trend and ecosystem shift, as they are often the first to be impacted by and illuminate change on the landscape. As a result, upper Sustut River Steelhead are an ideal population to monitor in order to understand trends of abundance, life history, biology and ecosystem health over time.

Early research (Spence *et al.*, 1990) into Sustut River Steelhead shed light on a migration behaviour which provides a unique opportunity for weir-based stock assessment. Because the upper Sustut River and its major tributary Johanson Creek are both lake-headed, they provide hydrologically and thermally stable overwintering, spawning and rearing habitat for Steelhead. This stability lends itself well to enumeration by weir. Since 1994, the upper Sustut River Steelhead population has been monitored in a standardized manner at a counting weir located upstream of Moosevale Creek during the months of August and September. The information collected at the weir site provides insight into annual escapements of upper Sustut River Steelhead and is believed to demonstrate trends in abundance for other populations of upper Skeena River Steelhead.

Perpetual concerns exist regarding the conservation of summer-run Steelhead stocks in the Skeena watershed as their run timing coincides with mixed stock commercial gillnet and seine fisheries primarily targeting Chinook, Sockeye and Pink salmon. Steelhead are incidentally captured and suffer mortality in these fisheries (Ward *et al.*, 1993; Cox-Rogers, 1994). Sustut River Steelhead are also harvested by Indigenous fishers using various methods (gillnet, seine, rod, dip-net, gaff, etc.) during their migration through the Skeena watershed and at terminal locations near the weir site.

The Sustut River is managed as a Class 1 Classified Water from September 1 to October 31. Angling on the Sustut River is prohibited all year upstream of the BC Railway bridge at the Bear River/Sustut River confluence to protect the upper Sustut River Steelhead population and minimize possible effects of angling on migration of this reference population. In addition, angling is prohibited from January 1 to June 15 to protect overwintering, spawning and emigrating Steelhead. The use of bait while angling is also prohibited from Sept 1 to Dec 31 to minimize angling-related mortality. As per provincial policy, wild Steelhead may not be harvested by recreational anglers.

The objectives of the project are to:

- Enumerate the upper Sustut River Steelhead population
- Inform management of upper Skeena River Steelhead stocks
- Monitor the biological characteristics of upper Sustut River Steelhead
- Monitor environmental variables in critical Steelhead habitat
- Monitor the impact of gillnet fisheries by examining Steelhead for the presence of gillnet scars

Although the objectives of the project relate to Steelhead, other species are enumerated during weir operation. Data for Chinook, Sockeye, Coho, Bull Trout, Rocky Mountain Whitefish and Rainbow Trout are also recorded. Salmon data is forwarded to Fisheries and Oceans Canada.

2.0 Methods

2.1 Steelhead Enumeration

A floating fish weir constructed from 3.8 cm PVC pipe was installed in the upper Sustut River approximately 600m upstream of the Moosevale Creek confluence (Figures 2 and 3), approximately 97km upstream from the confluence of the Skeena and Sustut rivers. It is important to note that as a result of localized erosion, the weir was repositioned in 2015, to a new location approximately 100m upstream (Figures 3 and 4).

The weir was in operation between August 1 and September 30, 2017. Upon arriving at the weir, fish were directed into an aluminum trap box where they remained until a gate was opened allowing upstream migration to continue (Figures 5, 6 and 7). A count of Steelhead crossing the weir after September 30 (usually during de-construction of the weir) is periodically recorded, in addition to Steelhead holding in the pool below the weir upon its removal. This information is not added to total counts as it is not consistently measured. In some years, water clarity is limited and accurate visual counts are not possible.

During operation, the weir was inspected a minimum of three times a day. Debris was removed and repairs were made as necessary. The trap box was checked in the morning, afternoon and evening during low levels of fish migration. At peak migration, the weir was checked in the morning and a member of the project crew remained on site throughout the afternoon and evening. Experience indicates that human activity around the weir often delays or halts migration (Ron Steffey pers. comm.). Therefore, the removal of debris and salmon carcasses from the weir was limited to avoid affecting fish migration.

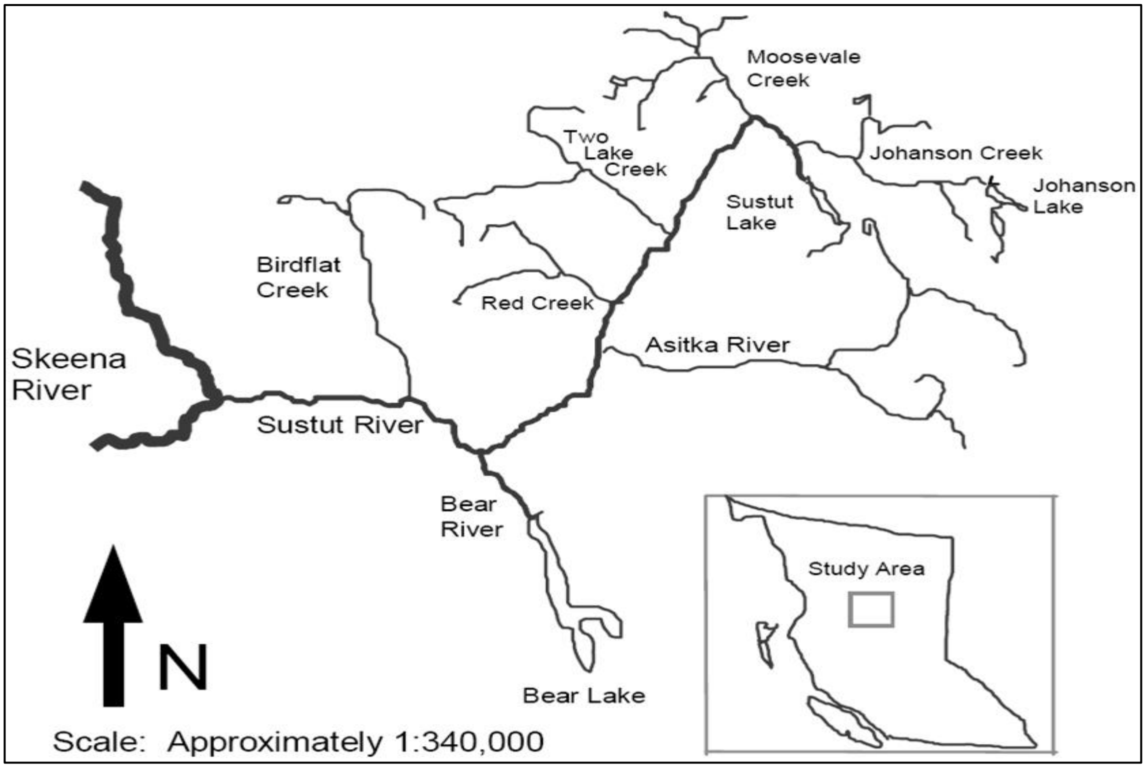

Figure 1. Sustut River and surrounding tributaries (Saimoto, 1995)

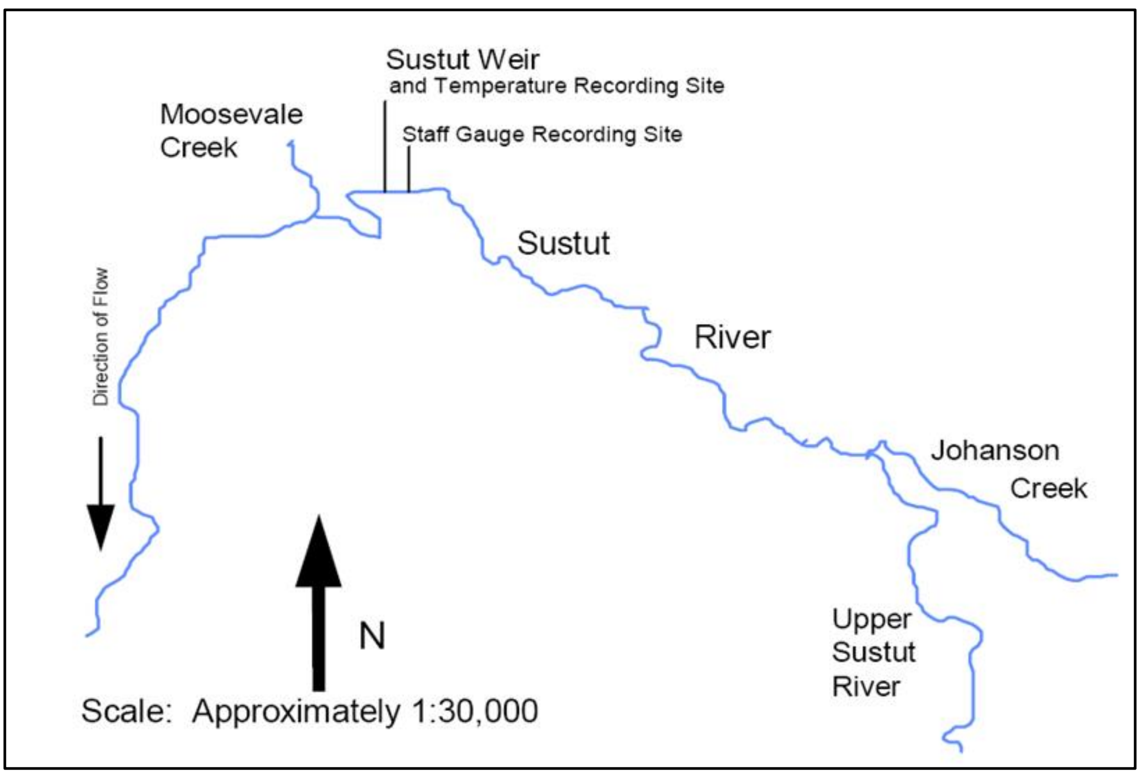

Figure 2. Sustut enumeration weir location on the upper Sustut River

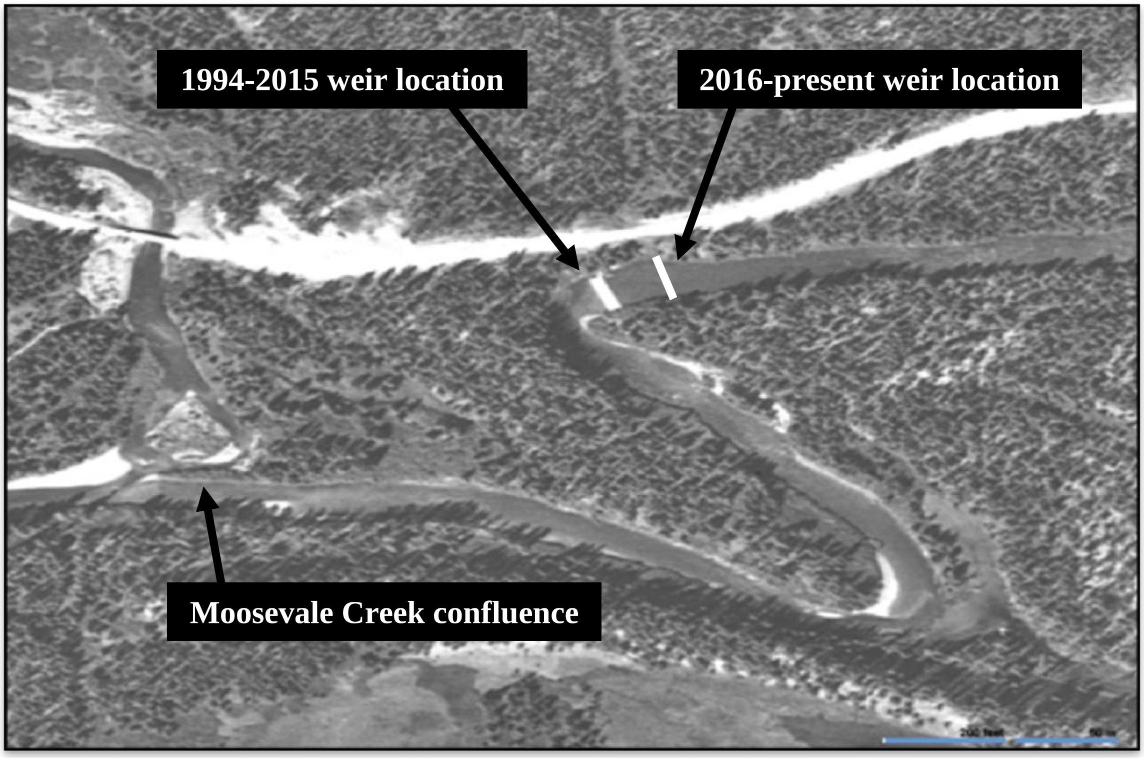

Figure 3. Aerial view of Sustut enumeration weir relocation

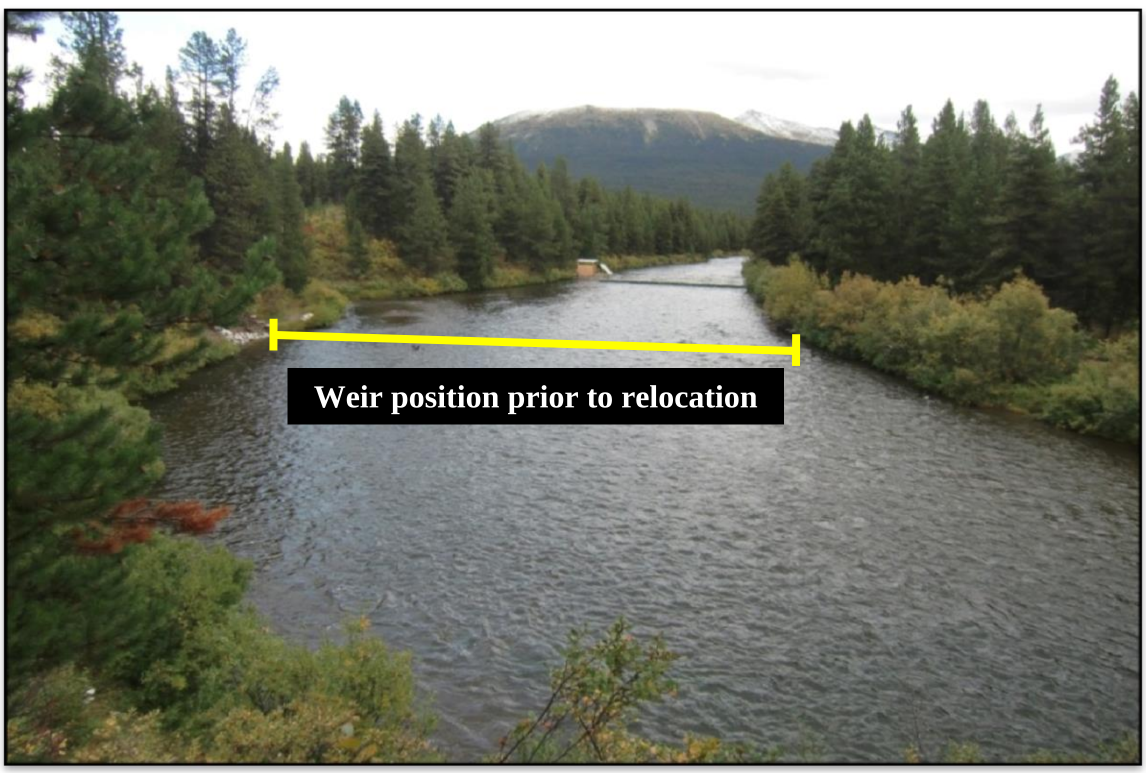

Figure 4. Ground view of Sustut enumeration weir relocation
Photo courtesy of Mark Beere

Figure 5. Sustut enumeration weir looking downstream
Photo courtesy of Mark Beere

Figure 6. Sustut enumeration weir looking upstream
Photo courtesy of Mark Beere

Figure 7. Sustut enumeration weir trap box entrance
Photo courtesy of Mark Beere

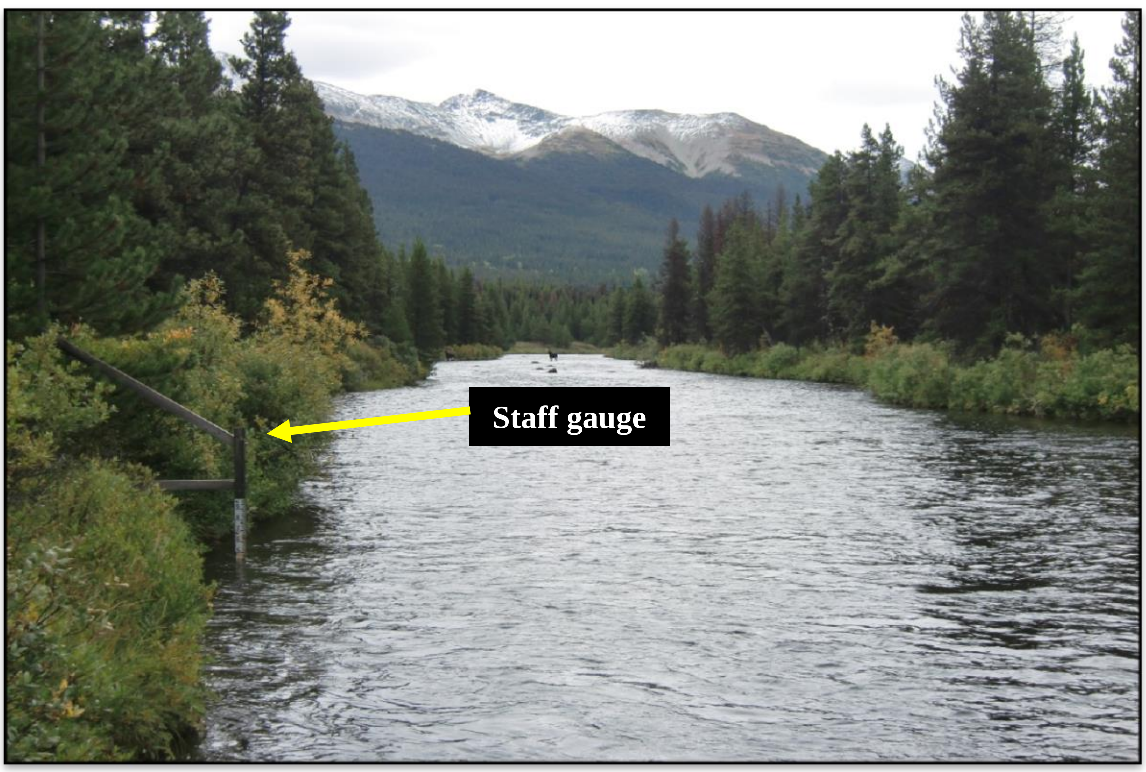

Figure 8. Staff gauge location upstream of the repositioned Sustut enumeration weir
Photo courtesy of Mark Beere

2.2 Management Framework

Sustut River Steelhead are managed according to the *Provincial Framework for Steelhead Management in British Columbia* (MFLNRO, 2016). This framework conceptualizes an abundance based management regime which relies on biological reference points to ensure conservation of stock and species (Figure 9). These biological reference points were proposed in Johnston *et al.* (2002) and adapted in MFLNRO (2016). Reference points are typically assigned using estimates of carrying capacity. Steelhead carrying capacities for streams in the Skeena watershed were determined using a habitat based productivity model developed by Tautz *et al.* (1992). This model indicates an adult production potential of 1036 Steelhead for the upper Sustut River. Existing management thresholds are currently being reviewed to determine if they can effectively meet conservation objectives for upper Sustut River Steelhead.

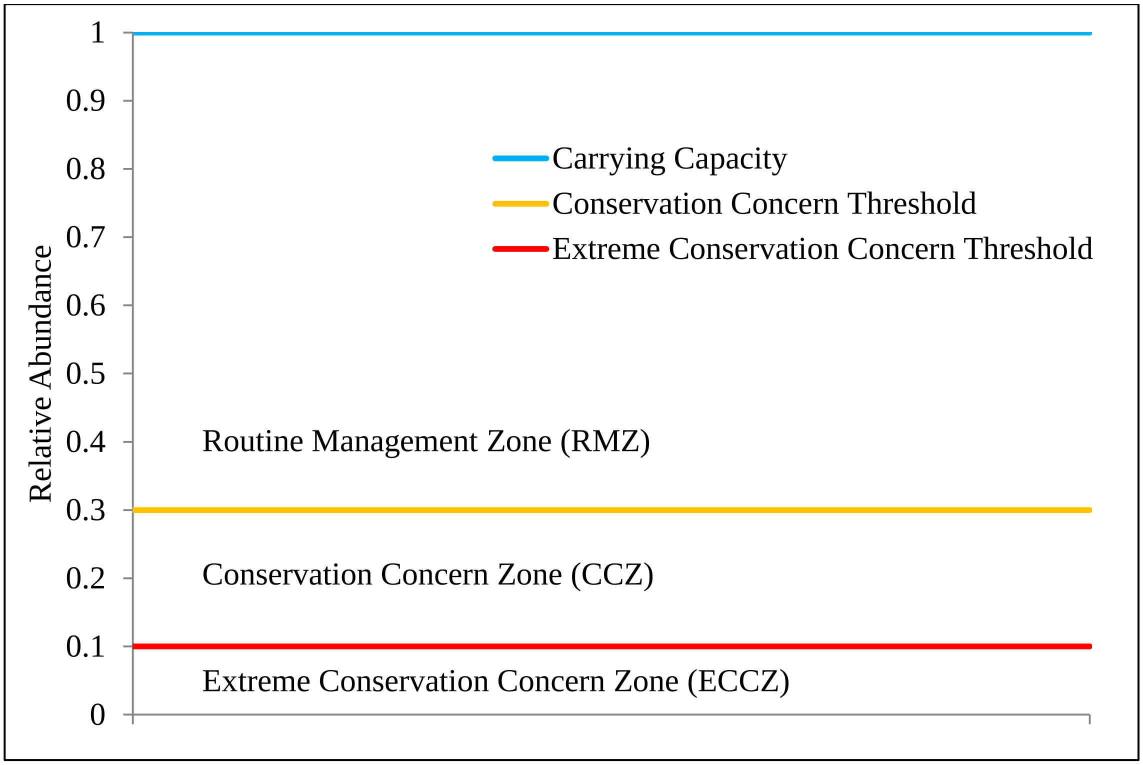

Figure 9. Management framework for the upper Sustut River Steelhead population

2.3 Steelhead Biological Information

Experienced personnel using the visual characteristics described in Scott & Crossman (1973) and McPhail & Carveth (1994) identified all fish passing the weir by species. This information was recorded and summarized daily. A plexiglass viewing box was used to identify fish by species and sex and to observe scars, wounds and general condition. Approximately 17% of all Steelhead passing through the weir were sub-sampled for fork length and scale ageing. Steelhead were sampled by dip netting from the trap box (Figure 7). Fork length was measured to the nearest half-centimeter and five scales were removed mid-laterally between the dorsal and anal fins. Any mortalities recovered from the weir were also sampled for fork length and age structures.

Scale samples were analyzed by Birkenhead Scale Analyses who determined length of freshwater (FW) and saltwater (SW) residency and incidence of spawning events.

FLNRO staff then filtered the scale ages by condition. All scales coded as 1, 5, 5a and 9 were included in the analysis. For scales identified as condition code 2 (poor condition, n=4), three had useable SW ages and one had a useable FW age. One scale sample was identified as code 3, freshwater age unreadable. This sample was excluded from FW age analysis and included in the SW age analysis. For scales identified as condition code 6 (regenerated, n=24), all SW ages except one (unreadable) were included in the analysis. No scale samples were assigned codes 4, 7, 8 or 10 in 2016. See Appendix Table 2 for full scale condition code descriptors. Total useable scale ages from 2017 sampling were FW n= 142 and SW n=168 and combined n=141. Fish age was determined by adding FW and SW residency periods and spawning checks. For example, a Steelhead reported as 3.2S1 was deemed to have been spawned as an egg in May 2010, hatched in August 2010, lived for three years in freshwater, smolted in May 2013, spent until August 2015 in the ocean, migrated to freshwater and subsequently spawned in May of 2016, migrated back to the ocean immediately after spawning, remained there until August of 2017 and migrated back to their weir site and was sampled in September 2017. This individual is then reported as a repeat spawner in its 8^{th} year of life.

2.4 Steelhead Tagging

Steelhead intercepted in commercial or Indigenous fisheries, the Tyee Test Fishery or other biological monitoring programs may be tagged or marked prior to release. Steelhead enumerated at the weir were checked for the presence of these tags and marks. This information allows fisheries managers to assess migration rates, interception in domestic and international fisheries and survival following capture in these fisheries.

2.5 Steelhead Gillnet Scars

The presence of gillnet scars was noted for all Steelhead that migrated through the weir to the extent possible. The plexiglass viewing box allowed this information to be collected and avoided the need to handle fish. In some cases, not all fish with net scars may have been recorded due to turbid water conditions or limited observation time during high rates of migration.

2.6 Environmental Variables

Two Onset Hobo Pro v2® temperature loggers were used to record water and air temperatures at the weir site. These loggers have been secured in consistent locations annually. Hourly data was averaged to generate mean daily air and water temperatures. For redundancy, stream water and air temperatures were recorded each day using a hand-held minimum-maximum thermometer.

Water level measurements were recorded from a metric staff gauge located immediately upstream of the weir (Figure 8). Levels were recorded by weir staff twice a day, typically in the morning (~0900H) and evening (~2000H). Weir staff also recorded air temperature and weather conditions daily. For comparison purposes, the two daily water level measurements were averaged to determine the mean daily water level. Mean daily water temperature and level were compared against daily Steelhead migration to illustrate potential links between these variables. As previously noted, the weir was repositioned in 2015, to a location approximately 100m upstream of the previous location. The staff gauge used for measuring water level was also moved and fixed upstream of the new weir site (Figure 8).

3.0 Results

3.1 Steelhead Enumeration

Between August 1 and September 30, 1005 Steelhead migrated past the Sustut enumeration weir (Figure 10). This value is above the long term average (*n*=781; Table 1) and just below estimated carrying capacity (1036, Figure 12). The first Steelhead migrated past the weir on August 8. Since 1994, the date on which the first Steelhead passed weir has ranged between July 28 (2004) and August 18 (1999), averaging August 9. As indicated in Figure 11, Steelhead arrival at the weir in 2017 was later than normal, and peaked late in September, just before the weir was removed. Approximately 55% of the total enumeration crossed the weir in the last seven days of operation. Four Steelhead were observed crossing the weir site during deconstruction on October 1, and approximately thirty were observed holding approximately 100m downstream.

3.2 Management Framework

The upper Sustut Steelhead population has been in the Routine Management Zone for the past nine years (Figure 12).

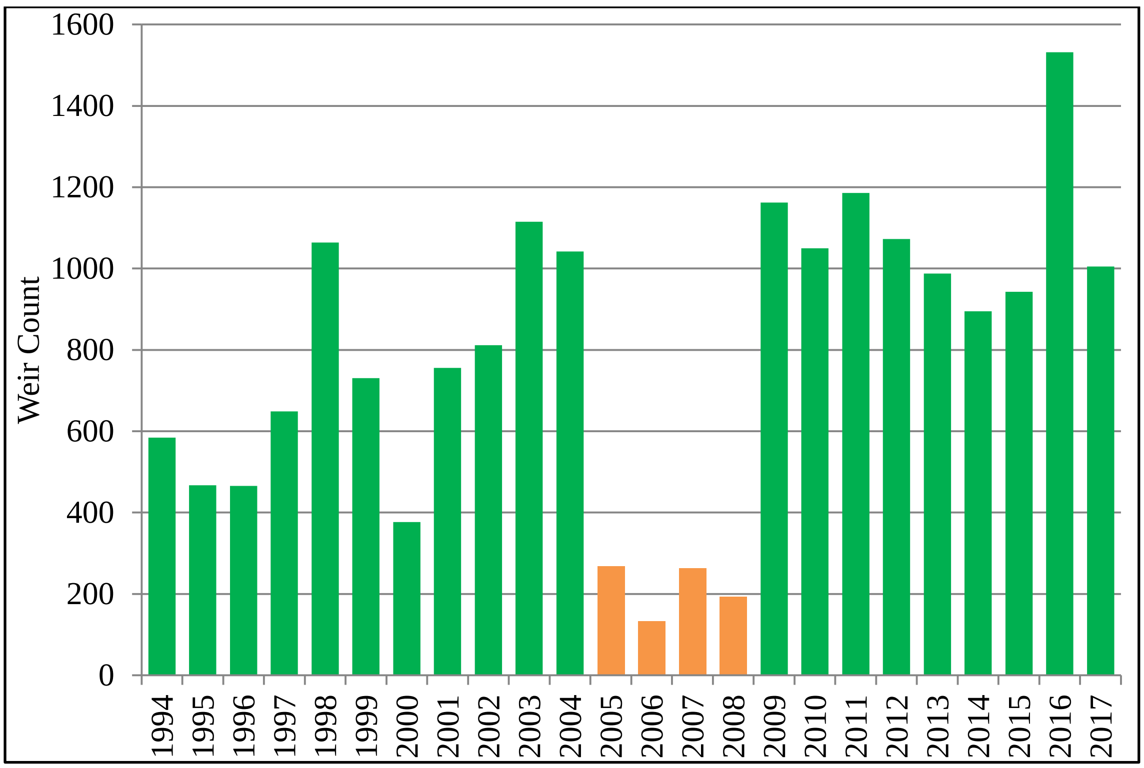

Figure 10. Upper Sustut River Steelhead enumeration, 1994-2017

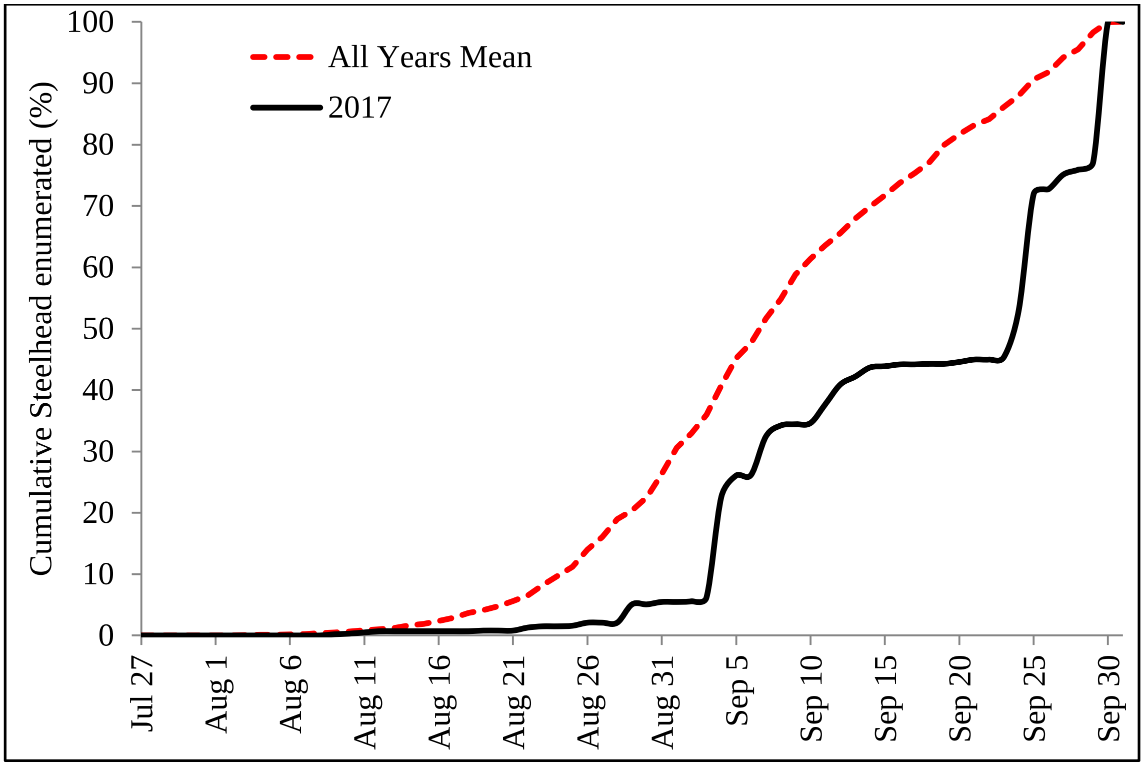

Figure 11. Upper Sustut River Steelhead migration timing

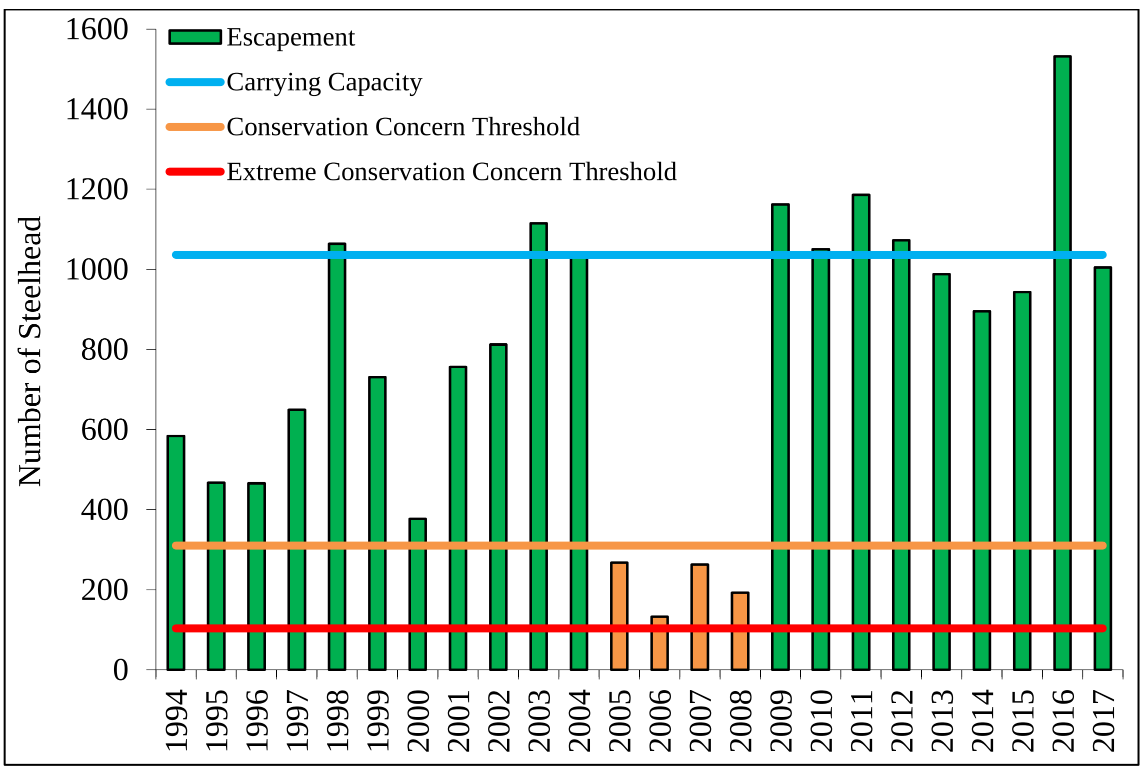

Figure 12. Annual enumeration showing management thresholds

Table 1. Summary data collected at the Sustut enumeration weir, 1994 – 2017.

Year	First Steelhead Arrival	Total Steelhead Count	Average Steelhead Length (mm)		Repeat Spawners (%)	Sex Ratio (F:1M)	Gillnet Scarring (%)			Mean Water Temp (°C) Aug1 - Sep30	Mean Water Level (m) Aug1 - Sep30
			M	F			M	F	M+F		
1994	08-Aug	584	824	737		1.55			2.0		
1995	08-Aug	467	826	746	1.2	1.23			6.0		
1996	17-Aug	466	829	739	1.3	1.58			14.0		
1997	09-Aug	649	814	733	0.6	1.43	9.2	17.8	15.4		
1998	03-Aug	1064	827	749		1.73	13.4	13.8	13.7		0.27
1999	18-Aug	731	848	756	2.5	1.64	6.1	9.9	8.5		0.28
2000	08-Aug	377	827	741	0.4	1.64	10.6	16.2	14.1		0.30
2001	15-Aug	756	864	771	2.5	1.63	10.1	14.5	12.8		
2002	09-Aug	812			1.9	1.27	3.6	8.4	6.3		0.23
2003	03-Aug	1115	780	730	1.2	1.39	8.3	14.2	11.8		0.31
2004	28-Jul	1042	818	745		1.48	6.0	8.8	7.7		0.34
2005	31-Jul	268	859	741	19.0	2.01	3.3	5.5	4.8	8.81	0.32
2006[1]	09-Aug	133				1.50	0.5	1.6	2.3	8.71	0.21
2007[1]	09-Aug	263				1.39	2.7	4.6	3.8	8.81	0.16
2008[1]	08-Aug	193				1.92	4.5	2.4	3.1	9.11	0.23
2009[1]	06-Aug	1162				1.66	0.7	1.5	1.2	9.61	0.20
2010	03-Aug	1050	793	746	1.0	1.48	0.9	2.6	1.9	8.91	0.12
2011	13-Aug	1186	824	756	10.3	1.73	3.7	8.0	6.4	8.65	0.27
2012	11-Aug	1073	801	728	5.3	1.65	2.7	2.4	2.5	9.29	0.15
2013	03-Aug	988	816	752	9.2	1.96	0.5	0.5	1.0	10.1	0.10
2014	03-Aug	895	773	724	6.4	1.69	6.3	4.8	5.4	9.31	0.11
2015	06-Aug	943	804	743	8.2	2.13	0.2	1.3	1.5	8.38	0.30
2016	08-Aug	1532	778	732	8.9	1.99	2.9	3.6	3.4	9.47	0.25
2017	**09-Aug**	**1005**	**820**	**751**	**6.0**	**1.98**	**0.4**	**1**	**1.4**	**9.56**	**0.19**
Min	28-Jul	133	773	724	0.4	1.23	0.2	0.5	1.0	8.38	0.10
Max	18-Aug	1532	864	771	19.0	2.13	13.4	17.8	15.4	10.10	0.34
Mean	08-Aug	781	817	743	5.1	1.65	4.6	6.8	6.3	9.13	0.23

1 – Steelhead biological samples were not collected from 2006 to 2009 to eliminate handling stress while Steelhead abundance was in the Conservation Concern Zone.

3.3 Steelhead Biological Information

3.3.1 Length

A total of 170 Steelhead were sampled for fork length in 2017, 62 males and 108 females. Male lengths ranged from 670 to 920 mm and female lengths ranged from 640 to 910 mm. Since monitoring began, the difference in fork lengths between male and female Steelhead has been statistically significant. Males are, on average, larger than females. Figure 13 shows length frequency of upper Sustut River Steelhead in 20mm increments of fork length.

3.3.2 Scale analysis and age determination

The predominant FW age (Figure 14) observed was four (72.5%) and ranged from three (17%) to five (10.5%). The predominant maiden SW age (Figure 15) observed was two (66%), the remainder were three-ocean migrants (34%). Maiden Steelhead represented 94% of the sample and 6% of Steelhead sampled showed evidence at least of one previous spawning event (predominantly 4.2S1). The full suite of upper Sustut River Steelhead life history strategies observed in 2017 is illustrated in Figure 16.

3.3.3 Sex ratio

Of the 1005 Steelhead that migrated past the weir, 668 (66%) were female and 337 (34%) were male resulting in a female to male ratio of 1.98:1.

3.3.4 Mortalities

There were no Steelhead mortalities observed at the weir during 2017.

3.4 Steelhead Tagging

One tagged Steelhead was observed at the weir in 2017. It was captured, sampled and tagged with tag number 49323 at the Tyee test fishery on August 19, 2017. At the time of tagging, the Steelhead was recorded as a female of 710mm in length.

On September 30, 2017 at approximately 12:00pm, after travelling 557km in 43 days (12.9km/day), Steelhead 49323 was sampled at the weir as a female of 730mm in length, age class 3.2 and was noted by weir technicians as having severe gillnet scarring. It is improbable that this Steelhead grew 20mm between encounters, so it is likely that one or both of the measurements were inaccurate, due to human error or variability in sampling equipment.

3.5 Steelhead Gillnet Scars

Gillnet scars were present on 1.4% (n=14) of all Steelhead that passed through the weir in 2017 (Table 1). Ten of the Steelhead observed with net scars were female and four were male (2.5:1).

3.6 Environmental Variables

3.6.1 Water Temperature

The lowest water temperature, 4.2°C, was recorded on September 19 at 0800H. The highest water temperature, 17.3°C, was recorded on August 9 at 1800H (Figure 17). Since 2005, the mean daily water temperature between August 1 and Sept 30 has ranged between 8.4°C and 10.1°C, averaging 9.1°C (Table 1).

3.6.2 Air Temperature

The lowest air temperature, -7.0°C, was recorded on September 14 at 0700H. The highest air temperature, 27.5°C, was recorded on August 9 at 1700H (Figure 17). Mean daily air temperature ranged from 1.9°C to 16.8°C and averaged 8.8°C.

3.6.3 Water Level

The lowest water levels, 0.13m, were recorded on Sept 9 and 10. The highest water level, 0.33m, was recorded on September 30, the last of the project (Figure 18). Water level measurements recorded for this project after 2015 cannot be compared to historical values as the staff gauge was relocated in 2015. The new staff gauge location is narrower and lower in gradient than the previous site.

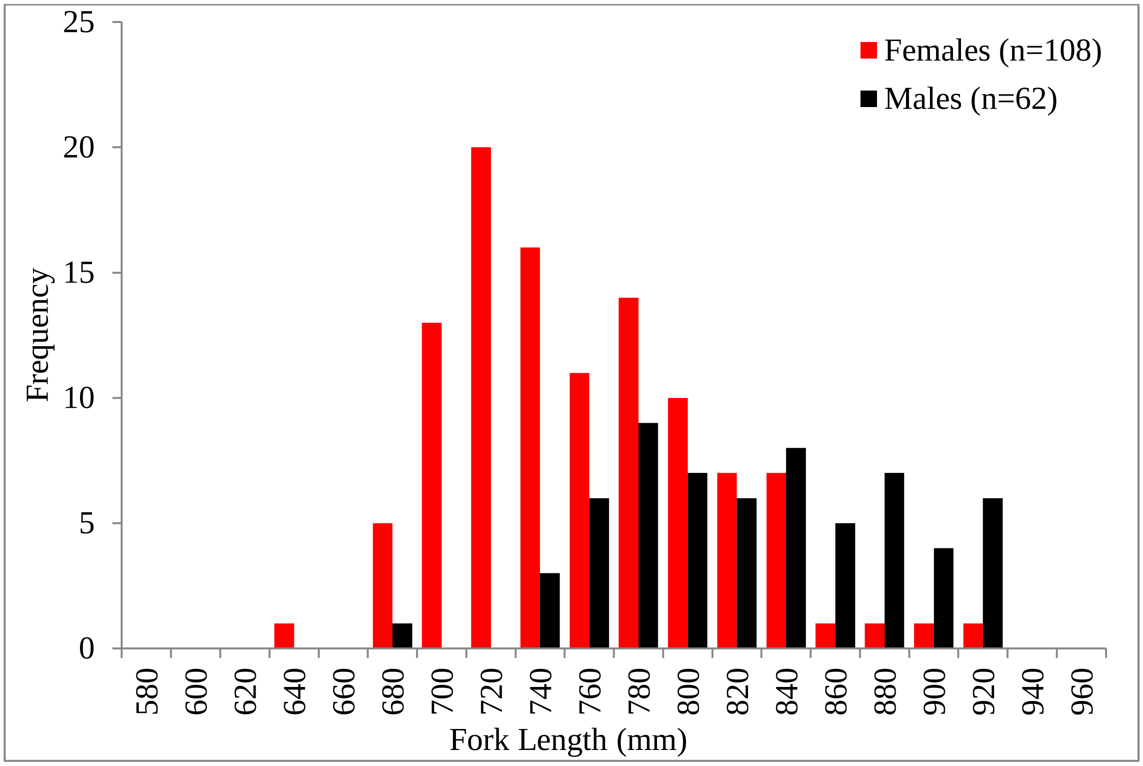

Figure 13. Upper Sustut River Steelhead length frequency, 2017

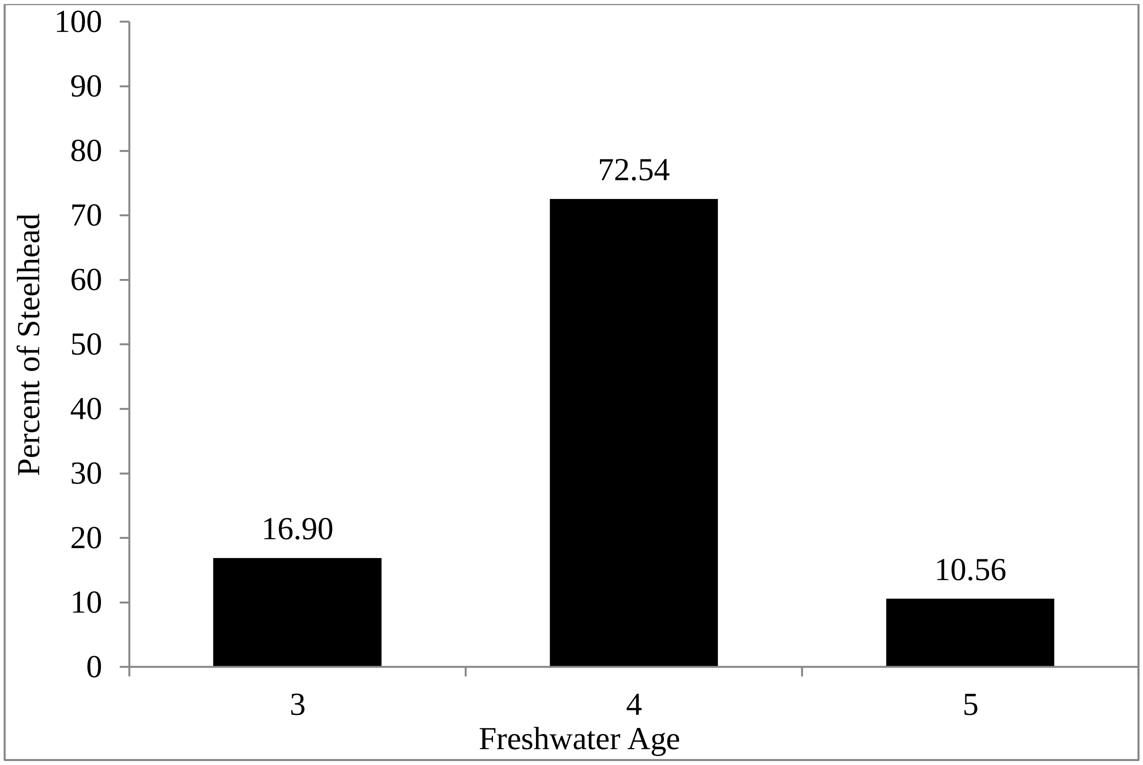

Figure 14. Freshwater ages of upper Sustut River Steelhead, 2017

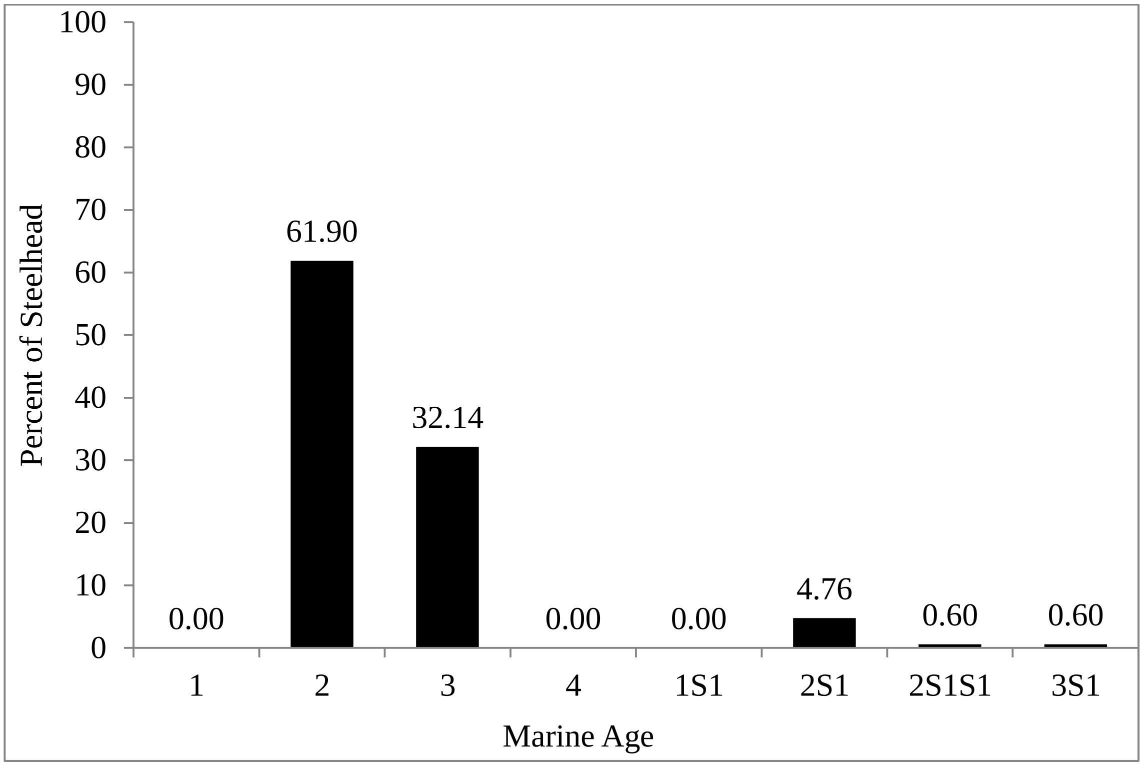

Figure 15. Marine ages of upper Sustut River Steelhead, 2017

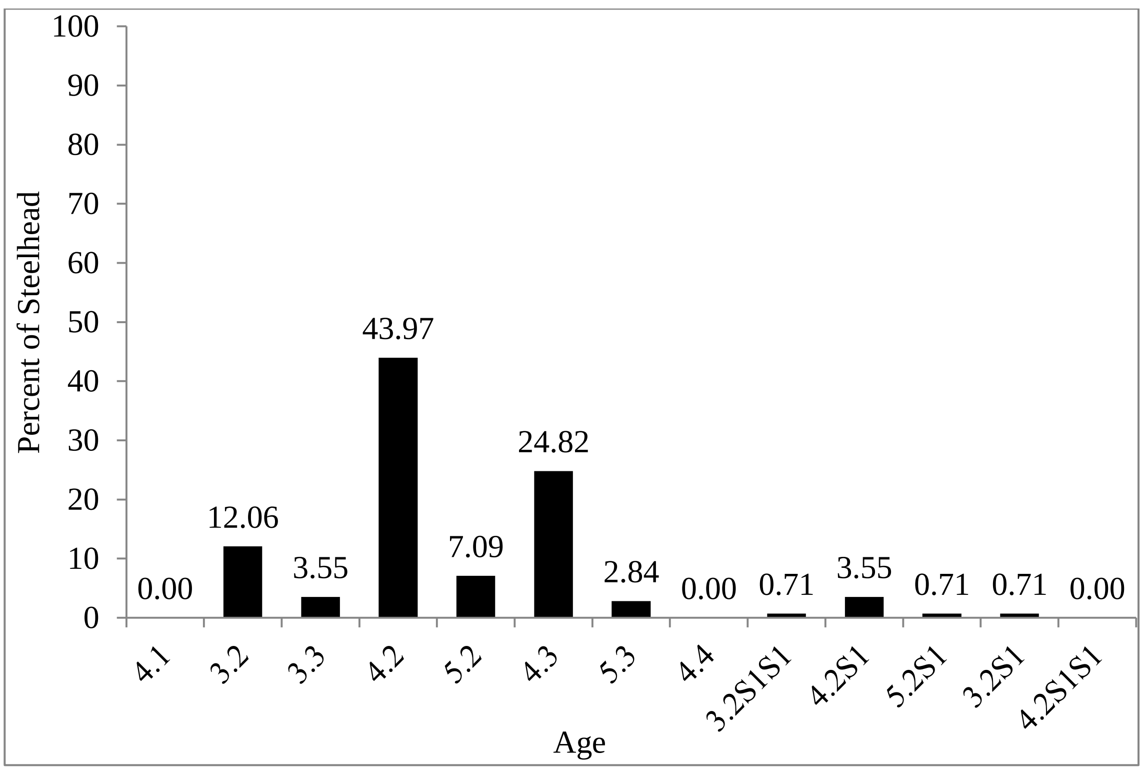

Figure 16. Age classes of upper Sustut River Steelhead, 2017

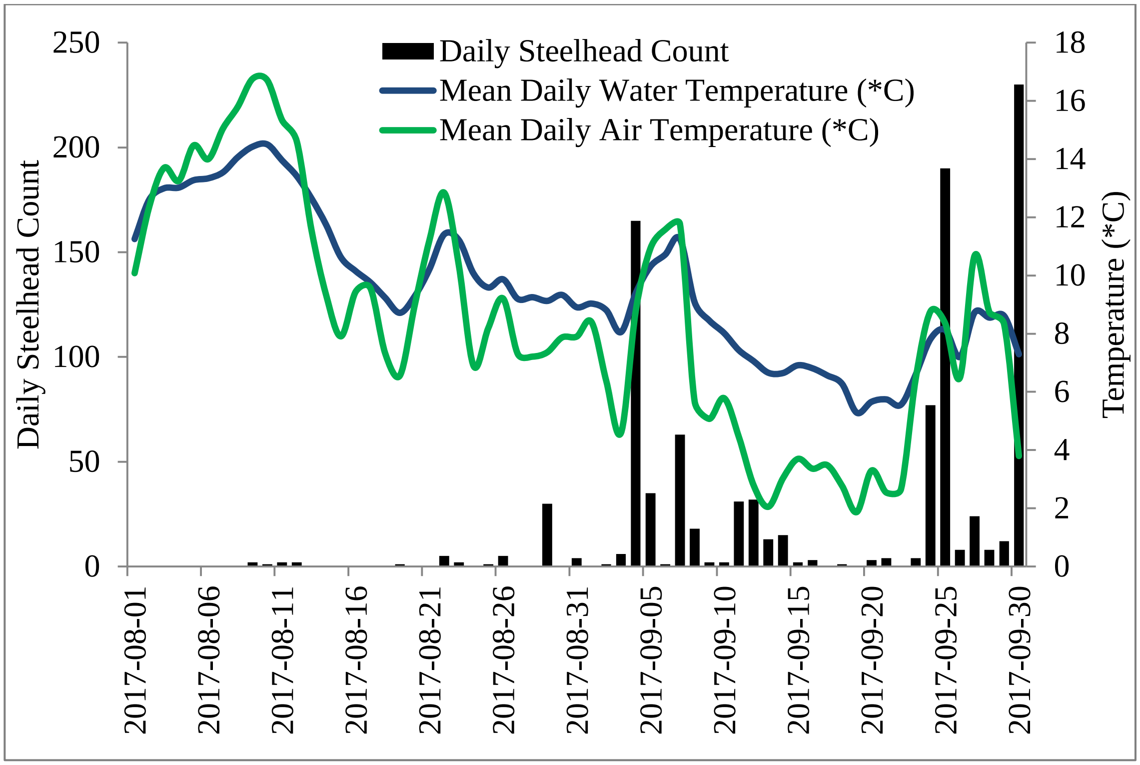

Figure 17. Mean daily air and water temperature plotted against daily Steelhead count Aug 1 - Sep 30 2017

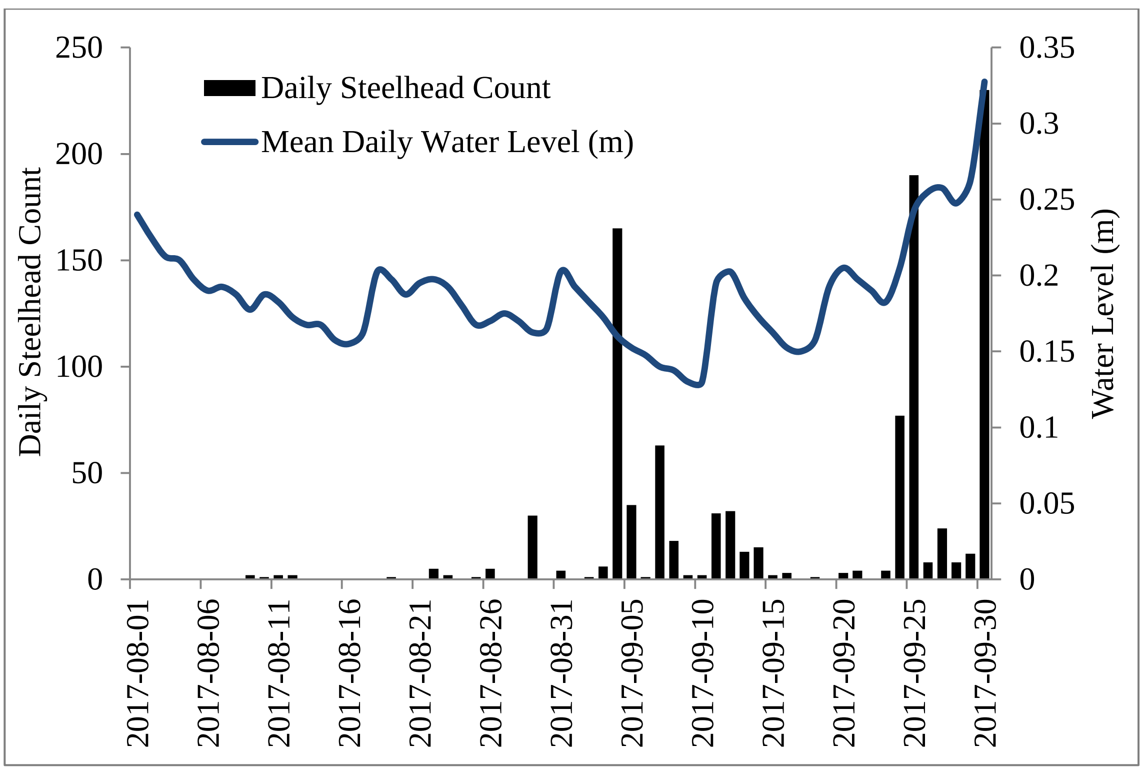

Figure 18. Mean daily water level plotted against daily Steelhead count Aug 1 - Sep 30 2017

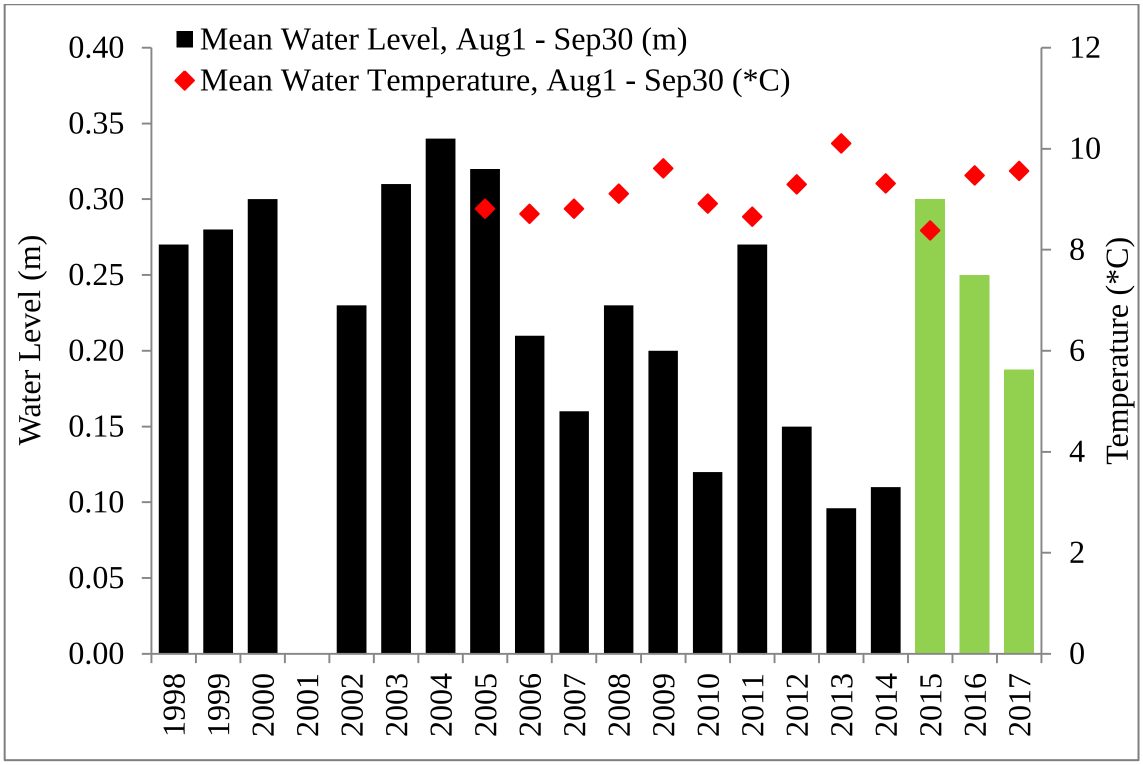

Figure 19. Mean project water level and temperature, 1998-2017
Green bars denote new staff gauge location

4.0 Discussion

4.1 Steelhead Enumeration

The total count of Steelhead migrating past the weir between August 1 and September 30 is believed to reflect the majority of the upper Sustut River Steelhead population. The count recorded during this time period is used for comparison amongst years and is believed to demonstrate trends in Steelhead abundance for other upper Skeena River tributaries.

Observations of Steelhead crossing the weir site or holding downstream during and after weir removal are not included in the enumeration total. These observations are not made reliably from year to year and as such are not standardized for observer error and conditions. The use of this non-standard information could lead to improper management actions and as such is provided only as an anecdote. The average number of Steelhead observed at or near the weir site following deconstruction over the twenty-four years of the project is forty-seven. It has ranged between zero and 188.

While there have been variations in arrival date and cumulative migration timing over the course of twenty-four years, on average these events have been remarkably consistent. The 2017 run was interesting in this respect. The first Steelhead arrival was within one day of the mean but the cumulative run timing was, on the whole, significantly later than normal, with approximately 55% of Steelhead moving through the weir in the final seven days of the project. The hydrograph at the weir site in 2017 was low, stable and declining until the middle of September, which may have influenced Steelhead movements through the lower and middle reaches of the Sustut River. Movements through the weir site are typically associated with moderate to large increases in water level, which did not occur in August or early September. Anecdotal information on the run timing of other species suggests that the majority of anadromous fish populations entering the Skeena River in 2017 were later than normal to varying degrees (DFO, MFLNRORD unpublished data). The observed late Steelhead migration through the weir site may have been a combination of these factors.

4.2 Management Framework

According to a habitat based productivity model developed for the Skeena drainage (Tautz *et al.,* 1992) the 1005 Steelhead that migrated past the weir in 2017 was 3% below the estimated adult production at capacity for the system (1036).

Comparisons made between annual weir counts and adult production capacity estimates rely on the assumption that weir counts represent total escapement through the weir. As noted above, the number of Steelhead below the weir at removal has ranged considerably, and in some years would have the ability to shift the population status between conservation zones. This has significant implications for potential conservation actions and should be considered carefully by decision makers.

4.3 Sex Ratio

While the sex ratio observed at the Sustut enumeration weir has been female biased since 1994, it is higher than sex ratios reported for other major Steelhead bearing tributaries in the Skeena watershed (Parken & Morten, 1996).

The female biased sex ratio observed in the upper Sustut River Steelhead population is a concern. Moore *et al.* (2014) highlighted the importance of life history diversity in buffering environmental variability: as repeat spawning rates increase, probability of extinction decreases. The observed sex ratio in the upper Sustut population indicates the possibility of selective removal of certain life history strategies from the population. The loss of those Steelhead over time is a direct loss of life history variability which negatively impacts population sustainability and the ability of the population to withstand environmental change. The female biased sex ratio could be linked to natural and/or anthropogenic selective pressures.

4.3.1 Natural selective pressures

Smolt sex ratios in Ohms *et al.* (2014) were not found to be biased to either sex. Natural mortality (e.g.: outmigrant predation, ocean survival rates) for juvenile and maiden Steelhead should affect males and females similarly. As a result, we would expect that maiden Steelhead would return from ocean migrations in an approximate sex ratio of 1:1. This has been shown to be the case with few exceptions in other long-term monitoring programs (e.g.: Seamons *et al.,* 2005). For non-maiden Steelhead, iteroparity has been shown to be negatively correlated with body size (Matala *et al.,* 2016, Narum *et al.,* 2008) and being male (Beere, 1999). Thus we can conclude that there may be an existing natural selection pressure against non-maiden large male steelhead.

4.3.2 Anthropogenic selective pressures

Anthropogenic selection pressures such as exposure to gillnet fisheries appear to affect male and female steelhead differently. It appears that when upper Sustut River Steelhead encounter gillnets, male Steelhead are killed at a higher rate than females due to their larger average size. This impact is compounded for emigrating male Steelhead kelts or those on repeat spawning immigrations, as they usually retain some secondary sexual characteristics (e.g.: enlarged kype) which increases their already elevated risk of becoming entangled in gillnets. This selective pressure, compounded with the existing naturally higher mortality for large male steelhead, artificially inflates the female to male sex ratio and creates the potential for a conservation concern.

4.3.3 Potential buffers to an artificially biased sex ratio

It has been documented that stream-resident populations can buffer effective population size (Martinez *et al.*, 2000). Abundance of rainbow trout has been consistently low throughout the duration of the upper Sustut enumeration weir project (annual mean RB count *n*=4.8, range 1-12). Given this observation, there is little evidence to suggest that a significant stream-resident spawning component exists which could mitigate the observed female bias in the anadromous sex ratio. However, if an additional undocumented resident rainbow spawning component exists, it is unknown if resident rainbow populations could mitigate the loss of unique, large bodied Steelhead phenotypes.

4.4 Gillnet Scarring

Gillnet scars were identified on 1.4% (*n*=14) of Steelhead migrating past the Sustut weir in 2017. This value is below the long term average of 6.3% (Table 1).

In 2017, Fisheries and Oceans Canada permitted no commercial gillnet or demonstration gillnet/seine fisheries in Area 4 (Skeena approach waters) due to low pre- and in-season abundance forecasts for Chinook and Sockeye.

Indigenous Food, Social and Ceremonial (FSC) fisheries were undertaken in various formats throughout the summer of 2017. Anecdotally, gillnetting effort on the mainstem Skeena River by Indigenous harvesters increased in the latter half of August, once in-season Sockeye abundance exceeded conservation concern thresholds. Steelhead capture and/or release is not quantified for Indigenous fisheries.

4.5 Environmental Variables

The mean water level in 2017 was 0.1875m. Thirty-seven percent (*n*=374) of Steelhead entered the trap box when water levels were below this level and sixty-three percent (*n*=631) entered when water levels were above. This is consistent with previous observations which indicate that the majority of Steelhead move past the weir during periods of increased flow.

The average water level observed at the project site has been on a general downward trend since 1998. Observed increases in 2015 and 2016 (Figure 20) are likely attributable to the relocation of the staff gauge. Given this change, it is not possible to directly compare water levels pre- and post-2015. However, the continued downward trend since 2015 is cause for concern.

Declining flow rates in the upper Sustut River may have serious consequences for not only habitat and fish, but the ability of the project to accurately enumerate upper Sustut River Steelhead over time. If water levels continue to decline, migration can be temporarily or permanently delayed. If upper Sustut River Steelhead are forced to overwinter in sub-optimal locations in the mainstem Sustut River or tributaries, the implications for both the project's efficacy and the population's conservation outlook are severe.

The average water temperature during the project in 2017 was 9.56°C. Given the evidence for declining flows, it is a positive sign that annual temperature records indicate no significant change in the thermal regime of the upper Sustut River. However, this variable is only measured for the duration of the weir operation, chiefly the months of August and September. Temperature monitoring should be expanded to include the entire calendar year so that changes to the thermal regime of the Upper Sustut River are not misunderstood.

4.6 The Importance of Continued Monitoring

The upper Sustut River enumeration weir is one of two long term indexes used to estimate summer run Steelhead abundance in the Skeena River watershed. It is also the only index available to monitor the abundance of upper Skeena River Steelhead stocks. This long term data set is invaluable. The data provided to fisheries managers provides critical insight into a multitude of variables that affect Steelhead. The ability to detect changes in these parameters and establish linkages to natural and anthropogenic impacts is vital to sustaining the ecological, social and economic benefits Skeena Steelhead provide now and into the future.

5.0 Recommendations

1. Continue to enumerate the upper Sustut River Steelhead population annually. The long term monitoring data from this project provides fisheries managers with critical information on abundance trends for all early run / upper Skeena Steelhead populations.
2. Year-round monitoring of environmental variables should commence immediately.
3. Conservation thresholds should be evaluated to determine their efficacy at ensuring the long-term sustainability of the upper Sustut River Steelhead population.
4. An upper Skeena River Steelhead conservation plan should be developed to inform management actions to be taken if the indicator population described in this report falls below management objectives. This plan should draw heavily from the results of Recommendation #3, and be based on the framework outlined in Johnston *et al.* (2002) and MFLNRO (2016).
5. The conservation plan and associated actions developed in Recommendation #4 should be incorporated into the North Coast Integrated Fisheries Management Planning (IFMP) process conducted by DFO.
6. Visual observations of Steelhead at or near the weir site during deconstruction should continue. In years when large numbers of Steelhead are suspected to be holding below the weir during removal, standardized snorkel surveys may be useful to compare and validate visual observations.
7. Undertake a review of results at the Sustut weir every five years. Doing so would provide useful insight into changing environmental factors and anthropogenic impacts as they relate to conserving the upper Sustut River Steelhead population.

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7.0 Appendices

Appendix 1. Daily and cumulative totals for all fish species counted at the Sustut enumeration weir in 2017.

Date	Chinook		Sockeye		Steelhead		Coho		Bull Trout		Whitefish		Rainbow	
	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
27-Jul-17	2	0	0	0	0	0	0	0	0	0	1	0	0	0
28-Jul-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29-Jul-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30-Jul-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-Jul-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01-Aug-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02-Aug-17	1	1	0	0	0	0	0	0	0	0	1	1	0	0
03-Aug-17	0	1	0	0	0	0	0	0	0	0	0	1	0	0
04-Aug-17	2	3	0	0	0	0	0	0	0	0	0	1	0	0
05-Aug-17	1	4	1	1	0	0	0	0	0	0	4	5	0	0
06-Aug-17	17	21	2	3	0	0	0	0	0	0	2	7	0	0
07-Aug-17	4	25	1	4	0	0	0	0	0	0	1	8	0	0
08-Aug-17	9	34	0	4	0	0	0	0	1	1	1	9	0	0
09-Aug-17	22	56	12	16	2	2	0	0	0	1	0	9	0	0
10-Aug-17	13	69	40	56	1	3	2	2	0	1	1	10	0	0
11-Aug-17	10	79	548	604	2	5	14	16	1	2	0	10	0	0
12-Aug-17	16	95	252	856	2	7	7	23	0	2	0	10	4	4
13-Aug-17	12	107	49	905	0	7	2	25	0	2	2	12	0	4
14-Aug-17	8	115	19	924	0	7	2	27	0	2	1	13	0	4
15-Aug-17	3	118	1	925	0	7	0	27	0	2	0	13	0	4
16-Aug-17	5	123	1	926	0	7	0	27	0	2	0	13	0	4
17-Aug-17	9	132	28	954	0	7	2	29	0	2	0	13	0	4
18-Aug-17	6	138	45	999	0	7	2	31	0	2	1	14	1	5
19-Aug-17	6	144	66	1065	1	8	2	33	0	2	1	15	0	5
20-Aug-17	2	146	50	1115	0	8	2	35	0	2	1	16	0	5
21-Aug-17	6	152	115	1230	0	8	15	50	1	3	1	17	0	5
22-Aug-17	5	157	54	1284	5	13	8	58	0	3	1	18	0	5
23-Aug-17	1	158	47	1331	2	15	23	81	0	3	0	18	0	5
24-Aug-17	1	159	7	1338	0	15	3	84	0	3	0	18	0	5
25-Aug-17	1	160	12	1350	1	16	0	84	0	3	0	18	0	5
26-Aug-17	6	166	202	1552	5	21	37	121	0	3	1	19	0	5
27-Aug-17	1	167	25	1577	0	21	1	122	0	3	1	20	0	5
28-Aug-17	1	168	77	1654	0	21	18	140	0	3	2	22	0	5
29-Aug-17	0	168	107	1761	30	51	12	152	0	3	4	26	0	5
30-Aug-17	3	171	5	1766	0	51	0	152	0	3	3	29	0	5
31-Aug-17	1	172	83	1849	4	55	17	169	1	4	6	35	0	5
01-Sep-17	1	173	4	1853	0	55	0	169	2	6	5	40	0	5
02-Sep-17	0	173	18	1871	1	56	1	170	1	7	0	40	0	5
03-Sep-17	1	174	102	1973	6	62	22	192	0	7	2	42	0	5
04-Sep-17	1	175	251	2224	165	227	56	248	0	7	2	44	0	5
05-Sep-17	0	175	40	2264	35	262	24	272	0	7	1	45	0	5
06-Sep-17	0	175	29	2293	1	263	9	281	0	7	1	46	0	5
07-Sep-17	0	175	93	2386	63	326	60	341	1	8	4	50	0	5
08-Sep-17	0	175	55	2441	18	344	11	352	1	9	1	51	0	5
09-Sep-17	0	175	8	2449	2	346	0	352	0	9	0	51	0	5

10-Sep-17	0	175	32	2481	2	348	1	353	1	10	2	53	0	5
11-Sep-17	0	175	91	2572	31	379	20	373	0	10	5	58	0	5
12-Sep-17	0	175	100	2672	32	411	17	390	0	10	1	59	0	5
13-Sep-17	0	175	31	2703	13	424	4	394	0	10	0	59	0	5
14-Sep-17	0	175	35	2738	15	439	7	401	0	10	0	59	0	5
15-Sep-17	0	175	20	2758	2	441	2	403	0	10	1	60	0	5
16-Sep-17	0	175	24	2782	3	444	1	404	0	10	1	61	0	5
17-Sep-17	0	175	5	2787	0	444	0	404	1	11	1	62	0	5
18-Sep-17	0	175	2	2789	1	445	0	404	2	13	0	62	0	5
19-Sep-17	0	175	5	2794	0	445	9	413	0	13	0	62	0	5
20-Sep-17	0	175	2	2796	3	448	22	435	0	13	0	62	0	5
21-Sep-17	0	175	6	2802	4	452	8	443	0	13	0	62	0	5
22-Sep-17	0	175	1	2803	0	452	0	443	1	14	0	62	0	5
23-Sep-17	0	175	1	2804	4	456	1	444	1	15	2	64	0	5
24-Sep-17	0	175	2	2806	77	533	80	524	0	15	5	69	0	5
25-Sep-17	0	175	7	2813	190	723	34	558	0	15	5	74	1	6
26-Sep-17	0	175	1	2814	8	731	3	561	2	17	2	76	0	6
27-Sep-17	0	175	3	2817	24	755	11	572	0	17	1	77	0	6
28-Sep-17	0	175	0	2817	8	763	2	574	1	18	0	77	0	6
29-Sep-17	0	175	0	2817	12	775	3	577	1	19	0	77	1	7
30-Sep-17	0	175	1	2818	230	1005	3	580	2	21	8	85	2	9

Appendix 2. Scale condition code definitions.

Condition Code	Definition
1	Good condition
2	Poor condition or questionable age
3	Freshwater age unreadable (eg. U.2)
4	Unreadable (eg. U.U)
5	Starting to regenerate (freshwater age may be under-estimated)
5a	Starting to regenerate, wide focus (freshwater age not under-estimated)
6	Regenerated (eg. R.2)
7	Missing
8	Resorption (eg. last marine annulus on edge of scale)
9	First freshwater annulus very vague, but must be present due to high circuli count and spacing relative to other freshwater annuli
10	Other species, not a Steelhead

Appendix 3. Steelhead scale ages from the Sustut enumeration weir in 2016.

Date	Time	Sex	FL (mm)	Code	FW Age	SW Age	Age	Comment
10-Aug-17	8:00	M	90.5	1	5	3	5.3	
10-Aug-17	19:00	F	78	1	4	2S1	4.2S1	
25-Aug-17	7:45	F	83.5	**6**	**R**	3	R.3	**FW excluded**
25-Aug-17	19:00	M	74.5	1	4	2	4.2	
25-Aug-17	19:00	F	69	5	3	2	3.2	
31-Aug-17	7:45	F	80	1	5	3	5.3	
31-Aug-17	20:00	F	73	**6**	**R**	2	R.2	**FW excluded**
05-Sep-17	7:45	M	87	**2**	4	**3**	4.3	**SW excluded**
05-Sep-17	7:45	F	83.5	5	4	3	4.3	
05-Sep-17	19:00	F	77.5	1	4	2	4.2	
05-Sep-17	19:00	F	72	1	4	2	4.2	
05-Sep-17	19:00	F	75	5	3	2	3.2	

05-Sep-17	19:00	F	71	5	3	2	3.2	
05-Sep-17	19:00	M	83	5	4	3	4.3	
05-Sep-17	19:00	F	74	9	4	2	4.2	
07-Sep-17	8:00	F	78	1	4	3	4.3	
07-Sep-17	8:00	M	82	1	4	2	4.2	
07-Sep-17	8:00	F	70	**6**	**R**	2	R.2	**FW excluded**
07-Sep-17	8:00	F	81	**6**	**R**	3	R.3	**FW excluded**
08-Sep-17	7:45	F	74	**6**	**R**	2	R.2	**FW excluded**
08-Sep-17	17:00	F	74	**6**	**R**	2	R.2	**FW excluded**
08-Sep-17	20:00	F	77.5	**6**	**R**	3	R.3	**FW excluded**
09-Sep-17	8:00	F	72	1	3	2	3.2	
09-Sep-17	8:00	M	79	9	4	3	4.3	
10-Sep-17	8:00	F	72	1	4	2	4.2	
11-Sep-17	8:00	F	81	1	4	2	4.2	
11-Sep-17	14:00	F	76	1	4	2	4.2	
11-Sep-17	14:00	F	78	**6**	**R**	3	R.3	**FW excluded**
11-Sep-17	14:00	F	73	9	4	2	4.2	
11-Sep-17	16:00	F	77.5	1	4	2	4.2	
11-Sep-17	16:00	F	71.5	1	4	2	4.2	
11-Sep-17	16:00	M	78.5	1	5	2	5.2	
11-Sep-17	17:00	M	76	1	4	2	4.2	
11-Sep-17	17:00	F	82	**6**	**R**	3	R.3	**FW excluded**
11-Sep-17	17:00	M	92	**6**	**R**	3	R.3	**FW excluded**
11-Sep-17	18:00	F	70	1	4	2S1	4.2S1	
11-Sep-17	18:00	F	68.5	1	4	2	4.2	
11-Sep-17	18:00	F	70	1	4	2	4.2	
11-Sep-17	18:00	M	82	1	4	2	4.2	
11-Sep-17	18:00	M	84	1	4	3	4.3	
11-Sep-17	18:00	F	75	9	4	2	4.2	
11-Sep-17	18:00	M	77.5	9	4	2	4.2	
11-Sep-17	19:00	F	75	1	4	2	4.2	
11-Sep-17	19:00	F	72	1	4	2	4.2	
11-Sep-17	19:00	M	84	1	4	3	4.3	
11-Sep-17	19:00	F	74	**6**	**R**	2	R.2	**FW excluded**
11-Sep-17	19:00	F	67	9	3	2	3.2	
13-Sep-17	14:00	M	85	9	5	3	5.3	
13-Sep-17	15:00	F	84.5	1	4	3	4.3	
13-Sep-17	15:00	F	83	5	4	3	4.3	
13-Sep-17	16:00	F	73	1	4	2	4.2	
13-Sep-17	19:00	F	71	1	4	2	4.2	
13-Sep-17	19:00	F	74	1	5	2	5.2	
13-Sep-17	19:00	F	88.5	1	3	3	3.3	
13-Sep-17	19:00	F	70	**3**	**U**	2	U.2	**FW excluded**
13-Sep-17	19:00	M	77	5	3	2	3.2	
13-Sep-17	19:00	F	77.5	9	4	3	4.3	
13-Sep-17	19:00	F	73	9	4	2	4.2	
13-Sep-17	19:00	M	76.5	9	4	2	4.2	
13-Sep-17	19:00	F	84	5a	4	3	4.3	
14-Sep-17	14:00	F	67.5	**6**	**R**	2	R.2	**FW excluded**
14-Sep-17	15:00	M	67	1	4	2	4.2	
14-Sep-17	15:00	M	73	**2**	**5**	2	5.2	**FW excluded**
14-Sep-17	16:00	F	77	5	3	3	3.3	
14-Sep-17	17:00	F	71	9	5	2	5.2	
14-Sep-17	19:00	F	79	1	4	3	4.3	
14-Sep-17	19:00	F	73	1	4	2	4.2	
14-Sep-17	19:00	F	71.5	1	4	2	4.2	

14-Sep-17	19:00	F	76	1	4	2	4.2	
14-Sep-17	19:00	F	86.5	1	4	3	4.3	
14-Sep-17	19:00	M	73	1	4	2	4.2	
14-Sep-17	19:00	M	75	1	5	2	5.2	
14-Sep-17	19:00	F	79.5	5	4	3	4.3	
14-Sep-17	19:00	M	77	**6**	**R**	3	R.3	**FW excluded**
14-Sep-17	19:00	F	70	9	4	2	4.2	
14-Sep-17	19:00	F	83	5a	4	3	4.3	
18-Sep-17	17:00	F	71.5	9	5	2	5.2	
20-Sep-17	15:00	M	78	1	4	2	4.2	
20-Sep-17	17:00	F	78	9	5	2	5.2	
21-Sep-17	9:00	F	82	1	4	3	4.3	
21-Sep-17	15:00	F	69	1	4	2	4.2	
21-Sep-17	16:00	F	70	**6**	**R**	2	R.2	**FW excluded**
23-Sep-17	8:00	M	81.5	1	4	3	4.3	
23-Sep-17	15:00	F	75	1	4	2	4.2	
23-Sep-17	15:00	F	71.5	9	4	2	4.2	
23-Sep-17	16:00	M	75.5	9	5	2	5.2	
24-Sep-17	8:45	F	72	1	3	2	3.2	
24-Sep-17	8:45	F	70.5	1	4	2	4.2	
24-Sep-17	8:45	M	89	9	4	3	4.3	
24-Sep-17	8:45	M	84	9	4	3	4.3	
24-Sep-17	12:00	F	71.5	1	4	2	4.2	
24-Sep-17	12:00	F	73	9	5	2	5.2	
24-Sep-17	12:00	M	89	9	4	3	4.3	
24-Sep-17	14:00	M	77.5	1	4	2	4.2	
24-Sep-17	14:00	M	78	5	4	2	4.2	
24-Sep-17	14:00	F	79	**6**	**R**	2S1	R.2S1	**FW excluded**
24-Sep-17	14:00	F	76.5	9	4	2	4.2	
24-Sep-17	14:00	M	80.5	9	4	3	4.3	
24-Sep-17	14:00	M	75	9	4	2	4.2	
24-Sep-17	15:00	F	70.5	1	4	2	4.2	
24-Sep-17	15:00	F	75	1	4	2	4.2	
24-Sep-17	15:00	F	72.5	1	4	2	4.2	
24-Sep-17	15:00	F	78	1	4	2	4.2	
24-Sep-17	15:00	F	69.5	1	4	2	4.2	
24-Sep-17	15:00	F	71	1	4	2	4.2	
24-Sep-17	15:00	M	91	1	4	3	4.3	
24-Sep-17	15:00	M	92	5	4	3	4.3	
24-Sep-17	15:00	F	78.5	**6**	**R**	2	R.2	**FW excluded**
24-Sep-17	15:00	M	79.5	**6**	**R**	2	R.2	**FW excluded**
24-Sep-17	15:00	M	76.5	9	4	2	4.2	
24-Sep-17	15:00	M	72.5	9	4	2	4.2	
24-Sep-17	15:00	F	68	5a	3	2	3.2	
24-Sep-17	15:00	M	87.5	5a	4	3	4.3	
24-Sep-17	16:00	F	75	1	4	2	4.2	
24-Sep-17	16:00	F	80	1	4	3	4.3	
24-Sep-17	16:00	M	88	1	3	2S1S1	3.2S1S1	
24-Sep-17	16:00	M	79	1	3	3	3.3	
24-Sep-17	16:00	F	73	**2**	**4**	2	4.2	**FW excluded**
24-Sep-17	16:00	M	88	5	4	3	4.3	
24-Sep-17	16:00	M	81	**6**	**R**	2	R.2	**FW excluded**
24-Sep-17	16:00	F	81	9	5	2S1	5.2S1	
24-Sep-17	17:00	F	77.5	1	5	2	5.2	
24-Sep-17	17:00	F	83	1	4	3	4.3	
24-Sep-17	17:00	F	70	1	4	2	4.2	

24-Sep-17	17:00	M	80	5	4	2	4.2	
24-Sep-17	17:00	M	79	**6**	**R**	2	R.2	**FW excluded**
24-Sep-17	17:00	F	71	9	4	2	4.2	
24-Sep-17	18:00	F	83	1	4	2S1	4.2S1	
24-Sep-17	18:00	F	70.5	9	3	2	3.2	
24-Sep-17	18:00	F	67	9	4	2	4.2	
24-Sep-17	19:00	F	78.5	1	4	2	4.2	
24-Sep-17	19:00	M	86	1	3	3	3.3	
24-Sep-17	19:00	M	84.5	1	4	3	4.3	
24-Sep-17	19:00	M	88	5	4	3	4.3	
24-Sep-17	**19:00**	**F**	**73.5**	**6**	**R**	**R**	**R.R**	**Unreadable**
24-Sep-17	19:00	M	91.5	**6**	**R**	3	R.3	**FW excluded**
24-Sep-17	19:00	F	79	9	4	2S1	4.2S1	
24-Sep-17	19:00	F	75	9	4	2	4.2	
26-Sep-17	8:00	F	67.5	5	3	2	3.2	
26-Sep-17	15:00	F	79	1	4	3	4.3	
26-Sep-17	15:00	M	75.5	1	3	2	3.2	
26-Sep-17	15:00	M	82.5	9	5	2	5.2	
26-Sep-17	16:00	F	63.5	1	3	2	3.2	
26-Sep-17	16:00	F	69	**6**	**R**	2	R.2	**FW excluded**
26-Sep-17	17:00	M	84.5	9	4	2	4.2	
26-Sep-17	19:00	M	87	9	4	3	4.3	
27-Sep-17	8:00	F	73.5	1	4	2	4.2	
27-Sep-17	8:00	M	78.5	1	3	2	3.2	
27-Sep-17	8:00	M	81.5	**2**	**4**	3	4.3	**FW excluded**
27-Sep-17	8:00	F	91	**6**	**R**	3S1	R.3S1	**FW excluded**
27-Sep-17	8:00	M	89.5	**6**	**R**	3	R.3	**FW excluded**
27-Sep-17	13:00	F	75	1	4	2	4.2	
27-Sep-17	13:00	F	70.5	9	3	2	3.2	
27-Sep-17	13:00	M	91	9	4	3	4.3	
28-Sep-17	8:00	F	71	1	4	2	4.2	
28-Sep-17	8:00	F	76.5	1	3	2	3.2	
28-Sep-17	8:00	M	83	1	4	3	4.3	
28-Sep-17	8:00	F	69.5	5a	4	2	4.2	
28-Sep-17	15:00	M	84	9	3	3	3.3	
28-Sep-17	15:00	M	78	9	4	2	4.2	
29-Sep-17	8:00	F	80	1	3	2S1	3.2S1	
29-Sep-17	8:00	M	85	1	5	3	5.3	
29-Sep-17	8:00	M	89	1	4	3	4.3	
29-Sep-17	8:00	F	81	9	4	2S1	4.2S1	
29-Sep-17	12:00	F	73	1	3	2	3.2	
29-Sep-17	12:00	F	74.5	1	3	2	3.2	
29-Sep-17	12:00	M	83	1	4	2	4.2	
29-Sep-17	12:00	F	78	9	4	2	4.2	
29-Sep-17	12:00	F	81	9	4	3	4.3	
29-Sep-17	12:00	M	87	9	4	3	4.3	