2016 In-season Escapement Estimates of Fraser River Salmon at Qualark Dual-frequency Identification Sonar (DIDSON) Site with Test Fishing Results and Species Apportionment

2016 Project Report to Southern Boundary Restoration and Enhancement Fund

by

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ABSTRACT

The Qualark DIDSON project produces in-season estimates of total daily salmon escapement in the Fraser River near Yale, BC. These estimates combine acoustic counts of salmon with species composition information derived from a drifted gill net test fishing program conducted at the acoustic site. Although estimates of daily escapement can be produced for all five species of Pacific salmon, the focus of the Qualark program is on Sockeye Salmon. These in-season escapement estimates can be used in conjunction with hydroacoustic estimates from Pacific Salmon Commissions Mission site and test fisheries to manage fisheries on Fraser River salmon stocks. The total salmon escapement passing Qualark in 2016 was estimated to be 719,918 ± 35,026, consisting of, 527,040 Sockeye, 187,458 Chinook including 40,572 jacks, 3,912 Coho and 1,507 Steelhead Trout.

Additional testing and research was conducted using ARIS 1800, a second generation version of acoustic imaging technology. The ARIS system was used to examine potential passage occurring 10 m beyond the normal range of DIDSON coverage. An expanded total of 126 salmon were estimated beyond the normal range of coverage during a period of 18 days when the total salmon passage for this period was in excess of 85,000 salmon. A very small fraction of both the daily and total salmon migration occurs beyond 20 m distance from the transducer on either side of the Fraser River at Qualark. Migration occurring beyond 20 m on either bank of the Fraser at Qualark, monitored or not, will not contribute a significant source of bias to annual estimation. ARIS was also used to evaluate the vertical distribution of fish and potential DIDSON blind zones near the bottom and at the surface. The processing of this data is ongoing and results are pending.

INTRODUCTION

The Qualark acoustic salmon counting site was initially developed using split-beam hydroacoustic technology between 1993 and 1998 and employed a drifted gillnet test fishing program to apportion the daily acoustic estimate by species (Enzenhofer and Cronkite, 1998). The Applied Technologies Section of the Department of Fisheries and Oceans (DFO) re-activated the Qualark site on the mainstem of the Fraser River in 2008 using multi-beam acoustic technology (DIDSON) to monitor the abundance of adult Pacific Salmon (*Oncorhynchus* spp.) migrating upstream en route to terminal spawning areas in the middle and upper portions of the Fraser River watershed (Enzenhofer et al., 2010). A test fishery was implemented to collect daily biological and species composition data to apportion the acoustic estimates. Since 2010 the site has been transitioned from a research to an operational project operated by DFO's Fraser Stock Assessment Program. All six Pacific salmon species (Sockeye Salmon (*O. nerka*), Pink Salmon (*O. gorbuscha*), Chinook Salmon (*O. tshawytscha*), Coho Salmon (*O. kisutch*), Chum Salmon (*O. keta*)) and Steelhead Trout (*O. mykiss*) return to spawn in the Fraser River and pass the Qualark site. In even numbered years (e.g., 2016) Sockeye Salmon are numerically dominant in the Fraser River while Pink Salmon are often more abundant than Sockeye Salmon in odd numbered years (e.g., 2015).

The Pacific Salmon Commission (PSC) estimates daily escapement of Fraser River Sockeye Salmon at Mission, BC using acoustics in support of in-season management of Sockeye fisheries. The Mission site is strategically located to provide key information that meets multiple obligations under the Pacific Salmon Treaty. Reliable estimates of Sockeye Salmon escapement in the Fraser River are a prerequisite to achieving spawning escapement goals and harvest allocations. The Mission site poses technical challenges for the acoustic enumeration of salmon that contribute to the concerns among managers and other clients about the reliability of the Mission estimate (Enzenhofer et al, 2010).

In contrast to Mission site characteristics at Qualark are closer to the ideal for reliably detecting and tracking salmon using acoustics, as they move upstream (see Enzenhofer et al., 2010).

Project Goals

The 2016 program at Qualark was funded by the PSC's Southern Boundary Restoration and Enhancement Fund and is the 9th year of paired operation with Mission.

The goals of this project are to:

1. Produce reliable and timely estimates of gross in-season salmon escapement in the Fraser River using three study design elements that are complementary to work conducted by PSC staff at Mission:

- Operation of the Qualark DIDSON hydroacoustic enumeration systems in a manner consistent with practices developed from 2008 to 2010 (Enzenhofer et al., 2010);
- Implementation of the Qualark test fishery consistent with procedures developed during the period 2008 to 2010;
- Operation of an ARIS acoustic system to evaluate potential sources of estimate bias in the DIDSON data collection systems deployed at Qualark.

2. Provide validation of Sockeye Salmon escapement estimates produced at Mission with the goal of providing managers with the best possible in-season escapement estimates to utilize for effective management of fisheries; and

3. Provide data that can be used to develop analytical methods to either modify or combine estimates from the Mission and Qualark hydroacoustic sites to provide a more robust estimate of salmon escapement into the Fraser River based on multiple years of data from 2008 to 2016 when both sites were operating.

This report documents hydroacoustic estimates of daily salmon escapement at Qualark in 2016, including daily test fishing catch and species apportionment data.

METHODS

Study Area

The Qualark hydroacoustic facility operates in the Fraser River 15 km north of Hope, British Columbia, Canada and is 95 km upstream of Mission, BC where the PSC operates their acoustic estimation site for enumerating Fraser River salmon. The Qualark site is situated below many, but not all of the major Sockeye Salmon spawning areas in the Fraser River watershed (Figure 1). There are a number of Sockeye Salmon stocks that spawn in Fraser tributaries below the Qualark site including: Upper Pitt , Chilliwack , Harrison and Birkenhead rivers; Big Silver, Weaver Creek and spawning channel; Cultus and Chilliwack lakes; and, at Widgeon Slough. Total Fraser Sockeye Salmon escapement in the Fraser River requires enumeration at these locations in addition to Qualark. Pink Salmon spawn primarily in the Fraser mainstem, and the Harrison, Chilliwack and Coquihalla rivers which are tributary to the lower Fraser River below Qualark. The proportion of the total Fraser Pink Salmon escapement that migrates past Qualark to spawn in the middle and upper Fraser River mainstem and its tributaries varies annually.

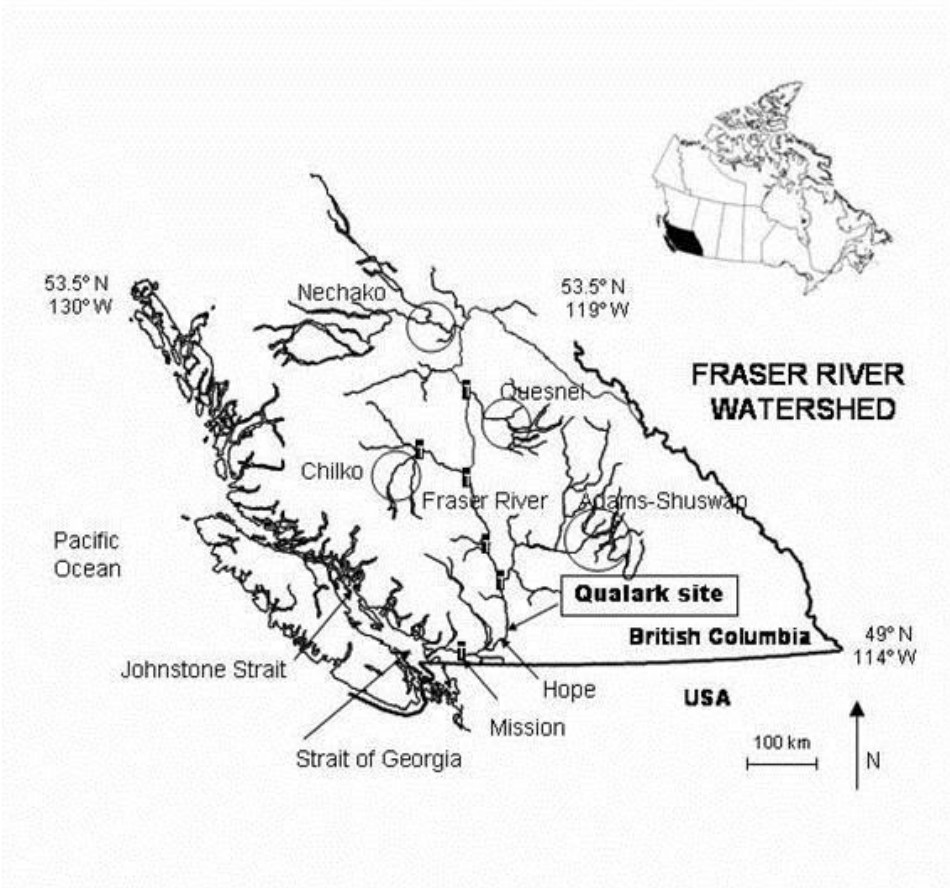

Figure 1. Map showing the Fraser River watershed and location of the Qualark hydroacoustic site near Hope, BC. Some of the major spawning areas including the Nechako, Quesnel, Chilko, and Adams-Shuswap Lake systems are circled.

The Qualark site was originally chosen as an experimental site because it possessed a number of favorable characteristics (Enzenhofer and Cronkite, 2000). It was on a straight stretch of river with laminar flow, water velocity was high, flows were not tidally-influenced, and substrate and bank configurations were planar and free of obstructions (scalloping, benches, and large boulders) that might impair acoustic fish detection or introduce noise to the acoustic system. There was also minimal human activity to alter fish behaviour. These characteristics ensure that fish actively migrate through this area rather than holding or milling, which is a key factor to the success of a riverine acoustic site. The relatively high water velocities and consistent bank slopes combined with the energy conserving migration behaviour of salmon, result in most salmon, including Sockeye Salmon, migrating past the Qualark site within 20 m of either shore regardless of Fraser River discharge and water level. Consequently, it is not necessary to continuously ensonify the middle of the river, although periodic checks to confirm the absence of fish escapement are necessary and prudent.

The Fraser River is 150 m wide at the Qualark site with discharge ranging from 10,000 m^3*s^{-1}during spring freshet to 700 m^3*s^{-1}during the low water period in winter (Environment Canada, 2016). The river banks have a natural slope of 21° (right-bank) and 20° (left-bank) with

the surface layer comprised of 30-50 cm diameter rock and some large boulders (Figure 2). Left-bank (LB) and right-bank (RB) are referenced relative to an observer facing downstream. Water velocities at the site range from 1.0 $m*s^{-1}$ near shore to 3-4 $m*s^{-1}$ in the middle of the river. Flow patterns vary from bank to bank, but in general fine materials are scoured along the right-bank and sand is deposited along the left-bank.

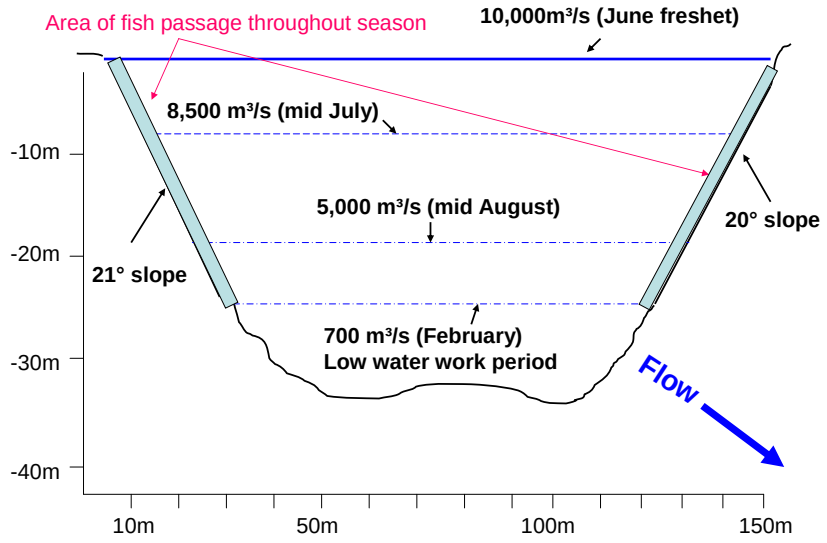

Figure 2. Fraser River cross section at the Qualark hydroacoustics site showing average discharge rates throughout the salmon migration period. Note that the vertical and horizontal scales differ. River flow is toward the viewer.

The RB is accessible by road and heavy equipment was used to mechanically re-profile the bank for acoustic work during the low water period in early 2008. The LB site which is approximately 150 m downstream of the RB site is only accessible by boat. Equipment and supplies were moved to the LB by boat and the refurbishment of the acoustic ramp and reinstallation of in-river equipment was done manually during the low water period in February of 2008. Refurbishment of the banks included removing large substrate, leveling the slope, adding sand bags and the track mounted fish deflection weir.

Equipment

Acoustic data were collected with two standard DIDSON imaging systems (one on each bank). The standard DIDSON imaging systems have high frequency (1.8 MHz) and low frequency modes (1.1MHz) and their output consists of images created by multiple sound beams focused through a moveable lens giving a field of view that is 14° vertical and 29° horizontal (Belcher et al., 2001; Sound Metrics 2007). The RB has hydroelectric lines to the site while the LB power source was a Power Pac (Enzenhofer et al., 2007) that was charged by a combination of a solar panel and a battery charger powered by a generator. The DIDSON systems are affixed to a track-mounted 6 m long fish deflection weir that can be adjusted in response to changes in

river water levels with a remotely controlled winch (Enzenhofer et al., 2010). The DIDSON systems were mounted on an adjustable pole mount that facilitates adjustments to depth, bearing, tilt and roll (Enzenhofer and Cronkite, 2005).

DIDSON Configuration

The DIDSON system bearing was set so that the beam aim was perpendicular to the river flow with the upstream end of the weir barely visible on the edge of the image. The tilt on RB was set at -17^{o} relative to the surface while LB was -14^{o}. A -35^{o} roll was adopted on both banks. This configuration was fixed throughout the program, although minor adjustments were made to the bearing and tilt as the season progressed. The aiming configuration was verified with a target suspended in the ensonified region to ensure that there were no blind zones near the surface or bottom through which fish could pass undetected and is consistent with protocols outlined by Holmes et al. (2006).

Sampling Design

Based on split-beam sonar work at the Qualark site in the 1990s (Enzenhofer and Cronkite, 2000) and previous years DIDSON assessments, the majority of fish migration was expected to occur within a range of 5 m from the end of the deflection weir and the remainder were expected within the next 10 m. During times where set gill nets are deployed in the area during First Nations fisheries, fish migration can occur slightly further offshore. We used a systematic range stratified sampling design on each bank that utilized one aiming configuration of the DIDSON to sample between 4.17 m to 29.17 m in range, divided into three range bin files each hour (Enzenhofer et al., 2010; Figure 3). Data were collected for a total of 50 minutes out of each hour. On each bank three files were recorded hourly consisting of:

- 20 minute 5 m window length (4.17 m to 9.17 m) at high frequency mode (1.8 MHz utilizing 96 beams) producing the best available image resolution for counting the majority of fish escapement (Bin 1);
- 20 minute 10 m window length (9.17 m to 19.17 m) at low frequency mode (1.1 MHz utilizing 48 beams) (Bin 2); and
- 10 minute 10 m window length (19.17 m to 29.17 m) at low frequency mode (Long-Range Bin 3).

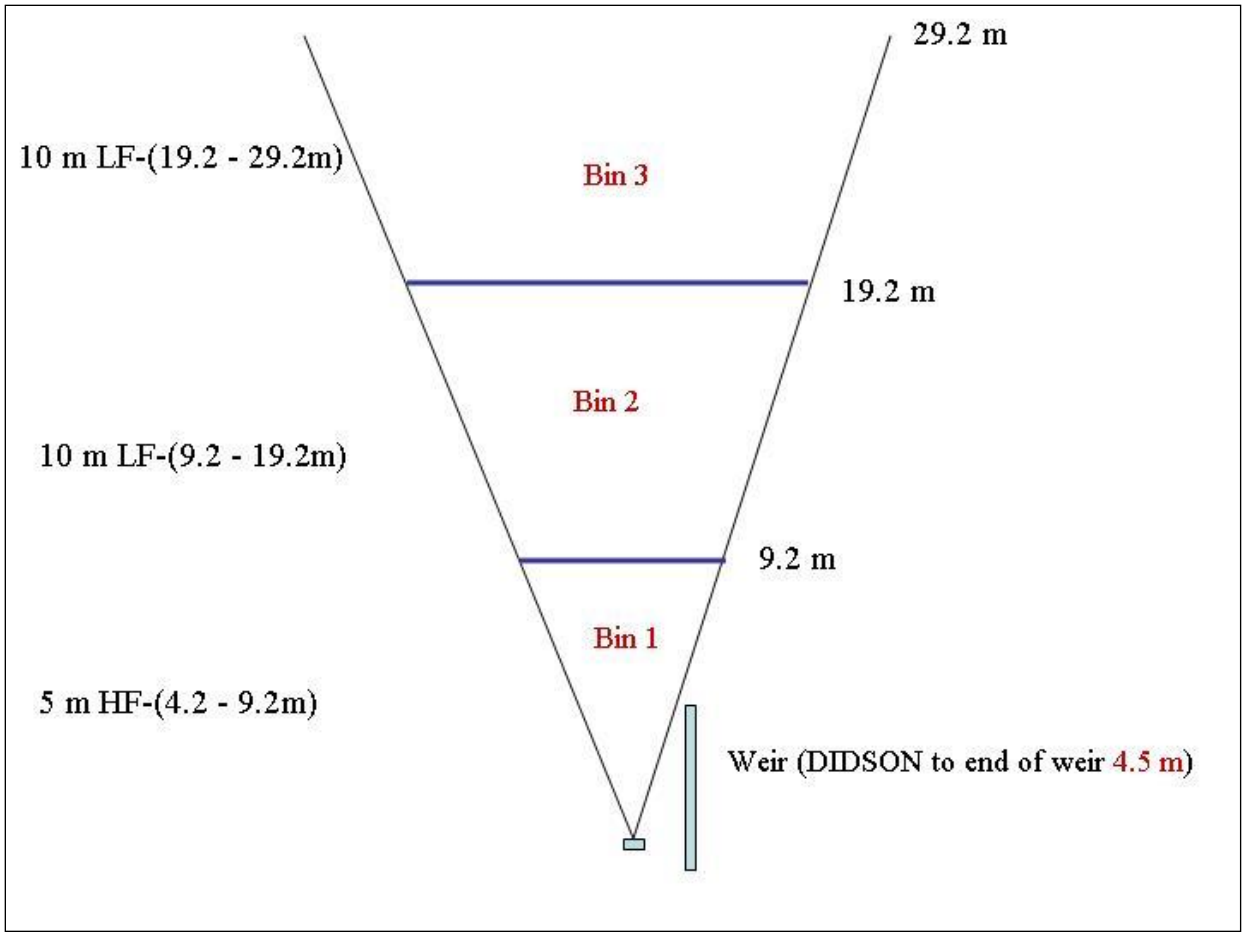

Figure 3. Plan view of the sampling strategy showing one aim configuration of the DIDSON and three range bins to sample 29.17 m range at the Qualark hydroacoustics site. Bin 1 is shown using a 5 m window length at high frequency (HF) starting at 4.17 m from the DIDSON. Bin 2 is shown with a 10 m window length in low frequency (LF) mode, from 9.17 m to 19.17 m from the DIDSON. Bin 3 is a 10 m window length in low frequency mode covering a range between 19.17 m to 29.17 m.

Data Processing Procedures

The DIDSON data files were saved directly onto laptop computer hard drives and subsequently backed up onto an external hard drive. The data was transferred from the DIDSON computers to a processing computer where the files were manually counted by site personnel applying pre-determined counting criteria to estimate net upstream flux (Enzenhofer et al., 2010). The upstream flux of migrating salmon is calculated as the upstream count minus the downstream count (Xie et al., 2002). Counting criteria addressed the potential for double counting of fish which may move out of or into an adjoining range bin (Figure 4 and 5). The expansion of 20 minute counts to hourly counts has been shown to be representative of the hourly flux (Lilja et al, 2008). In this same way the movement of fish in and out of the end of a range bin in a 20 minute file can be assumed to be representative of the behaviour during the whole hour. A minimum fish size limit was set at 30 cm (measured using the measurement tool on the DIDSON program) to remove smaller native species from the escapement estimate.

Identifiable non-salmon species (e.g. sturgeon) were not included in the counts. Test fishing over the past 8 years at Qualark indicate negligible numbers of non-salmon sized targets present at this site. Counting procedures relating to playback speed and file viewing settings (use of background subtraction, threshold and intensity settings) were utilized to ensure consistency between different counters. Counting of files with counts in excess of 1,500 fish in the first 10 minutes was terminated at the 10 minute mark. Net upstream flux for each range bin was expanded to the hour and summed to represent total daily salmon escapement.

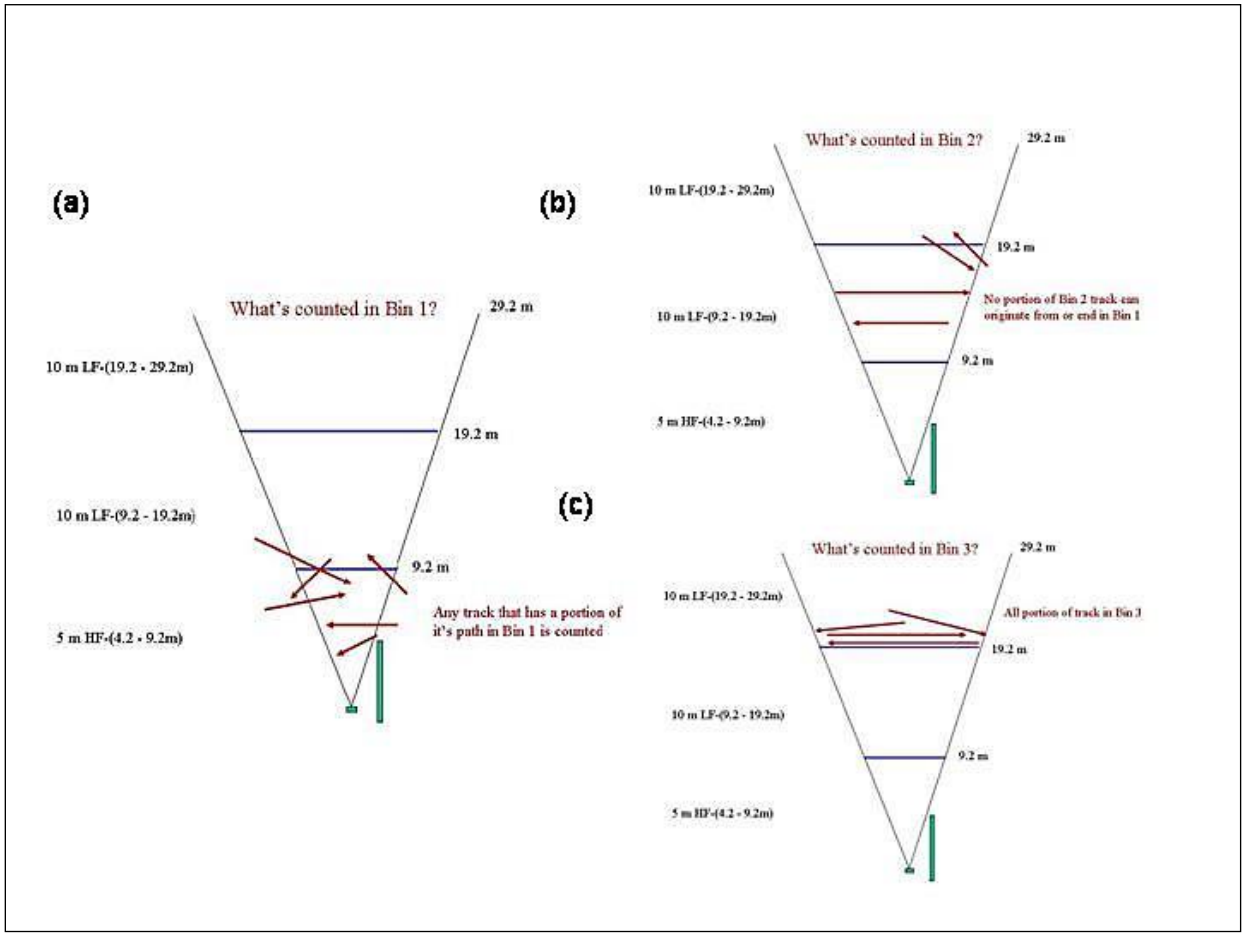

Figure 4. Counting criteria for manual counts of range bins to avoid double counting fish passing through more than one range bin. (a) Any portion of a fish trajectory is included in the Bin 1 count, (b) fish included in Bin 2 counts cannot have any portion of its track in Bin 1, and (c) fish included in the Bin 3 count must have entire portion of track in Bin 3.

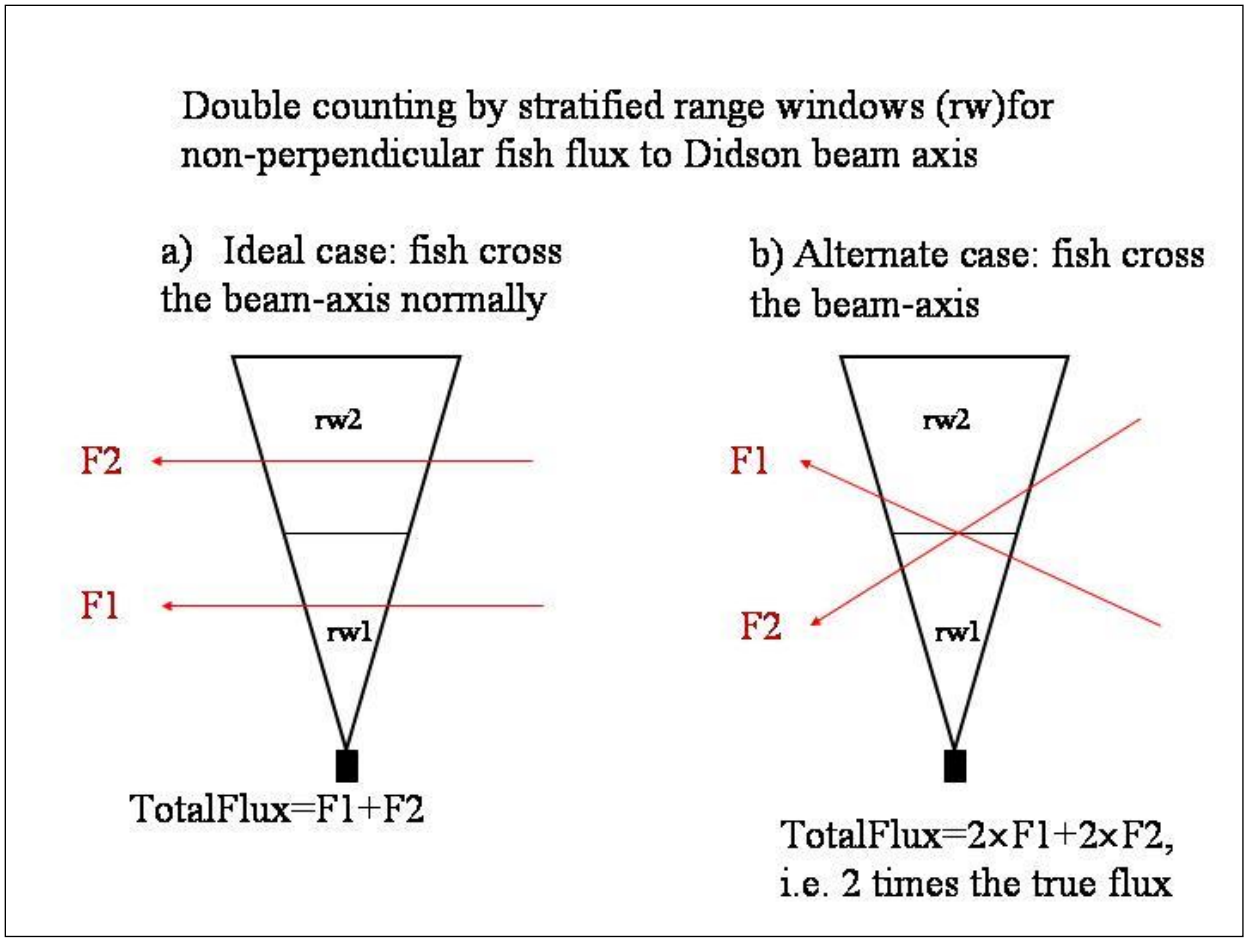

Figure 5. Illustration of fish escapement moving through a fixed location DIDSON imaging sonar configured with one aim and two range windows (rw1 & rw2). a) Two fish tracks (F1 & F2) each passing through only one range window resulting in a correct flux estimate of two, and b) Two fish tracks (F1 & F2) crossing through both range windows potentially resulting in an incorrect double count of four if the counting criteria protocols in Figure 4 are not applied.

Test Fishing

Test fishing consisted of 6 gill net drifts per day, seven days per week, one 3-drift set in the morning and one 3-drift set in the evening. Each set of 3 drifts was made close to shore along the right bank and directed at capturing salmon. The morning drift series was conducted from 07:00-08:00 and the evening drift series was conducted from 19:00-20:00. The shortening of day length later in the season may result in evening drifts being moved to an earlier start time (18:00-19:00). Two additional drifts per week, spaced out over the week, were made beyond 25 m from the right bank using the 5¼ inch mesh net to test for presence/absence of migrating salmon in the offshore regions. The mesh sizes used for the drifts included 4, 4 ¾, 5 ¼, 5 ¾, 6 ¾ and 8 inch (stretched mesh, 70 mesh hang, and 30 m length). The morning drifts began on the first day using the 4, 5 ¼, and 6 ¾ inch meshes in sequence, and the evening drifts began using the 4 ¾, 5 ¾ and 8 inch meshes in sequence. On the second day the morning and evening sequences were reversed and on each subsequent day the pattern of drifts was alternated to allow some randomisation of the sampling. Each drift was approximately 4-6 minutes in duration and began

150 m upstream of the acoustic system and terminated approximately 700 m downstream of the Qualark site.

The date, drift number, mesh size, start and end times were recorded, along with the number of each species of salmon caught in each drift. The number of each species caught in a drift was recorded as retained or released. Fish that were identified by species but escaped were included with the released fish. All Sockeye and Chinook salmon caught were retained; Coho Salmon and Steelhead Trout were released whenever possible but were retained if dead or mortally wounded. Chinook and Coho Salmon were assessed for adipose condition (present/absent). Comments were recorded relating to the success of the drift and any miscellaneous by-catch. Catch from different drifts was kept in separate labelled totes. Test fishing counts by species and drift were verified when the fish were sampled. The test fishing data was compiled daily (for the previous day) and entered into a MS-Excel spreadsheet database. The daily species proportion was determined from the test fishery data and applied to the total upstream flux to estimate daily escapement by species.

Sampling

Sex, post-orbital fork (POF) length (cm), weight (kgs), scale samples and DNA samples (adipose fin punch) from up to 50 Sockeye Salmon per day were taken. All additional Sockeye Salmon were sampled for sex, POF length and weight (kgs). Chinook Salmon were sampled for sex, fork length (FL), weight (kgs) and scales (10 per fish) and were assessed for adipose condition (present/absent). Heads were retained for all fish with clipped adipose fins. Coho Salmon were assessed and sampled in a similar fashion to Chinook Salmon. Up to 50 Pink Salmon per day were sampled for sex, post-orbital hypural (POH) length (cm) and weight (kgs).

Precision

There are two sources of error that affect the precision of the hydroacoustic estimate of total salmon passage. The first source is observer error related to the difference in counts of the same file by different personnel. In order to assess the precision between counters a random number generator was used to select 48 files (8 from each of the 6 range bins) daily to recount. Recounts were conducted by experienced staff. The precision was assessed by calculating the coefficient of variation (CV) and average percent error (APE) between the initial counts and recounted files (Enzenhofer et al., 2010).

$$CV = \sqrt{\frac{\sum_{i=1}^{R}(X_{ij} - \overline{X}_j)^2}{\overline{X}_j^{\,2}}} \quad \text{x} \quad 100$$

$$APE = \frac{1}{N}\sum_{j=1}^{N}\left[\frac{1}{R}\sum_{i=1}^{R}\frac{\left|X_{ij} - \overline{X}_j\right|}{\overline{X}_j}\right] \times 100$$

where *N* is the number of events counted by *R* observers, *Xij* is the i^{th} count of the j^{th} event and *Xj* is the average count of the j^{th} event.

CV was used to identify discrepancies between counters on a day to day basis. The discrepancies can help identify personnel that require further training or if there was an error in which files were counted. For example, files from an incorrect date are occasionally erroneously selected from the file directory and counted. APE was used to determine the precision of the entire dataset. Counter precision of files with low abundance presents a problem as the difference of one or two fish between counts can lead to a large and highly variable APE. A weighted mean of the APE from all files that were recounted was used to estimate counter precision for the season. The files with low abundance that make up a minute portion of the sample do not disproportionately weight the precision estimate when using this method.

The second source of error in the precision of the hydroacoustic estimate is temporal error relating to the expansion of the 10 or 20 minute files to represent hourly escapement. No full hour files were collected at Qualark and thus no actual observed estimates of the file expansion error are possible. However, variance of the expanded population estimate for each of the 6 bins was calculated using the following variance estimator (Cochran, 1977).

$$v(Bin_Z) = \frac{N^2 s_Z^2}{n_Z}(1 - f)$$

Where *N* is the total number of 1 hour sample periods, s_Z^2 is the sample variance of the different bins, n_Z is the total time sampled in hours and *f* is the sample fraction (n_z/N).

The sample variance was calculated for each of the bins using successive differences between stratified periods of time in this case the variation between the expanded counts over 5 hour periods (Reynolds et al., 2007; Lilja et al., 2008).

$$s_Z^2 = \sum_{i=5}^{N} \frac{(Bin_{Zi}/2 - Bin_{Zi-1} + Bin_{Zi-2} - Bin_{Zi-3} + Bin_{Zi-4}/2)^2}{3.5(N-4)}$$

Where Bin_{Zi} is the expanded upstream count from bin *Z* on the *i*th hour.

This method has been shown to overestimate sample variance (Reynolds et al., 2007). The variance estimates and subsequent calculations of standard deviation and confidence intervals should be positively biased and thus conservative estimates. The variance in the total salmon passage estimate is determined by summing the components of observer variance and the temporal variance for the 6 different data bins. (Eggers et al., 1995).

In-season Reporting

An estimate of salmon escapement by species was calculated on a daily basis for the previous day's data. Escapement was reported on a bi-weekly basis to the Fraser Panel and technical data users in DFO and PSC. Test fishing catch was sent to PSC on a daily basis and a detailed test fishing report was distributed monthly.

Additional Research

We were able to access an additional acoustic imaging system from DFO during summer 2016. ARIS 1800 has been developed as a replacement for the DIDSON acoustic imaging systems we currently use at Qualark but which are becoming obsolete. ARIS 1800 is similar to the standard DIDSON imaging system. It has high frequency (1.8 MHz) and low frequency (1.1MHz) modes and output consists of images created by multiple sound beams focused through a moveable lens giving a field of view that is 14° vertical and 28° horizontal (Sound Metrics, 2014). This equipment access gave us the opportunity to further evaluate the technical capabilities of the new ARIS acoustic imaging system. The ARIS monitoring conducted was opportunistic and incremental to the standard Qualark DIDSON procedures which were not modified in any way to accommodate ARIS deployment. Following a period of initial evaluation we used the ARIS equipment to monitor salmon migration occurring in two areas of possible concern identified by Pacific Salmon Commission staff in spring/summer 2015 (M. Lapointe, pers. comm.):

- First, we used ARIS to ensonify the RB water column beyond the current 29.17 m range using DIDSON. ARIS permitted us to evaluate fish passage occurring between 29 m and 40 m, extending coverage by 40% of the current range. While salmon migration has been shown to be highly shore oriented at Qualark during 13 years of monitoring concerns persist that migration may periodically occur outside the standard ensonified zone. ARIS has given us the opportunity to assess these distances at Qualark with acoustic imaging.
- Second, we simultaneously ensonfied RB DIDSONs Bin 1 (4.17-9.17m) using ARIS in -90^{o} roll aspect as an incremental add-on to DIDSON monitoring. In doing so we attempted to evaluate the vertical distribution of salmon and concerns that the DIDSON beam dimensions in -35^{o} roll aspect created a possible acoustic blind zone near the bottom approximately 8-9m from the DIDSON lens.

The ARIS was affixed to the track-mounted fish deflection weir next to the RB DIDSON using a pole mount with an ARIS mounting plate. The ARIS was aimed using similar methods employed with the DIDSON, except the ARIS was set at a 0^{o} or -90^{o} roll instead of the -35^{o} roll employed under normal Qualark operating procedures with the DIDSON.

While using ARIS to periodically evaluate fish passage occurring 10 m beyond the normal DIDSON range of 29 m roll was set at 0^{o}, while tilt was set at -17^{o}. Minor alterations were made the aim throughout the period of long range data collection. Files were recorded using a range bin of 25-40 m and duration of 20 minutes. ARIS software imparts limitations to user

specified range bins preventing a starting range of 29.17 m which would align exactly with DIDSON. These files were collected hourly in LF during the HF DIDSON file collection in order to reduce crosstalk interference between the systems. The ARIS files were counted by experienced staff; fish observed within the normal DIDSON range of 29.17 m (25-29.17m in the ARIS file) were not counted. Counting procedures used for processing DIDSON files were applied in processing the ARIS files. Sturgeon were easily recognizable and removed from the counts. A minimum size limit of 35 cm was used to remove smaller fish from the ARIS counts. This is equivalent to the 30 cm minimum size cut off used when processing DIDSON images collected using a -35^{o} roll because the use of roll makes fish appear 18% smaller than they actually are. Increasing the ARIS image minimum size cut off by 18% ensures the size exclusions are equivalent for data collected by each imaging system.

ARIS was also deployed to evaluate the vertical distribution of salmon targets in LB Bin 1. Simultaneous collection of ARIS files using the same aim and range as the DIDSON Bin 1 (-35^{o} roll; 4.17-9.17 m), with the exception that the ARIS data was collected using a -90^{o} roll with -13^{o} tilt, provided full water column coverage by both systems, Files were collected hourly in HF mode for both systems with no crosstalk interference being observed. Files were counted by experienced staff assessing direction of migration and ability to discriminate individual fish recorded and their vertical position in the water column for the ARIS data.

RESULTS

Environmental Conditions

Fraser River discharge levels measured at Hope, BC in 2016 were consistently below average values for the date over the duration of the study period. With the exception of a brief spate in early July, Fraser discharge decreased steadily during July and August in 2016. Discharge during acoustic equipment installation was particularly low compared to recent years values, near 4,250 m^3*s^{-1}, permitting both banks to be installed immediately on project start up. Discharge spiked briefly to 5,600 m^3*s^{-1}, a response to an intense rainfall event in the first week of July, and then decreased steadily to 2,250 m^3*s^{-1} in early September (Figure 6). The water levels and discharge experienced in 2016 did not pose any logistics challenges for acoustic program implementation.

Fraser River water temperature measured at Hope, BC was 1-2 °C above average on a daily basis during the 2016 study. Varying from 15.5 °C during the first week of July to >20.5 °C at peak in mid-August (Figure 6). Daily water temperature remained above 18 °C from the latter third of July almost until the project ended in early September, and was above 20 °C from August 12-19, 2016. Temperatures above 18°C can result in decreased swimming performance, above 19°C can result in early signs of physiological stress and slow migration and above 20°C are associated with high pre-spawn mortality and disease (Fisheries and Oceans Canada, 2016).

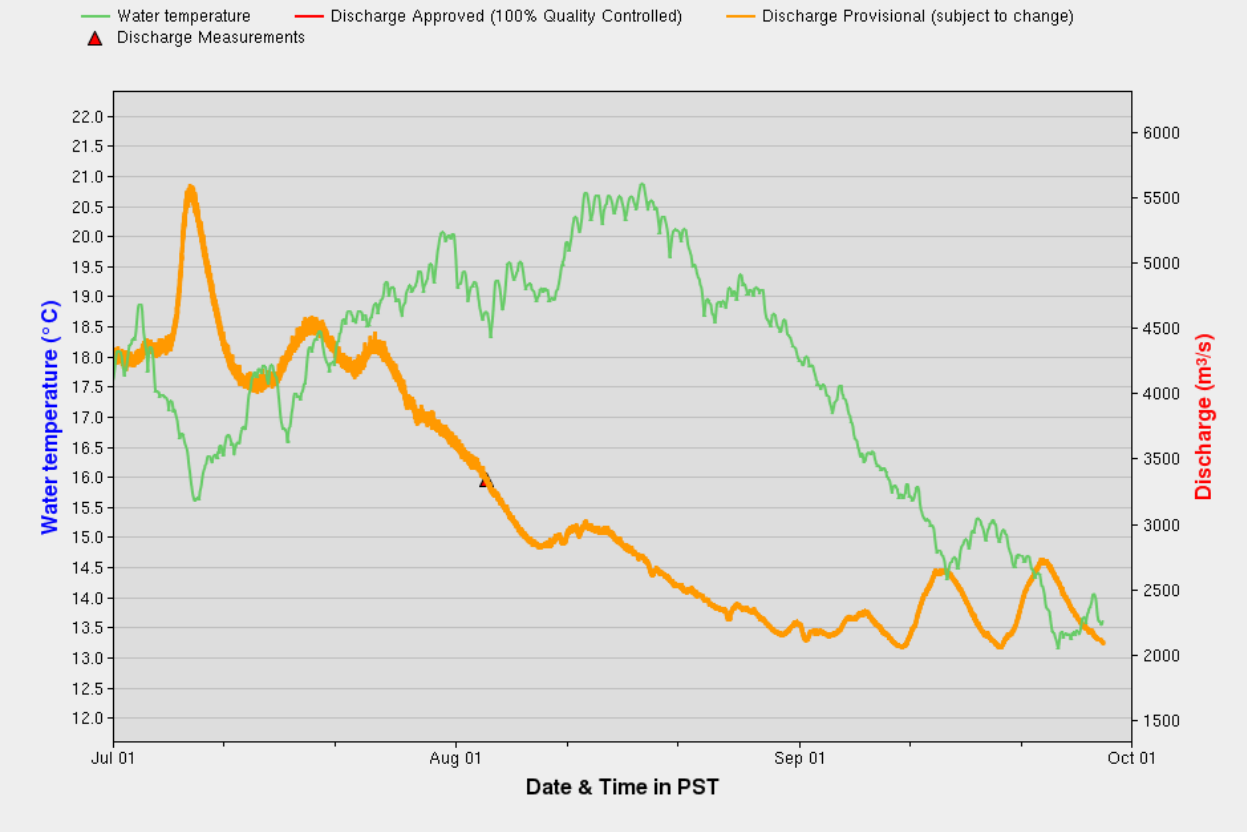

Figure 6. Discharge and water temperature for the Fraser River at Hope (Station # 08MF005) during the 2016 period of operation at the Qualark hydroacoustics site. (Environment Canada, 2016).

Total Salmon Escapement Estimate

Operation of the DIDSON systems was initiated on 1 July 2016 (RB at 10:00 and LB at 11:01). Seasonally low water levels allowed for installation of equipment on both banks at the beginning of the season. The DIDSON systems were shut down on 03 September 2016 (RB at 08:10 and LB at 08:57). The total salmon escapement estimate was 719,918 (Figure 7; Appendix 1 with escapement on RB of 321,921 salmon, representing 45 % of the total estimate and escapement on LB of 397,997 comprising the remaining 55 % of the total escapement estimate. Maximum daily salmon escapement was observed on 8 August 2016 at approximately 28,000 fish (Figure 8).

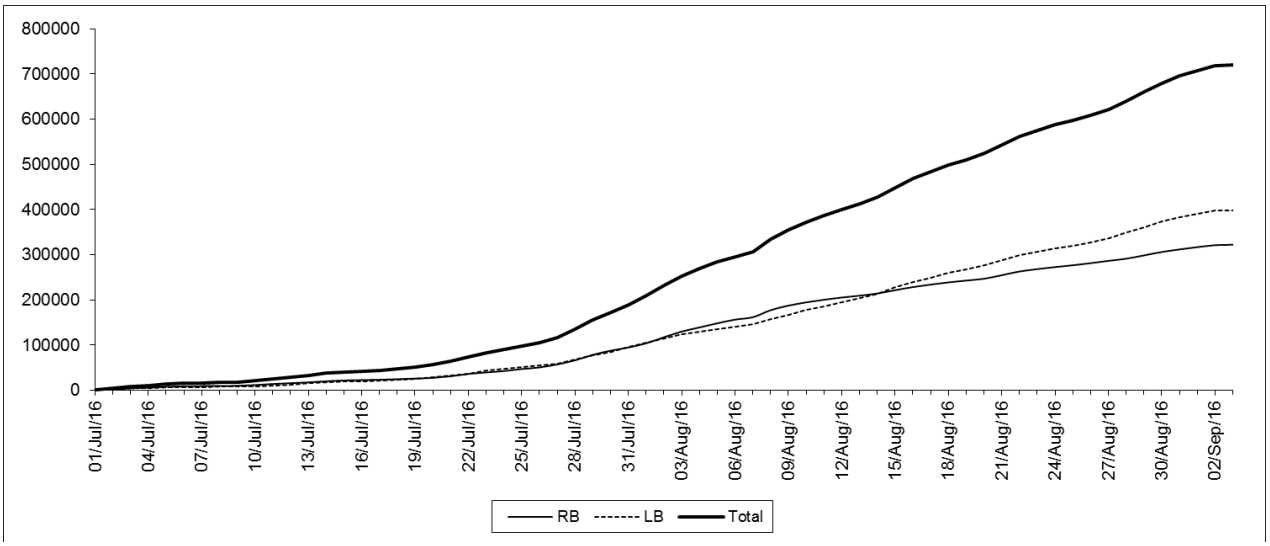

Figure 7. Cumulative daily counts of total salmon escapement derived from DIDSON assessment at Qualark, 2016, including daily cumulative counts by bank.

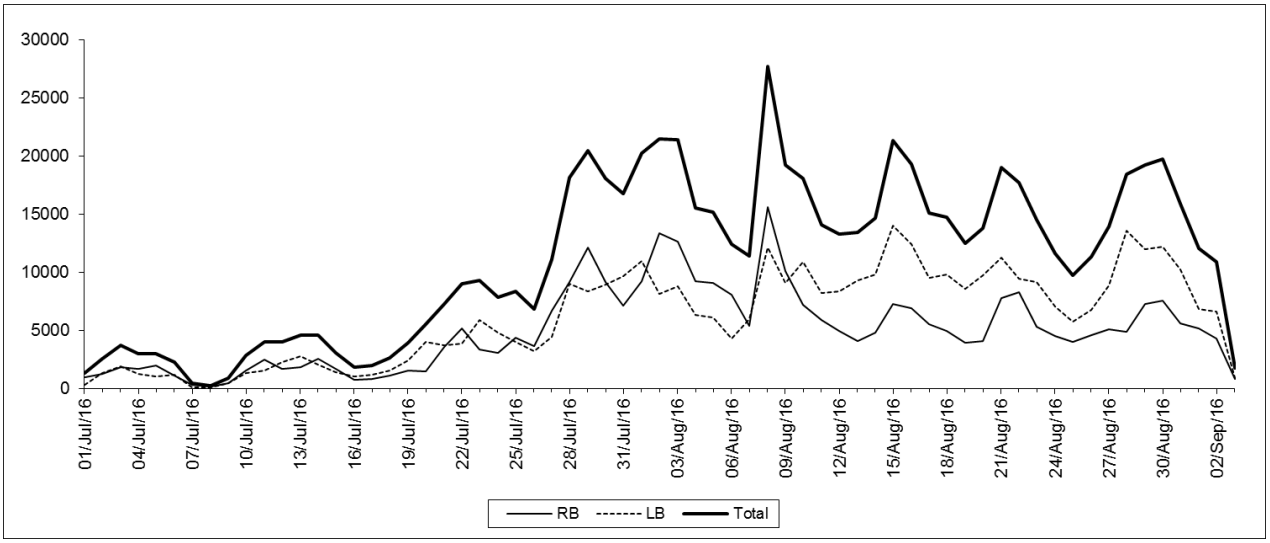

Figure 8. Expanded daily upstream counts of salmon escapement derived from DIDSON assessment at Qualark, 2016, including daily escapement by bank.

Migration Behavior

Salmon migration past the Qualark site is highly shore oriented a result of the rivers flow pattern which is lowest on shore and highest mid channel. In 2016 approximately 75% of all migration occurred within 5 m of the end of the fish deflection weirs (in Bin 1), which is within 9.2 m of shore (Table 1). Approximately 3% of the total migration occurred in Bin 3, 19-29 m offshore (Table 1). This is consistent with migration distribution patterns observed since 2008, and despite the seasonally low flows observed there was no tendency for salmon to migrate further offshore in 2016 than has been seen in previous years. During periods of First Nation set gill net fisheries in the river downstream of Qualark the proportion of migration occurring

beyond Bin 1 (the first 5 m) increased to 39% on RB and 49% on LB. This contrasts with 19% and 24% on RB and LB respectively, during periods when fisheries were not occurring. This migration shift slightly farther offshore (2-5 m) in response to fishing activity has been observed consistently since 2008. Once fishing pressure is removed salmon immediately respond by shifting their migration back onshore. Figure 9 illustrates the difference in the proportion of migration occurring offshore (9.17-29.17m; in Bins 2 & 3) during First Nation set gill net openings in the area adjacent to the Qualark site. No major holding or milling behavior was observed at Qualark in 2016.

Table 1. Escapement estimates recorded in the 4.17-9.17 m HF range bin compared to the two LF range bins from 9.17-29.17 m at Qualark, 2016. Escapement is divided by bank and period of time.

Period	Bank	Escapement	Bin 1 (4.17–9.17m)	Bin 2 (9.17–19.17m)	Bin 3 (19.17–29.17m)
Jul 1-Sep 3	Both	719,918	75%	22%	3%
Jul 1-Sep 3	Right	321,921	78%	21%	2%
Jul 1-Sep 3	Left	397,997	74%	22%	4%
No nets	Right	278,115	80%	18%	1%
No nets	Left	364,337	76%	21%	3%
Nets in	Right	43,806	61%	35%	4%
Nets in	Left	33,660	51%	34%	14%

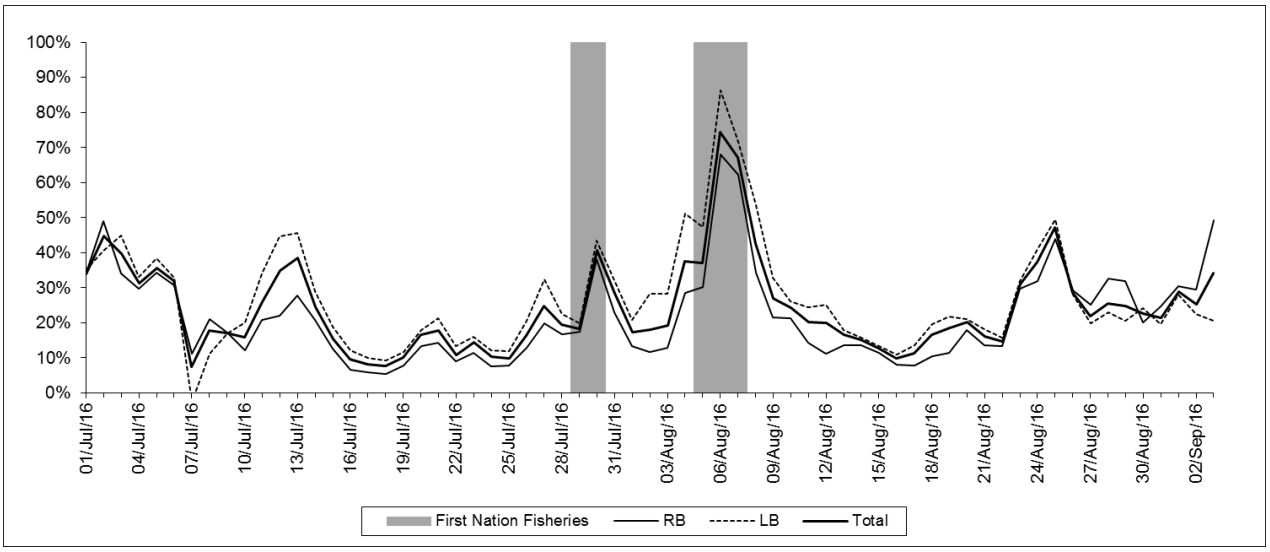

Figure 9. The proportion of daily escapement occurring beyond the first 5 m HF range bin from 9.17 to 29.17 m from the DIDSON at Qualark, 2016. First nation set gill net openings are identified.

Species Composition

The test fishing program commenced on the morning of 1 July 2016, concurrent with the hydroacoustic program launch. No fish were caught on 1 or 8 July 2016: species composition on these dates was estimated from catch obtained on adjacent sample days where catch occurred. The test fishing program terminated on 2 September 2016, with the hydroacoustic program ending the following day on 3 September 2016. Species composition from 2 September 2016

was applied to the final partial day of the hydroacoustic data. Sockeye Salmon were the most abundant species captured during the project (Figure 10; Appendix 1). A relatively high proportion of Chinook Salmon were observed during the first 3 weeks of July and again near the end of the project (Figure 11). Coho Salmon were observed in late August and continued in low numbers through the final week of the project (Figure 12). Steelhead Trout were observed in mid-August (Figure 12). Coho and Steelhead comprised only a very small component of daily migration. Appendix 2 contains details of test fishery catches by set.

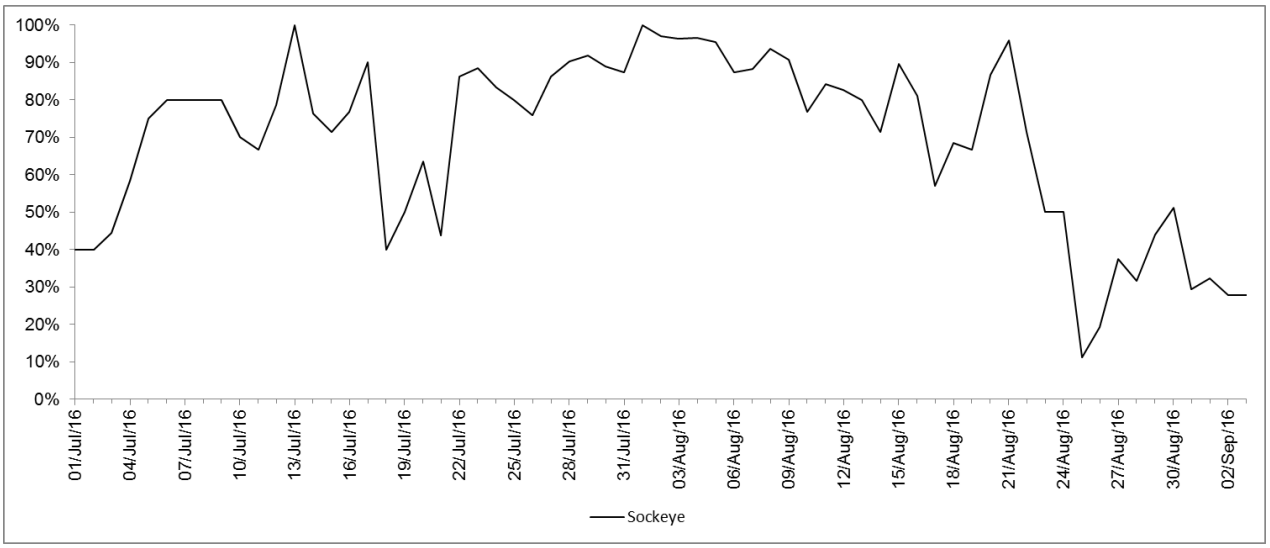

Figure 10. Daily Sockeye Salmon proportion derived from the test fishery at Qualark, 2016.

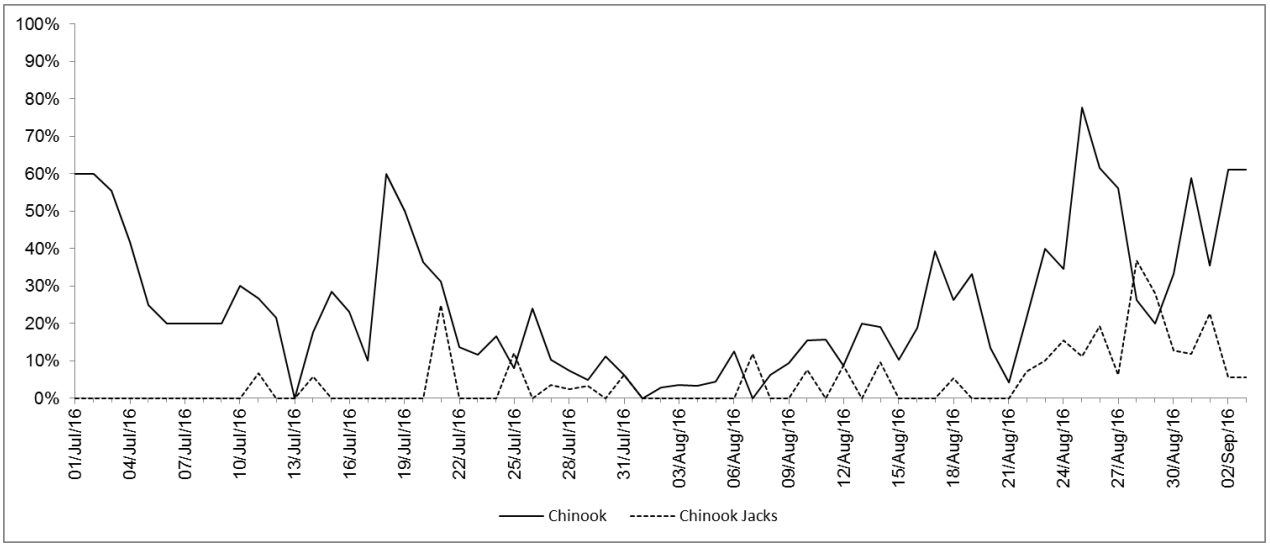

Figure 11. Daily Chinook Salmon proportion derived from the test fishery at Qualark, 2016.

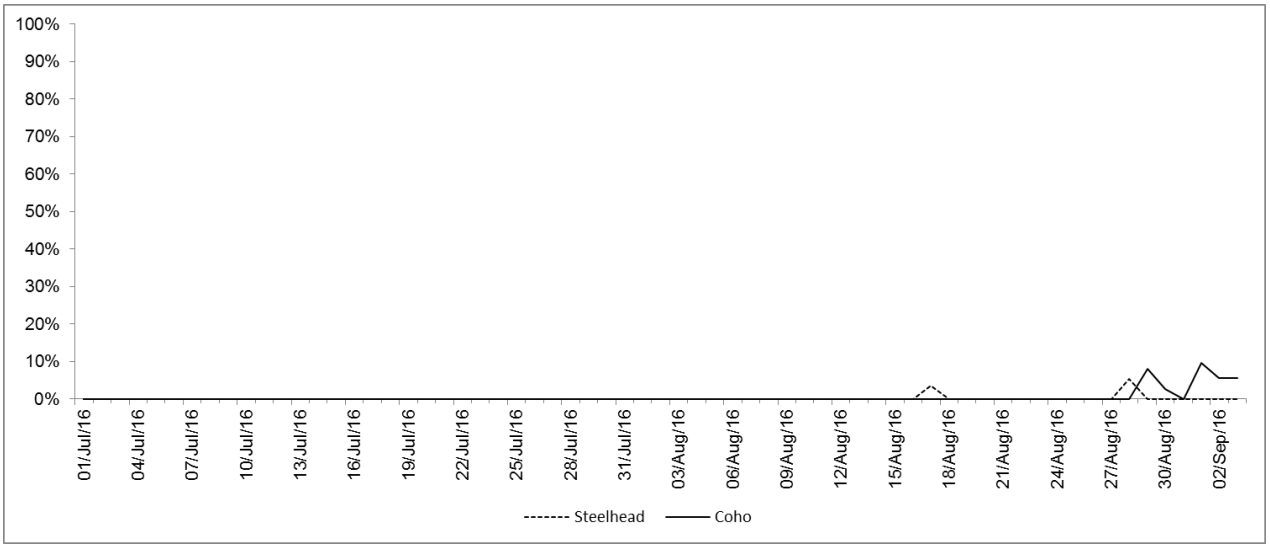

Figure 12. Daily Coho Salmon and Steelhead Trout proportion derived from the test fishery at Qualark, 2016.

Escapement by Species

Sockeye Salmon comprised 73% (527,040) of the total salmon escapement at Qualark in 2016 (Figure 13; Appendix 1). Sockeye Salmon were present daily throughout the majority of test fishery operation, comprising approximately 70% of daily migration in the first two weeks of July, 80% from 15 July 2016 to 21 August 2016 and 35% in the last two week of the project (Figure 10).

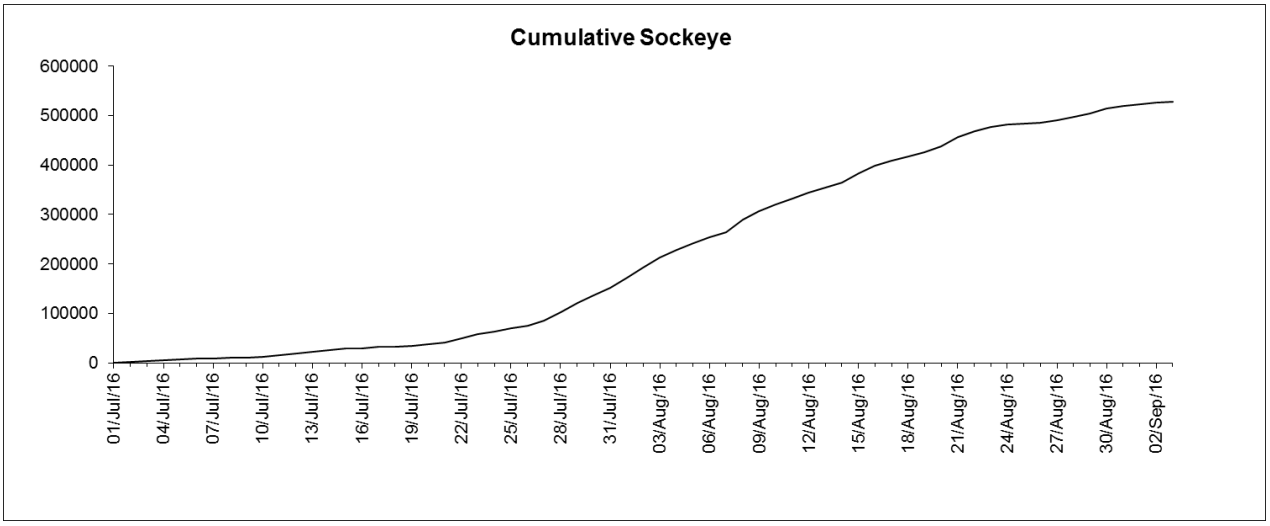

Figure 13. Cumulative daily Sockeye Salmon escapement apportioned by species based on test fishing catch at Qualark, 2016.

In general, Sockeye abundance was very low throughout the season. The daily abundance of Sockeye Salmon started increasing at the end of July (Figure 14; Appendix 1). Daily passage

estimates for Sockeye Salmon ranged from 200 early in July, to a peak of 25,931 on 8 August 2016. Multiple peaks and troughs were observed throughout the season.

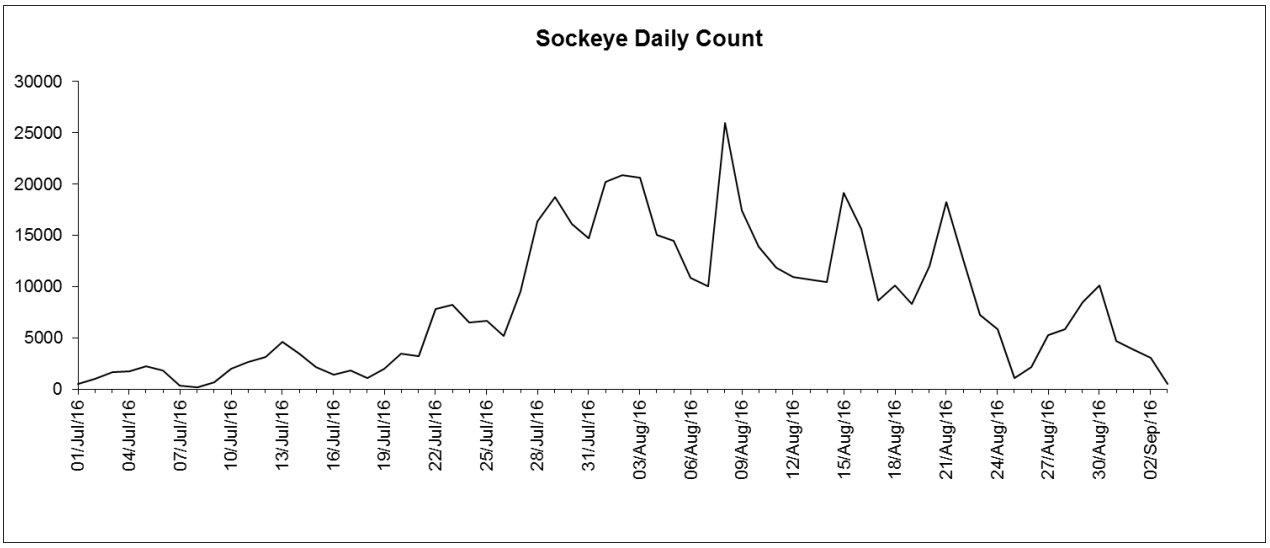

Figure 14. Daily estimates of Sockeye Salmon in the Fraser River at Qualark, 2016.

Chinook Salmon comprised 26% (187,458) of total salmon passage at Qualark in 2016 including an estimated 146,886 adult and 40,572 jacks (Figure 15; Appendix 1). Chinook Salmon were present daily throughout the majority of test fishery operation, comprising approximately 30% of daily migration in the first two weeks of July, 20% from 15 July 2016 to 21 August 2016 and 60% in the last two weeks of the project (Figure 11).

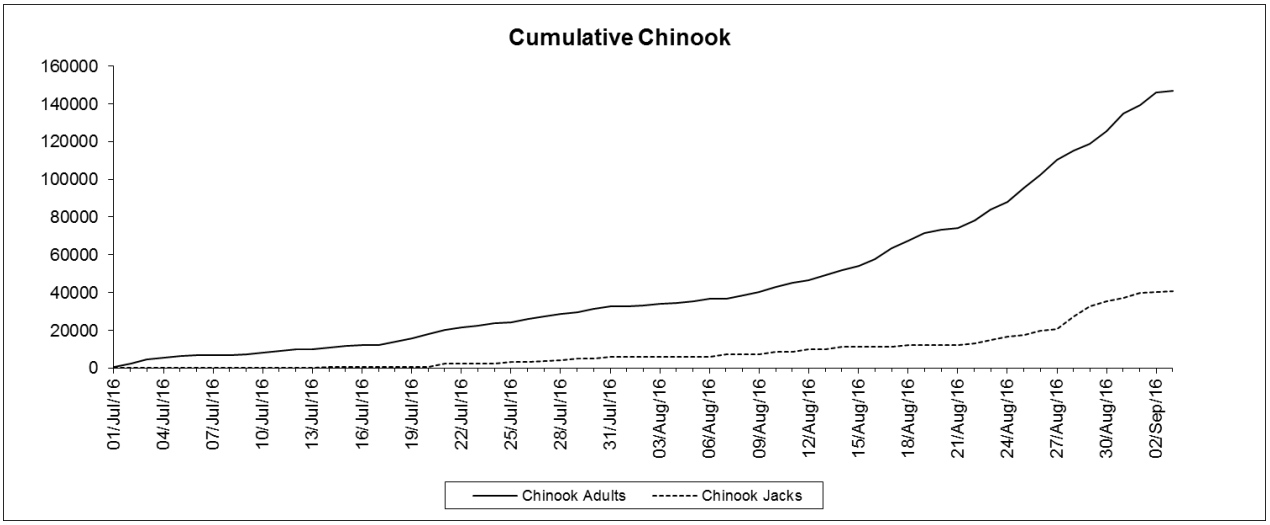

Figure 15. Cumulative daily Chinook Salmon escapement apportioned by species based on test fishing catch at Qualark, 2016.

The daily Chinook Salmon estimate remained very low and relatively stable until mid-August when escapement increased (Figure 16). Daily passage estimates for Chinook Salmon

ranged from a low of 0 to a peak of 11,628 on 28 August 2016. There was a relatively high abundance of jack Chinook observed in the last week of the project.

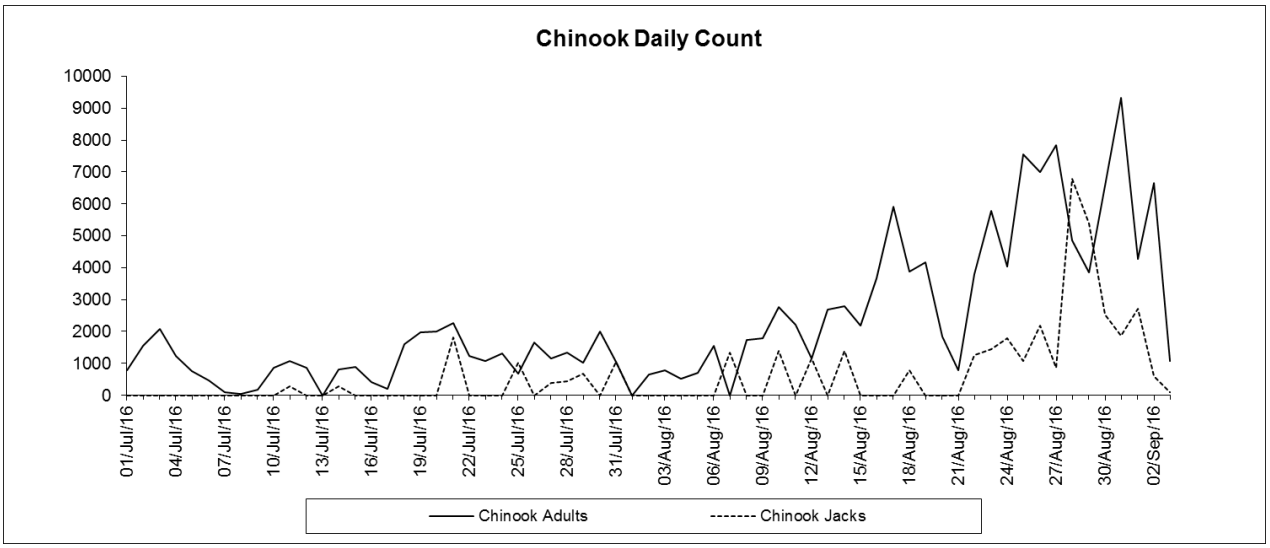

Figure 16. Daily estimates of Chinook Salmon in the Fraser River at Qualark, 2016.

Coho Salmon comprised a very minor proportion (3,912) of the 2016 Qualark estimate (Appendix 1). However a total of 7 Coho were caught in the last week of the project. This was a larger than normal catch for this early in the season.

Steelhead Trout comprised a very minor proportion (1,507) of the 2016 Qualark estimate (Appendix 1). Two Steelhead Trout were caught in the test fishery in 2016.

Precision

The variance estimates related to the temporal expansion procedures are documented in Table 2 for each of the 6 different range bins estimated at Qualark.

Table 2. Total number of files counted (*N*), total time counted in hours (*n*), unsampled fraction (1-*f*), sample variance (s^2) and variance related to temporal expansion in each of the 6 different bins at Qualark, 2016.

	RB Bin 1	RB Bin 2	RB Bin 3	LB Bin 1	LB Bin 2	LB Bin 3	Total
N	1530	1530	1531	1530	1530	1530	
n	510.0	510.0	255.2	510.0	510.0	255.0	
1 - *f*	0.67	0.67	0.83	0.67	0.67	0.83	
s^2	12937	656	49	6701	1484	150	
$v(Bin_z)$	39,587,186	2,007,970	376,309	20,504,699	4,540,118	1,150,663	67,476,547

The number of files recounted two or more times by different staff were 2,198. The escapement in the recounted files accounted for approximately 10% of the total estimated

escapement. The total weighted APE associated with observer precision was 2.2% (Table 3). The 95% confidence interval on total salmon passage was calculated to be ±35,026 salmon.

Table 3. Observer, temporal and total error, standard deviation and variance at Qualark 2016, including calculated 95% confidence intervals on the total salmon escapement estimate.

	Observer	Temporal	Total
Error	0.022	0.011	0.025
SD	15,871	8,214	17,870
Variance	251,873,537	67,476,547	319,350,084
Total Population			719,918
±95% CI			35,026
Lower 95% CI			684,892
Upper 95% CI			754,943
Percent Relative Error			4.87%

Additional Research

From 10 August 2016 to 15 August 2016, 116 long range ARIS (25-40m) files were recorded. From 22 August 2016 to 3 September 2016, 267 long range ARIS (25-40m) files were recorded (Figure 17). A total of 383 files were recorded and processed. A total of 42 salmon sized targets were observed in the range beyond 29.17m. All these targets were moving in an upstream direction. The total expanded salmon escapement from 29-40m during the recorded period was estimated to be 126 salmon. The total salmon escapement during this period in the normal DIDSON range on RB was estimated to be 85,622. The fish observed in the long range bin accounted for 0.15% of the total escapement on RB. Sturgeon were observed in the files but were not counted. Some salmon sized targets were observed within the normal DIDSON coverage of 29.17m and were not included in the expanded count.

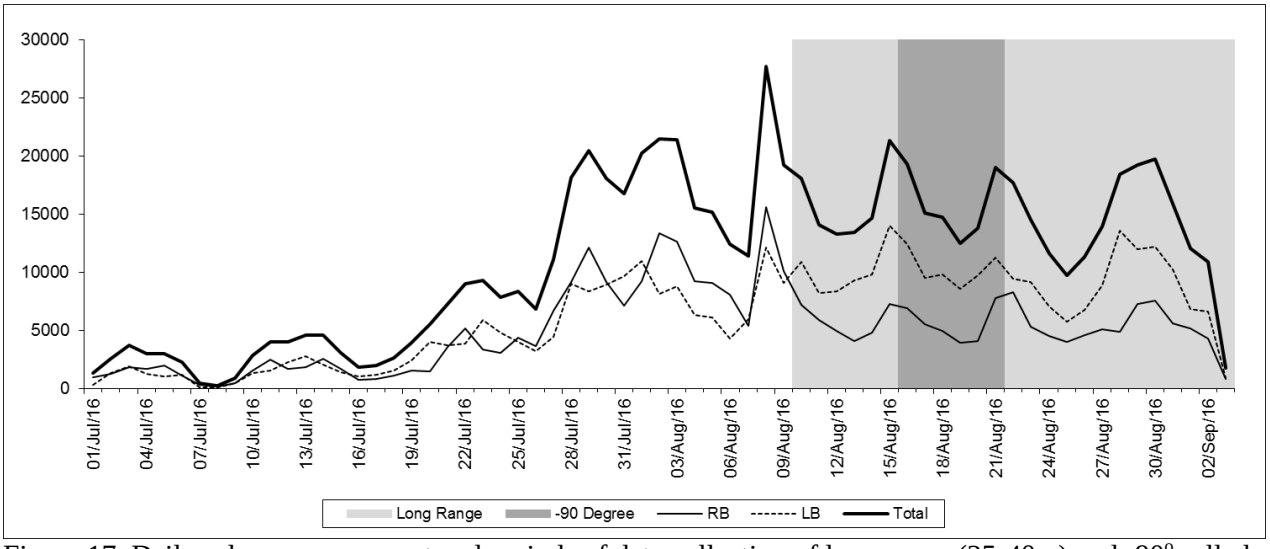

Figure 17. Daily salmon escapement and periods of data collection of long range (25-40m) and -90° rolled ARIS files at Qualark, 2016.

The processing of the -90^{o} ARIS data is in progress and results are pending.

DISCUSSION

The DIDSON hydroacoustic program at Qualark produces daily in-season estimates of salmon escapement in the Fraser River near Hope, BC. Daily escapement estimates at Qualark can be produced regardless of discharge and procedures do not change throughout the duration of the project. In 2016, escapement was the lowest recorded in the 9 years of operation since the re-inception of the project in 2008. The total escapement was estimated as 719,918 ± 35,026 salmon. The lower 95% confidence interval was 684,892 salmon; the upper 95% confidence interval was 754,943 salmon.

Hydroacoustic coverage of the area that salmon migrate within is complete at Qualark. The bottom of the ensonified area has been modified resulting in an acoustically non-reflective planar profile. There are no shelves or scalloped areas that create acoustic shadowing that could potentially obscure salmon escapement. The -35^{o} roll angle is utilized to maximize vertical coverage of the water column. The results of testing estimated vertical water column sampling coverage on RB to be from the substrate to 30 cm below the surface, on LB coverage is to within 23 cm from the surface. These measurements were collected from the weir approximately 4 m from the DIDSON. Beam spread beyond this point will further increase coverage as distance from the DIDSON increases. On-site testing has shown that salmon rarely migrate this close to the surface. Migration occurs primarily within 5 meters of the end of the fish deflection weir due to fast, strong flow in mid-river and slower seams of water along the banks. The absence of migration beyond the area of coverage is further supported by the very minimal escapement (3%) observed in the 19.17-29.17 m range bin (Bin3) and lack of catch in the bi-weekly offshore drifts.

The bank-oriented migratory behavior allows for the collection of high quality 5 m HF DIDSON files that contain the vast majority of the salmon migration, 75% in 2016. The directed upstream migratory behavior combined with the high image quality maximizes the accuracy and precision of the counts. Counting protocols address potential biases associated with fish crossing between range bins. Minimum length requirements remove smaller native fish from the counts.

In 2014, a number of interesting migratory behaviors were observed at Qualark. Particularly noteworthy was anomalous migration beyond Bin1 on RB during late September. Additionally, holding and milling behavior was observed periodically at night time on RB from the end of August through to the end of September. In contrast no major holding or milling behaviors were observed in 2015 or 2016, and there was no marked migration observed beyond Bin1, except during periods when First Nation Fisheries were occurring. In previous years, First Nations set gill net fisheries occurring near the site have consistently elicited a similar response from migrating salmon, regardless of discharge level. In 2016, 45% of passage was on RB and 55% was on LB. In previous years, the proportion by bank, though variable on a day to day basis, was close to 50% on each bank overall. There was no obvious explanation for this change in behavior.

The total daily salmon escapement is proportioned by species based on the direct proportion of each caught in the daily test fishery. The emphasis from a management perspective is on Sockeye Salmon. The total salmon escapement estimate at Qualark in 2016 was 719,918 consisting of, 527,040 Sockeye, 187,458 Chinook including 40,572 jacks, 3,912 Coho and 1,507 Steelhead salmon. Despite the high quality of the acoustically derived total salmon escapement estimate and the test fishing being conducted at the location of hydroacoustic site, the representativeness of species proportioning may introduce uncertainty due to small sample sizes in test fishing catch relative to total passage. In addition, the species apportioning procedures applied assume constant catchability through time and by species, if catchability varies, then application of direct proportional expansion may introduce species composition bias. We are investigating methods to account for differences in species specific vulnerability to the fishing gear to improve the species estimates and reduce sampling induced bias effects. This work is ongoing and will be reported on in the future.

Utility of the next generation ARIS was assessed as it will soon be replacing DIDSON which is no longer manufactured. There were a number of challenges encountered with the ARIS. The manufacturer confirmed the advanced timer recording was not yet functional, making set-up of the standard Qualark recording regime nearly impossible. The basic recording function does not allow flexibility in start times for 20 minute files. It only allows for start times of 0 minutes, 20 minutes and 40 minutes of each hour. The standard Qualark file start times on RB are 0 minutes, 15 minutes, 36 minutes of each hour. In order to get a 20 minute file with a start time of 15 minutes past the hour it was necessary to offset the ARIS computer clock by 5 minutes. Additionally there were problems with the silt plugs trapping air inside the unit causing poor image quality. The image quality was not good throughout the experimentation: we noted excessive arcing on salmon targets; poor bottom image; and numerous technical “glitches” when the system shutdown for no apparent reason. The file size from ARIS is much larger than DIDSON requiring much more data storage capacity. Lastly, the ARIS Fish program used to view recorded files requires additional development to improve user friendliness. The advantages of the ARIS are the increased flexibility in start ranges and bin size. Additionally the LF ARIS files can be recorded with 96 beams instead of 48 beams with the DIDSON so theoretically longer range and larger bins should have better image quality though this was not observed. Overall the image quality was poorer than that of the aging DIDSON systems and numerous other problems with the software functionality made use of the ARIS difficult.

Despite these challenges, we were able to explore, in a limited manner, whether salmon passage was occurring beyond the normal DIDSON coverage 29.17m, in 2016 using ARIS. Flow is fast in the middle of the river relative to the banks which have seams of slower flow within the ensonified area. Salmon exhibit high fidelity to moving through the near shore area with slower flow due to reduced energetic requirements. This is behavior is readily apparent within the DIDSON’s range stratified files. Approximately 75% of all the salmon migration was observed in Bin1 (4.17-9.17m). The remaining 22% moved in Bin2 (9.17-19.17m), with only 3% of total migration occuring in Bin 3 (19.17-29.17m) this year. External stimuli (Qualark drift gill net test fishery and First Nation set net fisheries) repeatedly cause a higher proportion of salmon to shift their migration offshore at Qualark. This shift is no greater than 3-5 m beyond normal distribution and sees temporally limited elevation in Bin2 counts. There is no evidence that salmon move off beyond the 30m ensonified area during these periods. Very low proportions

move out as far as Bin3. In all cases as soon as external stimuli are removed the fish immediately respond by resuming their highly on-shore oriented behavior. Migration occurring beyond the regularly ensonified zone has been assessed using bi-weekly offshore gillnet drifts since 2008. A 30 m gillnet is drifted just beyond the outboard edge of the ensonified area, sweeping a range of 30-60 m offshore to evaluate salmon presence there. Over the 8 year period of operation there have been a total of three salmon caught in these offshore drifts. Additionally, DFO's Applied Technologies group transected the river during the initial set up of the operation in the late 90's to determine if there was passage in the middle of the river. They used splitbeam hydroacoustic distribution plots to show that salmon migration was highly shore oriented: minimal or no passage was seen outside the normally ensonified area (30 m).

Our work in 2016, using long range ARIS files further reinforces the extremely low passage occurring beyond the normal range of coverage. The 25-40 m ARIS files recorded in August and September coincided with the bulk of salmon passage as well as seasonally low water conditions (Figures 6 and 16). High passage coinciding with low water periods may present conditions when salmon could migrate further offshore. While the range of relative abundance using ARIS in long range was low in 2016 there was no indication that there was any meaningful abundance migrating beyond 29m. This ARIS monitoring supports the general conclusion that only a very small fraction of both the daily and total salmon migration occurs beyond 20m distance from the transducer on either side of the Fraser River at Qualark. Salmon migration occurring beyond 20 m on either bank of the Fraser at Qualark, monitored or not, will not contribute a significant source of potential bias to annual estimation.

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APPENDICES

Appendix 1. Daily total and cumulative salmon escapement by bank, daily catch, daily species proportions and daily and cumulative escapement by species from Qualark hydroacoustic and test fishing programs in 2016.

	Total Expanded Daily Count			Cumulative Daily Count			Daily Catch						Species Proportion					Daily Species Count					Cumulative Species Count				
Date	RB	LB	Total	RB	LB	Total	Sockeye	Chinook	Chinook Jacks	Coho	Steelhead	Total	Sockeye	Chinook Adults	Chinook Jacks	Coho	Steelhead	Sockeye	Chinook Adults	Chinook Jacks	Coho	Steelhead	Sockeye	Chinook Adults	Chinook Jacks	Coho	Steelhead
1-Jul-16	995	309	1304	995	309	1304	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	522	782	0	0	0	522	782	0	0	0
2-Jul-16	1266	1308	2574	2261	1617	3878	2	3	0	0	0	5	0.40	0.60	0.00	0.00	0.00	1030	1544	0	0	0	1551	2327	0	0	0
3-Jul-16	1836	1896	3732	4097	3513	7610	4	5	0	0	0	9	0.44	0.56	0.00	0.00	0.00	1659	2073	0	0	0	3210	4400	0	0	0
4-Jul-16	1704	1260	2964	5801	4773	10574	7	5	0	0	0	12	0.58	0.42	0.00	0.00	0.00	1729	1235	0	0	0	4939	5635	0	0	0
5-Jul-16	1944	1056	3000	7745	5829	13574	12	4	0	0	0	16	0.75	0.25	0.00	0.00	0.00	2250	750	0	0	0	7189	6385	0	0	0
6-Jul-16	1074	1212	2286	8819	7041	15860	4	1	0	0	0	5	0.80	0.20	0.00	0.00	0.00	1829	457	0	0	0	9018	6842	0	0	0
7-Jul-16	324	120	444	9143	7161	16304	4	1	0	0	0	5	0.80	0.20	0.00	0.00	0.00	355	89	0	0	0	9373	6931	0	0	0
8-Jul-16	171	81	252	9314	7242	16556	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	202	50	0	0	0	9574	6981	0	0	0
9-Jul-16	438	441	879	9752	7683	17435	4	1	0	0	0	5	0.80	0.20	0.00	0.00	0.00	703	176	0	0	0	10278	7157	0	0	0
10-Jul-16	1550	1314	2864	11301	8997	20298	14	6	0	0	0	20	0.70	0.30	0.00	0.00	0.00	2004	859	0	0	0	12282	8016	0	0	0
11-Jul-16	2499	1521	4020	13800	10518	24318	10	4	1	0	0	15	0.67	0.27	0.07	0.00	0.00	2680	1072	268	0	0	14962	9088	268	0	0
12-Jul-16	1707	2280	3987	15507	12798	28305	11	3	0	0	0	14	0.79	0.21	0.00	0.00	0.00	3133	854	0	0	0	18095	9943	268	0	0
13-Jul-16	1821	2772	4593	17328	15570	32898	7	0	0	0	0	7	1.00	0.00	0.00	0.00	0.00	4593	0	0	0	0	22688	9943	268	0	0
14-Jul-16	2532	2043	4575	19860	17613	37473	13	3	1	0	0	17	0.76	0.18	0.06	0.00	0.00	3499	807	269	0	0	26186	10750	537	0	0
15-Jul-16	1704	1365	3069	21564	18978	40542	10	4	0	0	0	14	0.71	0.29	0.00	0.00	0.00	2192	877	0	0	0	28378	11627	537	0	0
16-Jul-16	777	1044	1821	22341	20022	42363	10	3	0	0	0	13	0.77	0.23	0.00	0.00	0.00	1401	420	0	0	0	29779	12047	537	0	0
17-Jul-16	822	1188	2010	23163	21210	44373	9	1	0	0	0	10	0.90	0.10	0.00	0.00	0.00	1809	201	0	0	0	31588	12248	537	0	0
18-Jul-16	1110	1551	2661	24273	22761	47034	2	3	0	0	0	5	0.40	0.60	0.00	0.00	0.00	1064	1597	0	0	0	32653	13845	537	0	0
19-Jul-16	1527	2433	3960	25800	25194	50994	7	7	0	0	0	14	0.50	0.50	0.00	0.00	0.00	1980	1980	0	0	0	34633	15825	537	0	0
20-Jul-16	1497	4011	5508	27297	29205	56502	7	4	0	0	0	11	0.64	0.36	0.00	0.00	0.00	3505	2003	0	0	0	38138	17828	537	0	0
21-Jul-16	3582	3690	7272	30879	32895	63774	7	5	4	0	0	16	0.44	0.31	0.25	0.00	0.00	3182	2273	1818	0	0	41319	20100	2355	0	0
22-Jul-16	5175	3858	9033	36054	36753	72807	19	3	0	0	0	22	0.86	0.14	0.00	0.00	0.00	7801	1232	0	0	0	49120	21332	2355	0	0
23-Jul-16	3363	5910	9273	39417	42663	82080	23	3	0	0	0	26	0.88	0.12	0.00	0.00	0.00	8203	1070	0	0	0	57323	22402	2355	0	0
24-Jul-16	3039	4773	7812	42456	47436	89892	20	4	0	0	0	24	0.83	0.17	0.00	0.00	0.00	6510	1302	0	0	0	63833	23704	2355	0	0
25-Jul-16	4371	4005	8376	46827	51441	98268	20	2	3	0	0	25	0.80	0.08	0.12	0.00	0.00	6701	670	1005	0	0	70534	24374	3360	0	0
26-Jul-16	3635	3213	6848	50463	54654	105117	19	6	0	0	0	25	0.76	0.24	0.00	0.00	0.00	5205	1644	0	0	0	75739	26018	3360	0	0
27-Jul-16	6687	4422	11109	57150	59076	116226	25	3	1	0	0	29	0.86	0.10	0.03	0.00	0.00	9577	1149	383	0	0	85316	27167	3743	0	0
28-Jul-16	9123	9033	18156	66273	68109	134382	37	3	1	0	0	41	0.90	0.07	0.02	0.00	0.00	16385	1328	443	0	0	101700	28495	4186	0	0
29-Jul-16	12102	8343	20445	78375	76452	154827	56	3	2	0	0	61	0.92	0.05	0.03	0.00	0.00	18769	1005	670	0	0	120470	29501	4856	0	0
30-Jul-16	9159	8925	18084	87534	85377	172911	24	3	0	0	0	27	0.89	0.11	0.00	0.00	0.00	16075	2009	0	0	0	136544	31510	4856	0	0
31-Jul-16	7119	9660	16779	94653	95037	189690	28	2	2	0	0	32	0.88	0.06	0.06	0.00	0.00	14682	1049	1049	0	0	151226	32559	5905	0	0
1-Aug-16	9252	10971	20223	103905	106008	209913	46	0	0	0	0	46	1.00	0.00	0.00	0.00	0.00	20223	0	0	0	0	171449	32559	5905	0	0
2-Aug-16	13320	8157	21477	117225	114165	231390	65	2	0	0	0	67	0.97	0.03	0.00	0.00	0.00	20836	641	0	0	0	192285	33200	5905	0	0
3-Aug-16	12615	8766	21381	129840	122931	252771	53	2	0	0	0	55	0.96	0.04	0.00	0.00	0.00	20604	777	0	0	0	212888	33977	5905	0	0
4-Aug-16	9219	6297	15516	139059	129228	268287	29	1	0	0	0	30	0.97	0.03	0.00	0.00	0.00	14999	517	0	0	0	227887	34495	5905	0	0
5-Aug-16	9099	6090	15189	148158	135318	283476	21	1	0	0	0	22	0.95	0.05	0.00	0.00	0.00	14499	690	0	0	0	242386	35185	5905	0	0
6-Aug-16	8070	4314	12384	156228	139632	295860	14	2	0	0	0	16	0.88	0.13	0.00	0.00	0.00	10836	1548	0	0	0	253222	36733	5905	0	0
7-Aug-16	5376	5988	11364	161604	145620	307224	15	0	2	0	0	17	0.88	0.00	0.12	0.00	0.00	10027	0	1337	0	0	263249	36733	7242	0	0
8-Aug-16	15570	12090	27660	177174	157710	334884	15	1	0	0	0	16	0.94	0.06	0.00	0.00	0.00	25931	1729	0	0	0	289180	38462	7242	0	0
9-Aug-16	10109	9108	19217	187282	166818	354100	39	4	0	0	0	43	0.91	0.09	0.00	0.00	0.00	17429	1788	0	0	0	306609	40249	7242	0	0
10-Aug-16	7167	10880	18047	194449	177698	372147	20	4	2	0	0	26	0.77	0.15	0.08	0.00	0.00	13882	2776	1388	0	0	320491	43026	8630	0	0
11-Aug-16	5868	8199	14067	200317	185897	386214	32	6	0	0	0	38	0.84	0.16	0.00	0.00	0.00	11846	2221	0	0	0	332337	45247	8630	0	0
12-Aug-16	4929	8343	13272	205246	194240	399486	19	2	2	0	0	23	0.83	0.09	0.09	0.00	0.00	10964	1154	1154	0	0	343301	46401	9784	0	0
13-Aug-16	4074	9327	13401	209320	203567	412887	24	6	0	0	0	30	0.80	0.20	0.00	0.00	0.00	10721	2680	0	0	0	354021	49081	9784	0	0
14-Aug-16	4814	9804	14618	214134	213371	427504	15	4	2	0	0	21	0.71	0.19	0.10	0.00	0.00	10441	2784	1392	0	0	364463	51865	11177	0	0
15-Aug-16	7292	14007	21299	221425	227378	448803	35	4	0	0	0	39	0.90	0.10	0.00	0.00	0.00	19114	2184	0	0	0	383577	54050	11177	0	0
16-Aug-16	6885	12408	19293	228310	239786	468096	30	7	0	0	0	37	0.81	0.19	0.00	0.00	0.00	15643	3650	0	0	0	399220	57700	11177	0	0

Appendix 1 cont.

	Total Expanded Daily Count			Cumulative Daily Count			Daily Catch						Species Proportion					Daily Species Count					Cumulative Species Count				
Date	RB	LB	Total	RB	LB	Total	Sockeye	Chinook	Chinook Jacks	Coho	Steelhead	Total	Sockeye	Chinook Adults	Chinook Jacks	Coho	Steelhead	Sockeye	Chinook Adults	Chinook Jacks	Coho	Steelhead	Sockeye	Chinook Adults	Chinook Jacks	Coho	Steelhead
17-Aug-16	5547	9528	15075	233857	249314	483171	16	11	0	0	1	28	0.57	0.39	0.00	0.00	0.04	8614	5922	0	0	538	407834	63622	11177	0	538
18-Aug-16	4941	9783	14724	238798	259097	497895	13	5	1	0	0	19	0.68	0.26	0.05	0.00	0.00	10074	3875	775	0	0	417908	67497	11951	0	538
19-Aug-16	3933	8544	12477	242731	267641	510372	10	5	0	0	0	15	0.67	0.33	0.00	0.00	0.00	8318	4159	0	0	0	426226	71656	11951	0	538
20-Aug-16	4077	9723	13800	246808	277364	524172	26	4	0	0	0	30	0.87	0.13	0.00	0.00	0.00	11960	1840	0	0	0	438186	73496	11951	0	538
21-Aug-16	7764	11244	19008	254572	288608	543180	23	1	0	0	0	24	0.96	0.04	0.00	0.00	0.00	18216	792	0	0	0	456402	74288	11951	0	538
22-Aug-16	8261	9414	17675	262833	298022	560854	10	3	1	0	0	14	0.71	0.21	0.07	0.00	0.00	12625	3787	1262	0	0	469027	78075	13214	0	538
23-Aug-16	5316	9162	14478	268149	307184	575332	5	4	1	0	0	10	0.50	0.40	0.10	0.00	0.00	7239	5791	1448	0	0	476266	83867	14662	0	538
24-Aug-16	4542	7080	11622	272691	314264	586954	13	9	4	0	0	26	0.50	0.35	0.15	0.00	0.00	5811	4023	1788	0	0	482077	87890	16450	0	538
25-Aug-16	3987	5736	9723	276678	320000	596677	1	7	1	0	0	9	0.11	0.78	0.11	0.00	0.00	1080	7562	1080	0	0	483157	95452	17530	0	538
26-Aug-16	4596	6750	11346	281274	326750	608023	5	16	5	0	0	26	0.19	0.62	0.19	0.00	0.00	2182	6982	2182	0	0	485339	102434	19712	0	538
27-Aug-16	5088	8865	13953	286362	335615	621976	12	18	2	0	0	32	0.38	0.56	0.06	0.00	0.00	5232	7849	872	0	0	490571	110283	20584	0	538
28-Aug-16	4854	13557	18411	291216	349172	640387	6	5	7	0	1	19	0.32	0.26	0.37	0.00	0.05	5814	4845	6783	0	969	496385	115128	27367	0	1507
29-Aug-16	7239	12006	19245	298455	361178	659632	11	5	7	2	0	25	0.44	0.20	0.28	0.08	0.00	8468	3849	5389	1540	0	504853	118977	32756	1540	1507
30-Aug-16	7575	12180	19755	306030	373358	679388	20	13	5	1	0	39	0.51	0.33	0.13	0.03	0.00	10131	6585	2533	507	0	514984	125562	35288	2046	1507
31-Aug-16	5604	10260	15864	311634	383618	695252	5	10	2	0	0	17	0.29	0.59	0.12	0.00	0.00	4666	9332	1866	0	0	519650	134893	37155	2046	1507
1-Sep-16	5169	6852	12021	316803	390470	707273	10	11	7	3	0	31	0.32	0.35	0.23	0.10	0.00	3878	4266	2714	1163	0	523528	139159	39869	3209	1507
2-Sep-16	4272	6606	10878	321075	397076	718151	5	11	1	1	0	18	0.28	0.61	0.06	0.06	0.00	3022	6648	604	604	0	526549	145807	40473	3814	1507
3-Sep-16	846	921	1767	321921	397997	719918	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	491	1080	98	98	0	527040	146886	40572	3912	1507

Appendix 2. Catch by drift from Qualark drift gill net test fishing program in 2016 including drift number, location, start and end times, duration, mesh size and comments.

			Time				Caught						
Date	Drift	Location	Start	End	Duration	Mesh Size	Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	Comments
01/07/16	1	near	07:01	07:06	05:00	4.00	0	0	0	0	0	0	Good drift. No fish.
01/07/16	2	near	07:24	07:29	05:00	5.25	0	0	0	0	0	0	Good drift.
01/07/16	3	near	07:40	07:45	05:00	6.75	0	0	0	0	0	0	Good drift. No fish.
01/07/16	4	near	19:00	19:05	05:00	4.75	0	0	0	0	0	0	Good drift.
01/07/16	5	near	19:21	19:25	04:00	5.75	0	0	0	0	0	0	Good drift.
01/07/16	6	near	19:40	19:45	05:00	8.00	0	0	0	0	0	0	Good drift. One fish went through the net, species unknown.
02/07/16	1	near	07:01	07:06	05:00	4.75	0	0	0	0	0	0	Good drift.
02/07/16	2	near	07:23	07:29	06:00	5.75	2	2	0	0	0	4	Good drift. Two Chinook unable to revive.
02/07/16	3	near	07:45	07:50	05:00	8.00	0	0	0	0	0	0	Good drift.
02/07/16	4	near	19:03	19:08	05:00	4.00	0	0	0	0	0	0	Good drift.
02/07/16	5	near	19:22	19:27	05:00	5.25	0	1	0	0	0	1	Good drift. One Chinook released.
02/07/16	6	near	19:43	19:49	06:00	6.75	0	0	0	0	0	0	Good drift. One Sturgeon went through net halfway through drift.
03/07/16	1	near	07:02	07:08	06:00	4.00	0	0	0	0	0	0	Good drift.
03/07/16	2	near	07:22	07:28	06:00	5.25	3	3	0	0	0	6	Good drift.One Chinook bleeding from gills, two released safely.
03/07/16	3	near	07:43	07:48	05:00	6.75	0	0	0	0	0	0	Good drift.
03/07/16	4	near	19:02	19:08	06:00	4.75	0	0	0	0	0	0	Good drift.
03/07/16	5	near	19:21	19:28	07:00	5.75	1	2	0	0	0	3	Good drift. 2 Chinook dead.
03/07/16	6	near	19:48	19:53	05:00	8.00	0	0	0	0	0	0	Good drift.
04/07/16	1	near	07:00	07:05	05:00	4.75	3	0	0	0	0	3	Good drift.
04/07/16	2	near	07:23	07:28	05:00	5.75	2	1	0	0	0	3	Good drift. One Chinook unable to revive.
04/07/16	3	near	07:45	07:51	06:00	8.00	0	1	0	0	0	1	Good drift. One Chinook released safely.
04/07/16	4	near	19:02	19:07	05:00	4.00	0	1	0	0	0	1	Good drift. One Chinook released.
04/07/16	5	near	19:26	19:31	05:00	5.25	2	2	0	0	0	4	Good drift. Two Chinook released.
04/07/16	6	near	19:48	19:53	05:00	6.75	0	0	0	0	0	0	Good drift.
05/07/16	1	near	07:03	07:08	05:00	4.00	1	0	0	0	0	1	Good drift.
05/07/16	2	near	07:25	07:31	06:00	5.25	1	3	0	0	0	4	Good drift. Two Chinook released and one dead.
05/07/16	3	near	07:45	07:51	06:00	6.75	2	0	0	0	0	2	Good drift.
05/07/16	4	near	19:00	19:05	05:00	4.75	5	0	0	0	0	5	Good drift. Fish caught throughout net.
05/07/16	5	near	19:26	19:31	05:00	5.75	2	0	0	0	0	2	Good drift.
05/07/16	6	near	19:46	19:51	05:00	8.00	1	1	0	0	0	2	Good drift. One dead Chinook.
06/07/16	1	near	07:03	07:08	05:00	4.75	1	0	0	0	0	1	Good drift.
06/07/16	2	near	07:26	07:32	06:00	5.75	3	1	0	0	0	4	Good drift. One Chinook bleeding from the gills.
06/07/16	3	near	07:46	07:51	05:00	8.00	0	0	0	0	0	0	Good drift.
06/07/16	4	near	19:00	19:05	05:00	4.00	0	0	0	0	0	0	Good drift.
06/07/16	5	near	19:25	19:30	05:00	5.25	0	0	0	0	0	0	Good drift.
06/07/16	6	near	19:45	19:50	05:00	6.75	0	0	0	0	0	0	Good drift. No fish.
07/07/16	1	near	07:00	07:05	05:00	4.00	1	0	0	0	0	1	Good drift.
07/07/16	2	near	07:26	07:31	05:00	5.25	1	1	0	0	0	2	Good drift. One Chinook unable to revive.
07/07/16	3	near	07:42	07:47	05:00	6.75	0	0	0	0	0	0	Good drift.
07/07/16	7	far	07:51	07:55	04:00	5.25	0	0	0	0	0	0	Good drift. Nothing but sticks.
07/07/16	4	near	19:02	19:08	06:00	4.75	1	0	0	0	0	1	Good drift. More fish hit net but fell off, species unknown.
07/07/16	5	near	19:24	19:29	05:00	5.75	0	0	0	0	0	0	Good drift.
07/07/16	6	near	19:46	19:51	05:00	8.00	1	0	0	0	0	1	Good drift.

Appendix 2 cont.

Date	Drift	Location	Time Start	Time End	Duration	Mesh Size	Caught Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	Comments
08/07/16	1	near	07:04	07:09	05:00	4.75	0	0	0	0	0	0	Good drift. No fish.
08/07/16	2	near	07:26	07:31	05:00	5.75	0	0	0	0	0	0	Good drift.
08/07/16	3	near	07:46	07:51	05:00	8.00	0	0	0	0	0	0	Good drift.
08/07/16	4	near	19:02	19:07	05:00	4.00	0	0	0	0	0	0	Good drift. First Nation fish opening tonight at 6pm - tomorrow 12pm.
08/07/16	5	near	19:24	19:29	05:00	5.25	0	0	0	0	0	0	Good drift.
08/07/16	6	near	19:45	19:50	05:00	6.75	0	0	0	0	0	0	Good drift.
09/07/16	1	near	07:01	07:06	05:00	4.00	0	0	0	0	0	0	Good drift
09/07/16	2	near	07:26	07:31	05:00	5.25	0	0	0	0	0	0	Good drift.
09/07/16	3	near	07:42	07:47	05:00	6.75	0	0	0	0	0	0	Good drift. No fish.
09/07/16	4	near	19:01	19:05	04:00	4.75	2	0	0	0	0	2	Good drift. Fish caught close to shore.
09/07/16	5	near	19:29	19:34	05:00	5.75	2	1	0	0	0	3	Good drift. One Chinook bleeding from gills.
09/07/16	6	near	19:44	19:49	05:00	8.00	0	0	0	0	0	0	Good drift.
10/07/16	1	near	07:02	07:07	05:00	4.75	3	0	0	0	0	3	Good drift.
10/07/16	2	near	07:24	07:30	06:00	5.75	2	3	0	0	0	5	Good drift. Two Chinook released safely, one dead.
10/07/16	3	near	07:43	07:48	05:00	8.00	2	1	0	0	0	3	Good drift. One Chinook released.
10/07/16	4	near	19:02	19:07	05:00	4.00	3	2	0	0	0	5	Good drift. One Chinook bleeding too badly to release. One released safely.
10/07/16	5	near	19:25	19:31	06:00	5.25	3	0	0	0	0	3	Good drift. Fish caught throughout net.
10/07/16	6	near	19:46	19:51	05:00	6.75	1	0	0	0	0	1	Good drift.
11/07/16	1	near	07:03	07:09	06:00	4.00	3	0	1	0	0	4	Good drift. One jack Chinook unable to revive.
11/07/16	2	near	07:24	07:29	05:00	5.25	1	0	0	0	0	1	Good drift. One Sturgeon in the net above weir but fell off at the end of the drift.
11/07/16	3	near	07:43	07:48	05:00	6.75	1	0	0	0	0	1	Good drift.
11/07/16	7	far	07:55	07:58	03:00	5.25	0	0	0	0	0	0	Good drift.
11/07/16	4	near	19:01	19:06	05:00	4.75	3	3	0	0	0	6	Good drift. One clipped Chinook retained. Two Chinook released safely.
11/07/16	5	near	19:25	19:31	06:00	5.75	2	1	0	0	0	3	Good drift. One Chinook released.
11/07/16	6	near	19:46	19:52	06:00	8.00	0	0	0	0	0	0	Good drift.
12/07/16	1	near	07:01	07:05	04:00	4.75	6	0	0	0	0	6	Good drift. Fish caught in first half of net.
12/07/16	2	near	07:24	07:28	04:00	5.75	0	0	0	0	0	0	Good drift.
12/07/16	3	near	07:45	07:51	06:00	8.00	0	0	0	0	0	0	Good drift.
12/07/16	4	near	19:04	19:09	05:00	4.00	3	1	0	0	0	4	Good drift. One Chinook partial clip.
12/07/16	5	near	19:32	19:38	06:00	5.25	1	0	0	0	0	1	Good drift.
12/07/16	6	near	19:55	20:00	05:00	6.75	1	2	0	0	0	3	Good drift. Two Chinook barely in net, released safely.
13/07/16	1	near	07:04	07:10	06:00	4.00	1	0	0	0	0	1	Good drift.
13/07/16	2	near	07:23	07:29	06:00	5.25	2	0	0	0	0	2	Good drift.
13/07/16	3	near	07:42	07:47	05:00	6.75	0	0	0	0	0	0	Good drift.
13/07/16	4	near	19:01	19:07	06:00	4.75	4	0	0	0	0	4	Good drift. Spotted a seal at the end of the drift.
13/07/16	5	near	19:25	19:31	06:00	5.75	0	0	0	0	0	0	Good drift.
13/07/16	6	near	19:45	19:50	05:00	8.00	0	0	0	0	0	0	Good drift. No fish.
14/07/16	1	near	07:07	07:13	06:00	4.75	5	0	1	0	0	6	Hung up at the beginning of the drift. Reset net.
14/07/16	2	near	07:27	07:32	05:00	5.75	1	0	0	0	0	1	Good drift.
14/07/16	3	near	07:44	07:49	05:00	8.00	0	1	0	0	0	1	Good drift.
14/07/16	7	far	07:53	07:58	05:00	5.25	0	0	0	0	0	0	Good drift.
14/07/16	4	near	19:02	19:07	05:00	4.00	3	0	0	0	0	3	Good drift.
14/07/16	5	near	19:23	19:29	06:00	5.25	1	0	0	0	0	1	Good drift.
14/07/16	6	near	19:46	19:51	05:00	6.75	3	2	0	0	0	5	Good drift. Fish caught throughout net.
15/07/16	1	near	07:01	07:08	07:00	4.00	0	0	0	0	0	0	Good drift. Fish hit the net but fell off before pulling in net.
15/07/16	2	near	07:26	07:32	06:00	5.25	3	1	0	0	0	4	Good drift.
15/07/16	3	near	07:43	07:49	06:00	6.75	0	2	0	0	0	2	Good drift.
15/07/16	4	near	19:04	19:09	05:00	4.75	4	0	0	0	0	4	Good drift.
15/07/16	5	near	19:27	19:34	07:00	5.75	1	0	0	0	0	1	Good drift.
15/07/16	6	near	19:46	19:51	05:00	8.00	2	1	0	0	0	3	Good drift.

Appendix 2 cont.

Date	Drift	Location	Time			Mesh Size	Caught						Comments
			Start	End	Duration		Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	
16/07/16	1	near	07:01	07:06	05:00	4.75	4	0	0	0	0	4	Good drift. Fish caught in first half of net.
16/07/16	2	near	07:23	07:28	05:00	5.75	2	2	0	0	0	4	Good drift. One Sockeye has wounds on both sides of the body.
16/07/16	3	near	07:44	07:50	06:00	8.00	1	0	0	0	0	1	Good drift. DFO boat patrolling scared fish away.
16/07/16	4	near	19:02	19:07	05:00	4.00	1	0	0	0	0	1	Good drift. Water slowly rising again.
16/07/16	5	near	19:25	19:31	06:00	5.25	2	0	0	0	0	2	Good drift.
16/07/16	6	near	19:46	19:51	05:00	6.75	0	1	0	0	0	1	Good drift. One nice Chinook caught.
17/07/16	1	near	07:04	07:09	05:00	4.00	1	0	0	0	0	1	Good drift.
17/07/16	2	near	07:23	07:28	05:00	5.25	6	1	0	0	0	7	Good drift. Fish caught throughout net.
17/07/16	3	near	07:45	07:50	05:00	6.75	0	0	0	0	0	0	Good drift.
17/07/16	4	near	19:04	19:09	05:00	4.75	0	0	0	0	0	0	Good drift.
17/07/16	5	near	19:28	19:34	06:00	5.75	2	0	0	0	0	2	Good drift.
17/07/16	6	near	19:45	19:51	06:00	8.00	0	0	0	0	0	0	Good drift.
18/07/16	1	near	07:01	07:07	06:00	4.75	1	0	0	0	0	1	Good drift.
18/07/16	2	near	07:23	07:29	06:00	5.75	1	0	0	0	0	1	Good drift.
18/07/16	3	near	07:42	07:47	05:00	8.00	0	1	0	0	0	1	Good drift.
18/07/16	7	far	07:50	07:54	04:00	5.25	0	0	0	0	0	0	Good drift. 25 m offshore.
18/07/16	4	near	19:05	19:10	05:00	4.00	0	1	0	0	0	1	Good drift. Very muddy water. One Chinook fell off the net.
18/07/16	5	near	19:24	19:29	05:00	5.25	0	1	0	0	0	1	Good drift. One Chinook fell off the net.
18/07/16	6	near	19:44	19:49	05:00	6.75	0	0	0	0	0	0	Good drift. No fish.
19/07/16	1	near	07:02	07:07	05:00	4.00	1	1	0	0	0	2	Good drift. One partially clipped Chinook.
19/07/16	2	near	07:24	07:29	05:00	5.25	1	0	0	0	0	1	Good drift.
19/07/16	3	near	07:43	07:48	05:00	6.75	1	2	0	0	0	3	Good drift.
19/07/16	4	near	19:02	19:07	05:00	4.75	1	2	0	0	0	3	Good drift. Wounded fish.
19/07/16	5	near	19:25	19:31	06:00	5.75	3	2	0	0	0	5	Good drift. One badly wounded Chinook.
19/07/16	6	near	19:45	19:50	05:00	8.00	0	0	0	0	0	0	Good drift.
20/07/16	1	near	07:02	07:07	05:00	4.75	3	0	0	0	0	3	Good drift.
20/07/16	2	near	07:25	07:31	06:00	5.75	1	0	0	0	0	1	Good drift. One sockeye fell off the net. Caught one 3 foot Sturgeon.
20/07/16	3	near	07:45	07:51	06:00	8.00	0	0	0	0	0	0	Good drift.
20/07/16	4	near	19:02	19:07	05:00	4.00	0	2	0	0	0	2	Good drift. One clipped Chinook retained.
20/07/16	5	near	19:22	19:28	06:00	5.25	2	0	0	0	0	2	Good drift.
20/07/16	6	near	19:45	19:51	06:00	6.75	1	2	0	0	0	3	Good drift. One of the two Chinook is big.
21/07/16	1	near	07:02	07:09	07:00	4.00	4	3	4	0	0	11	Good drift. Fish throughout net.
21/07/16	2	near	07:24	07:29	05:00	5.25	1	0	0	0	0	1	Good drift.
21/07/16	3	near	07:40	07:46	06:00	6.75	2	2	0	0	0	4	Good drift.
21/07/16	7	far	07:54	07:57	03:00	5.25	0	0	0	0	0	0	25m offshore. Good drift.
22/07/16	4	near	19:01	19:07	06:00	4.00	15	1	0	0	0	16	Good drift. Fish all throughout.
22/07/16	5	near	19:23	19:29	06:00	5.25	2	0	0	0	0	2	Good drift.
22/07/16	6	near	19:45	19:51	06:00	6.75	2	2	0	0	0	4	Good drift.
23/07/16	1	near	07:00	07:06	06:00	4.00	6	0	0	0	0	6	Good drift. One Sockeye fell off while pulling in net.
23/07/16	2	near	07:25	07:31	06:00	5.25	3	0	0	0	0	3	Good drift.
23/07/16	3	near	07:44	07:50	06:00	6.75	1	0	0	0	0	1	Good drift.
23/07/16	4	near	19:02	19:08	06:00	4.75	12	1	0	0	0	13	Good drift. Fish throughout net.
23/07/16	5	near	19:24	19:30	06:00	5.75	1	0	0	0	0	1	Good drift.
23/07/16	6	near	19:46	19:52	06:00	8.00	0	2	0	0	0	2	Good drift. One clipped Chinook.
24/07/16	1	near	07:00	07:06	06:00	4.75	11	1	0	0	0	12	Good drift.
24/07/16	2	near	07:23	07:30	07:00	5.75	2	0	0	0	0	2	Good drift.
24/07/16	3	near	07:45	07:51	06:00	8.00	0	2	0	0	0	2	Good drift. One Chinook fell off while pulling in net.
24/07/16	4	near	19:01	19:07	06:00	4.00	6	0	0	0	0	6	Good drift.
24/07/16	5	near	19:23	19:29	06:00	5.25	1	1	0	0	0	2	Good drift.
24/07/16	6	near	19:46	19:51	05:00	6.75	0	0	0	0	0	0	Good drift.

Appendix 2 cont.

			Time				Caught						
Date	Drift	Location	Start	End	Duration	Mesh Size	Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	Comments
25/07/16	1	near	07:00	07:06	06:00	4.00	11	1	3	0	0	15	Good drift. Fish caught throughout drift.
25/07/16	2	near	07:24	07:28	04:00	5.25	3	0	0	0	0	3	Incomplete drift. Net drifted into shore.
25/07/16	3	near	07:43	07:46	03:00	6.75	0	0	0	0	0	0	Incomplete drift. Net drifted into shore just after weir.
25/07/16	7	far	07:50	07:54	04:00	5.25	0	0	0	0	0	0	Good drift. 25 m offshore.
25/07/16	4	near	19:01	19:07	06:00	4.75	5	1	0	0	0	6	Net hit bottom.
25/07/16	5	near	19:24	19:29	05:00	5.75	0	0	0	0	0	0	Good drift.
25/07/16	6	near	19:44	19:49	05:00	8.00	1	0	0	0	0	1	Good drift.
26/07/16	1	near	07:00	07:06	06:00	4.75	10	1	0	0	0	11	Good drift.
26/07/16	2	near	07:25	07:31	06:00	5.75	3	0	0	0	0	3	Good drift.
26/07/16	3	near	07:45	07:51	06:00	8.00	2	3	0	0	0	5	Good drift.
26/07/16	4	near	19:01	19:07	06:00	4.00	1	2	0	0	0	3	Good drift. PSC watched from shore at the weir.
26/07/16	5	near	19:24	19:30	06:00	5.25	2	0	0	0	0	2	Good drift.
26/07/16	6	near	19:46	19:52	06:00	6.75	1	0	0	0	0	1	Good drift.
27/07/16	1	near	07:01	07:08	07:00	4.00	6	0	1	0	0	7	Good drift. All fish in the first half of the net.
27/07/16	2	near	07:23	07:29	06:00	5.25	4	1	0	0	0	5	Good drift.
27/07/16	3	near	07:44	07:51	07:00	6.75	2	1	0	0	0	3	Good drift. One Chinook hit net but fell off.
27/07/16	4	near	19:02	19:08	06:00	4.75	13	1	0	0	0	14	Good drift.
27/07/16	5	near	19:24	19:30	06:00	5.75	0	0	0	0	0	0	Good drift. No fish.
27/07/16	6	near	19:44	19:48	04:00	8.00	0	0	0	0	0	0	Good drift.
28/07/16	1	near	07:00	07:06	06:00	4.75	26	0	0	0	0	26	Good drift. Fish throughout the net.
28/07/16	2	near	07:23	07:28	05:00	5.75	0	0	0	0	0	0	Good drift.
28/07/16	3	near	07:44	07:49	05:00	8.00	6	2	0	0	0	8	Good drift.
28/07/16	7	far	07:56	07:58	02:00	5.25	0	0	0	0	0	0	Good drift. 30m offshore.
28/07/16	4	near	19:02	19:07	05:00	4.00	3	0	1	0	0	4	Good drift.
28/07/16	5	near	19:23	19:26	03:00	5.25	0	0	0	0	0	0	Incomplete drift. Hung up just past the weir.
28/07/16	6	near	19:43	19:49	06:00	6.75	2	1	0	0	0	3	Good drift.
29/07/16	1	near	07:02	07:08	06:00	4.00	29	1	0	0	0	30	Good drift.
29/07/16	2	near	07:23	07:29	06:00	5.25	2	0	1	0	0	3	Good drift.
29/07/16	3	near	07:43	07:46	03:00	6.75	0	0	0	0	0	0	Incomplete drift. Net drifted into shore.
29/07/16	4	near	19:02	19:07	05:00	4.75	24	0	1	0	0	25	Good drift. FN fishing opening for 18 hrs starting at 6 PM.
29/07/16	5	near	19:25	19:32	07:00	5.75	1	1	0	0	0	2	Good drift.
29/07/16	6	near	19:46	19:51	05:00	8.00	0	1	0	0	0	1	Good drift. One Chinook hit net but fell off.
30/07/16	1	near	07:00	07:05	05:00	4.75	13	2	0	0	0	15	Good drift. One Sockeye with skin wound.
30/07/16	2	near	07:24	07:30	06:00	5.75	2	0	0	0	0	2	Good drift.
30/07/16	3	near	07:44	07:49	05:00	8.00	1	1	0	0	0	2	Good drift. One Chinook fell off at boat.
30/07/16	4	near	19:01	19:06	05:00	4.00	5	0	0	0	0	5	Good drift.
30/07/16	5	near	19:26	19:31	05:00	5.25	3	0	0	0	0	3	Good drift.
30/07/16	6	near	19:42	19:45	03:00	6.75	0	0	0	0	0	0	Incomplete drift, hung up past weir.
31/07/16	1	near	07:00	07:06	06:00	4.00	12	0	1	0	0	13	Good drift.
31/07/16	2	near	07:24	07:31	07:00	5.25	7	0	0	0	0	7	Good drift. One 8 ft Sturgeon in the net but released while pulling it in.
31/07/16	3	near	07:45	07:51	06:00	6.75	2	0	0	0	0	2	Good drift.
31/07/16	4	near	19:02	19:07	05:00	4.75	7	0	1	0	0	8	Good drift.
31/07/16	5	near	19:23	19:29	06:00	5.75	0	0	0	0	0	0	Good drift.
31/07/16	6	near	19:44	19:50	06:00	8.00	0	2	0	0	0	2	Good drift. Two Chinook caught at the end of the drift.
01/08/16	1	near	07:02	07:08	06:00	4.75	36	0	0	0	0	36	Good drift. Fish all throughout.
01/08/16	2	near	07:23	07:28	05:00	5.75	0	0	0	0	0	0	Good drift. No fish.
01/08/16	3	near	07:44	07:49	05:00	8.00	1	0	0	0	0	1	Good drift.
01/08/16	7	far	07:52	07:55	03:00	5.25	0	0	0	0	0	0	Good drift.
01/08/16	4	near	19:00	19:05	05:00	4.00	7	0	0	0	0	7	Good drift.
01/08/16	5	near	19:25	19:31	06:00	5.25	2	0	0	0	0	2	Good drift.

Appendix 2 cont.

Date	Drift	Location	Time Start	Time End	Duration	Mesh Size	Caught Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	Comments
01/08/16	6	near	19:46	19:51	05:00	6.75	0	0	0	0	0	0	Good drift.
02/08/16	1	near	07:00	07:05	05:00	4.00	34	0	0	0	0	34	Good drift.
02/08/16	2	near	07:25	07:30	05:00	5.25	5	0	0	0	0	5	Good drift.
02/08/16	3	near	07:44	07:50	06:00	6.75	3	0	0	0	0	3	Good drift.
02/08/16	4	near	19:01	19:06	05:00	4.75	23	1	0	0	0	24	Good drift.
02/08/16	5	near	19:25	19:28	03:00	5.75	0	0	0	0	0	0	Incomplete drift. Hung up past the weir.
02/08/16	6	near	19:45	19:50	05:00	8.00	0	1	0	0	0	1	Good drift.
03/08/16	1	near	07:02	07:09	07:00	4.75	39	0	0	0	0	39	Good drift. Fish caught throughout drift.
03/08/16	2	near	07:23	07:29	06:00	5.75	4	1	0	0	0	5	Good drift.
03/08/16	3	near	07:45	07:51	06:00	8.00	0	0	0	0	0	0	Good drift.
03/08/16	4	near	19:00	19:06	06:00	4.00	7	1	0	0	0	8	Good drift. One very large Chinook.
03/08/16	5	near	19:24	19:30	06:00	5.25	1	0	0	0	0	1	Good drift.
03/08/16	6	near	19:45	19:51	06:00	6.75	2	0	0	0	0	2	Good drift.
04/08/16	1	near	07:00	07:07	07:00	4.00	16	0	0	0	0	16	Good drift. Fish caught close to shore.
04/08/16	2	near	07:23	07:29	06:00	5.25	3	0	0	0	0	3	Good drift.
04/08/16	3	near	07:44	07:49	05:00	6.75	2	0	0	0	0	2	Good drift.
04/08/16	7	far	07:50	07:54	04:00	5.25	0	0	0	0	0	0	Good drift. 30 m offshore.
04/08/16	4	near	19:00	19:07	07:00	4.75	6	0	0	0	0	6	Good drift.
04/08/16	5	near	19:23	19:28	05:00	5.75	1	0	0	0	0	1	Good drift.
04/08/16	6	near	19:45	19:51	06:00	8.00	1	1	0	0	0	2	Good drift.
05/08/16	1	near	07:02	07:08	06:00	4.75	13	0	0	0	0	13	Good drift.
05/08/16	2	near	07:23	07:29	06:00	5.75	2	0	0	0	0	2	Good drift.
05/08/16	3	near	07:45	07:51	06:00	8.00	1	1	0	0	0	2	Good drift. One wounded Sockeye.
05/08/16	4	near	19:00	19:06	06:00	4.00	5	0	0	0	0	5	Good day, FN fish opening 6pm Friday to 6pm Sunday.
05/08/16	5	near	19:23	19:28	05:00	5.25	0	0	0	0	0	0	Good drift.
05/08/16	6	near	19:44	19:50	06:00	6.75	0	0	0	0	0	0	Good drift.
06/08/16	1	near	07:00	07:05	05:00	4.00	7	0	0	0	0	7	Good drift.
06/08/16	2	near	07:23	07:28	05:00	5.25	3	0	0	0	0	3	Good drift.
06/08/16	3	near	07:43	07:48	05:00	6.75	1	2	0	0	0	3	Good drift.
06/08/16	4	near	19:00	19:07	07:00	4.75	3	0	0	0	0	3	Good drift.
06/08/16	5	near	19:25	19:31	06:00	5.75	0	0	0	0	0	0	Good drift.
06/08/16	6	near	19:45	19:47	02:00	8.00	0	0	0	0	0	0	Incomplete drift. Net hung up at weir.
07/08/16	1	near	07:01	07:07	06:00	4.75	11	0	2	0	0	13	Good drift. Fish caught throughout net.
07/08/16	2	near	07:23	07:26	03:00	5.75	0	0	0	0	0	0	Incomplete drift. Hung up past the weir.
07/08/16	3	near	07:43	07:49	06:00	8.00	0	0	0	0	0	0	Good drift.
07/08/16	4	near	19:02	19:08	06:00	4.00	1	0	0	0	0	1	Good drift.
07/08/16	5	near	19:24	19:27	03:00	5.25	3	0	0	0	0	3	Incomplete drift. Hung up past the weir.
07/08/16	6	near	19:46	19:50	04:00	6.75	0	0	0	0	0	0	Good drift.
08/08/16	1	near	07:01	07:05	04:00	4.00	9	0	0	0	0	9	Bad drift. Net drifted into shore.
08/08/16	2	near	07:20	07:26	06:00	5.25	0	0	0	0	0	0	Good drift.
08/08/16	3	near	07:35	07:40	05:00	6.75	0	1	0	0	0	1	Good drift.
08/08/16	7	far	07:45	07:48	03:00	5.25	0	0	0	0	0	0	Good drift. 30m offshore.
08/08/16	4	near	19:09	19:11	02:00	4.75	2	0	0	0	0	2	Incomplete drift. Hung up past the weir.
08/08/16	5	near	19:26	19:31	05:00	5.75	4	0	0	0	0	4	Good drift.
08/08/16	6	near	19:46	19:51	05:00	8.00	0	0	0	0	0	0	Net hit bottom but managed to recover.
09/08/16	1	near	07:00	07:04	04:00	4.75	17	0	0	0	0	17	Incomplete drift. One large Sturgeon wrecked drift.
09/08/16	2	near	07:24	07:30	06:00	5.75	2	2	0	0	0	4	Good drift.
09/08/16	3	near	07:45	07:51	06:00	8.00	0	0	0	0	0	0	Good drift.
09/08/16	4	near	19:00	19:06	06:00	4.00	14	0	0	0	0	14	Good drift.
09/08/16	5	near	19:29	19:35	06:00	5.25	1	0	0	0	0	1	Good drift.

Appendix 2 cont.

Date	Drift	Location	Time Start	Time End	Duration	Mesh Size	Caught Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	Comments
09/08/16	6	near	19:46	19:52	06:00	6.75	5	2	0	0	0	7	Good drift.
10/08/16	1	near	07:00	07:05	05:00	4.00	16	2	2	0	0	20	Good drift. Fish caught throughout net.
10/08/16	2	near	07:24	07:30	06:00	5.25	0	0	0	0	0	0	Good drift.
10/08/16	3	near	07:44	07:50	06:00	6.75	0	1	0	0	0	1	Good drift.
10/08/16	4	near	19:00	19:06	06:00	4.75	4	0	0	0	0	4	Good drift.
10/08/16	5	near	19:25	19:28	03:00	5.75	0	0	0	0	0	0	Incomplete drift. Hung up 100 ft past the weir.
10/08/16	6	near	19:48	19:53	05:00	8.00	0	1	0	0	0	1	Good drift.
11/08/16	1	near	07:01	07:08	07:00	4.75	21	1	0	0	0	22	Good drift.
11/08/16	2	near	07:26	07:31	05:00	5.75	0	0	0	0	0	0	Good drift.
11/08/16	3	near	07:44	07:49	05:00	8.00	4	1	0	0	0	5	Good drift.
11/08/16	7	far	07:52	07:56	04:00	5.25	0	0	0	0	0	0	Good drift. 30m offshore.
11/08/16	4	near	19:00	19:07	07:00	4.00	6	1	0	0	0	7	Good drift. A few wounded fish.
11/08/16	5	near	19:23	19:28	05:00	5.25	1	0	0	0	0	1	Good drift. Wounded fish.
11/08/16	6	near	19:46	19:53	07:00	6.75	0	3	0	0	0	3	Good drift.
12/08/16	1	near	07:00	07:07	07:00	4.00	7	2	2	0	0	11	Good drift.
12/08/16	2	near	07:26	07:32	06:00	5.25	5	0	0	0	0	5	Good drift.
12/08/16	3	near	07:44	07:50	06:00	6.75	2	0	0	0	0	2	Good drift.
12/08/16	4	near	19:04	19:10	06:00	4.75	3	0	0	0	0	3	Good drift.
12/08/16	5	near	19:25	19:31	06:00	5.75	2	0	0	0	0	2	Good drift.
12/08/16	6	near	19:46	19:49	03:00	8.00	0	0	0	0	0	0	Incomplete drift. Hung up past weir, net trashed.
13/08/16	1	near	07:00	07:06	06:00	4.75	20	1	0	0	0	21	Good drift. Fish caught throughout net.
13/08/16	2	near	07:26	07:29	03:00	5.75	0	0	0	0	0	0	Incomplete drift. Hung up, net trashed.
13/08/16	3	near	07:46	07:52	06:00	8.00	4	1	0	0	0	5	Good drift.
13/08/16	4	near	19:00	19:06	06:00	4.00	0	1	0	0	0	1	Good drift.
13/08/16	5	near	19:26	19:32	06:00	5.25	0	0	0	0	0	0	Good drift.
13/08/16	6	near	19:46	19:51	05:00	6.75	0	3	0	0	0	3	Good drift.
14/08/16	1	near	07:00	07:05	05:00	4.00	6	3	2	0	0	11	Good drift.
14/08/16	2	near	07:27	07:32	05:00	5.25	6	0	0	0	0	6	Good drift.
14/08/16	3	near	07:45	07:50	05:00	6.75	1	0	0	0	0	1	Good drift.
14/08/16	4	near	19:01	19:06	05:00	4.75	2	1	0	0	0	3	Good drift. One large Sturgeon released itself.
14/08/16	5	near	19:22	19:27	05:00	5.75	0	0	0	0	0	0	Good drift.
14/08/16	6	near	19:44	19:49	05:00	8.00	0	0	0	0	0	0	Good drift. One fish hit the net but released itself.
15/08/16	1	near	07:01	07:06	05:00	4.75	15	1	0	0	0	16	Good drift.
15/08/16	2	near	07:24	07:29	05:00	5.75	0	1	0	0	0	1	Good drift.
15/08/16	3	near	07:44	07:49	05:00	8.00	1	0	0	0	0	1	Good drift.
15/08/16	7	far	07:53	07:56	03:00	5.25	0	0	0	0	0	0	Good drift. 30m offshore.
15/08/16	4	near	19:01	19:05	04:00	4.00	4	2	0	0	0	6	Incomplete drift. Net drifted into shore.
15/08/16	5	near	19:25	19:30	05:00	5.25	14	0	0	0	0	14	Good drift.
15/08/16	6	near	19:46	19:52	06:00	6.75	1	0	0	0	0	1	Good drift.
16/08/16	1	near	07:00	07:05	05:00	4.00	15	3	0	0	0	18	Good drift. Fish caught throughout.
16/08/16	2	near	07:25	07:31	06:00	5.25	2	0	0	0	0	2	Good drift.
16/08/16	3	near	07:44	07:50	06:00	6.75	2	0	0	0	0	2	Good drift.
16/08/16	4	near	19:00	19:05	05:00	4.75	5	0	0	0	0	5	Net hung up past weir but recovered.
16/08/16	5	near	19:25	19:31	06:00	5.75	4	4	0	0	0	8	Good drift. DFO boat ran through drift channel and scared fish away.
16/08/16	6	near	19:45	19:51	06:00	8.00	2	0	0	0	0	2	Good drift.
17/08/16	1	near	07:00	07:06	06:00	4.75	10	6	0	0	1	17	Good drift. One Steelhead dead.
17/08/16	2	near	07:24	07:30	06:00	5.75	0	0	0	0	0	0	Good drift.
17/08/16	3	near	07:42	07:48	06:00	8.00	3	2	0	0	0	5	Good drift.
17/08/16	4	near	19:00	19:03	03:00	4.00	0	2	0	0	0	2	Incomplete drift. Hung up just past the weir.
17/08/16	5	near	19:25	19:30	05:00	5.25	3	1	0	0	0	4	Good drift.

Appendix 2 cont.

			Time				Caught						
Date	Drift	Location	Start	End	Duration	Mesh Size	Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	Comments
17/08/16	6	near	19:44	19:50	06:00	6.75	0	0	0	0	0	0	Good drift.
18/08/16	1	near	07:00	07:05	05:00	4.00	3	1	1	0	0	5	Good drift.
18/08/16	2	near	07:25	07:28	03:00	5.25	2	1	0	0	0	3	Incomplete drift. Net hung up after weir.
18/08/16	3	near	07:44	07:48	04:00	6.75	3	1	0	0	0	4	Hung up, net trashed.
18/08/16	7	far	07:53	07:56	03:00	5.25	0	0	0	0	0	0	Good drift. 30m offshore.
18/08/16	4	near	19:00	19:05	05:00	4.75	2	0	0	0	0	2	Good drift.
18/08/16	5	near	19:25	19:31	06:00	5.75	1	0	0	0	0	1	Good drift.
18/08/16	6	near	19:45	19:51	06:00	8.00	2	2	0	0	0	4	Good drift.
19/08/16	1	near	07:10	07:16	06:00	4.75	7	3	0	0	0	10	Good drift.
19/08/16	2	near	07:24	07:28	04:00	5.75	2	0	0	0	0	2	Incomplete drift. Net hung up and damaged.
19/08/16	3	near	07:39	07:45	06:00	8.00	1	2	0	0	0	3	Good drift.
19/08/16	4	near	19:00	19:03	03:00	4.00	0	0	0	0	0	0	Incomplete drift. Net drifted into shore at weir.
19/08/16	5	near	19:25	19:31	06:00	5.25	0	0	0	0	0	0	Good drift.
19/08/16	6	near	19:45	19:51	06:00	6.75	0	0	0	0	0	0	Good drift.
20/08/16	1	near	07:00	07:02	02:00	4.00	5	0	0	0	0	5	Incomplete drift. Net hit bottom before weir.
20/08/16	2	near	07:18	07:24	06:00	5.25	17	1	0	0	0	18	Good drift.
20/08/16	3	near	07:42	07:48	06:00	6.75	1	2	0	0	0	3	Good drift.
20/08/16	4	near	19:00	19:03	03:00	4.75	0	0	0	0	0	0	Incomplete drift. Net hung up and damaged.
20/08/16	5	near	19:25	19:31	06:00	5.75	3	0	0	0	0	3	Good drift.
20/08/16	6	near	19:44	19:50	06:00	8.00	0	1	0	0	0	1	Good drift.
21/08/16	1	near	07:00	07:03	03:00	4.75	2	1	0	0	0	3	Incomplete drift. Hung up and another net damaged. Chinook wounded.
21/08/16	2	near	07:23	07:28	05:00	5.75	4	0	0	0	0	4	Good drift. One sockeye with disease on mouth
21/08/16	3	near	07:45	07:50	05:00	8.00	0	0	0	0	0	0	Good drift.
21/08/16	4	near	19:00	19:05	05:00	4.00	4	0	0	0	0	4	Good drift. Very windy tonight.
21/08/16	5	near	19:23	19:29	06:00	5.25	13	0	0	0	0	13	Good drift.
21/08/16	6	near	19:46	19:51	05:00	6.75	0	0	0	0	0	0	Good drift.
22/08/16	1	near	07:00	07:04	04:00	4.00	2	0	1	0	0	3	Incomplete drift. Hung up past weir.
22/08/16	2	near	07:20	07:26	06:00	5.25	2	0	0	0	0	2	Good drift.
22/08/16	3	near	07:45	07:50	05:00	6.75	1	0	0	0	0	1	Good drift.
22/08/16	7	far	07:54	07:57	03:00	5.25	0	0	0	0	0	0	Good drift.
22/08/16	4	near	19:00	19:06	06:00	4.75	3	1	0	0	0	4	Good drift.
22/08/16	5	near	19:23	19:29	06:00	5.75	1	1	0	0	0	2	Good drift.
22/08/16	6	near	19:46	19:51	05:00	8.00	1	1	0	0	0	2	Good drift.
23/08/16	1	near	07:00	07:04	04:00	4.75	2	2	0	0	0	4	Incomplete drift, net stalled. One Chinook hit net but released itself.
23/08/16	2	near	07:22	07:28	06:00	5.75	3	0	0	0	0	3	Good drift.
23/08/16	3	near	07:44	07:50	06:00	8.00	0	2	0	0	0	2	Good drift.
23/08/16	4	near	19:00	19:05	05:00	4.00	0	0	1	0	0	1	Good drift.
23/08/16	5	near	19:25	19:31	06:00	5.25	0	0	0	0	0	0	Good drift.
23/08/16	6	near	19:46	19:52	06:00	6.75	0	0	0	0	0	0	Good drift. One Sturgeon hit net but fell off.
24/08/16	1	near	07:00	07:07	07:00	4.00	5	5	2	0	0	12	Good drift.
24/08/16	2	near	07:28	07:33	05:00	5.25	3	1	0	0	0	4	Good drift. One wounded Sockeye.
24/08/16	3	near	07:44	07:50	06:00	6.75	1	0	0	0	0	1	Good drift. One wounded Sockeye.
24/08/16	4	near	19:04	19:10	06:00	4.75	3	0	1	0	0	4	Good drift. One badly wounded Sockeye.
24/08/16	5	near	19:23	19:29	06:00	5.75	1	2	1	0	0	4	Good drift.
24/08/16	6	near	19:45	19:50	05:00	8.00	0	1	0	0	0	1	Good drift. One Chinook fell off the net.
25/08/16	1	near	07:00	07:06	06:00	4.75	1	3	0	0	0	4	Good drift.
25/08/16	2	near	07:26	07:31	05:00	5.75	0	0	0	0	0	0	Net hit bottom but managed to recover.
25/08/16	3	near	07:43	07:49	06:00	8.00	0	3	0	0	0	3	Good drift.
25/08/16	7	far	07:55	07:57	02:00	5.25	0	0	0	0	0	0	Good drift. 30m offshore.
25/08/16	4	near	19:10	19:16	06:00	4.00	0	0	1	0	0	1	Good drift. Late start because of train blocking crossing.

Appendix 2 cont.

Date	Drift	Location	Time			Mesh Size	Caught						Comments
			Start	End	Duration		Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	
25/08/16	5	near	19:25	19:30	05:00	5.25	0	1	0	0	0	1	Good drift.
25/08/16	6	near	19:45	19:48	03:00	6.75	0	0	0	0	0	0	Incomplete drift. Hung up, net trashed.
26/08/16	1	near	07:00	07:05	05:00	4.00	1	5	5	0	0	11	Good drift. Lots of Chinook.
26/08/16	2	near	07:25	07:31	06:00	5.25	0	3	0	0	0	3	Good drift. A few wounded fish.
26/08/16	3	near	07:46	07:52	06:00	6.75	0	3	0	0	0	3	Good drift.
26/08/16	4	near	07:00	07:07	07:00	4.75	1	3	0	0	0	4	Net hit bottom. Lost two Chinook.
26/08/16	5	near	07:23	07:29	06:00	5.75	3	1	0	0	0	4	Good drift.
26/08/16	6	near	07:44	07:49	05:00	8.00	0	1	0	0	0	1	Good drift.
27/08/16	1	near	07:00	07:07	07:00	4.75	8	7	0	0	0	15	Good drift.
27/08/16	2	near	07:26	07:32	06:00	5.75	0	0	0	0	0	0	Good drift.
27/08/16	3	near	07:44	07:50	06:00	8.00	0	3	0	0	0	3	Good drift. Fish caught throughout.
27/08/16	4	near	19:00	19:06	06:00	4.00	3	3	2	0	0	8	Good drift. Fish caught throughout.
27/08/16	5	near	19:24	19:30	06:00	5.25	1	1	0	0	0	2	Good drift.
27/08/16	6	near	19:45	19:52	07:00	6.75	0	4	0	0	0	4	Good drift. One large rock picked up from bottom.
28/08/16	1	near	07:02	07:08	06:00	4.00	1	0	4	0	1	6	Good drift. One Steelhead released safely.
28/08/16	2	near	07:24	07:31	07:00	5.25	0	0	1	0	0	1	Good drift.
28/08/16	3	near	07:45	07:48	03:00	6.75	0	2	0	0	0	2	Hung up bad. Broke net in half.
28/08/16	4	near	19:00	19:06	06:00	4.75	5	3	2	0	0	10	Good drift.
28/08/16	5	near	19:26	19:32	06:00	5.75	0	0	0	0	0	0	Good drift. Two fish hit the net but were gone when the net was pulled in.
28/08/16	6	near	19:45	19:51	06:00	8.00	0	0	0	0	0	0	Good drift.
29/08/16	1	near	07:00	07:06	06:00	4.75	9	1	7	1	0	18	Good drift. Fish caught throughout net. 1 Coho unable to revive.
29/08/16	2	near	07:24	07:27	03:00	5.75	0	0	0	0	0	0	Incomplete drift. Net hit bottom.
29/08/16	3	near	07:44	07:48	04:00	8.00	0	1	0	0	0	1	Incomplete drift. Net drifted into shore.
29/08/16	7	far	07:51	07:54	03:00	5.25	0	0	0	0	0	0	Good drift. 30m offshore.
29/08/16	4	near	19:03	19:09	06:00	4.00	2	2	0	1	0	5	Good drift. One Coho released.
29/08/16	5	near	19:24	19:30	06:00	5.25	0	1	0	0	0	1	Good drift.
29/08/16	6	near	19:46	19:52	06:00	6.75	0	0	0	0	0	0	Net hit bottom. Broke in two spots.
30/08/16	1	near	07:00	07:06	06:00	4.00	11	5	5	0	0	21	Good drift. Fish caught throughout. One Pikeminnow caught and released.
30/08/16	2	near	07:23	07:29	06:00	5.25	1	4	0	1	0	6	Good drift. One Coho dead. One spotless Chinook.
30/08/16	3	near	07:46	07:51	05:00	6.75	0	2	0	0	0	2	Good drift. One Chinook fell off at boat.
30/08/16	4	near	19:02	19:09	07:00	4.75	8	1	0	0	0	9	Good drift.
30/08/16	5	near	19:25	19:30	05:00	5.75	0	1	0	0	0	1	Good drift. One Chinook got away.
30/08/16	6	near	19:44	19:50	06:00	8.00	0	0	0	0	0	0	Hung up net broke.
31/08/16	1	near	07:00	07:04	04:00	4.75	2	3	0	0	0	5	Incomplete drift. Hung up just past weir, net trashed.
31/08/16	2	near	07:25	07:31	06:00	5.75	0	0	0	0	0	0	Net hit bottom but recovered.
31/08/16	3	near	07:48	07:52	04:00	8.00	0	3	0	0	0	3	Good drift.
31/08/16	4	near	19:00	19:06	06:00	4.00	3	1	2	0	0	6	Good drift.
31/08/16	5	near	19:23	19:29	06:00	5.25	0	0	0	0	0	0	Good drift. No fish.
31/08/16	6	near	19:44	19:50	06:00	6.75	0	3	0	0	0	3	Good drift.
01/09/16	1	near	07:00	07:06	06:00	4.00	6	5	6	1	0	18	Good drift. Fish caught throughout. One Coho released safely.
01/09/16	2	near	07:23	07:29	06:00	5.25	0	2	0	0	0	2	Good drift.
01/09/16	3	near	07:43	07:49	06:00	6.75	1	2	0	0	0	3	Good drift.
01/09/16	7	far	07:52	07:55	03:00	5.25	0	0	0	0	0	0	Good drift. 30m offshore.
01/09/16	4	near	19:00	19:06	06:00	4.75	3	0	1	2	0	6	Good drift. One Coho released safely and one Coho dead.
01/09/16	5	near	19:25	19:31	06:00	5.75	0	0	0	0	0	0	Good drift.
01/09/16	6	near	19:45	19:51	06:00	8.00	0	2	0	0	0	2	Good drift.
02/09/16	1	near	07:00	07:06	06:00	4.75	4	5	1	0	0	10	Good drift.
02/09/16	2	near	07:23	07:29	06:00	5.75	0	2	0	0	0	2	Good drift.
02/09/16	3	near	07:46	07:51	05:00	8.00	0	0	0	0	0	0	Good drift.
02/09/16	4	near	19:00	19:06	06:00	4.00	1	2	0	0	0	3	Good drift.

Appendix 2 cont.

			Time				Caught						
Date	Drift	Location	Start	End	Duration	Mesh Size	Sockeye	Chinook	Chin. Jacks	Coho	Sthd	Total	Comments
02/09/16	5	near	19:26	19:31	05:00	5.25	0	0	0	0	0	0	Good drift.
02/09/16	6	near	19:45	19:51	06:00	6.75	0	2	0	1	0	3	Good drift, one Coho released.