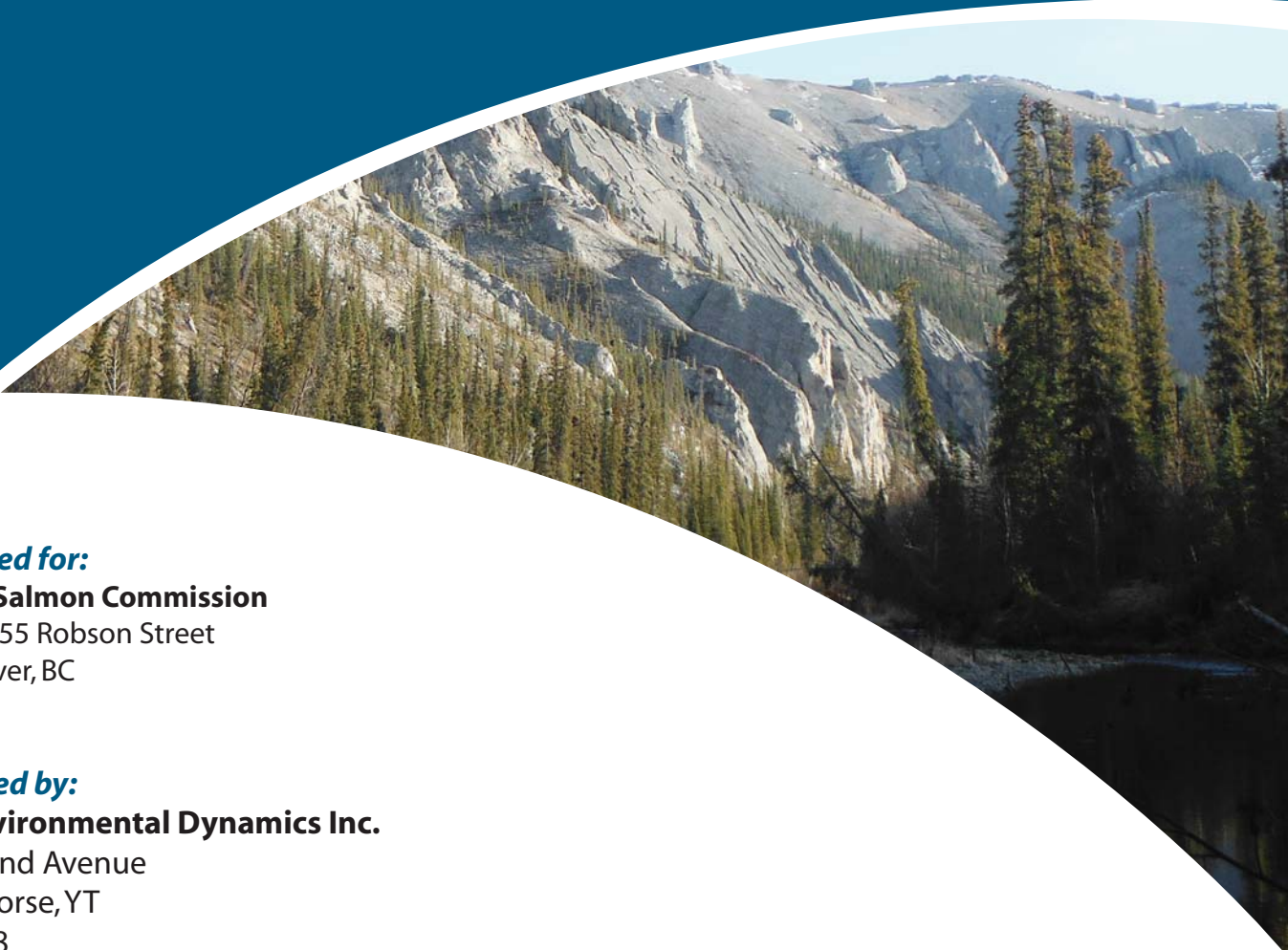


2013 Porcupine River Chum Salmon Telemetry Program



Prepared for:

Pacific Salmon Commission

600 - 1155 Robson Street
Vancouver, BC
V6E 1B5

Prepared by:

EDI Environmental Dynamics Inc.

2195 -2nd Avenue
Whitehorse, YT
Y1A 3T8

EDI Contact:

Ben Snow

867.393.4882

EDI Project No:

13-Y-0325
January 2014



This page is intentionally blank.



EXECUTIVE SUMMARY

In 2013, the Department of Fisheries and Oceans transitioned the stock assessment of chum salmon in the Porcupine River from an enumeration weir on the Fishing Branch River to a sonar program located approximately 2 km downstream of Old Crow, YT. In 2011 and 2012, the weir and sonar programs were operated together and direct comparisons of the counts from the two programs were possible. The weir was not operated in 2013; however, additional comparative data was desired to allow for a better understanding of the relationship between weir and sonar counts. As such, EDI Environmental Dynamics (EDI) captured and applied dorsal implant coded radio tags to 94 chum salmon near Old Crow and conducted telemetry tracking flights to track tagged chum in areas of the Porcupine River watershed upstream of the sonar site. Tags were applied at the sonar site and at two locations downstream of the site, between August 24 and October 4, 2013; telemetry tracking flights were conducted on October 12 and 17, and from October 26 to 28, 2013.

In total, 90 of 94 tags were successfully relocated. A considerable number of tags (29) were captured in the Vuntut Gwitch'in First Nation chum salmon subsistence fishery and were turned in to the Vuntut Gwitch'in Government's (VGG) Natural Resources Department. Seven additional tags were located in the vicinity of Old Crow and were thought to have been captured in the local fishery and not turned in to VGG or died near the tagging site. These 36 tags were removed from the pool of deployed tags that were successfully relocated; of the remaining 54 tags, 74.1% (40 of 54) were relocated in the Fishing Branch River upstream of the weir location. This proportion is similar to the 2011 and 2012 proportions of chum salmon that spawned upstream of the weir, as determined by floy tag recoveries. Of the remaining radio tagged chum salmon, 5 tags were relocated in the Fishing Branch River downstream of the weir site, 6 tags were relocated in the upper Porcupine River mainstem, one tag was relocated in David Lord Creek, and one in the Bluefish River. One tag was also captured by a subsistence fisher on the Porcupine River in Alaska, approximately 50 km downstream of the Canada/U.S. border.

The total 2013 Porcupine River chum salmon sonar count was 35,626 but 1,380 chum salmon were captured in the VGFN subsistence fishery upstream of the tagging sites. Chum salmon captured upstream of the tagging site were removed from the total sonar count, resulting in adjusted total of 34,246 (EDI 2014a). Based on the percentage of tagged chum salmon found above a weir (74.1%), an estimated 25,376 chum salmon spawned upstream of the weir this year. The data collected by this program provide additional insight into the spawning of chum salmon in the Porcupine River, and will help in the development of appropriate escapement goals for the Porcupine River sonar program in the future.



ACKNOWLEDGEMENTS

Funding for this project was provided by the Yukon River Salmon Restoration and Enhancement Fund. Elizabeth MacDonald (Fisheries and Oceans Canada) provided technical support and reviewed the draft report. William Josie and Erica Tizya, of the Vuntut Gwitch'in Government Natural Resources Department provided general project direction and assistance with logistics, and collected tags recovered in the local fishery. Local VGFN members Robert Kaye, Donovan Frost, and Shane Charlie assisted with radio tag applications and provided the practical input to ensure the project's success.

AUTHORSHIP

This report was prepared by EDI Environmental Dynamics Inc. Staff who contributed to this project include:

- Ben Snow, B.Sc., R.P.Bio Primary Author
- Ben Schonewille, B.Sc., R.P.BioReport Editing
- Charles Blysak, Dipl. Tech. Field Crew Leader
- Joel MacFabe Field Technician, Tag Applications
- Lucas Wheeler Field Technician, Tag Applications
- Jake DuncanSenior Field Technician, Tag Tracking
- Laura Grieve, B.Sc.GIS



TABLE OF CONTENTS

| | | |
|----------|--|-----------|
| 1 | INTRODUCTION | 1 |
| 1.1 | PROJECT BACKGROUND AND GOALS | 1 |
| 1.2 | RATIONALE FOR TRANSITION TO SONAR BASED ESCAPEMENT ESTIMATES | 2 |
| 1.3 | STUDY AREA | 2 |
| 2 | METHODS | 4 |
| 2.1 | CHUM SALMON RADIO TAGGING..... | 4 |
| 2.2 | TRACKING RADIO TAGGED CHUM SALMON..... | 5 |
| 2.3 | DETERMINING LOCATIONS OF RADIO TAGGED CHUM SALMON..... | 7 |
| 3 | RESULTS | 9 |
| 3.1 | CHUM SALMON TAGGING..... | 9 |
| 3.1.1 | <i>Drift and Set Netting Capture Data</i> | 9 |
| 3.1.2 | <i>Radio Tag Deployment Data</i> | 9 |
| 3.2 | RELOCATIONS OF RADIO TAGGED CHUM SALMON | 10 |
| 3.2.1 | <i>Mortality Sensor Status</i> | 14 |
| 4 | SPAWNING HABITAT CHARACTERISTICS OF SURVEYED WATERSHEDS | 15 |
| 4.1.1 | <i>Fishing Branch River – North Fork</i> | 15 |
| 4.1.2 | <i>Miner River</i> | 16 |
| 4.1.3 | <i>Whitestone River</i> | 16 |
| 4.1.4 | <i>Porcupine River Mainstem</i> | 17 |
| 4.1.5 | <i>Bell River</i> | 17 |
| 4.1.6 | <i>Driftwood River</i> | 17 |
| 4.1.7 | <i>David Lord Creek</i> | 18 |
| 4.1.8 | <i>Bluefish River</i> | 18 |
| 4.1.9 | <i>Crow River</i> | 19 |
| 5 | DISCUSSION..... | 21 |
| 5.1 | DEVELOPMENT OF LOCAL CAPACITY..... | 21 |
| 5.2 | ADJUSTED TOTAL RADIO TAG NUMBERS..... | 21 |
| 5.3 | ESTIMATE OF CHUM SALMON PASSAGE AT THE FISHING BRANCH WEIR..... | 22 |
| 5.4 | COMPARISON TO HISTORICAL DATA..... | 22 |
| 5.4.1 | <i>Mark-Recapture and CPUE Data</i> | 22 |
| 5.4.2 | <i>2011 and 2012 Porcupine River Sonar Data</i> | 23 |
| 5.5 | RECAPTURE OF TAGS IN LOCAL FISHERY | 24 |
| 5.6 | FATES OF MISSING RADIO TAGS | 25 |
| 6 | CONCLUSIONS | 26 |
| 7 | REFERENCES CITED | 27 |
| 7.1 | PERSONAL COMMUNICATIONS..... | 28 |

| | |
|------------------|--|
| APPENDIX A. | TAG FREQUENCY LIST PROVIDED BY ADVANCED TELEMTRY SYSTEMS |
| APPENDIX B. | DRIFT AND SET NETTING EFFORT AND FISH CAPTURE DATA |
| APPENDIX C. | LOCATIONS OF TAGS DETECTED DURING RADIO TRACKING |



LIST OF TABLES

| | | |
|-----------|---|----|
| Table 1. | Frequencies of radio tags applied to chum salmon at the Porcupine River sonar site in 2013. | 5 |
| Table 2. | Summary of chum salmon telemetry surveys in the Porcupine River watershed in 2013. | 6 |
| Table 3. | Summary of 2013 weekly drift netting catches at and near the Porcupine River sonar site. | 9 |
| Table 4. | Summary of 2013 weekly set netting catches at and near the Porcupine River sonar site. | 9 |
| Table 5. | Summary of weekly chum salmon radio tag deployments on the Porcupine River in 2013. | 10 |
| Table 6. | Weekly summary of sex and fork length data from chum salmon radio tagged in the Porcupine River in 2013. | 10 |
| Table 7. | Summary of locations of chum salmon radio tagged in the Porcupine River in 2013. | 11 |
| Table 8. | Summary of mortality sensor status for radio tagged chum salmon in the Porcupine River in 2013 (excludes tagged chum salmon recaptured in local subsistence fishery). | 14 |
| Table 9. | Summary of locations of chum salmon radio tagged in the Porcupine River in 2013; tags that were recaptured in the local fishery, found in the vicinity of Old Crow or not found during tracking have been removed. | 22 |
| Table 10. | Relative proportion of tagged chum salmon counted at the Fishing Branch River weir (Data Source: EDI 2011). | 23 |
| Table 11. | Comparison of harvest adjusted Porcupine River sonar and Fishing Branch River weir chum salmon passage estimates from 2011 and 2012 (EDI 2012, EDI 2013a), and 2013 radio telemetry data. The Fishing Branch weir estimate for 2013 is derived from the adjusted proportion of radio tag detections upstream of the weir site. | 23 |
| Table 12. | Comparison of the recapture rate of radio tagged chum salmon to overall capture of chum in salmon the VGFN subsistence fishery upstream of the Porcupine River sonar site in 2013. | 24 |

LIST OF MAPS

| | | |
|--------|--|----|
| Map 1. | Overview map of the Porcupine River watershed showing chum radio tag application sites and extent of telemetry surveys. | 3 |
| Map 2. | Locations of radio tagged chum salmon in the southern portion of the Porcupine River watershed in October, 2013. | 12 |
| Map 3. | Locations of radio tagged chum salmon in the northern portion of the Porcupine River watershed in October, 2013. | 13 |

LIST OF PHOTOGRAPHS

| | | |
|----------|--|---|
| Photo 1. | A male chum salmon with an attached radio tag at the base of the dorsal fin, and posterior secondary spaghetti tag; September 24, 2013. | 5 |
| Photo 2. | Cessna 172 used during radio telemetry flights, with radio antennas mounted on wing struts. October 12, 2013. | 7 |



1 INTRODUCTION

1.1 PROJECT BACKGROUND AND GOALS

Salmon migrating up the Porcupine River through the Traditional Territory of the Vuntut Gwitch'in First Nation (VGFN) are culturally important to VGFN citizens. Old Crow, the only Canadian community on the Porcupine River, relies on the salmon fishery as a traditional food source. The subsistence harvest of salmon on the Porcupine River is an important component of Old Crow resident's diets.

The Yukon River Panel was established to manage "transboundary" salmon stocks, which move through waters subject to both U.S. and Canadian fisheries management processes, in a cooperative forum. Three salmon species spawn in the Canadian portion of the Porcupine River: Chinook (*Oncorhynchus tshawytscha*), chum (*Oncorhynchus keta*) and coho (*Oncorhynchus kisutch*). Chinook and chum salmon are managed jointly through the Yukon River Panel's Joint Technical Committee (JTC) process; however, there is currently no joint management process for coho salmon.

Prior to 2013, a Fisheries and Oceans Canada (DFO) enumeration weir on the Fishing Branch River (a tributary to the Porcupine River) historically recorded annual passage rates between approximately 5,057 and 186,000 chum salmon, with an average annual return of approximately 44,000 (1998 to 2011; JTC 2012). This weir had been used to enumerate chum salmon in the Fishing Branch River, and to fulfill Canadian management obligations to provide an index of chum salmon escapement in the Canadian portion of the Porcupine River.

In 2009, the Vuntut Gwitch'in Government (VGG) initiated the Porcupine River sonar program, to allow for the in-season enumeration of chum salmon at a site located 2 km downstream of Old Crow. The Porcupine River sonar program has provided chum salmon escapement estimates since 2011. In response to the development of the sonar program, DFO discontinued the operation of the Fishing Branch River chum salmon enumeration weir after the 2012 chum salmon run.

The primary goal of the Porcupine River chum salmon telemetry program was to help enable the transition from weir to sonar based escapement goals as counts at the Porcupine River sonar site must be calibrated to counts from the Fishing Branch River weir. The concurrent operation of the sonar and the Fishing Branch River weir in 2011 and 2012 provided two years of comparative data. In 2013, no weir count was available. Radio tagging of chum salmon at the sonar site, and subsequent tracking of these salmon provides a means to estimate the proportion of fish that were counted on the sonar and were destined for spawning areas upstream of the weir. This proportion can be used to estimate what the 2013 Fishing Branch River weir count would have been. This provides three years of comparative of sonar and weir data, to help transition the escapement goals from the weir to the sonar program. A secondary goal of this project was to locate and document chum salmon spawning in other locations within the Porcupine River watershed, including portions of the Fishing Branch River downstream of the former weir. This program also collected information on chum salmon spawning habitat in these areas, and helped to develop local capacity to conduct fisheries work within the community of Old Crow.



1.2 RATIONALE FOR TRANSITION TO SONAR BASED ESCAPEMENT ESTIMATES

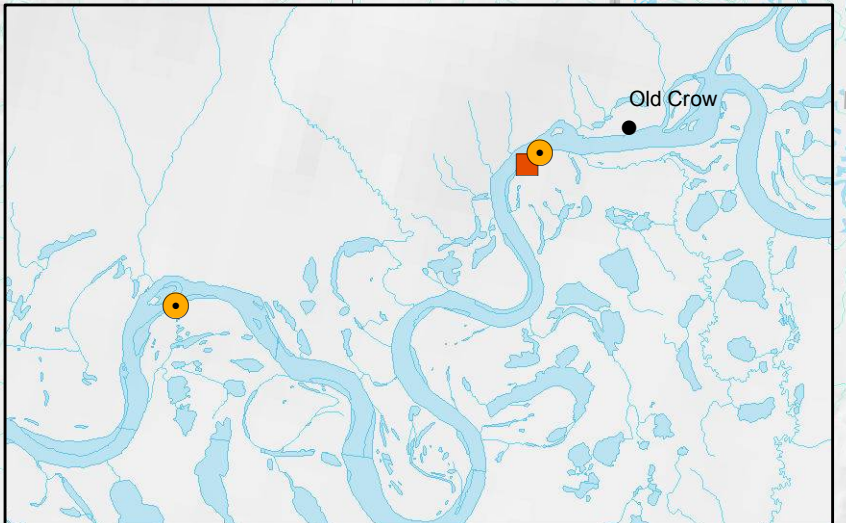
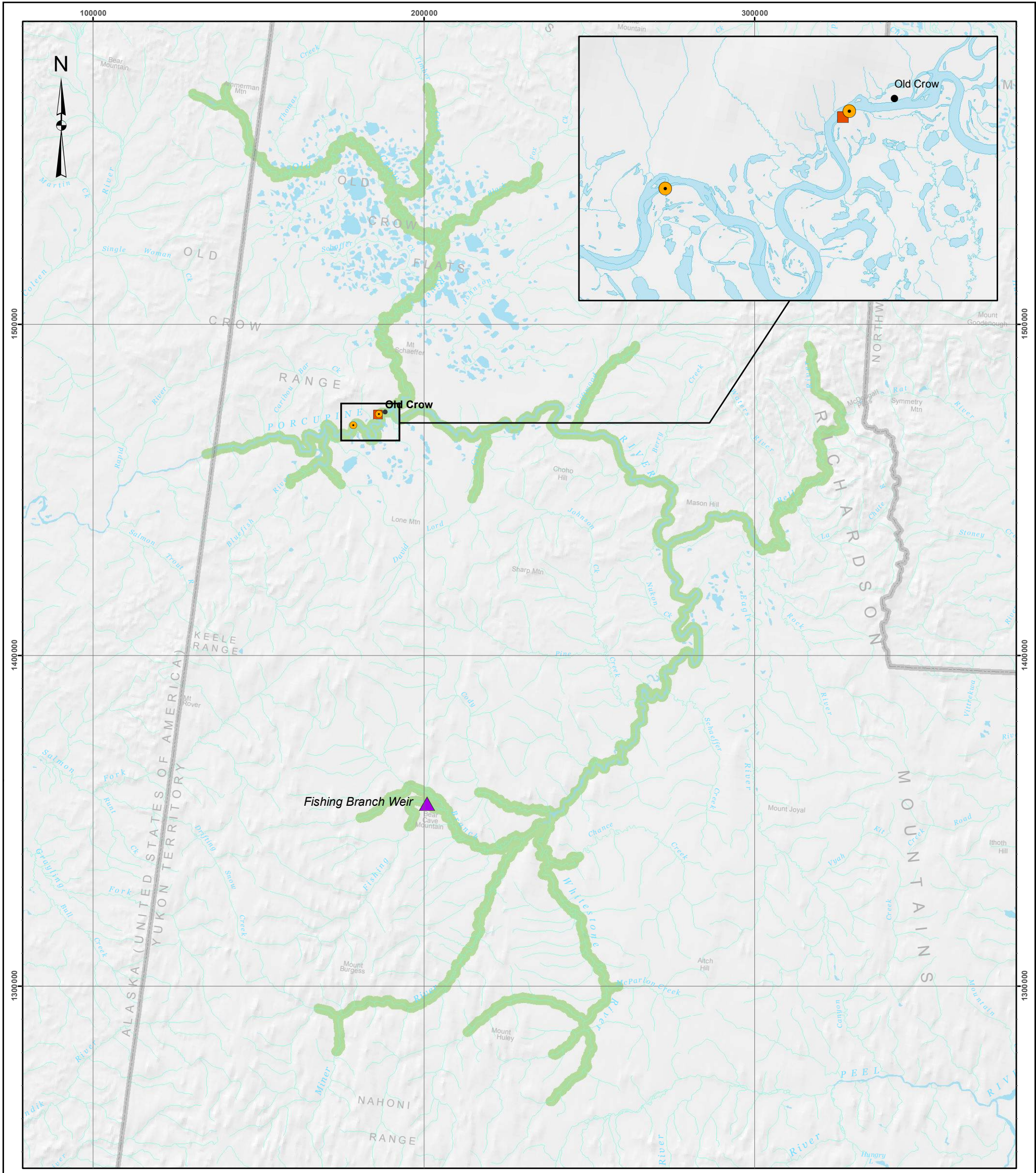
The primary motivation for the transition of the of the Porcupine River chum salmon stock assessment from weir based to sonar based escapement goals is related to the effective management of this stock by fisheries managers. The VGFN chum salmon subsistence fishery is the only harvest of the Porcupine River chum salmon in the Canadian portion of the river. The Fishing Branch weir is a considerable distance upstream of this fishery; however, the Porcupine River sonar site is downstream of a large portion of this fishery. The data collected at the sonar site provides fisheries managers with a timely, in-season escapement data to help fisheries managers and resource users manage the local fishery in a manner that ensures a healthy Porcupine River chum salmon population in the future.

1.3 STUDY AREA

The Porcupine River is one of the largest tributaries in the Yukon River watershed, much of which is located within the Traditional Territory of the VGFN. It has a number of large tributaries within Canada, including the Whitestone, Miner, and Fishing Branch rivers (Map 1). The only Canadian settlement within the Porcupine River watershed is the community of Old Crow, located approximately 80 kilometres east of the Canada/U.S. border at the confluence of the Old Crow and Porcupine rivers. Old Crow has a population of approximately 300 people, mainly VGFN members.

Radio tags were primarily applied at the Porcupine River sonar site; approximately 2 km downstream of the community of Old Crow (Map 1). Several tags were also applied at a site located several kilometers downstream of the Porcupine River sonar site, where Mark-Recapture and CPUE netting had been conducted in previous years (Map 1; Snow 2012). No tags were applied upstream of Old Crow.

Radio tag tracking flights were flown over the entire Canadian portion of the Porcupine River mainstem. Tracking flights were also flown over all major tributaries, including the Miner, Whitestone, Fishing Branch (including the North Fork), Bell, Crow, Driftwood and Bluefish Rivers (Map 1). Smaller tributary streams that were surveyed included David Lord, Black Fox, Timber, Cody, Chance and McParlon creeks (Map 1).



Legend

- Approximate Location of Tagging Site
- Approximate Location of Sonar Site
- ▲ Fishing Branch Weir - Inactive
- Extent of Telemetry Surveys (2013)

Overview map of the Porcupine River watershed showing chum radio tag application sites and extent of telemetry surveys

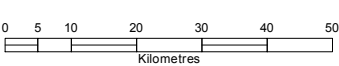
Data Sources
 1,000,000 Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Natural Resources Canada. All Rights Reserved.

Digital Elevation Model provided by Alaska State Geospatial Data Clearing House - <http://www.asgdc.state.ak.us/>.

1:1,000,000 National Topographic Database (NTDB) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomatics.yukon.ca.

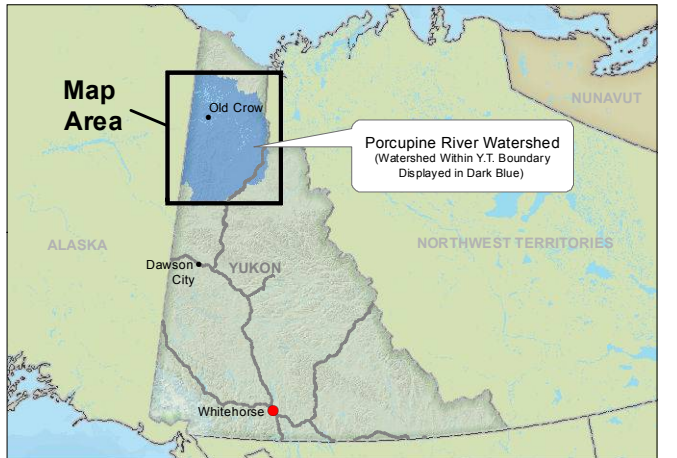
Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. (2013) was obtained using Garmin GPS technology.

Disclaimer
 This document is not an official land survey and the spatial data presented is subject to change.



Map Scale 1:1,100,000 (printed on 11 x 17)
 Map Projection: North American Datum 1983 CSRS Yukon Albers

| | | | |
|--------------|--------------------|------------------|--------------|
| Drawn: LG | Checked: BSn/MP | Date: 29/01/2014 | MAP 1 |
|--------------|--------------------|------------------|--------------|





2 METHODS

2.1 CHUM SALMON RADIO TAGGING

The Porcupine Sonar program began operation on August 24, 2013 and chum salmon were radio tagged at and near the sonar site from August 24, to October 4, 2013. Tags were applied throughout the chum salmon run, with a weekly target application rate of approximately 15 tags. Tags were also applied proportionally among male and female fish, with the knowledge males are typically more common and would therefore represent a greater proportion of the total tags than females.

Chum salmon were initially captured via six minute drift nets sets; however, it was determined that additional effort was required to capture a sufficient number of chum salmon to meet the targeted weekly tag application rate. From September 6 to 30^A, set netting was periodically conducted on an ‘as-needed’ basis, to increase the fishing effort and capture rates of chum salmon. Drift netting was conducted in onshore and offshore areas, at the Porcupine River sonar site; onshore drifts were conducted on the left bank of the river. All drifts were approximately 6 minutes in length. Set nets were deployed downstream of the Porcupine River sonar site (Map 1); these locations had been used during previous chum mark-recapture programs (Snow 2010) and were known to be effective fishing sites. There are no known chum salmon spawning areas between these two sites. Set nets were checked regularly (approximately hourly). The same gill nets were used in both the drift and set net fisheries; these nets were 100 feet in length by approximately 10 feet deep (mesh depth of 29, using cable salmon net mesh). Nets were single panels, with mesh sizes of 4.5, 5 and 6 inches.

Chum salmon captured in the drift and set net fisheries were quickly removed from the net and placed in a water filled tote to recover. Fish were observed for any signs of injury (e.g. lacerations, bleeding from gills), and healthy fish were selected for tagging. Scale samples were collected from all captured chum and delivered to DFO for processing; any injured chum salmon were sexed, measured, and released. All other captured fish were identified to species, measured and released.

Selected chum were fitted with ATS (Advanced Telemetry Systems) model F2050 dorsal implant tags. Tags were applied using hollow aluminum tagging needles, and were attached the dorsal side of chum salmon, near the base of the dorsal fin. Tags were secured to each chum salmon using the attached wires, crimps and padding discs provided by ATS (Photo 1). A secondary coded orange “spaghetti” tag was applied to each radio tagged chum (Photo 1). Spaghetti tags were meant to make radio tagged fish more visible to local fishers; tags were brightly colored and fishers were accustomed to looking for tags due to previous salmon chum research programs in the area. Following each successful tagging, fish were allowed to recover once more and were inspected for any signs of injury or unusual stress post-tagging; healthy tagged fish were released.

^A A sufficient number of fish were captured via drift netting from October 1 to 4 to install the remaining few tags.



Photo 1. A male chum salmon with an attached radio tag at the base of the dorsal fin, and posterior secondary spaghetti tag; September 24, 2013.

A total of 95 radio tags on four different frequencies were utilized for this project, as shown in Table 1. Ninety four tags were applied to chum salmon, and one tag was retained a test tag, to allow for the testing of the radio receiver and antennas, prior to tracking flights. Each tag was coded with a unique identifier; a full list of tag frequency and unique tag identifiers is provided in APPENDIX A. Tags were also encoded with a mortality sensor, to help deduce whether tracked chum had reached their terminal spawning destinations. Mortality sensors were pre-set to activate if no movement was registered by the tag for 24 hours or more.

Table 1. Frequencies of radio tags applied to chum salmon at the Porcupine River sonar site in 2013.

| Tag Frequency | Number of Tags |
|----------------------|----------------|
| 148.250 | 25 |
| 148.383 | 25 |
| 148.554 ^A | 24 |
| 148.859 | 20 |

^A One tag was retained as a tester tag.

2.2 TRACKING RADIO TAGGED CHUM SALMON

Radio tagged chum salmon were tracked on three separate tracking flights, conducted on October 11, 17 and 26-28, 2013. The locations that were flown on each survey are shown in Table 2. The Fishing Branch River mainstem was flown on all surveys, to ensure that all tagged fish that spawned upstream of the weir were detected.



Table 2. Summary of chum salmon telemetry surveys in the Porcupine River watershed in 2013.

| Date of Tracking Flight | Survey Locations | |
|--------------------------------|---|--|
| October 11, 2013 | Fishing Branch River main fork, upstream and downstream of the weir site | Miner River |
| October 17, 2013 | Fishing Branch River main fork, upstream and downstream of the weir site Porcupine River mainstem from the Whitestone confluence to Old Crow | Bell River Cody Creek East fork of the Whitestone River Driftwood River |
| October 26 to 28, 2013 | Fishing Branch River main fork, upstream and downstream of the weir site Miner River, including Fishing Creek Porcupine River mainstem from the Whitestone River confluence to Canada/U.S. border | North fork of the Fishing Branch River Whitestone River mainstem, including middle and north forks. Crow River, including Blackfox and Timber Creeks Bluefish River David Lord Creek |

Radio tracking on October 11 and 26-28 was conducted by an EDI technician (October 11) and biologist (October 26-28), using a Cessna 172 chartered from Dawson City. Radio antennas were mounted to each wing of the plane, to allow for optimal detection of tags on either side of the plane's flight path. The October 17 survey was flown by two DFO biologists in a Maule 90, chartered from Whitehorse (Photo 2). A similar antenna configuration was used. All tagged fish were tracked using an ATS model R4520C GPS equipped receiver; the same receiver unit was used on all flights. The frequencies of applied tags were input into the receiver, and the receiver was set to cycle through each frequency at a scan rate of 3 seconds per channel. Prior to the tracking flights, the accuracy of the receiver's GPS was tested against a handheld GPS unit of known accuracy and found to be within ± 10 m.



Photo 2. Cessna 172 used during radio telemetry flights, with radio antennas mounted on wing struts. October 12, 2013.

While tracking, the plane was flown as low as possible (300 to 500 feet), at speeds ranging from 100 to 130 km/h (the slowest possible speed, dependent on wind conditions). When a tag tone was heard by the technician/biologist, the frequency was locked using the receiver's "hold" function and the tag was decoded. When required, the pilot was asked to fly a loop to allow the receiver sufficient time to detect the tag. On October 11 and 26, the Fishing Branch River (where many tagged chum were expected to have spawned) was flown four times, with one frequency on 'hold' for each pass. This facilitated decoding of all tags in the area, and helped ensure that no tags were missed while the receiver was cycling through frequencies.

A number of tags were recaptured in the local fishery and turned in to VGG's Natural Resource department; these tags were collected during a stopover in Old Crow on the final survey. The collected tags were deactivated using magnets supplied by ATS. Several over flights of Old Crow were conducted after the tags were deactivated, to locate any tags that had been captured in the local fishery but not turned in to VGG.

2.3 DETERMINING LOCATIONS OF RADIO TAGGED CHUM SALMON

The locations of all chum salmon detected during radio tracking flights were determined from the recorded telemetry data. For each tag that was decoded, the R4520C radio receiver recorded the date, time, frequency, tag identifier, signal strength and GPS coordinates (UTMs). After each survey, this data was downloaded from the receiver and exported to excel. Data from all three surveys was compiled together for further analysis.



Each tag was set to continually broadcast its data, and therefore several data records were collected for most tags. To determine the final position of each tagged chum salmon, the data records from all surveys were sorted by frequency, tag identifier and signal strength. For each tag, the data record with the highest signal strength was taken as the best approximation of the tag's location.

To determine the status of a tag's mortality sensor, the highest signal strength record was examined to see if the mortality sensor was in the 'on' position. If the highest signal strength was in the 'off' position, but at a later date the tag had recorded an 'on' signal, the record from the later date was taken indicating mortality. In most cases, the mortality sensors provide a good indication of whether a tagged fish is alive or dead; however, false positive are possible. For example, a chum carcass that is caught on larger woody debris in an area of high current could be moving enough to maintain the mortality sensor in the "off" position, erroneously indicating this fish was still alive. For this purposes of this project, the status of the mortality sensors on tagged chum salmon were taken as indicator of the vitality of each tagged chum, but were not taken as proof that a particular chum salmon was alive or dead.



3 RESULTS

3.1 CHUM SALMON TAGGING

3.1.1 Drift and Set Netting Capture Data

A summary of weekly drift and set net catches are presented in Table 4; daily fish capture data is included in Appendix B. Sixty-four chum salmon and one resident fish (an inconnu) were captured by drift netting (Table 3). Set nets (Table 4) captured sixty-three chum salmon and three other fish species (one longnose sucker, one northern pike and one coho salmon).

Table 3. Summary of 2013 weekly drift netting catches at and near the Porcupine River sonar site.

| Program Week | Chum Salmon Captured | Other Fish Species Captured | Total Fish Captured | Chum Proportion (%) |
|---------------------------------------|----------------------|-----------------------------|---------------------|---------------------|
| August 24 - August 30 | 14 | 1 | 15 | 93.3 |
| August 31 - September 6 | 8 | 0 | 8 | 100 |
| September 7 - September 13 | 7 | 0 | 7 | 100 |
| September 14 - September 20 | 9 | 0 | 9 | 100 |
| September 21 - September 27 | 10 | 0 | 10 | 100 |
| September 28 - October 4 ^A | 16 | 0 | 16 | 100 |
| Total | 64 | 1 | | - |
| Program Mean | - | - | - | 98.8 |

^A Partial week, includes catch data from September 28 only.

Table 4. Summary of 2013 weekly set netting catches at and near the Porcupine River sonar site.

| Program Week | Chum Salmon Captured | Other Fish Species Captured | Total Fish Captured | Chum Proportion (%) |
|--|----------------------|-----------------------------|---------------------|---------------------|
| August 31 - September 6 ^A | 5 | 0 | 5 | 100 |
| September 7 - September 13 | 12 | 0 | 12 | 100 |
| September 14 - September 20 ^B | 0 | 0 | 0 | -- |
| September 21 - September 27 | 30 | 3 | 33 | 90.9 |
| September 28 - October 4 | 16 | 0 | 16 | 100 |
| Total | 63 | 3 | 66 | - |
| Program Mean | - | - | - | 97.7 |

^A Partial week, includes only September 6

^B No set netting conducted during this week.

3.1.2 Radio Tag Deployment Data

A summary of weekly radio tag deployment totals are shown in Table 5. Tag application rates were spaced out through the run, with the exception of the week of September 14-20 (Table 5); a high water event prevented all set netting and reduced drift netting efforts during this week. Additional tags were applied in the following week, to make up for this low rate of tag applications. Detailed drift netting and set netting data, and information on the location and date that each radio tag was applied can be found in Appendix B.



Table 5. Summary of weekly chum salmon radio tag deployments on the Porcupine River in 2013.

| Program Week | Number of Radio Tagged chum | Proportion of Total Tags (%) ^A |
|-----------------------------|-----------------------------|---|
| August 24 - August 30 | 6 | 6.5 |
| August 31 - September 6 | 14 | 15.1 |
| September 7 - September 13 | 17 | 18.3 |
| September 14 - September 20 | 6 | 6.5 |
| September 21 - September 27 | 36 | 38.7 |
| September 28 - October 4 | 14 | 15.1 |
| Total | 93^a | 100.0 |

^A Tag application data was not recorded for one of the applied tags, and it is not included in the total number of tags and calculation of tag proportions.

The sex ratios and fork lengths of radio tagged chum salmon that were captured between August 24 and October 4, 2013 are shown in Table 6. The average fork lengths of captured male chum salmon were 68.8 mm, while the average fork lengths of female chum salmon were 62.1 mm (Table 6). Male chum salmon were tagged more frequently than female chum salmon; male chum accounted for 79.3% of all tags, while female salmon accounted for 20.7%. The lengths and sex ratios are similar to the results of past chum salmon netting programs on the Porcupine River (EDI 2011, Snow 2010). The tagging location, date, sex and fork lengths for each captured fish are included in Appendix C. At the time that this report was written, analysis of scale samples taken from captured chum salmon was not yet completed by DFO.

Table 6. Weekly summary of sex and fork length data from chum salmon radio tagged in the Porcupine River in 2013.

| Program Week | Total Weekly Tagged | Male | | Female | | |
|--------------------------------------|---------------------|-------------------|------------------|---------------------|-------------------|------------------|
| | | % of Weekly Total | Mean Length (cm) | Total Weekly Tagged | % of Weekly Total | Mean Length (cm) |
| August 24 - August 30 | 5 | 83.3 | 66 | 1 | 16.7 | 63 |
| August 31 - September 6 ^A | 7 | 53.8 | 74.9 | 6 | 46.2 | 60.8 |
| September 7 - September 13 | 14 | 82.4 | 68.5 | 3 | 17.6 | 63.3 |
| September 14 - September 20 | 3 | 50.0 | 70.6 | 3 | 50.0 | 66 |
| September 21 - September 27 | 34 | 94.4 | 68.5 | 2 | 5.6 | 61.7 |
| September 28 - October 4 | 10 | 71.4 | 67.7 | 4 | 28.6 | 61 |
| Total | 73 | -- | -- | 19 | -- | -- |
| Program Mean | -- | 79.3 | 68.8 | -- | 20.7 | 62.1 |

^A No sex was recorded for one of the chum salmon that was tagged during this week

3.2 RELOCATIONS OF RADIO TAGGED CHUM SALMON

Chum salmon radio tracking flights conducted in October 2013 located 90 of 94 tags that were applied during the 2013 tagging program; the locations of detected tags are summarized in Table 7. The specific location of each tag that was relocated can be found in Appendix C. Surveys of the Fishing Branch River located forty tagged chum salmon upstream of the weir site (Table 7; Map 2). An additional five tags were located in the Fishing Branch River downstream of the inactive weir site; no tags were located in the North Fork of the Fishing Branch River.

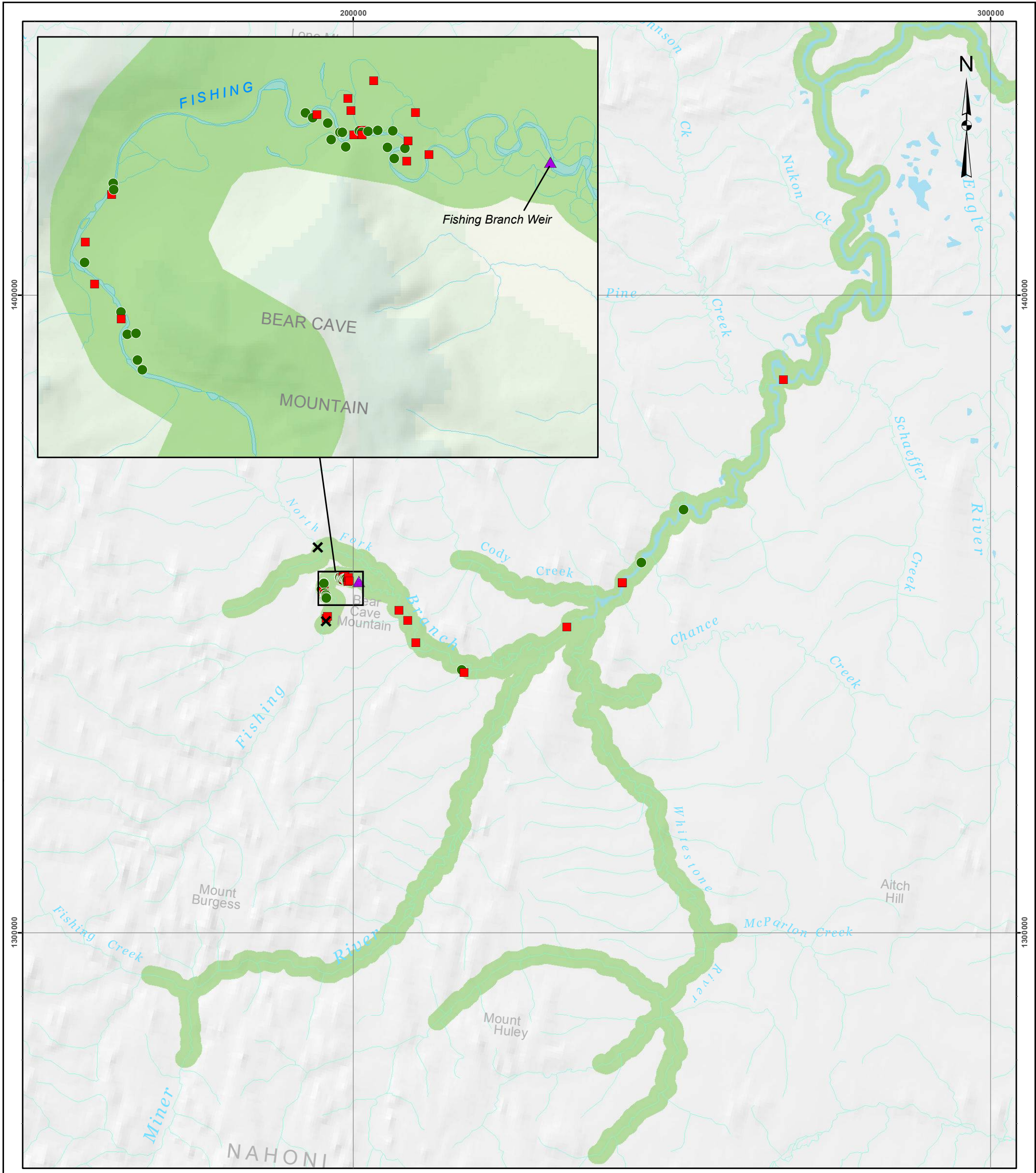


In the upper Porcupine River mainstream, six tags were found between the Whitestone River confluence and Schaeffer Creek (approximately 30 km downstream; Table 7; Map 2). One tag was also found in the lower Bluefish River and another in the lower reaches of David Lord Creek (Map 3). No other tags were located during any of the three survey conducted in October; however, a single tagged chum salmon was captured downstream by a subsistence fisherman from Fort Yukon, AK, on the Porcupine River mainstem in the vicinity of the mouth of the Campbell River (approximately 50 km downstream of the Canada/U.S. border; A. Martin pers. comm. 2013).

In addition to the tags that were relocated in the various tributaries, a considerable number of tagged chum salmon were recaptured in the local fishery in Old Crow. Local fishers were asked not to release tagged chum that were captured due to the risk of injury/mortality of these chum, and uncertainty regarding changes to normal migration patterns if they were released. Twenty-nine radio tagged chum salmon were captured by local fishers, and were collected by the VGG Natural Resource department and the North Yukon Renewable Resource Council (NYRRC). An additional seven tags were detected within 5 km of Old Crow during tracking flights. There is no known current or historical chum salmon spawning in this area and the likelihood of spawning in this area is considered very low. Due to the close proximity of these tags to Old Crow, these chum were presumed to be tags that had been captured in the local fishery, but had not been turned in to VGG/ NYRRC or tagged chum that may have died after being tagged but prior to reaching their spawning locations.

Table 7. Summary of locations of chum salmon radio tagged in the Porcupine River in 2013.

| Location | Number of Tagged Fish Detected |
|---|---------------------------------------|
| Fishing Branch River – Upstream of weir site | 40 |
| Fishing Branch River – Downstream of weir site | 5 |
| Upper Porcupine River Mainstem | 6 |
| David Lord Creek | 1 |
| Bluefish River | 1 |
| Vicinity of Old Crow | 7 |
| Tags Recaptured and turned in at Old Crow | 29 |
| Recaptured in Alaskan Porcupine River subsistence fishery, approximately 50 km downstream of the Canada/US border | 1 |
| Not found during tracking | 4 |



Legend

Radio Tag Location and Status (October, 2013)

- Mortality
- Active
- ▲ Fishing Branch Weir - Inactive
- ✕ End of Wetted Channel
- Extent of Telemetry Surveys (2013)

Locations of radio tagged chum salmon in the southern portion of the Porcupine River watershed in October, 2013

Data Sources
 1,000,000 Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Natural Resources Canada. All Rights Reserved.

Digital Elevation Model provided by Alaska State Geospatial Data Clearing House - <http://www.asgdc.state.ak.us/>.

1:1,000,000 National Topographic Database (NTDB) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomatics.yukon.ca.

Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. (2013) was obtained using Garmin GPS technology.

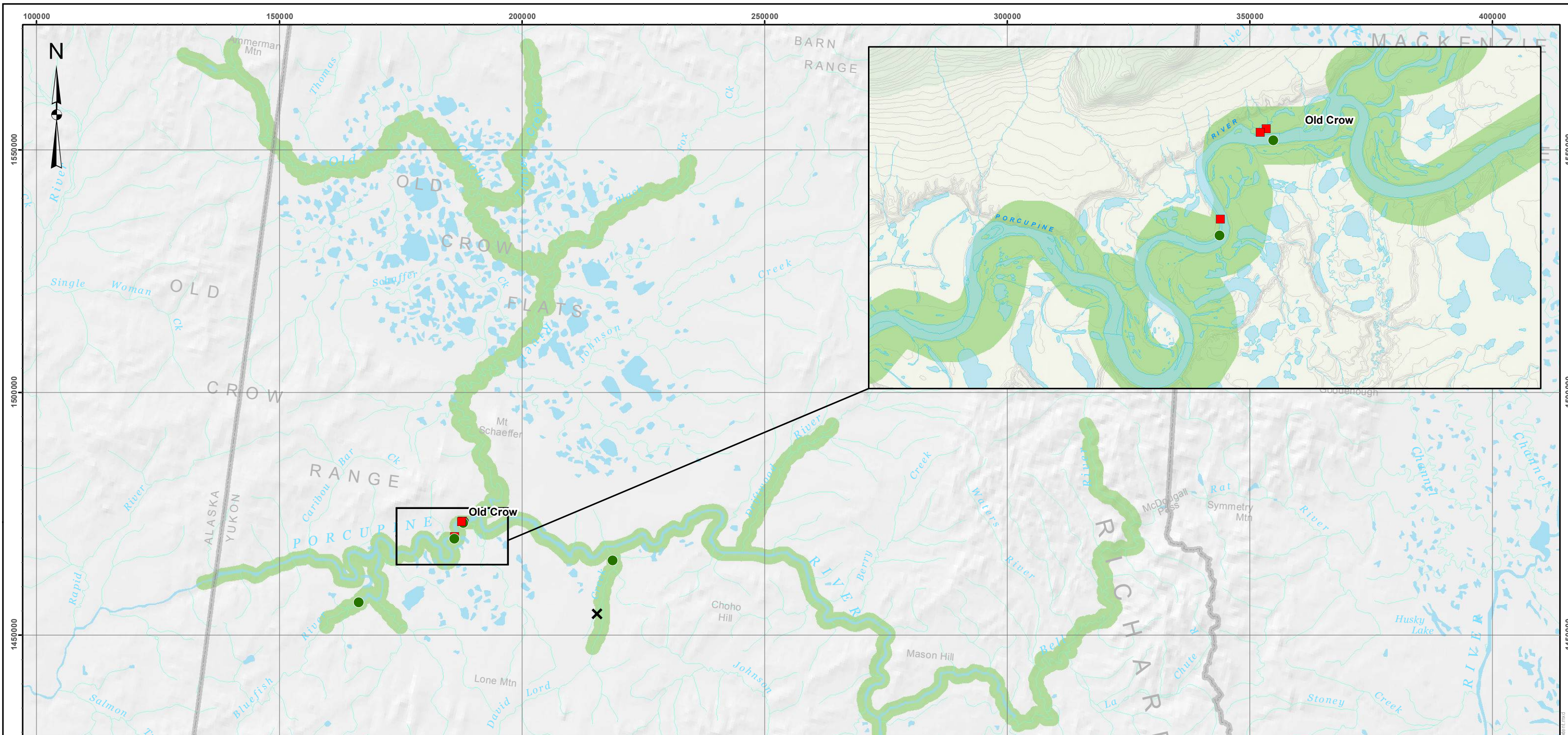
Disclaimer
 This document is not an official land survey and the spatial data presented is subject to change.

0 5 10 15 20 25
Kilometres

Map Scale 1:600,000 (printed on 11 x 17)
 Map Projection: North American Datum 1983 CSRS Yukon Albers

| | | | |
|--------------|--------------------|------------------|--------------|
| Drawn: LG | Checked: BSn/MP | Date: 29/01/2014 | MAP 2 |
|--------------|--------------------|------------------|--------------|

Map Area



Locations of radio tagged chum salmon in the northern portion of the Porcupine River watershed in October, 2013

Legend

Radio Tag Location and Status (October, 2013)

- Mortality
- Active
- X** End of Wetted Channel

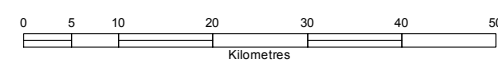
Data Sources
 1,000,000 Topographic Spatial Data courtesy of Her Majesty the Queen in Right of Canada, Natural Resources Canada. All Rights Reserved.

Digital Elevation Model provided by Alaska State Geospatial Data Clearing House - <http://www.asgdc.state.ak.us/>.

1:1,000,000 National Topographic Database (NTDB) provided by Geomatics Yukon - Yukon Government via online source (Corporate Spatial Warehouse) www.geomatics.yukon.ca.

Project data displayed is site specific. Data collected by EDI Environmental Dynamics Inc. (2013) was obtained using Garmin GPS technology.

Disclaimer
 This document is not an official land survey and the spatial data presented is subject to change.



Map Scale = 1:800,000 (printed on 11 x 17)
 Map Projection: North American Datum 1983 CSRS Yukon Albers

Drawn: LG Checked: BSn / BSc Date: 29/01/2014 **MAP 3**



Path: J:\Yukon\Projects\2013_13_Y_0022_PSC_Porcupine_River_Chum_Tagging\Map3_NonEmSolve.mxd



3.2.1 Mortality Sensor Status

The status of the mortality sensors for the detected tags (excluding tags recovered in Old Crow) is summarized in Table 8. Nearly half of the detected tags were found with their mortality sensors 'on' (Table 8), meaning that no movement had occurred in over 24 hours. In the lower part of the Fishing Branch River, and the Porcupine River mainstem, the mortality tags of most tags were 'on', indicating that chum salmon with these tags were dead. In contrast, the mortality sensors in the tags found in Bluefish River and David Lord Creek were 'off', and these fish may have still been migrating to their spawning destinations.

Table 8. Summary of mortality sensor status for radio tagged chum salmon in the Porcupine River in 2013 (excludes tagged chum salmon recaptured in local subsistence fishery).

| Location | Number of Tags with Mortality Sensor On ('Dead') | Number of Tags with Mortality Sensor Off ('Alive') | Percentage of 'Dead' Tags (%) |
|--|---|---|--------------------------------------|
| Fishing Branch River – Upstream of weir site | 17 | 23 | 40.4 |
| Fishing Branch River – Downstream of weir site | 4 | 1 | 80 |
| Porcupine River Mainstem | 4 | 2 | 75 |
| David Lord Creek | 0 | 1 | 0 |
| Bluefish River | 0 | 1 | 0 |
| Vicinity of Old Crow | 2 | 2 | 50 |
| TOTAL | 27 | 30 | 47.3 |



4 SPAWNING HABITAT CHARACTERISTICS OF SURVEYED WATERSHEDS

The suitability of spawning habitat for chum salmon in the surveyed tributaries of the Porcupine River is described in the following sections. The areas of the Fishing Branch River that are upstream of the former weir are known to be productive chum salmon spawning habitats, and are well documented. This habitat is not discussed further in this report. The descriptions below focus on other rivers and creeks that were surveyed during this project. Where relevant, data from past telemetry and ground based investigations has been incorporated to provide additional context to the discussion.

Chum salmon are known to select areas of upwelling water (McPhail 2007) when choosing spawning locations. This preference indicates that groundwater discharge areas are important in the selection of spawning habitat by chum salmon. In the Porcupine River, coho salmon spawning has also been shown to be associated with groundwater discharge areas (Schonewille and Anderton 2006; EDI 2008). Conversely, Chinook salmon spawning in the Porcupine River appears to be less dependent on upwelling water, as Chinook salmon have been observed spawning in many areas (e.g. the Miner River; EDI 2014b) where no evidence of groundwater was found during winter telemetry flights (Schonewille and Anderton 2006; EDI 2008).

In the winter, the presence of groundwater upwelling areas is often indicated by ice free river/stream channels. In many locations that were surveyed in October 2013, ice free areas of stream channel were observed in the vicinity of locations where tags were located. These observations are discussed in the relevant sections below. Past telemetry data from radio tagged coho salmon is also discussed in the sections below, where relevant. Chinook salmon data is not discussed, as the differing life history of this species suggest that they select different habitat than coho and chum salmon in the Porcupine River.

4.1.1 Fishing Branch River – North Fork

The north fork of the Fishing Branch River was surveyed for a distance of approximately 18 km; no tagged chum salmon were relocated in the north fork. This portion of the Fishing Branch River is characterized by more extensive meanders than the south fork, with intermittent areas of cobble, gravel and fine sediments. The water was clear at the time of the survey and there appeared to be many areas of suitable bed material for spawning chum salmon, especially in the lower reaches.

Approximately 10 km upstream of the mouth of the north fork of the Fishing Branch River, an unnamed tributary joins from the north. At the time of the October 26 survey, this tributary was dry. The main channel was surveyed upstream of this location. Upstream of the tributary, the river becomes smaller and the surrounding topography is flatter than the areas downstream. In general, chum salmon spawning habitat appeared to be poorer upstream of location where the tributary joined. The majority of the north fork of the Fishing Branch River was unfrozen at the time of the 2013 survey, and inferences on the presence of groundwater upwelling areas could not be made. However, coho telemetry programs conducted in 2005 and 2007 (Schonewille and Anderton 2006; EDI 2008) indicated that extensive areas of open water were present



in the north fork of the Fishing Branch River in winter months. Several tagged coho salmon were also found in the upper portion of the north fork of the Fishing Branch River in both 2005 and 2007 (Schonewille and Anderton 2006; EDI 2008).

4.1.2 Miner River

The Miner River is a large, clear water river and is known as an important spawning area for Chinook salmon in the Porcupine River (EDI 2014b). Approximately 115 km of the Miner River mainstem was surveyed from the vicinity of the confluence of Fishing Creek to the river mouth; no tagged chum salmon were relocated in this area. The Miner River contains extensive areas of gravels and cobbles that appear of suitable size/composition for chum salmon spawning, but the ice conditions in parts of this river may be unsuitable for overwintering of chum salmon eggs. At the time of the October 26 survey, large areas of the Miner River were partially frozen over and anchor ice was observed on the river bottom in many areas that were still open. In general, the Miner River was more frozen than the Fishing Branch River. The presence of anchor ice may limit the availability of spawning habitat for chum salmon in this river. A past chum salmon telemetry program (Boyce 1999) located two chum salmon tags very near the mouth of the Miner River, below the confluence with the Fishing Branch River.

Fishing Creek is a substantial tributary to the Miner River and was surveyed for 7 km, from its mouth upstream. At the time of the October 26 survey, some small areas of open water were noted, and suitable cobble/gravel spawning material was observed. The river banks were heavily wooded and the stream flowed adjacent to a small ridge. The spawning habitat in Fishing Creek generally appeared to be of relatively good quality for chum salmon spawning, but salmon spawning has never been documented in this creek.

4.1.3 Whitestone River

From its mouth, the Whitestone River was surveyed over a distance of approximately 206 km, including two tributaries that join the mainstem of the river in its upper reaches. The two tributaries appeared to likely to support chum salmon spawning, and they were surveyed in addition to the river mainstem. The eastern tributary was surveyed for a distance of approximately 30 km and the western tributary for approximately 14 km. The lower reaches of the Whitestone River (downstream of the tributaries) appeared to be somewhat turbid and a larger proportion of the bed materials were fines. The quality of the habitat for chum salmon spawning in this area was low. Ice coverage was low at the time of the October 27 survey.

Two smaller tributary streams to the Whitestone River, Chance Creek and McParlon Creek, were also surveyed on October 27. Chance Creek was surveyed for approximately 14 km and McParlon Creek for approximately 4.5 km. Both creeks were completely frozen over at the time of the survey, and appeared to have relatively small channels. Although the river bed could not be observed, the absence of any evidence of groundwater upwelling suggests that the spawning potential for chum salmon is low in Chance and McParlon creeks.

In the upper reaches of the Whitestone River, including the eastern and western tributaries, the water was clearer and the river channel flowed through low lying valleys. Cobbles and gravels of a suitable size for spawning chum salmon were observed in both tributaries. Very minimal amounts of ice were observed in



these areas. Coho salmon telemetry over flights of this portion of the river in December 2007 noted several small areas of groundwater discharge (EDI 2008). In general, the quality of spawning habitat appeared higher upstream than downstream.

4.1.4 Porcupine River Mainstem

The entire Canadian portion of the Porcupine River was surveyed in 2013 (approximately 400 km). The most suitable chum spawning habitat appears to be located near the confluence of the Whitestone River. A portion of this area was ice covered when it was surveyed on October 27; however, several prominent side channels were noted towards the western edge of the river. These channels were entirely ice free and appeared to have appropriate bed material for spawning chum salmon. Several radio tags were located in this area. In December 2007, small areas of open water were observed in the upper Porcupine River mainstem (EDI 2008), in the general vicinity of where tagged chum salmon were found this year.

Downstream of this area, the river is predominantly a single thread channel and was partially frozen over in some locations and fully frozen in others. The bed material could not be observed. No notable spawning habitat for chum salmon was observed in areas of the river further than 20 km downstream of the mouth of the Whitestone River.

Coho radio telemetry conducted in December 2007 located three tagged coho salmon in this general vicinity, near the mouth of Cody Creek (EDI 2008). Cody Creek was surveyed for approximately 30 km in this year's program; however, no tags were located in the creek or at its mouth.

4.1.5 Bell River

The Bell River is a large tributary to the Porcupine River, and was surveyed for approximately 152 km. No radio tagged fish were relocated in the Bell River. The bed materials in the lower section of this river were predominantly fine materials, and the river channel flowed through marsh like terrain; the potential for chum salmon spawning in this area appeared to be low (MacDonald pers. comm. 2014). A survey of this habitat during a 2003 Chinook salmon telemetry program (Anderton 2003) also indicated that this habitat was general unsuitable for salmon spawning. In the middle reaches of the river, the surrounding topography is more mountainous and the potential for chum salmon spawning was moderate (MacDonald pers. comm. 2014). The headwaters of the river had a predominantly gravel bottom and may have provided some areas of suitable habitat for chum salmon spawning (MacDonald pers. comm. 2014). The lower section of the Bell River and major tributaries were surveyed during a coho telemetry program in 2005 (Schonewille and Anderton 2006) but no tags were relocated. In general the potential for salmon in the mainstem of the Bell River is thought to be moderate to low.

4.1.6 Driftwood River

The Driftwood River was surveyed for approximately 40 km; no radio tags were relocated. At the time of the October 17 survey, the Driftwood River was extensively frozen; observations of river bed materials could not be made (MacDonald pers. comm. 2014). However, suitable cobble and gravel bed material has been observed in this river during the open water season (Schonewille pers. comm. 2014). The extensive



freezing of the river channel on the Driftwood River is notable, since many other Porcupine River tributaries (e.g. David Lord Creek, Bluefish River, Timber Creek) were mostly ice free when surveyed later in the year (October 27-29, 2013). These observations are corroborated by telemetry flights in December 2007, when the entirety of the river was flown and no open water areas were observed. It is likely that groundwater inputs in the Driftwood River are limited during winter months; consequently, the likelihood of chum salmon spawning in this river is low.

4.1.7 David Lord Creek

David Lord Creek was surveyed on October 27, 2013. At the time of the survey, the water was clear and numerous areas of cobble and gravel bed material were noted, especially in the lower and middle reaches of the creek. The creek channel was mostly ice free at the time it was surveyed. The chum salmon radio tag that was detected in David Lord Creek in 2013 was located in the lower 5 km of the creek. This is the first known record of possible chum salmon spawning in this creek. In 2004, a number of spawning chum, including spent chum salmon, were captured via gillnetting in the Porcupine River very near the mouth of David Lord Creek, (Schonewille and Anderton 2004). Chum salmon redds were also observed at this time. The mortality sensor of the 2013 tagged chum salmon was not activate at the time of the survey and it is possible that this tag was a chum salmon that had strayed into the creek and did not spawn there; however, the observations of spawning chum salmon in 2004 and this year's data suggest that additional investigations into chum spawning near the mouth of David Lord Creek are warranted..

In the upper reaches of David Lord Creek, there is considerably less flow and the channel becomes intermittent at a location approximately 20 km from the mouth. In general the suitability of chum salmon spawning habitat is lower further upstream. The creek channel was flown for another 2 – 3 km upstream of this point; however, no suitable chum salmon spawning habitat was observed.

4.1.8 Bluefish River

The mouth of the Bluefish River is a small flood plain and the lower reaches of the river are braided and predominantly composed of alluvium, with little suitable spawning habitat for chum salmon. Further upstream, the river channel becomes more sinuous and flows through a small valley. There are areas of cobble and gravel bed materials that are suitably sized for chum salmon spawning; the river channel was mostly ice free at the time of the survey. A tributary to the Bluefish River join the river at a location approximately 11 km upstream of its mouth. The Bluefish River was surveyed for approximately 17 km upstream of the mouth of this tributary, and the tributary was surveyed for approximately 10 km. A radio tagged chum salmon was located in the Bluefish River approximately 1-2 km upstream of the mouth of the tributary. This finding is notable because the Bluefish River is over 35 km downstream of the site where this fish was tagged. The occurrence of downstream migration of tagged fish has been documented in the Bluefish River for radio tagged coho salmon on two separate occasion (Schonewille and Anderton 2006; EDI 2008). In 2005, two radio tagged coho salmon were located in the vicinity of the tagged chum salmon located during this year's study (Schonewille and Anderton 2006). This year's tagged chum salmon was located a considerable distance upstream of the mouth of the river (approximately 11 km); a small number



of chum salmon were also reported to be have been observed migrating up the Bluefish River in the fall of 2006 (EDI 2008).

Upstream of the location where the tagged chum salmon was observed, the Bluefish River becomes more sinuous. Relative to the lower portions of the river, there was increased ice coverage in this section of the river at the time of the survey. Small areas of cobble and gravel river bed material were present. The quality of potential spawning habitat for chum salmon in this area was moderate. In December 2007, a small area of groundwater discharge was noted approximately 23 km upstream of the river mouth during coho telemetry flights in this area (EDI 2008). This suggests that some groundwater flow may be present in this portion of the river during winter months.

The detection of the radio tagged chum salmon in the upper Bluefish River in 2013, the observations of groundwater, and the recent historical observations of migration chum salmon (EDI 2008) suggest that the Bluefish River may support a small spawning population of chum salmon.

4.1.9 Crow River

The Canadian portion of the Crow River flows through the Old Crow flats. The river channel is extremely sinuous, and large portions of the river channel were frozen over at the time of the survey (October 27 and 28). In areas where open water was observed, the water was somewhat turbid. Upstream of the Canada/U.S. border, the gradient of the river increases and the channel becomes straighter, especially in the vicinity of Ammerman Mountain. The U.S. portion of the Crow River was surveyed for approximately 30 km upstream of the border. A small unnamed tributary was also surveyed for approximately 5 km. No radio tags were relocated in the Crow River or any of its tributaries.

The U.S. portion of the Crow River is upstream of the Old Crow flats area and appeared to have excellent potential spawning habitat for chum salmon: large areas of suitable cobble/gravel materials were observed, and the river channel was entirely ice free at the time of the survey. It is also notable that the U.S. portion of the river flows through sparsely vegetated tundra but large trees are present in the riparian area of the Crow River, which may be indicative of groundwater flow in this part of the river. This portion of the Crow River was surveyed during coho salmon radio telemetry programs in 2005 and 2007 (Schonewille and Anderton 2006; EDI 2008). No tags were relocated in the area, however; extensive areas of aufeis and groundwater discharge were observed in the vicinity of Ammerman Mountain during December 2007 (EDI 2008). Fisheries studies conducted in the 1970's by Steigenberger et al. (1975) in this portion of the river also estimated that over 10,000 freshwater fish (primarily Arctic grayling) were overwintering in this general vicinity. These observations suggest that this area receives considerable groundwater inputs during the winter months, which could potentially support spawning chum salmon.

In addition to the mainstem of the Crow River's two tributaries, Timber and Black Fox creeks were also surveyed. Black Fox Creek flows into the Crow River downstream of Timber Creek, and was surveyed for approximately 50 km. Timber Creek was surveyed for approximately 55 km. The headwaters of both creeks flow through the tundra and appear to have high quality spawning habitat for chum salmon. Abundant cobble and gravel materials are present and there was no evidence of ice on either stream channel at the



time of the 2013 survey, despite the high latitude of these creeks and adjacent snow covered tundra. Timber Creek appeared to have to have slightly more suitable bed material for spawning chum salmon than Blackfox Creek. Although no chum salmon radio tags were located in the Crow River or its tributaries in 2013, the presence of groundwater discharge and documented overwintering of freshwater fish species warrant further investigation for chum salmon spawning in the Crow River watershed.



5 DISCUSSION

5.1 DEVELOPMENT OF LOCAL CAPACITY

An important goal of the 2013 chum radio tagging program was to develop local capacity to conduct fisheries work within the community of Old Crow. While a number of past programs (e.g., Mark-Recapture, CPUE index and sonar programs) have helped to develop fisheries technical capacity within the community, this particular program provides several important advantages:

- The program offered approximately 6 weeks of fisheries related work to two individuals;
- The skills needed to apply the radio tags and conduct drift netting provided new learning opportunities for local technicians; and,
- The program provides a means to employ skilled fisheries technicians in the community, while also providing experience to younger community members who have not been involved in past programs.

Three local field technicians were trained and participated in this program. Field technicians conducted much of the tagging work, and were essential to safe and successful drift netting. The knowledge of the theory and rationale of radio tagging fish is a specialized skill and there is a considerable amount of interest within the community of Old Crow to pursue further stock assessment programs, especially for the Porcupine River Chinook salmon. If the additional radio tagging studies are conducted in the Porcupine River watershed, there is technical understanding and experience that can be leveraged to assist with such studies/programs.

5.2 ADJUSTED TOTAL RADIO TAG NUMBERS

The results of the chum salmon radio tag tracking confirm that the Fishing Branch River was the major spawning destination for chum salmon in 2013. Of the 94 tag that were applied during the 2013 field program, 40 tags were found in the Fishing Branch River in spawning areas upstream of the former DFO enumeration weir. However, a number of the tags were recaptured in the local fishery and an additional four tags were not located during the tracking flights. The destinations of these tags cannot be determined, and they should be removed from the data set when considering the proportion of chum salmon that spawned upstream of the former Fishing Branch River weir site.

If the total number of tagged chum salmon is adjusted to remove the tags that were recaptured in the local Old Crow fishery (27 tags), the tagged chum that were found near Old Crow (9 tags; assumed harvested or died as a result of tagging) and the tagged chum that were not found during tracking flights (4 tags), 54 tagged chum salmon remain. The proportion of this adjusted total number of tagged chum salmon that spawned upstream of the former Fishing Branch River weir is 74.1% (Table 9).



Table 9. Summary of locations of chum salmon radio tagged in the Porcupine River in 2013; tags that were recaptured in the local fishery, found in the vicinity of Old Crow or not found during tracking have been removed.

| Location | Number of Tagged Chum Detected | Proportion of Total Tags (%) |
|---|--------------------------------|------------------------------|
| Fishing Branch River – Upstream of weir site | 40 | 74.1 |
| Fishing Branch River – Downstream of weir site | 5 | 9.3 |
| Porcupine River Mainstem | 6 | 11.1 |
| David Lord Creek | 1 | 1.9 |
| Bluefish River | 1 | 1.9 |
| Recaptured in Alaskan Porcupine River subsistence fishery, approximately 50 km downstream of the Canada/US border | 1 | 1.9 |
| TOTAL | 54 | -- |

5.3 ESTIMATE OF CHUM SALMON PASSAGE AT THE FISHING BRANCH WEIR

The adjusted proportion of tags that were recovered upstream of the Fishing Branch Weir in 2013 can be used to apportion the number of chum that were counted at the Porcupine River sonar site that were bound for spawning areas upstream of the weir. This apportionment provides a means to estimate the number of fish that spawned above the site of the former Fishing Branch River weir in 2013, which was the primary goal of this project.

A total of 35,626 chum salmon were estimated to have passed the Old Crow sonar site between August 24 and October 12, 2013. However, 1,380 chum salmon were captured in the local VGFN subsistence fishery, upstream of Old Crow (MacDonald pers. comm. 2014). Although some of these chum salmon were undoubtedly not destined for spawning areas upstream of the former weir site, there is no reliable way to partition the local harvest by spawning destination. Removing the entire local harvest upstream of the sonar from the final sonar count is the best means to adjust the sonar count for harvest. If these chum salmon are removed from the sonar estimate, a harvest adjusted total of 34,246 chum salmon are estimated to have migrated to spawning areas upstream of the sonar site. An estimate of the proportion of this harvest adjusted sonar count that spawned upstream of the weir is obtained by multiplying 34,246 chum salmon by the adjusted percentage of radio tagged fish that were found upstream of the Fishing Branch weir (74.1%). This calculation indicates that an estimated 25,376 chum salmon spawned upstream of the site of the inactive Fishing Branch River weir 2013.

5.4 COMPARISON TO HISTORICAL DATA

5.4.1 Mark-Recapture and CPUE Data

The proportion of radio tagged chum salmon that were relocated upstream of the Fishing Branch River in 2013 (74.1%) can be compared to historical tag recovery rates from chum salmon Mark Recapture/CPUE index programs (EDI 2011). Chum salmon tagging during these programs was conducted at a site 23 km downstream of Old Crow and there are no known chum salmon spawning areas between this site and Porcupine River Sonar site. As shown in Table 10, the average tag recovery rate over 7 years of Mark-



Recapture and CPUE index programs ranged from 35% to 88%, with an average of 56.4 % (EDI 2011). The 74.1% tag detection rate from the 2013 radio telemetry is within the upper end of the historical range of the Mark-Recapture and CPUE index program.

Table 10. Relative proportion of tagged chum salmon counted at the Fishing Branch River weir (Data Source: EDI 2011).

| Year | Tags Counted Through the Fishing Branch River Weir (%) ¹ |
|----------------------------------|---|
| 2003 | 88 |
| 2004 | 59 |
| 2005 | 71 |
| 2006 | - ² |
| 2007 | 56 |
| 2008 | 45 |
| 2009 | 35 |
| 2010 | 41 |
| Average Tag Recovery Rate | 56.4 |

¹Percentages are calculated after the removal of tags by the Old Crow aboriginal fishery and are corrected for fish that may have crossed the weir while it was not operating.

²During 2006, the weir was not operated continuously due to flooding and as such a reliable proportion of tags could not be obtained.

5.4.2 2011 and 2012 Porcupine River Sonar Data

The estimated proportion of chum salmon that were counted at the Porcupine River sonar site and spawned upstream of the Fishing Branch weir in 2013 can be compared to sonar and weir counts from 2011 and 2012. In 2011 and 2012, the Porcupine River sonar operated concurrently with the Fishing Branch River weir; Table 11 compares counts from the sonar and weir sites for the periods in 2011 and 2012 when the two programs were operating simultaneously. The average travel times of chum salmon from the sonar to the weir site were 9 and 13 days in 2011 and 2012, respectively (EDI 2012, EDI 2013a). These travel time offsets were used to compare counts from the two programs. For 2013, tag relocations upstream of the weir were used place of weir counts. Despite the difference in the methods of estimation, a similar percentage of chum salmon passed the Porcupine Sonar site in 2011, 2012 and 2013 and were subsequently counted/detected upstream of the site of the Fishing Branch River (Table 11). From 2011 to 2013, the chum salmon that spawned in the Fishing Branch River upstream of the weir site accounted for an average of 76.6% of the harvest adjusted Porcupine River sonar estimate.

Table 11. Comparison of harvest adjusted Porcupine River sonar and Fishing Branch River weir chum salmon passage estimates from 2011 and 2012 (EDI 2012, EDI 2013a), and 2013 radio telemetry data. The Fishing Branch weir estimate for 2013 is derived from the adjusted proportion of radio tag detections upstream of the weir site.

| Program Year | Harvest Adjusted Porcupine River Sonar Estimate | Equivalent Fishing Branch River Weir Estimate | Percentage of Sonar Estimate |
|-----------------|---|---|------------------------------|
| 2011 | 10,938 | 8,574 | 78.3 |
| 2012 | 27,793 | 21,561 | 77.5 |
| 2013 | 34,246 | 25,376 | 74.1 |
| Averages | 24,325 | 18,503 | 76.6 |



5.5 RECAPTURE OF TAGS IN LOCAL FISHERY

A considerable number of radio tagged chum salmon were recaptured in the local VGFN subsistence fishery near Old Crow. Some recapture was understood to be possible and was considered during the planning phase of this project; however, relative to the proportion of sonar counted chum salmon that were harvested in the VGFN subsistence harvest, a much higher proportion of radio tagged fish were recaptured than was expected (Table 12). The high recapture rate of radio tagged chum salmon is suspected to be due to the proximity of the tagging location to the local fishery and increased susceptibility of tagged chum to capture in gillnets.

Table 12. Comparison of the recapture rate of radio tagged chum salmon to overall capture of chum in salmon the VGFN subsistence fishery upstream of the Porcupine River sonar site in 2013.

| | Total Count | Number Recaptured in VGFN subsistence fishery | Proportion of Total Count (%) |
|--------------------------------------|--------------------|--|--------------------------------------|
| Chum Salmon Sonar Interpolated Total | 35,626 | 1,380 | 3.9 |
| Radio Tagged Chum Salmon | 94 | 29 | 31 |

An increase in the susceptibility of radio tagged chum salmon to capture in gill nets may account for the relatively high recapture rate of tagged chum salmon. The dorsally implanted radio tag protrudes approximately 1 to 2 cm from the back of the fish, and a chum that would perhaps otherwise slip through the net could be caught. This possibility was suggested by members of the Joint Technical Committee during the 2013 post-season. It is unclear what quantitative increases in catch susceptibility, if any, were caused by the dorsally implanted tags. Another possible reason for the increased susceptibility of tagged chum salmon to capture in gill nets could be that tagged chum slow down and mill around the tagging site as they recover from tagging. This would increase the time that these fish are in the area of the gill net fishery, and could potentially result in a corresponding increase in susceptibility to capture.

The tagging location of the Porcupine River Sonar site was downstream of a number of local VGFN subsistence fishing sites; however, this site was chosen for several important reasons. First, the primary goal of this project was to estimate the number of chum salmon that spawned upstream of the Fishing Branch River weir site in 2013. This estimate was derived from chum sonar counts and tag relocation rates upstream of the weir sites. To produce this estimate, the tagging had to be conducted at or near the sonar site. Second, tagging could not be conducted upstream of the Crow River, as it is suspected to support chum salmon spawning (Anderton and Frost 2003). If tagging were conducted upstream of the mouth of the Crow River, there would be no way to determine the proportion of chum that were counted at the sonar site and spawned in the Crow River. This would introduce uncertainty into the comparison of the sonar and weir estimate, and is undesirable.

When local fishers captured radio tagged chum salmon, they were asked to retain these fish. It was unclear what effects recapture would have on the normal migration pattern of tagged chum salmon, and it was decided to encourage local fishers to retain captured tagged fish to avoid the possibility of altering the normal behaviour of tagged chum. Orange floy tags were attached to all tagged chum salmon, to aid local fishers in identifying tagged chum. A small cash incentive was also provided, to encourage local fishers to



return captured tags. It should also be noted that the ATS radio tags used in 2013 used a cut-away wire attachment method; tags were single-use and could not be reapplied to another chum salmon once they had been removed.

5.6 FATES OF MISSING RADIO TAGS

Four radio tagged chum salmon were not detected during the 2013 tracking flights. There are several possible theories that may explain this occurrence. Tag failure could account for a few of the missing tags. Hardware failures on VHF radio tags of the type used in the 2013 program are rare; according to manufacturer data, the failure rate is approximately 2% (Adsem pers. comm. 2013). Although it is understood to be a very infrequent occurrence, a 2% tag failure rate could account for some or all of missing tags that were applied in 2013. Another possibility is that small number of tagged chum salmon may have migrated into un-surveyed areas of the Porcupine River watershed; the possibility of this occurrence is supported by the recovery of a radio tagged chum salmon near the mouth of the Campbell River in Alaska. Tags could also been damaged after deployment. For example, damage could have occurred to one or more tags during recovery in the local fishery in Old Crow or could also have occurred from predators consuming tagged salmon on the spawning ground.



6 CONCLUSIONS

The 2013 Porcupine River chum salmon telemetry program provided valuable insights into the relationship between sonar counts and the number of chum salmon that spawn upstream of the former Fishing Branch River weir site. This project confirmed that the areas of the Fishing Branch River upstream of the former weir site remain the primary spawning destination for chum salmon in the Porcupine River watershed. This program also provided the third year of comparative escapement estimates between the weir and the sonar programs, allowing for the calculation of the average proportion of chum salmon that migrate past the Porcupine River sonar site en-route to spawning grounds upstream of the former weir site. In addition, the project provided new information on chum salmon spawning in other watersheds within the Porcupine River.

The recapture of a large number of tags in the local VGFN subsistence fishery was an undesired outcome of this program. The use of dorsal implant radio tags in 2013 was the first time this technology had been used in chum salmon in the Porcupine River; it is unclear if this type of tag increased the susceptibility of these fish to capture in the local fishery. If this study is conducted in future years, esophageal implant tags should be used in place of the dorsal implant tags. A 2007 study conducted on the effects of esophageal implant tags on 120 chum salmon in the Tanana River in Alaska found that tag regurgitation rates were low (10% of all applied tags) and that ruptures of chum salmon stomachs after tagging were also low (7.5% of all applied tags; Driscoll pers. comm. 2014). Esophageal implant tags may help to mitigate any increases in susceptibility of tagged fish to capture in gill nets, and can be removed from harvested fish and redeployed.



7 REFERENCES CITED

- Anderton., I. and Schonewille., B. 2006. 2005 Porcupine River Coho Radio Tagging/Telemetry Pilot Project. Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in First Nation and the Yukon River Panel.
- Anderton., I. and Front, P. 2003. Traditional/Local Knowledge Salmon Survey. Yukon River Panel Project CRE-16-03 Final Report.
- Anderton., I. 2003. Chinook Radio Tracking/Telemetry Pilot Project. Yukon River Panel Project CRE-17N-03 Final Report.
- Boyce, I. 1999. Porcupine River Fall Chum tracking (RE-09-98). Prepared by Fisheries and Oceans Canada.
- EDI 2008. Porcupine River Coho Radio Tagging/Telemetry Project. Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in Government and the Yukon River Panel.
- EDI 2011. 2010 Porcupine River Fall Chum Salmon CPUE Index CRE-27-01. Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in Government and the Yukon River Panel.
- EDI 2012. 2011 Porcupine River Fall Chum Salmon Sonar Program CRE-114N-11. Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in Government and the Yukon River Panel.
- EDI 2013a. 2012 Porcupine River Chum Salmon Sonar Program. Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in Government
- EDI 2014a. 2013 Porcupine River Chum Sonar. Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in Government and the Polar Continental Shelf Program.
- EDI 2014b. 2013 Miner River Aerial Index Survey. Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in Government and the Polar Continental Shelf Program.
- JTC (Joint Technical Committee of the Yukon River US/Canada Panel). 2012. Yukon River salmon 2011 season summary and 2012 season outlook. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A12-01, Anchorage.
- McPhail, J. D., 2007. The Freshwater Fishes of British Columbia. The University of Alberta Press, Edmonton.
- Schonewille, B. 2008. Porcupine River Coho Radio Tagging/Telemetry Project (Yukon River Panel Project CRE-18-07). Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in First Nation and the Yukon River Panel.
- Schonewille, B. and I. Anderton. 2005. Porcupine River Chum Mark Recapture Program (2004). Prepared for the Vuntut Gwitch'in First Nation and the Yukon River Panel. Prepared by EDI Environmental Dynamics Inc.



Schonewille, B. and I. Anderton. 2006. Porcupine River Coho Radio Tagging / Telemetry Pilot Project. EDI Environmental Dynamics Inc. and the Vuntut Gwitch'in First Nation. Yukon River Panel Project CRE-18N-05.

Snow. 2010. 2009 Porcupine River Fall Chum Salmon CPUE Index: Yukon Restoration and Enhancement Project CRE-27-09. Prepared by EDI Environmental Dynamics for the Vuntut Gwitch'in Government and the Yukon River Panel.

Steigenberger, L.W., M.S. Elson and R.T. Drury. 1975a. Northern Yukon Fisheries Studies, 1971 – 1974. Environment Canada, Northern Operations Branch, Pacific Region.

7.1 Personal Communications

Adsem, J. Advanced Telemetry Systems Territory Manager & Project Consultant. Phone call to the author. January 7, 2014.

Driscoll, R. Alaska Department of Fish and Game Fisheries Biologist. Email to the author. January 9, 2014.

MacDonald, E. DFO Aquatic Science Biologist. Email to the author. January 9, 2014.

Martin, Aaron. U.S. Fish and Wildlife Service Fisheries Biologist. Phone call to the author October 5, 2013.

Schonewille, B. EDI Environmental Dynamics Fish and Wildlife Biologist. Conversation with the author. January 17, 2014.



**APPENDIX A. TAG FREQUENCY LIST
PROVIDED BY ADVANCED TELEMTRY
SYSTEMS**



ADVANCED TELEMETRY SYSTEMS

470 FIRST AVE N · ISANTI, MN 55040-7123

763-444-9267 · 763-444-9384 fax

email:sales@atstrack.com · www.atstrack.com

Transmitter Data Sheet

Job #: 78651

Ship Date: 7/30/2013

Customer Info

Environmental Dynamics Inc.

Attn: Ben Schonewille

2195 - 2nd Ave

Whitehorse

Y1A 1X8

CANADA

| Serial # | Quantity | Model# | Description | Species | | |
|--------------------|----------|---------------------|-----------------------|------------------------|-------------------------------|-----------------------------------|
| 01 | 95 | F2050 | Ext Mount Transmitter | | | |
| | | ProgDesc: | Mortality: 24 hr | | | |
| Pulse Rate: | 45.8 ppm | Pulse Width: | 34 ms | Weight: 14.0 gr | Warranty Life: 65 days | Battery Cap Life: 131 days |
| 148.250 | | 148.250 | 148.250 | 148.250 | | |
| A-0/830/45 | | A-1/850/55 | A-11/1060/155 | A-12/1000/125 | | |
| 148.250 | | 148.250 | 148.250 | 148.250 | | |
| A-13/1090/175 | | A-14/1130/185 | A-15/1140/195 | A-16/1160/205 | | |
| 148.250 | | 148.250 | 148.250 | 148.250 | | |
| A-17/1180/215 | | A-18/1190/225 | A-19/1220/235 | A-2/890/65 | | |
| 148.250 | | 148.250 | 148.250 | 148.250 | | |
| A-20/1240/245 | | A-21/1270/255 | A-22/1290/265 | A-23/1300/275 | | |
| 148.250 | | 148.250 | 148.250 | 148.250 | | |
| A-24/1310/285 | | A-26/990/115 | A-3/910/75 | A-4/920/85 | | |
| 148.250 | | 148.250 | 148.250 | 148.250 | | |
| A-5/940/95 | | A-6/970/105 | A-75/1030/145 | A-8/1070/165 | | |
| 148.250 | | 148.383 | 148.383 | 148.383 | | |
| A-9/1010/135 | | A-0/830/45 | A-1/850/55 | A-11/1060/155 | | |
| 148.383 | | 148.383 | 148.383 | 148.383 | | |
| A-12/1000/125 | | A-13/1090/175 | A-14/1130/185 | A-15/1140/195 | | |
| 148.383 | | 148.383 | 148.383 | 148.383 | | |
| A-16/1160/205 | | A-17/1180/215 | A-18/1190/225 | A-19/1220/235 | | |
| 148.383 | | 148.383 | 148.383 | 148.383 | | |
| A-2/890/65 | | A-20/1240/245 | A-21/1270/255 | A-22/1290/265 | | |
| 148.383 | | 148.383 | 148.383 | 148.383 | | |
| A-23/1300/275 | | A-24/1310/285 | A-26/990/115 | A-3/910/75 | | |
| 148.383 | | 148.383 | 148.383 | 148.383 | | |
| A-4/920/85 | | A-5/940/95 | A-6/970/105 | A-75/1030/145 | | |
| 148.383 | | 148.383 | 148.554 | 148.554 | | |
| A-8/1070/165 | | A-9/1010/135 | A-0/830/45 | A-1/850/55 | | |
| 148.554 | | 148.554 | 148.554 | 148.554 | | |
| A-11/1060/155 | | A-12/1000/125 | A-13/1090/175 | A-14/1130/185 | | |
| 148.554 | | 148.554 | 148.554 | 148.554 | | |

| | | | |
|---------------|---------------|---------------|---------------|
| A-15/1140/195 | A-16/1160/205 | A-17/1180/215 | A-18/1190/225 |
| 148.554 | 148.554 | 148.554 | 148.554 |
| A-19/1220/235 | A-2/890/65 | A-20/1240/245 | A-21/1270/255 |
| 148.554 | 148.554 | 148.554 | 148.554 |
| A-22/1290/265 | A-23/1300/275 | A-24/1310/285 | A-26/990/115 |
| 148.554 | 148.554 | 148.554 | 148.554 |
| A-3/910/75 | A-4/920/85 | A-5/940/95 | A-6/970/105 |
| 148.554 | 148.554 | 148.554 | 148.859 |
| A-75/1030/145 | A-8/1070/165 | A-9/1010/135 | A-0/830/45 |
| 148.859 | 148.859 | 148.859 | 148.859 |
| A-1/850/55 | A-11/1060/155 | A-12/1000/125 | A-13/1090/175 |
| 148.859 | 148.859 | 148.859 | 148.859 |
| A-14/1130/185 | A-15/1140/195 | A-16/1160/205 | A-17/1180/215 |
| 148.859 | 148.859 | 148.859 | 148.859 |
| A-18/1190/225 | A-19/1220/235 | A-2/890/65 | A-20/1240/245 |
| 148.859 | 148.859 | 148.859 | 148.859 |
| A-21/1270/255 | A-3/910/75 | A-4/920/85 | A-5/940/95 |
| 148.859 | 148.859 | 148.859 | |
| A-6/970/105 | A-8/1070/165 | A-9/1010/135 | |



**APPENDIX B. DRIFT AND SET NETTING EFFORT AND FISH
CAPTURE DATA**



Table A1. Drift Netting Effort at catches at the Porcupine River sonar site in 2013.

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|--------|---------|-----------|--------------|------------------|--------|----------------------------|
| 24-Aug-13 | 1 | Onshore | 15:39 | 15:45 | 5 | | | | |
| 24-Aug-13 | 2 | Onshore | 15:48 | 15:54 | 5 | | | | |
| 24-Aug-13 | 3 | Onshore | 16:00 | 16:06 | 5 | | | | |
| 24-Aug-13 | 4 | Onshore | 16:09 | 16:15 | 5 | | | | |
| 24-Aug-13 | 5 | Onshore | 16:24 | 16:30 | 5 | | | | |
| 24-Aug-13 | 6 | Onshore | 16:36 | 16:42 | 5 | Chum | 630 | Female | 148.554 - A13 |
| 24-Aug-13 | 7 | Onshore | 18:03 | 18:09 | 5 | | | | |
| 24-Aug-13 | 8 | Onshore | 18:12 | 18:18 | 5 | | | | |
| 24-Aug-13 | 9 | Onshore | 18:25 | 18:31 | 5 | | | | |
| 24-Aug-13 | 10 | Onshore | 18:34 | 18:40 | 5 | | | | |
| 24-Aug-13 | 11 | Onshore | 18:45 | 18:51 | 5 | | | | |
| 24-Aug-13 | 12 | Onshore | 18:53 | 18:59 | 5 | | | | |
| 24-Aug-13 | 13 | Onshore | 19:02 | 19:08 | 5 | | | | |
| 24-Aug-13 | 14 | Onshore | 19:10 | 19:16 | 5 | | | | |
| 25-Aug-13 | 1 | Onshore | 14:48 | 14:50 | 6 | | | | |
| 25-Aug-13 | 2 | Onshore | 14:42 | 14:58 | 6 | | | | |
| 25-Aug-13 | 3 | Onshore | 15:03 | 15:09 | 6 | | | | |
| 25-Aug-13 | 4 | Onshore | 15:12 | 15:18 | 6 | | | | |
| 25-Aug-13 | 5 | Onshore | 15:20 | 15:26 | 6 | | | | |
| 25-Aug-13 | 6 | Onshore | 16:47 | 15:53 | 6 | | | | |
| 25-Aug-13 | 7 | Onshore | 16:55 | 17:01 | 6 | | | | |
| 25-Aug-13 | 8 | Onshore | 17:05 | 17:11 | 6 | | | | |
| 25-Aug-13 | 9 | Onshore | 17:20 | 17:26 | 6 | | | | |
| 25-Aug-13 | 10 | Onshore | 17:27 | 17:33 | 6 | | | | |
| 25-Aug-13 | 11 | Onshore | 18:29 | 18:35 | 6 | | | | |
| 25-Aug-13 | 12 | Onshore | 18:36 | 18:42 | 6 | | | | |
| 25-Aug-13 | 13 | Onshore | 18:44 | 18:50 | 6 | | | | |
| 25-Aug-13 | 14 | Onshore | 18:53 | 18:59 | 6 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|--------|---------|-----------|--------------|------------------|--------|----------------------------|
| 26-Aug-13 | 1 | Onshore | 16:43 | 16:49 | 4.5 | | | | |
| 26-Aug-13 | 2 | Onshore | 16:53 | 16:59 | 4.5 | | | | |
| 26-Aug-13 | 3 | Onshore | 17:07 | 17:13 | 4.5 | | | | |
| 26-Aug-13 | 4 | Onshore | 17:15 | 17:21 | 4.5 | | | | |
| 26-Aug-13 | 5 | Onshore | 17:26 | 17:32 | 4.5 | | | | |
| 26-Aug-13 | 6 | Onshore | 17:35 | 17:41 | 4.5 | | | | |
| 26-Aug-13 | 7 | Onshore | 18:21 | 18:27 | 4.5 | | | | |
| 26-Aug-13 | 8 | Onshore | 18:28 | 18:36 | 4.5 | Chum | 640 | Male | 148.250 - A16 |
| 26-Aug-13 | 9 | Onshore | 18:50 | 18:56 | 4.5 | Inconnu | 600 | - | Not tagged |
| 26-Aug-13 | 10 | Onshore | 19:01 | 19:07 | 4.5 | | | | |
| 26-Aug-13 | 11 | Onshore | 19:42 | 19:48 | 4.5 | Chum | 680 | Male | 148.554 - A16 |
| 26-Aug-13 | 11 | Onshore | 19:42 | 19:48 | 4.5 | Chum | 660 | Male | 148.554 - A21 |
| 27-Aug-13 | 1 | Onshore | 15:22 | 15:28 | 5 | | | | |
| 27-Aug-13 | 2 | Onshore | 15:31 | 15:37 | 5 | | | | |
| 27-Aug-13 | 3 | Onshore | 15:42 | 15:48 | 5 | | | | |
| 27-Aug-13 | 4 | Onshore | 15:55 | 16:01 | 5 | | | | |
| 27-Aug-13 | 5 | Onshore | 16:05 | 16:11 | 5 | | | | |
| 27-Aug-13 | 6 | Onshore | 16:14 | 16:20 | 5 | Chum | 660 | Female | Not tagged |
| 27-Aug-13 | 7 | Onshore | 16:26 | 16:32 | 5 | Chum | 690 | Male | Not tagged |
| 27-Aug-13 | 7 | Onshore | 16:26 | 16:32 | 5 | Chum | 680 | Male | Not tagged |
| 27-Aug-13 | 8 | Onshore | 16:36 | 16:42 | 5 | | | | |
| 27-Aug-13 | 9 | Onshore | 16:47 | 16:53 | 5 | | | | |
| 27-Aug-13 | 10 | Onshore | 19:48 | 19:54 | 5 | | | | |
| 27-Aug-13 | 11 | Onshore | 19:57 | 20:03 | 5 | Chum | 730 | Male | Not tagged |
| 27-Aug-13 | 12 | Onshore | 20:05 | 20:11 | 5 | | | | |
| 27-Aug-13 | 13 | Onshore | 20:15 | 20:21 | 5 | | | | |
| 27-Aug-13 | 14 | Onshore | 20:25 | 20:31 | 5 | | | | |
| 28-Aug-13 | 1 | Onshore | 17:22 | 17:28 | 6 | | | | |
| 28-Aug-13 | 2 | Onshore | 17:46 | 17:52 | 6 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|--------|---------|-----------|--------------|------------------|--------|----------------------------|
| 28-Aug-13 | 3 | Onshore | 17:54 | 18:00 | 6 | | | | |
| 28-Aug-13 | 4 | Onshore | 19:31 | 19:37 | 6 | | | | |
| 28-Aug-13 | 5 | Onshore | 19:40 | 19:46 | 6 | | | | |
| 28-Aug-13 | 6 | Onshore | 19:50 | 19:56 | 6 | | | | |
| 29-Aug-13 | 1 | Onshore | 15:38 | 15:44 | 4.5 | | | | |
| 29-Aug-13 | 2 | Onshore | 15:45 | 15:51 | 4.5 | | | | |
| 29-Aug-13 | 3 | Onshore | 15:55 | 16:01 | 4.5 | | | | |
| 29-Aug-13 | 4 | Onshore | 16:04 | 16:10 | 4.5 | | | | |
| 29-Aug-13 | 5 | Onshore | 16:12 | 16:18 | 4.5 | | | | |
| 29-Aug-13 | 6 | Onshore | 16:22 | 16:28 | 4.5 | | | | |
| 29-Aug-13 | 7 | Onshore | 16:30 | 16:36 | 4.5 | | | | |
| 29-Aug-13 | 8 | Onshore | 19:09 | 19:15 | 4.5 | | | | |
| 29-Aug-13 | 9 | Onshore | 19:18 | 19:24 | 4.5 | | | | |
| 29-Aug-13 | 10 | Onshore | 19:29 | 19:35 | 4.5 | | | | |
| 29-Aug-13 | 11 | Onshore | 19:38 | 19:42 | 4.5 | Chum | 630 | Male | Not tagged |
| 29-Aug-13 | 12 | Onshore | 19:47 | 19:53 | 4.5 | Chum | 650 | Male | Not tagged |
| 29-Aug-13 | 12 | Onshore | 19:47 | 19:53 | 4.5 | Chum | 700 | Male | Not tagged |
| 29-Aug-13 | 13 | Onshore | 20:21 | 20:27 | 4.5 | | | | |
| 29-Aug-13 | 14 | Onshore | 20:30 | 20:36 | 4.5 | Chum | 780 | Male | Not tagged |
| 30-Aug-13 | 1 | Onshore | 17:18 | 17:24 | 5 | | | | |
| 30-Aug-13 | 2 | Onshore | 17:27 | 17:33 | 5 | | | | |
| 30-Aug-13 | 3 | Onshore | 17:36 | 17:42 | 5 | Chum | 680 | Male | Not tagged |
| 30-Aug-13 | 3 | Onshore | 17:36 | 17:42 | 5 | Chum | 700 | Male | Not tagged |
| 30-Aug-13 | 4 | Onshore | 17:50 | 17:56 | 5 | | | | |
| 30-Aug-13 | 5 | Onshore | 17:58 | 18:04 | 5 | | | | |
| 30-Aug-13 | 6 | Onshore | 18:06 | 18:12 | 5 | | | | |
| 30-Aug-13 | 7 | Onshore | 19:41 | 19:47 | 5 | | | | |
| 30-Aug-13 | 8 | Onshore | 19:49 | 19:55 | 5 | Chum | 630 | Female | Not tagged |
| 30-Aug-13 | 9 | Onshore | 20:00 | 20:06 | 5 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|--------|---------|-----------|--------------|------------------|--------|----------------------------|
| 30-Aug-13 | 10 | Onshore | 20:09 | 20:17 | 5 | | | | |
| 30-Aug-13 | 11 | Onshore | 20:20 | 20:26 | 5 | | | | |
| 30-Aug-13 | 12 | Onshore | 20:29 | 20:35 | 5 | | | | |
| 31-Aug-13 | 1 | Onshore | 19:30 | 19:36 | 4.5 | | | | |
| 31-Aug-13 | 2 | Onshore | 19:37 | 19:43 | 4.5 | | | | |
| 31-Aug-13 | 3 | Onshore | 19:48 | 19:54 | 4.5 | | | | |
| 31-Aug-13 | 4 | Onshore | 19:56 | 20:02 | 4.5 | | | | |
| 31-Aug-13 | 5 | Onshore | 20:07 | 20:13 | 4.5 | | | | |
| 31-Aug-13 | 6 | Onshore | 20:14 | 20:20 | 4.5 | | | | |
| 31-Aug-13 | 7 | Onshore | 20:26 | 20:32 | 4.5 | | | | |
| 31-Aug-13 | 8 | Onshore | 20:35 | 20:41 | 4.5 | Chum | 680 | Male | Not tagged |
| 01-Sep-13 | 1 | Onshore | 13:42 | 13:48 | 4.5 | | | | |
| 01-Sep-13 | 2 | Onshore | 13:50 | 13:56 | 4.5 | | | | |
| 01-Sep-13 | 3 | Onshore | 14:00 | 14:06 | 4.5 | | | | |
| 01-Sep-13 | 4 | Onshore | 14:07 | 14:13 | 4.5 | | | | |
| 01-Sep-13 | 5 | Onshore | 14:16 | 14:22 | 4.5 | | | | |
| 01-Sep-13 | 6 | Onshore | 14:23 | 14:29 | 4.5 | | | | |
| 01-Sep-13 | 7 | Onshore | 14:32 | 14:38 | 4.5 | | | | |
| 01-Sep-13 | 8 | Onshore | 14:39 | 14:45 | 4.5 | | | | |
| 01-Sep-13 | 9 | Onshore | 15:00 | 15:12 | 4.5 | | | | |
| 01-Sep-13 | 10 | Onshore | 15:14 | 15:20 | 4.5 | Chum | 640 | Female | Not tagged |
| 01-Sep-13 | 11 | Onshore | 15:23 | 15:29 | 4.5 | | | | |
| 01-Sep-13 | 12 | Onshore | 15:29 | 15:35 | 4.5 | | | | |
| 01-Sep-13 | 13 | Onshore | 15:37 | 15:47 | 4.5 | | | | |
| 01-Sep-13 | 14 | Onshore | 15:44 | 15:50 | 4.5 | | | | |
| 02-Sep-13 | 1 | Onshore | 12:57 | 13:03 | 6 | | | | |
| 02-Sep-13 | 2 | Onshore | 13:05 | 13:11 | 6 | | | | |
| 02-Sep-13 | 3 | Onshore | 13:17 | 13:23 | 6 | | | | |
| 02-Sep-13 | 4 | Onshore | 13:25 | 13:31 | 6 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|--------|---------|-----------|--------------|------------------|--------|----------------------------|
| 02-Sep-13 | 5 | Onshore | 13:36 | 13:42 | 6 | | | | |
| 02-Sep-13 | 6 | Onshore | 13:45 | 13:51 | 6 | | | | |
| 02-Sep-13 | 7 | Onshore | 13:56 | 14:02 | 6 | | | | |
| 02-Sep-13 | 8 | Onshore | 14:04 | 14:10 | 6 | | | | |
| 02-Sep-13 | 9 | Onshore | 15:42 | 15:48 | 6 | | | | |
| 02-Sep-13 | 10 | Onshore | 15:50 | 15:56 | 6 | | | | |
| 02-Sep-13 | 11 | Onshore | 16:02 | 16:08 | 6 | | | | |
| 02-Sep-13 | 12 | Onshore | 16:11 | 16:17 | 6 | | | | |
| 02-Sep-13 | 13 | Onshore | 16:23 | 16:29 | 6 | | | | |
| 02-Sep-13 | 14 | Onshore | 16:31 | 16:37 | 6 | | | | |
| 03-Sep-13 | 1 | Nearshore | 11:56 | 12:02 | 5 | | | | |
| 03-Sep-13 | 2 | Nearshore | 12:06 | 12:12 | 5 | Chum | 770 | Male | 148.250 - A16 |
| 03-Sep-13 | 3 | Nearshore | 12:16 | 12:26 | 5 | | | | |
| 03-Sep-13 | 4 | Nearshore | 12:36 | 12:46 | 5 | Chum | 620 | Female | 148.554 - A11 |
| 03-Sep-13 | 5 | Nearshore | 13:56 | 14:02 | 5 | | | | |
| 03-Sep-13 | 6 | Nearshore | 14:05 | 14:11 | 5 | | | | |
| 03-Sep-13 | 7 | Nearshore | 14:18 | 14:24 | 5 | | | | |
| 03-Sep-13 | 8 | Nearshore | 14:27 | 14:33 | 5 | | | | |
| 03-Sep-13 | 9 | Nearshore | 14:39 | 14:46 | 5 | | | | |
| 03-Sep-13 | 10 | Nearshore | 14:48 | 14:54 | 5 | | | | |
| 03-Sep-13 | 11 | Nearshore | 16:38 | 16:44 | 5 | Chum | 760 | Male | 148.544 - A0 |
| 03-Sep-13 | 11 | Nearshore | 16:38 | 16:44 | 5 | Chum | 780 | Male | 148.544 - A22 |
| 03-Sep-13 | 12 | Nearshore | 17:02 | 17:08 | 5 | Chum | 785 | Male | 148.554 - A14 |
| 03-Sep-13 | 13 | Nearshore | 17:18 | 17:24 | 5 | | | | |
| 03-Sep-13 | 14 | Nearshore | 17:26 | 17:32 | 5 | | | | |
| 04-Sep-13 | 1 | Nearshore | 19:53 | 19:59 | 4.5 | Chum | 720 | -- | 148.554 - A75 |
| 04-Sep-13 | 2 | Nearshore | 20:06 | 20:12 | 4.5 | | | | |
| 04-Sep-13 | 3 | Nearshore | 20:16 | 20:22 | 4.5 | | | | |
| 04-Sep-13 | 4 | Nearshore | 20:25 | 20:31 | 4.5 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|-----|----------------------------|
| 04-Sep-13 | 5 | Nearshore | 20:35 | 20:41 | 4.5 | | | | |
| 04-Sep-13 | 6 | Nearshore | 20:44 | 20:50 | 4.5 | | | | |
| 04-Sep-13 | 7 | Nearshore | 20:54 | 21:00 | 4.5 | | | | |
| 04-Sep-13 | 8 | Nearshore | 21:02 | 21:08 | 4.5 | | | | |
| 04-Sep-13 | 9 | Nearshore | 21:47 | 21:53 | 4.5 | | | | |
| 04-Sep-13 | 10 | Nearshore | 21:55 | 22:01 | 4.5 | | | | |
| 04-Sep-13 | 11 | Nearshore | 22:06 | 22:12 | 4.5 | | | | |
| 04-Sep-13 | 12 | Nearshore | 22:15 | 20:21 | 4.5 | | | | |
| 04-Sep-13 | 13 | Nearshore | 22:25 | 22:31 | 4.5 | | | | |
| 04-Sep-13 | 14 | Nearshore | 22:34 | 22:40 | 4.5 | | | | |
| 05-Sep-13 | 1 | Nearshore | 10:58 | 11:04 | 6 | | | | |
| 05-Sep-13 | 2 | Nearshore | 11:07 | 11:13 | 6 | | | | |
| 05-Sep-13 | 3 | Nearshore | 11:22 | 11:28 | 6 | | | | |
| 05-Sep-13 | 4 | Nearshore | 11:31 | 11:37 | 6 | | | | |
| 05-Sep-13 | 5 | Nearshore | 11:41 | 11:47 | 6 | | | | |
| 05-Sep-13 | 6 | Nearshore | 11:51 | 11:57 | 6 | | | | |
| 05-Sep-13 | 7 | Nearshore | 12:00 | 12:06 | 6 | | | | |
| 05-Sep-13 | 8 | Nearshore | 20:59 | 21:05 | 6 | | | | |
| 05-Sep-13 | 9 | Nearshore | 21:07 | 21:13 | 6 | | | | |
| 05-Sep-13 | 10 | Nearshore | 21:27 | 21:33 | 6 | | | | |
| 05-Sep-13 | 11 | Nearshore | 21:35 | 21:41 | 6 | | | | |
| 05-Sep-13 | 12 | Nearshore | 21:44 | 21:50 | 6 | | | | |
| 05-Sep-13 | 13 | Nearshore | 21:50 | 21:56 | 6 | | | | |
| 05-Sep-13 | 14 | Nearshore | 22:02 | 22:08 | 6 | | | | |
| 06-Sep-13 | 1 | Nearshore | 15:47 | 15:51 | 5 | | | | |
| 06-Sep-13 | 2 | Nearshore | 15:54 | 16:00 | 5 | | | | |
| 06-Sep-13 | 3 | Nearshore | 16:06:40 | 16:12:40 | 5 | | | | |
| 06-Sep-13 | 4 | Offshore | 16:17:40 | 16:23:40 | 5 | | | | |
| 06-Sep-13 | 5 | Nearshore | 16:30:00 | 16:36:00 | 5 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|--------|----------------------------|
| 06-Sep-13 | 6 | Offshore | 16:39:42 | 16:45:42 | 5 | | | | |
| 06-Sep-13 | 7 | Nearshore | 16:50:25 | 16:56:25 | 5 | | | | |
| 06-Sep-13 | 8 | Offshore | 17:00:54 | 17:06:54 | 5 | | | | |
| 06-Sep-13 | 9 | Nearshore | 17:13:00 | 17:19:00 | 5 | | | | |
| 06-Sep-13 | 10 | Offshore | 17:22:10 | 17:28:10 | 5 | | | | |
| 06-Sep-13 | 11 | Nearshore | 17:36:55 | 17:42:55 | 5 | | | | |
| 06-Sep-13 | 12 | Nearshore | 17:46:17 | 17:52:17 | 5 | | | | |
| 06-Sep-13 | 13 | Nearshore | 17:58:15 | 18:04:15 | 5 | | | | |
| 06-Sep-13 | 14 | Nearshore | 18:07:48 | 18:13:40 | 5 | | | | |
| 07-Sep-13 | 1 | Nearshore | 13:12:00 | 13:18:00 | 4.5 | | | | |
| 07-Sep-13 | 2 | Nearshore | 13:20:40 | 13:26:40 | 4.5 | | | | |
| 07-Sep-13 | 3 | Nearshore | 13:32:10 | 13:38:10 | 4.5 | | | | |
| 07-Sep-13 | 4 | Offshore | 13:41:19 | 13:47:19 | 4.5 | | | | |
| 07-Sep-13 | 5 | Nearshore | 13:51:50 | 13:58:40 | 4.5 | | | | |
| 07-Sep-13 | 6 | Nearshore | 14:01:12 | 14:07:12 | 4.5 | Chum | 660 | Male | 148.859 - A4 |
| 07-Sep-13 | 7 | Nearshore | 14:34:32 | 14:40:32 | 4.5 | | | | |
| 07-Sep-13 | 8 | Nearshore | 14:43:50 | 14:49:50 | 4.5 | | | | |
| 07-Sep-13 | 9 | Nearshore | 14:53:53 | 14:59:53 | 4.5 | | | | |
| 07-Sep-13 | 10 | Offshore | 15:03:10 | 15:09:10 | 4.5 | | | | |
| 07-Sep-13 | 11 | Nearshore | 16:24:05 | 16:30:05 | 4.5 | | | | |
| 07-Sep-13 | 12 | Offshore | 16:32:38 | 16:38:38 | 4.5 | Chum | 580 | Female | Not tagged |
| 07-Sep-13 | 13 | Nearshore | 16:50:59 | 16:56:59 | 4.5 | | | | |
| 07-Sep-13 | 14 | Offshore | 16:59:52 | 17:05:52 | 4.5 | | | | |
| 09-Sep-13 | 1 | Nearshore | 16:46:58 | 16:52:58 | 6 | | | | |
| 09-Sep-13 | 2 | Nearshore | 17:00:17 | 17:06:17 | 6 | | | | |
| 09-Sep-13 | 3 | Nearshore | 17:12:12 | 17:18:12 | 6 | | | | |
| 09-Sep-13 | 4 | Nearshore | 17:21:28 | 17:27:28 | 6 | | | | |
| 09-Sep-13 | 5 | Nearshore | 17:34:12 | 17:40:12 | 6 | | | | |
| 09-Sep-13 | 6 | Nearshore | 17:43:55 | 17:49:55 | 6 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|------|----------------------------|
| 09-Sep-13 | 7 | Nearshore | 17:53:49 | 17:59:49 | 6 | | | | |
| 09-Sep-13 | 8 | Nearshore | 18:04:00 | 18:10:00 | 6 | | | | |
| 09-Sep-13 | 9 | Nearshore | 18:16:04 | 18:22:04 | 6 | | | | |
| 09-Sep-13 | 10 | Nearshore | 18:26:55 | 18:32:55 | 6 | | | | |
| 09-Sep-13 | 11 | Nearshore | 18:50:59 | 18:56:59 | 6 | | | | |
| 09-Sep-13 | 12 | Nearshore | 19:02:15 | 19:08:15 | 6 | | | | |
| 09-Sep-13 | 13 | Nearshore | 19:13:50 | 19:19:50 | 6 | | | | |
| 09-Sep-13 | 14 | Nearshore | 19:23:53 | 19:29:56 | 6 | | | | |
| 10-Sep-13 | 1 | Nearshore | 14:04:00 | 14:10:00 | 5 | | | | |
| 10-Sep-13 | 2 | Nearshore | 14:15:00 | 14:21:00 | 5 | | | | |
| 10-Sep-13 | 3 | Nearshore | 14:24:00 | 14:30:00 | 5 | | | | |
| 10-Sep-13 | 4 | Nearshore | 14:35:00 | 14:41:00 | 5 | | | | |
| 10-Sep-13 | 5 | Nearshore | 14:53:00 | 14:59:00 | 5 | | | | |
| 10-Sep-13 | 6 | Nearshore | 15:02:00 | 15:08:00 | 5 | | | | |
| 10-Sep-13 | 7 | Nearshore | 15:10:00 | 15:16:00 | 5 | | | | |
| 10-Sep-13 | 8 | Nearshore | 18:31:00 | 18:37:00 | 5 | | | | |
| 10-Sep-13 | 9 | Nearshore | 18:42:00 | 18:48:00 | 5 | Chum | 650 | Male | 148.859 -A21 |
| 10-Sep-13 | 10 | Nearshore | 19:00:00 | 19:06:00 | 5 | | | | |
| 10-Sep-13 | 11 | Nearshore | 19:08:00 | 19:14:00 | 5 | Chum | 740 | Male | 148.859 - A20 |
| 10-Sep-13 | 12 | Nearshore | 19:17:00 | 19:23:00 | 5 | | | | |
| 10-Sep-13 | 13 | Nearshore | 19:26:00 | 19:32:00 | 5 | | | | |
| 10-Sep-13 | 14 | Nearshore | 19:35:00 | 19:41:00 | 5 | | | | |
| 11-Sep-13 | 1 | Nearshore | 17:49:00 | 17:55:00 | 4.5 | | | | |
| 11-Sep-13 | 2 | Nearshore | 17:57:00 | 18:03:00 | 4.5 | | | | |
| 11-Sep-13 | 3 | Nearshore | 18:06:00 | 18:12:00 | 4.5 | | | | |
| 11-Sep-13 | 4 | Nearshore | 18:15:00 | 18:21:00 | 4.5 | | | | |
| 11-Sep-13 | 5 | Nearshore | 18:23:00 | 18:29:00 | 4.5 | | | | |
| 11-Sep-13 | 6 | Nearshore | 18:30:00 | 18:36:00 | 4.5 | | | | |
| 11-Sep-13 | 7 | Nearshore | 18:50:00 | 18:56:00 | 4.5 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|------|----------------------------|
| 11-Sep-13 | 8 | Nearshore | 18:58:00 | 19:04:00 | 4.5 | | | | |
| 11-Sep-13 | 9 | Nearshore | 19:06:00 | 19:12:00 | 4.5 | | | | |
| 11-Sep-13 | 10 | Nearshore | 19:15:00 | 19:21:00 | 4.5 | | | | |
| 11-Sep-13 | 11 | Nearshore | 19:24:00 | 19:30:00 | 4.5 | | | | |
| 11-Sep-13 | 12 | Nearshore | 19:33:00 | 19:39:00 | 4.5 | | | | |
| 11-Sep-13 | 13 | Nearshore | 19:42:00 | 19:48:00 | 4.5 | | | | |
| 11-Sep-13 | 14 | Nearshore | 19:50:00 | 19:56:00 | 4.5 | | | | |
| 12-Sep-13 | 1 | Nearshore | 14:49:00 | 14:55:00 | 6 | | | | |
| 12-Sep-13 | 2 | Nearshore | 14:58:00 | 15:04:00 | 6 | Chum | 700 | Male | 148.554 - A2 |
| 12-Sep-13 | 3 | Nearshore | 15:10:00 | 15:16:00 | 6 | | | | |
| 12-Sep-13 | 4 | Nearshore | 15:20:00 | 15:26:00 | 6 | | | | |
| 12-Sep-13 | 5 | Nearshore | 15:28:00 | 15:34:00 | 6 | | | | |
| 12-Sep-13 | 6 | Nearshore | 15:36:00 | 15:42:00 | 6 | Chum | 720 | Male | 148.859 - A2 |
| 12-Sep-13 | 6 | Nearshore | 15:36:00 | 15:42:00 | 6 | Chum | 740 | Male | 148.554 - A8 |
| 12-Sep-13 | 7 | Nearshore | 15:46:00 | 15:52:00 | 6 | | | | |
| 12-Sep-13 | 8 | Nearshore | 17:40:00 | 17:46:00 | 6 | | | | |
| 12-Sep-13 | 9 | Nearshore | 18:49:00 | 18:55:00 | 6 | | | | |
| 12-Sep-13 | 10 | Nearshore | 18:58:00 | 19:04:00 | 6 | | | | |
| 12-Sep-13 | 11 | Nearshore | 19:08:00 | 19:14:00 | 6 | | | | |
| 12-Sep-13 | 12 | Nearshore | 19:17:00 | 19:23:00 | 6 | | | | |
| 12-Sep-13 | 13 | Nearshore | 19:25:00 | 19:31:00 | 6 | | | | |
| 12-Sep-13 | 14 | Nearshore | 19:33:00 | 19:39:00 | 6 | | | | |
| 16-Sep-13 | 1 | Nearshore | 18:16:01 | 18:22:01 | 5 | | | | |
| 16-Sep-13 | 2 | Nearshore | 19:02:02 | 19:08:02 | 5 | | | | |
| 16-Sep-13 | 3 | Offshore | 19:11:47 | 19:17:47 | 5 | | | | |
| 16-Sep-13 | 4 | Nearshore | 19:23:00 | 19:29:00 | 5 | | | | |
| 16-Sep-13 | 5 | Nearshore | 19:37:44 | 19:43:44 | 5 | | | | |
| 16-Sep-13 | 6 | Offshore | 19:56:46 | 20:02:46 | 5 | | | | |
| 16-Sep-13 | 7 | Nearshore | 20:08:50 | 20:14:50 | 5 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|--------|----------------------------|
| 16-Sep-13 | 8 | Offshore | 20:18:18 | 20:24:18 | 5 | Chum | 650 | Male | Not tagged |
| 16-Sep-13 | 9 | Nearshore | 20:39:32 | 20:45:32 | 5 | | | | |
| 16-Sep-13 | 10 | Offshore | 20:49:00 | 20:55:00 | 5 | | | | |
| 16-Sep-13 | 11 | Nearshore | 20:59:06 | 21:05:06 | 5 | | | | |
| 16-Sep-13 | 12 | Nearshore | 21:07:30 | 21:13:30 | 5 | Chum | -- | Female | 148.859 - A3 |
| 16-Sep-13 | 13 | Nearshore | 21:27:26 | 21:33:26 | 5 | Chum | 680 | Male | 148.859 - A15 |
| 16-Sep-13 | 14 | Nearshore | 21:47:30 | 21:53:30 | 5 | | | | |
| 17-Sep-13 | 1 | Nearshore | 13:59:08 | 14:05:08 | 4.5 | | | | |
| 17-Sep-13 | 2 | Nearshore | 14:08:48 | 14:14:48 | 4.5 | Chum | 680 | Male | 148.859 - A1 |
| 17-Sep-13 | 3 | Nearshore | 14:28:10 | 14:34:10 | 4.5 | | | | |
| 17-Sep-13 | 4 | Nearshore | 14:37:30 | 14:43:30 | 4.5 | | | | |
| 17-Sep-13 | 5 | Nearshore | 14:47:45 | 14:53:45 | 4.5 | | | | |
| 17-Sep-13 | 6 | Nearshore | 14:57:12 | 15:03:12 | 4.5 | Chum | 760 | Male | 148.859 - A19 |
| 17-Sep-13 | 7 | Nearshore | 15:13:07 | 15:19:07 | 4.5 | Chum | 710 | Female | 148.859 - A0 |
| 17-Sep-13 | 8 | Nearshore | 15:29:30 | 15:35:30 | 4.5 | | | | |
| 17-Sep-13 | 9 | Nearshore | 15:40:26 | 15:46:26 | 4.5 | Chum | 610 | Female | 148.859 - A14 |
| 17-Sep-13 | 10 | Nearshore | 15:56:20 | 16:02:20 | 4.5 | | | | |
| 17-Sep-13 | 11 | Nearshore | 16:07:10 | 16:13:10 | 4.5 | | | | |
| 17-Sep-13 | 12 | Nearshore | 16:16:40 | 16:22:40 | 4.5 | | | | |
| 17-Sep-13 | 13 | Nearshore | 16:27:05 | 16:33:05 | 4.5 | | | | |
| 17-Sep-13 | 14 | Nearshore | 16:35:50 | 16:41:50 | 4.5 | | | | |
| 18-Sep-13 | 1 | Nearshore | 20:42:40 | 20:48:40 | 6 | | | | |
| 18-Sep-13 | 2 | Nearshore | 20:54:30 | 21:00:30 | 6 | Chum | 665 | Male | Not tagged |
| 18-Sep-13 | 3 | Nearshore | 21:09:57 | 21:15:57 | 6 | | | | |
| 18-Sep-13 | 4 | Nearshore | 21:18:42 | 21:24:42 | 6 | Chum | 630 | Female | Not tagged |
| 18-Sep-13 | 5 | Nearshore | 21:32:30 | 21:38:30 | 6 | | | | |
| 18-Sep-13 | 6 | Nearshore | 21:42:09 | 21:48:09 | 6 | | | | |
| 18-Sep-13 | 7 | Nearshore | 21:51:47 | 21:57:47 | 6 | | | | |
| 19-Sep-13 | 1 | Nearshore | 15:04:54 | 15:10:54 | 5 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|------|----------------------------|
| 19-Sep-13 | 2 | Nearshore | 15:17:30 | 15:23:30 | 5 | | | | |
| 19-Sep-13 | 3 | Nearshore | 15:28:17 | 15:34:17 | 5 | | | | |
| 19-Sep-13 | 4 | Nearshore | 15:36:25 | 15:42:25 | 5 | | | | |
| 19-Sep-13 | 5 | Nearshore | 15:46:40 | 15:52:40 | 5 | | | | |
| 19-Sep-13 | 6 | Nearshore | 15:56:15 | 16:02:15 | 5 | | | | |
| 19-Sep-13 | 7 | Nearshore | 16:06:40 | 16:12:40 | 5 | | | | |
| 19-Sep-13 | 8 | Nearshore | 16:15:38 | 16:21:38 | 5 | | | | |
| 19-Sep-13 | 9 | Nearshore | 16:25:51 | 16:31:51 | 5 | | | | |
| 19-Sep-13 | 10 | Nearshore | 16:34:40 | 16:40:40 | 5 | | | | |
| 19-Sep-13 | 11 | Nearshore | 16:44:40 | 16:50:40 | 5 | | | | |
| 19-Sep-13 | 12 | Nearshore | 16:53:40 | 16:59:40 | 5 | | | | |
| 19-Sep-13 | 13 | Nearshore | 17:05:50 | 17:11:50 | 5 | | | | |
| 19-Sep-13 | 14 | Nearshore | 17:14:30 | 17:20:30 | 5 | | | | |
| 21-Sep-13 | 1 | Nearshore | 18:12:32 | 18:18:32 | 4.5 | | | | |
| 21-Sep-13 | 2 | Offshore | 18:23:09 | 18:29:09 | 4.5 | | | | |
| 21-Sep-13 | 3 | Nearshore | 18:33:28 | 18:39:28 | 4.5 | | | | |
| 21-Sep-13 | 4 | Offshore | 18:42:10 | 18:48:10 | 4.5 | | | | |
| 21-Sep-13 | 5 | Nearshore | 18:53:14 | 18:59:14 | 4.5 | | | | |
| 21-Sep-13 | 6 | Nearshore | 19:02:34 | 19:08:34 | 4.5 | | | | |
| 21-Sep-13 | 7 | Nearshore | 19:13:28 | 19:19:28 | 4.5 | Chum | 695 | Male | Not tagged |
| 21-Sep-13 | 8 | Nearshore | 19:27:40 | 19:33:40 | 4.5 | | | | |
| 21-Sep-13 | 9 | Nearshore | 19:40:09 | 19:46:09 | 4.5 | | | | |
| 21-Sep-13 | 10 | Nearshore | 19:51:10 | 19:57:10 | 4.5 | | | | |
| 21-Sep-13 | 11 | Nearshore | 20:01:30 | 20:07:30 | 4.5 | | | | |
| 21-Sep-13 | 12 | Nearshore | 20:11:50 | 20:17:50 | 4.5 | | | | |
| 21-Sep-13 | 13 | Nearshore | 20:22:12 | 20:28:12 | 4.5 | | | | |
| 21-Sep-13 | 14 | Nearshore | 20:32:02 | 20:38:02 | 4.5 | | | | |
| 22-Sep-13 | 1 | Nearshore | 12:34:40 | 12:40:40 | 6 | | | | |
| 22-Sep-13 | 2 | Offshore | 12:45:05 | 12:51:05 | 6 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|--------|----------------------------|
| 22-Sep-13 | 3 | Nearshore | 12:56:03 | 13:02:03 | 6 | | | | |
| 22-Sep-13 | 4 | Offshore | 13:06:42 | 13:12:42 | 6 | | | | |
| 22-Sep-13 | 5 | Nearshore | 13:55:30 | 14:01:30 | 6 | Chum | 695 | Male | 148.250 - A11 |
| 22-Sep-13 | 6 | Nearshore | 14:21:44 | 14:27:44 | 6 | | | | |
| 22-Sep-13 | 7 | Nearshore | 14:47:20 | 14:53:20 | 6 | Chum | 690 | Male | 148.859 - A5 |
| 22-Sep-13 | 8 | Offshore | 14:12:33 | 14:18:33 | 6 | | | | |
| 22-Sep-13 | 9 | Nearshore | 19:48:10 | 19:54:10 | 6 | | | | |
| 22-Sep-13 | 10 | Offshore | 19:57:35 | 20:03:35 | 6 | | | | |
| 22-Sep-13 | 11 | Nearshore | 20:09:30 | 20:15:30 | 6 | | | | |
| 22-Sep-13 | 12 | Offshore | 20:18:32 | 20:24:32 | 6 | | | | |
| 22-Sep-13 | 13 | Nearshore | 20:39:16 | 20:45:16 | 6 | | | | |
| 22-Sep-13 | 14 | Nearshore | 20:39:16 | 20:45:16 | 6 | | | | |
| 23-Sep-13 | 1 | Offshore | 12:14:59 | 12:20:59 | 5 | | | | |
| 23-Sep-13 | 2 | Offshore | 12:26:00 | 12:32:00 | 5 | | | | |
| 23-Sep-13 | 3 | Nearshore | 12:49:55 | 12:55:55 | 5 | | | | |
| 23-Sep-13 | 4 | Offshore | 12:59:28 | 13:05:26 | 5 | Chum | 615 | Female | 148.250 - A15 |
| 23-Sep-13 | 5 | Nearshore | 13:10:15 | 13:16:15 | 5 | | | | |
| 23-Sep-13 | 6 | Nearshore | 13:20:06 | 13:26:06 | 5 | | | | |
| 23-Sep-13 | 7 | Nearshore | 13:55:50 | 14:01:50 | 5 | | | | |
| 23-Sep-13 | 8 | Nearshore | 14:06:30 | 14:01:50 | 5 | | | | |
| 23-Sep-13 | 9 | Nearshore | 14:18:40 | 14:24:40 | 5 | | | | |
| 23-Sep-13 | 10 | Nearshore | 14:28:40 | 14:34:40 | 5 | | | | |
| 23-Sep-13 | 11 | Nearshore | 17:37:30 | 17:43:30 | 5 | | | | |
| 23-Sep-13 | 12 | Nearshore | 17:46:52 | 17:52:52 | 5 | | | | |
| 23-Sep-13 | 13 | Nearshore | 18:22:03 | 18:28:03 | 5 | Chum | 725 | Male | 148.383 - A20 |
| 23-Sep-13 | 14 | Nearshore | 18:31:34 | 18:37:34 | 5 | | | | |
| 24-Sep-13 | 1 | Nearshore | 12:20:10 | 12:26:10 | 4.5 | | | | |
| 24-Sep-13 | 2 | Nearshore | 12:28:50 | 12:34:50 | 4.5 | | | | |
| 24-Sep-13 | 3 | Nearshore | 12:39:20 | 12:45:20 | 4.5 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|--------|----------------------------|
| 24-Sep-13 | 4 | Nearshore | 12:48:17 | 12:54:17 | 4.5 | | | | |
| 24-Sep-13 | 5 | Nearshore | 13:59:14 | 14:05:14 | 4.5 | | | | |
| 24-Sep-13 | 6 | Nearshore | 15:20:30 | 15:26:30 | 4.5 | | | | |
| 24-Sep-13 | 7 | Nearshore | 15:30:00 | 15:36:00 | 4.5 | | | | |
| 24-Sep-13 | 8 | Nearshore | 15:40:10 | 15:46:10 | 4.5 | | | | |
| 24-Sep-13 | 9 | Nearshore | 15:48:45 | 15:54:45 | 4.5 | | | | |
| 24-Sep-13 | 10 | Nearshore | 15:58:45 | 16:04:45 | 4.5 | | | | |
| 24-Sep-13 | 11 | Nearshore | 19:21:08 | 19:27:08 | 4.5 | | | | |
| 24-Sep-13 | 12 | Nearshore | 19:29:57 | 19:35:57 | 4.5 | | | | |
| 24-Sep-13 | 13 | Nearshore | 19:39:46 | 19:45:46 | 4.5 | | | | |
| 24-Sep-13 | 14 | Nearshore | 19:58:25 | 20:04:25 | 4.5 | | | | |
| 25-Sep-13 | 1 | Nearshore | 13:22:20 | 13:28:20 | 6 | | | | |
| 25-Sep-13 | 2 | Offshore | 13:31:32 | 13:37:32 | 6 | | | | |
| 25-Sep-13 | 3 | Nearshore | 13:46:56 | 13:52:56 | 6 | | | | |
| 25-Sep-13 | 4 | Nearshore | 15:38:41 | 15:44:41 | 6 | | | | |
| 25-Sep-13 | 5 | Nearshore | 15:48:05 | 15:54:05 | 6 | | | | |
| 25-Sep-13 | 6 | Nearshore | 16:00:25 | 16:06:25 | 6 | | | | |
| 25-Sep-13 | 7 | Nearshore | 16:10:00 | 16:16:00 | 6 | | | | |
| 25-Sep-13 | 8 | Nearshore | 16:20:18 | 16:20:18 | 6 | Chum | 650 | Male | Not tagged |
| 25-Sep-13 | 8 | Nearshore | 16:20:18 | 16:20:18 | 6 | Chum | 695 | Male | 148.250 - A22 |
| 25-Sep-13 | 8 | Nearshore | 16:20:18 | 16:20:18 | 6 | Chum | 640 | Female | Not tagged |
| 25-Sep-13 | 9 | Offshore | 16:43:50 | 16:49:50 | 6 | | | | |
| 25-Sep-13 | 10 | Nearshore | 17:03:52 | 17:09:52 | 6 | | | | |
| 25-Sep-13 | 11 | Nearshore | 17:12:26 | 17:18:26 | 6 | | | | |
| 25-Sep-13 | 12 | Nearshore | 17:22:32 | 17:28:32 | 6 | | | | |
| 25-Sep-13 | 13 | Nearshore | 17:31:08 | 17:37:08 | 6 | | | | |
| 25-Sep-13 | 14 | Nearshore | 17:41:00 | 17:47:00 | 6 | | | | |
| 25-Sep-13 | 15 | Nearshore | 17:49:32 | 17:55:32 | 6 | Chum | 690 | Male | Not tagged |
| 26-Sep-13 | 1 | Nearshore | 14:26:58 | 14:32:58 | 5 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|----------|-----------|--------------|------------------|--------|----------------------------|
| 26-Sep-13 | 2 | Nearshore | 14:36:30 | 14:42:30 | 5 | | | | |
| 26-Sep-13 | 3 | Nearshore | 14:49:07 | 14:55:07 | 5 | | | | |
| 26-Sep-13 | 4 | Nearshore | 15:00:30 | 15:06:30 | 5 | | | | |
| 26-Sep-13 | 5 | Nearshore | 15:11:00 | 15:17:00 | 5 | | | | |
| 26-Sep-13 | 6 | Nearshore | 15:21:10 | 15:27:10 | 5 | | | | |
| 26-Sep-13 | 7 | Nearshore | 15:32:13 | 15:38:13 | 5 | | | | |
| 26-Sep-13 | 8 | Nearshore | 15:41:20 | 15:47:20 | 5 | | | | |
| 26-Sep-13 | 9 | Nearshore | 15:51:30 | 15:57:30 | 5 | | | | |
| 26-Sep-13 | 10 | Nearshore | 16:00:41 | 16:06:41 | 5 | | | | |
| 26-Sep-13 | 11 | Offshore | 16:27:30 | 16:33:30 | 5 | | | | |
| 26-Sep-13 | 12 | Nearshore | 16:38:38 | 16:44:38 | 5 | | | | |
| 26-Sep-13 | 13 | Nearshore | 16:50:25 | 16:56:25 | 5 | | | | |
| 26-Sep-13 | 14 | Nearshore | 17:00:05 | 17:06:05 | 5 | | | | |
| 27-Sep-13 | 1 | Nearshore | 15:23:12 | 15:29:12 | 4.5 | | | | |
| 27-Sep-13 | 2 | Nearshore | 15:32:10 | 15:38:10 | 4.5 | | | | |
| 27-Sep-13 | 3 | Nearshore | 15:41:27 | 15:47:27 | 4.5 | Chum | 610 | Female | Not tagged |
| 27-Sep-13 | 4 | Nearshore | 15:52:32 | 15:58:32 | 4.5 | | | | |
| 27-Sep-13 | 5 | Nearshore | 16:03:12 | 16:09:12 | 4.5 | | | | |
| 27-Sep-13 | 6 | Nearshore | 16:14:36 | 16:20:36 | 4.5 | | | | |
| 27-Sep-13 | 7 | Nearshore | 16:26:56 | 16:32:56 | 4.5 | | | | |
| 27-Sep-13 | 8 | Nearshore | 16:35:35 | 16:41:35 | 4.5 | | | | |
| 27-Sep-13 | 9 | Nearshore | 16:45:50 | 16:51:50 | 4.5 | | | | |
| 27-Sep-13 | 10 | Nearshore | 16:55:15 | 17:01:15 | 4.5 | | | | |
| 27-Sep-13 | 11 | Nearshore | 17:05:00 | 17:11:00 | 4.5 | | | | |
| 28-Sep-13 | 1 | Nearshore | 17:51:30 | 17:57:30 | 6 | | | | |
| 28-Sep-13 | 2 | Nearshore | 18:01:10 | 18:07:10 | 6 | | | | |
| 28-Sep-13 | 3 | Nearshore | 18:13:42 | 18:19:42 | 6 | | | | |
| 28-Sep-13 | 4 | Nearshore | 18:23:24 | 18:29:24 | 6 | Chum | 615 | Female | 148.250 - A8 |
| 28-Sep-13 | 5 | Nearshore | 18:48:58 | 18:54:58 | 6 | | | | |



2013 Porcupine River Chum Salmon Telemetry Program

| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|----------|--------------------------------|-----------|--------------|------------------|------|----------------------------|
| 28-Sep-13 | 6 | Nearshore | 18:58:15 | 19:04:15 | 6 | | | | |
| 28-Sep-13 | 7 | Nearshore | 19:11:58 | 19:17:58 | 6 | | | | |
| 28-Sep-13 | 8 | Nearshore | 19:22:12 | 19:28:12 | 6 | Chum | 695 | Male | Not tagged |
| 28-Sep-13 | 9 | Nearshore | 19:34:40 | 19:40:40 | 6 | | | | |
| 28-Sep-13 | 10 | Nearshore | 19:46:00 | 19:52:00 | 6 | | | | |
| 28-Sep-13 | 11 | Nearshore | 19:57:06 | 20:03:06 | 6 | | | | |
| 28-Sep-13 | 12 | Nearshore | 20:07:45 | 20:13:45 | 6 | | | | |
| 28-Sep-13 | 13 | Nearshore | 20:19:30 | 20:25:30 | 6 | | | | |
| 28-Sep-13 | 14 | Nearshore | 20:30:10 | 20:36:10 | 6 | | | | |
| 29-Sep-13 | | | | No drifts conducted, too windy | | | | | |
| 30-Sep-13 | | | | No drifts conducted, too windy | | | | | |
| 01-Oct-13 | | | | No drifts conducted, too windy | | | | | |
| 02-Oct-13 | 1 | Offshore | 18:00 | 18:06 | 4.5 | | | | |
| 02-Oct-13 | 2 | Offshore | 18:08 | 18:14 | 4.5 | | | | |
| 02-Oct-13 | 3 | Offshore | 18:18 | 18:24 | 4.5 | | | | |
| 02-Oct-13 | 4 | Offshore | 18:28 | 18:34 | 4.5 | | | | |
| 02-Oct-13 | 5 | Offshore | 18:39 | 18:45 | 4.5 | | | | |
| 02-Oct-13 | 6 | Offshore | 18:48 | 18:54 | 4.5 | | | | |
| 02-Oct-13 | 7 | Offshore | 18:57 | 19:03 | 4.5 | | | | |
| 02-Oct-13 | 8 | Offshore | 19:07 | 19:13 | 4.5 | | | | |
| 02-Oct-13 | 9 | Offshore | 19:17 | 19:23 | 4.5 | | | | |
| 02-Oct-13 | 10 | Offshore | 19:26 | 19:32 | 4.5 | | | | |
| 03-Oct-13 | 1 | Offshore | 18:32 | 18:38 | 5 | | | | |
| 03-Oct-13 | 2 | Offshore | 18:41 | 18:47 | 5 | | | | |
| 03-Oct-13 | 3 | Offshore | 18:50 | 18:56 | 5 | | | | |
| 03-Oct-13 | 4 | Offshore | 18:59 | 19:05 | 5 | | | | |
| 03-Oct-13 | 5 | Offshore | 19:08 | 19:14 | 5 | | | | |
| 03-Oct-13 | 6 | Offshore | 19:16 | 19:22 | 5 | | | | |
| 03-Oct-13 | 7 | Offshore | 19:26 | 19:32 | 5 | | | | |



| Date | Drift Number | Drift Location | Net In | Net Out | Mesh Size | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency-Code) |
|-----------|--------------|----------------|--------|---------|-----------|--------------|------------------|-----|----------------------------|
| 03-Oct-13 | 8 | Offshore | 19:35 | 19:41 | 5 | | | | |
| 03-Oct-13 | 9 | Offshore | 19:44 | 19:50 | 5 | | | | |
| 03-Oct-13 | 10 | Offshore | 19:53 | 19:59 | 5 | | | | |
| 03-Oct-13 | 11 | Offshore | 19:02 | 19:08 | 5 | | | | |
| 03-Oct-13 | 12 | Offshore | 19:12 | 19:18 | 5 | | | | |
| 03-Oct-13 | 13 | Offshore | 19:23 | 19:29 | 5 | | | | |
| 03-Oct-13 | 14 | Offshore | 19:32 | 19:38 | 5 | | | | |
| 05-Oct-13 | 1 | Offshore | 16:22 | 16:28 | 6 | | | | |
| 05-Oct-13 | 2 | Offshore | 16:32 | 16:38 | 6 | | | | |
| 05-Oct-13 | 3 | Offshore | 16:42 | 16:48 | 6 | | | | |
| 05-Oct-13 | 4 | Offshore | 16:53 | 16:59 | 6 | | | | |
| 05-Oct-13 | 5 | Offshore | 17:03 | 17:09 | 6 | | | | |
| 05-Oct-13 | 6 | Offshore | 17:12 | 17:18 | 6 | | | | |
| 05-Oct-13 | 7 | Offshore | 17:21 | 17:27 | 6 | | | | |
| 05-Oct-13 | 8 | Offshore | 17:31 | 17:37 | 6 | | | | |
| 05-Oct-13 | 9 | Offshore | 17:40 | 17:46 | 6 | | | | |
| 05-Oct-13 | 10 | Offshore | 17:50 | 17:56 | 6 | | | | |
| 05-Oct-13 | 11 | Offshore | 18:59 | 19:05 | 6 | | | | |
| 05-Oct-13 | 12 | Offshore | 19:08 | 19:14 | 6 | | | | |
| 05-Oct-13 | 13 | Offshore | 19:17 | 19:23 | 6 | | | | |
| 05-Oct-13 | 14 | Offshore | 19:27 | 19:33 | 6 | | | | |
| 07-Oct-13 | 1 | Offshore | 18:47 | 18:48 | 4.5 | | | | |
| 07-Oct-13 | 2 | Offshore | 18:51 | 18:57 | 4.5 | | | | |
| 07-Oct-13 | 3 | Offshore | 19:01 | 19:07 | 4.5 | | | | |
| 07-Oct-13 | 4 | Offshore | 19:10 | 19:16 | 4.5 | | | | |
| 07-Oct-13 | 5 | Offshore | 19:20 | 19:26 | 4.5 | | | | |
| 07-Oct-13 | 6 | Offshore | 19:30 | 19:36 | 4.5 | | | | |
| 07-Oct-13 | 7 | Offshore | 19:39 | 19:45 | 4.5 | | | | |



Table B2. Set Netting Effort and catches downstream of the Porcupine River sonar site in 2013.

| Date | Set Time | Mesh size | Location | Fish Species | Fork Length (mm) | Sex | Radio Tag (Frequency – Code) |
|-----------|----------|-----------|-----------------------------------|-----------------|------------------|--------|------------------------------|
| 06-Sep-13 | 13:15 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 650 | Male | 148.554 A15 |
| 06-Sep-13 | 14:40 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 610 | Female | 148.554 A17 |
| 06-Sep-13 | 14:52 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 615 | Female | 148.554 A3 |
| 06-Sep-13 | 15:20 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 600 | Female | 148.554 A9 |
| 06-Sep-13 | 15:25 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 595 | Female | 148.554 A4 |
| 07-Sep-13 | 13:12 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 670 | Male | 148.554 A5 |
| 07-Sep-13 | 13:37 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 665 | Male | 148.554 A24 |
| 07-Sep-13 | 14:12 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 700 | Male | 148.859 A6 |
| 07-Sep-13 | 14:13 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 675 | Male | 148.554 A19 |
| 07-Sep-13 | 14:15 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 700 | Male | 148.859 A13 |
| 07-Sep-13 | 14:19 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 650 | Female | 148.859 A12 |
| 07-Sep-13 | 14:30 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 630 | Female | 148.859 A11 |
| 07-Sep-13 | 14:35 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 635 | Male | 148.859 A17 |
| 09-Sep-13 | 12:25 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 675 | Male | 148.859 A9 |
| 09-Sep-13 | 12:45 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 655 | Male | 148.859 A16 |
| 09-Sep-13 | 12:56 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 620 | Female | 148.859 A8 |
| 09-Sep-13 | 13:15 | 4.5 | 20 Km Downstream of Sonar Site | Chum | 685 | Male | 148.859 A18 |
| 22-Sep-13 | 13:24 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 745 | Male | 148.383 A15 |
| 22-Sep-13 | 14:35 | 4.5 | 3 km Downstream of the Sonar Site | Longnose Sucker | 430 | - | Not tagged |
| 23-Sep-13 | 18:42 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 670 | Male | 148.383 A8 |
| 23-Sep-13 | 18:42 | 4.5 | 3 km Downstream of the Sonar Site | Coho | 575 | Male | Not tagged |
| 24-Sep-13 | 13:18 | 4.5 | 3 km Downstream of | Chum | 695 | Male | 148.554 A20 |



2013 Porcupine River Chum Salmon Telemetry Program

| | | | | | | | |
|-----------|-------|-----|---|---------------|-----|--------|-------------|
| 24-Sep-13 | 13:18 | 4.5 | the Sonar Site 3 km Downstream of the Sonar Site | Chum | 690 | Male | 148.250 A1 |
| 24-Sep-13 | 13:18 | 4.5 | 3 km Downstream of the Sonar Site | Northern Pike | 770 | - | Not tagged |
| 24-Sep-13 | 15:00 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 715 | Male | 148.383 A14 |
| 24-Sep-13 | 16:11 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 665 | Male | 148.250 A18 |
| 24-Sep-13 | 16:30 | 5 | 3 km Downstream of the Sonar Site | Chum | 690 | Male | 148.383 A1 |
| 24-Sep-13 | 16:30 | 5 | 3 km Downstream of the Sonar Site | Chum | 620 | Female | 148.383 A23 |
| 24-Sep-13 | 18:33 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 680 | Male | 148.250 A17 |
| 24-Sep-13 | 18:33 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 660 | Male | Not tagged |
| 24-Sep-13 | 18:33 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 565 | Female | Not tagged |
| 24-Sep-13 | 18:33 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 698 | Male | 148.383 A4 |
| 24-Sep-13 | 18:33 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 655 | Male | 148.250 A14 |
| 24-Sep-13 | 18:33 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 660 | Male | 148.383 A11 |
| 25-Sep-13 | 11:27 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 700 | Male | 148.250 A13 |
| 25-Sep-13 | 11:27 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 680 | Male | 148.383 A22 |
| 25-Sep-13 | 11:27 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 730 | Male | 148.383 A16 |
| 25-Sep-13 | 11:27 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 665 | Male | 148.250 A3 |
| 25-Sep-13 | 11:27 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 685 | Male | 148.250 A0 |
| 25-Sep-13 | 12:15 | 5 | 3 km Downstream of the Sonar Site | Chum | 665 | Male | 148.383 A18 |
| 25-Sep-13 | 12:15 | 5 | 3 km Downstream of the Sonar Site | Chum | 680 | Male | 148.250 A24 |
| 25-Sep-13 | 12:15 | 5 | 3 km Downstream of the Sonar Site | Chum | 625 | Male | 148.383 A9 |
| 26-Sep-13 | 13:28 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 665 | Male | 148.383 A19 |
| 26-Sep-13 | 13:28 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 690 | Male | 148.250 A5 |
| 26-Sep-13 | 13:42 | 5 | 3 km Downstream of the Sonar Site | Chum | 665 | Male | 148.250 A19 |
| 26-Sep-13 | 13:42 | 5 | 3 km Downstream of the Sonar Site | Chum | 660 | Male | 148.250 A12 |



2013 Porcupine River Chum Salmon Telemetry Program

| | | | | | | | |
|-----------|-------|-----|-----------------------------------|------|-----|--------|---------------|
| 26-Sep-13 | 13:42 | 5 | 3 km Downstream of the Sonar Site | Chum | 705 | Male | 148.383 A12 |
| 27-Sep-13 | 14:18 | 5 | 3 km Downstream of the Sonar Site | Chum | 650 | Male | 148.383 A26 |
| 27-Sep-13 | 14:18 | 5 | 3 km Downstream of the Sonar Site | Chum | 660 | Male | 148.383 A24 |
| 27-Sep-13 | 14:18 | 5 | 3 km Downstream of the Sonar Site | Chum | 700 | Male | 148.383 A2 |
| 27-Sep-13 | 14:18 | 5 | 3 km Downstream of the Sonar Site | Chum | 745 | Male | 148.383 A0 |
| 27-Sep-13 | 14:18 | 5 | 3 km Downstream of the Sonar Site | Chum | 680 | Male | 148.383 A75 |
| 28-Sep-13 | 11:28 | 5 | 3 km Downstream of the Sonar Site | Chum | 700 | Male | 148.383 - A3 |
| 28-Sep-13 | 11:28 | 5 | 3 km Downstream of the Sonar Site | Chum | 675 | Male | 148.250 - A26 |
| 28-Sep-13 | 11:28 | 5 | 3 km Downstream of the Sonar Site | Chum | 640 | Male | 148.250 - A4 |
| 28-Sep-13 | 11:28 | 5 | 3 km Downstream of the Sonar Site | Chum | 690 | Male | 148.250 - A75 |
| 30-Sep-13 | 14:30 | 5 | 3 km Downstream of the Sonar Site | Chum | 600 | Female | 148.250 - A2 |
| 30-Sep-13 | 14:30 | 5 | 3 km Downstream of the Sonar Site | Chum | 610 | Female | 148.250 - A33 |
| 30-Sep-13 | 14:30 | 5 | 3 km Downstream of the Sonar Site | Chum | 650 | Male | 148.250 - A6 |
| 30-Sep-13 | 14:30 | 5 | 3 km Downstream of the Sonar Site | Chum | 675 | Male | 148.383 - A6 |
| 30-Sep-13 | 14:30 | 5 | 3 km Downstream of the Sonar Site | Chum | 710 | Male | 148.383 - A12 |
| 01-Oct-13 | 14:10 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 610 | Female | 148.250 - A12 |
| 01-Oct-13 | 14:10 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 710 | Male | 148.250 - A16 |
| 02-Oct-13 | 14:10 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 600 | Male | 148.383 - A13 |
| 02-Oct-13 | 14:10 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 685 | Male | 148.383 - A5 |
| 04-Oct-13 | 14:10 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 675 | Male | 148.250 - A20 |
| 04-Oct-13 | 14:10 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 615 | Female | 148.250 - A9 |
| 04-Oct-13 | 14:10 | 4.5 | 3 km Downstream of the Sonar Site | Chum | 715 | Male | 148.383 - A17 |



**APPENDIX C. LOCATIONS OF TAGS DETECTED DURING RADIO
TRACKING**



Table C1. Detected locations of and fates of radio tagged chum salmon in the Porcupine River watershed in 2013.

| Tag Frequency | Tag Code | Location of Detection | Mortality (Alive/Dead) | UTM Coordinates (Zone 07W) | |
|---------------|----------|--------------------------------|------------------------|----------------------------|----------|
| | | | | Easting | Northing |
| 148.25 | 0 | Porcupine Mainstem | dead | 618838 | 7385114 |
| 148.25 | 1 | Fishing Branch, above weir | alive | 572918 | 7376907 |
| 148.25 | 2 | Porcupine Mainstem | dead | 376703 | 7419238 |
| 148.25 | 3 | Vicinity of Old Crow | alive | 549241 | 7494778 |
| 148.25 | 4 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 5 | Fishing Branch, above weir | alive | 574864 | 7379917 |
| 148.25 | 6 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 8 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 9 | Porcupine Mainstem | alive | 621437 | 7388633 |
| 148.25 | 11 | Fishing Branch, above weir | alive | 572802 | 7377174 |
| 148.25 | 12 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 13 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 14 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 15 | Fishing Branch, above weir | alive | 575888 | 7379888 |
| 148.25 | 16 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 17 | Fishing Branch, above weir | alive | 575697 | 7379870 |
| 148.25 | 18 | Fishing Branch, below weir | dead | 584656 | 7376135 |
| 148.25 | 19 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 20 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 21 | Porcupine Mainstem | dead | 618857 | 7385152 |
| 148.25 | 22 | Fishing Branch, below weir | dead | 586230 | 7374791 |
| 148.25 | 23 | Porcupine Mainstem | alive | 626927 | 7397709 |
| 148.25 | 24 | Not found | -- | -- | -- |
| 148.25 | 26 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.25 | 75 | Fishing Branch, above weir | alive | 573084 | 7376604 |
| 148.383 | 0 | Vicinity of Old Crow | -- | -- | -- |
| 148.383 | 1 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 2 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 3 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 4 | Fishing Branch, above weir | alive | 575060 | 7379878 |
| 148.383 | 5 | Vicinity of Old Crow | alive | 547863 | 7491318 |
| 148.383 | 6 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 8 | Fishing Branch, above weir | alive | 575468 | 7379835 |
| 148.383 | 9 | Porcupine Mainstem | dead | 611220 | 7377095 |
| 148.383 | 11 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 12 | Fishing Branch, above weir | alive | 575228 | 7379782 |
| 148.383 | 13 | Bluefish River | alive | 530039 | 7475731 |
| 148.383 | 14 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 15 | Fishing Branch, above weir | alive | 576071 | 7379691 |
| 148.383 | 16 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 17 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 18 | Vicinity of Old Crow | dead | 548747 | 7495002 |
| 148.383 | 19 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 20 | Fishing Branch, above weir | alive | 575579 | 7379843 |



| Tag Frequency | Tag Code | Location of Detection | Mortality (Alive/Dead) | UTM Coordinates (Zone 07W) | |
|---------------|----------|--------------------------------|------------------------|----------------------------|----------|
| | | | | Easting | Northing |
| 148.383 | 21 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 22 | Fishing Branch, above weir | alive | 573161 | 7376495 |
| 148.383 | 23 | Fishing Branch, above weir | alive | 573021 | 7376933 |
| 148.383 | 24 | Vicinity of Old Crow | dead | 548940 | 7495146 |
| 148.383 | 26 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.383 | 75 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.554 | 0 | Fishing Branch, above weir | dead | 575497 | 7379848 |
| 148.554 | 1 | Fishing Branch, above weir | dead | 575400 | 7379780 |
| 148.554 | 2 | Fishing Branch, above weir | dead | 572477 | 7378627 |
| 148.554 | 3 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.554 | 4 | Fishing Branch, above weir | alive | 575325 | 7379612 |
| 148.554 | 5 | Tester Tag | -- | -- | -- |
| 148.554 | 6 | Fishing Branch, above weir | alive | 575132 | 7379677 |
| 148.554 | 8 | Fishing Branch, above weir | alive | 572503 | 7378689 |
| 148.554 | 9 | Fishing Branch, above weir | dead | 576133 | 7380158 |
| 148.554 | 11 | Fishing Branch, above weir | alive | 575257 | 7379784 |
| 148.554 | 12 | Fishing Branch, above weir | alive | 574765 | 7379965 |
| 148.554 | 13 | David Lord Creek | alive | 580711 | 7491303 |
| 148.554 | 14 | Vicinity of Old Crow | -- | -- | -- |
| 148.554 | 15 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.554 | 16 | Fishing Branch, above weir | | | |
| 148.554 | 17 | Fishing Branch, above weir | | | |
| 148.554 | 18 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.554 | 19 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.554 | 20 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.554 | 21 | Not found | -- | -- | -- |
| 148.554 | 22 | Campbell River, AK | -- | -- | -- |
| 148.554 | 23 | Fishing Branch, above weir | dead | 576093 | 7379795 |
| 148.554 | 24 | Fishing Branch, above weir | dead | 575508 | 7379787 |
| 148.554 | 26 | Vicinity of Old Crow | alive | 575850 | 7379672 |
| 148.554 | 75 | Fishing Branch, above weir | alive | 575950 | 7379545 |
| 148.859 | 0 | Fishing Branch, above weir | dead | 576375 | 7379660 |
| 148.859 | 1 | Fishing Branch, above weir | dead | 596151 | 7367868 |
| 148.859 | 2 | Fishing Branch, below weir | alive | 575500 | 7379817 |
| 148.859 | 3 | Fishing Branch, above weir | dead | 576093 | 7379795 |
| 148.859 | 4 | Not found | -- | -- | -- |
| 148.859 | 5 | Not found | -- | -- | -- |
| 148.859 | 6 | Fishing Branch, below weir | alive | 595759 | 7368159 |
| 148.859 | 8 | Fishing Branch, below weir | dead | 587991 | 7371525 |
| 148.859 | 9 | Fishing Branch, above weir | dead | 576106 | 7379536 |
| 148.859 | 11 | Fishing Branch, above weir | dead | 574910 | 7379967 |
| 148.859 | 12 | Fishing Branch, above weir | dead | 575326 | 7380077 |
| 148.859 | 13 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.859 | 14 | Fishing Branch, above weir | dead | 572420 | 7377484 |
| 148.859 | 15 | Fishing Branch, above weir | dead | 573708 | 7373708 |
| 148.859 | 16 | Fishing Branch, above weir | dead | 573516 | 7373403 |



| Tag Frequency | Tag Code | Location of Detection | Mortality (Alive/Dead) | UTM Coordinates (Zone 07W) | |
|---------------|----------|--------------------------------|------------------------|----------------------------|----------|
| | | | | Easting | Northing |
| 148.859 | 17 | Old Crow, recapture in fishery | -- | -- | -- |
| 148.859 | 18 | Fishing Branch, above weir | dead | 572235 | 7377995 |
| 148.859 | 19 | Fishing Branch, above weir | dead | 575558 | 7380485 |
| 148.859 | 20 | Fishing Branch, above weir | alive | 572264 | 7377732 |
| 148.859 | 21 | Fishing Branch, above weir | dead | 575268 | 7380225 |