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EDI Job Number: 14-Y-0359

Pacific Salmon Commission  
600-1155 Robson Street  
Vancouver, BC V6E 1B5

Attention: Angus Mackay

**Re: Radio Tracking of Chinook Salmon and Genetic Sampling in the Porcupine River – Final Report**

This letter summarizes the project activities conducted for the 2014 Porcupine River Chinook salmon telemetry and genetic sampling program (CRE-11-14N). This letter serves as the final report for the project; as discussed with the Pacific Salmon Commission, a decision was made to suspend this project's field activities part way through the project based on low capture rates of Chinook salmon. This letter report is intended to summarize the work conducted under this project, to detail the reasons why project the project was suspended and to provide recommendations to ensure the success of similar project in the future. The decision to format this report as a letter has been made as a cost-savings measure, as VGG feels that the preparation of a larger formal report would incur greater costs and would not add any measurable value to this project results described herein.

## **Project Background**

The monitoring of escapement of Canadian origin Chinook salmon into the upper Porcupine River watershed is of high priority for the community of Old Crow and the Vuntut Gwitch'in Government (VGG), as Chinook salmon provide the primary salmon food fishery for community members. A more thorough understanding of Porcupine River Chinook spawning locations is required for the future conservation of this run. A limited amount of information is available on Porcupine River Chinook spawning destinations. A small number of salmon outfitted with radio tags entered the Porcupine River during Yukon River Chinook telemetry projects in 2003 (CRE-17N-03) and 2004 (CRE-17-04). Over these two years, a total of 26 tags were relocated in the Porcupine River watershed and Chinook spawning was documented in a few tributaries including the Miner, Whitestone, Fishing Branch and Old Crow rivers. To satisfy the need for more detailed information on Chinook spawning distributions, VGG undertook a Chinook radio telemetry project during 2014. A secondary component of the project was to collect genetic samples from Chinook while tagging and also on the spawning grounds.



The objectives of this study were to:

- Tag 50 Chinook salmon with esophageal implant radio tags in the Porcupine River mainstem, downstream of Old Crow.
- Track radio-tagged Chinook salmon by fixed wing aircraft after the completion of spawning to better define the existing information on spawning areas in the watershed.
- Collect as many genetic samples as possible from adult Chinook salmon that spawn in the Miner and Fishing Branch rivers (the initial goal was 30 samples per river), priority areas identified by the Yukon River Panel Joint Technical Committee.

## Methods

### Radio Tagging of Chinook Salmon

Based upon run timing at the concurrent Porcupine River Chinook sonar project, radio tag application was scheduled for the anticipate peak of the run (July 16 – 21). Sampling was initially attempted at Caribou Bar Creek, which is located 65 km downstream of Old Crow (20 km upstream of the Yukon/Alaska border). This site was chosen for sampling as it is known by local fishers as one of the best fishing locations near Old Crow for Chinook. This site was also located downstream of the Bluefish River, a known salmon destination (chum and coho). Gillnets were set in suitable fishing locations (large eddies) using 5.25, 6.5 and 7.5 inch stretch mesh nets, hung at a ratio of 2:1 (nets were 100 feet long and 29 mesh deep). Sampling using the same gillnets was also attempted closer to Old Crow, near the Porcupine River sonar site. As a component of the related 2014 Porcupine River Chinook sonar species apportionment sampling, drift netting was conducted near the sonar site throughout the operation period of the sonar program and it was intended that healthy, uninjured Chinook salmon that were captured in the drift fishery would also be radio tagged. This drift netting increased the fishing effort and thus increased the chance of capturing the required number of Chinook salmon for tagging purposes.

### Genetic Sample Collection/Radio Tracking Events

Genetic sampling for spawning Chinook was conducted by a biologist from EDI and a local VGG technician by helicopter from August 2-5, and again from August 14-15. Areas of focus included the Miner River from Fishing Creek downstream to the confluence of the Fishing Branch River, and the Fishing Branch River from Bear Cave Mountain downstream to a location near the confluence of the Miner River. The river was flown at a slow speed, at an elevation just above tree level, to visually scan for fresh Chinook salmon carcasses and or near/dead spawners; a total count of Chinook redds was also conducted opportunistically during the second overflight (August 14-15). Tracking of radio tagged Chinook was also conducted opportunistically during the survey but should not be considered a comprehensive overflight as not all potential Chinook spawning habitat in the Porcupine River watershed was flown.



## Results & Discussion

### Radio Tagging

The concurrent Porcupine Chinook sonar project (EDI 2015 in prep) determined that the peak timing of Chinook migration near the study area occurred between July 17 and 23. Extensive gillnetting effort was applied during this time frame. A total of 8 Chinook salmon spawners were captured (6 radio tagged) in 237.8 net hours of sampling (Table 1); additional fish captured during the set netting included one chum salmon and five broad whitefish. Two Chinook mortalities occurred as the result of fishing induced mortalities; both individuals were relatively small and were badly gilled by the nets intended to capture larger Chinook. Both Chinook mortalities were salvaged and provided to VGG citizens in Old Crow. Five Chinook were captured at Caribou Bar Creek and three were captured near the sonar site (Photo 1); the catch-per-unit-effort (CPUE) of 0.27 Chinook per 8 net hours. Based upon these very low capture rates during the peak of the run, it was estimated that in excess of 1,700 additional net hours could be required to capture the necessary number of Chinook salmon to meet the target radio tag application goal (50 tags total). It was determined that this amount of effort could not be reasonably applied during the remaining portion of the 2014 Porcupine River Chinook run, and by extension, that it would not be feasible to apply the balance of the radio tags in 2014. In consultation with fisheries managers, a decision was made to suspend the radio tagging program with the goal of reattempting tagging in 2015 with a revised sampling approach and an increased in the planned sampling effort. Drift netting at the sonar site was also unsuccessful in capturing Chinook for the purposes of radio tagging. A total of 429 drift net sets (of approximately 6 minutes duration each) were conducted near the sonar site and only a single Chinook was captured.

**Table 1. Summary of set netting effort and fish captured on the Porcupine River during radio tagging of Chinook from July 16 to 21, 2014.**

Date	Location	Effort (Net Hours)	Chinook Captured	Chinook Tagged	Chinook Captured per 8 Hours	Other Fish Captured <sup>A</sup>
July 16	Caribou Bar Creek	16.5	1	0	0.48	0
July 17	Caribou Bar Creek	43.5	1	1	0.18	3
July 18	Caribou Bar Creek	70.5	2	1	0.23	1
July 19	Caribou Bar Creek	40.5	1	1	0.20	2
July 20	Sonar	30.0	2	2	0.53	0
July 21	Sonar	36.8	1	1	0.22	0
TOTAL		237.8	8	6	0.27	6

<sup>A</sup> Aside from Chinook salmon, other fish species captured at Caribou Bar Creek included 1 chum salmon and 5 broad whitefish.



**Photo 1. EDI technician Charles Blysak with a radio tagged Chinook captured near the Porcupine Chinook sonar at Old Crow.**

#### Genetic Sample Collection/ Radio Tracking events

The first genetic sample collection field visit (August 2-5) coincided with high water levels on the Miner and Fishing Branch rivers which resulted in highly turbid in-river water quality, with near zero visibility (Photo 2). No fish could be observed and no genetic samples were obtained. Despite the poor survey conditions, two radio tagged Chinook were located in the vicinity of Cathedral Rock on the Miner River; this area is within the area where the majority of Chinook redds have been observed in previous years. It is important to note that streamflow data for other streams in the region were reviewed prior to conducting this overflight and these stations did not indicate high water levels; however, without a streamflow gauging station on the Miner River itself, the conditions observed in the field could not be anticipated.

Due to the poor survey conditions on the first overflight, a second genetic sample collection attempt was planned for August 8-12; however, due to limited helicopter availability the second survey could not be conducted until August 14-15. During the second genetic sampling field visit, water levels were lower and visibility was much improved. However, only one live Chinook salmon spawner was observed during this survey (in the Fishing Branch River, near the North Fork confluence). Despite numerous attempts to capture this fish via snagging and netting, a genetic sample could not be obtained. Three Chinook salmon carcasses were also located in the Miner River although they were too decomposed to obtain suitable genetic samples. The second overflight was likely conducted too late to obtain samples and the high water levels



during the preceding week likely flushed the majority of near dead spawners and carcasses off of the spawning beds.



**Photo 2.** Aerial overview of the Miner River on August 3, 2014. Note the high water level and very turbid conditions which were not conducive to finding spawning Chinook.

During the August 14-15 overflight, good visibility of the river bottom allowed for Chinook redds to be counted in the Miner and Fishing Branch rivers. Although the location of each redd was not mapped, the entire Miner River was surveyed and the total counts of 55 redds can be compared to the results of previously aerial surveys of the river (Table 2). This count is within the range of previous redd counts on the Miner River, but below the average count of 74 redds (Photo 2). A total of ten Chinook redds were also counted on the Fishing Branch River between Bear Cave Mountain and the North Fork confluence; comparative data for this river is not available from previous years.

**Table 2.** Summary of Chinook redd counts on the Miner River during aerial index overflights. Only years with quantitative data are included. For example, overflights during 2003 and 2010 were conducted during periods of poor visibility and a complete redd count was not possible.

Survey Date	Chinook Redds Observed
August 8, 2001	102
August 10, 2002	42
August 3, 2009	110
August 5, 2011	53
August 16, 2012	74
August 10, 2013	64
August 14, 2014	55

**Data sources:** Anderton (2001, 2002), Snow 2009, EDI (2011, 2012, 2013)



## Summary/Recommendations

The telemetry component of the project was suspended to the very low capture rate of Chinook during the radio tagging component of the project and limited data was gleaned from the fish that were tagged. The presence of numerous redds and tags in the Miner River and Fishing Branch (redds only) rivers indicate these are important spawning the location for Chinook; however, additional tagging is required to determine the significance of these versus other spawning destinations. In order to increase capture rates during future Chinook salmon telemetry programs on the Porcupine River, there are a number of factors which should be taken into consideration, including:

- Increased sampling effort – it was apparent during 2014 that the amount of effort required to tag 50 Chinook was underestimated. In order to ensure success with a similar run size, a total of 20 days of fishing effort should be planned and radio tagging should continue in the vicinity of Caribou Bar Creek downstream of Old Crow. This location is the most preferred fishing area by local subsistence fishers and targeting Chinook in this area should maximize the number of radio tags which may be applied.
- Hiring of an experienced local fisher – an experienced local fisher should be hired as a member of the field crew to assist in radio tag application. Capturing Chinook is much more challenging than catching chum salmon and different techniques are required to effectively capture Chinook in the large, fast flowing eddies near Caribou Bar Creek. Having an individual on the field crew who is familiar with fishing for Chinook in this area should maximize the number of radio tags which can be applied.
- Use of more appropriate sampling equipment – to increase capture rates, new gillnets are recommended and should be hung at a 3:1 ratio to increase entanglement of Chinook. Prior to ordering of these nets, an experienced local fisher in Old Crow should be contacted to determine the net dimensions and characteristics (including mesh size, type and color) which are most effective in capturing Chinook in the eddies at Caribou Bar Creek. In addition to different gillnets, it is recommended that more appropriate net anchors (large metal material) be used to more efficiently set the gillnets in areas with much stronger current than the areas near Old Crow which are typically fished for chum salmon.

The genetics component of the project was unsuccessful primarily due to environmental factors (high flows) which substantially reduced visibility on the spawning grounds and ultimately made it impossible to obtain genetic samples of spawning Chinook. The timing of the first helicopter overflight was likely correct for obtaining samples; however, the unfavorable visibility required a second overflight which appeared to be too late to obtain samples.

Obtaining genetic samples on the Miner and Fishing Branch rivers is very challenging even under ideal conditions due to low densities of spawners spread over long distances. These rivers are large and are often too deep and swift to wade across or effectively snag/net spawners which are spotted from the air. A more



suitable method of obtaining genetic samples for Chinook in these rivers would be to collect samples during the radio tagging process and use the tag relocation data to assign them to each spawning river of interest. This could also provide samples from other spawning tributaries in the Porcupine River such as the Old Crow and Whitestone rivers.

Yours truly,

**EDI Environmental Dynamics Inc.**

*Submitted via email.*

Ben Snow, B.Sc., R.P.Bio.

## References

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