Chinook Radio Tracking/Telemetry Pilot Project

Yukon River Panel Project CRE-17N-03
Final Report

Prepared on behalf of the North Yukon Renewable Resources Council (RRC) and the Vuntut Gwitchin First Nation
by
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ABSTRACT:

An aerial telemetry survey was conducted over most of the Porcupine River watershed, including all larger 2nd order streams and most larger 3rd order streams. Signals from radio tags fitted into chinook salmon in the lower Yukon River by the Alaska Department of Fish and Game were located and decoded with a radio telemetry receiver. Twenty radio tags were located and decoded in four tributaries as well as the Porcupine River main-stem itself. These results provide valuable and, in some cases, groundbreaking information on the migratory distribution and habitat use of Porcupine River chinook salmon stocks.

OBJECTIVES:

a. Inspire and build community capacity and stewardship for the conservation, restoration, and enhancement of salmon stocks and their habitat in the Porcupine River sub-basin: in order to carry out needed research and to ensure long-term salmon habitat stewardship, the human capacity must be developed within the community of Old Crow. This is consistent with goals and objectives of the Vuntut Gwitchin Final Agreement and that of the Vuntut Gwitchin First Nation (VGFN). This project will provide valuable experience and training opportunities to community members;

b. The assessment of chinook stocks and habitat has been established as a priority for local managers: this project will provide information about the locations of chinook spawning habitat within the Porcupine River system;

c. Set the stage to ensure the long-term conservation of the chinook salmon resource and its habitat in the Porcupine River watershed. The knowledge acquired through this project will provide a basis from which local managers will pursue the conservation and restoration of this valued food resource.

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1 INTRODUCTION:

The Porcupine River is one of the largest tributaries in the Yukon River system. It extends from its mouth at Fort Yukon, Alaska, across the Canada/U.S. border where it drains a large portion of the north Yukon and most of the Vuntut Gwitchin First Nation's Traditional Territory. The Porcupine has a number of large tributaries in Canada, including three significant rivers that form its headwaters: the Whitestone, Miner, and Fishing Branch Rivers. The only settlement within the Porcupine River watershed is the village of Old Crow, located approximately 80 kilometres east of the Canada/U.S. border at the mouth of the Crow River. Old Crow has a population of roughly three hundred, mainly Vuntut Gwitchin First Nation members.

Three species of salmon migrate up the Porcupine River. These include a chinook run that passes Old Crow mainly during the month of July, a chum run that passes Old Crow mainly in September, and a coho run that passes Old Crow between early October and late January. The coho and chinook salmon runs in the Porcupine River system are an important food fish to the Vuntut Gwitchin; the preferred chinook being a large summer salmon, while the more abundant coho is caught during the late fall/winter. Vuntut Gwitchin Citizens fish both runs in the vicinity of Old Crow. The Vuntut Gwitchin also depend on the chum run for a substantial subsistence fishery. There have also been reports of summer chum in the vicinity of Old Crow.

A significant lack of information regarding chinook salmon stocks in the Porcupine River system has been identified as an issue that needs to be addressed. Filling such information gaps has been identified as a priority to ensure the future success of stock and habitat management.

In 2002, an effort was made in certain headwater tributaries of the Porcupine River to track the signals of radio transmitters placed in chinook salmon on the lower Yukon River by the Alaska Department of Fish and Game (ADF&G). This was conducted in conjunction with other aerial survey work being carried out for another project (CRE-15-02) (Anderton, 2002). In 2003, ADF&G conducted a similar tagging effort, which represented an excellent opportunity to gain information and knowledge on the migration of Porcupine River chinook stocks. With a relatively strong chinook run and an increase in the number of tags released by ADF&G, three times as many tagged chinook crossed the border on the Porcupine River this year, compared to 2002, providing an excellent sample of migratory distribution and destinations/patterns throughout the watershed. This study was conducted without unexpected difficulties or setbacks. Combined with the results obtained, this made it a particular success.

2 METHODS

On August 1st, 2nd, and 3rd, a telemetry survey using a Cessna 185 fixed-wing aircraft was conducted over the majority of the Porcupine River watershed. Telemetry was conducted using an ATS R4500 receiver, programmed and coordinated with respect to the ADF&G radio-tagging project on the lower Yukon River. Flights were typically at an altitude of

200m to 300m above streams. Those radio tag signals located were decoded; the specific tags identified, and associated aircraft locations were recorded by GPS. These functions were performed electronically using the R4500 receiver; however, a manual record was also kept simultaneously (on standardised forms) to assist with data interpretation at a later point in time. The original flight schedule was to begin on July 30th from the kilometre 237 airport, just off the Dempster Highway. Unfortunately, weather prevented the chartered aircraft and pilot (BeauDel Air) from reaching the location. Two days later on August 1st, the aircraft was able to land at the Km 237 airport, and survey work began in the southern portion of the Porcupine River watershed.

While most streams of significance were flown, some were not due to time constraints. Those streams (or portions thereof) not covered were considered to be of lesser potential for chinook spawning habitat at the time that the work was conducted. These included:

- Eagle River (tributary of Bell River)
- Upper portion of Rock River (tributary of Bell River)
- Little Bell River (tributary of Bell River)
- Bluefish River, upstream from lower 20-30 Km (as the crow flies)
- Black Fox Creek (tributary of Crow River)
- Johnson Creek (tributary of Crow River)
- Lower portion of Schaeffer Creek (tributary of Crow River)
- Lower portion of Bell River, below mouth of Rock River
- Lower portion of Johnson Creek, below mouth of Pine Creek. (tributary of Porcupine)
- Porcupine main-stem between the portion of the River known as "Porcupine Lake" and the mouth of the Driftwood River
- Porcupine main-stem below the mouth of Caribou Bar Creek

Smaller tributary streams were not surveyed, with the exception of a few with particular attributes in regards to salmon habitat.

It should also be noted that there was incomplete coverage of the mid-portion of the upper Bell River, due to strong winds that prevented the aircraft from flying slowly along the bends in the river.

It should additionally be noted that the mid-portion of the Miner River (where a concentration of radio tags were located) was flown both on August 1st and August 2nd. This was to ensure that all tags transmitting from the stream were located, as there was a possibility of missing one or more tags due to the high concentration in one portion of the river. It also provided an opportunity to observe any movements of tagged chinook that were located a second time on August 2nd. One additional tag was located and decoded on August 2nd.

Notes were taken which characterize the nature of each stream in terms of habitat, such as substrate, riparian, and aquatic characteristics.

3 RESULTS

3.1 Location of radio tag signals

Chinook radio tag signals were received and decoded with locations fixed in three 2nd order tributaries of the Porcupine River, as well as the main-stem. Eleven (55%) radio tagged chinook were located in the Miner River, with smaller amounts in the Fishing Branch (3 tags, 15%), Whitestone (1 tag, 5%), and Crow (2 tags, 10%)Rivers. Three (15%) radio tags were located in the Porcupine River main-stem and/or in the community of Old Crow. Details of each tag located are as follows, according to stream location:

3.1.1 Miner River/Tributaries

The Miner River main-stem was covered from its headwaters downstream. No radio tag signals were encountered until the mid-portion of the river, well below the mouth of Fishing Creek, and near Mount Dewdney. Ten other signals were decoded successfully on the Miner River between this point and the mouth of the Fishing Branch River, with the highest concentration of tags (8 of 11) located from Mount Dewdney to Cathedral Rocks (see Map in section 3.1.7). The following list details tag numbers (upstream to downstream) in this section of the river:

Frequency:	Tag#:
702	20 mortality
902	17
882	23 mortality
742	20
702	39
702	06
682	72
702	71

Three other tags were located downstream from Cathedral Rocks, with the following tag numbers (see Map in section 3.1.6):

Frequency:	Tag#:
722	19
902	98
722	24

Three tributary streams were also covered: a large unnamed creek joining the upper Miner River from the west, both the main-stem and western fork of Fishing Creek, and the unnamed tributary joining the Miner from the west at Cathedral Rock.

A comparison of tag locations in the Miner River between August 1st and 2nd is of interest. The following tag movements of at least 5km are worth noting:

- Tag 722/19 moved downstream from the Cathedral Rocks area approximately 18 to 19km (as the crow flies);

- Tag 902/98 moved upstream approximately 5km from a location approximately 20 km upstream from the mouth of the Fishing Branch River (as the crow flies).

3.1.2 Fishing Branch River

The Fishing Branch River was flown from its confluence with the Miner River, upstream past Bear Cave Mountain approximately 10 to 15km to where the river dried up. Three tags were located and decoded, one just upstream from the confluence with the Miner River (1033/15), and two just below the confluence of the north fork and main branch of the River (742/14, & 682/39). See map in section 3.1.7. The north fork of the Fishing Branch River was also flown in its entirety.

3.1.3 Whitestone River/Tributaries

The Whitestone River main-stem was covered in its entirety. One radio tag was located and decoded (742/15) approximately 12 to 15km downstream from Mount Huely, and approximately 20km upstream from the mouth of a large tributary joining the Whitestone from the south. See map in section 3.1.7.

Two unnamed tributaries were also covered, most of one joining the Whitestone approximately 10km upstream from the mouth of McPharlon Creek, where the river changes course from west to north. The lower 10km of another tributary joining the upper Whitestone approximately 7km downstream from Mount Fowlie was also covered.

3.1.4 Crow River/Tributaries

The Crow River and 4 of its tributaries were completely or partially flown. The Crow River was covered downstream from where it crosses the Canada/U.S border. Two radio tags were located and decoded, one (842/21) approximately 5 to 6km downstream (as the crow flies) from the Canada/U.S. border and 1.5 to 2km downstream from the mouth of Bilwaddy Creek. The other tag (922/76) was located approximately 3km (as the crow flies) downstream from the mouth of Black Fox Creek. See map in section 3.1.6.

The following four tributary streams were also covered:

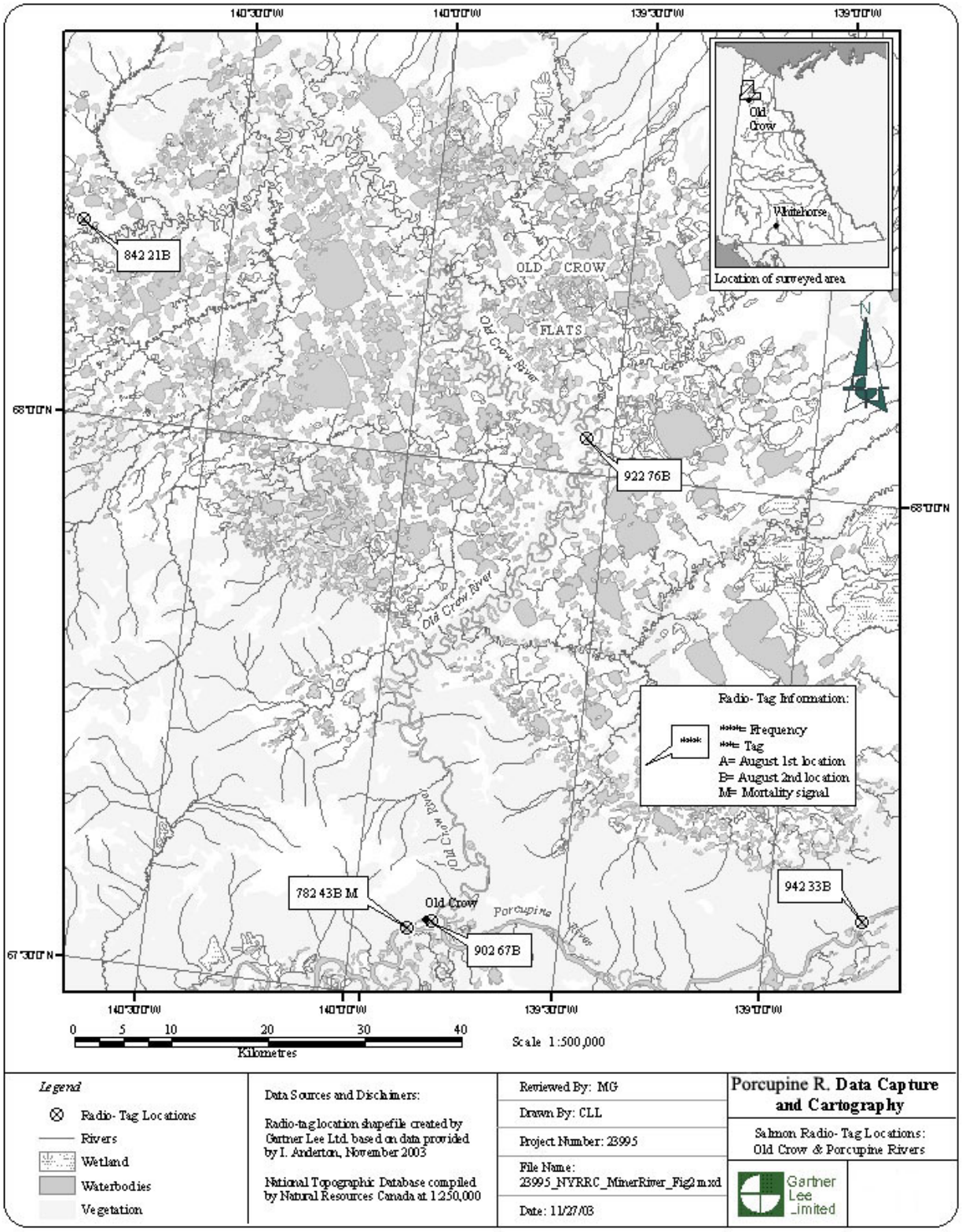
- Schaeffer Creek from its headwaters downstream until it becomes thoroughly immersed in Crow Flats;
- Surprise Creek in its entirety;
- Thomas Creek upstream from its mouth until well above tree line;
- Timber Creek upstream from its mouth until well above tree line.

3.1.5 Porcupine River/Old Crow

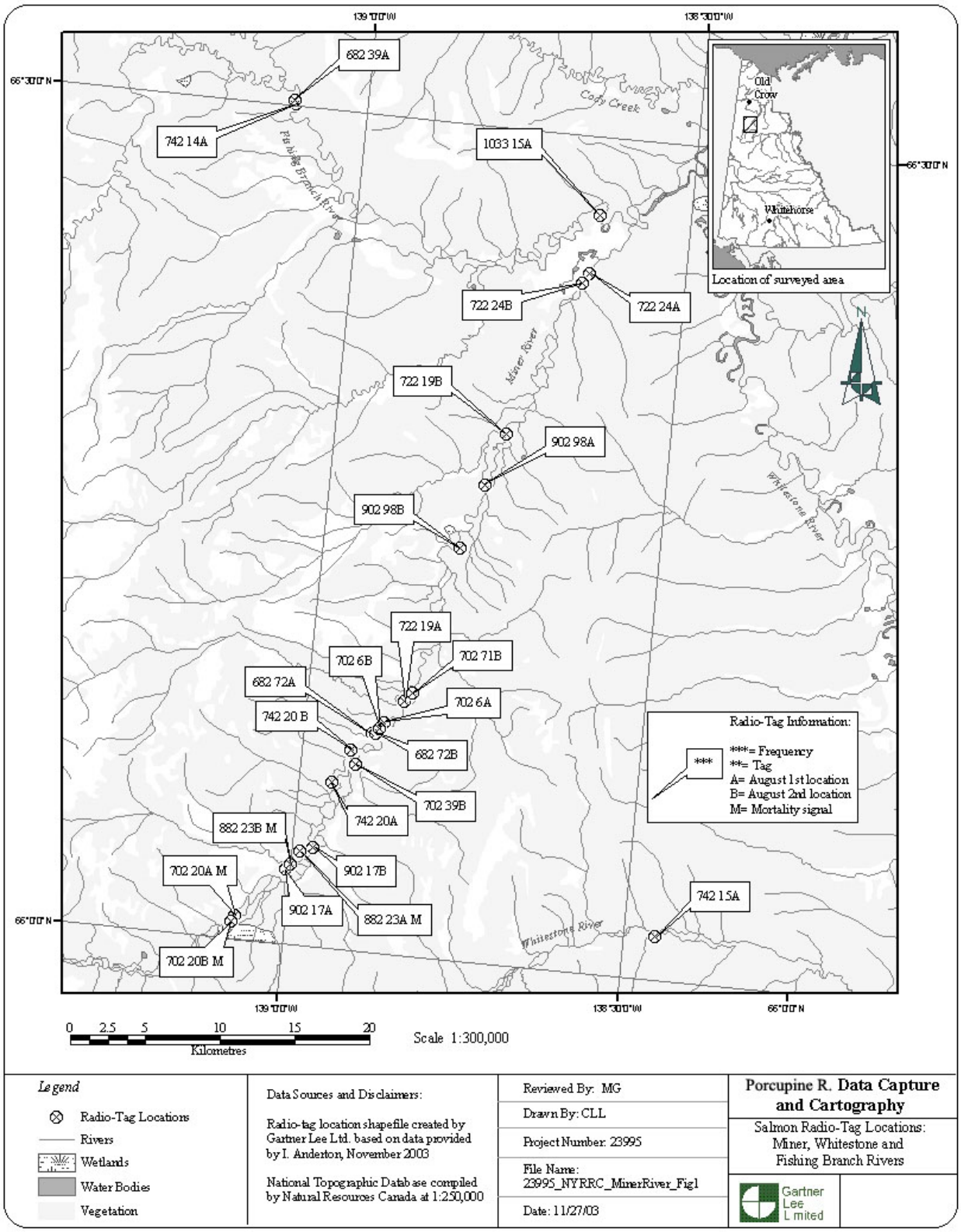
The Porcupine River was covered from the confluence of the Whitestone and Miner Rivers downstream to the portion of the river known as “Porcupine Lake.” No radio tag signals were located in that portion of the river. No coverage of the river was made from this point downstream to the mouth of the Driftwood River, where coverage of the Porcupine main stem was continued. Coverage continued downstream to the mouth of Caribou Bar Creek, approximately 18km upstream from the Canada/U.S. border. One radio tag signal (942/33) was located approximately 15km downstream from the mouth of the Driftwood River. As well, two tags were located at or near the community of Old

Crow. One of these signals indicated mortality (782/43), while the other one did not (902/67). A mortality signal is based upon lack of tag movement for more than 24 hours. It has not been determined if one or both of these tags were in the possession of fishers in Old Crow or if one was actually in a salmon migrating past the community in the Porcupine River.

3.1.6 Map of Chinook Radio Tag Locations in the Northern Porcupine Watershed



3.1.7 Map of Chinook Radio Tag Locations in the Southern Porcupine Watershed



3.2 Observations of Stream Habitat, Spawning Redds, and Salmon

3.2.1 Miner River/Tributaries

The very upper reaches of the Miner River were extremely clear, with a very clean and bright substrate. Stream-flow was quite swift with a relatively steep grade. As the river runs south, there are two areas of extreme braiding and possible sources of up-welling water and aufies. Considerable algal growth was observed in slower side channels of these braided areas. Several deep pools separated by shallow riffles were observed below these two areas of braiding and just upstream from the mouth of an unnamed large tributary entering from the west.

The large unnamed stream entering the upper Miner River from the west had some slight stain or turbidity, increasing in intensity moving upstream. The substrate was composed of gravel with small cobbles. Some good reaches of potential chinook spawning habitat were observed (extended stretches of medium depth with semi-swift water moving over even, cobbled substrate).

The Miner River main-stem, below the mouth of the unnamed tributary and above the mouth of Fishing Creek, was characterized by clear water and a clean, bright substrate of larger cobbles. The stream was composed of alternating good reaches, riffles, and some pools. Substrate appears to have excellent potential for chinook habitat.

Fishing Creek enters the Miner River as it changes direction from south to east. Its water is stained, and the substrate has a dark coating of algae and/or silt. This darkness made observation of the substrate difficult. It appeared to be mixed, with some gravel and small cobbles. Large boulders were observed, causing rough water conditions in the lower portions of the stream. Both the main branch and the northern fork of Fishing Creek demonstrated dark water/substrate conditions. In the mid-upper portions of the main branch, the stream was composed of large deep pools. In the north fork, algal growth was heavier, with less silt than the main branch. Large logjams were observed throughout the north fork channel. Large timber lined the streambed all the way up the north fork until it reached a wide tundra valley, at which point the stream became quite small. Algal growth remained heavy in some pools all the way into the upper reaches of the north fork.

Downstream from the mouth of Fishing Creek, the water of the Miner River had a slight tint, with a coating of algae on the substrate. Despite these conditions, the substrate was visible most of the time. The change in river conditions below Fishing Creek was quite dramatic, with a bright, clean bottom upstream from the confluence. Excellent cobbled reaches exist intermittently throughout the mid and lower Miner River main-stem. No spawning redds or signs of salmon were observed in or above this tributary. However, redds were observed approximately 3km downstream from the mouth of Fishing Creek. This is consistent with the findings of research conducted in 2002 (CRE-15-02) (Anderton, 2002). The flight conditions and visibility did not allow for a thorough survey of redds, rather only sporadic sightings. As well, once radio tags were encountered, the survey crew focussed most attention on locating and decoding radio tag signals. Eight locations with spawning redds were observed between the mouth of Fishing Creek and

the mouth of the Fishing Branch River. Salmon were also observed on three occasions. As previously mentioned, these observations should be considered minimal and sporadic.

In the lower Miner River (below the mouth of the Fishing Branch River), the bottom was not visible due to the depth and turbidity of the water.

3.2.2 Fishing Branch River

Water conditions in the Fishing Branch River were turbid, thereby limiting visibility. The bottom was only visible sporadically below the mouth of the north fork, with water levels estimated to be medium-high. However, one location of spawning redds was observed approximately 6 to 7km below the mouth of the north fork. Much of the turbidity was coming from the north fork and visibility improved above its mouth. One location of redds was observed immediately under Bear Cave Mountain. Some pools and logjams were observed in the main-stem. A considerable amount of algae was observed in pools under Bear Cave Mountain.

The north fork of the Fishing Branch River was turbid, with small cobbles forming a portion of the substrate. Visibility was limited. Large timber lined the shores of the north fork for the majority of the stream until it became quite small.

3.2.3 Cody Creek

Cody Creek had extremely low water conditions, with almost no surface flow in its upper reaches. In this portion of the stream, the high water mark indicates dynamic water levels, likely with seasonal extreme highs and lows. Substrate is semi-rounded cobbles, mixed in size. Moving downstream, large amounts of angular material appeared to be mixed in as well, and there were some sporadically scattered pools. Large beaver dams appeared further downstream, some of which blocked the entire stream. Between pools the stream is extremely shallow. One small tributary has a distinct red colour. The substrate of Cody Creek is not suitable salmon spawning habitat.

3.2.4 Whitestone River/Tributaries

The uppermost portions of the Whitestone River have an extremely clean, bright bottom. In this part of the river, which passes through various rapids and a low box canyon, an area of extreme braiding (a possible source of groundwater and aufies) was observed just upstream of Mount Fowlie. Below Mount Fowlie the river channel is intermittently braided, and its substrate is mixed, with many cobbled reaches. The water flow appears to be quite variable, with high and low events throughout the year.

3.2.5 Upper Porcupine

It was not possible to sufficiently observe the bottom of the upper Porcupine River, due to turbidity and depth.

3.2.6 Bell River/Tributaries

The lower and mid-portions of the Bell River have a generally muddy substrate and were very turbid at the time of this survey, from the mouth of the river upstream to a point just above the mouth of the Little Bell River. This portion of the Bell main-stem is not suitable as salmon spawning habitat.

The upper Bell River (above mouth of Little Bell) had good visibility, with some turbidity. The substrate was composed of large cobbles, with some shallow reaches between deep pools and stretches of braided channels. Stands of large timber were observed along the river until the faded out upstream of Helen and Anne Creeks. Large stands of timber were also observed in many small adjoining valleys. Habitat in the upper Bell appeared to be potentially good for chinook spawning.

Three tributaries of the Bell River were surveyed. These were the La Chute, Waters, and Rock Rivers.

The La Chute River was slightly turbid. The lower portion of the river was composed of pools and shallow riffles. Substrate appeared mixed, composed of cobbles and gravel. Further upstream, areas of extreme braiding were observed, including a portion of the stream that appeared to move under gravel bars. In the mid to upper portions of the stream, there were some excellent cobbled reaches with superb visibility in very clear water. In the upper reaches of the stream, sources of groundwater were observed, as well as patches or "islands" of large timber in areas above the tree line. Some potential chinook habitat exists.

Waters River was clear with a slight stain. The stream was composed of pools, shallows, and some reaches. Some braiding was evident as the survey moved upstream. Reaches with large cobbles were observed in the mid to upper portions of the stream, providing good to very good potential habitat for chinook spawning. In the upper portions of the Waters River valley, extensive sources of up-welling groundwater in sloughs adjacent to the main-stem were observed.

The lower Rock River was turbid, with generally poor visibility, and the substrate was composed of small, semi-rounded material. Habitat appears to be poor for chinook spawning.

3.2.7 Driftwood River

The Driftwood River was slightly turbid with limited visibility. A mixed substrate was observed, with larger cobbles in the upper portions of the stream. Further downriver some sand is evident, and in the lower portions some mud was observed.

3.2.8 Mid-Porcupine River (Driftwood to Caribou Bar)

It was not possible to observe the bottom of the mid portions of the Porcupine River sufficiently, due to turbidity and depth. An area of fine sand was observed in the Bluefish River area.

3.2.9 Lower Bluefish River

The Bluefish River was clear with excellent visibility. The substrate was fine sand with occasional gravel. The water level was low, within a wide floodplain, illustrating dynamic flow conditions. Both shallow and deeper reaches were observed, generally with slower water in the deeper reaches. A silt/algae covering was observed on the bottom in areas of slower water. Approximately 25 to 35km upstream from its mouth,

the stream flow dried up. The location of up-welling/emergence was observed near where the stream encounters mountains. Large boulders, possibly limestone, were observed in the streambed at this location.

3.2.10 Caribou Bar Creek

Caribou Bar Creek had stained but clear water, and was shallow with a mixed cobble substrate. The stream was composed of pools, interspersed with riffles and reaches. Some large boulders were observed in pools through one part of the stream. What appeared to be a pool of heavy and multi-coloured algae growth was observed adjacent to the stream channel; a possible spring. What makes this stream unique in the watershed is the canyon-like setting, with steep cliffs along most of its mid and lower drainage. In many cases, dynamic slopes of debris appeared to be eroding directly into the stream.

3.2.11 Upper Schaeffer Creek (Crow River Watershed)

The upper portions of Schaeffer Creek were observed to be slow moving and stained. The substrate was variable in composition, with sand, gravel and cobbles as well as a large number of pools and large rocks in the streambed. Little evidence of up welling water was observed. As the stream moves into Crow Flats, the substrate changes largely to mud with some sand/gravel. The character of the stream in Crow Flats is considerably different than of its mountainous sources.

3.2.12 Surprise Creek

Two streams join together in the upper reaches of Surprise Creek. Considerable timber was observed in the eastern fork. Otherwise, the upper portions of Surprise Creek closely resemble that of Schaeffer Creek. As the stream enters Crow Flats, the substrate becomes sand. In certain areas through Crow Flats, the stream channel is quite narrow and not well defined. In one area, it was difficult to follow from the air.

3.2.13 Thomas Creek

The lower portions of Thomas Creek were clear with a sand/gravel substrate and some cobbles. The water was slow, and some silt and/or algae was observed on the bottom. Farther upstream, some pools and reaches were observed. Moving farther upstream, the water was moving faster and approaching the mountains it was quite swift. Some timber was observed for over half the length of the stream. A beaver house and a large beaver were observed in Thomas Creek, as well as a large bear on the stream bank. Light conditions at the time of the survey were not suitable for adequate observation of the stream bottom, particularly in its mid to upper portions.

3.2.14 Crow River

The upper portions of Crow River were clear, with a sand/gravel substrate. The stream was shallow with some reaches and small pools. A bald eagle was observed in this portion of the river. Despite unfavourable light conditions at the time of the survey, a couple of locations of possible spawning redds were observed. One of these was near the Canada/U.S. border and the other was approximately halfway between the border and the mouth of Thomas creek. Some mud became visible in the stream banks and substrate near this location above Thomas Creek. Clarity of the stream changed abruptly from clear to very turbid approximately halfway between the mouth of Thomas Creek and the

mouth of Surprise Creek. This turbidity completely obscured any further observation of the stream bottom. Below this point, the river was quite turbid all the way to its mouth. The stream banks were composed largely of mud, and at times rose to high bluffs eroding directly into the river. This was the case for most of the river's length, with some variation closer to the confluence with the Porcupine River.

3.2.15 Timber Creek

The lower portions of the stream had a substrate of small gravel. Limited turbidity was observed. As the stream passed Timber Hill it moved slower and the banks and substrate turned to mud with some gravel. As the stream left the zone of lakes on Crow Flats, the streambed again turned to gravel. Approaching the mountains, the substrate was covered in a dark stain or silt.

3.2.16 David Lord Creek

The substrate of David Lord Creek was mixed, with sand, gravel and cobbles in various locations and distributions. The water was clear with some stain. Some silt/algae was observed on the bottom as well as many good reaches for potential chinook spawning throughout the length of the stream. A location of possible spawning redds was observed in the mid-portion (approximately 20 km from the mouth) of the stream. As the stream entered "foothills," the water became swifter and large rocks were observed in the streambed. The substrate was observed to be quite good as potential salmon habitat; however, the water is a little stained throughout the length of the stream.

3.2.17 Johnson Creek (Tributary of the Porcupine River)

Upper Johnson Creek is shallow and darkly stained but clear, with a substrate of sand and gravel. As the stream passes between two small hills in its mid-portion, the banks and substrate change, becoming partially muddied. At this point in the survey, it was generally not possible to see the bottom due to the dark stain and the water depth. Large boulders were observed in the stream where it runs between two mountains. Just above the confluence of Pine Creek with Johnson Creek, the survey was cut short due to a shortage of time. Observations downstream from that point were limited.

4 CONCLUSIONS/RECOMMENDATIONS

This project built on research conducted over the previous two years and it has provided important new information about Porcupine River Chinook salmon stocks. This research also continued to build interest and capacity in the community of Old Crow to carry out similar work in the future. It has contributed significantly to local and regional management objectives.

The identification of 20 radio-tagged Chinook salmon in various locations throughout the Porcupine River watershed provides important information on the location and distribution of Chinook spawning activity within the drainage basin. The numbers of tags identified in this type of survey cannot be used to estimate overall run strength. However, they can provide rough estimations of relative run strength and associated habitat usage when comparing different spawning areas (tributaries) within the watershed. Should similar data be collected

over a number of years (at least one complete population cycle), it could provide a good estimation of relative run strength and associated habitat use.

Observations of possible spawning redds were made in David Lord Creek, where no radio tags were located. This indicates that chinook may have been located in tributaries where radio tags were not found, which, in turn illustrates the value of conducting similar surveys over a number of years. Salmon do occasionally "wander" into new areas, however if an established run of chinook salmon does return to a particular stream, eventually one or more radio-tagged fish would be found there. On the other hand, if an observation such as the one in David Lord Creek is an atypical event, then even over a number surveys, a tagged fish is not likely to be located there.

4.1 Miner River

With 55% of all radio tags located in the Miner River, the results of this study confirm the indications of recent research in 2001 and 2002 (RE-24-01 & CRE-15-02) that the Miner River provides the most significant spawning grounds for Porcupine River chinook stocks identified thus far. The specific locations of the radio tags in the Miner also indicate that spawning takes place in the Miner main-stem between the mouth of Fishing Creek and that of the Fishing Branch River. The area of most intense spawning was identified to be the Cathedral Rocks/Mount Dewdney region, as also indicated in other recent research (Anderton, 2001, 2002).

The significant movement of two tags over a period of 24 hours in the Miner River is notable. One movement upstream (tag 902/98) is not surprising, as salmon were evidently still migrating upstream lower in the watershed. However, the movement of tag 722/19 downstream from known spawning grounds of particular intensity (Cathedral Rocks) a distance close to 20km is of interest. While further comment on this would be speculative, it is worth noting that Traditional Knowledge documented in 2002 (CRE-16-02) indicated that salmon move around extensively in various rivers on their way to spawning grounds (Anderton, 2002).

It should be stressed that while the areas of most intensive spawning have been observed to be in the Cathedral Rocks/Mount Dewdney portion of the river, spawning redds and chinook salmon (adults) have been observed and/or captured (juveniles) in numerous locations from near the mouth of the Fishing Branch River to near the mouth of Fishing Creek. This 80km (as the crow flies) portion of the river is nearly the entire lower half of the Miner River main-stem.

4.2 Fishing Branch River

With 15% of all radio tags located in the Fishing Branch River, the results of this study confirm the indications of research in 2002 (CRE-15-02) that chinook salmon do spawn in the Fishing Branch River (Anderton, 2002). The location of these radio tags indicates that an established run of chinook salmon does return to the Fishing Branch River. Although visibility of the river bottom was very poor, spawning redds were observed in two locations, once approximately 7 to 9km below the mouth of the north fork and the other directly adjacent to Bear Cave Mountain. The observation of these redds confirms that the location of the radio tags in the Fishing Branch River is associated with chinook spawning.

4.3 Whitestone River

With 5% of all radio tags located in the Whitestone River, the results of this study confirm the indications of research in 2001 and 2002 (RE-24-01, CRE-16-02) that chinook salmon do spawn in the Whitestone (Anderton, 2001, 2002). The location of the radio tag indicates that an established run of chinook salmon does return to the Whitestone River. The observation of eight locations of one or more spawning redds in the upper Whitestone River (spread over approximately 40km) confirms the association of chinook spawning activity with the location of the radio tag.

4.4 Crow River

With 10% of all radio tags located in the Crow River, the results of this study indicate that an established run of chinook salmon does return to the Crow River watershed. Traditional Knowledge documented in 2002 (CRE-16-02) indicated that chinook salmon did at one time return to Timber Creek, a tributary of the Crow River (Anderton, 2002). Also, limited anecdotal reports of chinook salmon being caught in the Crow River did previously exist.

While one radio tag (842/21) was located in the upper portion of the Crow River main-stem, the other tag (922/76) was located in the mid portion of the Crow River main-stem just below the mouth of Black Fox Creek (See Section 3.1.7). The first tagged fish (842/21) may or may not have reached its spawning destination, as some suitable habitat was present in that portion of the Crow River and spawning redds were observed both upstream and downstream of that location.

While conditions did not permit a comprehensive survey of the river bottom, the fact that spawning redds were observed in at least two different locations confirms that spawning does take place in the upper Crow River. This observation and the location of the radio tagged chinook represents the first scientific documentation of chinook salmon migrating and spawning in the Crow River watershed. However, it can be reasonably concluded that the second tagged fish (922/76) was in migration, as no suitable spawning habitat exists in that portion of the Crow River, nor anywhere in the vicinity. While the ultimate destination of this fish may also have been the upper Crow River, suitable habitat was also identified in both Timber and Thomas Creeks. As well, no survey was conducted over Black Fox Creek, a substantial tributary that may or may not offer potential spawning habitat. Therefore, any suggestion as to the spawning destination of the second radio tagged chinook would be speculative.

4.5 Porcupine River/Old Crow

Fifteen percent (15%) of all radio tags were located in the Porcupine River main-stem and/or at the community of Old Crow. With no current or past indication of chinook spawning in the Porcupine River main-stem, and a lack of appropriate habitat, it can be reasonably concluded that the tag located downstream of Driftwood River (942/33) was in migration. Likewise, it can be reasonably concluded that the two tags located in the vicinity of Old Crow (902/67 & 782/43) were either in the possession of fishers or in migration up the Porcupine River in front of the community. Tag 782/43 indicated a mortality signal, therefore a stronger possibility exists that this tag was in possession of an Old Crow fisher.

4.6 Recommendations

4.6.1 Future Telemetry Opportunities

The opportunity to participate in this greater Yukon River study has proven very successful in the Porcupine River watershed. It is recommended that any future opportunities to participate in such radio telemetry surveys should be pursued, including in the upcoming year. If it became possible for data such as has been produced through this project to be collected for an entire chinook cycle, managers of the Porcupine River watershed would have a reasonable estimate of the relative (not total) abundance and spawning habitat use of the various Porcupine River chinook stocks.

4.6.2 Chinook Salmon Habitat

With confirmation of established runs of chinook salmon returning to the Whitestone, Fishing Branch, and Crow Rivers, it is recommended that the extent of juvenile chinook presence/absence in these tributaries be assessed.

In the case of the Whitestone River, it is recommended that the focus of such work be on the upper portion of the river, above the mouth of McPharlon creek. The results of this and previous research has indicated that chinook spawning activity takes place upstream from this point, where habitat has been observed to be much more suited to chinook spawning (Anderton, 2002).

In the case of the Fishing Branch River, it is recommended that the focus of such work be on the main and north forks and the 10 to 15km section downstream from their confluence. The results of this and previous research has indicated that chinook-spawning activity takes place primarily downstream of the confluence (Anderton, 2002) (Timpany, 1997).

In the case of the Crow River watershed, it is recommended that future work focus on the upper portion of the Crow main-stem near the Canada/U.S. border. Several other tributaries, including Bilwaddy, Thomas, Timber, Black Fox, and Johnson creeks should also be investigated. The results of this project have indicated that chinook spawning may take place in the upper portion of the Crow River. Previous Traditional Knowledge research has indicated that chinook had historically been observed in Timber Creek. Traditional Knowledge gathered in 2003 also indicated that chinook were historically observed in Black Fox Creek and Crow Flats near Johnson Creek.

5 REFERENCES

1. Anderton, Isaac, North Yukon RRC & Vuntut Gwitchin FN, 2001. Project Report: "Salmon Research Training and Coho/Chinook Habitat Assessment." Yukon River Panel Project RE-24-01.
2. Anderton, Isaac, North Yukon RRC & Vuntut Gwitchin FN, 2002. Project Report: "Salmon Research Training and Chinook/Coho Habitat Assessment." Yukon River Panel Project CRE-15-02.

3. Anderton, Isaac, North Yukon RRC & Vuntut Gwitchin FN, 2002. Project Report: "Traditional/Local Knowledge Salmon Survey." Yukon River Panel Project CRE-16-02.
4. Timpany, Phil. YTG Dept. of Renewable Resources, 1997. Project Report: "Salmon Survey and Grizzly Bear Habitat Assessment Bear Cave Mountain and the Fishing Branch River."

6 FIELD DATA/DOCUMENTATION

Spreadsheets were downloaded from the ATS 4500 Telemetry receiver following each survey flight. Copies and originals of these spreadsheets and field notes remain on file with the North Yukon RRC.