



3.8 Yukon River Tributaries Watershed Area

The table below summarizes salmon and salmon habitat information for the Yukon River Tributaries Watershed Area. For additional details on the information provided below, refer to the relevant source citations. See Figure 9 and 10 for maps summarizing the existing scientific salmon habitat utilization knowledge available for the Yukon River Tributaries Watershed Area. For specific map point information refer to Appendix B using the point ID number.

Watershed Overview	
<p>The Yukon River Watershed Area was defined by this study to encompass all other smaller systems running into the mainstem of the Yukon River. The North Klondike Highway does cross several of the tributaries entering from the east, north of Carmacks. Access to the creeks in the southern portion of the watershed area (i.e. Walsh, Mandanna and Claire creeks) is limited mostly to access by boat from the Yukon River.</p> <p>Primary tributaries to the Pelly River (within the LSCFN Traditional Territory) include;</p> <ul style="list-style-type: none"> • Tributaries North of Carmacks (Figure 9): McCabe, McGregor, Hoocheekoo, Williams, Merrice, Crossing, and Murray creeks • Tributaries South of Carmacks (Figure 10): Mandanna, Claire, Fyfe, Frank and Walsh creeks 	
Spawning & Spawning Habitat Summary	
Walsh Creek	Adult Chinook salmon extent has been documented to approximately 40 km upstream from the confluence with the Yukon River (von Finster 2001b). Walsh Creek has no lake storage or significant wetland areas, but the glacio-fluvial-lacustrine deposits (von Finster 2001b) provide significant surface and subsurface water storage, which can result in favourable water quality conditions for spawning.
Mandanna Creek	Adult Chinook have sometimes been seen in the creek by members of the LSCFN; however, spawning has not been confirmed (von Finster 2000). Beaver dams have been documented in and around the lakes in the upper drainage (von Finster 2000).
Rearing & Rearing Habitat Summary	
McCabe Creek	Chinook fry utilize the creek as rearing habitat (NNRS 1977; Beak Consultants Ltd. 1979; Mossop and Bradford 2006). Most sampling has been concentrated near the Klondike Highway crossing which is only 2.5 km upstream from the confluence; however, Mossop and Bradford (2006) found higher densities of juvenile Chinook 5 km upstream. The creek has cobble, pebble and gravel substrates with some sand, and riparian cover is provided by forest and brush. Arctic grayling, round whitefish and slimy sculpin have also been captured in the creek (NNRS 1977; Beak Consultants Ltd. 1979).
Hoocheekoo Creek	Juvenile Chinook have been captured within the first 250 m upstream of the stream mouth at relatively high densities (2.26 fish/m ² , Mossop and Bradford 2006). The habitat in this portion



	of the creek was dominated by large woody debris and pools. No sampling has been conducted further upstream.
Williams Creek	Juvenile Chinook have been captured within the first 50-250 m of the creek (Harder and Associates 1991; Osborne 1995b; Mossop and Bradford 2006). Electrofishing further upstream has not caught any fish, and may be because of small cascades and plunges that may be barriers to fish passage (Osborne 1995b). Habitat was characterized as having significant riparian vegetation cover, in addition to cover from cutbanks, organic debris, and boulders (Osborne 1995b; Mossop and Bradford 2006).
McGregor Creek	Juvenile Chinook have been captured directly upstream of the Klondike Highway crossing (Beak Consultants Ltd. 1979; Mossop and Bradford 2006). A large beaver dam was identified roughly 0.75 km upstream of the highway crossing. The dam apparently blocked the upstream migration of juvenile and adult grayling (Beak Consultants Ltd. 1979), as evidenced by the large congregation there, and the dam is likely also a barrier to juvenile Chinook migration.
Merrice Creek	Juvenile Chinook have been captured within first 250 m upstream of the stream mouth; however, in lower densities than other creeks of the area such as Hoocheeko, McCabe and Williams (0.13 fish/m ² , Mossop and Bradford 2006). This creek had a higher gradient (1.9 %) and less large woody debris and pools than the other creeks studied in the area.
Crossing Creek	Juvenile Chinook are known to use at least the lower section of creek for rearing, but they have not been captured at more upstream locations (e.g. Freegold Road crossing; Beak Consultants Ltd. 1979). Only Arctic grayling have been observed at the Freegold Road bridge (17.8 km upstream from the mouth; Beak Consultants Ltd. 1979). The creek had low flows during the summer and was considered poor fish habitat, but the extensive riparian vegetation shading may provide some cover as a nursery for young fish (Beak Consultants Ltd. 1979).
Murray Creek	Chinook fry were captured at the Freegold Road crossing, 0.9 km upstream from the confluence with the Yukon River (Beak Consulting Ltd. 1979). Arctic grayling, round whitefish and slimy sculpin were also captured. Moderate stream shading, clean gravels and boulders provided moderate to good rearing habitat (Beak Consultants Ltd. 1979).
Walsh Creek	Juvenile Chinook would likely use the creek for natal rearing habitat if adults had spawned the year prior; however, there is no sampling data to confirm this and no habitat assessment has been completed. The creek has many unnamed tributaries as well as the larger tributary of Lokken Creek, which have never been studied.
Mandanna Creek	Juvenile Chinook were captured in 2003 (unknown number of fry, Brown 2003). The creek had plentiful large woody debris (including entire logs), some cutbanks, and 50% of substrate was composed of cobble-boulder (Brown 2003).
Fyfe Creek	Juvenile Chinook were captured in 2003 (122 fry, Brown 2003). Habitat survey results showed that there was lots of large woody debris, undercut banks, and riparian cover (Brown 2003).



Unnamed Trib. #18 (also known as Sioux Creek)	Juvenile Chinook were captured in 2003 (19 fry, Brown 2003). Habitat was characterized as having cutbanks, small woody debris, large woody debris, and significant riparian cover of willow and alder (Brown 2003).
Claire Creek	Juvenile Chinook were captured in 2003; however, habitat values were low as there was little instream cover identified and riparian cover was also low (Brown 2003).
Twin Creek	Juvenile Chinook were captured in 2003 and habitat was influenced by large woody debris, cutbanks, and riparian vegetation (Brown 2003).
Whitegrass Creek	Juvenile Chinook were present in the creek (unknown number) and cover was composed of large woody debris and overhanging riparian vegetation (Brown 2003). A beaver dam was identified in the lower portion of the creek (Brown 2003).
Seven Mile Creek	Juvenile Chinook were present in the creek (unknown number) and habitat was composed of large woody debris, pools, cutbanks and riparian cover (Brown 2003).
Overwintering	
<p>Documented spawning streams like Walsh Creek likely provide overwintering habitat, as well as lake headed tributaries like Mandanna, Claire, and Frank creeks. Also the Yukon River itself provides overwintering habitat. However, important overwintering areas have not been surveyed or mapped.</p> <p>McCabe and Crossing creek were thought to have low overwintering potential near the mouths because of a lack of deep pools in McCabe and unlikely winter flows in Crossing Creek (Beak Consultants Ltd. 1979). However slimy sculpin were documented in McCabe Creek, as well as other creeks such as Murray and McGregor (NNRS 1977; Beak Consultants Ltd. 1979), and because sculpin are not considered migratory their presence generally suggests overwintering conditions exists.</p>	

3.8.1 Other Information

- **Water Quality:** Water quality and habitat data was collected by Brown (2003) for many of the tributaries of in the south of the watershed area.
- **Hydrology:** There are no Water Survey of Canada hydrometric stations in this watershed, but there is a snow survey station on Williams Creek (09AH-SC04) which has been in operation since 1995¹⁵.
- **Benthos:** There is a CABIN site¹⁶ on McCabe Creek.

¹⁵ Snow Survey Data:

http://www.environmentyukon.gov.yk.ca/monitoringenvironment/snow_survey.php



3.8.2 Data Gaps

- **Spawning & Spawning Habitat:** Spawning in Walsh Creek is limited to one documented event and it is not clear to what extent spawning occurs in the creek or how frequently. Mandanna Creek may also support Chinook spawning, but it has never been documented and beaver dams may limit migration.
- **Rearing & Rearing Habitat:** Juvenile Chinook presence has been documented in many of the tributaries in the watershed area; however, data is limited to one or two sampling points and does not fully delineate the upstream extent of juvenile Chinook use. Also the Yukon River tributaries upstream of the confluence with Fyfe Creek have not been studied (i.e. Frank Creek).
- **Overwintering:** Overwintering potential of the tributaries within this watershed area has not been fully investigated and is only assumed based on general site characteristics and the presence of slimy sculpin.
- **Other Information:** Some habitat information has been collected by Brown (2003) for some of the tributary streams, but there is a lack of winter data (i.e. water temperature).

3.8.3 Recommendations

To build upon the existing knowledge base of Chinook utilization within the watershed, the following activities are recommended;

- Focus sampling effort on streams with no previous sampling data.
- Where Chinook are captured near the mouth additional investigation into distribution and habitat limitations (i.e. beaver dams) should be conducted.
- Additional sampling can be conducted on the tributaries with limited past sampling data in the watershed area (i.e. McCabe, McGregor, Mandanna, Claire, Fyfe, etc.) to determine upstream extent of habitat utilization and habitat characteristics and limitations (i.e. beaver dams).

¹⁶ Map of Cabin Sites:
http://cabin.cciw.ca/Main/cabin_current_activities.asp?Lang=en-ca

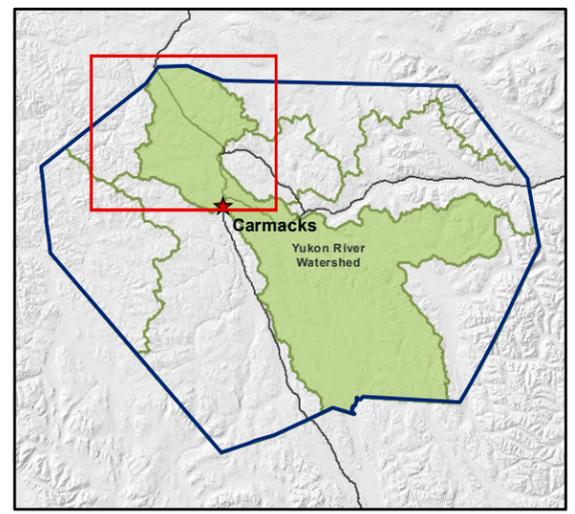
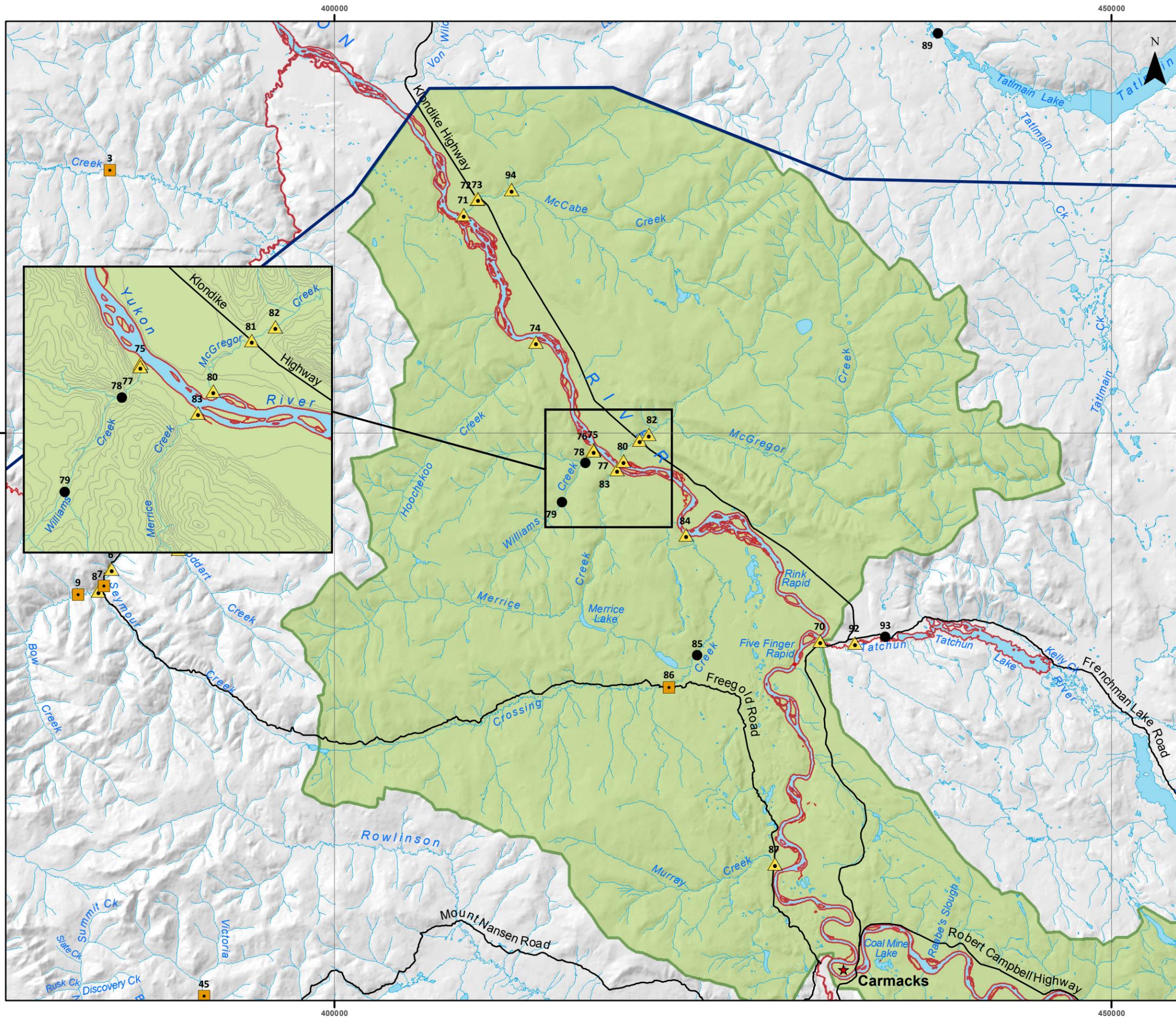
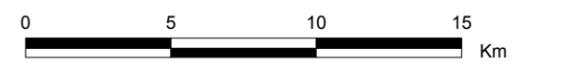


Figure 9. Yukon River North Tributaries Watershed Area Existing Chinook Salmon Knowledge

- Legend**
- Juvenile Chinook Captured
 - Freshwater Fish Captured
 - No Fish Captured
 - Watercourse Known Extent of Adult Chinook
 - Waterbody Known Extent of Adult Chinook
 - LSCFN Traditional Territory
 - Yukon River Watershed Area



Drawn By: L. Grieve and M. Marjanovic
 Checked By: M. Power and P. Tobler
 Date: 18 March 2011
 Projection: NAD 1983 UTM Zone 08
 EDI Project #: 10-YC-0058

Digital Data Sources:
 Yukon digital elevation model provided courtesy of Yukon Government - Geomatics Yukon.
 1:50,000 waterbodies, watercourses, and LSCFN Traditional Territory boundary, and Main Roadways from Yukon Geomatics Corporate Spatial Warehouse.

Fish Capture Point Data: The FISS Yukon Fish Distribution Shapefile (provided by DFO) was checked against original source data and any new data acquired during EDI's scientific information gathering.

Known Extent of Adult Chinook: This data was reproduced digitally from a hard copy map developed by DFO (early 2000s) of known extent of adult Chinook utilization, which was then checked against other source data (see Methods in report).

Watershed Areas: Project specific watershed areas digitized by EDI using 1:50,000 watercourse and waterbody data along with DEM and contour data.

Disclaimer: This document is not an official land survey and is presented without prejudice. The spatial data presented on the map is subject to change without notice.



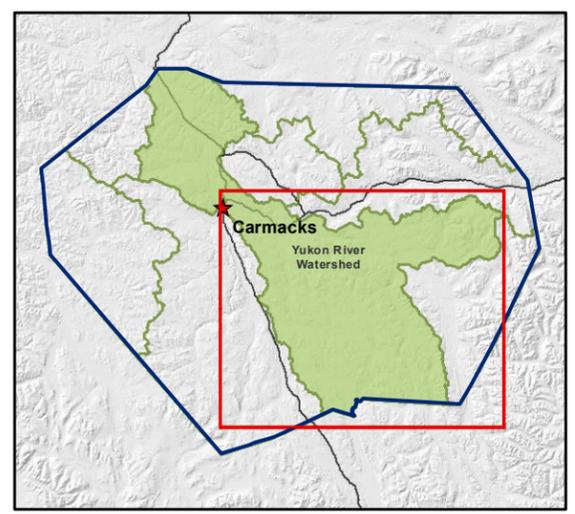
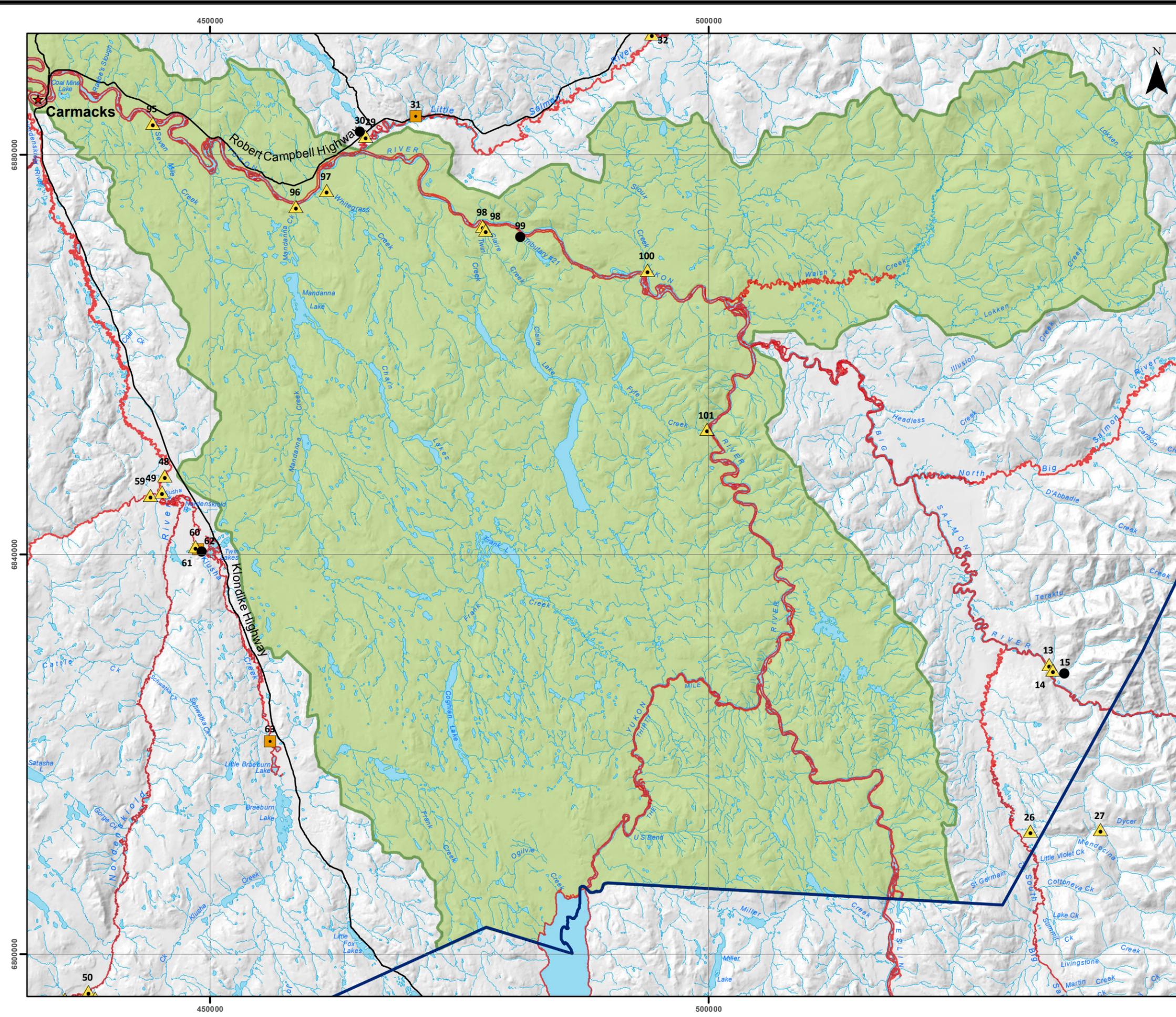


Figure 10. Yukon River South Tributaries Watershed Area Existing Chinook Salmon Knowledge

Legend

- Juvenile Chinook Captured
- Freshwater Fish Captured
- No Fish Captured
- Watercourse Known Extent of Adult Chinook
- Waterbody Known Extent of Adult Chinook
- LSCFN Traditional Territory
- Yukon River Watershed Area

0 5 10 15 20 Km

Drawn By: L. Grieve and M. Marjanovic
 Checked By: M. Power and P. Tobler
 Date: 18 March 2011
 Projection: NAD 1983 UTM Zone 08
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Digital Data Sources:
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4 CONCLUSIONS & RECOMMENDATIONS

This report summarizes existing scientific information on Chinook salmon and their habitat in eight watershed areas within the LSCFN Traditional Territory. It is apparent from the maps and/or summary information that there is limited information on habitat and juvenile Chinook use of the small non-natal tributary streams. For example, the Big Salmon River supports a large Chinook salmon run, but little to no data has been collected on juvenile habitat and rearing in the tributary streams.

Much of juvenile sampling and habitat data collected throughout the Traditional Territory was collected in the late 1970s, with the most recent data being from 2003. Many of these studies were undertaken in anticipation of future development in the area, whether it was for mining, construction of a pipeline or transmission line. Also, most streams that have been studied have only been sampled on one or two occasions and there is limited information on the upstream extent of juvenile use of these streams.

Given these results, there is considerable opportunity for the LSCFN to conduct juvenile Chinook sampling and habitat assessment programs within their Traditional Territory. Future work should focus first on streams where no past juvenile salmon data has been collected, before moving on to streams with existing data. Priority watersheds are categorized below as follows, based on the size of the run, access, relative importance to community, and extent of knowledge:

Top Priority	Big Salmon	Large Chinook run, important to LSCFN community, very limited information on juvenile rearing habitat and overwintering potential
	Yukon River Tributaries	Important to LSCFN community, limited to moderate information on extent of adult spawning and juvenile rearing habitat
	Little Salmon	Moderate Chinook run, important to LSCFN community, limited to moderate information on upstream extent of juvenile habitat utilization, easy to access
	Nordenskiöld	Moderate Chinook run, important to LSCFN community, limited to moderate information on juvenile rearing habitat, heavily impacted by beaver dams
Second Priority	Tatchun	Moderate Chinook run, important to LSCFN community, limited to moderate information on juvenile Chinook rearing
	Big Creek	Small Chinook run, limited use by LSCFN community, limited to moderate information on upstream extent of juvenile habitat utilization and non-natal use
Lower Priority	Nisling	Chinook spawning occurs outside of Traditional Territory, limited information on upstream extent of juvenile habitat utilization, but unlikely to be Chinook in this watershed area
	Pelly	Spawning areas lie outside of Traditional Territory, limited use by LSCFN community, very limited information on juvenile rearing habitat and use



It is recommended that the LSCFN secure funding and resources to conduct fish and fish habitat assessments in future years to increase the knowledge base as prioritized above while also building capacity for fisheries sampling in the community. This increased knowledge will identify areas to focus future Chinook salmon monitoring programs and restoration and enhancement projects in the Traditional Territory. The recommendations for each watershed area, together with the priority areas outlined above will serve to guide the development of workplans for future work.

To assist the LSCFN with the implementation of fish and fish habitat assessments, EDI has developed a potential 'LSCFN Juvenile Chinook and Chinook Habitat Assessment Program Outline' (Appendix C). This program outline lists overall project objectives, and describes program components such as watershed sampling plans, training, data collection, and reporting. A standardized data sheet was also developed as an example to organize and simplify data collection. The Program Outline is intended to provide a proposed framework for assessments and to increase capacity within the LSCFN community for salmon stewardship in the Traditional Territory through training and implementation of salmon sampling programs.



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Appendix A. LSCFN Traditional Salmon Habitat Knowledge Study: Traditional and Community Knowledge Study Results

LSCFN Traditional Salmon Habitat Knowledge Study

Traditional and Community Knowledge Study Results

Yukon River Panel #CRE-141N-10

LITTLE SALMON CARMACKS FIRST NATION

2010/2011

LSCFN Traditional Salmon Habitat Knowledge Study

Traditional and Community Knowledge Study Results

Little Salmon Carmacks First Nation (LSCFN)

Project Objective:

To conduct compilation and assessment studies of (1) available scientific knowledge and (2) community and Traditional Knowledge of salmon stocks and habitat throughout the LSCFN traditional territory.

Project Description:

- 1.) Gather and summarize the available scientific understanding of Salmon (life stages) and their habitats in LSCFN Traditional Territory.
- 2.) Gather and summarize the available community and Traditional Knowledge (TK) of the life stages of Salmon and their habitat use in LSCFN Traditional Territory, with particular focus on juvenile fish and where they live.
- 3.) Use the results of these two project components to provide guidance to prioritize the design and implementation of future field assessments for the LSCFN River Crews over the next several years.
- 4.) Use the results of these two project components to provide focused opportunity for further scientific study, education programs, and restoration and enhancement opportunities within the LSCFN Traditional Territory.

Project Accomplishments:

1. LSCFN River Crews completed Yukon College Fisheries Technician Training Program – Spring / Summer 2010 (LSCFN own costs)
2. LSCFN River Crew terrestrial, aquatic and fish sampling kits purchased and put together – Completed March 2011(LSCFN Own Costs)
3. EDI Environmental Dynamics Inc. LSCFN Salmon Knowledge Study - Science Based - Literature review, Assessment and gap analysis
 - Completed on a watershed by watershed approach
 - List of science based habitat assessment requirements completed
 - Recommendations for fish sampling and habitat assessment work prioritization completed
4. Interviews of LSCFN Elders completed at fish camps by LSCFN River Crew for two weeks early August (Appendix A – List of Questions)
 - Interviews completed using traditional methods
 - Provided basis for discussions with Northern Tutchone Elders
5. Northern Tutchone Elders meeting completed in late November 2010 to gather TK on salmon and their habitats. Particular focus on juvenile Chinook salmon.





Community and Traditional Knowledge Survey Results:

LSCFN Elders were interviewed during two weeks of fish camp visits by the LSCFN River Crews during the summer of 2010. Elders expressed to LSCFN River Crews that it would be better in future for Elders to go in person and show where they have seen the little fish in the past. It was too difficult to look at maps. The results of these interviews provided the opportunity to focus discussions about Salmon during the Northern Tutchone Elders meeting in Carmacks in November 2010. In compliance with traditional ways of gathering Elders knowledge, the results of the summer interviews were checked with Elders for accuracy.

In general, here are the highlights of what was discussed...

- Creeks and areas of rivers that have open ice or thin ice during winter are where little fish (Elders were shown pictures of Chinook and Chum salmon fry) are often seen in the spring.
- Places where there are overhanging banks have little fish.
- The mouths of creeks often have little fish. Start looking there in Spring.

- Salmon used to be found most of the way up to Braeburn. Some creeks up that way had salmon and some did not.
- The LSCFN River Crew should be checking creeks during the winter to learn where thin ice or open areas are.
- There are less salmon now and they are smaller over the last 20-50 yrs
- Fish eggs are smaller and not as fresh as before.
- Salmon areas – McQuesten River; Mayo River way up further; Fraser falls; Upper Stewart River; Bonnetplume; Peel; Beaver River; Snake River; Jeanette Creek and Jeanette Lake; Waterfall Creek downriver from Carmacks; McGuinty Creek; Talbot Creek; Moose Creek; and MacGregor Creek; Walsh Creek used to have Salmon; No More Lake near Braeburn.
- As beaver hunting and trapping slowed, more dams have blocked off where salmon used to go.
- Little fish can't jump over beaver dams.
- Little fish are often found where big ice has damaged the sides of the river bank.
- Creeks were traditionally classified in three ways
 - 1.) Spring fed
 - 2.) Lake Fed
 - 3.) Snowmelt
- Spring fed creeks and open areas from underground springs during winter have more little fish.
- Big eddies have little fish in summer.
- Big Salmon River used to have lots of little fish in its creeks.
- Little Salmon River has many creeks that stay open or have thin ice.

Elder Recommendations:

The advice given by Northern Tutchone Elders will be used to help focus the future habitat assessment work of LSCFN River crews. Some of their main recommendations include:

- Elders have asked that they be kept informed about what is found each summer.
- It is clear that a comparison should be done identifying where salmon range used to be vs. today.
- Northern Tutchone Elders also suggested that River Crews check for areas of thin ice and open areas during the winter and see what fish are there in the spring.
- Elders from Mayo and Pelly would like to see more information sharing between communities

Project Benefits:

1. This project will provide a basis for focused work by LSCFN River Crews, DFO and the Yukon River Panel to assess and understand the missing pieces of Yukon River Salmon habitat use in LSCFN Traditional Territory.
2. Prioritize areas for Habitat and Stock Assessment Work needed to be completed by LSCFN River Crew and DFO in future years.
3. Provide further understanding of future study opportunities within LSCFN Traditional Territory.
4. Once assessments are complete areas for Restoration and Enhancement project opportunities can be identified.
5. Assessments will provide greater understanding of areas where barriers to fish passage are present..
6. Allow LSCFN, DFO and YRP the opportunity to recommend methodology for other Yukon Communities to follow in LSCFN/YRP footsteps regarding

assessment, and combination of scientific, traditional and community knowledge in their Traditional Territories.



Special Thanks To:

LSCFN Elders for welcoming River Crews into their Fish Camps.

Northern Tutchone Elders for sharing their knowledge.

LSCFN River Crews and *Nan, Nena Dan Do K`anete* Department staff.

Facilitator extraordinaire Doug Urquhart.

Yukon River Panel for providing the funding for this project.





Appendix B. Fish Distribution Point Data

Appendix B. Fish Distribution Point Data

Fish ID	Creek Name	Watershed Area	Species	Method	Effort	Other Species Caught	Source	UTM Zone	UTM Easting	UTM Northing	Comments
1	Big Creek	Big Creek	CH	BS	UNK	58 GR, 18 RW	DFO et al. 1985	8	382379.6543	6915146.447	2 sampling events
2	Big Creek	Big Creek	CH	UNK	UNK	N/A	Mathers, West, & Burns 1981	8	350718.4302	6919855.62	
3	Dark Creek	Big Creek	GR	EF	1151 s	1 CCG	Hallam Knight Piesold Ltd. 1994	8	385551.705	6936831.548	
4	Stoddart Creek	Big Creek	CH	BS	UNK	N/A	DFO et al. 1985	8	389472.1818	6914689.983	
5	Stoddart Creek	Big Creek	CH	SN, EF	UNK	N/A	DFO et al. 1985	8	389923.0004	6912556.999	
6	Seymour Creek	Big Creek	CH	BS	UNK	1 GR	DFO et al. 1985	8	385629.0001	6911282	
7	Seymour Creek	Big Creek	GR	BS	UNK	N/A	DFO et al. 1985	8	385194.9957	6910170.998	
8	Bow Creek	Big Creek	CH	SN, EF	UNK	2 GR	DFO et al. 1985	8	384774.0026	6909868.995	Fry observed at 1.1 km
9	Bow Creek	Big Creek	GR	BS	UNK	N/A	DFO et al. 1985	8	383515.267	6909609.093	
10	No-Name Creek	Big Creek	CH	MT	UNK	N/A	DFO et al. 1985	8	378257.9995	6916703	Captured at the mouth of No-Name Creek
11	Magman Creek	Big Creek	CH	MT	UNK	N/A	DFO 2002	8	376438.981	6918259.246	Captured at mouth
12	Magman Creek	Big Creek	GR	BS	UNK	N/A	DFO et al. 1985	8	375804.944	6917752.016	600 m above confluence
13	Unnamed Creek 'J' (trib to Big Salmon River)	Big Salmon	CH	MT	6 MT	N/A	Hunka and Schuler 1988	8	534061.9996	6829027.001	
14	Unnamed Creek 'I'	Big Salmon	CH	MT	9 MT	N/A	Hunka and Schuler 1988	8	534470.266	6828400.25	
15	Unnamed Creek 'H'	Big Salmon	NFC	MT	12 MT	N/A	Hunka and Schuler 1988	8	535722.588	6828107.629	
16	Unnamed Creek 'F'	Big Salmon	CH	MT	12 MT	N/A	Hunka and Schuler 1988	8	554762.831	6822502.926	
17	Unnamed Creek 'G'	Big Salmon	NFC	MT	9 MT	N/A	Hunka and Schuler 1988	8	554400.707	6821178.08	
18	Unnamed Creek 'E'	Big Salmon	CH	MT	6 MT	N/A	Hunka and Schuler 1988	8	561948.374	6822716.794	
19	Unnamed Creek 'D'	Big Salmon	NFC	MT	3 MT	N/A	Hunka and Schuler 1988	8	563787.785	6832526.987	
20	Souch Creek	Big Salmon	CH	MT	6 MT	N/A	Hunka and Schuler 1988	8	567199.342	6838736.965	
21	Moose Creek	Big Salmon	CH	MT	15 MT	N/A	Hunka and Schuler 1988	8	579130.09	6816779.56	
22	Sheep Creek	Big Salmon	CH	MT	9 MT	N/A	Hunka and Schuler 1988	8	578833.225	6808740.413	
23	Scurvy Creek	Big Salmon	CH	MT	3 MT	N/A	Hunka and Schuler 1988	8	588521.152	6799668.554	
24	Scurvy Creek	Big Salmon	CH	MT	3 MT	N/A	Hunka and Schuler 1988	8	582705.63	6798262.906	
25	Caribou Creek	Big Salmon	CH	MT	9 MT	N/A	Hunka and Schuler 1988	8	589844.115	6798538.524	
26	Mendocina Creek	Big Salmon	CH	MT	4 MT	BB	DFO 1994	8	532208.9689	6812328.09	Creek aslo referred to as Mendocino
27	Dycer Creek	Big Salmon	CH	MT	2 MT	N/A	DFO 1994	8	539227.6384	6812481.406	Trib to Mendocina
28	May Creek	Big Salmon	NFC	MT	4 MT	N/A	von Finster 1991	8	543931.0021	6792905.004	
29	Unnamed Creek 1	Little Salmon	CH	MT, SN	UNK	N/A	NNRS Ltd. 1977	8	465613.9965	6881833.003	Sampling location adjacent to highway.
30	Unnamed Creek 1	Little Salmon	NFC	MT	2 MT 24 hr	N/A	von Finster 1988	8	465446.263	6881973.029	NFC, vast numbers of AG fry seen, highest density ever encountered
31	Unnamed Creek 5	Little Salmon	GR	MT, SN	UNK	CCG	NNRS Ltd. 1977	8	340088.4619	847245.7633	No CH captured
32	Unnamed Creek 4	Little Salmon	CH	MT	UNK	GR	NNRS Ltd. 1977	8	494228.9974	6892112	Sampling location within stream not specified
33	Bearfeed Creek	Little Salmon	CH	SN	8 hauls	AG, CCG, RW	NNRS Ltd. 1977	8	495906.9991	6893001.996	GN and MT were also used to catch other species
34	Bearfeed Creek	Little Salmon	CH	MT	3 MT, 23 Min	N/A	von Finster 1989	8	495482.0018	6894291.001	Outstanding rate of juvenile CH captures, set upstream of highway crossing
35	Unnamed Creek 3	Little Salmon	GR	OBS	UNK	UNK	NNRS Ltd. 1977	8	396101.9982	857549.7874	Unknown date or sampler.
36	Unnamed Creek 2	Little Salmon	GR	GN	1 set	N/A	NNRS Ltd. 1977	8	401284.0451	857632.7209	NFC in MT or SN
37	Drury Creek	Little Salmon	CCG	MT, SN	UNK	2 NPj	NNRS Ltd. 1977	8	401620.2395	860181.6055	
38	Truitt Creek	Little Salmon	GR	SN	2 hauls		NNRS Ltd. 1977	8	403637.2767	858487.8564	NFC in MT
39	Magundy River	Little Salmon	GR	SN	1 set	5 RW	NNRS Ltd. 1977	8	533300.41	6894828.228	RW caught in GN and SN, and NFC in MT
40	Nansen Creek	Nisling	NFC	EF	UNK	N/A	Osborne 1995a	8	385358.834	6875906.524	Sampling conducted 2.4 km upstream of mouth
41	Nansen Creek	Nisling	NFC	EF	UNK	N/A	Osborne 1995a	8	385346.823	6875952.783	Sampling conducted 2.4 km upstream of mouth

Appendix B. Fish Distribution Point Data

Fish ID	Creek Name	Watershed Area	Species	Method	Effort	Other Species Caught	Source	UTM Zone	UTM Easting	UTM Northing	Comments
42	Nansen Creek	Nisling	GR	MT, GN, EF	UNK	N/A	Norecol 1989	8	383872.637	6882360.088	1 km upstream of Webber Creek, multiple grayling were captured
43	Victoria Creek	Nisling	GR	EF	UNK	CCG, BB	Osborne 1995a	8	392363.978	6878200.359	Captured 0.6 km downstream from road crossing
44	Victoria Creek	Nisling	GR	EF	UNK	1 BB	Osborne 1995a	8	392519.915	6878994.221	Captured 0.1 km upstream of road crossing
45	Victoria Creek	Nisling	GR	EF	UNK	N/A	Osborne 1995a	8	391597.277	6883866.714	Captured 6.4 km upstream of road crossing
46	Dome Creek	Nisling	NFC	MT, EF	4 MT, 261 s	N/A	EDI 2009a	8	391195.497	6880525.517	Sampled section of creek downstream of road towards mouth
47	Back Creek	Nisling	GR	EF	448 s	N/A	EDI 2009b	8	390861.328	6881287.749	Lower 1 km of stream, note Pony Creek also sampled MT, EF but NFC
48	Nordenskiold River	Nordenskiold	CH	GN, SN, AG	82 h, 74.4 m2, 0.45 h	GR, RW, NP, LSU, CCG	Beak Consultants Ltd. 1979	8	445380.546	6847925.74	
49	Nordenskiold River	Nordenskiold	CH	MT	5 MT	N/A	Pumphrey 1999	8	445045	6846279.003	Numerous other fry feeding in area
50	Nordenskiold River	Nordenskiold	CH	MT	10 MT	CCG, LSU	Pumphrey 1999	8	437674.0025	6796289.996	
51	Nordenskiold River	Nordenskiold	NFC	MT	5 MT	N/A	Pumphrey 1999	8	419550.0007	6785784.996	
52	Nordenskiold River	Nordenskiold	NFC	MT	5 MT	N/A	Pumphrey 1999	8	416331.0011	6784133.003	Also sampled here in 1995, 5 MT, NFC
53	Nordenskiold River	Nordenskiold	NFC	MT	5 MT		Pumphrey 1999	8	414291.9957	6779686.996	
54	Rowlinson Creek	Nordenskiold	CH	EF, S	1603 s, 310 m2	Gr, BB, CCG	Beak Consultants Ltd. 1979	8	430694.825	6879207.133	Other methods included AG and DN
55	Incised Creek	Nordenskiold	CH	MT, GN	4 MT, 48 h	2 GR	DFO 1990	8	429346.0001	6869494	Stn 1, 14.7 km upstream from the mouth of Incised Cr
56	Incised Creek	Nordenskiold	CH	MT	4 MT, 48 h	N/A	DFO 1990	8	428967.0001	6864979	Stn 2, 23.9 km upstream of the mouth of Incised Cr
57	Incised Creek	Nordenskiold	CH	MT	4 MT, 48 h	N/A	DFO 1990	8	429242.9986	6860635.997	
58	Incised Creek	Nordenskiold	CCG	MT, GN	4 MT, 48 h	GR	DFO 1990	8	422361.462	6856536.547	
59	Kirkland Creek	Nordenskiold	CH	MT	1 MT	N/A	Pumphrey 1999	8	443905.9957	6845943.002	Also saw school of fry in area
60	Klusha Creek	Nordenskiold	CH	OBS	UNK	N/A	Brown 2002	8	448414.858	5840811.549	2 MT set NFC, but juvenile CH seen at location (unknown number)
61	Klusha Creek	Nordenskiold	CCG	EF, S, DN	1609 s, 183 m2	NP, BB	Beak Consultants Ltd. 1979	8	448781.532	6840512.615	
62	Klusha Creek	Nordenskiold	NFC	MT	2 MT, 24 hrs	N/A	Otto 1998a	8	449183.121	6840287.365	Below West Twin Lakes outlet. Numerous other MT set throughout creek (near Airport Lake) but NFC anywhere.
63	Klusha Creek	Nordenskiold	CCG	EF	1806 s	N/A	Beak Consultants Ltd. 1979	8	455991.352	6821309.011	
64	Angel Creek	Nordenskiold	CH	OBS	UNK	1 CCG	Pumphrey 1999	8	438400.249	6795615.54	CH fry observed, but only CCG captured in MT
65	Unnamed Creek (aka Disappearing Creek)	Nordenskiold	CH	MT	1 MT, 5 min	N/A	Pumphrey 1999	8	435315.002	6795534.713	Also visual observation of 100 fry
66	Mica Creek	Pelly River	CH	MT	21 hrs, 5 MT	14 LSU, 1 CCG	Wilson & Associates 1999	8	419592.0043	6964876.001	Sampling in 1978 around same location did not capture CHj, but did capture GR, RW, LSU, CCG and an Arctic lamprey
67	Ptarmigan Creek	Pelly River	NFC	MT	3 MT	NFC	Wilson & Associates 1999	8	429863.004	6954023.005	
68	Needlerock Creek	Pelly River	CH	MT	5MT, 14 hrs	N/A	Wilson & Associates 1999	8	441666.1713	6963473.677	
69	Needlerock Creek	Pelly River	NFC	MT	5 MT	NFC	Wilson & Associates 1999	8	459842.9975	6957514.003	
70	Tatchun River	Tatchun	CH	MT	5 MT, 8 hrs	1 CCG, 3 LSU	Otto 1998b	8	431202.9959	6906667.002	Sampling in Lower Reaches
71	McCabe Creek	Yukon River	CH	EF	UNK	N/A	Mossop and Bradford 2006	8	408283.9971	6934025.999	No exact reference to sampling site; but caught within 250 m of mouth, juv CH captured but no number given
72	McCabe Creek	Yukon River	CH	EF	873 s	11 GR, 1 RW, 3 CCG	Beak Consultants Ltd. 1979	8	409125.9992	6935007.004	GR included adult and juveniles and RW was adult
73	McCabe Creek	Yukon River	CH	SN	7 hauls	5 GR, 1 CCG	NNRS Ltd. 1977	8	409172.661	6935050.825	AG were also caught in GN, and NFC were caught in MT
74	Hoocheekoo Creek	Yukon River	CH	EF	UNK	N/A	Mossop and Bradford 2006	8	412939.247	6925838.656	No exact reference to sampling site; but caught within 250 m of mouth, juvenile CH captured but no number given
75	Williams Creek	Yukon River	CH	EF	405 s	N/A	Osborne 1995b	8	416648.086	6918981.839	An additional 8 CH fry were observed, 50 m u/s from mouth

Appendix B. Fish Distribution Point Data

Fish ID	Creek Name	Watershed Area	Species	Method	Effort	Other Species Caught	Source	UTM Zone	UTM Easting	UTM Northing	Comments
76	Williams Creek	Yukon River	CH	EF	UNK	N/A	Mossop and Bradford 2006	8	416617.9977	6919067.004	No exact reference to sampling site; but caught within 250 m of mouth, juvenile CH captured but no number given
77	Williams Creek	Yukon River	CH	EF	UNK	N/A	Harder & Associates 1991	8	416638.0039	6918869.998	Reach #1
78	Williams Creek	Yukon River	NFC	EF	UNK	N/A	Osborne 1995b	8	416170.9988	6918064.999	
79	Williams Creek	Yukon River	NFC	EF	UNK		Osborne 1995b	8	414659.035	6915573.683	
80	McGregor Creek	Yukon River	CH	EF	UNK		Mossop and Bradford 2006	8	418543.565	6918225.922	Caputred within first 250 m of stream mouth, no catch number given
81	McGregor Creek	Yukon River	CH	OBS	UNK	N/A	DFO 1989b	8	419581.0042	6919564.003	Juveniles were seen in the plunge pool below the highway crossing
82	McGregor Creek	Yukon River	CH	EF	710 s	53 GR, 2 CCG	Beak Consultants Ltd. 1979	8	420181.1	6919958.387	All life stages of GR were caught - there is a beaver dam u/s of pipeline corssing that was a barrier
83	Merrice Creek	Yukon River	CH	EF	UNK	N/A	Mossop and Bradford 2006	8	418157.9999	6917654.001	No exact reference to sampling site; but caught within 250 m of mouth, juvenile CH captured but no number given
84	Crossing Creek	Yukon River	CH	EF	552 s	2 LSU fry	Beak Consultants Ltd. 1979	8	422577.9995	6913468	
85	Crossing Creek	Yukon River	NFC	EF	482 s	NFC	Beak Consultants Ltd. 1979	8	422943.9964	6904985.001	
86	Crossing Creek	Yukon River	GR	EF	251 s	N/A	Beak Consultants Ltd. 1979	8	421581.286	6903680.135	
87	Murray Creek	Yukon River	CH	EF	1159 s	GR, RW, CCG	Beak Consultants Ltd. 1979	8	428291.997	6892376	0.9 KM at road crossing, GR fry and adult and juvenile RW
88	Mica Creek	Pelly River	CH	MT	3 MT, 19.75 hrs	1 CCG, 1 LSU	Wilson & Associates 1999	8	421447.97	6961784.27	
89	Mica Creek	Pelly River	NFC	MT	3 MT	NFC	Wilson & Associates 1999	8	438814	6945661	
90	Needlerock Creek	Pelly River	CH	MT	10 MT, 18 hrs	N/A	Wilson & Associates 1999	8	438533.348	6964511.517	
91	Needlerock Creek	Pelly River	NFC	MT	5 MT	N/A	Wilson & Associates 1999	8	453693.612	6958936.711	
92	Tatchun River	Tatchun	CH	MT	5 MT, 8 hrs	5 CCG	Otto 1998b	8	433444.637	6906547.765	Middle Reaches.
93	Tatchun River	Tatchun	NFC	MT	5 MT	NFC	Otto 1998b	8	434369.822	6906915.98	Upper Reaches - NFC.
94	McCabe Creek	Yukon River	CH	MT	24 hrs	UNK	Mossop and Bradford 2006	8	411358.936	6935757.598	Capture numbers not provided in study, but the highest densities were found 5 km upstream from the confluence, around this point.
95	Seven Mile Creek	Yukon River	CH	MT	UNK	UNK	Brown 2003	8	444133.24	6883199.651	Juvenile CH captured, but no details in report on numbers or effort.
96	Mandanna Creek	Yukon River	CH	MT	UNK	UNK	Brown 2003	8	458519.791	6874833.728	Juvenile CH captured but no details in report on numbers or effort.
97	Whitegrass Creek	Yukon River	CH	MT	UNK	UNK	Brown 2003	8	461592.14	6876473.698	Juvenile CH captured but no details in report on numbers or effort. Beaver Dam obstruction noted in report.
98	Twin Creek	Yukon River	CH	MT	UNK	UNK	Brown 2003	8	477202.996	6872882.371	No details in report on effort or other species captured.
98	Claire Creek	Yukon River	CH	MT	UNK	UNK	Brown 2003	8	477576.66	6872487.947	No details on effort or other species captured.
99	Tributary #21	Yukon River	NFC	MT	UNK	UNK	Brown 2003	8	481105.71	6871782.137	No fish caught.
100	Sioux Creek	Yukon River	CH	MT	UNK	UNK	Brown 2003	8	493748.011	6868460.679	Juvenile CH captured but no details in report on effort.
101	Fyfe Creek	Yukon River	CH	MT	UNK	UNK	Brown 2003	8	499726.637	6852496.918	Juvenile CH captured but no details in report on effort.
NOTES					Species Code	CH	Chinook Salmon	Method Code	MT	Minnow Trapping	
						GR	Arctic Grayling		EF	Electrofishing	
* Fish ID is a number that refers to a point on a map						CCG	Slimy Sculpin		BS	Beach Seine	
* The Watershed Area will direct the reader to the correct map						BB	Burbot		SN	Seine Net	
						NP	Northern Pike		GN	Gill Net	
						LSU	Longnose Sucker		OBS	Observed	
						RW	Round Whitefish		AG	Angling	
						NFC	No Fish Caught		DN	Dip Net	



Appendix C. LSCFN Juvenile Chinook and Chinook Habitat Assessment Program Outline



Proposed LSCFN Juvenile Chinook & Chinook Habitat Assessment Program

Program Objectives

- To collect juvenile Chinook salmon distribution and basic habitat information for streams within the LSCFN Traditional Territory where limited or no past data has been collected.
- To build capacity within the LSCFN community for technical fisheries work.
- Identify potential future restoration or enhancement opportunities.

Program Description

This program will be developed as a community driven fish sampling program with high-level supervision from a qualified biologist who will act as a technical supervisor. The program will begin with training for the LSCFN River Crew, providing them with the capacity to collect basic fisheries data on a daily basis throughout the field season. The project will be very similar to the stewardship project taken on by the Ta'an Kwäch'än Council which has been running since 2007, funded by the Yukon River Panel Restoration and Enhancement Fund.

Program Components

Watershed Sampling Plan

Sampling plans will be developed by the technical supervisor in consultation with staff from the LSCFN Lands and Resources Department (with input from DFO's Technical Advisor, as required) for each of the priority watersheds identified in the LSCFN salmon knowledge study.

- The biologist will use the summarized fish data and maps from the salmon knowledge study to guide the planning, and customize a sampling plan for each watershed based on access restrictions and existing knowledge.
- Plans will include the number of sampling stations per stream, number of traps per station, and an access plan.
- The intention of the assessment program is for both fish and stream data to be collected at each station.

Data Collection Template

A data collection template will be developed to help standardize field sampling and make sure all the important data is collected at each sampling station. See example on following page.



LSCFN Fish & Fish Habitat Assessment Form (EXAMPLE)								
Stream Name:					Station #:			
Sampled By:					Date(s):			
Location: UTM Zone					Dist. from Mouth:			
SITE CHARACTERISTICS								
Stream Width (m): Wetted Channel					Stream Depth (m):			
Photo #s:					Gradient:			
<i>Check all appropriate boxes below .</i>								
Cover	None	Trace	Some	Abundant	Barriers	Present? Y/N	Approx. Height (m)	
Boulders					Beaver Dams			
Overhanging Veg					Log Jams			
Large Woody Debris					Waterfalls			
Small Woody Debris					Cascades			
Undercut Banks								
Deep Pools					Notes			
Stream Bottom	None	Trace	Some	Abundant				
Cobble								
Pebble								
Gravel								
Sand								
Fines								
Other	None	Low	Moderate	High				
Flow Level								
Turbidity								
FISH SAMPLING								
<i>Enter trap set and pull data.</i>	Set Date:		Pull Date:		Trap Depth (m)	Set Location Description		
	Set Time	Set Temp (°C)	Pull Time	Pull Temp (°C)		<i>(was the trap set under a log, in back eddie, or undercut bank, etc.?)</i>		
Trap 1								
Trap 2								
Trap 3								
Trap 4								
<i>Enter number of each fish species</i>	Chinook	Slimy Sculpin	Arctic Grayling	Burbot	Longnose Sucker	Northern Pike	Least Cisco	Other
Trap 1								
Trap 2								
Trap 3								
Trap 4								
Fish Lengths (mm) (Max 10 from each species)								
Species:	Species:	Species:	Species:					



Training Component

River Crew training would begin with a 'classroom' component followed by a 'field' component, and will be led by the technical supervisor (1-2 weeks). Throughout the training, the crew will become comfortable with the program and sampling methods. The training is intended to provide the crew with the capacity to carry out the fish and fish habitat assessments without continuous field supervision from a biologist. Note that other training such as First Aid is not included here; however, should be addressed if people working on the project do not have up-to-date certification.

CLASSROOM TRAINING	
Introduction to Program	<ul style="list-style-type: none"> - Program objectives, - Overview of project area and watershed areas.
Introduction to Chinook Salmon Life Cycle	<ul style="list-style-type: none"> - Spawning - Rearing - Overwintering - Migration
Introduction to Sampling	<ul style="list-style-type: none"> - Stream measurements - Fish sampling - Overview of data form - Safety Plan Components - Data collection/organization including downloading of GPS and Camera data.
Fish Identification	<ul style="list-style-type: none"> - Chinook and chum salmon - Freshwater species found in the Yukon River Watershed (Arctic grayling, northern pike, slimy sculpin, etc.). - Including description of habitats they are typically found in
FIELD TRAINING	
Pre-Field	<ul style="list-style-type: none"> - Introduce watershed sampling plan, - Equipment list - Orientation to GPS and compasses - Safety Plan Development
Field Trips	<ul style="list-style-type: none"> - Practice fish sampling and stream measurements discussed in the classroom - Begin to collect data for a select watershed area



Data Collection & Review

- Following training, the River Crew will continue with field sampling and data collection within the selected watershed, following the protocol outlined in the watershed plan. The Crew will check in daily with a local Lands and Resources employee for progress tracking and safety purposes.
- The River Crew will enter field data into a spreadsheet database and send weekly updates and copies of the data to the technical supervisor who will review the data and program progress. The Crew will check in weekly with the technical supervisor to discuss progress, findings and future sampling plans.
- The technical supervisor will check in on the crew periodically to ensure proper data collection and go over any questions/issues early on in the sampling program. Such events will allow for quality control and modifications to the program, as well as investigation of any unique findings (i.e. barriers to fish passage or restoration opportunities).
- Supervisor will go over additional watershed plans with the crew as per schedule and continue to manage data.

Reporting

Data collected by the River Crew will be summarized in a final report. Interpretation of the data will focus on general trends and unique findings, while the raw data will be included in appendices for reference. The report will include maps, a record of field activities, and recommendations for future years of the program. The recommendations will identify future sampling needs and restoration and enhancement opportunities within the LSCFN Traditional Territory. The reporting will be coordinated by the technical supervisor.