2007 FALL CHUM SALMON TAG RECOVERY PROJECT YUKON RIVER *(MINTO TO FORT SELKIRK)* CRE-29-07

Prepared for:

YUKON RIVER PANEL

and

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ABSTRACT

The Department of Fisheries and Oceans Canada has conducted tagging programs on migratory Pacific salmon populations in the upper Yukon River drainage since 1982. Fall chum salmon are marked with spaghetti tags at two fish wheels located near the Yukon-Alaska border. The purpose of the tagging and subsequent tag recovery is to estimate the size of the fall chum spawning migration into Canada using marked to unmarked ratios. Yearly spawning migration estimates are used to monitor the relative long term run size of the fall chum salmon population in the Yukon River in Canada.

During October of 2007, the project recovered spaghetti tags from post-spawning fall chum salmon in the Minto index area of the Yukon River near Pelly Crossing, Yukon Territory. Spaghetti tags were recovered through foot and boat surveys at several known fall chum spawning locations. The survey observed and recovered a total of 42 spaghetti tags, all of which were Canadian origin. The fall chum salmon tagged to untagged ratio for Canadian tagged fall chum for 2007 was 43.7 fish for the Minto index area. Based on this ratio the Canadian Yukon River fall chum border escapement is estimated to be 188,539 ± 39,462 in 2007.

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INTRODUCTION

A fall chum salmon spawning ground tag recovery program has been conducted annually on the Yukon River between Minto and Fort Selkirk, Yukon since the late 1990s. It is one of several assessment programs for fall chum salmon that are conducted within Canadian portion of the Upper Yukon River each year. Funding for the project was provided by the Yukon River Panel which funds programs in both Canada and the United States that focus on the restoration, and enhancement of Canadian-origin salmon within the Yukon River Basin. In addition, the program provides funding for projects conducted within the Canadian portion of the Yukon River drainage that foster stewardship of salmon habitat and resources and maintaining viable fisheries. Through various projects in both countries, there is hope that sustainable salmon fisheries can continue along the Yukon River over the long-term and that salmon returns can once again approach historic levels of abundance. A stock rebuilding program for Canadian origin fall chum has implemented when run projections are low (Milligan, pers. com., 2007). The means of measuring success or failure of this program involves a mark-recapture program that is used to determine annual border and spawning escapement estimates and temporal trends.

The project was administered by the Selkirk District Renewable Resource Council (SRRC) with field assistance provided by members of the Selkirk First Nation (SFN) from the community of Pelly Crossing in south central Yukon. The involvement of the SRRC and SFN members in local fisheries management projects has recently expanded as a result of the finalization of the SFN Final Agreement and the Canada-US Yukon River Salmon Agreement. Combined, these agreements have been influential in increasing awareness of local issues while building the capacity to initiate and participate in various fisheries management projects throughout the SFN Traditional Territory. In addition to providing local jobs and benefits to the community of Pelly Crossing, this project identifies important fall chum spawning habitat for consideration in ongoing land use planning initiatives in the region. The Minto area is especially rife with activity with the development of the Minto Mine that is currently in production.

Fall chum runs have been weak within the 1998-2001 period, however run strength improved within the 2002-2006 period. As part of the management of the Upper

Yukon fall chum salmon run in Canada, a mark-recapture tagging program is initiated each year as the primary tool for estimating border escapement, the number of fish entering Canada. In years past, when the commercial fishery was closed for conservation purposes, management biologists found that abundance estimates without the fishery were difficult to determine since there was no catch or tag recovery information available (Milligan, pers. com., 2007). In response, an alternate method to estimate fall chum abundance was explored in the late 1990s that involved the enumeration and recovery of spaghetti tags at known fall chum spawning sites.

In summary, the primary objective of this project is to determine if the Minto index area can be used as a proxy to estimate border escapement and relative year to year abundance. Tag ratios are derived through the enumeration of spawning fish and recovery of spaghetti tags at known spawning sites in the Yukon River between Minto Landing and Fort Selkirk, Yukon (Figure 1 and Appendix I).

METHODS

Spaghetti tags applied by DFO to fall chum salmon at fish wheels near the Yukon-Alaska border were recovered through a combination of foot surveys and drifting over known spawning locations on the Yukon River between Minto and the confluence of the Yukon and Pelly rivers at Fort Selkirk (Figure 1). Tag recovery work was conducted from October 15-19, 2007 during a period that was well after the peak spawning period. Spawning locations were found using previously referenced coordinates using a hand held Garmin 76CS GPS. All sites were accessed using a boat and outboard motor. Loose tags along the shoreline were collected and carcasses enumerated by surveying the perimeter of the spawning area by foot. For the carcass tally, only heads were enumerated to avoid duplication. The sex, spawning condition, visual inspection for mark (adipose clip, adipose and caudal punch) and a measurement of both mid-eye fork and post orbital hypural length (± 5 mm) were recorded on only those carcasses that were whole. The higher water level in 2007 allowed access to all of the spawning sloughs by boat. At locations where significant numbers of schooling fall chum were observed in the water, enumeration was performed using a boat and tally counter by simply drifting over spawning aggregations. At these sites a minimum of

three drifts were made by a single observer at the bow of the boat. A second observer surveyed the stream bed for loose tags during each drift which were eventually recovered using a gaff or wading in the water. All live fish and carcasses on the slough bottom were counted during each drift. The maximum number of enumerated fish or tagged live fish that were recorded during any one drift was used in the overall calculation of tag to untagged ratios for the project.

A border escapement estimate using recovered and observed tags in 2007 was calculated using a linear relationship between previously determined tag ratios and past DFO independent estimates of border escapement. For comparison, the Lincoln-Peterson mark and recapture method was also used to estimate border escapement (N) in 2007 using the total number of tagged fish ($n1$), tags observed or recovered (m) and fish enumerated in the Minto index area ($n2$). The formula used for the border escapement estimate was $N = (n1n2)/m$.

Conductivity and pH values were recorded at several of the spawning sites using calibrated Oakton pocket sized testers. Stream temperatures at the spawning sites were recorded using a handheld alcohol thermometer.

RESULTSAND DISCUSSION

Environmental Conditions

Ground accumulations of snow and the high water level of the river during the fall of 2007 made some aspects of the field work more difficult. Snow hampered tag recovery along the shoreline by covering loose tags that were well away from the margins of the sloughs. Snow and ice can dramatically reduce shoreline tag recoveries and can skew ratios of tagged to untagged fish. The unusually high water level of the Yukon River in 2007, while allowing easy boat access to each index site, reduced visibility in the deeper regions of the sloughs. Reduced visibility, which was more pronounced at some sites over others, resulted in limited enumeration of schooling fall chum at many sites. The higher water levels also made wading difficult at a few of the sites.

Water temperatures at the spawning sites ranged from 4.5 to 5.5°C during the survey. Specific conductance was consistent at 150 μScm^{-1} and did not vary between sites. Surface waters were alkaline with recorded pH values ranging from 8.1 to 8.4

(Table 1). The air temperature was seasonally normal with temperatures usually well below freezing during the morning and warming up to near 0°C by the late afternoon. Ice cover on the sloughs was negligible and did not hamper access or tag recovery in 2007.

Table 1 Temperature, pH and conductivity measurements from fall chum spawning sites between Minto and Fort Selkirk on the Yukon River, October 2007.

Site	Temperature (C)	pH	Conductivity (μScm^{-1})
W50	4.5	8.4	150
W52	5.0	8.1	150
W54	4.5	8.3	150
W55	5.0	8.4	150
W58	5.5	8.4	150

Fall Chum Salmon Tag Recoveries

Nine sites were inspected for spaghetti tags (Figure 1 and Appendix I) between October 15 and 19, 2007. Combined, these sites resulted in the enumeration of a total 2,010 fall chum salmon in various condition stages. A total of 1,695 spawning fish were enumerated by boat during drifts over spawning aggregations; the balance (315 fish) was carcasses enumerated along the shoreline during foot surveys at each of the spawning sites. Many of those carcasses were not whole fish, having been scavenged by wildlife such as eagles, ravens and bears. Fall chum salmon heads and jaw bones were often the only remains observed along the shoreline.

A total of 52 orange spaghetti tags were recovered or observed all of which were of Canadian origin. Of the 52 Canadian tags, 46 were determined to be from the current tagging year and used to calculate tagged to untagged ratios (Table 2). All tag recoveries were either found along the shoreline, attached to carcasses, or lying submerged on the bottom of sloughs (Appendix II). Un-recovered tags represented those observed and enumerated on live fish during drifts at each of the spawning sites.

The 2007 field study represented the first year where more tags were counted on live fish than were recovered along the shoreline or found on the bottom of sloughs (Table 2). The run in 2007 was notably latter than in previous years by ~6 days and was likely the cause for the lower number of shoreline tag recoveries. The tag ratio which was calculated by counting live spawning fish (i.e. fish in the water) was 70.6 live fish

per tag. Unattached tags were collected in both the water and along the shoreline in equal proportions resulting in a tag ratio of 14.3 carcasses per unattached tag. Combining all Canadian 2007 tag data collected resulted in an overall tagged / untagged ratio of 43.7 fish per tag fall chum salmon within the Minto index area. This value was slightly higher than the 40.1 ratio determined in 2006.

Table 2 Summary of enumeration and tag recovery statistics of fall chum salmon in the Minto Index area, October 2007.

Enumeration Method	Count	Canadian 2007 Spaghetti Tags Recovered or Observed	Tag Ratio
Fall Chum Carcasses on Shore	315	22**	14.3 fish per tag
Live Fall Chum in Slough*	1,695	24	70.6 fish per tag
Total	2,010	46	43.7 fish per tag

* Orange tags observed of Canadian origin
** Consists of 10 tags found unattached in slough, 6 unattached on shore and 6 attached to carcasses

Using a linear relationship between yearly determined Minto index tag ratios and Canadian border escapement an estimate of 188,539 ± 39,462 (95% confidence interval) fall chum salmon was determined for 2007. The relationship, expressed as an equation (border escapement estimate = 2,919.9 * tag ratio + 60,952; R^2 = 0.9260), was derived from previous tag ratio determinations for the Minto index area and 6 years of border escapement estimates established from Fisheries and Oceans Canada mark recapture programs (Table 3). The current estimate is well above the Canadian Yukon River fall chum spawning escapement goal of greater than 80,000 fish and below the preliminary border escapement estimate of 226,362 determined by Fisheries and Oceans Canada (DFO). The final border estimate may be ~ 250,000 when the estimate is adjusted using migration timing data (Milligan, pers. com., 2007).

Alternatively, an additional estimate of border escapement using the Lincoln-Peterson method was determined to be 322,780 ± 92,221 (95% confidence interval) fall chum salmon. This estimate used the number of tagged fish at the border, tag recoveries,

observed tags and enumerated fish at each of the spawning locations in the Minto index area. Considering that several key assumptions using this method may not have been achieved it is likely an over estimation of escapement. It should also be noted that in 2007 the tagging program ended before the run was completed (Milligan, pers. com., 2007). With a portion of the run being untagged, the potential for skewing of the tag ratio is likely and may be a further constraint on the accuracy of the estimate.

Table 3 Data used to derive a relationship between DFO fall chum border escapement estimates and determined tag ratios for the Minto index area, 2002-2007.

Year	Canada-US border escapement estimate	Determined tag ratios Minto index area (fish per tag)
2002	91,800	24.2
2003	140,000	31.1
2004	134,260	33.3
2005	451,477	137.4
2006	226,386	40.1
2007	226,362*	43.7

* Preliminary estimate

The late spawning run made for a modest recovery of whole spawned out carcasses for sexual determination and visual inspection for tag loss or markings. Carcass retention along the shoreline was also low due to the high water levels and strong flows at all spawning locations. The male to female sex ratio in a sample of 75 fall chum salmon along the shoreline was 1.08 males to each female fish (36 males: 39 females). Only a single carcass that was visually examined was suspected of tag loss, this observation based on seeing a potential tag scar below the dorsal fin base (Appendix III). No other markings were observed on any of the other carcasses. With the exception of six tagged carcasses either found in the water or along the shore, tags were generally unattached with the majority having the appearance of being forcibly removed. While the project failed to capture live tagged fish, the collection of loose unattached tags and the enumeration of live tagged fish were again very successful methods to amass meaningful tag data in 2007.

Tag Recovery Timing

The survey in 2007 was completed during roughly the same statutory weeks as 2005 and 2006, and about a week earlier than previous survey years. Spawning activity appeared to be just past the peak as evidenced by the many live fish that were observed in good condition. During the survey many female fall chum were observed digging in gravel with many more simply holding over their respective redds. The run was considered to be late by ~6 days in 2007. It is believed that the higher water level and flow of the Yukon River may have contributed to the late spawning activity (Figure 2).

All of the carcasses examined in 2007 were in a post-spawn condition. Only one female carcass was found to have retained all her eggs, this fish may have been predated upon, although there was no visual evidence to support this. The majority of female carcasses inspected had <5% egg retention. As with other years nearly all of carcasses that were enumerated were partial remains composed of only heads, tissue or skeletal fragments scattered along the shoreline. This was unlike the situation in 2005 where the large run resulted in many whole carcasses scattered along the shorelines as predators were simply high-grading select parts of the fish, particularly the eyes. Predators seemed to have a more difficult time of accessing fish in 2007 as both the high flows and depth appeared to make harvesting difficult for all but bears.

Fall Chum Salmon Spawning Sites

The mainstem sloughs of the Yukon River between Minto and Fort Selkirk have long been known as an important fall chum spawning areas by Selkirk First Nation people as well as local residents. Fall chum salmon have been historically harvested in a select number of sloughs in this section of river by Selkirk First Nation people for hundreds, if not thousands of years (Gotthardt, pers. com., 2003). While the earlier run of Chinook salmon is generally a more popular fishery for the residents of Pelly Crossing, a small aboriginal fishery for fall chum salmon continues around the Minto Landing area and along the Pelly River near the community of Pelly Crossing. Local interest in harvesting fall chum salmon was again modest in 2007. Few people or boats were observed on the river during the survey. Some harvesting effort was observed

around Minto Landing however local employment opportunities at the Minto mine likely translate to a fairly small aboriginal fishery (Brown, pers. com., 2006).

With the high water level of the Yukon River in 2007 some notable changes occurred in habitat utilization at the spawning sites in comparison to previous survey years. High utilization of spawning habitat was observed at sites W50-1, W53, W55 and W58. Combined, these sites represented approximately 75% of the 2007 Canadian tags recovered or observed during the project. Unlike other years, site W58-1 had very few redds and carcasses than one would expect with the abundance of fish in the system. The poor utilization of this site, as was the case in 2006, can likely be attributed to greater water depths and higher water velocities that resulted in fish not selecting this spawning site. This site represents the upper reaches of an important and consistently utilized spawning site known as Big Creek Slough or W58. Both sites W58 and W58-1 were heavily used by spawning fall chum in 2005.

Water levels of the Yukon River in 2007 were extremely high. Yukon River flow data at a water survey station just downstream of the Minto Index area show higher discharge than the previous six years for the period considered to be the peak fall chum salmon spawning period during the latter part of September through to the middle of October (Figure 2). As in 2005 and 2006, it is believed the increased water velocities and substrate depths had profound impacts on both carcass retention and the specific location of redds at each of the spawning sites. This was especially evident at site W58 where fall chum salmon were spawning in a side channel that was dry in all previous survey years. Sites that continue to be heavily utilized are generally those that have the most diverse and extensive habitats available.

REFERENCES

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PERSONAL COMMUNICATION

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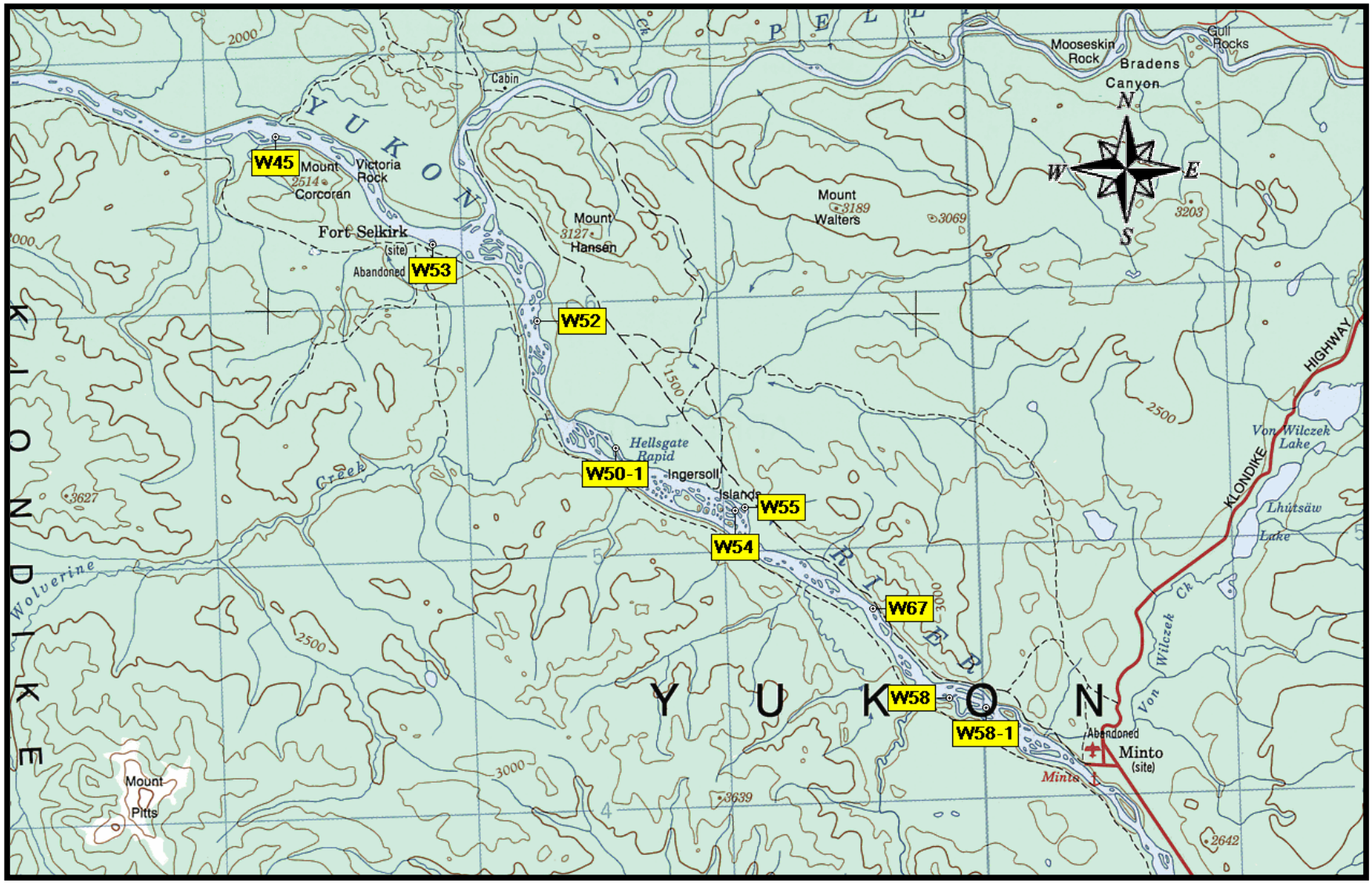

FIGURE 1: YUKON RIVER (MINTO INDEX AREA) FALL CHUM SALMON TAG RECOVERY INSPECTION SITES

5 0 5 10 15 km

SCALE 1 : 250,000

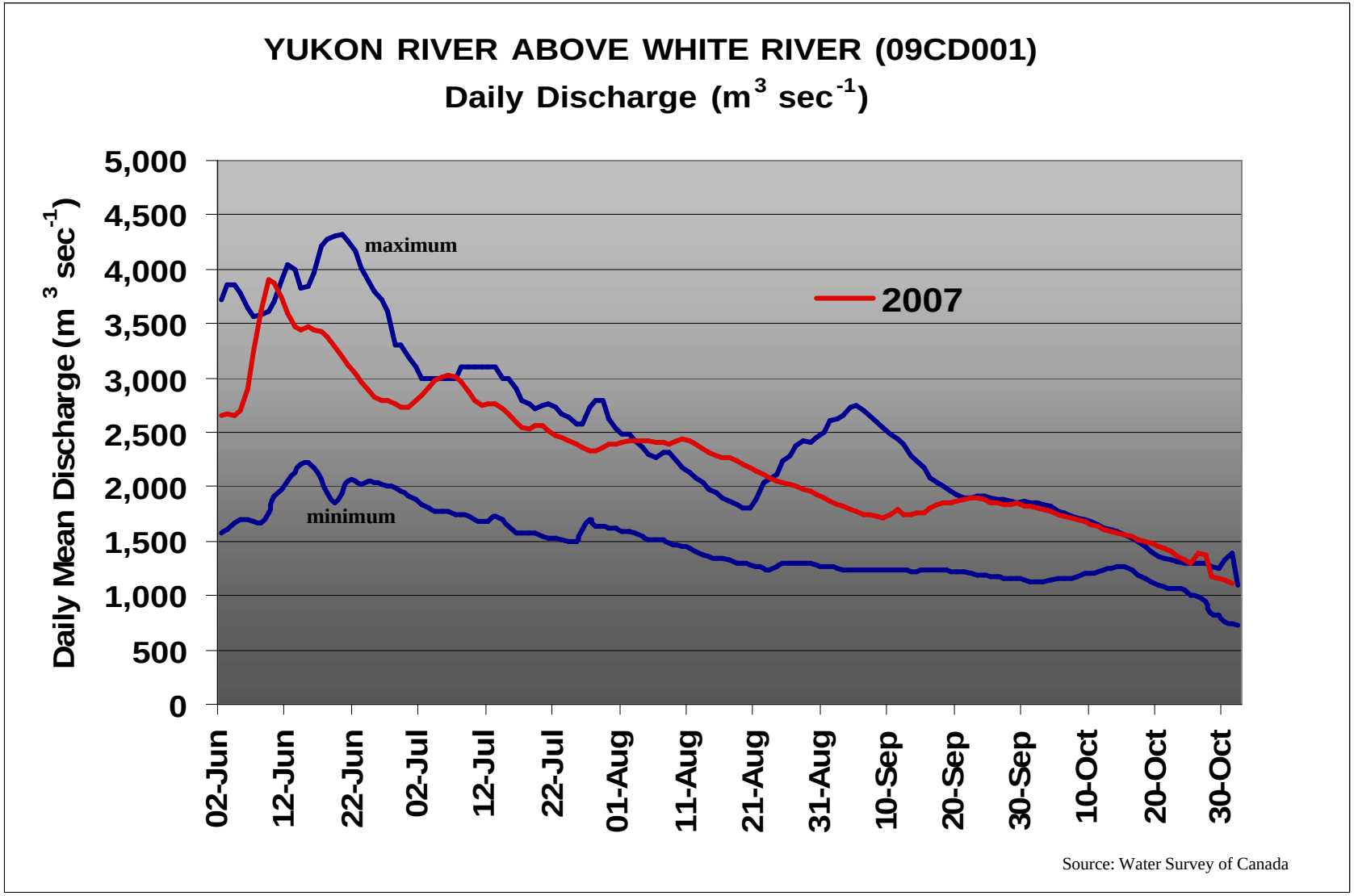

Figure 2 Comparison of water discharge for Yukon River 2001-2006. The daily 2001 to 2006 minimum and maximum, and 2007 water discharges for the Yukon River at gauging station # 09CD001 above the confluence with the White River from June through October as presented.

APPENDIX I

SURVEY WAYPOINTS 2007

APPENDIX I SURVEY WAYPOINTS 2007

Waypoints	Updated Map Reference*	Description
W45	N 62° 48' 40.5" W 137° 29' 47.1"	Slough downstream of Victoria Rock
W50-1	N 62° 42' 08.6" W 137° 13' 55.4"	Rock Face Slough – near upstream inlet – Chum Spawning Area
W52	N 62° 44' 48.8" W 137° 17' 35.3"	Warm-springs above confluence of Pelly River on right bank of Yukon River - Chum Spawning Area
W53	N 62° 46' 25.0" W 137° 22' 27.5"	Slough in front of Fort Selkirk – Chum Spawning Area
W54	N 62° 40' 48.7" W 137° 8' 24.4"	Ingersoll Islands – amongst islands
W55	N 62° 40' 53.6" W 137° 07' 58.9"	Ingersoll Islands right side channel
W58	N 62° 36' 50.8" W 136° 58' 32.5"	Big Creek Slough – primary spawning area
W58-1	N 62° 36' 38.6" W 136° 56' 51.0"	Big Creek Slough - upstream inlet
W67	N 62° 38' 45.0" W 137° 2' 2.2"	Downstream of Big Creek right bank of Yukon River at downstream outlet – Chum Spawning Area

***Position Format: hdddº mm' ss.s" (NAD 27 Alaska)**

APPENDIX II

2007 FALL CHUM SALMON TAG RECOVERY DATA

APPENDIX II 2007 FALL CHUM SALMON TAG RECOVERY DATA

Sample	Site	Date	Tag Color	Tag Origin	Tag Number	Location
1	W58	15-Oct-07	Orange	Canada	Z001924	found in slough
2	W58	16-Oct-07	Orange	Canada	Z008269	found in slough
3	W58	16-Oct-07	Orange	Canada	X002800	found in slough
4	W55	17-Oct-07	Orange	Canada	Z008501	found on shore
5	W55	17-Oct-07	Orange	Canada	X002940	found on shore
6	W55	17-Oct-07	Orange	Canada	-	found in slough
7	W55	17-Oct-07	Orange	Canada	X003031	found attached to shore carcass
8	W55	17-Oct-07	Orange	Canada	Z008050	found in slough
9	W55	17-Oct-07	Orange	Canada	Z008935	found attached to slough carcass
10	W55	17-Oct-07	Orange	Canada	X002868	found in slough
11	W55	17-Oct-07	Orange	Canada	X001666	found in slough
12	W55	17-Oct-07	Orange	Canada	Z008320	found in slough
13	W54	17-Oct-07	Orange	Canada	Z007740	found on shore
14	W54	17-Oct-07	Orange	Canada	X002781	found attached to shore carcass
15	W50-1	18-Oct-07	Orange	Canada	-	found in slough
16	W50-1	18-Oct-07	Orange	Canada	A04885	found on shore
17	W50-1	18-Oct-07	Orange	Canada	X001965	found on shore
18	W50-1	18-Oct-07	Orange	Canada	Z099813	found on shore
19	W50-1	18-Oct-07	Orange	Canada	B03221	found on shore
20	W50-1	18-Oct-07	Orange	Canada	X003142	found attached to slough carcass

Sample	Site	Date	Tag Color	Tag Origin	Tag Number	Location
21	W50-1	18-Oct-07	Orange	Canada	Z009742	found in slough
22	W50-1	18-Oct-07	Orange	Canada	-	found in slough
23	W52	18-Oct-07	Orange	Canada	Z009806	found in slough
24	W52	18-Oct-07	Orange	Canada	-	found on shore
25	W52	18-Oct-07	Orange	Canada	X002954	found on shore
26	W53	19-Oct-07	Orange	Canada	Z008283	found attached to slough carcass
27	W53	19-Oct-07	Orange	Canada	Z009574	found attached to shore carcass
28	W45	19-Oct-07	Orange	Canada	Z009716	found in slough

APPENDIX III

2007 FALL CHUM SALMON BIOLOGICAL DATA

APPENDIX III 2007 FALL CHUM SALMON BIOLOGICAL DATA

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
1	W58-1	15-Oct-07	M	no tag or markings	SC	540	620
2	W58	16-Oct-07	M	no tag or markings	SC	500	565
3	W58	16-Oct-07	F	no tag or markings	SC	500	565
4	W58	16-Oct-07	F	no tag or markings	SC	520	580
5	W58	16-Oct-07	F	no tag or markings	SC	540	595
6	W58	16-Oct-07	M	no tag or markings	SC	530	600
7	W58	16-Oct-07	M	no tag or markings	SC	535	590
8	W58	16-Oct-07	M	no tag or markings	SC	540	610
9	W58	16-Oct-07	M	no tag or markings	SC	475	540
10	W58	16-Oct-07	F	no tag or markings	SC	510	570
11	W58	16-Oct-07	M	no tag or markings	SC	495	595
12	W58	16-Oct-07	M	no tag or markings	SC	505	560
13	W58	16-Oct-07	M	no tag or markings	SC	510	580
14	W58	16-Oct-07	F	no tag or markings	SC	470	530
15	W58	16-Oct-07	M	no tag or markings	SC	530	610
16	W67	16-Oct-07	F	no tag or markings	SC	530	590
17	W55	17-Oct-07	M	no tag or markings	SC	505	570
18	W55	17-Oct-07	M	no tag or markings	SC	540	610
19	W55	17-Oct-07	M	no tag or markings	SC	500	550
20	W55	17-Oct-07	M	no tag or markings	SC	520	590
21	W55	17-Oct-07	M	no tag or markings	SC	460	530
22	W55	17-Oct-07	F	lost tag, no other markings	SC	490	540
23	W55	17-Oct-07	F	no tag or markings	SC	500	570
24	W55	17-Oct-07	M	no tag or markings	SC	550	630
25	W55	17-Oct-07	F	no tag or markings	SC	510	575
26	W55	17-Oct-07	M	no tag or markings	SC	520	575
27	W55	17-Oct-07	M	no tag or markings	SC	500	570
28	W55	17-Oct-07	M	no tag or markings	SC	535	605

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
29	W55	17-Oct-07	M	no tag or markings	SC	490	550
30	W55	17-Oct-07	M	no tag or markings	SC	550	610
31	W55	17-Oct-07	M	no tag or markings	SC	595	650
32	W55	17-Oct-07	M	no tag or markings	SC	540	605
33	W55	17-Oct-07	M	no tag or markings	SC	530	580
34	W55	17-Oct-07	F	tag #Z008935, no other markings	SC	515	560
35	W55	17-Oct-07	F	no tag or markings	SC	470	520
36	W55	17-Oct-07	F	no tag or markings	SC	505	570
37	W55	17-Oct-07	F	no tag or markings	SC	470	520
38	W55	17-Oct-07	M	no tag or markings	SC	520	575
39	W55	17-Oct-07	F	no tag or markings	SC	485	545
40	W55	17-Oct-07	F	no tag or markings	SC	510	580
41	W55	17-Oct-07	F	no tag or markings	SC	485	515
42	W54	17-Oct-07	F	tag #X002781, no other markings	SC	550	615
43	W50-1	18-Oct-07	M	no tag or markings	SC	475	550
44	W50-1	18-Oct-07	M	no tag or markings	SC	520	580
45	W50-1	18-Oct-07	M	no tag or markings	SC	580	640
46	W50-1	18-Oct-07	F	no tag or markings	SC	490	560
47	W50-1	18-Oct-07	F	no tag or markings	SC	510	550
48	W50-1	18-Oct-07	F	no tag or markings	SC	490	550
49	W50-1	18-Oct-07	F	no tag or markings	SC	495	550
50	W50-1	18-Oct-07	M	no tag or markings	SC	525	605
51	W50-1	18-Oct-07	F	no tag or markings	SC	510	560
52	W50-1	18-Oct-07	M	no tag or markings	SC	500	570
53	W50-1	18-Oct-07	F	no tag or markings	SC	530	600
54	W50-1	18-Oct-07	F	tag #X003154, no other markings	SC	535	560
55	W50-1	18-Oct-07	M	no tag or markings	SC	455	520
56	W52	18-Oct-07	F	no tag or markings	SC	560	610
57	W52	18-Oct-07	F	no tag or markings	SC	525	560

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
58	W52	18-Oct-07	F	no tag or markings	SC	520	570
59	W53	19-Oct-07	F	no tag or markings	SC	510	560
60	W53	19-Oct-07	F	no tag or markings	SC	470	520
61	W53	19-Oct-07	M	no tag or markings	SC	500	580
62	W53	19-Oct-07	M	no tag or markings	SC	490	565
63	W53	19-Oct-07	M	no tag or markings	SC	520	580
64	W53	19-Oct-07	M	no tag or markings	SC	540	610
65	W53	19-Oct-07	M	no tag or markings	SC	540	610
66	W53	19-Oct-07	F	no tag or markings	SC	520	570
67	W53	19-Oct-07	F	tag #Z008283, no other markings	S	500	540
68	W53	19-Oct-07	F	tag #Z009574, no other markings	SC	520	580
69	W53	19-Oct-07	M	no tag or markings	SC	520	590
70	W53	19-Oct-07	F	no tag or markings	SC	530	595
71	W53	19-Oct-07	F	no tag or markings	SC	500	565
72	W53	19-Oct-07	M	no tag or markings	SC	570	640
73	W53	19-Oct-07	F	no tag or markings	SC	520	590
74	W45	19-Oct-07	F	no tag or markings	SC	550	610
75	W45	19-Oct-07	M	no tag or markings	SC	540	600

R = ripe live fish
S = spent live fish
SC = spent carcass