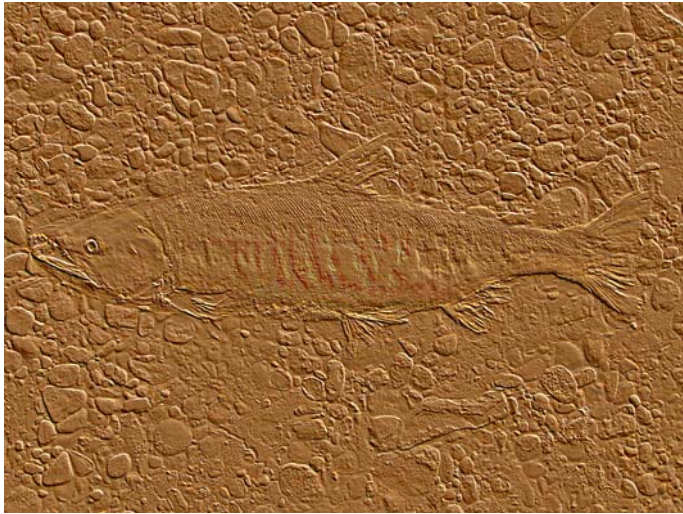


**2005 CHUM SALMON
TAG RECOVERY PROJECT
YUKON RIVER
(MINTO TO FORT SELKIRK)
CRE-29-05**



Prepared for:
**YUKON RIVER PANEL
SELKIRK FIRST NATION**
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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. 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 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 Chum salmon population in the Yukon River in Canada.

During October of 2005, the Selkirk First Nation recovered spaghetti tags from post-spawn Chum salmon in the Minto index area of the Yukon River near Pelly Crossing, Yukon. Spaghetti tags were recovered through foot and boat surveys at several known Chum spawning locations. The survey documented a total of 32 spaghetti tags, of which 28 were of Canadian origin and 4 originated from US tagging programs. The Chum salmon tag to untagged ratio for 2005 was 137.4 fish per Canadian tag for the Minto index area. This high tag ratio can be attributed to high border escapement in 2005.

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INTRODUCTION

A 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 Chum salmon that are conducted within Canadian portion of the upper Yukon River mainstem. This project continues to be administered and coordinated by the Selkirk First Nation (SFN) located in the community of Pelly Crossing in south central Yukon. The involvement of SFN members in community based 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 Chum spawning habitat for consideration in ongoing land use planning initiatives in the area.

The Yukon River Salmon Agreement specifically funds programs in Canada and the United States which focus on the restoration, conservation and enhancement of Canadian-origin salmon stocks. Included in this agreement is funding for projects directed at developing stewardship of salmon habitat and maintaining viable fisheries within the Yukon River drainage. 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 Chum returns can once again approach historic levels. In that effort, a stock rebuilding program for Canadian origin Chum on the Yukon River continues to be a management goal of DFO. The means of measuring success or failure of this program are mark-recapture estimates that establish yearly abundance estimates that, in turn, are used to monitor temporal trends.

Chum stocks have been weak since 1997 although in 2003, 2004 and again in 2005 stock strength was considered sufficient to allow for a commercial fishery in the Yukon River in Canada. As part of the management of the Chum population in Canada a mark-recapture tagging program is initiated each year and used as the primary tool for estimating border escapement. In years past, when the commercial fishery was closed for

conservation purposes, management biologists found that abundance estimates without the fishery were more difficult to derive. In response, an alternate method to estimate Chum abundance was explored in the late 1990s. This involved the recovery of tags at known Chum spawning sites for use in deriving an alternative estimate of border escapement. In summary, the primary objective of this project is to determine if tagged to untagged ratios in the Minto index area can be used as a proxy to estimate border escapement. 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 III).

METHODS

Spaghetti tags applied by DFO to Chum salmon at fish wheels near the Yukon-Alaska border were recovered through a combination of foot surveys, beach seining and drifting over known spawning locations on the Yukon River between Minto and the confluence of the Pelly River at Fort Selkirk (Figure 1). Tag recovery work was conducted between October 13 and 19, 2005 during a period that was well after the peak spawning period to avoid any disruption to salmon actively engaged in spawning. Spawning locations were found using previously referenced coordinates (SFN 2002, 2003, 2004) and a hand held Garmin 76CS GPS. All sites were accessed using a boat and outboard motor. Tags were collected by walking the perimeter of the spawning area while enumerating carcasses on the shore. At locations where significant numbers of Chum were observed in the water, a seine net or simply drifting over congregations with the boat, were the chosen methods of enumeration. With the higher water stage in 2005 many of the spawning sites could be accessed by boat. At these sites, a minimum of three enumeration drifts were made. At locations where a seine was used to capture fish, fish were marked by hole-punching the operculum and released at site of capture. Seining continued until previously captured fish became disproportionate in the sample or when the field personal considered the disturbance excessive. 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 both live captured and whole Chum salmon carcasses. All captured fish were released at site of capture after sampling.

RESULTS

Seven sites were inspected for spaghetti tags (Figure 1) between October 13 and 19, 2005. A total of 32 spaghetti tags were observed or recovered of which 28 were orange and of Canadian origin. Of the 28 Canadian tags, 26 were from the current tagging year (Table 1). In addition, a total of 4 US tags were observed or recovered during the project. All US tags were singularly applied green, pink or white spaghetti tags. All tag recoveries were either found along the shoreline, attached to carcasses, or lying submerged on the bottom of sloughs (Appendix II). Observed tags were on live fish that avoided capture.

Altogether, 7 surveyed sites resulted in the enumeration of 3,573 Chum salmon in varying condition. A total of 1,595 were live and either captured with a seine net or enumerated by drifting with a boat over congregations of spawning fish. The remaining 1,978 fish were carcasses that were enumerated during shoreline foot surveys of each spawning site. Many of those carcasses enumerated during the foot surveys were not whole fish, having been scavenged by wildlife such as eagles, ravens and bears. Chum heads frozen into the gravel bars are often the only remains of carcasses.

The large run of fish in 2005 enabled the sampling of many fresh whole carcasses for sexual determination and visual inspection for tag loss or markings. In a sample of 191 Chum salmon along the shoreline, the male to female sex ratio was 1.03 males to each female fish (97 males: 94 females). All sampled fish were measured and visually inspected for caudal or adipose punches or clips (Appendix I). No markings were observed on any of these sampled fish.

Table 1 Summary of the results from Chum salmon enumeration surveys and tag recoveries from the Minto Index area, 2005.

Enumeration Method	Count	Canadian 2005 Spaghetti Tags Recovered or Observed	Tag Ratio
Chum Carcasses on Shore	1,978	20**	98.9 fish per tag
Live Chum in Slough*	1,595	6	265.8 fish per tag
Total	3,573	26	137.4 fish per tag

* orange tags observed and believed to be of Canadian origin

** includes 6 tags found on carcasses in slough or unattached in the slough

DISCUSSION

Chum Tag Recovery Timing

Unlike previous years, field work in 2005 was performed under excellent conditions with no ground accumulation of snow that would otherwise hinder tag recovery. In addition, the lack of ice cover on many of the sloughs combined with the higher stage of the Yukon River allowed boat access into almost all of the spawning sites which provided excellent viewing for enumeration. The survey period in 2005 was about 5 days earlier than in previous survey years. When the project commenced at site W58 on October 13 it was evident that many of the spawning fish were still holding over recently constructed redds. By October 20, many of the spawning Chum at this site were in poor condition and the area was inundated with carcasses both in the water and along the shoreline.

The high water stage of the Yukon River allowed boat access into many of the spawning locations. A vantage point from the bow of the boat provided excellent visibility into the water and accurate visual enumeration of spawning fish. This method proved successful and was less intrusive than seine nets that were used extensively during previous years. The only noted disadvantage was that observed tags on live fish could not be recovered.

In 2005, the high escapement of fish provided the field crew with the opportunity to gather morphometric data using carcasses that were found along the shoreline as many were whole and entirely intact. It was noticed that with the abundance of carcasses that avian scavengers were simply “high-grading” select parts of the fish such as the eyes. With the exception of very few fish, all the carcasses were spent. Live fish that were well advanced in post-spawning condition were more prevalent in the deeper waters of the sloughs where they typically concentrate after spawning based on observations from previous years. None-the-less, many spent fish were still loosely holding over spawning redd locations at the time of the survey. Water temperatures were generally warmer in 2005 by a few degrees and averaged 5°C over the spawning dunes when the project commenced.

Chum Salmon Spawning Sites

The section of the Yukon River between Minto and Fort Selkirk has long been known as an important Chum spawning area. 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 subsistence fishery for Chum salmon continues around the Minto Landing area (Klugie, pers. com., 2004) and along the Pelly River near the community of Pelly Crossing. Local interest in harvesting Chum salmon was renewed in 2005 with the strong returns. Reports of good catches with little effort were common in the Minto area. The high abundance also enticed fishers back to their traditional fish camps along the Pelly River with good success (Huberschawlin, pers. com., 2005).

The combination of high water flows in the Yukon River and strong Chum returns in 2005 revealed some distinct changes of spawning habitat utilization in comparison to previous survey years. High utilization of habitat for the construction of redds continued at sites W50-1, W52, W54 and W58. Combined, these sites represented approximately 85 % of the 2005 Canadian tags recovered during the project. Conversely, sites W53 and W67 had far fewer redds and carcasses than one would expect with the abundance of fish in the system. The poor utilization of these sites can likely be attributed to greater substrate depths and higher water velocities that did not favour selection. Perhaps the

most notable change in habitat utilization was at site W58-1. Generally, the upper reaches of this slough receive marginal use based on observations from previous survey years. This was not the case in 2005 where high numbers of spawning fish, rather than crowding the spawning area at site W58, responded by spreading out in pockets throughout the entire slough and associated lengthy side channels. The higher flows in combined with warmer seasonal temperatures resulted in little ice cover throughout the area.

During the survey water levels and associated discharge appeared to be much higher than in previous years based on the observations of boat moorage sites and the accessibility to spawning sites. Flow data from the Yukon River at a station just downstream of the Minto Index area showed higher discharge for the period considered to be the peak for Chum spawning, the latter part of September and through to the middle of October (Figure 2). It is believed the higher sustained flows at sites W53 and W67 resulted in less spawning habitat utilization at these sites. Conversely, the higher water stage appeared to promote more extensive habitat utilization at other sites, this was especially evident at W58. Water level and discharge continued to decline on the Yukon River towards the end of October but stayed elevated above those recorded in 2003 and 2004.

Chum Salmon Tag and Sex Ratios

Snow cover can influence shoreline tag recoveries and enumeration estimates. A ground cover of snow in any particular year can significantly skew ratios of marked to unmarked fish. As in other years, attempts were made in 2005 to complete the project before ground accumulations began, with field work beginning earlier than in previous years. This strategy was successful as snow cover was not an issue in 2005.

Overall, a total of 26 Canadian tags from 2005 were recorded throughout the project with 20 recovered during foot surveys and 6 observed on live fish. Tags on live fish were few relative to the large numbers of spawning Chum that were enumerated during the project (Table 1). This is reflected in the high tag ratio of 265.8 live fish per tag. Tag recoveries were more numerous along the shoreline similarly to previous surveys with a resulting lower tag to untagged ratio of 98.9 carcasses per tag. All data combined resulted in a tag ratio of 137.4 fish per tag for the Minto index area.

Due to differences in tagging intensity between years, tag ratios for the Minto index area from 2002 to 2005 were weighted to reflect numbers of tagged fish relative to the abundance of fish in the system based on population estimates from the mark recapture program. The results are presented in Table 2.

The high weighted tag ratio determined for 2005 appears to be directly the result of higher border escapement for Chum salmon in 2005. When compared with ratios from other survey years a relationship with border escapement becomes apparent (Figure 3). A regression of tag ratios from 2002 to 2005 derived from the Minto index area shows a robust correlation with Canadian border escapement estimates (escapement estimate = 4,103.2 tag ratio + 9,658.8; $R^2 = 0.9584$), although a closer examination of the data suggests a precise escapement estimate is not easily attained.

Table 2 Summary of Canadian tags applied to Chum salmon, border escapement estimates and tag ratios for the Minto Index area, 2002 to 2005.

Year	Canadian tagged Chum salmon	Canada-US border escapement estimate	Percent of population tagged	Observed tag ratio - Minto index area (fish per tag)	Weighted tag ratio- Minto index area (fish per tag)
2002	5,206	91,800	5.7	24.2	50.1
2003	5,394	140,000	3.9	31.1	43.8
2004	4,146	134,260*	3.1	33.3	37.6
2005	7,193	381,500	1.9	137.4	94.6

* preliminary estimate

None of the 191 Chum salmon that was visually inspected was suspected of losing its tag. The fish had symmetric lacerations on either side of the dorsal fin combined with a hole-punched adipose fin would have indicated that it had been previously tagged. While the project failed to capture any live tagged fish, the collection of unattached tags or tagged carcasses was very successful in 2005. The proportion of unattached tags collected along the shoreline was much greater than those found in the sloughs. With the exception of one tag found on shore, all unattached tags were “broken” with the appearance of having been forcibly removed. No caudal or adipose fin punches were observed on any of the visually inspected fish. The weather was seasonally warm and above average in temperature during the survey period. Enumeration conditions

could be characterized as excellent in 2005 due to the lack of snow and ice in the sloughs and side channels that would otherwise result in poor visibility. The high water stage allowing access with a small boat to spawning locations greatly contributed to the success of the project.

REFERENCES

Selkirk First Nation. 2001. *2001 Chum Spawning Ground Recoveries-Minto Area*. Prepared for the Yukon River Panel under the Yukon Restoration and Enhancement Fund. 19 p.

_____. 2002. *2002 Chum Salmon Tag Recovery Project, Yukon River (Minto to Fort Selkirk)*. Prepared for the Yukon River Panel under the Yukon Restoration and Enhancement Fund.

_____. 2003. *2003 Chum Salmon Tag Recovery Project, Yukon River (Minto to Fort Selkirk)*. Prepared for the Yukon River Panel under the Yukon Restoration and Enhancement Fund.

_____. 2004. *2004 Chum Salmon Tag Recovery Project, Yukon River (Minto to Fort Selkirk)*. Prepared for the Yukon River Panel under the Yukon Restoration and Enhancement Fund.

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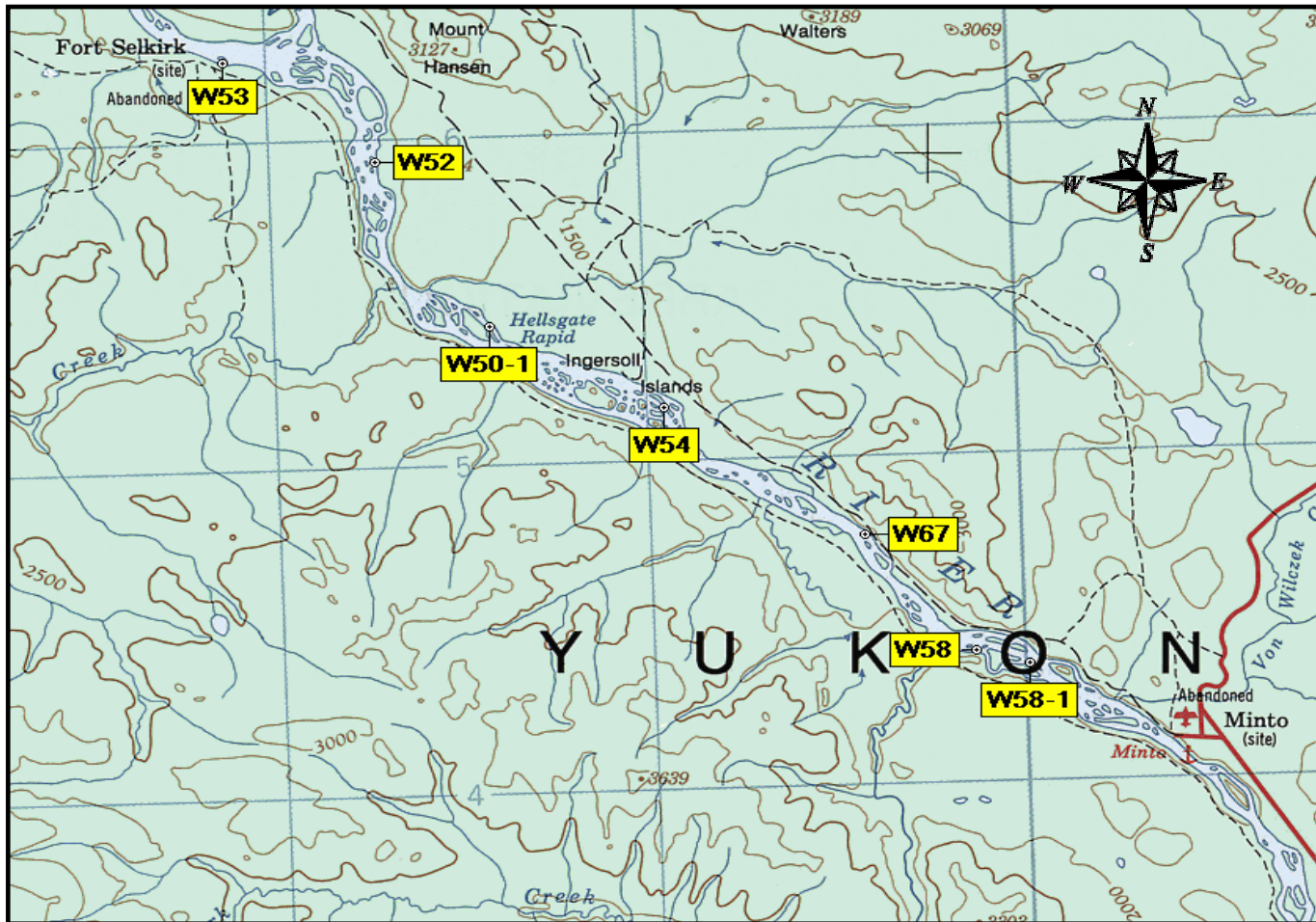
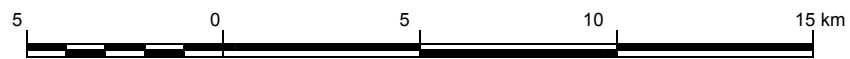
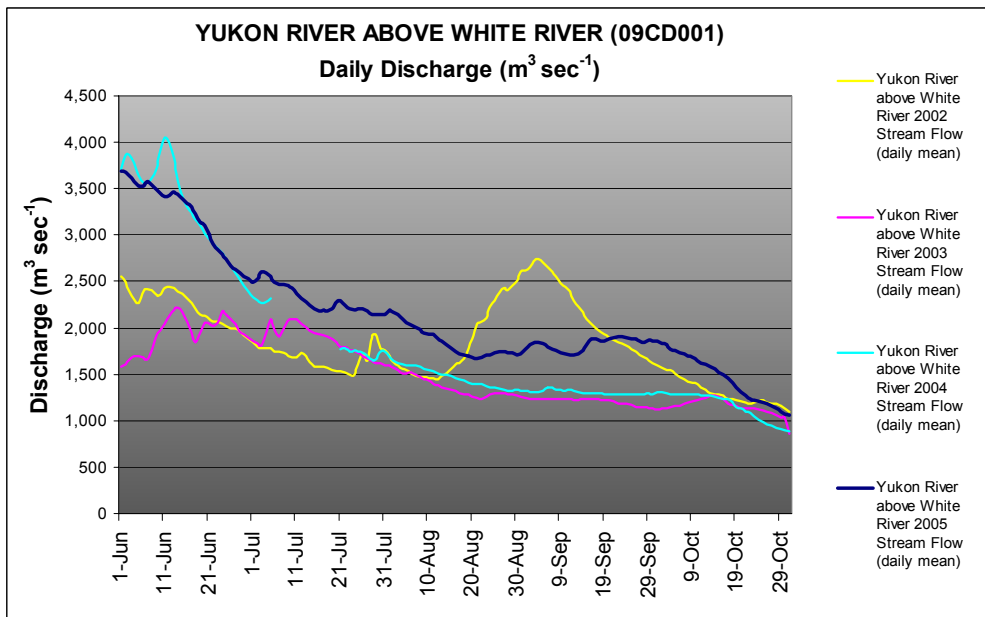


FIGURE 1: YUKON RIVER (MINTO INDEX AREA) CHUM SALMON TAG RECOVERY INSPECTION SITES



SCALE 1 : 250,000



Source: Water Survey of Canada

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Figure 2 Comparison of water discharge for Yukon River at a station (09CD001) above the confluence with the White River just downstream of the Minto Index area, 2002 - 2005.

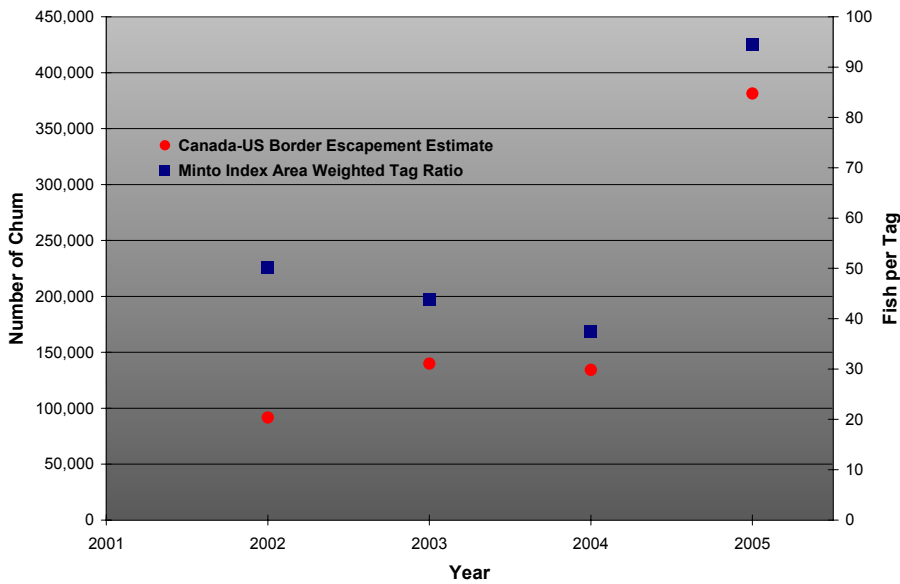


Figure 3 Comparison of Alaska-Yukon border escapement estimates and determined tag ratios for the Minto index tag recovery project 2002 to 2005.

APPENDIX I

SURVEY WAYPOINTS 2005

APPENDIX I SURVEY WAYPOINTS 2005

Waypoints	Updated Map Reference*	Description
Fort Selkirk	N 62° 46' 34.5" W 137° 23' 17.8"	Downstream survey limit.
Minto Landing	N 62° 52' 31.0" W 136° 35' 30.0"	Upstream survey limit.
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 - Chum Spawning Area
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 - Chum Spawning Area
W58.1	N 62° 36' 38.6" W 136° 56' 51.0"	Big Creek Slough - upstream inlet – Chum Spawning Area
W59	N 62° 36' 24.9" W 136° 55' 34.9"	Side channel just downstream of Minto landing
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: hddd° mm' ss.s" (NAD 27 Alaska)**

APPENDIX II

**2005 CHUM SALMON TAG
RECOVERY DATA**

APPENDIX II 2005 CHUM SALMON TAG RECOVERY DATA

Sample	Site	Date	Tag Color	Tag Origin	Tag Number	Location
1	W50-1	14-Oct-05	Orange	Canada	B03319	found in slough
2	W50-1	14-Oct-05	Orange	Canada	B02100	found on carcass on shore
3	W50-1	14-Oct-05	Orange	Canada	A01993	found on shore
4	W50-1	15-Oct-05	Orange	Canada	A04769	found on shore
5	W52	19-Oct-05	Orange	Canada	B03938	found in slough
6	W52	19-Oct-05	Orange	Canada	B04743	found in slough
7	W52	19-Oct-05	Orange	Canada	M00378	found on shore
8	W52	19-Oct-05	Green	US	43330	found on carcass in water
9	W52	19-Oct-05	Pink	US	67087	found on shore
10	W53	18-Oct-05	Orange	Canada	B03402	found in slough
11	W54	14-Oct-05	Orange	Canada	B03569	found on carcass on shore
12	W58	20-Oct-05	Orange	Canada	A02850	found on carcass in water
13	W58	20-Oct-05	Orange	Canada	B03681	found on carcass in water
14	W58	13-Oct-05	Orange	Canada	B03118	found on carcass on shore
15	W58	13-Oct-05	Orange	Canada	B02388	found on carcass on shore
16	W58	13-Oct-05	Orange	Canada	B03495	found on carcass on shore
17	W58	13-Oct-05	Orange	Canada	C08819	found on shore
18	W58	13-Oct-05	Orange	Canada	X00890	found on shore
19	W58	13-Oct-05	Orange	Canada	B02363	found on shore
20	W58	13-Oct-05	Orange	Canada	A03909	found on shore

Sample	Site	Date	Tag Color	Tag Origin	Tag Number	Location
21	W58	13-Oct-05	Orange	Canada	A04919	found on shore
22	W58-1	13-Oct-05	Orange	Canada	B03689	found on carcass on shore
23	W58-1	13-Oct-05	Orange	Canada	B03503	found on shore
24	W67	13-Oct-05	Orange	Canada	A04468	found on shore

APPENDIX III

**2005 CHUM SALMON
BIOLOGICAL DATA**

APPENDIX III 2005 CHUM SALMON BIOLOGICAL DATA

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
1	W50-1	14-Oct-05	F	no tag or markings	SC	485	540
2	W50-1	14-Oct-05	F	no tag or markings	SC	490	550
3	W50-1	14-Oct-05	F	no tag or markings	SC	490	555
4	W50-1	14-Oct-05	F	no tag or markings	SC	495	550
5	W50-1	14-Oct-05	F	no tag or markings	SC	510	560
6	W50-1	14-Oct-05	F	Orange DFO Tag # B02100	SC	520	570
7	W50-1	14-Oct-05	F	no tag or markings	SC	525	600
8	W50-1	14-Oct-05	F	no tag or markings	SC	565	625
9	W50-1	14-Oct-05	M	no tag or markings	SC	510	580
10	W50-1	14-Oct-05	M	no tag or markings	SC	520	575
11	W50-1	14-Oct-05	M	no tag or markings	SC	530	600
12	W50-1	14-Oct-05	M	no tag or markings	SC	535	610
13	W50-1	14-Oct-05	M	no tag or markings	SC	535	615
14	W50-1	14-Oct-05	M	no tag or markings	SC	540	620
15	W50-1	14-Oct-05	M	no tag or markings	SC	540	615
16	W50-1	14-Oct-05	M	no tag or markings	SC	550	625
17	W50-1	14-Oct-05	M	no tag or markings	SC	555	635
18	W50-1	14-Oct-05	M	no tag or markings	SC	560	630
19	W50-1	14-Oct-05	M	no tag or markings	SC	560	635
20	W50-1	14-Oct-05	M	no tag or markings	SC	560	640
21	W50-1	14-Oct-05	M	no tag or markings	SC	565	640
22	W52	19-Oct-05	F	no tag or markings	SC	430	475
23	W52	19-Oct-05	F	no tag or markings	SC	455	520
24	W52	19-Oct-05	F	no tag or markings	SC	480	540
25	W52	19-Oct-05	F	no tag or markings	SC	480	540
26	W52	19-Oct-05	F	no tag or markings	SC	485	555
27	W52	19-Oct-05	F	no tag or markings	SC	485	535
28	W52	19-Oct-05	F	no tag or markings	SC	485	555
29	W52	19-Oct-05	F	no tag or markings	SC	485	545
30	W52	19-Oct-05	F	no tag or markings	SC	490	575

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
31	W52	19-Oct-05	F	no tag or markings	SC	495	595
32	W52	19-Oct-05	F	no tag or markings	SC	500	555
33	W52	19-Oct-05	F	no tag or markings	SC	500	560
34	W52	19-Oct-05	F	no tag or markings	SC	500	550
35	W52	19-Oct-05	F	Green USFWS Tag # 043330	SC	500	560
36	W52	19-Oct-05	F	no tag or markings	SC	500	565
37	W52	19-Oct-05	F	no tag or markings	SC	505	565
38	W52	19-Oct-05	F	no tag or markings	SC	510	470
39	W52	19-Oct-05	F	no tag or markings	SC	510	565
40	W52	19-Oct-05	F	no tag or markings	SC	520	580
41	W52	19-Oct-05	F	no tag or markings	SC	525	590
42	W52	19-Oct-05	F	no tag or markings	SC	535	610
43	W52	19-Oct-05	F	no tag or markings	SC	540	600
44	W52	19-Oct-05	F	no tag or markings	SC	545	605
45	W52	19-Oct-05	F	no tag or markings	SC	545	595
46	W52	19-Oct-05	F	no tag or markings	SC	545	610
47	W52	19-Oct-05	F	no tag or markings	SC	555	610
48	W52	19-Oct-05	F	no tag or markings	SC	560	560
49	W52	19-Oct-05	F	no tag or markings	SC	600	555
50	W52	19-Oct-05	M	no tag or markings	SC	480	555
51	W52	19-Oct-05	M	no tag or markings	SC	485	545
52	W52	19-Oct-05	M	no tag or markings	SC	485	565
53	W52	19-Oct-05	M	no tag or markings	SC	500	565
54	W52	19-Oct-05	M	no tag or markings	SC	500	570
55	W52	19-Oct-05	M	no tag or markings	SC	505	570
56	W52	19-Oct-05	M	no tag or markings	SC	505	575
57	W52	19-Oct-05	M	no tag or markings	SC	510	590
58	W52	19-Oct-05	M	no tag or markings	SC	515	580
59	W52	19-Oct-05	M	no tag or markings	SC	520	600
60	W52	19-Oct-05	M	no tag or markings	SC	525	590
61	W52	19-Oct-05	M	no tag or markings	SC	525	590

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
62	W52	19-Oct-05	M	no tag or markings	SC	525	595
63	W52	19-Oct-05	M	no tag or markings	SC	530	590
64	W52	19-Oct-05	M	no tag or markings	SC	530	595
65	W52	19-Oct-05	M	no tag or markings	SC	530	610
66	W52	19-Oct-05	M	no tag or markings	SC	535	610
67	W52	19-Oct-05	M	no tag or markings	SC	535	610
68	W52	19-Oct-05	M	no tag or markings	SC	540	610
69	W52	19-Oct-05	M	no tag or markings	SC	545	605
70	W52	19-Oct-05	M	no tag or markings	SC	550	630
71	W52	19-Oct-05	M	no tag or markings	SC	555	630
72	W52	19-Oct-05	M	no tag or markings	SC	555	620
73	W52	19-Oct-05	M	no tag or markings	SC	555	610
74	W52	19-Oct-05	M	no tag or markings	SC	560	635
75	W52	19-Oct-05	M	no tag or markings	SC	565	640
76	W52	19-Oct-05	M	no tag or markings	SC	570	635
77	W52	19-Oct-05	M	no tag or markings	SC	575	640
78	W52	19-Oct-05	M	no tag or markings	SC	580	640
79	W52	19-Oct-05	M	no tag or markings	SC	580	660
80	W53	18-Oct-05	F	no tag or markings	SC	435	500
81	W53	18-Oct-05	F	no tag or markings	SC	460	515
82	W53	18-Oct-05	F	no tag or markings	SC	480	545
83	W53	18-Oct-05	F	no tag or markings	SC	490	545
84	W53	18-Oct-05	F	no tag or markings	SC	505	565
85	W53	18-Oct-05	F	no tag or markings	SC	515	565
86	W53	18-Oct-05	F	no tag or markings	SC	520	565
87	W53	18-Oct-05	F	no tag or markings	SC	520	590
88	W53	18-Oct-05	F	no tag or markings	SC	530	585
89	W53	18-Oct-05	F	no tag or markings	SC	530	595
90	W53	18-Oct-05	F	no tag or markings	SC	535	590
91	W53	18-Oct-05	F	no tag or markings	SC	535	580
92	W53	18-Oct-05	F	no tag or markings	SC	540	600

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
93	W53	18-Oct-05	F	no tag or markings	SC	545	610
94	W53	18-Oct-05	F	no tag or markings	SC	550	620
95	W53	18-Oct-05	F	no tag or markings	SC	570	630
96	W53	18-Oct-05	M	no tag or markings	SC	525	590
97	W53	18-Oct-05	M	no tag or markings	SC	525	595
98	W53	18-Oct-05	M	no tag or markings	SC	530	605
99	W53	18-Oct-05	M	no tag or markings	SC	545	615
100	W53	18-Oct-05	M	no tag or markings	SC	550	640
101	W53	18-Oct-05	M	no tag or markings	SC	550	640
102	W53	18-Oct-05	M	no tag or markings	SC	550	620
103	W53	18-Oct-05	M	no tag or markings	SC	550	625
104	W53	18-Oct-05	M	no tag or markings	SC	555	625
105	W53	18-Oct-05	M	no tag or markings	SC	555	620
106	W53	18-Oct-05	M	no tag or markings	SC	560	630
107	W53	18-Oct-05	M	no tag or markings	SC	570	640
108	W53	18-Oct-05	M	no tag or markings	SC	575	635
109	W53	18-Oct-05	M	no tag or markings	SC	585	660
110	W53	18-Oct-05	M	no tag or markings	SC	620	700
111	W54	14-Oct-05	F	no tag or markings	SC	500	560
112	W54	14-Oct-05	F	no tag or markings	SC	505	555
113	W54	14-Oct-05	F	no tag or markings	SC	515	570
114	W54	14-Oct-05	F	no tag or markings	SC	515	575
115	W54	14-Oct-05	F	no tag or markings	SC	520	575
116	W54	14-Oct-05	F	no tag or markings	SC	525	590
117	W54	14-Oct-05	F	no tag or markings	SC	530	580
118	W54	14-Oct-05	F	no tag or markings	SC	530	595
119	W54	14-Oct-05	F	Orange DFO Tag # B03569	SC	535	605
120	W54	14-Oct-05	F	no tag or markings	SC	535	600
121	W54	14-Oct-05	F	no tag or markings	SC	540	600
122	W54	14-Oct-05	F	no tag or markings	SC	560	515
123	W54	14-Oct-05	F	no tag or markings	SC	560	625

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
124	W54	14-Oct-05	F	no tag or markings	SC	565	625
125	W54	14-Oct-05	M	no tag or markings	SC	540	625
126	W54	14-Oct-05	M	no tag or markings	SC	555	625
127	W54	14-Oct-05	M	no tag or markings	SC	565	640
128	W58	13-Oct-05	F	no tag or markings	SC	465	520
129	W58	13-Oct-05	F	no tag or markings	SC	490	550
130	W58	13-Oct-05	F	no tag or markings	SC	490	550
131	W58	13-Oct-05	F	no tag or markings	SC	495	560
132	W58	13-Oct-05	F	no tag or markings	SC	500	540
133	W58	13-Oct-05	F	no tag or markings	SC	520	590
134	W58	13-Oct-05	F	no tag or markings	SC	525	590
135	W58	13-Oct-05	F	no tag or markings	SC	530	595
136	W58	20-Oct-05	F	Orange DFO Tag # B03681	SC	530	590
137	W58	13-Oct-05	F	no tag or markings	SC	535	595
138	W58	13-Oct-05	F	no tag or markings	SC	540	590
139	W58	13-Oct-05	F	Orange DFO Tag # B03118	SC	540	610
140	W58	20-Oct-05	F	Orange DFO Tag # A02850	SC	555	610
141	W58	13-Oct-05	M	no tag or markings	SC	490	565
142	W58	13-Oct-05	M	no tag or markings	SC	490	550
143	W58	13-Oct-05	M	no tag or markings	SC	500	570
144	W58	13-Oct-05	M	no tag or markings	SC	510	570
145	W58	13-Oct-05	M	Orange DFO Tag # B03495	SC	510	590
146	W58	13-Oct-05	M	no tag or markings	SC	520	590
147	W58	13-Oct-05	M	no tag or markings	SC	520	595
148	W58	13-Oct-05	M	no tag or markings	SC	520	590
149	W58	13-Oct-05	M	no tag or markings	SC	530	600
150	W58	13-Oct-05	M	no tag or markings	SC	535	610
151	W58	13-Oct-05	M	no tag or markings	SC	540	615
152	W58	13-Oct-05	M	no tag or markings	SC	550	615
153	W58	13-Oct-05	M	no tag or markings	SC	550	630
154	W58	13-Oct-05	M	no tag or markings	SC	565	640

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
155	W58	13-Oct-05	M	no tag or markings	SC	575	650
156	W58	13-Oct-05	M	no tag or markings	SC	585	660
157	W58-1	13-Oct-05	F	no tag or markings	SC	470	520
158	W58-1	13-Oct-05	F	no tag or markings	SC	480	545
159	W58-1	13-Oct-05	F	no tag or markings	SC	485	540
160	W58-1	13-Oct-05	F	no tag or markings	SC	505	560
161	W58-1	13-Oct-05	F	no tag or markings	SC	520	580
162	W58-1	13-Oct-05	F	no tag or markings	SC	520	580
163	W58-1	13-Oct-05	F	no tag or markings	SC	520	580
164	W58-1	13-Oct-05	F	Orange DFO Tag # B03689	SC	520	570
165	W58-1	13-Oct-05	F	no tag or markings	SC	525	590
166	W58-1	13-Oct-05	F	no tag or markings	SC	535	590
167	W58-1	13-Oct-05	F	no tag or markings	SC	535	595
168	W58-1	13-Oct-05	F	no tag or markings	SC	545	605
169	W58-1	13-Oct-05	F	no tag or markings	SC	545	605
170	W58-1	13-Oct-05	F	no tag or markings	SC	550	620
171	W58-1	13-Oct-05	F	no tag or markings	SC	560	620
172	W58-1	13-Oct-05	M	no tag or markings	SC	500	570
173	W58-1	13-Oct-05	M	no tag or markings	SC	510	585
174	W58-1	13-Oct-05	M	no tag or markings	SC	520	590
175	W58-1	13-Oct-05	M	no tag or markings	SC	525	590
176	W58-1	13-Oct-05	M	no tag or markings	SC	525	595
177	W58-1	13-Oct-05	M	no tag or markings	SC	525	590
178	W58-1	13-Oct-05	M	no tag or markings	SC	530	600
179	W58-1	13-Oct-05	M	no tag or markings	SC	530	595
180	W58-1	13-Oct-05	M	no tag or markings	SC	530	600
181	W58-1	13-Oct-05	M	no tag or markings	SC	545	600
182	W58-1	13-Oct-05	M	no tag or markings	SC	545	625
183	W58-1	13-Oct-05	M	no tag or markings	SC	545	620
184	W58-1	13-Oct-05	M	no tag or markings	SC	550	620
185	W58-1	13-Oct-05	M	no tag or markings	SC	555	625

Sample	Site	Date	Sex	Tag Number or Fin Markings	Condition*	POHL (mm)	MEF (mm)
186	W58-1	13-Oct-05	M	no tag or markings	SC	555	640
187	W58-1	13-Oct-05	M	no tag or markings	SC	565	640
188	W58-1	13-Oct-05	M	no tag or markings	SC	565	625
189	W58-1	13-Oct-05	M	no tag or markings	SC	585	655
190	W58-1	13-Oct-05	M	no tag or markings	SC	595	665
191	W67	13-Oct-05	M	no tag or markings	SC	600	675

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