



Coded Wire Tagging of Chinook Salmon at the Whitehorse Rapids Hatchery in 2011

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Abstract

Chinook salmon fry reared at the Whitehorse Rapids Hatchery were adipose fin- clipped and injected with “Agency-only” coded wire tags in the early summer of 2011. This was the fifth year the facility used an “Agency-only” coded wire tag. Tricaine methane sulphonate (MS222) was used to anaesthetize the fry prior to clipping and tagging. The 2011 release of a total of 134,922 fry in four areas upstream of the Whitehorse Rapids dam included:

- 11,550 into Wolf Creek on May 29,
- 23,921 into the main stem Yukon River on June 1;
- 66,640 into Michie Creek on June 6, and
- 32,811 into the McIntock River on June 1.

Three fry released with “Agency-only” coded wire tags in 2007 were recovered in mid-September in the Bering Strait during a surface trawl operation aboard a National Oceanic and Atmospheric Administration research vessel. These recoveries represent the most northerly recoveries of coded wire tagged Chinook salmon released in Whitehorse, Yukon.

The Whitehorse Rapids Fishway program, another program undertaken by the Yukon Fish and Game Association, has a number of components that relate to the Whitehorse Rapids Hatchery coded wire tagging program. In 2011, 739 of the 1,532 returning adult Chinook salmon counted at the fishway were of hatchery origin. The hatchery component included 534 males and 205 females and represented 48% of the Whitehorse Rapids Fishway count. This is one per cent less than last year.

This year 21,790 visitors came to the Whitehorse Rapids Fishway! Last year there were 21,736 visitors. This is an increase of roughly 7,000 over 2009 but just below the numbers for 2006 of 28,854.

There are many visitors that speak different languages. The most common language spoken was German with 889 visitors. The German translation of the brochure Whitehorse Rapids Fish Ladder and Hatchery was extremely helpful but of even more interest was the fluency of one of the attendants that accommodated these visitors. The staff made an incredible contribution with their many talents to the success of the program in 2011.

Visitors were provided opportunities to view the returning salmon and learn about the Upper Yukon Chinook salmon resource and the coded wire tag program. Local students employed at the Whitehorse Rapids Fishway provided information and answered the visitors’ questions. The Whitehorse Rapids Fishway staff also assisted hatchery staff in the collection of biological data and the recovery of coded wire tags from the hatchery fish which were used for broodstock.

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Introduction

Coded-wire tags (CWT's) are small, metal, coded tags that are injected into the nose cartilage of juvenile salmon. The first tags, developed in the 1960's, were replaced by binary-coded tags in 1971. The improved readability and an increase in the number of available codes provided additional data to tagging programs. In addition, juvenile fish tagged with CWT's are given a secondary, external mark, typically the removal of the adipose fin, to allow visual identification (Johnson 1990).

Coded wire tags are widely used in North America. Studies involving them generally fall into one of the three following categories: experimental, stock assessment and stock contribution. Experimental studies are designed to compare the survival of two or more groups of fish, or their contribution to a specific fishery or fisheries. Stock assessment studies are designed to measure contributions to fisheries, survival rates, and distribution of a given stock. Stock contribution studies focus on exploitation of the stock in a fishery or fisheries and require more tagged fish to generate meaningful results (Johnson 1990).

Groups of Upper Yukon River Chinook salmon have been tagged with coded wire tags annually in the Yukon Territory since 1985¹, principally by Fisheries and Oceans Canada. In excess of 80% of all the fish tagged have originated from the Whitehorse Rapids Fish Hatchery (WRFH). The hatchery was constructed in 1984 in concert with the construction of a fourth turbine at the Whitehorse hydroelectric facility in order to offset a perceived impact that the hydro generating facility was having on Chinook salmon.

In recent years very capable staff has returned the facility to the most visited site in the Whitehorse area with 21,790 visiting the location in 2011. This is 7,000 more than the number of visitors in 2009, although not as many as the **record of 28,854** visitors in 2006. Further effort will continue in coming years to enhance the viewing options of visitors.

A decision was made in early 2007 to change the tags applied from binary coded, coded wire tags to "Agency-only" type tags and to discontinue the carcass recovery portion of the Whitehorse Rapids Fish Hatchery Coded Wire Tagging project. Although "Agency Only" tags do not allow researchers to distinguish the individual release groups of tagged salmon, the decision to use them was made in consideration of their much cheaper price (less than half) relative to the binary coded tags.

The long-term objectives of the WRFH Chinook salmon CWT program are to:

- (1) Permit the identification of returning hatchery fish in order to assist the WRFH broodstock collection;
- (2) Provide information on the return of hatchery-reared fish as they move upstream through the WRF; and
- (3) To provide data upon which to base assessments of the success/failure of the WRFH in producing Chinook salmon.

¹ An exception occurred in 1999 when all fry released from the Whitehorse Rapids Hatchery were marked with the removal of their adipose fin, but coded wire tags were not applied.

The specific goals of the 2011 WRFH Chinook salmon CWT program were to:

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| <ul style="list-style-type: none"> • To apply decimal coded wire tags to all Chinook salmon fry reared at the Whitehorse Rapids Hatchery in YR 2010-2011. |
| <ul style="list-style-type: none"> • To contract out clipping and tagging (CWT) of the Chinook salmon fry (out of Territory supervisor with significant expertise in tagging operations) |
| <ul style="list-style-type: none"> • Create public venues 1) to highlight the salmon release and promote the involvement of all young people at Wolf Creek and 2) for the staff participation and public viewing at the Whitehorse Rapids Fishway in the collection of ASL and origin data |

Materials and Methods

Coded Wire Tag Application

Phyllis Nelson of 'Eh! Fish', a professional contractor from Vancouver who works throughout the Pacific Region and who has conducted the tagging in Yukon for over 20 years, was contracted to conduct the tagging and fin clipping. Ms. Nelson, one additional tagger and four adipose fin clippers were employed. Most were students, including some who went on to work at the fish ladder after tagging ended. Operations commenced on May 24, 2011 and were completed on June 8.

Agency Only tags were used after consultation with DFO Pacific Regional staff in Vancouver BC to determine project requirements. The "Agency only" tag code identifies the fry as being tagged by DFO.

Fry were sorted according to size and condition prior to tag application. Small or deformed fry were not tagged but were externally marked with an adipose clip. Feeding was suspended for at least 24 hours prior to tagging and resumed afterwards. Feeding was suspended again for a period of 24 to 48 hours prior to release.

Batches of approximately 50 fry were held in a nine-litre capacity plastic tub containing anaesthetic, for a minimum of two minutes prior to fin clipping. The anaesthetic used was tricaine methane sulphonate (MS222). Anaesthetic baths were changed frequently to prevent thermal shock of the fry, and to refresh the anaesthetic. Anaesthetic was prepared by mixing 30 grams of MS222 into 500 ml's of water to prepare a stock solution, and then mixing 25 ml's of the stock solution into 20 liters of water to prepare anaesthetic baths. Water was at 6 degrees Celsius. Fish were left in the basins just until they become docile enough to handle, and were monitored throughout to avoid the risk of over-dosing. The number of fish

anesthetized at one time varied, and depended on the size of the fish, and the speed and agility of the clippers and tagger.

Anaesthetized fry were dip netted onto the clipping section of the tagging table, where clippers used surgical scissors to remove the adipose fin. Once the fry were fin clipped, they were passed to the “clipped” section of the table, where they were accessible to a tagger for “Agency-only” tag application. After tagging, each fry was immediately passed through a quality control device (QCD) to check for successful tag implantation. The QCD automatically detected, separated, and enumerated tagged and untagged specimens. Fry exited the QCD into recovery buckets of water which were supplied with a trickle flow to replenish oxygen. Recovery time of fish after the tagging procedure averaged about 2 minutes.

Untagged fry identified and separated by the QCD were checked a second time for tag implantation. All untagged fry were then retagged with a CWT. Once tagging was complete, the recovered fry were returned to the rearing tanks where they were held for five days, and sample lots were passed through a QCD to determine CWT retention. All these activities are under the professional guidance of Phylis Nelson throughout the entirety of the project. (Cover photo shows the tagging set-up.)

Results and Discussion

Coded Wire Tagging

Table 1. Summary of tagging and release dates for fry released from the Whitehorse Rapids Fish Hatchery in 2011.

<u>Location</u>	<u>Date</u>	<u>Number released</u>
Wolf Creek	May 29	11,550
Michie Creek	June 6	66,640
M’Clintock	June 1	32,811
Main stem Yukon River	June 1	23,921
	Total	134,922

The total number of fry tagged and released in 2011 was 134,922. Appendix 1 provides the Whitehorse Rapids Hatchery 2010-2011 Chinook Data Summary. Appendix 2 provides the Whitehorse Rapids Hatchery Chinook Tagging 1985-2011 Summary, to place this year’s release in a historic context. Fry weight at time of release ranged from 2.65 grams to 2.94 grams with an average weight of 2.80 grams.

The broodstock collection guidelines established for the WRFH prior to YR 2000 required that the use of hatchery-origin fish be minimized. This approach was reviewed by DFO prior to the YR 2000 broodstock program.

A literature review by Whitehorse DFO staff found that hatchery broodstock requires only a 10% infusion of a wild component every second generation to maintain genetic diversity (Bonnell, 1999). The requirement to minimize the number of hatchery fish used for broodstock has since been relaxed after consultation with DFO staff

It is interesting to note that tag recoveries through marine studies have provided information about the behaviour and location of tagged Yukon River Chinook in the Bering Sea. A recent interesting aspect of these tag recoveries is that they identify a northward migrating component in Yukon salmon within the Bering Strait (Celewycz et al. 2010)

Recommendations

- 1) We believe we should return to the use of coded tags that enable the different release groups to be distinguished is a worthwhile expense, considering that the tag costs are not the major cost of the tagging project. Tag costs proportion is much smaller still if the whole incubation, rearing, tagging and releasing of these groups of fish is considered.
- 2) A greater focus on recovery of coded wire tags in the salmon fisheries would likely make this project more valuable.

Literature Cited

Bonnell, Greg. 1999. Genetic Practices For Hatcheries. Fisheries & Oceans Canada, Pacific Region, Habitat Enhancement Branch. Supplementation Workshop, July, 1999.

Celewycz, A.G., L.M. Thompson, J. Cusick, M. Fukuwaka, and J.M. Murphy. 2010 High Seas Salmonid Coded-Wire Tag Recovery Data, 2010. NPAFC Doc.1279. 26pp. (Available at <http://www.npafc.org>).

Johnson, Kenneth J. 1990. Regional Overview of Coded Wire Tagging of Anadromous Salmon and Steelhead in Northwest America. American Fisheries Symposium 7:782-816.

DFO. 2012. Whitehorse Rapids Hatchery Chinook Tagging 1985-2011 Summary

Appendix 1: Whitehorse Rapids 2010-2011 Chinook Data Summary

Chinook Salmon Egg Take / Fry / Release Information 2010-2011 & 2011-2012`

CHINOOK EGG TAKES AND PRODUCTION 2010-2011

CHINOOK EGG TAKE (BY 2010)

The following are the results of the Chinook egg take results from the green egg stage to release stage from the brood year 2010.

Estimated Number of Green Eggs Taken: 140,000
 Estimated Fertilization Rate: 97%
 Pre-eyed Pick Dates (150 ATU'S) = September 25 to October 5
 Number of Dead Eggs Removed = 6,235
 Percent Development = 84%
 Estimated Dates of Shocking (300 ATU'S) = October 13 to October 30, 2010
 Shocking Mortalities= 12,374
 Estimated number of Eyed Eggs= 158,022
 Adjusted Estimated Number of Green Eggs Taken= 176,631
 Adjusted Number of Green Eggs Taken Post Fox Creek Donation= 166,531
 Estimated Survival Green to Eyed Egg= 89%
 Average Fecundity Per Female = 5,352
 Fecundity Range =Max: 7,433 Min: 3,794 Green Eggs Per Female
 Number of Eyed Eggs Donated To the Fox Creek Project= 10,100
 Date of Eyed Egg Transfer to McIntyre Creek Facility= November 2, 2010
 Number of Eyed Eggs After Fox Creek Donation = 147,922
 Number Of Mortalities Eyed to Hatch = 11,662
 Hatching Dates= Start November 20 (492 ATUs) End December 5 (541 ATU's)
 Estimated Number of Alevins = 136,260
 Estimated Adjusted Survival Green Egg To Hatch Stage = 82%
 Estimated Survival Eyed To Hatch =92%
 Number of Mortalities Hatch To Ponding February 5, 2011= 980
 Estimated Adjusted Survival Green Egg To Ponding Stage = 81%
 Ponding Dates= February 5 to February 20 @ 988 ATU's
 Estimated Number Of Fry Ponded= 135,280
 Total Mortalities Ponding to May 31, 2011 = 3,763
 Estimated Number Of Fry On Hand May 31, 2011 = 131,517
 Percent Survival Green Egg (166,531) To May 31, 2011 (131,517) = 79%
 Actual Count During Coded Wire Tagging = 135,160
 Discrepancy Gain = 3,643 (includes small-deformed un-taggable fry)

Percent Gain = 2.70% Gain

Date Of Coded Wire Tagging = May 24, 2011 to June 2, 2011

Total Number Coded Wire Tagged And Or Adipose Clipped= 135,160

Release Information:

Wolf Creek:

10,000 - 0 Mortalities X 100% Tag Retention

10,000 Fry Released @ 2.95 Grams May 29, 2011

Small /Deformed Fry Found During Tagging = 1,577 - 27 Mortalities

1,550 Fry Adipose Clipped Only No Coded Wire Tag -

Released June 10, 2011 @ 2.76 Grams

Total Released Wolf Creek = 11,550 Fry (10,000 Coded Wire Tagged- 1,550 Adipose Fin Clipped Only).

Fry were Released By Truck And Live Transport Tank

Michie Creek:

66,752 - 112 Mortalities X 98.5% Tag Retention

65,640 Coded Wire Tagged And Adipose Fin Clipped, 1,000 Adipose Clipped No Coded Wire Tag

Released June 6, 2011 @ 2.94 Grams (3 Helicopter Loads)

Total Released Michie Creek = 66,640 (65,640 Coded Wire Tagged Retained and Adipose Fin Clipped - 1,000 Adipose Fin Clipped Only Tag Not Retained)

McClintock River:

32,889 - 78 Mortalities X 100% Tag Retention

32,811 Coded Wire Tagged And Adipose Fin Clipped, 0 Adipose Clipped No Coded Wire Tag

Released June 6, 2011 @ 2.65 (2 Helicopter Loads)

Total Released McClintock River = 32,811 (32,811 Coded Wire Tagged Retained and Adipose Fin Clipped - 0 Adipose Fin Clipped Only Tag Not Retained)

Main Stem Yukon River:

23,942 - 21 Mortalities X 100% Tag Retention

23,921 Coded Wire Tagged And Adipose Fin Clipped, 0 Adipose Clipped No Coded Wire Tag

Released June 6, 2011 @ 2.67 Grams (1 Helicopter Load)

Total Released Main Stem Yukon River = 23,921 (23,921 Coded Wire Tagged Retained and Adipose Fin Clipped - 0 Adipose Fin Clipped Only Tag Not Retained)

CHINOOK EGG TAKES AND PRODUCTION 2011-2012

CHINOOK EGG TAKE (BY 2011)

The following are the results of the Chinook egg take results from the green egg stage to the end of the pre-eyed development stage from the brood year 2011.

Date Takes: August 16 to September 3, 2011

Number of Females successfully spawned: 43

Number of Males used for spawning: 88

Estimated Number of Green Eggs Taken: 190,500

Estimated Fertilization Rate: 100%

Pre-eyed Pick Dates (150 ATU'S) = September 16 to September 24, 2011

Number of Dead Eggs Removed = 1,732 Includes 10 removed for development

Percent Development = 98%

Estimated Dates of Shocking (300 ATU'S) = October 5 to October 23, 2011

At The Present Date (October 8, 2011) hatchery staff is still in the process of shocking and eyed egg inventory. Results from this procedure will be available October 26, 2011

**Appendix 2: Summary of releases for Coded-wire Tagged Chinook Salmon from Whitehorse Hatchery, 1985 - 2011.
(DFO, 2012)**

Release Location	Release Date*	Code	# Tagged & Clipped ^c	Adipose Clipped Clip Only	%Tag- % Tag Loss	Total Total Clipped	Weight (grams)	Total Total Unclipped	Total Total Released
Michie	25-May-85	02-32-48	26,670	518	0.019	27,188		0	27,188
Michie	25-May-85	02-32-26	28,269	518	0.018	28,787		0	28,787
Michie	25-May-85	02-32-47	43,325	518	0.012	43,843		0	43,843
Wolf	1985	no-clip	0	0		0		10,520	10,520
SUM 1984 brood	1985		98,264	1,555		99,819		10,520	110,339
Michie	1986	02-37-31	77,170			77,170		1,000	78,170
Wolf	1986					0		5,720	5,720
SUM 1985 brood	1986		77,170			77,170		6,720	83,890
Michie	05-Jun-87	02-48-12	47,644	1,361	0.028	49,005	2.50	9,598	58,603
Michie	05-Jun-87	02-48-13	49,344	808	0.016	50,152	2.50	9,141	59,293
Michie	05-Jun-87	02-48-14	51,888	559	0.011	52,447	2.50	9,422	61,869
Michie	05-Jun-87	02-48-15	43,367	2,066	0.045	45,433	2.50	7,868	53,301
Michie	05-Jun-87	02-42-58	25,945	245	0.009	26,190	2.50	4,171	30,361
Wolf	30-May-87	02-42-59	26,752	123	0.005	26,875	2.50	422	27,297
SUM 1986 brood	1987		244,940	5,162		250,102		40,622	290,724
Michie	10-Jun-88	02-55-49	77,670	1,991	0.025	79,661	2.80	84,903	164,564
Michie	10-Jun-88	02-555-0	78,013	1,592	0.020	79,605	2.70	85,288	164,893
Wolf	05-Jun-88	no-clip	0	0		0		25,986	25,986
SUM 1987 brood	1988		155,683	3,583		159,266		196,177	355,443
Wolf	1989	no-clip	0	0		0		22,388	22,388
Michie	06-Jun-89	02-60-04	26,161	326	0.012	26,487	2.30	0	26,487
Michie	06-Jun-89	02-60-05	24,951	128	0.005	25,079	2.30	0	25,079
Michie	06-Jun-89	02-60-06	25,098	291	0.011	25,389	2.40	0	25,389
Michie	06-Jun-89	02-60-07	25,233	156	0.006	25,389	2.20	95,724	121,113
Fishway	06-Jun-89	02-60-08	25,194	357	0.014	25,551	2.70	0	25,551
Fishway	06-Jun-89	02-60-09	25,190	351	0.014	25,541	2.70	0	25,541

Release Release Location	Release Release Date*	Code	# Tagged & agged & Clipped	Adipose Clipped Clip Only	%Tag- % Tag Loss	Total Total Clipped	Weight (grams)	Total Total Unclipped	Total Total Released
Wolf	06-Jun-90	no-clip	0	0		0		11,969	11,969
Michie	02-Jun-90	02-02-38	24,555	501	0.020	25,056	2.30	0	25,056
Michie	02-Jun-90	02-02-39	24,345	753	0.030	25,098	2.30	0	25,098
Fishway	02-Jun-90	02-02-60	24,508	501	0.020	25,009	2.20	0	25,009
Fishway	02-Jun-90	02-02-63	25,113	254	0.010	25,367	2.20	0	25,367
SUM 1989 brood	1990		98,521	2,009		100,530		11,969	112,499
Wolf	08-Jun-91	18-03-22	49,477	793	0.016	50,270	2.30	0	50,270
Fishway	06-Jun-91	18-03-23	52,948	193	0.004	53,141	2.30	0	53,141
Michie	06-Jun-91	18-03-24	50,020	176	0.004	50,196	2.30	87,348	137,544
SUM 1990 brood	1991		152,445	1,162		153,607		87,348	240,955
Wolf	04-Jun-92	18-08-29	48,239	0	0.000	48,239	2.40	0	48,239
Fishway	04-Jun-92	18-08-28	49,356	99	0.002	49,455	2.30	0	49,455
Michie	04-Jun-92	18-08-30	52,946	643	0.012	53,589	2.20	249,166	302,755
SUM 1991 brood	1992		150,541	742		151,283		249,166	400,449
Wolf	06-Jun-93	18-12-15	50,248	0	0.000	50,248	2.30	0	50,248
Fishway	06-Jun-93	18-12-16	49,957	434	0.009	50,391	2.30	0	50,391
Michie	06-Jun-93	18-12-17	50,169	0	0.000	50,169	2.30	290,647	340,816
SUM 1992 brood	1993		150,374	434		150,808		290,647	441,455
Wolf	02-Jun-94	18-14-27	50,155	270	0.005	50,425	2.30	0	50,425
Michie	02-Jun-94	18-14-28	50,210	127	0.003	50,337	2.30	158,780	209,117
Fishway	02-Jun-94	18-14-29	50,415	125	0.002	50,540	2.30	0	50,540
SUM 1993 brood	1994		150,780	522		151,302		158,780	310,082
Wolf	06-Jun-95	18-12-46	10,067	164	0.016	10,231	1.67	0	10,231
Wolf	06-Jun-95	18-12-47	9,122	0	0.000	9,122	1.53	0	9,122
Michie	06-Jun-95	18-18-26	25,231	337	0.013	25,568	2.47	4,552	30,120
Michie	06-Jun-95	18-18-27	25,187	141	0.006	25,328	2.33	0	25,328
SUM 1994 brood	1995		69,607	642		70,249		4,552	74,801

Release	Release		# Tagged	Adipose		Total	Weight	Total	Total
Release Location	Release Date*	Code	& Clipped	Clipped	%Tag-	Total Clipped	(grams)	Total Unclipped	Total Released
Wolf	26-May-96	18-07-48	10,131	102	0.010	10,233	2.30	0	10,233
Fox	04-Jun-96	18-28-23	35,452	0	0.000	35,452	2.43	0	35,452
Byng	04-Jun-96	18-10-41	25,263	516	0.020	25,779	2.37	0	25,779
Michie	05-Jun-96	18-33-45	50,082	1,022	0.020	51,104	2.51	0	51,104
Michie	05-Jun-96	18-33-46	50,260	508	0.010	50,768	2.43	0	50,768
Michie	05-Jun-96	18-33-47	49,985	505	0.010	50,490	2.32	0	50,490
Judas	04-Jun-96	18-33-48	49,798	1,016	0.020	50,814	2.43	0	50,814
McClintock	04-Jun-96	18-33-49	49,991	302	0.006	50,293	2.27	0	50,293
SUM 1995 brood	1996		320,962	3,971		324,933		0	324,933
Wolf	01-Jun-97	18-23-25	14,850	150	0.010	15,000	2.30	0	15,000
Wolf	01-Jun-97	18-23-26	20,334	0	0.000	20,334		0	20,334
Wolf	08-Jun-97	18-29-06	10,158	0	0.000	10,158		0	10,158
Fox	11-Jun-97	18-25-54	25,242	0	0.000	25,242	2.43	0	25,242
Fox	11-Jun-97	18-25-55	24,995	253	0.010	25,248		0	25,248
Byng	11-Jun-97	18-29-07	10,029	0	0.000	10,029	2.37	0	10,029
Byng	11-Jun-97	18-29-05	10,155	0	0.000	10,155		0	10,155
Michie	11-Jun-97	18-28-59	49,657	502	0.010	50,159	2.51	0	50,159
Michie	11-Jun-97	18-28-60	50,130	0	0.000	50,130	2.43	0	50,130
Judas	07-Jun-97	18-23-27	19,951	202	0.010	20,153	2.43	0	20,153
Judas	11-Jun-97	18-25-53	25,146	0	0.000	25,146	2.43	0	25,146
McClintock	11-Jun-97	18-25-51	25,399	0	0.000	25,399	2.27	0	25,399
McClintock	11-Jun-97	18-25-52	24,792	251	0.010	25,043		0	25,043
SUM 1996 brood	1997		310,838	1,358		312,196		0	312,196
Michie	12-Jun-98	18-41-22	49,243	1,004	0.020	50,247	2.84	0	50,247
Michie	12-Jun-98	18-41-21	49,197	1,004	0.020	50,201	2.81	0	50,201
Byng	12-Jun-98	18-31-60	24,518	1,022	0.040	25,540	3.00	0	25,540
McClintock	12-Jun-98	18-40-43	49,810	503	0.010	50,313	2.76	0	50,313
Judas	13-Jun-98	02-54-17	19,018	1,432	0.070	20,450	2.55	0	20,450
Judas	12-Jun-98	18-31-59	25,331	256	0.010	25,587	2.60	0	25,587
Wolf	06-Jun-98	02-19-58	10,104	421	0.040	10,525	1.95	0	10,525
Wolf	04-Jun-98	02-46-06	34,813	710	0.020	35,523	2.63	0	35,523
SUM 1997 brood	1998		262,034	6,352		268,386		0	268,386

Release Release Location	Release Release Date*	Code	# Tagged & agged & Clipped	Adipose Clipped Clip Only	%Tag- % Tag Loss	Total Total Clipped	Weight (grams)	Total Total Unclipped	Total Total Released
Michie	06-Jun-99			80,393		80,393	3.13	0	80,393
Byng	06-Jun-99			64,430		64,430	2.92	0	64,430
McClintock	06-Jun-99			64,169		64,169	2.95	0	64,169
Wolf	06-Jun-99			31,048		31,048	3.07	0	31,048
SUM 1998 brood	1999			240,040		240,040		0	240,040
Michie	08-Jun-00	18-31-28	25,114	254	0.010	25,368	2.80	0	25,368
Michie	08-Jun-00	18-31-29	25,037	253	0.010	25,290	2.80	0	25,290
Michie	08-Jun-00	18-43-03	10,907	110	0.010	11,017	2.84	0	11,017
McClintock	08-Jun-00	18-13-54	25,041	254	0.010	25,295	2.70	0	25,295
McClintock	08-Jun-00	18-13-55	25,016	253	0.010	25,269	2.68	0	25,269
Wolf	04-Jun-00	18-23-53	25,071	253	0.010	25,324	2.67	0	25,324
Wolf	04-Jun-00	18-23-54	25,012	254	0.010	25,266	2.40	0	25,266
SUM 1999 brood	2000		161,198	1,631		162,829		0	162,829
Michie	08-Jun-01	18-44-16	25,318	256	0.010	25,574	2.68	0	25,574
Michie	08-Jun-01	18-44-17	27,293	276	0.010	27,569	2.68	0	27,569
Michie	08-Jun-01	18-44-18	27,337	276	0.010	27,613	2.60	0	27,613
Michie	08-Jun-01	18-44-19	11,629	117	0.010	11,746	2.60	0	11,746
McClintock	08-Jun-01	18-44-12	24,526	248	0.010	24,774	3.13	0	24,774
McClintock	08-Jun-01	18-44-13	25,033	253	0.010	25,286	3.13	0	25,286
McClintock	08-Jun-01	18-36-50	10,840	110	0.010	10,950	3.13	0	10,950
Byng	08-Jun-01	18-44-14	25,788	260	0.010	26,048	2.84	0	26,048
Byng	08-Jun-01	18-44-15	25,136	254	0.010	25,390	2.84	0	25,390
Wolf	28-May-01	18-44-10	26,205	265	0.010	26,470	3.34	0	26,470
Wolf	28-May-01	18-44-11	23,902	241	0.010	24,143	3.34	0	24,143
SUM 2000 brood	2001		253,007	2,556		255,563		0	255,563

Release Release Location	Release Release Date*	Code	# Tagged & agged & Clipped	Adipose Clipped Clip Only	%Tag- % Tag Loss	Total Total Clipped	Weight (grams)	Total Total Unclipped	Total Total Released
Wolf	23-May-02	18-51-01	25,334	126	0.005	25460	3.30	0	25460
Wolf	02-Jun-02	18-51-02	25,079	177	0.007	25256	3.10	0	25256
McClintock	10-Jun-02	18-51-03	24,769	505	0.020	25274	3.60	0	25274
Byng	10-Jun-02	18-51-04	24,907	0	0.000	24907	3.00	0	24907
Byng	10-Jun-02	18-51-05	24,925	125	0.005	25050	3.00	0	25050
Michie	10-Jun-02	18-51-06	27,114	191	0.007	27305	3.20	0	27305
Michie	10-Jun-02	18-51-07	26,854	0	0.000	26854	3.02	0	26854
Michie	10-Jun-02	18-50-61	27,850	281	0.010	28131	3.20	0	28131
Michie	10-Jun-02	18-50-62	27,241	0	0.000	27241	3.04	0	27241
Michie	10-Jun-02	18-50-63	8,481	86	0.010	8567	3.20	0	8567
Yukon River	01-Jun-02							3,062	3062
SUM 2001 brood	2002		242,554	1,491		244,045		3,062	247,107
Wolf	25-May-03	18-47-48	27,489	83	0.003	27,572	2.72	0	27,572
Wolf	25-May-03	18-47-49	26,704	161	0.006	26,865	2.69	0	26,865
Byng	2-Jun-03	18-47-47	23,483	71	0.003	23,554	3.01	0	23,554
Byng	2-Jun-03	18-47-46	27,058	54	0.002	27,112	2.98	0	27,112
Michie	2-Jun-03	18-49-58	28,485	0	0.000	28,485	3.05	0	28,485
Michie	2-Jun-03	18-49-59	27,519	0	0.000	27,519	2.98	0	27,519
Michie	2-Jun-03	18-49-60	15,541	0	0.000	15,541	3.07		15,541
Judas Lake	6-Jun-03							2,500	
SUM 2002 brood	2003		176,279	369		176,648		0	176,648
Wolf	5/28-30/2004	01-01-70	28,946	292		29,238	2.90	0	29,238
Wolf	22-Jun-04							2,514	2,514
Mainstem	5/28-29/2004	02-01-69	24,920	431		25,351	3.10	0	25,351
Byng	8-Jun-04	02-01-68	24,401	626		25,027	3.36	0	25,027
McClintock	8-Jun-04	02-01-67	24,246	879		25,125	3.20	0	25,125
Michie	8-Jun-04	02-01-66	24,609	554		25,163	3.12	0	25,163
Michie	8-Jun-04	02-01-65	13,594	306		13,900	3.12	0	13,900
SUM 2003 brood	2004		140,716	3,088		143,804		2,514	146,318

Release	Release		# Tagged	Adipose					
Release Location	Release Date*	Code	& Tagged & Clipped	Clipped Clip Only	%Tag- % Tag Loss	Total Total Clipped	Weight (grams)	Total Total Unclipped	Total Total Released
Wolf	5/31-6/05	18-19-36	10,751	109	1.000	10,860	2.50	0	10,860
Wolf	5/31-6/05	18-56-17	5,835	59	1.000	5,894	2.50	0	5,894
Wolf	7-Jul-05			614		614			614
Byng	13-Jun-05	18-56-18	5,853	119	2.000	5,972	2.50	0	5,972
Byng	13-Jun-05	18-56-19	4,369	89	2.000	4,458	2.50	0	4,458
McClintock	13-Jun-05	18-44-19	10,632	0	0.000	10,632	2.50	0	10,632
Michie	13-Jun-05	02-01-64	4,870	0	0.000	4,870	2.50	0	4,870
Michie	13-Jun-05	02-01-65	5,983	0	0.000	5,983	2.50	0	5,983
Michie	13-Jun-05	08-01-65	28,082	284	1.000	28,366	2.50	0	28,366
Michie	13-Jun-05	18-56-20	5,906	0	0.000	5,906	2.50	0	5,906
Mainstem	6/02,6/14,07/7	08-01-68	28,991	293	1.000	29,284	2.50	0	29,284
SUM 2004 brood	2005		111,272	1,567		112,839			112,839
Wolf	6/4 - 6/11	08-01-66	26,412	0	0.000	26,412	2.66	0	26,412
Wolf	6/4 - 6/11	08-01-71	8,718	88	1.000	8,806	2.66	0	8,806
Mainstem	8-Jun-06	08-01-72	6,761	427	1.500	7,188	2.63	0	7,188
Mainstem	8-Jun-06	08-01-67	28,045	103	1.500	28,148	2.63	0	28,148
Michie	14-Jun-06	08-01-69	39,164	596	1.500	39,760		0	39,760
Michie	14-Jun-06	08-01-74	3,692	56	1.500	3,748	2.41	0	3,748
McClintock	14-Jun-06	08-01-70	29,282	296	1.000	29,578	2.58	0	29,578
McClintock	14-Jun-06	08-01-73	5,426	55	1.000	5,481	2.89	0	5,481
Wolf	11-Jun-06		0	7,658	0.000	7,658	3.02	0	7,658
SUM 2005 brood	2006		147,500	9,279		156,779			156,779
Wolf	5/24-6/3	Agency Tags 18	37,781	771	2.000	38,552		0	38,552
Wolf	3-Jun-07			2,632	0.000	2,632	2.33	0	2,632
Mainstem	29-May-07	Agency Tags 18	35,253	356	1.000	35,609	2.87	0	35,609
Michie	8-Jun-07	Agency Tags 18	50,084	506	1.000	50,590	3.22	0	50,590
McClintock	8-Jun-07	Agency Tags 18	38,383	388	1.000	38,771	3.22	0	38,771
SUM 2006 brood	2007		161,501	4,653		166,154			166,154

Release Release Location	Release Release Date*	Code	# Tagged & agged & Clipped	Adipose Clipped Clip Only	%Tag- % Tag Loss	Total Total Clipped	Weight (grams)	Total Total Unclipped	Total Total Released
Wolf	6/01-6/26	Agency Tags 08	10,939	0	0.000	10,939	2.97		10,939
Wolf	26-Jun-08			2,618		2,618			2,618
Mainstem	5-Jun-08	Agency Tags 08	20,498	418	2.000	20,916	2.84		20,916
Michie	5-Jun-08	Agency Tags 08	24,615	502	2.000	25,117	2.71		25,117
McClintock	5-Jun-08	Agency Tags 08	24,687	1,029	4.000	25,716	2.89		25,716
SUM 2007 brood	2008		80,739	4,567		85,306		0	85,306
Wolf	39964	Agency Tags 08	19,652	199	1.000	19,851	2.76		19,851
Wolf	11-Jun-09			2,672		2,672			2,672
Mainstem	6-Jun-09	Agency Tags 08	42,648	258	0.600	42,906	3.00		42,906
Michie	6-Jun-09	Agency Tags 08	77,048	778	0.100	77,826	2.87		77,826
McClintock	6-Jun-09	Agency Tags 08	26,338	53	0.020	26,391	2.52		26,391
SUM 2008 brood	2009		165,686	3,960		169,646		0	169,646
Wolf	40328	Agency Tag 18	12,000	0	0.000	12,000	2.89	0	12,000
Michie	1-Jun-10	Agency Tag 18	66,848	2,067	3.000	68,915	3.00	0	68,915
McClintock	1-Jun-10	Agency Tag 18	19,714	0	0.000	19,714	3.00	0	19,714
McClintock	1-Jun-10			1,369		1,369		0	1,369
Mainstem	1-Jun-10	Agency Tag 18	23,985	242	1.000	23,985	2.98	0	24,227
SUM 2009 brood	2010		122,547	3,678		126,225		0	126,225
Wolf	40692	Agency Tag 18	10,000		0.000	10,000	2.95	0	10,000
Wolf	10-Jun-11			1,550		1,550	2.76	0	1,550
Michie	6-Jun-11	Agency Tag 18	65,640	1,000	1.500	66,640	2.94	0	66,640
McClintock	6-Jun-11	Agency Tag 18	32,811	0	0.000	32,811	2.65	0	32,811
Mainstem	6-Jun-11	Agency Tag 18	23,921	0	0.000	23,921	2.67	0	23,921
SUM 2010 brood	2011		132,372	2,550		134,922		0	134,922
TOTAL all	all		4,289,357	308,530	all	4,597,887		1,180,189	5,778,076