BLIND CREEK CHINOOK SALMON ENUMERATION WEIR, 2006

CRE-37-06

Prepared for: The Yukon River Panel
Restoration and Enhancement Fund

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ABSTRACT

A weir was operated in Blind Creek to enumerate the chinook salmon escapement in 2006. An enumeration weir has been operated in Blind Creek annually since 1995 with the exception of 2001 and 2002. The weir site was located in the same general area as in previous years, approximately 1 km upstream of the confluence with the Pelly River. Operation of the weir began on July 16 and continued until August 17. The first fish through the weir was counted on July 28, which was eight days later than 2005. In total, 677 chinook were counted with 50% of the run through by August 5 and 90% by August 12. Chinook spawners were sampled randomly throughout the weir operation to obtain information on the age-sex-length structure of the run. Out of a sample size of 101 fish, 41 % were female and 59 % were male. Jacks (males with a fork length $\leq$630 mm) represented 10% of the total fish sampled. The mean fork length of females and males sampled was 840 mm and 770 mm, respectively. Spaghetti tags applied at the DFO tagging program at Bio-Island near the Canada/U.S. border were also recorded. Seven orange spaghetti tags were observed on fish passing through the weir, three of which were retrieved.

INTRODUCTION

Blind Creek is a significant chinook salmon spawning stream flowing into the Pelly River approximately 10 km southeast of the Town of Faro. It is also a traditional fishing area of the Ross River Dena people, although the families that once resided at the mouth of the creek have since moved to outlying communities. The Ross River Dena people, however, continue to fish for salmon in the Pelly River downstream of Blind Creek. Recognizing the contribution of the Blind Creek salmon to the Pelly River, Ross River Dena Council (RRDC) with assistance from Fisheries and Oceans Canada (DFO) initiated a weir enumeration program in 1995 to monitor the Blind Creek chinook run. Since then a weir has been operated annually with the exception of 2001 and 2002. Chinook counts at the weir have ranged from a low of 373 in 1998 to a high of 1,155 in 2003.

Since there is very little quantitative information available for the Pelly River Watershed, annual weir counts in Blind Creek also provide a valuable chinook escapement index. In addition, the weir operation facilitates the recovery of spaghetti tags from mark recapture studies in the Yukon River drainage and the collection of information on the age-sex-length structure of the spawning population. This stock assessment information is important for the conservation and restoration of Blind Creek chinook salmon and for relevant salmon management agencies to manage Yukon River chinook salmon.

The enumeration weir program also provides an opportunity to increase awareness of the chinook salmon resource and management programs. The weir site is located near the Town of Faro and can be easily accessed from a maintained mining road. Since 2003, a considerable number of tourists as well as local people have stopped to view the weir operation and a great deal of interest has been shown in salmon and the enumeration project.

Since 2003, the Yukon River Restoration and Enhancement Fund has provided funding for enumeration weir programs in Blind Creek. This report provides a summary of weir operations in 2006. The objectives of this year's program were as follows:

1. Install and operate a weir in Blind Creek to enumerate returning chinook salmon;
2. Recover spaghetti tags applied for management purposes;
3. Conduct live sampling to obtain a representative sample of the 2006 Blind Creek chinook stock for age, sex and length characteristics.
4. Update the salmon brochure prepared in 2005 for distribution to visitors of the Town of Faro Interpretive Centre.
5. Provide training and employment for community residents.

STUDY AREA

Blind Creek flows in a southwesterly direction form its headwaters in the Anvil Range into the Pelly River, approximately 10 km southeast of the Town of Faro (Fig. 1). The creek and its tributaries drain an area of approximately 618 km^2. Major lake systems in the drainage basin include the Blind Lake and Swim Lake chains. A mining access road from the Town of Faro crosses the creek at two locations, approximately 2 km (bridge #1) and 3 km (bridge #2)

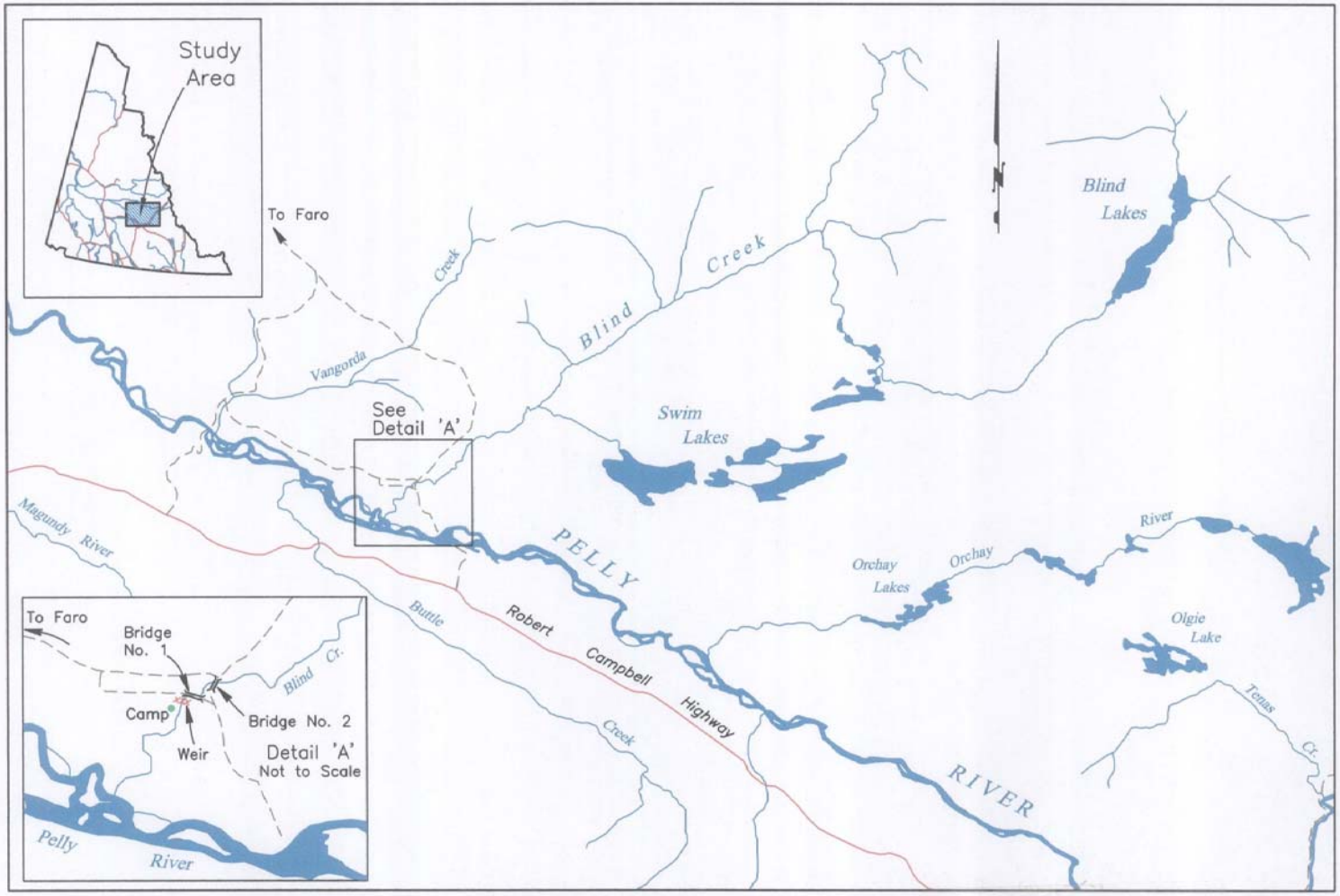

FIGURE 1.0 : Blind Creek and Weir Location

upstream of its confluence with the Pelly River[1]. Aerial surveys have identified chinook spawning sites throughout the lower 40 km of the creek, with the largest concentrations observed between 20 and 35 km upstream of the mouth (Harder, 1996; Wilson 2001,2002).

METHODS

Site Selection

The weir was placed in the same location as in 2005, approximately 1 km upstream of the creek mouth and 30 m downstream of the first bridge crossing (Fig. 1). This general area has been used since weir operations began in Blind Creek. It is easy to access from a maintained mining road and is close to an existing First Nation camp with wall tent frames. The weir is situated far enough downstream of the major spawning areas to allow for the majority of chinook to be counted.

Weir Construction

Construction of the weir was initiated on July 14 using weir materials stored on site from previous operations. As in 2005, the counting chamber was placed mid-stream and at the upstream apex of the fence (Fig. 2). This chamber consisted of conduit panels connected together to form an enclosure measuring 2m (L) X 0.7 m (W) X 1.0 m (H). Two conduit panels, each 2 meters long, were used to connect the chamber to the fence and create a staging area for fish moving into the chamber. The fence was constructed of conduit panels and tripods placed downstream of the counting chamber in a 'V' configuration to direct fish moving close to the bank towards the staging area (Fig.3).

Figure 2. View of counting chamber and sampling station looking upstream.

[1] The two bridges on the mining access road are referred to as bridge #1 and bridge #2 for the purposes of this report.

Figure 3. View of weir looking upstream.

After the panels were in place, sand bags were placed along the bottom upstream side of the weir to prevent scouring of the creek substrate and undermining of the structure. A white 'flashboard' was secured to the bottom of the counting chamber to improve visibility of salmon passing through. A platform was placed alongside the counting chamber for enumerating and sampling fish and accessed from the bank via a wooden walkway. Similar to last year, black poly was draped over the staging area to prevent fish moving in from seeing weir attendants and activity on the platform.

As in 2005, a recovery container was placed immediately upstream of the sampling platform to hold fish after sampling (Fig. 4). This was constructed of plywood and consisted of four shallow chambers to support individual fish. The container was submerged just beneath the surface level to allow some water to flow over the chambers. Chinook held in the chamber after sampling could regain their strength and swim over the top to continue upstream.

Figure 4. Chinook salmon resting in recovery chamber after sampling.

Weir Operation

On July 16 the weir was 'fish tight' and operations began. Personnel were on site 24 hours a day for the duration of the chinook run. The weir was monitored daily from first light until dark. To allow chinook to pass through the counting chamber, two or three pieces of conduit were removed from both the downstream and upstream end of the chamber. After a number of fish had passed through, the upstream opening was closed and the next fish moving in held for sampling. After closing the downstream opening, all chinook held in the chamber were immediately sampled to avoid causing stress on the fish. Only a small number of chinook were held at any one time. Sampling events were attempted each day and, when possible, at various times throughout the day to obtain a representative sample of the daily run.

Chinook held for sampling were dip-netted from the counting chamber and placed in a v-shaped trough filled with water. Information on sex, size (fork length) and general condition was recorded. Scale samples (5 per fish) were taken for age determination only when it was possible to do so quickly and without stressing the fish. After sampling, chinook were placed in a recovery container before continuing upstream. Chinook with spaghetti tags were held in the counting chamber and dip netted for tag recovery. Spaghetti tags and scale samples were sent to DFO, Whitehorse.

The weir was checked regularly for scouring and areas of possible escape. Debris collecting on the weir was removed as required.

Physical Measurements

Weir personnel recorded general weather and water conditions each morning. Air and water temperatures were taken using a hand-held thermometer. Water depth measurements were taken from a Water Survey of Canada staff gauge located about 25 m downstream of the lower bridge along the right bank.

Water Survey of Canada, Whitehorse, Yukon, provided stream discharge data and daily water temperatures, recorded by a data logger, from mid-May to mid-October, 2006.

RESULTS

Chinook counts

A total of 677 chinook salmon was counted through the weir between July 16 and August 17 (see daily counts Appendix 1). The first fish was counted through on July 28. Fifty percent of the run had passed through by August 5 and 90% by August 12.

Biological Sampling/Tag Recovery

A total of 101 chinook was live sampled during the weir operation (see sampling data, Appendix 4). Of the fish sampled, 41 (41%) were females and 60 (59%) were males (including 10 jacks $\leq$ 630 mm (FL)). The median fork length for females was 840 mm and the range 730 – 1020 mm. The median fork length for males was 770 mm and the range 460 - 1010 mm. Fork length frequencies of chinook sampled are shown in Figure 5. Age was determined from

scales taken from 36 of the chinook sampled. Of these, 71 % were comprised of age-4 fish and 28%, age-5 fish.

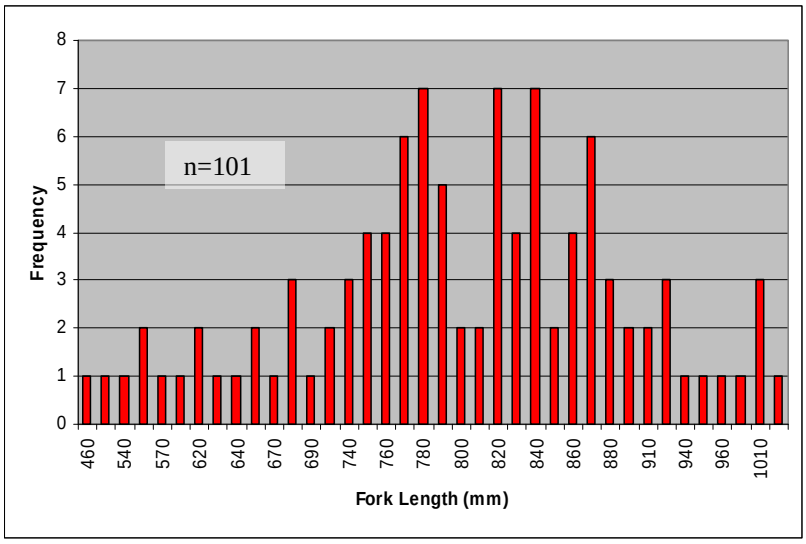

Figure 5. Length frequency of Blind Creek chinook sampled in 2006.

Seven chinook passing through the weir had been tagged with orange spaghetti tags; three of which were recovered. There were no markings on the chinook sampled that indicated tag loss.

Physical Measurements

Water temperatures recorded by Water Survey of Canada at the Blind Creek weir site, between June 27 and October 19, are illustrated in Figure 6. Daily water temperatures during the weir operation ranged from a high of 12.0°C on July 31 to a low of 8.4°C on August 15.

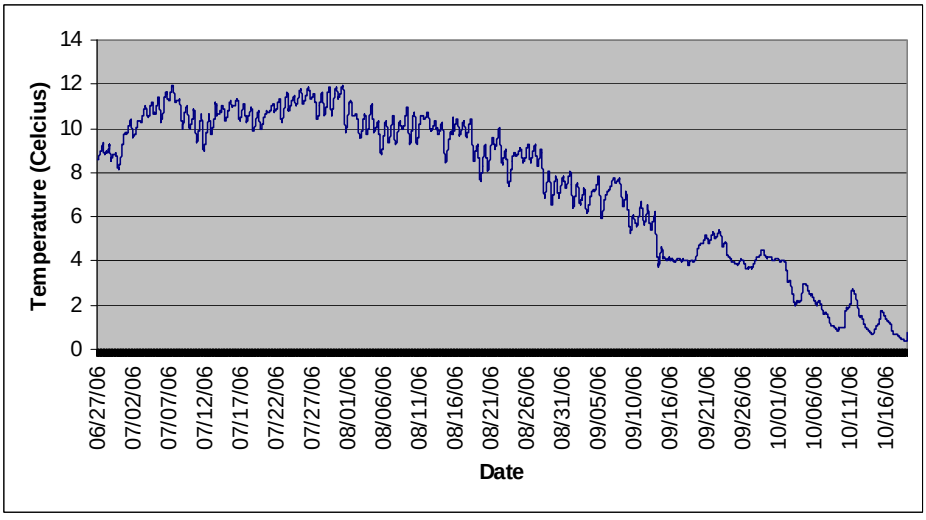

Figure 6. Water temperatures measured at Blind Creek weir, June – October, 2006 (Water Resources Survey of Canada).

Peak stream discharge in Blind Creek occurred on June 17 (Fig. 7). The mean daily stream discharge during set up and operation of the weir ranged from a high of 8.22 m3/sec on July 14 to a low of 2.50 m3/sec on August 1. Periodic fluctuations in water levels occurred throughout the operation as a result of rain events. The mean, maximum and minimum discharge in July and August for the period 1992 to 2006 is presented in Appendix 3.

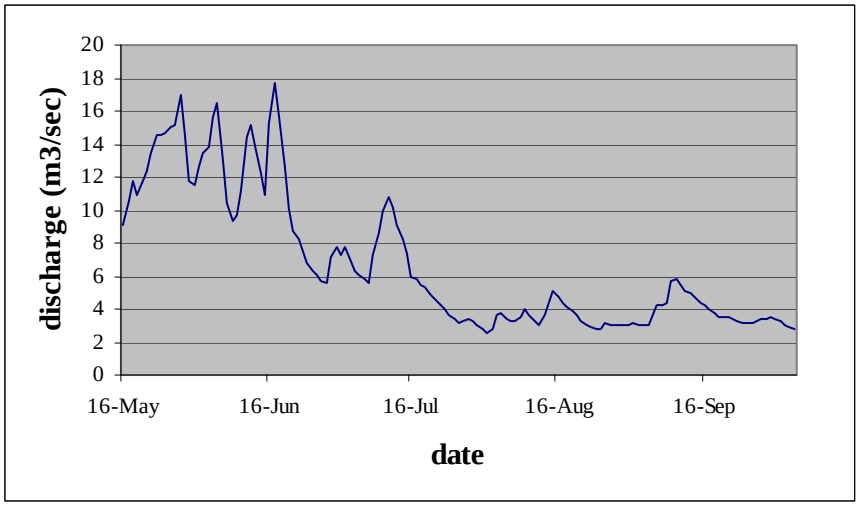

Figure 7. Stream discharge in Blind Creek, 2006 (Water Resources,Yukon Department of Environment).

DISCUSSION

The total count of 677 chinook salmon through the Blind Creek weir this year was slightly below (14%) the average weir passage of 789 since weir operations began in 1995[2]. Sampling data suggests the majority of chinook returning to Blind Creek this year were age-4 and age-5. However, there were no weir operations in Blind Creek during the 2001 and 2002 seasons, the brood years producing age-4 and age-5 fish, to indicate what the returns were in these years. Border escapement estimates in 2001 were considerably (85%) higher than the previous 10 year average (1991-2000) average and slightly lower (20%) in 2002 than the previous ten year average (1992-2001) (JTC, 2001, 2002).

Chinook arrived at the Blind Creek weir this year eight days later than in 2005 and the run appeared to peak slightly later. A late run timing was also observed (approximately 6 days) at the fishwheels located near the Canada/U.S. border (JTC, 2007). Although there was no weir operated in Blind Creek in 2001, the run timing at the fishwheels was similar to 2001, the brood year for age-5 fish.

The weir operation continued to be visited by a number of tourists as well as local people this year. As is 2005, a salmon brochure containing information about the salmon resource and weir operation was produced for distribution to visitors of the Town of Faro Interpretive Centre. At least 105 people visited the weir over the course of operations; many of whom were directed to the weir by staff at the Town of Faro Interpretive Centre.

[2] Weir counts in 1996 and 2000 were not reported and the weir was not operated in 2001 and 2002. Later installation dates in 1997, 1998 and 1999 may have resulted in early run fish being missed (appendix 2).

ACKNOWLEDGMENTS

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Appendix 1. Blind Creek Weir Chinook Salmon Counts, 2006.

DATE	Daily Count	Cumulative	# Sampled	Comments
16-Jul	0	0	0	Weir fish tight
17-Jul	0	0	0	
18-Jul	0	0	0	
19-Jul	0	0	0	
20-Jul	0	0	0	
21-Jul	0	0	0	
22-Jul	0	0	0	
23-Jul	0	0	0	
24-Jul	0	0	0	
25-Jul	0	0	0	
26-Jul	0	0	0	
27-Jul	0	0	0	
28-Jul	2	2	0	
29-Jul	9	11	4	
30-Jul	27	38	0	
31-Jul	26	64	0	
1-Aug	67	131	4	
2-Aug	8	139	0	
3-Aug	109	248	17	
4-Aug	25	273	8	
5-Aug	131	404	3	
6-Aug	19	423	6	
7-Aug	47	470	9	
8-Aug	63	533	11	
9-Aug	44	577	2	
10-Aug	14	591	12	
11-Aug	16	607	10	
12-Aug	28	635	6	
13-Aug	19	654	3	
14-Aug	11	665	2*	
15-Aug	6	671	0	
16-Aug	5	676	2*	
17-Aug	1	677	2*	Weir removed
TOTAL:	677		101	

* carcasses

Appendix 2. Blind Creek Chinook Counts from Aerial Surveys and Weir Operations, 1989, 1990, 1995-2006.

YEAR	METHOD	CHINOOK COUNTS	START DATE	END DATE
1989	Aerial survey [a]	400	August 7	August 7
1990	Aerial survey [a]	443	August 14	August 14
1995	Weir	826	NR	NR
1996	Aerial survey [a]	422	August ?	August ?
1996	Weir	NR	July 28	August 17
1997	Weir	957	July 24	August 22
1998	Weir	373	July 19	August 19
1999	Weir	892	July 28	August 22
2000	Weir	NR	NR	NR
2001	Aerial survey [b]	226	August 21	August 21
2002	Aerial survey [b]	107	August 15	August 15
2003	Weir	1,155	July 16	August 18
2004	Weir	792	July 11	August 15
2005	Weir	525	July 15	August 15
2006	Weir	677	July 16	August 17

[a] aerial survey conducted by P.A. Harder and Associates Ltd.
[b] aerial survey conducted by RRDC and Jane Wilson & Associates
NR - not reported

Appendix 3. Mean, Maximum and Minimum discharge in cubic metres per second for July and August, Blind Creek, 1992-2006.

	JULY Daily Discharge (m^3/sec)					**AUGUST** Daily Discharge (m^3/sec)				
	Mean	Max.	Max. Day	Min.	Min. Day	Mean	Max.	Max. Day	Min.	Min. Day
1992	9.87	13.06	14/07	6.59	31/07	4.47	6.24	01/08	3.30	27/08
1993	8.93	12.0	11/07	7.41	30/07	7.41	9.18	12/08	6.55	30/08
1994	3.92	5.50	01/07	2.52	27/07	1.48	2.61	01/08	0.94	21/08
1995	4.71	8.09	06/07	2.60	01/07	4.91	5.79	29/08	3.88	15/08
1996	4.80	8.87	12/07	2.67	31/07	3.92	7.62	30/08	2.24	03/08
1997*	4.96	9.66	25/07	2.53	04/07	9.11	10.3	01/08	7.71	03/08
1998	-	-	-	-	-	-	-	-	-	-
1999	4.49	12.5	02/07	2.12	25/07	2.25	3.20	01/08	1.93	27/08
2000	-	-	-	-	-	-	-	-	-	-
2001	8.49	16.2	17/07	5.20	31/07	3.33	5.00	01/08	2.28	18/08
2002	2.85	4.95	06/07	2.25	28/07	2.71	5.81	30/08	1.82	11/08
2003	5.25	14.6	07/07	3.26	29/07	2.49	4.27	01/08	1.37	21/08
2004	3.41	4.56	01/07	3.02	17/07	2.51	3.41	01/08	2.28	26/08
2005	4.28	5.57	19/07	3.23	12/07	2.31	4.48	01/08	1.47	18/08
2006	5.92	10.8	11/07	2.76	31/07	3.46	5.08	15/08	2.50	01/08

* no data available for period between July 14-July 24 and after August 3.
Note: 1998 and 2000 data not available

Appendix 4. Blind Creek chinook sampling results, 2006

DATE	FISH #	SEX	FL (mm)	SCALE BOOK#	BOOK #	SCALE #	European Age	Age Code
29-Jul	1	M	740	--		NS	-	
	2	M	770	61724	1	1-41	1.3	
	3	M	760			NS	-	
	4	M	830	61724	1	2-42	M3	RG
1-Aug	5	M	770	61724	1	3-43	1.3	
	6	F	900	61724	1	4-34	M4	RG
	7	M	850			NS	-	
	8	F	910	61724	1	5-45	1.4	
3-Aug	9	M	820	61724	1	6-26	-	RG
	10	F	960	61724	1	7-47	M4	RG
	11	M	570	61724	1	8-48	M2	RG
	12	M	750			NS	-	
	13	M	790	61724	1	9-49	M3	RG
	14	F	870	61724	1	10-50	1.4	
	15	M	970	61646	2	1-31	1.3	
	16	F	830	61646	2	2-42	M4	RG
	17	M	760	61646	2	3-43	1.4	
	18	M	770	61646	2	4-44	1.3	
	19	M	750			NS	-	
	20	F	790	61646	2	5-45	1.3	
	21	F	1020			NS	-	
	22	M	650			NS	-	
	23	F	910	61646	2	6-46	1.3	
	24	F	750	61646	2	7-47	M3	RG
	25	F	800	61646	2	8-48	1.3	
4-Aug	26	M	860			NS	-	
	27	F	860			NS	-	
	28	F	840	61646	2	9-49	M4	RG
	29	M	680	61646	2	10-30	M3	RG
	30	F	840	61723	3	1-11	-	UD
	31	M	780	61723	3	2-12	-	NS
	32	F	860	61723	3	3-13	M3	RG
	33	F	870	61723	3	4-34	M4	RG
5-Aug	34	M	780	61723	3	5-15	M3	RG
	35	M	780	61723	3	6	-	UD
	36	F	870	61723	3	7-17	M3	RG
6-Aug	37	M	940			NS	-	
	38	M	800	61723	3	8-48	1.3	
	39	M	1010	61723	3	9-49	1.3	
	40	M	770	61723	3	10-40	1.2	
	41	F	820	61721	4	1-41	M4	RG
	42	M	840	61721	4	2-32	1.3	
7-Aug	43	M	600			NS	-	
	44	M	560	61721	4	3-43	M2	RG

							European	Age
DATE	FISH #	SEX	FL (mm)	SCALE BOOK#	BOOK #	SCALE #	Age	Code
	45	F	780	61721	4	4-44	1.3	
	46	M	680			NS	-	
	47	F	730			NS	-	
	48	M	540			NS	-	
	49	F	740			NS	-	
	50	M	460			NS	-	
	51	M	840	61721	4	5-45	-	RG
8-Aug	52	F	920			NS	-	
	53	M	560	61721	4	6-46	M2	RG
	54	M	770	61721	4	7-47	M3	RG
	55	F	810	61721	4	8-48	1.4	
	56	M	740	61721	4	9-49	1.3	
	57	M	1010			NS	-	
	58	F	880	61721	4	10-50	1.4	
	59	M	690	61722	5	1-41	1.3	
	60	M	620	61722	5	2-42	1.3	
	61	M	650	61722	5	3-23	1.3	
	62	M	870			NS	-	
9-Aug	63	F	880			NS	-	
	64	F	860	61722	5	4-34	M3	RG
10-Aug	65	F	850	61722	5	5-35	1.4	
	66	M	620	61722	5	6-46	2.2	
	67	M	780	61722	5	7-37	1.3	
	68	M	870	61722	5	8	-	RG
	69	F	780	61722	5	9-29	-	RG
	70	F	840			NS	-	
	71	F	750	61722	5	10-40	1.3	
	72	M	630	61647	6	1-41	1.3	
	73	F	900	61647	6	2-12	M4	RG
	74	M	820	61647	6	3-43	1.3	
	75	F	840	61647	6	4-44	1.3	
	76	F	790	61647	6	5-45	1.4	
11-Aug	77	F	760	61647	6	6-46	1.3	
	78	M	770	61647	6	7-47	1.3	
	79	F	1010	61647	6	8-28	1.3	
	80	M	790	61647	6	9-49	1.4	
	81	M	780	61647	6	10-30	M2	RG
	82	M	810			NS	-	
	83	M	730			NS	-	
	84	M	820			NS	-	
	85	F	830			NS	-	
	86	M	950			NS	-	
12-Aug	87	M	820	61648	7	1-21	-	RS
	88	F	790			NS	-	
	89	F	840			NS	-	
	90	F	820			NS	-	

							European	Age
DATE	FISH #	SEX	FL (mm)	SCALE BOOK#	BOOK #	SCALE #	Age	Code
	91	M	670			NS	-	
	92	M	920			NS	-	
13-Aug	93	M	520			NS	-	
	94	M	760			NS	-	
	95	F	830			NS	-	
14-Aug	96	F	920			NS	-	
	97	M	640			NS	-	
16-Aug	98	F	870	61649	8	1-41	1.4	
	99	M	680	61649	8	2-42	1.3	
17-Aug	100	M	820	61648	8	3-43	1F	RS
	101	M	880	61648	8	4-44	1.4	

Note: RG = regenerate scale (centre is missing from scale)
RS = resorbed scale (growth from margin is missing)
NS = no scales taken
UD = scale upside down