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A BIOLOGICAL ASSESSMENT OF ARCTIC CHARR IN THE KAGLORYUAK RIVER, VICTORIA ISLAND, NWT, 1990

REPORT BY:

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ABSTRACT

A biological assessment of the anadromous Arctic charr in the Kagloryuak River, Prince Albert Sound, Northwest Territories, revealed 13,072 upstream migrants. The absence of old charr, evidence of large domestic harvests from the Inuvialuit harvest study and relatively high occurrence of net marks suggest a significant rate of exploitation. Since it assumed that this population is already exploited at close to the 4 percent rate, it is recommended that only 6 percent or 780 fish (1000 kg) be harvested every two years for commercial purposes.

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ACKNOWLEDGEMENTS

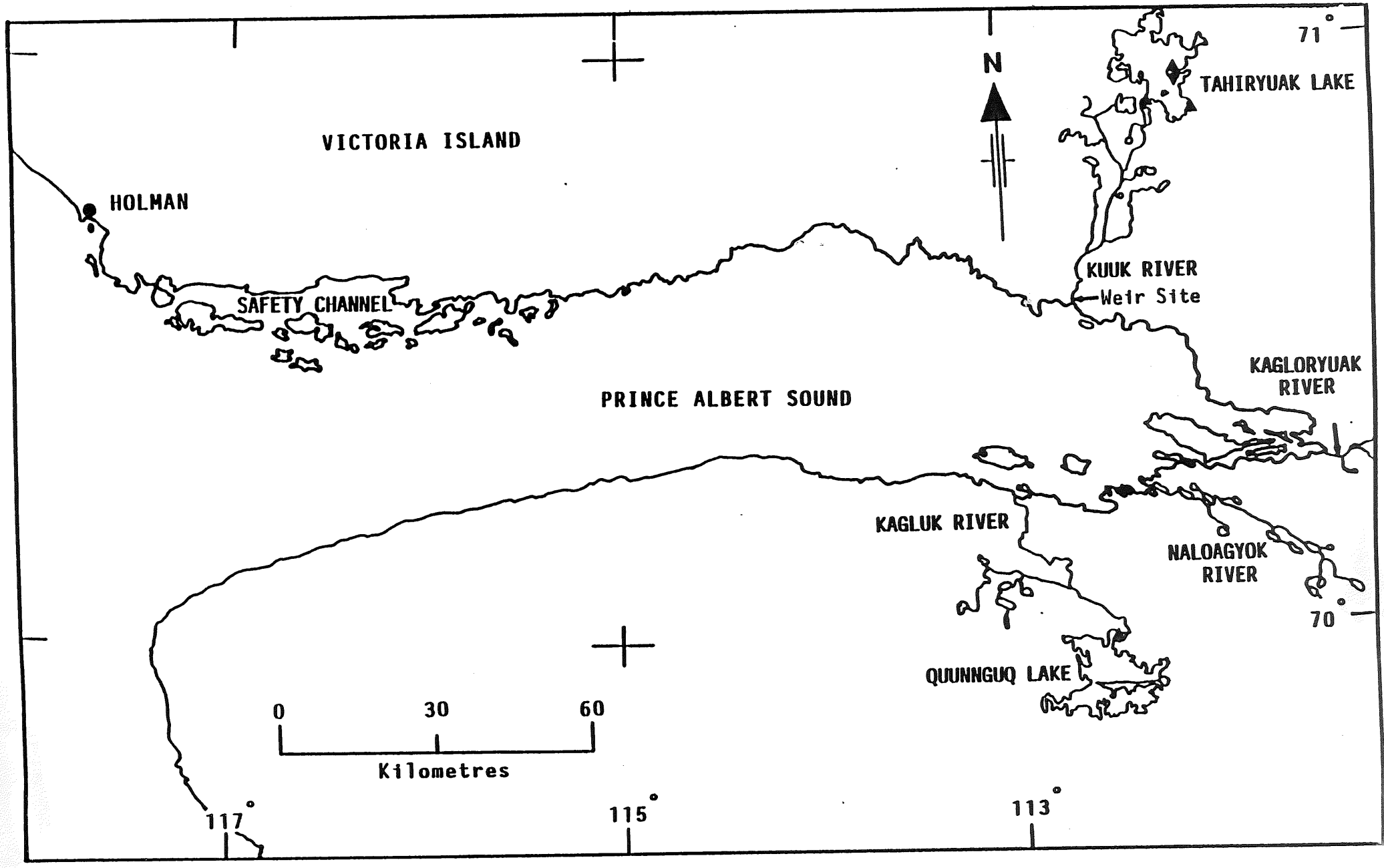
We would like to thank Paul Sparling, John Alikamik, Joseph Haluksit and their families for carrying out the field program in their usual efficient manner. We would also like to thank Gary Carder of DFO Winnipeg for determining the ages of the charr, members of the Holman HTC for their assistance with the project, and -------- for editing the manuscript.

1.0 INTRODUCTION

Residents of Holman, Northwest Territories, rely heavily on Arctic charr for food. Traditionally, their subsistence fishing has taken place on the Kuujjua River drainage (Minto Inlet) located north of the community. A small annual commercial quota of 600 kg permits local sale of Arctic charr to visitors. Fishermen have asked for an increase in this quota, but the Department of Fisheries and Oceans (DFO) has been reluctant to grant it since it is not known what effect increased exploitation would have on the Kuujjua River charr stock. The status of this particular stock is not known at present. However, DFO advised fishermen to seek unexploited stocks on which to conduct commercial fishing. Discussions with local residents indicated that the most likely area to look would be rivers draining into Prince Albert Sound, southeast of Holman (Fig. 1). Three possible areas, the Kuuk, Naloagyok and Kagluk Rivers were identified and preliminary assessments by DFO using gill nets were carried out at these sites in August, 1985. From 1986 to 1989, detailed assessments involving the installation of weirs were carried out to determine the commercial potential of these rivers. In 1990, the Holman Hunters and Trappers Committee (HTC) contracted P.D. Sparling to supervise a field study to evaluate the potential of a commercial fishery for anadromous Arctic charr at the Kagloryuak River. A weir was installed for the entire duration of the fall migration and the population was assessed.

This report summarizes the results from the Kagloryuak River study, provides an assessment of the stock and makes recommendations for its future use.

Figure 1. Map of Prince Albert Sound showing location of the four charr streams.



2.0 METHODS

2.1 Weir Construction and Evaluation

The field crew arrived by Twin Otter from Holman on August 8, 1990. By August 11 the weir was completely finished. The weir was erected approximately 6 km from the mouth of the river just upstream of the first major forks where the two major tributaries of the Kagloryuak have the narrowest width of land separating them. The channel at this location was about 35 m wide and had an average depth of about 0.5 m. While it was presumed that most of the charr travelled up this east flowing channel, based on traditional knowledge, movement of charr in the other channel was monitored. Two hoopnets; one to monitor upstream movement, the other to monitor downstream movement, were set from August 15 to August 24. All fish captured in the hoopnets were identified to species, measured and released.

2.2 Biological Evaluation

Arctic charr were counted as they migrated upstream from Prince Albert Sound into the Kagloryuak River (Figure 1). The trap was checked at regular intervals to ensure that migrating fish were not unduly stressed, and that the run was not delayed.

During the migration entire trap loads or random selections from larger trap loads were used to give an unbiased account of mean daily lengths. For each charr live sampled, the fork length (+/-1mm) was measured and tags and scars recorded. The plastic Floy spaghetti tags which were used to mark the fish were numbered sequentially from FC72501 to FC73000. The tags were inserted between the pterigiophores of the dorsal fin on the left side of the fish using a Floy Mark II tagging gun. The fish were not anesthetized and after tagging were released in quiet backwater for observation. The needle, gun, and tag were sterilized in a 10% solution of Prepodyne between each fish to prevent the introduction or spread of infectious pancreatic necrosis virus. None of these fish were weighed since it stresses them unduly.

To provide the basis for a regression of length against age, a total of 80 fish were sampled for round weight and sometimes dressed weight, sex and maturity, stomach contents, and sagittal otolith bones were removed for later age analysis.

The stage of maturity was determined by gross examination of the gonads following the classification code used by

Kristofferson et al. (1982) and aged according to the method of Grainger (1953) by Mr. G. Carder (Fish and Marine Mammal Management Division, DFO Central and Arctic Region, Winnipeg).

Weight at length relationships were calculated using least squares regression analysis on logarithmic transformations of fork lengths and round weights. The relationship is described as follows:

Log_{10} round weight in g = b x Log_{10} fork length in mm + log a

The condition factor (K), a relative measure of the plumpness or robustness of the fish, was determined by the following formula:

$K = (\text{round weight in g} \times 10^5) \times \text{fork length in mm}^3$

The length composition of the run over time was described statistically by regression analyses on the individual measurements and t-tests on the population means. The data were tested for sex-related differences using binomial t-tests on the mean length, weight, condition, and age. Statistical differences were considered significant if the probability of error was less than 5% ($P<0.05$).

2.3 Commercial Fishery

A commercial harvest was conducted during the weir enumeration of the Kagloryuak River charr population. A holding pen was constructed to hold fish for the commercial harvest. Fish were added to the pen until the harvest took place in August. The fish were measured for round weight and fork length and shipped to Holman round to be frozen for sale.

3.0 RESULTS AND DISCUSSION

3.1 Site Evaluation

The Kagloryuak River drains into the eastern end of Prince Albert Sound. The river divides into three major tributaries; the main one flows approximately 145 km from its headwaters. This watershed drains several large, deep, freshwater lakes which may be utilized as overwintering habitat. The major tributary form the southeast flows into the Kagloryuak River approximately 1.5 km from the coast.

Boat access to the Kagloryuak River is poor and should not be relied upon to conduct a commercial fishery. Drifting pack ice, high winds, fog, and snow interact to prevent reliable boat transportation.

There is good aircraft access for Twin or single Otter equipped with floats on the river just downstream of the first forks. Float planes could also land on the bay at the river mouth.

The weir worked very well and fish were harvested efficiently and in good condition. Because of the reasonable size of the river, the weir can be installed in a period of one day. The width of the stream at the weir location is about 35 m.

3.2 Biological Evaluation

3.2.1 Run Strength and Timing

Between August 11 and September 5 a total of 13,072 charr were counted moving upstream past the weir. A total of 20 charr were counted on the first day that the weir was operating so it is assumed that a small portion of the run was missed. All but one of the charr observed were silver-colored fresh from the sea.

As shown on Figure 2 the Arctic charr run of the Kagloryuak River took place between August 11 and September 5 with the peak occurring on August 28. Charr length did not decrease significantly as the run progressed (Figure 3).

3.2.2 Movements

Tags were placed on a total of 498 Arctic charr from the Kagloyuak River as they passed upstream through the trap. Blue plastic Floy spaghetti tags numbered from FC 72501 to FC 73000 were used and data on the tagged fish is presented in Appendix 1. A total of 3 of the tags in the sequence were destroyed. Following tagging most of the fish moved quickly upstream. Some remained for a short duration in the deeper water just upstream of the trap.

Movement of charr between the various Prince Albert Sound rivers appears to be very limited. None of the fish tagged at the Kagluk River in 1988 and at the Kuuk River in 1987 were recaptured in the weir on the Naloagyok River. Similarly, the weir operation on the Kagluk River in 1988 did not

Figure 2. Daily catches of Arctic charr from the Kagloryuak River, 1990.

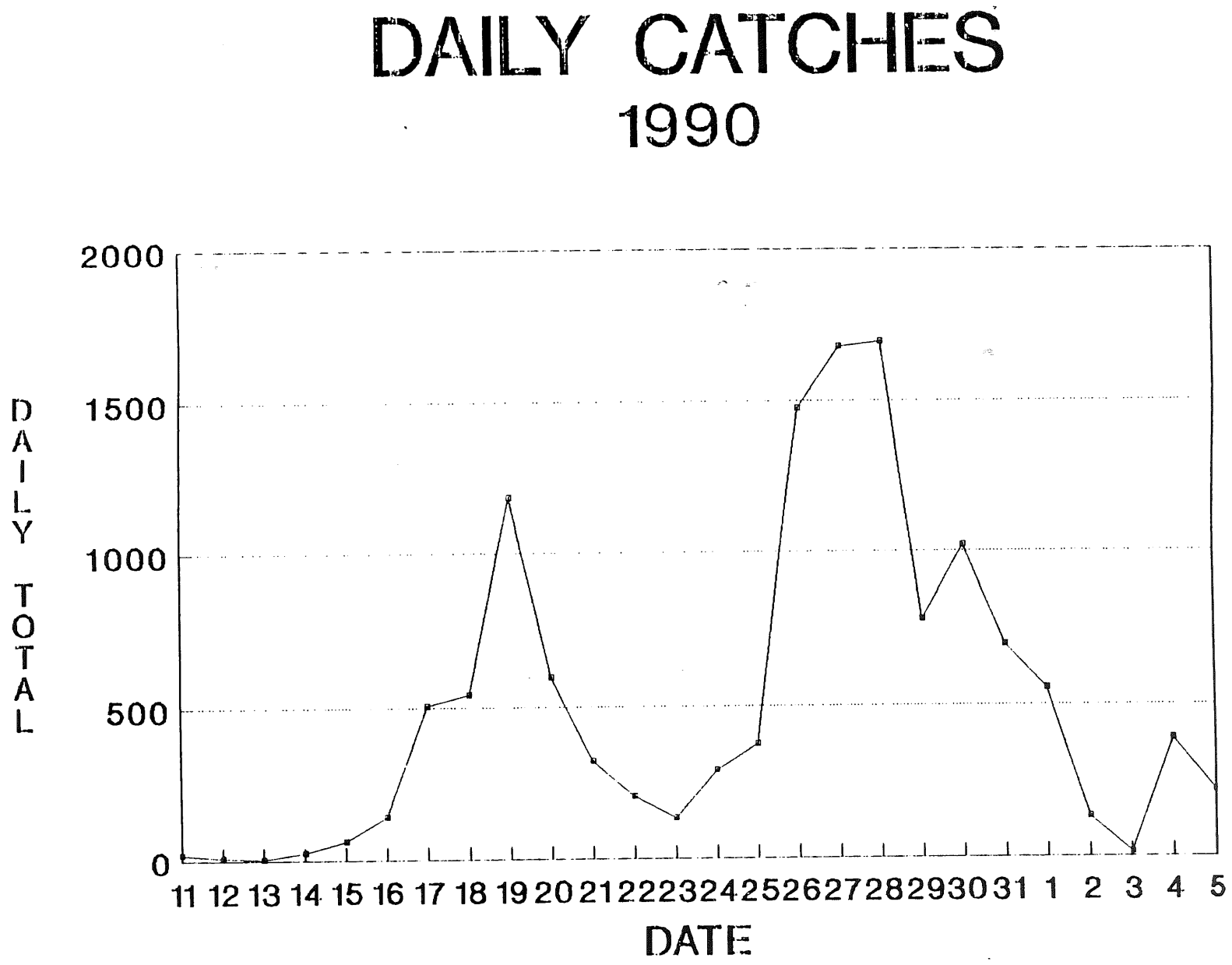
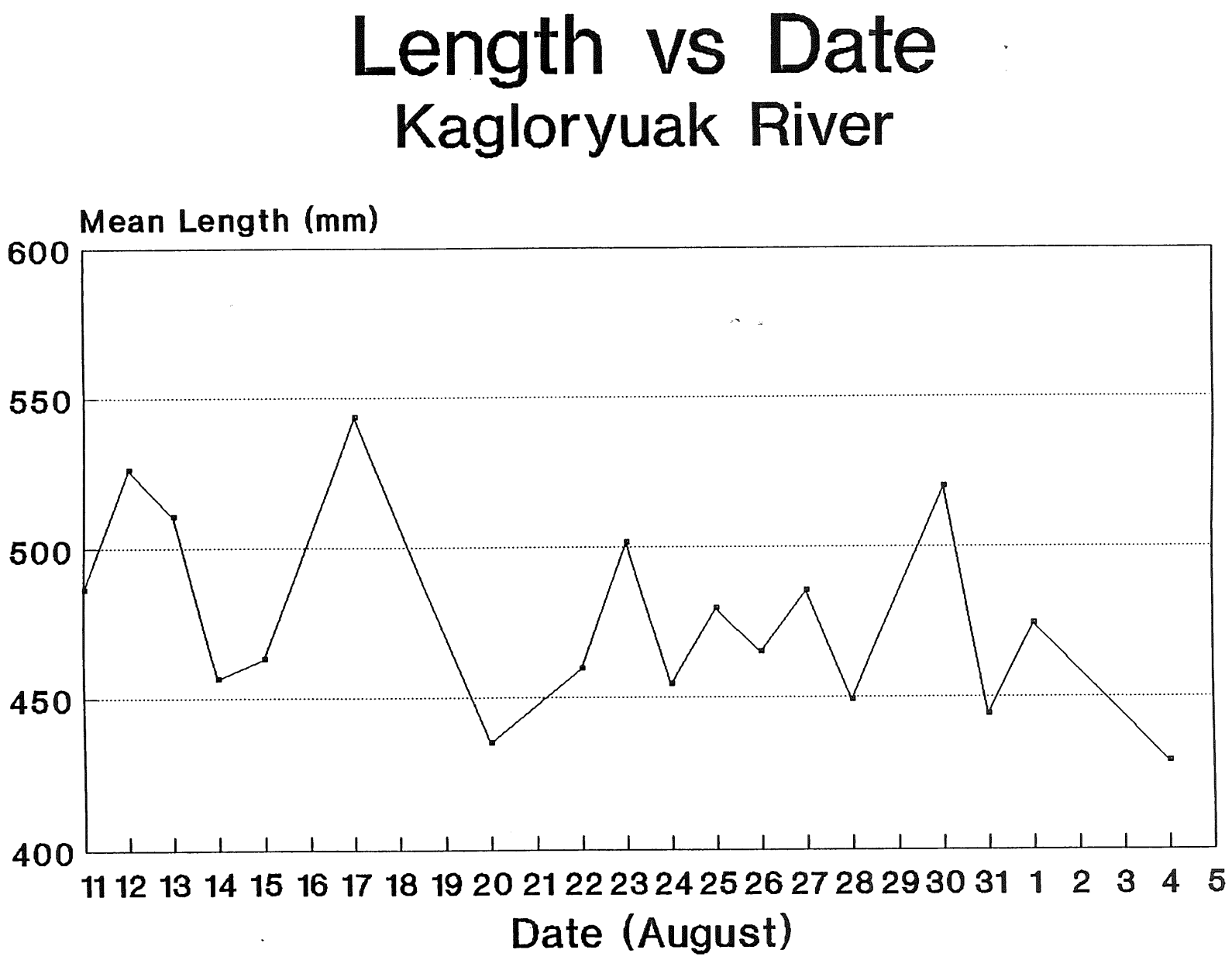


Figure 3. Daily mean lengths of Arctic charr from the Kagloryuak River, 1990.



recapture any of the tagged Kuuk River fish. During this assessment, there were eight charr recatured from the Naloagyok River and five from the Kagluk river. It is, therefore, difficult to make any definitive statements regarding natal stream fidelity of non spawning Prince Albert Sound charr. It would appear, however, that the degree of wandering between watersheds is very limited.

3.2.3 Growth

Fork length was measured for 489 charr which passed through the trap (Figure 4). The mean length of these fish was 457 mm (Table 1). The length frequencies were distributed in a unimodal fashion with maximum representation at the 400-450 mm length interval. Lengths of the upstream migrating population captured ranged from 298 mm to 766 mm.

An age-frequency distribution was not calculated as the sample size was inadequate. Mean age was determined to be 9.9 years. Modal age was found to be 9 years. Ages ranged from 4 to 15 years (Table 2).

The weight at length relationship for anadromous charr is best described by the equation:

$$\log_{10}Y = 3.09 \log_{10}X - 5.22$$

where X is fork length in mm and Y is round weight in g (r^2= 0.98, n = 277). Based on this relationship it appears as though these charr are in good condition.

3.2.4 Sex and Maturity

Sexually mature anadromous charr in Arctic populations seldom spawn every year (Johnson 1980), and there is no adequate classification for multi-year resting fish in the DFO Fish Management maturity code. Following the code, these charr, which have spawned previously but often do not have resorbing or maturing sex products in their gonads, would be incorrectly classified as "immature".

In an attempt to alleviate this problem charr which were not obviously virgin, with small transparent gonads, were classified as "resting".

The age at first maturity was 8 years or younger for males and 8 years or younger for females, and the sex ratio favoured females (F/M = 1.29). Of the 88 migrants sampled, 54% were resting, 43% were

Figure 4. Length-frequency distribution of Arctic charr from the Kagloryuak River, 1990.

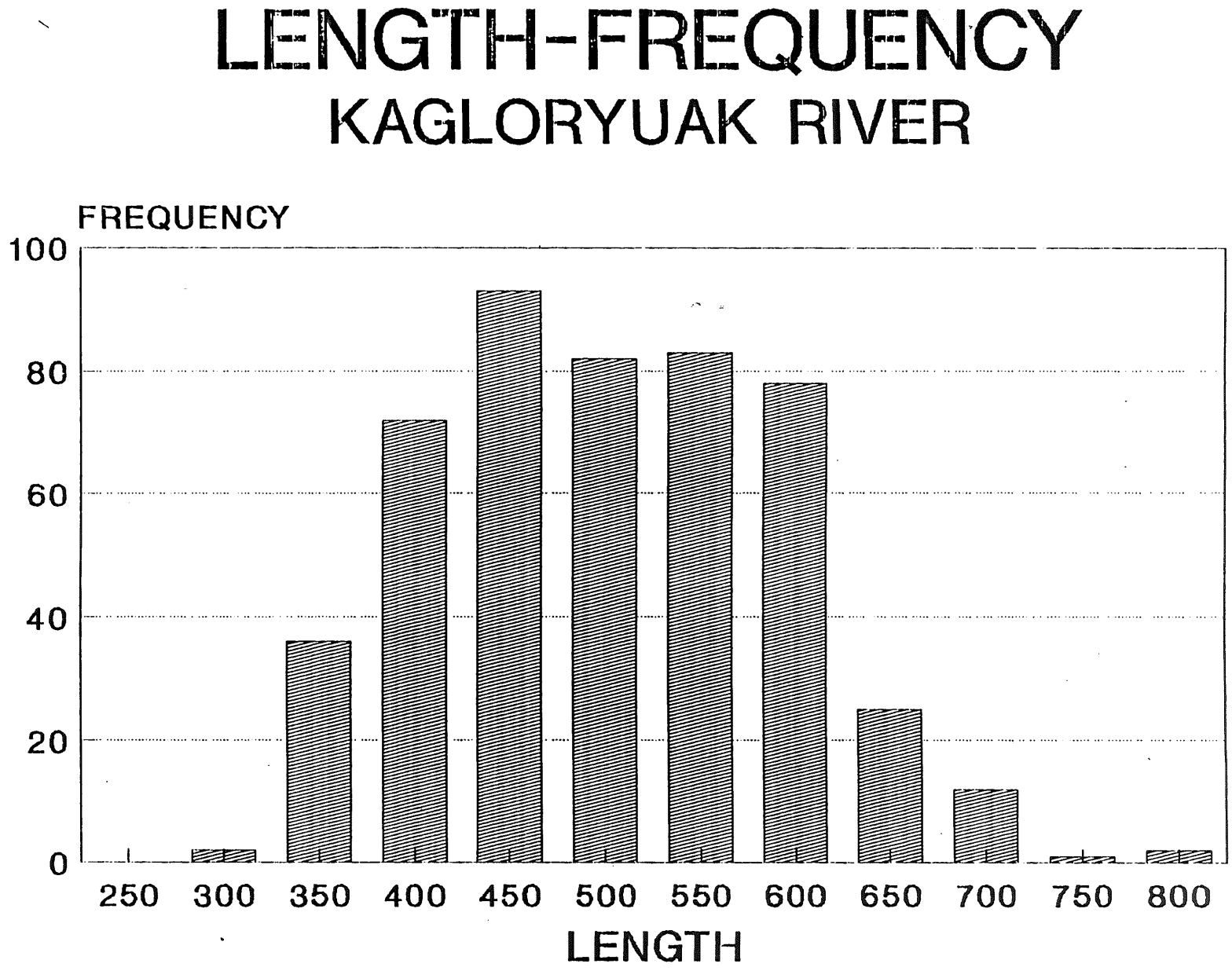


Table 1. Biological data by length interval for arctic charr caught by trap net in the Kagloryuak River (Holman area), August, 1990.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
	LENGTH(MM)		WEIGHT(G)			%	LENGTH(MM)		WEIGHT(G)			%	LENGTH(MM)		WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
100	.	.	.	.	.	.	.	.	.	.	.	.	1	147	50	.	1.57	0
150	.	.	.	.	.	.	1	156	50	.	1.32	0	1	156	50	.	1.32	0
200	1	241	150	.	1.07	0	1	242	150	.	1.06	0	2	242	150	0	1.07	0
250	4	272	213	48	1.04	25	3	262	175	43	0.96	0	7	268	196	47	1.01	14
300	1	319	300	.	0.92	0	7	334	357	45	0.96	0	8	332	350	46	0.96	0
350	3	367	500	87	1.01	0	6	366	475	88	0.96	0	9	367	483	83	0.97	0
400	5	433	840	129	1.03	80	7	421	750	108	1.00	0	12	426	788	121	1.01	33
450	3	484	1250	150	1.10	100	8	468	1025	204	1.01	75	11	472	1086	211	1.03	82
500	4	528	1763	75	1.20	100	8	528	1669	193	1.13	100	12	528	1700	165	1.16	100
550	9	580	2306	232	1.18	100	4	577	2225	275	1.16	100	13	579	2281	238	1.17	100
600	7	618	2771	155	1.18	100	5	610	2670	222	1.18	100	11	615	2745	184	1.18	100
650	1	670	3450	.	1.15	100	.	.	.	.	.	.	1	670	3450	.	1.15	100
TOTAL	38						50						88					
MEAN		492	1616	996	1.12			440	1103	818	1.05			457	1296	930	1.08	

Table 2. Biological data by age group for arctic charr caught by trap net in the Kagloryuak River (Holman area), August, 1990.

AGE (YR)	MALES							FEMALES							COMBINED						
	LENGTH(MM)			WEIGHT(G)			%	LENGTH(MM)			WEIGHT(G)			%	LENGTH(MM)			WEIGHT(G)			%
	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT
4	.	.	.	.	.	.	.	1	156	.	50	.	1.32	0	2	152	6	50	0	1.45	0
5	1	277	.	250	.	1.18	0	1	279	.	225	.	1.04	0	2	278	1	238	18	1.11	0
6	1	287	.	250	.	1.06	100	4	311	47	313	111	1.00	0	5	306	42	300	100	1.01	20
7	3	288	57	250	132	1.00	0	4	353	15	388	85	0.88	0	7	325	49	329	122	0.93	0
8	2	422	30	775	177	1.02	50	6	364	72	533	328	0.98	17	8	378	67	594	306	0.99	25
9	7	425	89	936	541	1.06	71	10	410	68	720	305	0.99	20	17	416	75	809	417	1.02	41
10	6	505	78	1575	628	1.15	83	3	447	41	933	208	1.04	33	9	486	71	1361	600	1.11	67
11	3	570	66	2150	794	1.12	100	5	515	33	1580	337	1.15	100	8	535	52	1794	576	1.13	100
12	10	598	26	2550	306	1.19	100	5	572	59	2180	742	1.12	100	14	588	41	2418	518	1.17	100
13	1	533	.	1650	.	1.09	100	5	561	38	2050	476	1.15	100	6	556	36	1983	456	1.14	100
14	3	626	40	2900	527	1.18	100	2	573	45	2200	849	1.14	100	5	605	46	2620	682	1.16	100
15	.	.	.	.	.	.	.	2	575	6	2200	212	1.16	100	2	575	6	2200	212	1.16	100
TOTAL	37							48							85						
MEAN		497	123	1651	985	1.12			443	114	1128	825	1.05			461	124	1326	931	1.09	
MEAN AGE	10.2							9.7							9.9						

immature 1.5% were mature and 1.5% were unidentified.

3.2.5 Diet

Of the 82 Arctic charr examined for stomach contents, 79% were empty and the remaining ones had small quantities of marine amphipods and fish.

3.2.6 Past and Present Use of the Stock

The Kagloryuak River was a traditional domestic fishery for Inuit before they moved to Holman. There are stone fish caches and tent rings in the area, but it is difficult to access by boat from Holman and has seldom been fished in recent years.

A commercial fishery was opened in 1983 with an annual quota of 4 500 kg. No commercial activity has taken place since. This is largely due to the fact that access to the location is very difficult due to ice conditions.

Of the 489 fish examined, physical damage in the form of scars or net marks, was observed on 1.6% (n = 8) and 9.2% (n = 45) respectively. The scars were slash marks more than likely caused by seals. The net marks, new and old, suggest that the stock is being harvested elsewhere, probably in the Safety Channel area nearly 180 km away.

Recent harvest studies which have been conducted within the ISR have shown that somewhere between 3 000 to 5 000 Arctic charr are taken from the summer coastal fishery, most of which takes place in the Safely Channel area.

While we have evidence to suggest that fish taken at the summer fishery locations are a mixture of Minto Inlet and Prince Albert Sound Arctic charr (Lewis et. al., 1989), we do not yet know what proportion of the stocks from the two general areas are represented. Given the fact that the Safety Channel area is about the same distance from the two above areas, and until we have evidence to suggest otherwise we will assume that each of the stocks are equally represented in the catch.

Assessments carried out in Prince Albert Sound from 1987 to 1990 suggest that the total number of anadromous Arctic charr from this area vulnerable to the domestic fishery and utilizing the marine environment during a certain period of the summer is approximately 48 000 (escapement of

approximately 46 000 plus annual estimated harvest of Prince Albert Sound charr of 2 000). Based on these figures, we must assume that the exploitation rate of this pool of stocks is at about the 4 percent level. Evidence (percentage of total anadromous population with gill net marks) from the individual population assessments suggests that the four populations from this area are equally exposed to exploitation. Therefore, we must assume that all four populations are equally exploited at about the 4 percent level.

3.2.7 Commercial Fishery

A total of 1308.75 kg (559 Arctic charr) of charr were taken from the Kagloryuak River for commercial sale. The entire quota of 1,500 kg was not taken due to the non-availability and cost of aircraft transportation.

Based on a sample of 30 fish, the ratio of round weight to dressed weight was calculated to be 1.13.

3.2.8 South Tributary Monitoring

During the ten day period that hoop nets were set on the tributary of the Kagloryuak River that flows from the southeast, only 7 charr were captured moving upstream and 14 were captured moving downstream. All of the downstream migrants were less than 280 mm in length and all but one of the upstream migrants was longer than 250 mm in length. It would appear as though use of this tributary is very limited as was assumed, based on traditional knowledge.

4.0 RECOMMENDATIONS

The relatively high percentage of net marks on the fish suggests that significant numbers of charr from the Kagloryuak River are already being harvested in other areas. Information from the harvest studies and the assessments of all Prince Albert Sound populations support this supposition and suggest that exploitation may already be as high as 4 percent. Fishery managers believe that annual exploitation at the rate of between 5% and 10% (of charr >400 mm in length) is sustainable by the eastern form of Arctic charr. Therefore, we must conclude that little additional fishing should take place and that the Prince Albert Sound stocks offer limited potential in terms of a commercial fishery. The prospect of any viable commercial fishery will become even less promising

as the human population of Holman increases and the demand for local charr increases.

4.1 Management

i) The Kagloryuak River charr population should only be fished commercially on a biannual basis. The TAC to be taken only every two years should be set at 6% of the total population. This represents a total of 780 fish or a round weight of approximately 1000 kg.

ii) Tag returns from the Holman community summer and fall domestic harvest should be aggresively pursued. A large number of charr have been tagged from four different charr streams in Prince Albert Sound. Valuable information on the degree of mixing of the stocks during the summer feeding period could be obtained from tag returns. It will also give us some indication as to whether our assumption of 4 percent exploitation is reasonable.

iii) The Kuujjua River population should be assessed in 1991 and a proportion of the population tagged (ie. 2000 tags). This will complete the requirements for the formulation of a Fishery Management Plan for Holman. Tag recoveries from the 1992 domestic fishery will also provide more information on the proportion of Minto Inlet versus Prince Albert Sound charr taken in the domestic fishery.

4.2 Research

i) Samples of spawners from the Kagloryuak River stock should be examined for information on maturity and fecundity. Spawners should also be subjected to genetic and morphometric analyses to determine stock identity. Such a sampling program should be carried out in conjunction with sampling of the other three charr streams in Prince Albert Sound. Sea run charr should also be taken at the same time so that a complete assessment of stock identity can be done.

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APPENDIX 1. Tagging record for Kagloryuak River charr, 1990.

Sample Number	Date	Tag Number	Total Length
1	15/08/90	72501	525
2	15/08/90	72502	616
3	15/08/90	72503	485
4	15/08/90	72504	365
5	15/08/90	72505	500
6	15/08/90	72506	496
7	15/08/90	72507	655
8	15/08/90	72508	445
9	15/08/90	72509	535
10	15/08/90	72510	355
11	15/08/90	72511	515
12	15/08/90	72512	565
13	15/08/90	72513	540
14	15/08/90	72514	515
15	15/08/90	72515	485
16	15/08/90	72516	475
17	15/08/90	72517	366
18	15/08/90	72518	585
19	15/08/90	72519	559
20	15/08/90	72520	450
21	15/08/90	72521	450
22	15/08/90	72522	571
23	15/08/90	72523	561
24	15/08/90	72524	515
25	15/08/90	72525	490
26	15/08/90	72526	538
27	15/08/90	72527	509
28	15/08/90	72528	637
29	15/08/90	72529	475
30	15/08/90	72530	545
31	15/08/90	72531	491
32	15/08/90	72532	478
33	15/08/90	72533	372
34	15/08/90	72534	509
35	15/08/90	72535	457
36	16/08/90	72536	515
37	16/08/90	72537	505
38	16/08/90	72538	489
39	16/08/90	72539	553
40	16/08/90	72540	554
41	16/08/90	72541	469
42	16/08/90	72542	543
43	16/08/90	72543	558
44	16/08/90	72544	529
45	16/08/90	72545	565
46	16/08/90	72546	519
47	16/08/90	72547	524
48	16/08/90	72548	455
49	16/08/90	72549	574
50	16/08/90	72550	556
51	16/08/90	72551	559
52	16/08/90	72552	554

Sample Number	Date	Tag Number	Total Length
53	16/08/90	72553	524
54	16/08/90	72554	584
55	16/08/90	72555	569
56	16/08/90	72556	547
57	16/08/90	72557	480
58	16/08/90	72558	578
59	16/08/90	72559	421
60	16/08/90	72560	466
61	16/08/90	72561	372
62	16/08/90	72562	565
63	16/08/90	72563	479
64	16/08/90	72564	369
65	16/08/90	72565	505
66	16/08/90	72566	565
67	16/08/90	72567	510
68	16/08/90	72568	422
69	16/08/90	72569	472
70	16/08/90	72570	435
71	16/08/90	72571	488
72	17/08/90	72572	495
73	17/08/90	72573	554
74	17/08/90	72574	555
75	17/08/90	72575	575
76	17/08/90	72576	587
77	17/08/90	72577	505
78	17/08/90	72578	540
79	17/08/90	72579	470
80	17/08/90	72580	530
81	17/08/90	72581	605
82	17/08/90	72582	600
83	17/08/90	72583	620
84	17/08/90	72584	505
85	17/08/90	72585	540
86	17/08/90	72586	529
87	17/08/90	72587	571
88	17/08/90	72588	629
89	17/08/90	72589	640
90	17/08/90	72590	625
91	17/08/90	72591	496
92	17/08/90	72592	610
93	17/08/90	72593	540
94	17/08/90	72594	540
95	17/08/90	72595	671
96	17/08/90	72596	550
97	17/08/90	72597	621
98	17/08/90	72598	445
99	17/08/90	72599	574
100	17/08/90	72600	556
101	17/08/90	72601	575
102	17/08/90	72602	543
103	17/08/90	72603	578
104	17/08/90	72604	585

Sample Number	Date	Tag Number	Total Length
105	17/08/90	72605	595
106	17/08/90	72606	517
107	17/08/90	72607	570
108	17/08/90	72608	603
109	17/08/90	72609	547
110	17/08/90	72610	595
111	17/08/90	72611	677
112	17/08/90	72612	545
113	17/08/90	72613	545
114	17/08/90	72614	555
115	17/08/90	72615	561
116	17/08/90	72616	640
117	17/08/90	72617	580
118	17/08/90	72618	540
119	17/08/90	72619	535
120	17/08/90	72620	590
121	17/08/90	72621	545
122	17/08/90	72622	645
123	17/08/90	72623	565
124	17/08/90	72624	destroyed
125	17/08/90	72625	530
126	17/08/90	72626	558
127	17/08/90	72627	557
128	17/08/90	72628	592
129	17/08/90	72629	505
130	17/08/90	72630	571
131	17/08/90	72631	585
132	17/08/90	72632	511
133	17/08/90	72633	536
134	17/08/90	72634	539
135	17/08/90	72635	583
136	17/08/90	72636	531
137	17/08/90	72637	640
138	17/08/90	72638	546
139	17/08/90	72639	612
140	17/08/90	72640	508
141	17/08/90	72641	408
142	17/08/90	72642	533
143	17/08/90	72643	392
144	17/08/90	72644	576
145	17/08/90	72645	475
146	17/08/90	72646	546
147	17/08/90	72647	507
148	17/08/90	72648	576
149	17/08/90	72649	590
150	17/08/90	72650	538
151	17/08/90	72651	510
152	17/08/90	72652	570
153	17/08/90	72653	515
154	17/08/90	72654	524
155	17/08/90	72655	605
156	17/08/90	72656	485

Sample Number	Date	Tag Number	Total Length
157	17/08/90	72657	595
158	17/08/90	72658	530
159	17/08/90	72659	631
160	17/08/90	72660	544
161	17/08/90	72661	530
162	17/08/90	72662	575
163	17/08/90	72663	destroyed
164	17/08/90	72664	520
165	17/08/90	72665	600
166	17/08/90	72666	505
167	17/08/90	72667	565
168	17/08/90	72668	595
169	17/08/90	72669	540
170	17/08/90	72670	565
171	17/08/90	72671	615
172	17/08/90	72672	550
173	17/08/90	72673	770
174	17/08/90	72674	525
175	17/08/90	72675	500
176	18/08/90	72676	531
177	18/08/90	72677	536
178	18/08/90	72678	544
179	18/08/90	72679	686
180	18/08/90	72680	546
181	18/08/90	72681	542
182	18/08/90	72682	669
183	18/08/90	72683	530
184	18/08/90	72684	545
185	18/08/90	72685	524
186	18/08/90	72686	611
187	18/08/90	72687	567
188	18/08/90	72688	556
189	18/08/90	72689	549
190	18/08/90	72690	532
191	18/08/90	72691	665
192	18/08/90	72692	554
193	18/08/90	72693	465
194	18/08/90	72694	552
195	18/08/90	72695	445
196	18/08/90	72696	634
197	18/08/90	72697	504
198	18/08/90	72698	521
199	18/08/90	72699	469
200	18/08/90	72700	480
201	18/08/90	72701	404
202	18/08/90	72702	541
203	18/08/90	72703	509
204	18/08/90	72704	607
205	18/08/90	72705	561
206	18/08/90	72706	552
207	18/08/90	72707	538
208	18/08/90	72708	426

Sample Number	Date	Tag Number	Total Length
209	18/08/90	72709	608
210	18/08/90	72710	430
211	18/08/90	72711	540
212	18/08/90	72712	524
213	18/08/90	72713	594
214	18/08/90	72714	451
215	18/08/90	72715	556
216	18/08/90	72716	522
217	18/08/90	72717	537
218	18/08/90	72718	495
219	18/08/90	72719	538
220	18/08/90	72720	571
221	18/08/90	72721	508
222	18/08/90	72722	372
223	18/08/90	72723	557
224	18/08/90	72724	508
225	18/08/90	72725	580
226	18/08/90	72726	455
227	18/08/90	72727	485
228	18/08/90	72728	473
229	18/08/90	72729	545
230	18/08/90	72730	563
231	18/08/90	72731	573
232	18/08/90	72732	402
233	18/08/90	72733	416
234	18/08/90	72734	515
235	18/08/90	72735	508
236	18/08/90	72736	541
237	18/08/90	72737	446
238	18/08/90	72738	535
239	18/08/90	72739	564
240	18/08/90	72740	536
241	18/08/90	72741	428
242	18/08/90	72742	608
243	18/08/90	72743	560
244	18/08/90	72744	528
245	18/08/90	72745	424
246	18/08/90	72746	512
247	18/08/90	72747	586
248	18/08/90	72748	595
249	18/08/90	72749	463
250	18/08/90	72750	570
251	18/08/90	72751	556
252	18/08/90	72752	511
253	18/08/90	72753	515
254	18/08/90	72754	510
255	18/08/90	72755	594
256	18/08/90	72756	513
257	18/08/90	72757	406
258	18/08/90	72758	467
259	18/08/90	72759	415
260	18/08/90	72760	521

Sample Number	Date	Tag Number	Total Length
261	18/08/90	72761	454
262	18/08/90	72762	540
263	18/08/90	72763	426
264	18/08/90	72764	465
265	18/08/90	72765	500
266	18/08/90	72766	485
267	18/08/90	72767	556
268	18/08/90	72768	455
269	18/08/90	72769	705
270	18/08/90	72770	516
271	18/08/90	72771	527
272	18/08/90	72772	514
273	18/08/90	72773	535
274	18/08/90	72774	465
275	18/08/90	72775	527
276	19/08/90	72776	565
277	19/08/90	72777	515
278	19/08/90	72778	520
279	19/08/90	72779	590
280	19/08/90	72780	531
281	19/08/90	72781	destroyed
282	19/08/90	72782	585
283	19/08/90	72783	528
284	19/08/90	72784	595
285	19/08/90	72785	605
286	19/08/90	72786	471
287	19/08/90	72787	531
288	19/08/90	72788	527
289	19/08/90	72789	515
290	19/08/90	72790	524
291	19/08/90	72791	544
292	19/08/90	72792	545
293	19/08/90	72793	531
294	19/08/90	72794	570
295	19/08/90	72795	575
296	19/08/90	72796	535
297	19/08/90	72797	541
298	19/08/90	72798	505
299	19/08/90	72799	510
300	19/08/90	72800	501
301	19/08/90	72801	495
302	19/08/90	72802	531
303	19/08/90	72803	500
304	19/08/90	72804	510
305	19/08/90	72805	571
306	19/08/90	72806	510
307	19/08/90	72807	495
308	19/08/90	72808	614
309	19/08/90	72809	526
310	19/08/90	72810	431
311	19/08/90	72811	411
312	19/08/90	72812	454

Sample Number	Date	Tag Number	Total Length
313	19/08/90	72813	461
314	19/08/90	72814	531
315	19/08/90	72815	525
316	19/08/90	72816	415
317	19/08/90	72817	521
318	19/08/90	72818	571
319	19/08/90	72819	524
320	19/08/90	72820	556
321	19/08/90	72821	516
322	19/08/90	72822	465
323	19/08/90	72823	556
324	19/08/90	72824	459
325	19/08/90	72825	511
326	19/08/90	72826	525
327	19/08/90	72827	634
328	19/08/90	72828	725
329	19/08/90	72829	539
330	19/08/90	72830	585
331	19/08/90	72831	462
332	19/08/90	72832	574
333	19/08/90	72833	555
334	19/08/90	72834	527
335	19/08/90	72835	626
336	19/08/90	72836	622
337	19/08/90	72837	567
338	19/08/90	72838	550
339	19/08/90	72839	570
340	19/08/90	72840	573
341	19/08/90	72841	465
342	19/08/90	72842	509
343	19/08/90	72843	530
344	19/08/90	72844	565
345	19/08/90	72845	475
346	19/08/90	72846	504
347	19/08/90	72847	547
348	19/08/90	72848	568
349	19/08/90	72849	570
350	19/08/90	72850	604
351	19/08/90	72851	500
352	19/08/90	72852	569
353	19/08/90	72853	540
354	19/08/90	72854	557
355	19/08/90	72855	556
356	19/08/90	72856	554
357	19/08/90	72857	540
358	19/08/90	72858	553
359	19/08/90	72859	475
360	19/08/90	72860	512
361	19/08/90	72861	540
362	19/08/90	72862	610
363	19/08/90	72863	552
364	19/08/90	72864	442

Sample Number	Date	Tag Number	Total Length
365	19/08/90	72865	515
366	19/08/90	72866	660
367	19/08/90	72867	543
368	19/08/90	72868	468
369	19/08/90	72869	545
370	19/08/90	72870	467
371	19/08/90	72871	624
372	19/08/90	72872	688
373	19/08/90	72873	530
374	19/08/90	72874	551
375	19/08/90	72875	572
376	20/08/90	72876	562
377	20/08/90	72877	550
378	20/08/90	72878	510
379	20/08/90	72879	511
380	20/08/90	72880	410
381	20/08/90	72881	720
382	20/08/90	72882	529
383	20/08/90	72883	489
384	20/08/90	72884	450
385	20/08/90	72885	505
386	20/08/90	72886	475
387	20/08/90	72887	490
388	20/08/90	72888	549
389	20/08/90	72889	454
390	20/08/90	72890	500
391	20/08/90	72891	522
392	20/08/90	72892	506
393	20/08/90	72893	498
394	20/08/90	72894	511
395	20/08/90	72895	590
396	20/08/90	72896	475
397	20/08/90	72897	495
398	20/08/90	72898	524
399	20/08/90	72899	470
400	20/08/90	72900	473
401	20/08/90	72901	508
402	20/08/90	72902	432
403	20/08/90	72903	526
404	20/08/90	72904	445
405	20/08/90	72905	417
406	20/08/90	72906	415
407	20/08/90	72907	491
408	20/08/90	72908	445
409	20/08/90	72909	493
410	20/08/90	72910	408
411	20/08/90	72911	392
412	20/08/90	72912	455
413	20/08/90	72913	561
414	20/08/90	72914	436
415	20/08/90	72915	576
416	20/08/90	72916	485

Sample Number	Date	Tag Number	Total Length
417	20/08/90	72917	482
418	20/08/90	72918	522
419	20/08/90	72919	411
420	20/08/90	72920	425
421	20/08/90	72921	561
422	20/08/90	72922	437
423	20/08/90	72923	491
424	20/08/90	72924	436
425	20/08/90	72925	605
426	20/08/90	72926	536
427	20/08/90	72927	438
428	20/08/90	72928	481
429	20/08/90	72929	476
430	20/08/90	72930	537
431	20/08/90	72931	506
432	20/08/90	72932	488
433	20/08/90	72933	391
434	20/08/90	72934	458
435	20/08/90	72935	412
436	20/08/90	72936	419
437	20/08/90	72937	418
438	20/08/90	72938	512
439	20/08/90	72939	457
440	20/08/90	72940	430
441	20/08/90	72941	479
442	20/08/90	72942	391
443	20/08/90	72943	468
444	20/08/90	72944	533
445	20/08/90	72945	448
446	20/08/90	72946	351
447	20/08/90	72947	400
448	20/08/90	72948	578
449	20/08/90	72949	510
450	20/08/90	72950	556
451	21/08/90	72951	580
452	21/08/90	72952	410
453	21/08/90	72953	460
454	21/08/90	72954	490
455	21/08/90	72955	398
456	21/08/90	72956	543
457	21/08/90	72957	548
458	21/08/90	72958	446
459	21/08/90	72959	390
460	21/08/90	72960	500
461	21/08/90	72961	385
462	21/08/90	72962	535
463	21/08/90	72963	542
464	21/08/90	72964	420
465	21/08/90	72965	495
466	21/08/90	72966	445
467	21/08/90	72967	552
468	21/08/90	72968	520

Sample Number	Date	Tag Number	Total Length
469	21/08/90	72969	403
470	21/08/90	72970	510
471	21/08/90	72971	445
472	21/08/90	72972	500
473	21/08/90	72973	514
474	21/08/90	72974	413
475	21/08/90	72975	360
476	21/08/90	72976	470
477	21/08/90	72977	458
478	21/08/90	72978	425
479	21/08/90	72979	511
480	21/08/90	72980	378
481	21/08/90	72981	374
482	21/08/90	72982	532
483	21/08/90	72983	440
484	21/08/90	72984	555
485	21/08/90	72985	506
486	21/08/90	72986	365
487	21/08/90	72987	520
488	21/08/90	72988	380
489	21/08/90	72989	515
490	21/08/90	72990	455
491	21/08/90	72991	440
492	21/08/90	72992	375
493	21/08/90	72993	396
494	21/08/90	72994	420
495	21/08/90	72995	360
496	21/08/90	72996	469
497	21/08/90	72997	380
498	21/08/90	72998	420
499	21/08/90	72999	380
500	21/08/90	73000	445