

Canadian Data Report of
Fisheries and Aquatic Sciences No. 834

April 1991

Nekite River Spawning Channel
1990 Operations

by

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Cat. No. FS 97-13/0834E ISSN 0706-6465

Correct citation for this publication:

Bachen, S.K., B.P. Spilsted and R.D. Goruk, 1991. Nekite River
Spawning Channel, 1990 Operations. Can. Data Rep. Fish.
Aquat. Sci. 834. iii + 13p.

ABSTRACT

Bachen, S.K., B.P. Spilsted and R.D. Goruk, 1991.
Nekite River Spawning Channel, 1990 Operations. Can. Data Rep.
Fish. Aquat. Sci. 834. iii + 13p.

The Nekite River spawning channel (Central Coast District, British Columbia) has been operated annually for the enhancement of chum salmon since 1986. This report summarizes the data collected during the 1990 Nekite River spawning channel operation. Chum salmon enumeration, camp operation and maintenance of the spawning channel are described.

RESUMÉ

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Le canal de fraie de la rivière Nekite (district de la région centrale de la côte de la Colombie-Britannique) est exploité chaque année pour la mise en valeur du saumon kéta depuis 1986. Ce rapport renferme les données recueillies au canal durant l'année 1990. Les résultats du dénombrement des saumons kétéas et les opérations du camp et d'entretien du canal de fraie sont présentés.

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INTRODUCTION

The Nekite River flows into the head of Smith Inlet at 51 25'N by 120 10'W in the Central Coast District of British Columbia within the Department of Fisheries and Oceans, Canada, Statistical Area 10 (Fig. 1). The Nekite River spawning Channel was completed in 1986 in response to poor production levels for chum salmon and spawning channel operations for the years 1988 and 1989 has been documented in Winther et al (1989), and Winther et al (1990). The spawning channel is located 10 km upstream from the river mouth and can support 13,000 spawning chum salmon. Figure 2 presents the details of the spawning channel.

METHODS

The Nekite Spawning Channel facility was first opened on August 13th when a three man crew connected water and propane lines to the cabin. The camp was opened, fuel, food and other supplies were hauled to the camp on the logging road. The cabin was in good condition with no sign of vandalism or damage.

There was severe silting in the top portion of the channel caused by the river overflowing the channel intake and channel dyke above the cabin in November 1989. These areas are illustrated in Figure 2.

On August 14th, representatives from the Department of Fisheries and Oceans, Engineering Branch arrived to assess the channel damage and meet the contractor who did the repairs. The contractor arrived on August 15 with heavy equipment and initiated repairs.

However, before repairs commenced, a fry splitter was installed in the lower channel. The fry splitter was assembled at the site and placed just above the first settling pool at the entrance to the channel (Fig. 2).

Repairs started by removing gravel and debris that had sloughed into the channel. Ramps were dug along each side of the settling basin near the intake area (Fig. 2). These ramps enabled the equipment to reach into the basin to clean out silt and other debris. The material from these ramps and the basin was then used to raise the level of the dike. The road over the intake and dike to the area behind the cabin was raised approximately 3 feet. Most of the material to build up these areas was taken from a gravel pit approximately half mile from the channel site. The 1-1/2 inch camp waterline was also buried in the dike, and a 500 gallon reservoir installed on top of the hill overlooking the cabin.

Repairs were completed on August 23rd, at which time the camp was closed until September 13. There were no chum salmon in the spawning channel at this time, but there were chums in the deep pools throughout the river. The river water was very low and warm at this time.

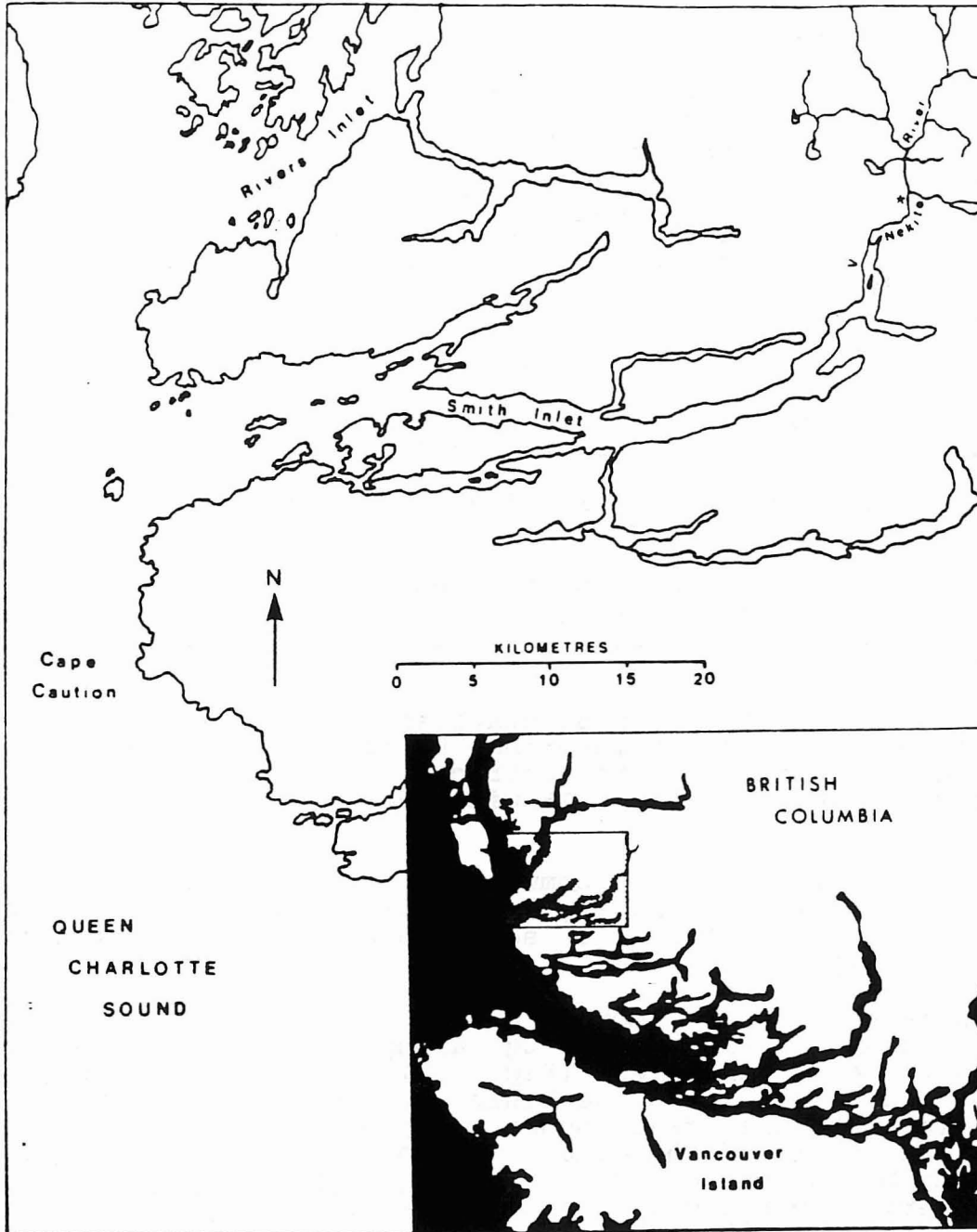


Figure 1: Location of the Nekite River, British Columbia, Canada. The > indicates the log dump and the * indicates the spawning channel site.

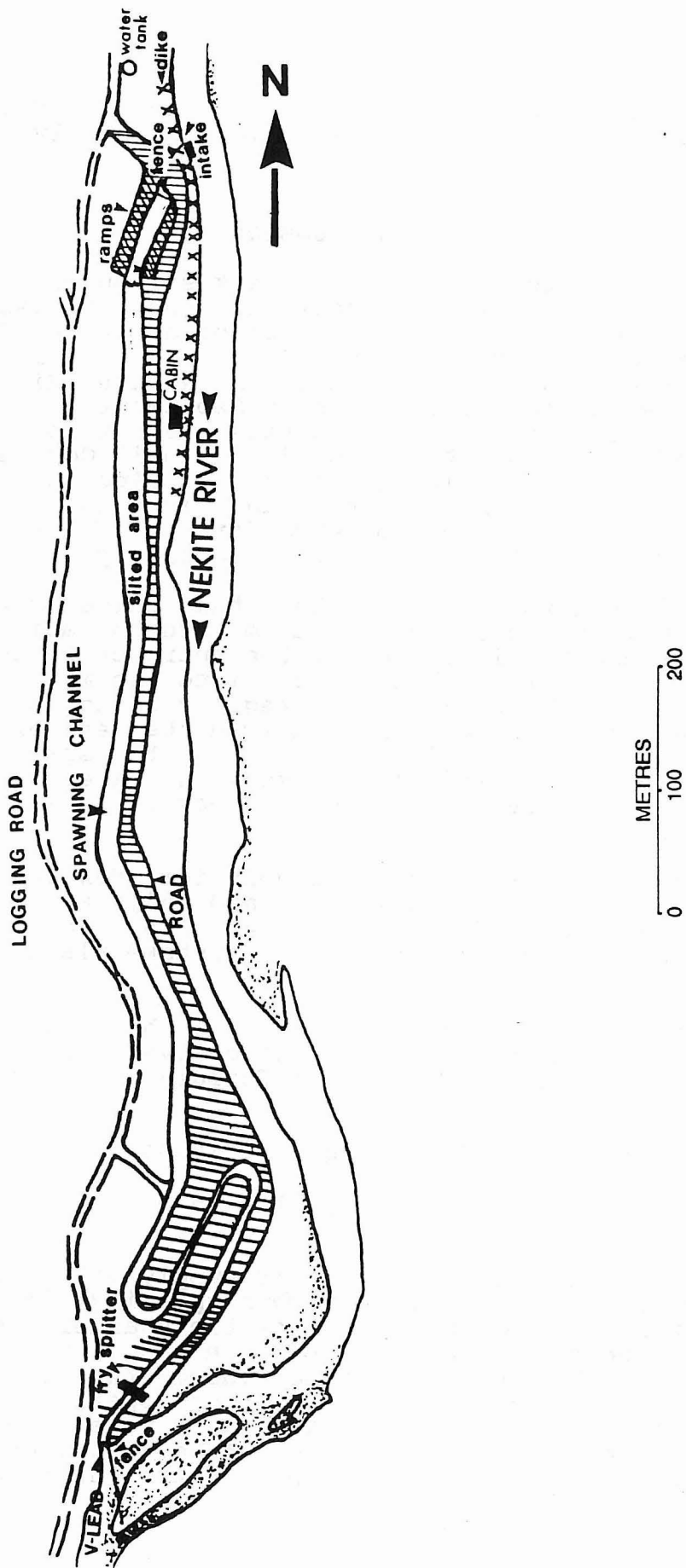


Figure 2. Detail of the Nekite River spawning channel.

On September 13th, the camp was again opened. Equipment and supplies were transported to the camp which was fully operational September 14.

RESULTS AND DISCUSSION

On September 14th, 1000 chum and 30 Pink salmon were counted in the channel. There were also a number of chum carcasses in the channel. The spawning channel was counted twice daily from September 14th through to October 19th (Fig. 3). Table 1 presents daily counts of chum and pink salmon in the Nekite River spawning channel. The first carcass count was on September 17th, when 539 male and 200 female chum salmon carcasses were removed from the channel. The dead pitch operation continued until October 18th and is documented in Table 2. Biological data collected from Nekite River spawning channel chum salmon dead pitch is presented in Appendix 1. The total chum escapements for the Nekite River and spawning channel were 30,000 and 11,000 respectively.

During the first days in camp, the intake culverts were fenced off as the chums were escaping through them into the main river. At the same time a V-lead was installed at the entrance to the spawning channel to stop the fish from backing out into the main river (Fig. 2). The V-lead had to be repaired on a regular basis as bears would knock it over. A fence was also placed from the end of the V-lead out across the main river to divert chums into the spawning channel (Fig. 2). This lead was difficult to keep in place as high water, bears or a build up of carcasses would knock it over. Chainlink fencing was used for these fences.

Weather conditions and water levels for Nekite River and spawning channel are presented in Table 3 and daily water levels for the Nekite River are graphed in Figure 4. The river levels were taken from the staff/gauge on the water intake platform for the channel.

The relationships between nose-fork and hypural lengths for female and male chum salmon for the Nekite River spawning channel are presented in Figures 5 and 6. The formula for the regression lines are:

FEMALE: $NF = 1.19(\text{Hyp. Length}) + 10.06$

MALE: $NF = 1.37(\text{Hyp. Length}) - 65.5$

During the spawning period, the water supply valves were opened to their full position. The heaviest chum spawning in the channel was from the channel entrance (bottom of the channel) to the area below the cabin. The area above this section had very few spawners, most likely due to the heavy silting caused the previous year. Large numbers of chum salmon would hold in the upper settling basin, and fall back onto the spawning beds when they were ready to spawn. If bears or high water knocked the culvert fence down, most of these fish would escape into the main river through the culverts.

Table 1. Salmon counts in the Nekite River spawning channel, 1990.

Date	Chum Count		Pink Count	
	am	pm	am	pm
14-Sep	900	1010	20	30
15-Sep	1140	1224	37	59
16-Sep	1145	1250	81	100
17-Sep	1345	1375	78	115
18-Sep	4330	4100	200	230
19-Sep	1950	2660	70	200
20-Sep	2110	2380	200	225
21-Sep	2020	2110	240	260
22-Sep	1910	1830	170	183
23-Sep	1840	1820	150	135
24-Sep	2030	1870	150	153
25-Sep	1943	2125	225	207
26-Sep	1516	1673	210	241
27-Sep	1569	1734	260	287
28-Sep	3000			
29-Sep	2015	1857	293	250
30-Sep	1767	1589	270	285
01-Oct				
02-Oct	1718	1930	410	379
03-Oct	1940		300	
04-Oct	1450	1675	375	400
05-Oct	829	978	125	125
06-Oct	648	560		150
07-Oct	485	425	100	
08-Oct	350	330	70	70
09-Oct				
10-Oct	275	250	50	50
11-Oct	235	230	50	50
12-Oct	234	249	25	25
13-Oct	210	170	20	20
14-Oct	170	130	20	20
15-Oct	95	67	25	20
16-Oct	63	55	15	20
17-Oct	48	43	17	20
18-Oct	32	33	15	15
19-Oct	21	25	10	15

Table 2. Chum salmon dead pitch in the Nekite River spawning channel, 1990.

Date	Number Dead		Cumulative total	
	Male	Female	Male	Female
17-Sep	539	200	539	200
18-Sep	69	38	608	238
19-Sep	73	49	681	287
20-Sep	111	89	792	376
21-Sep	181	87	973	463
22-Sep	107	63	1080	526
23-Sep	168	99	1248	625
24-Sep	219	121	1467	746
25-Sep	218	163	1685	909
26-Sep	346	304	2031	1213
27-Sep	198	154	2229	1367
28-Sep	64	39	2293	1406
29-Sep	198	150	2491	1556
30-Sep	272	209	2763	1765
01-Oct			2763	1765
02-Oct	91	53	2854	1818
03-Oct			2854	1818
04-Oct			2854	1818
05-Oct	331	299	3185	2117
06-Oct	155	168	3340	2285
07-Oct	57	82	3397	2367
08-Oct	33	40	3430	2407
09-Oct			3430	2407
10-Oct	52	44	3482	2451
11-Oct			3482	2451
12-Oct	15	26	3497	2477
13-Oct	10	14	3507	2491
14-Oct	22	17	3529	2508
15-Oct	18	13	3547	2521
16-Oct	11	6	3558	2527
17-Oct	9	8	3567	2535
18-Oct	5	2	3572	2537

Table 3. Weather and water conditions for the Nekite River and spawning channel from September 14 to October 23, 1990.

Date	Weather		River Level (ft.)		Water Temperature ($^{\circ}$ C)	
	am	pm	am	pm	Channel	River
14-Sep	clear, sunny	clear, sunny	N/A	1.6	N/A	N/A
15-Sep	clear, hot	overcast, windy	1.6	1.5	N/A	N/A
16-Sep	light rain	drizzel, windy	1.7	1.7	N/A	N/A
17-Sep	overcast, warm	overcast, warm	1.7	1.6	N/A	N/A
18-Sep	heavy rain	broken cloud	5.0	4.0	N/A	N/A
19-Sep	sunny, warm	sunny, warm	2.5	2.3	N/A	N/A
20-Sep	sunny, warm	sunny, warm	1.9	1.9	N/A	N/A
21-Sep	sunny, warm	sunny, warm	1.9	1.9	N/A	N/A
22-Sep	sunny, warm	sunny, warm	2.0	2.0	N/A	N/A
23-Sep	cloudy	clear, windy	2.1	2.1	N/A	N/A
24-Sep	cloudy, cool	overcast, cool	2.0	2.0	N/A	N/A
25-Sep	sunny, warm	sunny, warm	2.0	1.9	N/A	N/A
26-Sep	sunny, warm	sunny, warm	1.6	1.7	N/A	N/A
27-Sep	sunny, warm	high clouds	1.3	1.3	12.0	11.0
28-Sep	overcast, rain	rain, windy	7.9	8.8	11.0	11.0
29-Sep	sunny, cool	sunny, warm	3.7	3.1	10.0	10.0
30-Sep	slight ov/cast	sunny periods	2.3	2.0	11.0	10.0
01-Oct	heavy rain	heavy rain	above marker		9.0	9.0
02-Oct	heavy rain	heavy rain	9.9	10.0	9.0	9.0
03-Oct	heavy rain	heavy rain	16.0		8.0	8.0
04-Oct	overcast, cool	rainy periods	17.0		8.0	8.0
05-Oct	broken cloud	sunny, warm	8.0	7.1	9.0	9.0
06-Oct	rainy periods	rainy periods	6.0	5.3	8.0	8.0
07-Oct	low overcast	rain	6.5	8.0	8.0	8.0
08-Oct	overcast, rain	overcast, rain	10.5	13.0	8.0	8.0
09-Oct	overcast, rain	rain, cold	above marker		N/A	N/A
10-Oct	broken cloud	sunny periods	9.5	8.5	8.0	7.0
11-Oct	overcast, rain	overcast, rain	6.5	12.5	7.0	7.0
12-Oct	overcast, rain	overcast, rain	11.7	13.0	7.0	7.0
13-Oct	overcast, rain	some breaks	10.3	9.5	7.0	7.0
14-Oct	overcast, cold	sunny, cold	8.2	6.1	8.0	7.0
15-Oct	overcast, cold	rain	5.1	4.9	6.0	6.0
16-Oct	sunny, cool	high cloud	4.6	4.5	6.0	6.0
17-Oct	rain, windy	rain, cold	4.7	5.5	6.0	6.0
18-Oct	rain, cold	rainy periods	12.1	10.5	6.0	6.0
19-Oct	overcast, cold	rainy periods	6.9	6.3	6.0	6.0
20-Oct	raining	raining				
21-Oct	N/A	N/A				
22-Oct	raining	raining				
23-Oct	raining	raining				
24-Oct	broken cloud	broken cloud				

Figure 3. Maximum number of chum salmon counted per day in the Nekite River spawning channel, 1988 - 1990.

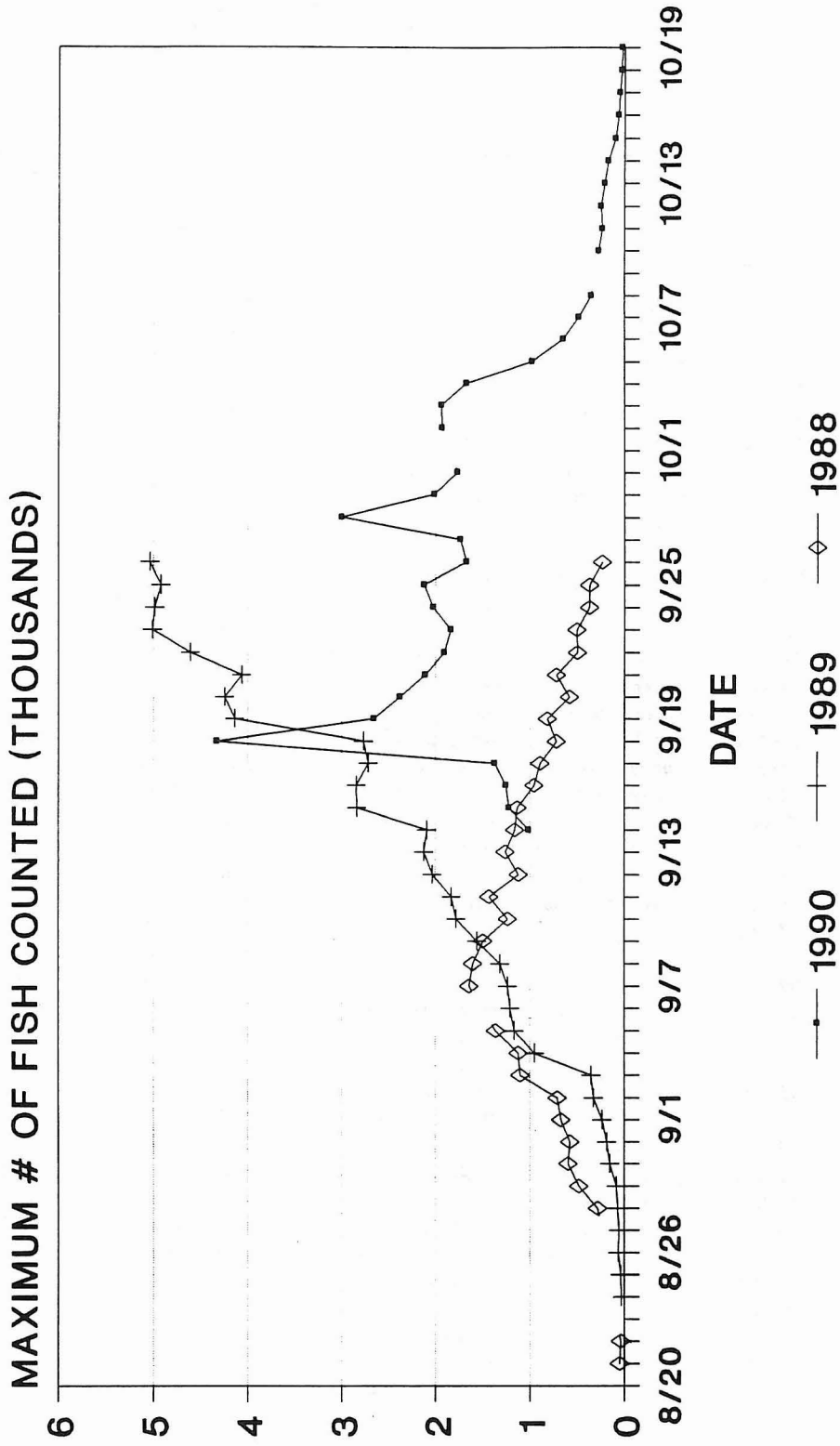
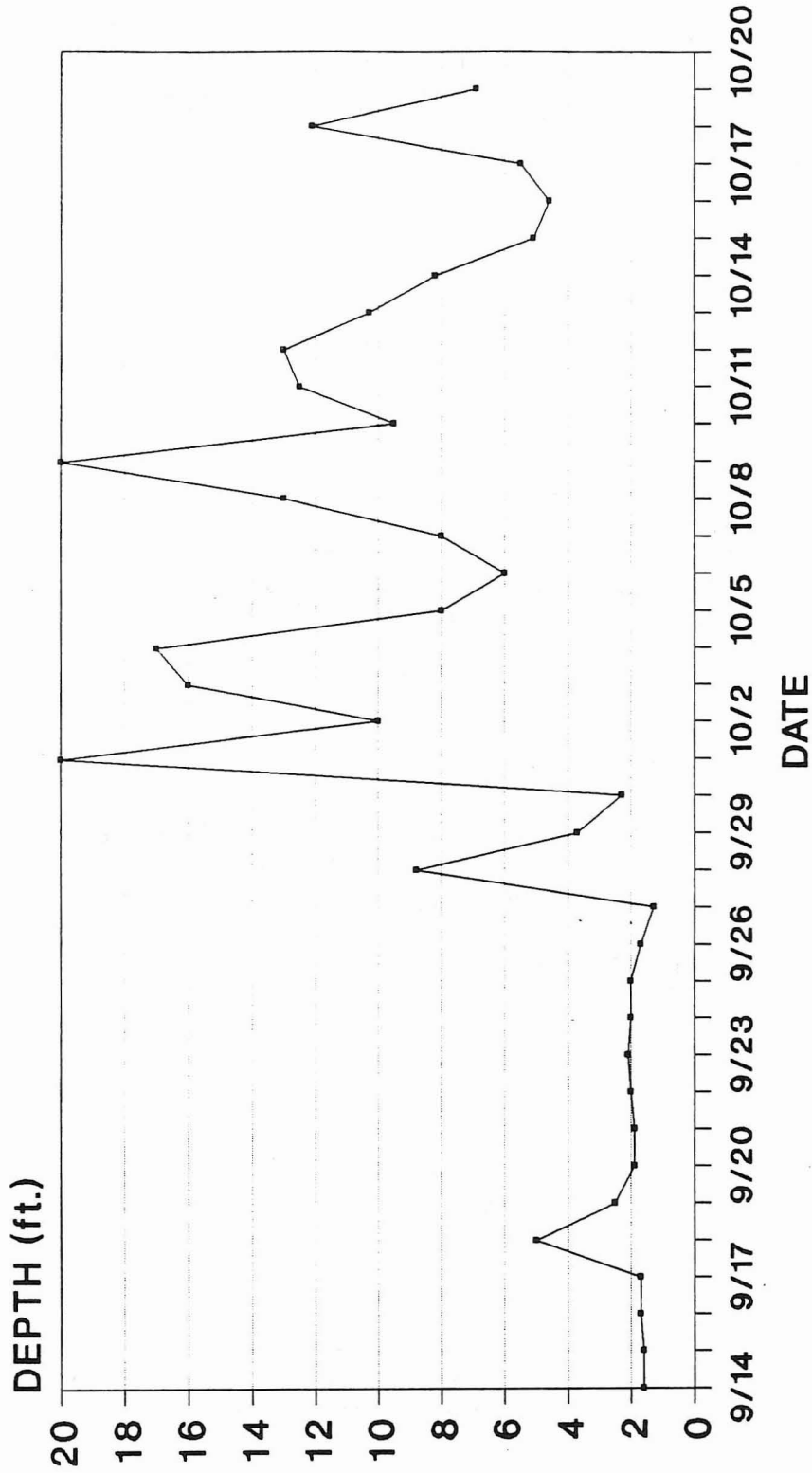


Figure 4. Water levels for Nekite River
1990



—•— Daily water level

Note: River level above marker on Oct. 1 and Oct. 9.

Figure 5. 1990 Nekite River Spawning Channel - Female Chum
Nose-fork length vs. hypural length

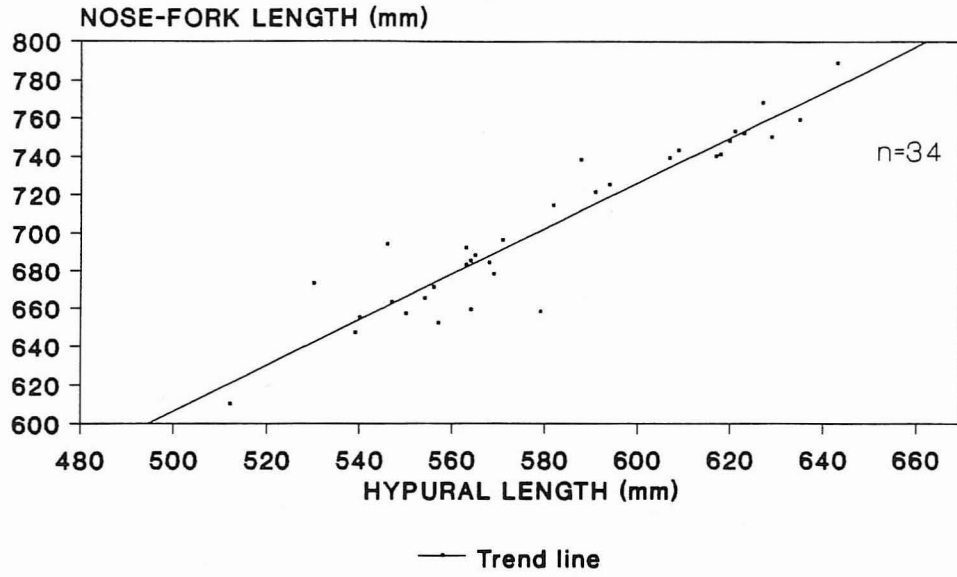
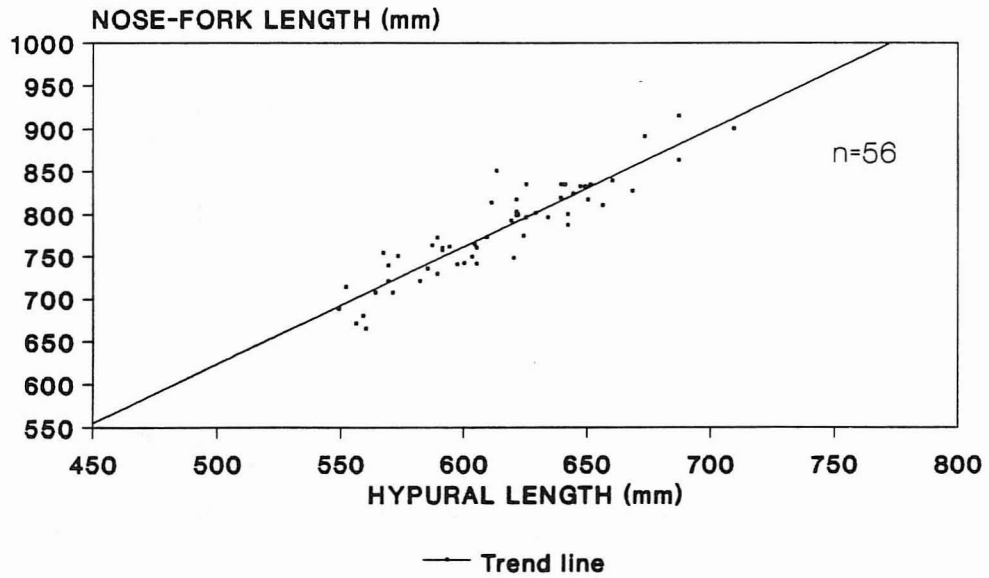


Figure 6. 1990 Nekite River Spawning Channel - Male Chum
Nose-fork length vs. hypural length



It appears that when the river rises and there is more flow through the channel, chum tend to move into the channel more readily. During low to normal flow, there is very little current at the mouth of the channel to entice the chum in. It is possible that, if the entrance was built to resemble a riffle, there would be no problem filling the spawning channel to capacity.

During the season, a storage area was constructed on the back of the cabin. This was used to keep extra building materials, generators, water pumps and other tools and equipment. Also the interior of the cabin was painted and flooring installed in the bedrooms.

A larger storage building is needed to house fuel and All Terrain Vehicles to prevent Grizzly bears damaging equipment. Tires, seats, rubber hoses, propane lines and jerry cans have all been targeted in the past. It would be best to build a metal structure to comply with the storage of flammable goods and W.H.M.I.S. Regulations.

A second All Terrain Vehicle is also needed in the camp. The Honda Four Track presently used is ideal for the type of work in the facility and is also well suited for hauling equipment up the road.

The Nekite River Spawning Channel has had a crew assessing the escapement of chum salmon into the channel for 3 years.

1988 - August 21 to September 25.
 1989 - August 24 to September 26.
 1990 - September 14 to October 19.

CONCLUSIONS

The following is a comparison of chum mortalities in the spawning channel for the years 1988 - 1990:

On August 21, 1988 there were 53 chum salmon in the channel. The first chum mortalities were on September 3, when 13 carcasses were pitched from the channel. At this time there were 1100 spawning chum in the channel. On September 26 there were 237 spawners in the channel, and 47 carcasses pitched out.

On August 24, 1989 there were 30 chum salmon in the channel and the first mortalities were observed on September 8, when 15 carcasses were pitched out of the channel. At this time there were 1319 spawning chum in the channel. When the program was terminated on September 26, there were 5032 chum salmon in the channel and 187 carcasses pitched out.

On August 23, 1990 there were no chum in the channel. On September 14th, there were 1010 chum spawners in the channel and on the 17th, 739 carcasses were pitched from the channel. On October 19th, 25 chum were counted, and on the 18th, 7 carcasses were dead pitched out.

From this information, it appears the best period to operate the spawning channel in order to cover the majority of the run, catch the peak and end up with a reasonable escapement number, would be from the beginning of September to approximately mid October.

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APPENDIX 1. Biological data for Nekite River spawning channel chum salmon dead pitch.

#	Sex	Hypural Length (mm)	N/F Length (mm)	Scale Age	Egg Retention	#	Sex	Hypural Length (mm)	N/F Length (mm)	Scale Age	Egg Retention
1	M	552	714	3		51	F	627	768	4	2
2	M	605	741	NP		52	M	621	798	4	
3	F	547	663	3	42	53	F	512	610	3	13
4	M	651	834	4		54	F	539	647	RS	0
5	F	565	688	4	17	55	F	569	678	4	297
6	F	607	739	4	20	56	F	579	658	4	35
7	M	625	834	4		57	F	609	743	4	13
8	M	609	773	4		58	F	623	752	4	7
9	M	589	729	4		59	F	618	741	UD	5
10	F	594	725	4	462	60	F	582	714	4	52
11	M	668	827	4		61	M	644	824	4	
12	M	556	671	4		62	F	557	652	4	0
13	M	567	754	4		63	F	588	738	4	4
14	F	517	758	4	121	64	M	649	832	4	
15	M	634	796	4		65	M	687	915	4	
16	M	639	834	RS		66	F	629	750	4	0
17	M	619	792	4		67	M	585	735	UD	
18	M	549	688	4		68	M	673	891	4	
19	M	629	801	4		69	M	647	832	4	
20	M	624	774	4		70	F	554	665	4	105
21	M	571	707	4		71	F	568	684	4	3
22	M	621	803	4		72	M	589	772	4	
23	F	563	692	4	4	73	F	540	655	4	4
24	M	621	817	4		74	F	530	673	4	2
25	M	560	665	4	83	75	M	641	834	4	
26	M	625	796	4		76	M	591	757	4	
27	M	564	707	4		77	F	635	759	4	0
28	M	594	761	4		78	F	550	657	3	0
29	M	587	763	4		79	F	564	659	3	42
30	F	563	683	4	3	80	F	546	694	4	5
31	M	613	850	4		81	M	611	813	5	
32	M	642	800	5		82	M	569	721	3	
33	M	591	760	4		83	F	643	789	RG	2
34	M	660	839	4		84	F	556	671	4	3
35	M	687	863	4		85	M	569	739	3	
36	M	605	760	UD		86	M	603	749	4	
37	F	620	748	RS	63	87	M	597	740	4	
38	M	604	764	3		88	F	621	753	4	2
39	M	656	810	4		89	M	600	742	RG	
40	M	709	900	W		90	M	639	819	UP	
41	M	559	680	UD		91	F	571	696	3	0
42	M	650	817	RS							
43	F	591	721	4	FULL						
44	F	617	740	4	3						
45	F	564	685	4	123						
46	M	642	787	4							
47	M	582	721	4							
48	M	622	799	4							
49	M	573	750	UD							
50	M	620	748	UD							