ANNUAL REPORT FOR TOBOGGAN CREEK HATCHERY OPERATIONS IN 1996/97

Toboggan Creek Salmon and Steelhead
Enhancement Society

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Contract # : FP96 - 5089

Financial Code : 0000-1245-0302

Contract Period : August 1, 1996 - July 31, 1997

Introduction

The Toboggan Creek Salmon Hatchery, with the direction of the Toboggan Creek Salmon and Steelhead Enhancement Society, has just now completed its twelfth year of successful operations. The Toboggan Creek facility is located thirteen kilometers north-northwest of Smithers, British Columbia, on Highway 16 West (Fig. 1). The facility is located on C.N.R. right-of-way which is in turn leased to Fisheries and Oceans Canada for a nominal fee for use as the fish hatchery grounds. Funding for this contract is provided yearly by the federal Department of Fisheries and Oceans under the Community Involvement Division of the Salmonid Enhancement Program.

Over the past 30 years, and in particular during the 1980's, stocks of both coho and chinook salmon native to Skeena River tributaries were severely impacted by Alaskan and Canadian ocean fisheries. The situation has now become even more of an issue with coho escapements in recent years. Chinook have had somewhat better escapements recently although some stocks are still at depressed levels. The upper Bulkley chinook stock, a genetically unique population of salmon, has seen only 190 to 200 wild spawners in recent years. This fish stock is heavily impacted by an Indian gaff fishery at Moricetown Falls on the lower Bulkley River near Smithers, B.C.

The Toboggan Creek facility, constructed during 1984/85, has been attempting to preserve and enhance endangered stocks of both of the aforementioned salmon species. During the 1996/97 contract period our Society reared and released some 100,000 coho and 92,000 chinook salmon from the 1995 brood year. As well, we provided local P.I.P. projects and school classroom incubators with another 10,000 coho eggs and fry. Successful rearing of over 187,000 chinook and coho from the 1996 brood continues, with most releases set for the spring of 1998.

Egg targets for 1996 brood chinook, from the upper Bulkley River, were achieved and at the present we have approximately 95,000 fingerlings rearing at the hatchery. Chinook spawning escapements to the upper Bulkley were up substantially from a year previous, with 1,027 chinook adults estimated in 1996 as compared to 334 in 1995. The wild component was around 60 %, which was encouraging, and totalled over 600 chinook adults.

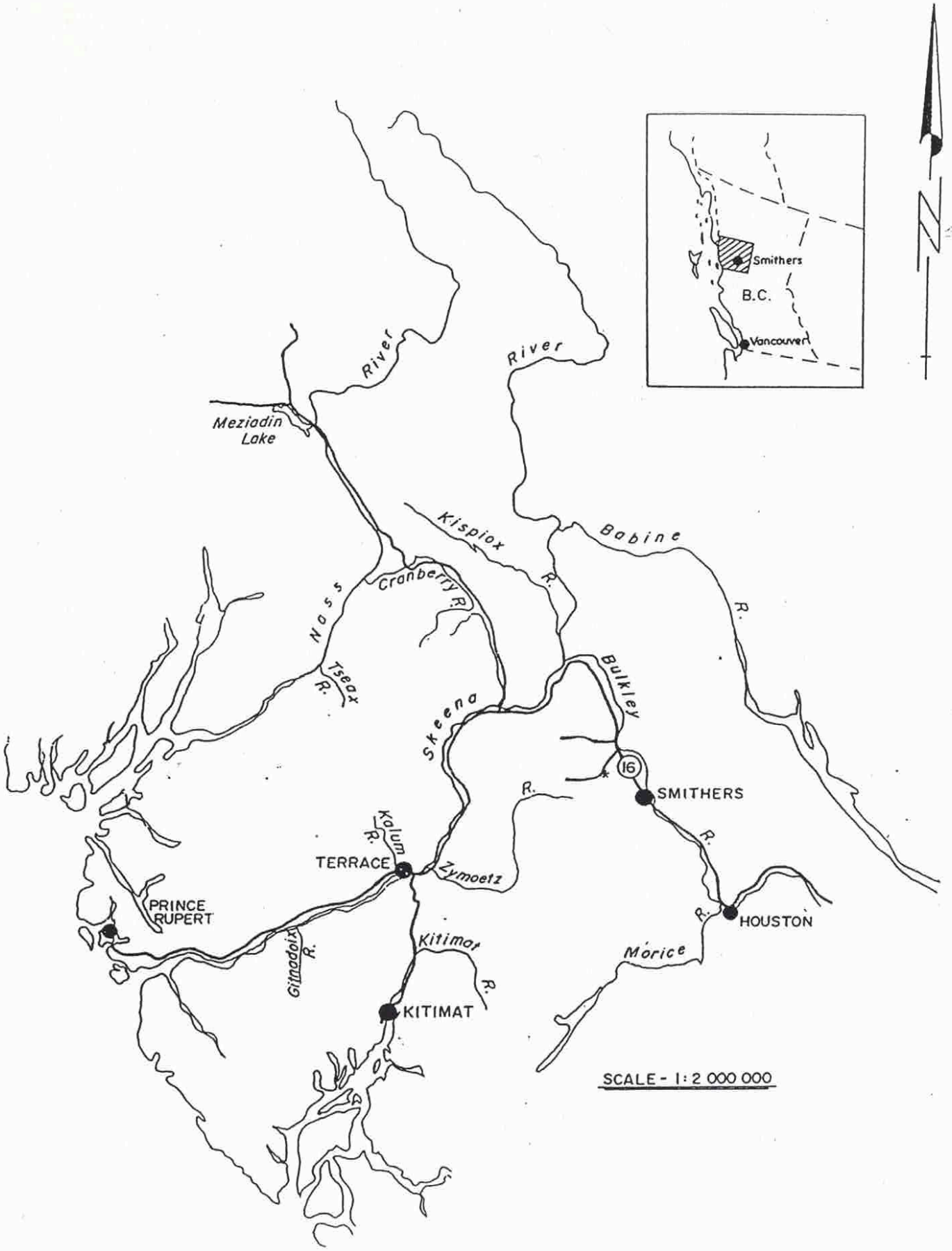

Fig.1 Location of Toboggan Creek Hatchery near Smithers, B.C. *

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Coho returns to most upper Skeena tributaries in 1996 were down significantly, only 1,185 spawners were estimated in the Toboggan Creek system. This is the lowest recorded return for any Toboggan fence count. Overall exploitation of coho still is very high, especially in the commercial ocean fishery and in the Indian food fishery at Moricetown Canyon. Escapements to the upper Bulkley River system were also very low, a total of 230 spawners were estimated of which just over one third were wild fish. Despite these low numbers egg collection for 1996 brood coho enhancement went well, with the assistance of both counting fences for adult broodstock collection, and we were able to attain our egg target. Presently, we have 92,000 coho fingerlings rearing at the hatchery.

The Toboggan Creek Hatchery has the capacity to rear 155,000 coho and chinook salmon smolts from the Bulkley River system on a yearly basis. Initial incubation is accomplished using moist incubators and eggs are transferred to Heath stacks at the eyed stage, egg to fry survivals are usually over 93.0 %. Ponding and initial rearing is done in Capilano troughs and the fingerlings are transferred to an earthen rearing channel prior to the winter period to make way for the ponding of fry from the following brood year. Smolt releases occur in April and May to coincide with peak migration of wild smolts to the ocean. Ponding to release survivals usually exceed 95.0 %, a period of 12 months. Two full-time personnel are required to operate the facilty and extra manpower is hired during the summer and fall periods as needed.

The coho counting fence panels were installed on August first this year. This enabled an accurate assessment of our ninth major return of hatchery-produced coho to Toboggan Creek. The fence data indicated hatchery returns of 216 marked coho in 1996, from a release of 33,948 smolts this is a 0.6 % return. Preliminary coded-wire tag data from the northern troll and net fisheries indicate poor ocean survival of the stock after reaching the ocean as smolts. The data indicate a total adult recruitment of 817 coho from the release, at a 2.4 % survival it is a relatively poor success from smolt to adult. The rate of exploitation was up substantially from 1995, climbing back up over the 70 % threshold again. This is a full 20 % higher than the upper limits recommended by the DFO coho scientists.

Around 16.4 % of Toboggan coho handled in 1996 were adipose-clipped hatchery salmon, and we estimate that the total coho run was approximately 18.2 % hatchery clips. The marked coho appear to make up a larger proportion later in the migration.

Our hatchery facility is frequented by over 2,000 visitors on a yearly basis and our Society encourages the public to learn more about the salmonid resource in British Columbia. Members of the Toboggan Creek Salmon & Steelhead Enhancement Society greatly appreciate the opportunity to be involved in efforts to enhance and conserve the wild salmon stocks of this area.

Objectives

i) enhance stocks of anadromous fish species in the Bulkley-Morice drainage which are identified as being below historic levels.

ii) provide coded - wire tagged groups of salmon from Bulkley - Morice stocks to aid in identifying the movements, timing and exploitation of these fish through the various ocean and river fisheries.

iii) assess returns of hatchery produced salmon to the stream of origin to determine escapement of adult spawners and therefore aid in identifying smolt to adult survivals and total exploitation rates.

iv) maintain a high public profile of the facility to inform the local population of the benefits and goals of the Community Involvement and Salmonid Enhancement Programs.

v) provide employment and training for local school students in the Bulkley Valley area.

vi) develop a core of qualified local people that can be depended upon to accomplish the various goals and objectives with respect to progressive fish culture in the upper Bulkley - Morice drainages.

Water Supplies (1996/97)

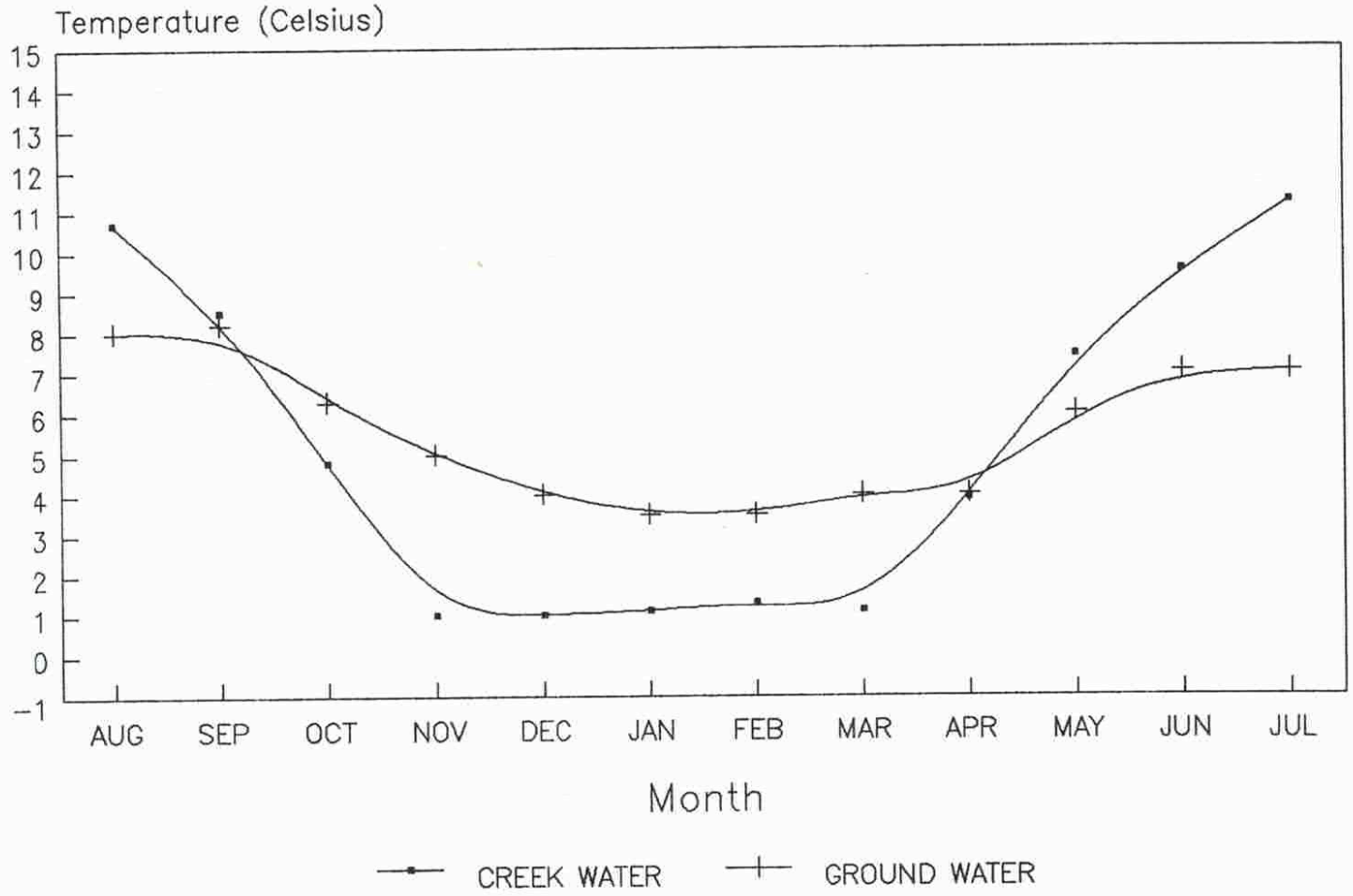
As for the previous years, the average daily temperatures of the three hatchery water sources were recorded and average weekly temperatures have been calculated. We depend on two of the water sources for egg incubation and fish rearing, ground water from an underground collection system and surface water from Toboggan Creek. The third water supply, surface water of Brandt Brook, has been used increasingly more often in recent years due to water quality concerns for the creek supply. The three water supplies have proven to be very dependable during the years and we have never experienced a fish loss due to an interruption of water flows.

The creek water supply is used for year-round rearing and has a maximum flow of approximately 4,500 litres per minute, the normal operating flow is 1,600 to 1,800 litres per minute. In most cases the creek supply is also used for egg incubation, the exception being during periods of silty runoff flow when the ground water supply is utilized. In cases where we would like to manipulate egg development the ground water supply is used, as it is warmer in the winter period and colder during the spring and summer. The ground water supply has a maximum flow of 100 to 150 litres per minute and is used solely for incubation purposes and initial chinook ponding.

Average temperatures in 1996/97 were similar to past years in most months. The creek temperatures increased quite rapidly in the spring this year, and declined just as rapidly in the fall period, which was extremely similar to the profile for 1995/96 (Fig. 2). On average, the creek supply fluctuates in between 1.0 and 12.0 degrees celsius and the ground supply is from 3.5 to 8.0 degrees celsius on a yearly cycle.

Water levels and flows were stable overall during the summer and fall of 1996, due in part to the fact that Toboggan Creek is glacier fed. Again, the levels of this year followed the pattern of 1995 very closely with no substantial flooding in either the fall or the spring freshets. An early snowfall had the effect of insulating the ground, and winter flows seemed fair to good through the winter period and dewatering of coho salmon redds did not seem as much of a factor in 1997. Flows during the steelhead spawning period, early May through June, were very constant and provided for excellent survivals from the egg stage to the swim-up fry stage of this species. Many steelhead fry were observed in Toboggan Creek this summer.

Fig.2 Rearing Temperatures at Toboggan Creek Hatchery (1996/97)



TOBOGGAN CREEK HATCHERY - SALMON BROOD YEAR SUMMARIES

Bulkley River Chinook (1995 brood)

Growth of the 1995 brood chinook fry was good from the first of August until freezeup in late November. These salmon went from 3.3 grams in early August to 8.5 grams just prior to the winter period (Fig. 3). Our long and consistently cold winter then stalled growth, which is a normal pattern for the area.

Releases of the 1995 brood chinook smolts commenced April 22 and were completed on May 01, 1997. A total of 75,089 chinook smolts were taken in batches of up to 9,500 fish to the upper Bulkley River, near Houston, B.C. These smolts averaged 10.1 grams in weight. As release conditions were on the verge of a major flood we released almost all of these chinook smolts at the groundwater site near McQuarrie Creek this year, one load of fish was planted near Topley prior to the increased flows. An additional 16,720 chinook from this same brood year were released, as fed fry, prior to this. These fry averaged 6.2 grams at release, and all of these salmon were left-ventral clipped for future assessment purposes. These fed fry were released between September 5th and 9th, 1996, into an area of the upper Bulkley River system near Goosly Lake. Locations of the smolt releases this spring are as follows:

Topley road crossing	10,029
McQuarrie groundwater area	65,060
Total Released	75,089

Releases took six work days to complete this year, and we had just one crew and vehicle working. Releases took 8 individual trips to complete. Everything went very well during all these releases and we observed very few mortalities in total. Using the new 1,500 litre transport tank again enabled us to speed up the releases and reduce stress on the smolts in transport. Green egg to release survivals of this stock were 83.6 % over a 20 month period from mid August, 1995 to early May of 1997.

This stock was enumerated prior to release by using standard subsampling techniques. Results of this enumeration verified that our book estimates were accurate and indicated predation was again not a factor in the outdoor channel this past year.

Bulkley River Chinook (1996 brood)

Broodstock collection for 1996 brood Bulkley chinook began on August 19, 1996 and by August 21st we had attained our target of 100,000 eggs. A total of 30 female and 63 male chinook had eggs or sperm collected from them, all these males were then released back into the river after use. Eggs were transported unfertilized back to the hatchery and each female's eggs were then fertilized using sperm from 6 different males. Prior to incubation all eggs were rinsed, water hardened, disinfected and screened. Kidney and spleen samples were removed from all females, and were then sent to the Pacific Biological Station for BKD screening. None of the females tested BKD positive.

Chinook assessment was carried out, in conjunction with these egg takes, including a helicopter count of salmon spawners on August 19, 1996. A total of 818 chinook were observed between the Morice River junction and the Bulkley Falls, with close to half the run occupying the section of river from McQuarrie Creek downstream to Knockholt. These salmon were well spread out over the prime spawning beds this year, benefitting from good flows through the summer and fall. We sampled a total of 357 different chinook during and after broodstock collection, and we also had 38 additional chinook recaptures, identified by operculum punches. The overall composition of the run this year was 60.0 % wild and 40.0 % adipose clipped chinook.

Assessment prior to and after egg collection activities also allowed us to collect over 150 individual DNA samples for the Pacific Biological Station, well over 100 scale samples from wild and known-age chinook adults, as well as 62 heads taken from adipose clips for coded-wire tag identification. Also, a total of three redds, one from each major spawning area, were mapped out for possible overwintering survival studies.

Results of the helicopter count were as follows:

		Aug. 19th
above Bulkley Falls	-	0 chinook
Meanwhile Creek	-	23 chinook
Topley	-	0 chinook
Richfield Creek	-	99 chinook
Perow Station	-	83 chinook
McQuarrie Creek	-	95 chinook
below McQuarrie Creek	-	407 chinook
below Knockholt	-	4 chinook
Houston	-	92 chinook
in Buck Creek	-	15 chinook
Total observed / flight	-	818 chinook

From these observations, and using two instantaneous ground counts done at the same time as the helicopter count, we came to estimate escapement at approximately 1,027 chinook adults in 1996. We captured and sampled over one third of this years chinook escapement to the upper Bulkley River.

All of the individual DNA, scale and CWT samples were sent to the various labs for analysis, and a summary of every chinook sampled was sent to interested DFO personnel.

From the aging information done at the scale lab it appears a large portion of the fish in 1996 were four year old chinook. Both the wild and adipose clipped portions of the run showed an abundance of four year olds, and these chinook on average were larger in size than normal. This may indicate good ocean survivals and growth for 1992 brood year smolts, and a strong return of large five year olds for the 1997 escapement. Four year old chinook made up 38 % of the chinook sampled in 1996, while five year olds made up the remaining 62 %.

Shocking and picking of the 1996 brood Bulkley River chinook eggs was completed in early October, at 280.0 A.T.U.'s. All of the surviving chinook eggs were moved to heath trays after this event, and prior to the beginning of the hatch. Overall survivals to eyed stage were good and averaged 94.8 % in 1996 (Table I). Volume estimates done at eyed stage verified our spawning estimate of over 100,000 eggs collected.

Development of the 1996 brood chinook eggs was slowed down in the incubators to aim at a later ponding date. This was done in an effort to reduce the stress from ponding in cold water. Ponding of chinook fry was completed on April 18, 1997, which was two months later than for the 1995 brood. Results of this later ponding were positive and survivals were excellent. The number of chinook ponded in 1997 was 95,827 salmon, and these fish were split up into two Capilano troughs initially. These fry were fed using # 2 Biodiet starter at first. The fry got on the feed very quickly, and by late May they had more than doubled their weight from 0.44 grams to 0.89 grams. Growth of this stock has continued strongly, and as of the end of July these chinook fry averaged 3.9 grams in weight (Fig. 3). The 1996 brood chinook continue to feed actively and survivals of these fish since ponding are the highest we have achieved.

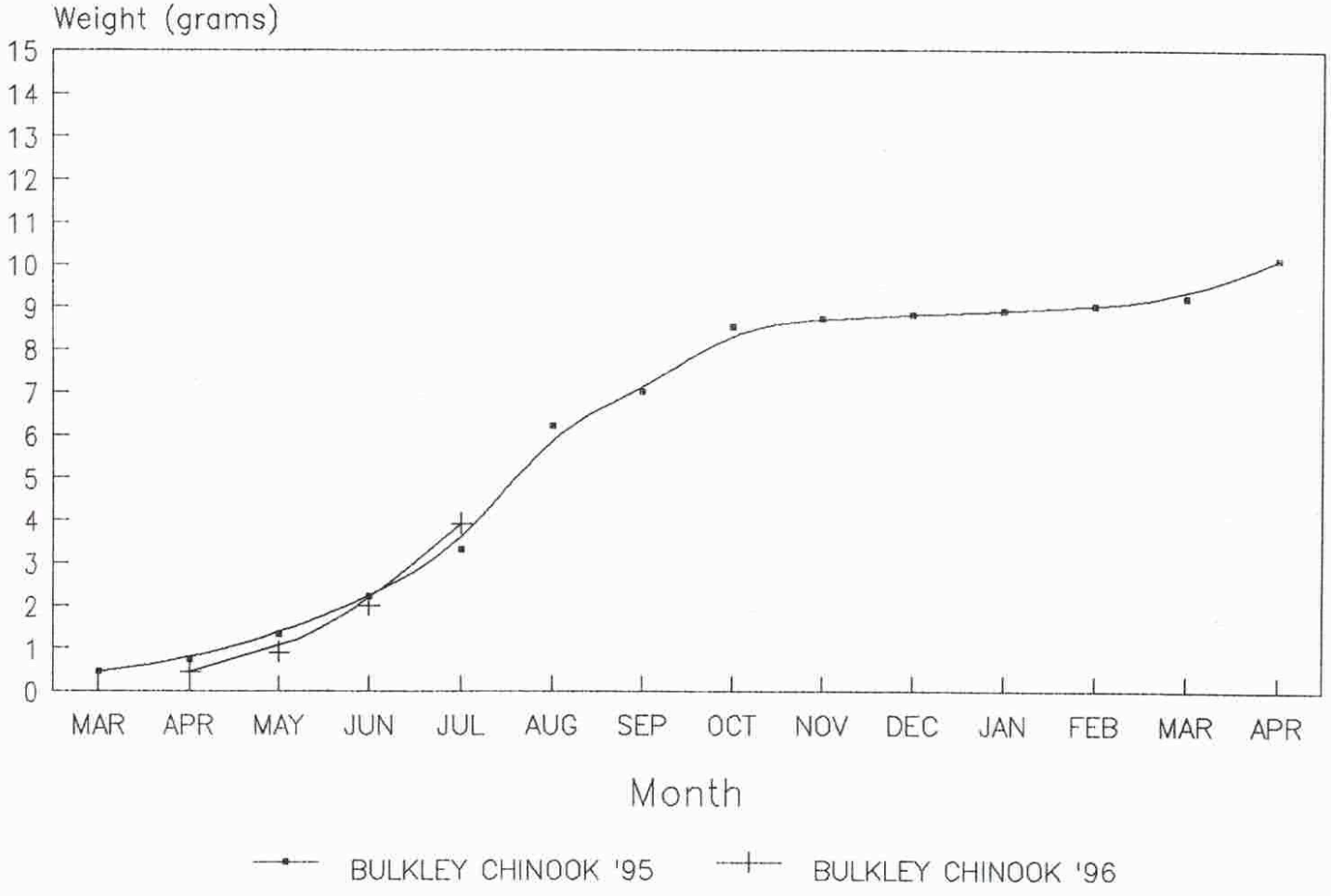
Coded-wire tagging occurred between June 30th and July 5th, 1997 and this tag group is now rearing in compartments "B/C" of the outdoor rearing channel. In total, 82,808 chinook were tagged and adipose clipped. Since tagging we have marked all of the surplus chinook with a right-ventral clip. These fish will be released as fed fry when they reach 5.0 grams.

Data Codes	Total Tagged	Fin Clip
18-32-09/10/11	82,808	adipose

Table I. Shocking and Picking Summary of the 1996 Brood Bulkley River Chinook Eggs at Toboggan Hatchery.

Tray#	Pre-shock	Post-shock	50 ml	Volume(mls)	Survival
M1-1	63	936	126(2.52)	3860	8791(89.8)
M1-2	30	513	112(2.24)	3600	7551(93.3)
M1-3	72	344	115(2.30)	4200	9316(95.7)
M1-4	13	578	140(2.80)	3940	10454(94.6)
M1-5	14	342	114(2.28)	3650	7980(95.8)
M1-6	7	277	144(2.88)	3890	10926(97.5)
SubTot	199(0.3%)	2990(5.2%)	125(2.50)	23140	55018(94.5%)
M2-1	29	135	118(2.36)	3630	8432(98.1)
M2-2	15	140	104(2.08)	3220	6557(97.7)
M2-3	12	146	117(2.34)	1670	3762(96.0)
M2-4	45	385	148(2.94)	3190	8994(95.4)
M2-5	22	1020	133(2.66)	3480	8236(88.8)
M2-6	51	176	104(2.08)	3230	6543(96.6)
SubTot	174(0.4%)	2002(4.5%)	121(2.42)	18420	42524(95.1%)
Totals	373(0.4%)	4992(4.8%)	123(2.46)	41560	97542(94.8%)

Fig.3 Growth of Chinook Salmon at Toboggan Creek Hatchery (1996/97)



Chinook Hatchery Returns (1990, '91, '92 and '93 broods)

Marked hatchery returns made up close to 40 % of the chinook escapement to the upper Bulkley River this year, an estimated 412 finclipped hatchery chinook and 615 unclipped wild salmon returned to this system in 1996.

These escapement estimates were determined as a result of the intensive assessment carried out by hatchery staff in 1996, and with additional funding from D.F.O. biologists. The extra funding facilitated a helicopter survey of chinook spawning grounds on the upper Bulkley in mid August. This flight found an observed total of 818 chinook in the upper Bulkley system.

A total of 357 different chinook were randomly sampled during and after broodstock collection by hatchery staff, the sample represented close to 35 % of the total estimated escapement. As a result of this sampling it was found that 40 % of these chinook spawners were of hatchery origin. All of the clipped salmon observed in 1996 were adipose clipped coded-wire tags. We did not release any surplus ventral clips from either the 1991 or 1992 brood years, which would be the age classes most likely to return in 1996. Hatchery chinook were sampled for heads and pins and 62 chinook heads were collected, with 58 of them found to carry pins.

# of Chinook	Tag Code	Brood Year
25	18/05/31	1991
18	18/05/32	1991
7	18/10/06	1992
4	18/10/07	1992
4	18/10/08	1992

These coded-wire tag data indicate that escapement of marked chinook to the upper Bulkley in 1996 was predominantly 5 year old fish, making up 74.1 % of the adipose-clipped return. The 4 year old fish made up 25.9 %, there were no 3 year old or 6 year old chinook in the sample this year. These data show a large proportion of 4 year olds in the escapement, as did the scale sampling data, when compared to 1995 at 14.8 %.

Based on this year's data, it appears that we had 412 salmon return from adipose-clipped releases of 1991 and 1992 brood chinook, this represents smolt to spawner survivals of 0.59 % and 0.13 % for the 5 and 4 year old age classes respectively. The survival for the five year old component is 97.0 % better than the same year class in the 1995 escapement. Survivals of the four year old component were 250.0 % better than in 1995. This again indicates a fairly strong hatchery return in 1997.

Toboggan Creek Coho (1995 brood)

Growth of the 1995 brood Toboggan coho increased somewhat in the summer and fall of 1996, from 2.7 grams near the end of July up to 7.3 grams by the first week of November (Fig. 4). This growth slowed considerably in November and dropped right off during the winter period, from December through March. In April and May growth accelerated again due to the increasing water temperatures and enhanced feeding activity.

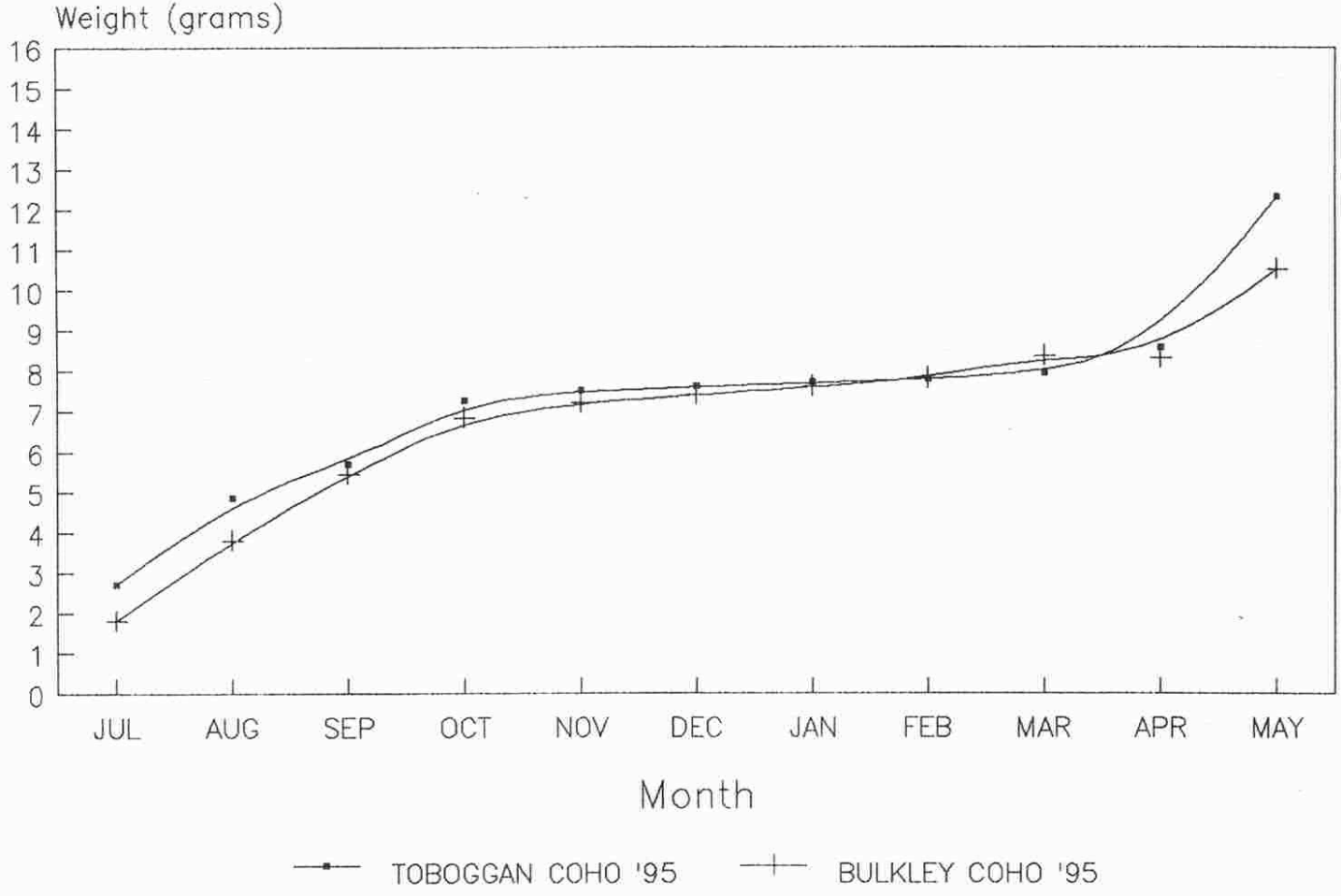
These coho fry were split into 3 capilano troughs in mid July and divided again into 4 troughs during August, prior to the tagging crew's arrival. Overall fish health of this stock was very good throughout the rearing cycle, and salmon survivals from ponding to release were 97.0 %, a period of 13 months.

Coded-wire tagging of this stock was completed on September 17th and 18th of 1996. A total of 33,290 coho salmon fry were tagged and adipose clipped. Remaining Toboggan coho that were surplus to this group were released into Kathlyn Lake, as fed fry, when a total of 21,910 coho were released. Another 5,000 fry were transferred to the Bulkley Valley Rod and Gun Club P.I.P. project earlier in the summer. The coded-wire tagged group was moved outdoors to the rearing channel a week or so after tagging was completed.

Tag code	# Tagged
18/11/44	11,326
18/11/45	11,349
18/11/46	10,615
Total Tagged	33,290

Survivals were excellent after tagging and through the winter period and we released 33,255 coded-wire tagged smolts during the spring of 1997, the screens were pulled on May 12th and all of these 12.3 gram smolts had migrated out by June 3rd. Observations of smolts indicated a peak movement on May 26th. Hatchery staff assisted members of the Bulkley Valley Rod and Gun Club in the release of all coho smolts from their P.I.P. project on Club Creek in late May of 1997. These coho smolts averaged 14.7 grams in weight at release, and appeared to be extremely healthy and active.

Fig.4 Growth of Coho Salmon
at Toboggan Creek Hatchery (1996/97)



Bulkley River Coho (1995 brood)

As with the Toboggan stock, growth of the 1995 brood Bulkley coho accelerated throughout the summer and fall periods, and they went from 1.8 grams near the end of July up to 6.8 grams into the first week of November (Fig. 4). This good growth slowed down during November then came to a halt in the months from December through March. In April, of 1997, their growth accelerated again, due to the increasing water temperatures, and this stock managed to get to 10.5 grams prior to release in the middle of May.

These coho fry were split into 3 capilano troughs in mid July and divided again into 4 troughs during August, prior to the tagging crew's arrival. Overall fish health of this stock was good, and the Bulkley River coho stock survivals from ponding to release were 96.5 %, over a period of 12 months.

Coded-wire tagging of these salmon was completed on the 18th and 19th of September, 1996. A total of 32,710 coho fry were tagged and adipose clipped. Remaining Bulkley River coho that were in excess to this tag group were left-ventral clipped, with 12,281 salmon being clipped. The coded-wire tagged group of these Bulkley coho was then moved to a compartment of the outdoor rearing channel, soon after the tagging operation.

Tag code	# Tagged
18/11/41	10,942
18/11/42	11,059
18/11/43	10,709
Total Tagged	32,710

Survivals after coded-wire tagging, and right through to the release date of this tag group, were excellent, and exceeded 99.4 %. Releases of these smolts were completed on May 13th, 1997 and a total of 32,529 smolts were transported by truck to the upper Bulkley River at this time. Releases of ventrals surplus to the tag group occured a week earlier, on May 6th. A total of 12,250 left-ventral clipped smolts were released, overall smolt health was excellent and releases went well.

Coho Egg Collection (1996 brood)

Coho egg targets over the past few years have included such stocks as Toboggan Creek, Bulkley River and Morice River. The Morice River coho enhancement program was discontinued during 1992 after three years of smolt production. The Bulkley stock is enhanced most years, depending on abundance of wild adult broodstock. The Toboggan stock has been enhanced yearly since we commenced operations in 1985. Coho egg targets for 1996/97 were as follows :

Kathlyn Creek	20,000
Toboggan Creek	40,000
Bulkley River	50,000
Total Egg Target	110,000

Kathlyn Creek Coho (1996 brood)

As in previous years no coho eggs were collected from Kathlyn Creek in 1996 due to nonexistent escapements of wild coho to this creek and, subsequently, a lack of wild genetic stock.

Escapements of hatchery produced coho to Kathlyn Creek have been good the past few years with adult coho returning in the hundreds. An accurate assessment of these returns hasn't been possible to date due to other priorities.

This system will again be the recipient of a coho transplant from wild Toboggan Creek broodstock, as has been the case for the past ten years.

Toboggan Creek Coho (1996 brood)

All of our 1996 brood coho eggs collected from Toboggan Creek this fall were taken from adult coho intercepted at our fence operation. A total of 70 coho were collected and transported back to the hatchery for egg take purposes. We took eggs from coho broodstock on October 16th, and the females surplus to our eggtake needs were released back into the stream. All of these eggs were disinfected with an iodine solution prior to being placed in the moist incubators.

Eggs were taken from a total of 19 ripe female coho and sperm was taken from 42 males. Each female's eggs were fertilized by using at least 2 different males and all eggs were water hardened for one hour prior to initial incubation using the moist incubators. Scales, weights and lengths were taken from the brood females. Average weight was 3.3 kgs, while overall the average length was 550 mm. The scales were sent to the DFO scale lab for analysis, 10 of the females were 4 years of age and 9 were 3 year olds in 1996.

Shocking and picking of the 1996 brood Toboggan Creek coho eggs began on January 6th and was completed January 7, 1997. Coho egg survivals to this stage were excellent, and a total of 55,965 eggs survived (Table II). Fecundities of Toboggan coho averaged 3,250 eggs per female in 1996.

Close to 10,000 eyed coho eggs were transferred to the P.I.P. project at the Chicago Creek site, in early February of 1997. The remaining eggs began hatching at 407.0 A.T.U.'s and peak hatch occurred at 460.0 thermal units. The survivals during hatch were excellent. Ponding of this stock occurred between May 9th and May 12, 1997 at 680.0 A.T.U.'s. In total, 45,725 coho fry were ponded into one Capilano trough and they began feeding actively shortly after ponding. At present, these fry are averaging 2.3 grams in weight, are now spread into three troughs, and with a condition coefficient of 1.16 are feeding very actively and showing continued good survivals.

Coho from these egg takes will be reared at the hatchery to a size of 12.0 grams and released as smolts in May of 1998. Up to 33,000 of these fish will be released into Toboggan Creek, as coded-wire tagged salmon, and another 11,000 coho smolts and fry will be transplanted into the Kathlyn Creek drainage. A total of 5,000 surplus coho from this stock were moved into a rearing tub at the Bulkley Valley Rod and Gun Club P.I.P. site in late July. The c.w.t. tagging crew is scheduled to be here on September 20th, this is later than usual and has made for a crowding problem. Usually tagging is done in August.

Survivals of this stock have been excellent since ponding and they continue to appear very healthy. We presently have over 40,000 coho fry from this stock on hand at the hatchery.

Table II. Shocking & Picking Summary of 1996 Brood Toboggan Creek Coho Salmon Eggs at Toboggan Creek Hatchery.

Tray #	# of Females	Pre-Shock	Post-Shock	50 ml Sample	Volume (mls)	Survival (%)
M2-1	3.0	152	375	187(3.74)	3070	11107(95.5)
M2-2	2.0	44	281	162(3.24)	2065	6410(95.2)
M2-3	4.0	35	301	186(3.72)	2980	10785(97.0)
M2-4	3.0	58	500	191(3.82)	3125	11438(95.3)
M2-5	2.0	115	383	132(2.64)	2000	4897(90.8)
M2-6	4.0	11	349	178(3.56)	3280	11328(96.9)
Total	18.0	415(0.7)	2189(3.7)	176(3.52)	16520	55965(95.6%)

Bulkley River Coho (1996 brood)

A total of 48 adult coho salmon were collected in the Bulkley River during September of 1996. All of the fish were taken at the Bulkley River counting fence, which was operated by the Nadina Community Futures Society with funding from the Skeena Green Plan being used to operate the fence. All of the salmon were transported back to the Toboggan Creek Hatchery and were held until ripe in our covered Capilano troughs. As with the Toboggan Creek coho, the fish enterred the river in a fairly ripe condition and they did not have to be held long before we were able to take eggs. The total count through the fence in 1996 was 170 coho spawners.

Eggs were taken from a total of 18 ripe female coho and sperm was taken from 19 male coho. The coho eggs were fertilized by using at least 2 different males per female, and were water hardened for one hour prior to initial incubation using the moist incubators. Scales, weights and lengths were taken from all of the brood females. Average weight was 2.8 kgs overall and average length 530 mm. The scale samples were sent to the DFO lab for analysis.

After the last of the egg takes on this stock all of the coho remaining were transported back to the upper Bulkley River and released, to spawn at a later date. Only 11 females were left unspawned while all males were released after expression of sperm. Coho eggs were taken on October 8th, 1996 which is about normal for this stock.

Shocking and picking of the 1996 brood Bulkley River coho eggs began on January 8th, 1997 and the last batch was done on January ninth. Egg survivals to this stage were excellent and a total of 59,463 eggs survived (Table III). Fecundities of the Bulkley coho were around 3,425 eggs per female.

Approximately 12,200 coho eggs were transferred to the P.I.P. project at Richfield Creek at eyed stage, these were surplus. Hatching of coho eggs began at 410.0 A.T.U.'s with the peak hatch occurring at 430.0 thermal units. Ponding of coho fry from this stock occurred between May 7th and May 10th, 1997 at about 700.0 A.T.U.'s. Survivals to ponding were very good and we began feeding 45,689 Bulkley coho fry, which initially were ponded in one Capilano trough. At the present time coho from this stock are averaging 2.16 grams with a c.c. of 1.17. Growth of this stock is somewhat slower than last year but we still expect them to achieve a 12.0 gram smolt size.

Approximately 33,000 of these coho will be reared to smolt at the hatchery, and released as coded-wire tagged fish in May of 1998. The remainder will be ventral clipped and released into the Bulkley River as fed fry in the fall of 1997. Coded-wire tagging of this stock will occur in September of 1997.

Table III. Shocking and Picking Summary of 1996 Brood Bulkley River Coho Salmon Eggs at Toboggan Creek Hatchery.

Tray #	# of Females	Pre-Shock	Post-Shock	50 ml Sample	Volume (mls)	Survival (%)
M1-2	3.0	39	267	194(3.88)	2980	11295(97.4)
M1-3	3.0	24	296	184(3.68)	3135	11241(97.2)
M1-4	4.0	281	348	206(4.12)	3355	13475(95.5)
M1-5	4.0	104	407	213(4.16)	2795	11220(95.6)
M1-6	4.0	35	381	234(4.68)	2695	12232(96.7)
Total	18.0	483(0.8)	1699(2.7)	208(4.16)	14960	59463(96.5%)

Assessment of Coho Escapement in 1996

Toboggan Creek Fence

The Toboggan Creek coho counting fence commenced operation on August 1st, 1996. The fence was monitorred twice daily from this date through to November 6th, 1996 at which time the aluminum panels were removed due to freezing conditions.

A total of 925 coho were passed through the fence, with coho migration into the creek peaking during early October. There was also a smaller peak of migration in mid September due to good flows in the creek at that time of year. In addition to our normal sampling, we floytagged and operculum punched 898 salmon at the fence. Different colored tags were installed at intervals throughout the escapement. Later assessment, done visually, found 535 spawning coho salmon of which only 3.2 % were untagged. Weekly counts were done starting October 17th.

We were able to estimate the total number of coho which were above the fence, by means of weekly spawner counts. Spawning appeared to have started around October 8th, 1996, and peak spawn occurred in the third week of October. We also observed some spawning coho downstream of the counting fence and, as a result of a couple of counts we estimated 250 coho spawned in this section of the creek. Of 10 untagged, dead coho sampled three fish did not have an operculum punch, and is conclusive in proving that we missed less than 1.0 % of the coho that spawned upstream of the counting fence in 1996. The complete spawner estimate, including salmon broodstock removed at the fence by hatchery personnel and salmon spawning downstream of the counting fence, was 1,185 coho.

Approximately 16.4 % of the salmon handled at the fence were hatchery returns from the 1993 brood. This represents a total of 216 spawners returning from a release of 33,948 smolts, a 0.6 % return overall. Adipose-clipped coho made up 97.4 % of the marked coho escapement with only four ventral clipped fish observed in 1996, likely coho transplanted into Kathlyn Creek and planted in the upper Bulkley in 1995.

Bulkley River Fence

The Bulkley fence operated from August until late October and a total of 170 coho were sampled. This was not a total count, as some fish would not enter the trap. The total coho run was estimated at around 230 spawners. A total of 109 coho caught at the fence were clipped hatchery fish, indicating 64.1 % of the upper Bulkley escapements in 1996 were hatchery produced.

Coho Hatchery Returns (1993 brood)

Although all other upper Skeena waters were closed to harvest of coho in 1996 anglers were allowed to harvest some coho at Toboggan Creek. An opening for sportfishermen was advertised, a daily limit of one wild or hatchery salmon was set. As a condition of the opening the Toboggan Hatchery was contracted to conduct a daily creel survey to estimate the total catch, and harvest of wild and hatchery coho near the confluence of Toboggan Creek and the Bulkley River. This survey was carried out from August 15th until October 16th, 1996. Funding for the creel survey was provided through the Skeena Green Plan.

As a result of this survey we determined the following: level of participation was quite high with 325 anglers interviewed, average time fished per angler was 3.7 hours, and during our survey we observed 24 coho and 31 steelhead landed. Three of the coho observed were adipose clips and we saw 21 wild fish. The total effort during this fishery was estimated at 2,873 angler hours, catch was estimated at 112 wild coho, 167 wild steelhead, and 16 adipose-clipped coho. A total of 85 coho were harvested, and 779 anglers took part in this fishery.

Head Depot returns of hatchery coho indicate that, of 11 coho adipose clips estimated to have been harvested, 11 heads were turned in. This represents a 100 % submission rate for 1996. Data from the dissected coho showed all heads came from 1993 brood salmon released in 1995. The dissection contractor gave us a breakdown of the tag codes. There was one no pin and one lost pin, the remaining 9 fish were from Toboggan Hatchery.

As a result of sampling done at the fence and on the spawning grounds we were able to collect 51 coho heads from Toboggan Creek coho spawners, of these 45 carried pins while 6 of them did not have pins found. This is a higher than normal rate of heads with no pins found.

Eleven heads were taken from Bulkley River coho in 1996, all of the 8 heads carrying pins were 1993 brood coho released in 1995. Results of the Toboggan sampling were as follows :

# of Coho	Tag Code
20	18/07/04
12	18/07/05
13	18/07/06
6	NO PIN

All of these escapement heads are from 1993 brood coho salmon reared and released at the Toboggan Creek Hatchery site.

Exploitation of 1993 Brood Coho

With groups of coded-wire tagged coho returning to Toboggan Creek yearly, and having a fence installed on this stream, we are able to come to an accurate assessment of coho escapement during each year. As well, the coded-wire tag sampling of the B.C. commercial catch, Alaskan commercial catch, and B.C. sport catch give an indication of exploitation rates by each group. The Indian food fish catch has also been studied to some extent and gives insight as to coho harvested yearly.

Coho catch and escapement estimates have been provided and/or corroborated by the following agencies and groups:

Escapement	-	Toboggan Hatchery/Fisheries and Oceans
B.C. Comm.	-	Fisheries & Oceans Canada
Alaskan Comm.	-	Alaska Department of Fish and Game
B.C. Sport	-	Fisheries & Oceans Canada/Toboggan Hatchery
Alaskan Sport	-	Alaska Department of Fish and Game
Indian Food	-	Toboggan Hatchery/Fisheries and Oceans

Exploitation rates indicated by this data suggest that coded-wire tagged coho from the Toboggan coho stock were harvested at rates of approximately 73.6% in 1996 (Fig. 5). Commercial catches by Canadian and Alaskan vessels were responsible for over 83.0 % of the harvest, Indian food fishermen took 6.7 % of the catch, while sportfishermen had a 10.3 % share. Coho spawning escapements to Toboggan Creek in 1996 were 26.4 % of the total adult stock. Exploitation could be higher than this due to the fact that the Indian catch estimate only includes the Moricetown Band catch, and none of the downstream catch.

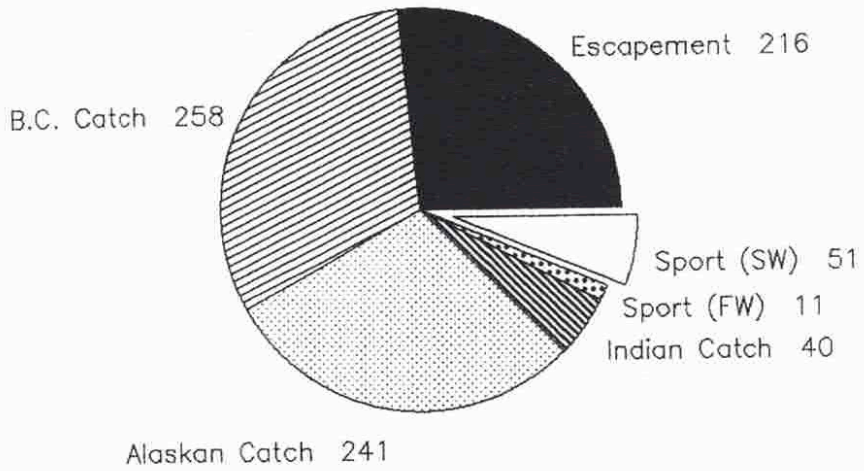
Alaskan commercial fishermen caught less coho than those that were reported by B.C. fishermen, with 241 and 258 coded-wire tagged hatchery coho respectively. The breakdown of Alaskan catches by gear type was not made available to us this year.

Survivals of hatchery-produced coho smolts from this facility were moderate in 1996. Assuming the catch rates are accurate we saw smolt to adult survivals of 2.4 %, with about 817 coho produced from a release of 33,948 Toboggan Creek coho smolts. This survival, although not high, is still 50 % better than the survival documented last year at 1.6 %.

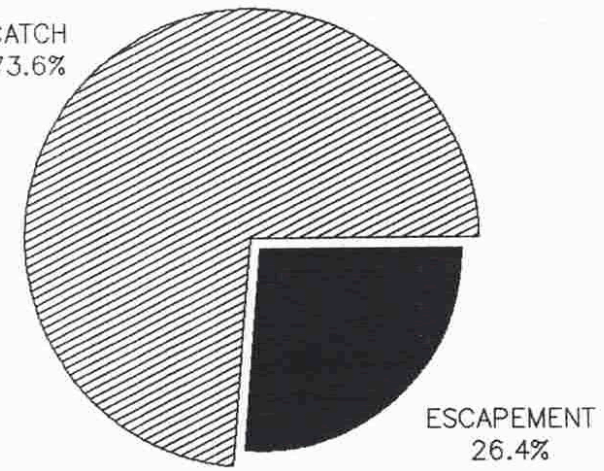
Overall, the exploitation rates indicated by these data are some of the highest we have seen. This is a concern given the management actions that were taken in 1996.

Fig.5 Total Coho Catch (1996)

Toboggan C.W.T.'S



CATCH/ESCAPEMENT



EXPLOITATION RATE

Administration Report

This report covers hours spent from August 1, 1996 through to July 31, 1997. This year, like last year, covers a period of twelve months, and is the third year of operations since the shift from the March 31st year end.

The following is a breakdown of hours spent carrying out the contract in 1996/97 :

Activity	Man-hours
Project Management	570.0
Facility Operations	3747.0
Broodstock Collection	416.0
Assessment	502.0
Coho Fence	570.0
Statutory Holidays	280.0
Total Hours in 1996/97	6085.0

The contract went very well again in 1996/97 and our hours of work spent in each category were consistent with most of the past few years. Hours spent doing broodstock collection were reduced due to the fences on both the Toboggan Creek and the Bulkley River systems.

Total employment generated by the hatchery in 1996/97 was 170 work weeks, employing 9 different people for varying lengths of time during the twelve month period. These last figures include seperate contracts we have undertaken via a Challenge Student Employment Program and the Skeena River Green Plan, during the 1996/97 period.

Labour costs were three percent higher than budgetted for in the contract period. Cost of operations were within 3.0 % of the budgetted costs. Overall, we were extremely close to our contracted amount of $ 151,300.00.

The following is a summary of expenditures made in carrying out the 1996/97 contract:

Category	Expenditures	Contract
Direct Labour	92,186.00	89,892.00
Overhead Costs	22,500.00	22,473.00
Capital Equipment	0.00	0.00
Operations	36,613.75	38,935.00
Totals	151,299.75	151,300.00

The labour and overhead portions of this table only include activities directly attributable to the C.E.D.P. contract. They do not include time spent operating the Bulkley fence in 1996, the Toboggan fence in the spring of 1997, student labor contracted through the Challenge '97 Program, or the creel survey and coho tagging carried out under Skeena Green Plan.

Development and Maintenance of the Facilty

In addition to general maintenance carried out as part of the contract requirement we also were involved in the following activities as well :

i.) The outdoor rearing channel was vacuumed out using one large sludge pump. The accumulation of fish waste and silt is difficult to move out of the channels and this appears to be the best way to address the problem.

ii.) The settling pond was flushed again to remove the sand that accumulates at the end of the inflow pipe. This has become an annual maintenance procedure and we try to remove the buildup before it becomes a problem.

iii.) The creek intake required some major maintenance this year as a result of a lowering of the streambed below this point. A few loads of large riprap were placed at the back of the intake to raise the water level. It is hoped that this will solve the problem.

iv.) Two students were hired for 6 weeks during the summer as a result of funding from the federal Challenge '97 Program. These students were instrumental during the summer period in providing public tours and in manning the hatchery during chinook broodstock collection, as well as helping out in the field.

v.) A "School Release Day" organized by our C.A., Brenda Donas, was carried out in May of 1997. Close to 200 of the schoolkids, who had reared coho from egg to fry in their classroom incubators, came out to release their fry. We also helped during October of 1996 to collect the coho eggs for the classrooms. Both activities were very successful and beneficial.

vi.) During the past five springs we operated the counting fence for steelhead enumeration. In 1993 we estimated an escapement of 450 steelhead spawners, in 1994 there were 300 steelhead spawners identified. No funding was provided for the 1993 assessment, while $5,000.00 came from M.O.E. via the Habitat Conservation fund for the 1994 count. In 1995 we identified 305 steelhead above our counting fence, that was done with H.C.F. funding of $8,000.00 to cover labour costs. In 1996 funding of $10,000.00 came from Skeena Green Plan for the count, which identifed 400 to 500 steelhead in the system. In 1997 we were unable to obtain funding but operated the fence again, 600 to 800 steelhead were estimated.

Operating Plan for 1997/98

As in previous years we will begin releasing the chinook and coho smolts in April and May. The 1996 brood Bulkley chinook will be the first to go in mid to late April, followed later by the 1996 brood coho stocks which are released in May. As in past years we will enumerate all salmon smolts while they are being loaded into the transport tanks. We will be taking over 116,000 salmon smolts to the Bulkley River and more than 33,000 smolts will go into the Toboggan Creek system. Also, 5,000 coho smolts from Toboggan stock will be transplanted in to the Kathlyn Creek watershed in late May. Releases should take two or three weeks to complete in 1998.

Our chinook target is still at 100,000 eggs for 1997 to allow for a c.w.t. release group of 80,000 smolts. We generally take more eggs than this as we send samples to the Biological Station for B.K.D. screening. Egg takes will happen in late August and we plan to produce 12.0 gram smolts for release in April of 1999.

Coho egg targets will increase from past years, and 200,000 eggs will be taken in 1997; Bulkley River (140,000), Toboggan Creek (45,000), and Kathlyn Creek (15,000). These coho will be reared to smolt size, 12.0 to 15.0 grams, and released in the spring of 1999.

We will continue with our assessment activities with the coho counting fence on Toboggan Creek and will attempt to install fence panels in early August this year, in an attempt to get a total count on coho salmon. We will again do a marking and recapture study to back up the fence counts for coho.

We intend on continuing with enumeration of steelhead trout spawners into Toboggan Creek in the spring of 1998. We hope to incorporate a tagging program at the Toboggan Creek mouth just prior to the fence count, as we have done previously.

As well, we will attempt to keep the public in this area well informed of our activities, goals and accomplishments in the area of fish culture on the Bulkley/Morice system. An " Open House " is planned for the fall of 1998 to encourage people to come out and view the facility, see the coho spawning and learn more about the salmon resource in the Bulkley Valley.

Recommendations

As in previous years, we have had a very successful year, and our survivals and fish quality were excellent. There are, as usual, some areas where I believe changes can be made that will be beneficial to our operation :

i.) Predation of our salmon smolts in the outdoor rearing channel is a problem in some years, usually during March and April. A predator fence along the back of the rearing channel may help to alleviate this. Otter are the main problem but mink and mergansers can be a concern as well.

ii.) Assessment of returning coded-wire tagged chinook and coho salmon would be greatly improved if we could get more accurate data from the Moricetown Native fishery in the summer season. Each year tens of thousands of salmon are landed by the Native fishers at Moricetown Falls, on the Bulkley River. In previous years there have been few clipped hatchery fish turned in at the Moricetown Fishery. A coordinated assessment program would provide an abundance of relevant information on stock timing and survival. As well, a move away from gaffing, and the high wounding rates, to a selective method would put many more fish on the spawning beds. We have noticed an improvement in harvesting methods and reporting in the last year, hopefully this will continue over the next few years.

iii.) Coded-wire tagging of chinook should continue to be done in June and coho done no later than August 10, and preferably in late July, thus allowing us to keep salmon pre-marking densities at acceptable levels and reduce the amount of stress on the fish.

iv.) We are very dependant on the abundance of broodstock to supply us with the eggs to enhance each specific stock we work with. I would recommend, and hope, that ocean harvests in 1998 will be restricted so that our enhancement goals can be realized. Coho returns to many tributaries continued to show low numbers, even though exploitation rates are known to be reduced. It appears that during some years the combination of low ocean survivals and heavy Alaskan interception is not allowing a harvestable surplus of wild coho to reach B.C. coastal waters. For years the catch data of coho coded-wire tags from this facility have shown these stocks are being overexploited, to their detriment. A look at Bulkley River coho escapement records and the Toboggan Creek exploitation data prove this out.

These recommendations are the same as past years and they are still the most important things that affect our success.

Since this facility was constructed, and since the Toboggan Creek Salmon and Steelhead Enhancement Society took on the task of operating the hatchery, we have successfully reared and released 2,675,532 salmon and steelhead smolts and fry. We continue to see good returns of hatchery-produced salmon to the Bulkley River and Toboggan Creek systems and it helps reinforce our resolve to continue with this worthwhile work. The coho counting fence which we operate on Toboggan Creek is allowing for a better understanding of coho smolt to spawning survivals on interior systems in Northwestern B.C. Along with coded-wire tag recoveries from the commercial operations from B.C. and Alaska it should now be evident at what rate these coho stocks are being exploited, and whether catch reductions are necessary to ensure the viability of each distinct stock.

Our Society is very appreciative for the opportunity to be part of the Salmon Enhancement Program in northwestern B.C. We also appreciate the support we receive on a yearly basis from various people from the Community Involvement Division, the Resource Restoration Unit and many other factions of the Salmonid Enhancement Program and the Department of Fisheries and Oceans. Also, financial support from DFO, through Skeena Green Plan, has allowed us to continue our salmon assessment operations in the past year.

Our greatest support still comes from the general public. We continue to receive encouragement from the many people that stop by the hatchery to learn about the salmon resource, and we in turn attempt to raise awareness of the resource during the many tours we give each year. Going into our fourteenth season of operation we now get a wide range of students, both past and present, who express a sincere gratitude for the SEP and CEDP initiatives. They have been exposed to the needs and requirements of salmon stocks, and are now strong advocates for conservation, habitat protection and enhancement.

We look forward to our continued involvement with the program in the future.

Mike O'Neill, Hatchery Manager

TOBOGGAN CREEK SALMON & STEELHEAD ENHANCEMENT SOCIETY
R.R. # 1, SMITHERS, B.C., CANADA V0J 2N0 (250) 847-4458

APPENDIX "A"

Statement of Work - 1996/97

TOBOGGAN CREEK HATCHERY CONTRACT STATEMENT OF WORK
FOR AUGUST 1, 1996 TO JULY 31, 1997

PAYMENT OF CLAIMS

PAYMENT SCHEDULE

August Advance : 20% upon signing the contract and receipt of April to July claims.

October Advance : 25% upon receipt of August and September 1995 claims.

January Advance : 20% upon receipt of Oct., Nov. and Dec. 1995 claims.

April Advance : 35% upon receipt of Jan., Feb. and Mar 1996 claims.

Note that the deadline for the 1995/96 annual report will be September 30, 1996. A $2500 penalty will be imposed on contractors who do not produce an Annual Report by the September 30,1996 deadline date.

MONTHLY CLAIM/PROGRESS PAYMENT REQUEST

The claim for payment will be accompanied by a form which breaks all O and M invoices into categories as per last years procedure. Claims must be submitted before advances will be made. Claims will not be processed by the Community Advisor unless both the financial and biological portions of the monthly claims have been submitted by the contractor.

This contract spans a fiscal year and there will be an accounting of expenditures on March 31, 1997. March claims should be submitted to the Community Advisor no later than April 10, 1997. Please note that contract monies advanced prior to March 31, 1997 must be spent by March 31, 1997 i.e. the August, October and January advances must be spent before March 31, 1997.

CAPITAL

There will be no Capital funds speifically allocated to the hatchery budget.

INVENTORY

At the end of each payment period, an inventory of any items with a purchase value over $500 will be included with the period end monthly report.

G.S.T.

G.S.T. will be claimed as per last year's procedures. Please note that GST is paid on the CLAIMS submitted and not the ADVANCE payments.

PROJECT MANAGEMENT AND ADMINISTRATION

Section 1.1. : Submit the Annual Report no later than September 30, 1997. If the report is not submitted by this date, a $2500 penalty will be imposed.

Section 3. FACILITY MAINTENANCE

1. Storage area and sheds are to be cleaned up and gas and oils stored in a separate location.

2. Broken docks are to be replaced with new wooden structures.

Section 4. FACILITY IMPROVEMENTS
No funds available for improvements.

Section 5. REPORTING REQUIREMENTS

Bi-monthly reports of biological activities should include the following information :

- broodstock capture with numbers and sexes of adults and location of capture
- assessment fence data
- marked adult capture : numbers, sex, location of captures
- numbers of females and males used in egg takes, egg take dates, numbers of eggs planted by species and stock
- dates of shocking and picking and eyed egg inventories by species and stock
- ponding dates and numbers of fry by species and stock
- live balance and size of all juveniles on hand by species and stock
- coded wire tag codes and number tagged once the marking program has been completed
- release information by species and stock i.e. numbers of juveniles released, date of release, size at release, number of marked fish released and release location
- all disease treatment information

Annual Report : should include all of the above information in summary form along with an introduction to the facility, project goals, an overview of the current status of the hatchery in relation to those goals, and comments regarding the broodstock capture, adult assessment, incubation, rearing and release programs. Any conclusions can also be included as well as a section of future aspirations.

Financial claims must also be submitted bi-monthly.

Section 6. PRODUCTION PLAN

1995 BROOD TOBOGGAN CREEK COHO

Continue rearing of the 60,000 Toboggan Creek coho. 34,000 are to be kept for yearling releases, 10,000 will be fry releases into Kathlyn Creek and the remaining fry will be transferred to the Bulkley Valley Rod and Gun Club. Target size at release is 12 to 18 grams per fish.

1995 BROOD UPPER BULKLEY RIVER COHO

Continue rearing of the 50,000 Upper Bulkley River coho. Approximately 34,000 will be retained for yearling releases and the remaining fry will be ventral or maxillary clipped for a fall release. Target size for the yearling release is 12 to 18 grams per fish.

1995 BROOD UPPER BULKLEY RIVER CHINOOK

Continue rearing of the 110,000 Upper Bulkley River chinook. Approximately 85,000 will be retained for yearling releases. The remainder will be clipped and released in the fall of 1995. Target size at release is 12 to 18 grams per fish.

1996 BROOD TOBOGGAN CREEK COHO, UPPER BULKLEY COHO AND UPPER BULKLEY RIVER CHINOOK

1996 brood coho and chinook will be at the fry stage prior to termination of this contract. Rear as per standard hatchery procedure.

Section 7. BIOLOGICAL STRATEGIES

7.1 Broodstock Collection

The contractor is required to collect that number of adults which will satisfy egg take and mark recovery requirements. Mark recovery and adult sampling requirements will be fulfilled in accordance with requirements defined in the Adult Sampling Manual. This manual is distributed by the Program Coordination and Assessment Division. If these sampling requirements cannot be met, please contact the Community Advisor well in advance of the broodstock program.

The contractor is responsible for preparing all equipment required for broodstock capture and mark recovery programs.

The contractor is responsible for preparation of all necessary adult holding locations and for preparation of areas where marked heads are to be processed and stored.

The contractor is to inform the local Fisheries Officers of the inititaion and termination dates of the broodstock and mark recovery programs. Information requested by the Fisheries Officers is to be submitted on a timely basis.

Section 7.2 Incubation

The incubation room is to be prepared prior to egg takes occurring. All incubators are to be thoroughly cleaned and disinfected. All tray screens are to be checked for tears and repaired. Flows are to be set to the appropriate levels. Eggs are to be surface disinfected using a standard Ovadine solution during water hardening.

Accumulated thermal units are to be recorded so that stage of development can be monitored.

Fungus will be treated using static salt baths in the incubators as per standard salt treatment procedures. These salt treatments will only be done to the eyed stage.

Chinook eggs will be initially incubated in moist incubators and then transferred to Heath stack incubators at the eyed stage.

Coho eggs are to be incubated as per chinook incubation techniques.

At the eyed stage, the eggs will be shocked and the dead picked out and counted. The remaining live eyed eggs will be enumerated. All data will be recorded on the appropriate data forms.

Subsequent dead picks will occur on an as needed basis and the appropriate records will be kept.

Fry will be ponded at the appropriate stage of development.

All pertinent data will be recorded. If possible, data should be recorded on diskette as this facilitates analysis.

Incubation data is to be summarized and reported in the monthly reports.

1996 BROOD EGG TARGETS

STOCK	SPECIES	NO. EGGS REQUIRED
Upper Bulkley	chinook	90,000
Toboggan Creek	coho	60,000
Upper Bulkley	coho	40,000

7.3 Rearing

All rearing units are to be thoroughly cleaned and disinfected in preparation for ponding. Endscreens should be fry proof, flows and water levels pre-set.

All rearing related equipment such as dipnets, feed containers, cleaning brushes etc... should be cleaned, disinfected and in good repair. Predator netting and/or covers should be in good repair.

All juvenile fish are to be fed according to feed manufacturers recommended feed rates and instruction by DFO staff.

Growth is to be carefully monitored such that release target sizes are met.

Keep daily records of water temperature, oxygen levels, mortalities and any pertinent observations i.e. abnormal behaviour, feeding response etc...

In the event of fish health concerns, contact the Community Advisor and the Disease Diagnostics Lab at the Pacific Biological Station.

Maintain the rearing facilities in safe, organized and sterile conditions.

Rearing information is to be summarized and reported in the monthly reports.

7.4 Marking

Marking is proposed as follows :

1. 1995 brood Toboggan Creek coho : 30,000 AD/CWT and the remainder will be clipped.

2. 1995 brood Upper Bulkley R. coho : 30,000 AD/CWT and the remainder will be clipped.

3. 1995 Upper Bulkley River chinook : 80,000 will be AD/CWT and the remainder will be clipped.

7.5 Release

The 1994 brood Toboggan Creek coho yearlings will be released into Toboggan Creek in the spring of 1996. The 1995 brood fry releases will be into Kathlyn Creek in the late summer to early fall of 1996.

The 1994 brood Upper Bulkley River coho yearlings will be released into the Upper Bulkley River in the spring of 1996. 1995 brood fry releases will be into the Upper Bulkley River in the late summer to early fall of 1996.

The 1994 brood Upper Bulkley River chinook yearlings will be released into the Upper Bulkley River in the spring of 1996. 1995 brood fry releases will be into the Upper Bulkley River in the fall of 1996.

All stocks are to be enumerated just prior to release.

Brood summaries and release forms are to be completed immediately after release and copies are to be forwarded to the Community Advisor with the bi-monthly biological reports.

7.6 Assessment

The Toboggan Creek assessment fence will be operated and all fish will be enumerated as per usual procedure. All fish will be checked for marks and all fish put above the fence will be opercular punched.

The appropriate number of adipose clipped adults will be sampled as per instructions in the Adult Sampling Manual distributed by the Program Coordination and Assessment Division. If the suggested sampling plan cannot be met, the Community Advisor must be contacted so that the sampling program can be adjusted.

Any other biological sampling will be carried out as directed by the Program Coordination and Assessment Division. If the contractor feels that the sampling requirements cannot be met, the Community Advisor must be contacted so the sampling program can be adjusted.

The appropriate record sheets will be filled out and copies sent to the appropriate divisions as directed by DFO staff.

A summary of the assessment programs will be included with the monthly reports.

Section 8 **TRAINING**

Spreadsheet and wordprocessing programs for the manager.

Any training required to employ hatchery staff in the event of hatchery closure due to removal of Dept. of Fisheries and Oceans funding.

Section 9 **SPECIAL TECHNICAL ASSISTANCE**

Bio-technical support will be available to the contractor on an as needed basis. This support will consist of the Community Advisor and technical staff.

Other support staff are available through the Resource Restoration Division. Any requests for this support are to be forwarded to the Community Advisor.

1. The contractor agrees that surplus funds unsupported by legitimate claims at the end of the contract period may be deducted from the first advance of a subsequent contract.

2. Failure to submit the Annual Report by 30th September 1996 for the 1995/96 contract year will result in a reduction of $2,500 from this contract. The deduction will be taken from the **OCTOBER 1996** advance payment.

3. All movement of fish or eggs requires Transplant Permit prior to movement. Contact your Community Advisor on how to apply for a permit.