

**ANNUAL REPORT FOR TOBOGGAN CREEK  
HATCHERY OPERATIONS IN 1998/99**

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## ANNUAL REPORT FOR TOBOGGAN CREEK HATCHERY ACTIVITIES , 1998/99

Contract # : F1521-8-0153  
Financial Code : 5B142-440-120-4447-50302-6  
Contract Period : August 1, 1998 - July 31, 1999

### Introduction

The Toboggan Creek Salmon Hatchery, under the direction of the Toboggan Creek Salmon and Steelhead Enhancement Society, has just completed its fourteenth year of successful operations. The Toboggan Creek Hatchery 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 was recently purchased by the Society from C.N.R. Funding for this contract is provided yearly by the federal Department of Fisheries and Oceans under the Community Involvement Division, Habitat and Enhancement Branch, of the Salmonid Enhancement Program.

Over the past three or four decades, and in particular during the mid 1990's, stocks of coho salmon native to the upper Skeena River tributaries were severely impacted by Alaskan and Canadian ocean fisheries. The situation has now become even more of an issue with coho due to very poor ocean survivals 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, has seen only 190 to 200 wild spawners in recent years. This stock has historically been impacted by a gaff fishery at Moricetown Falls on the lower Bulkley and angling pressure, it also suffers from degraded habitat conditions.

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 1998/99 contract period our Society reared and released some 71,000 coho and 120,000 chinook salmon from the 1997 brood year. Successful rearing of over 260,000 chinook and coho from the 1998 brood continues, with most of these salmon being reared through to smolt for release in the spring of 2000.

Egg targets for 1998 brood chinook, from the upper Bulkley River, were achieved and at the present we have approximately 72,000 fingerlings rearing at the hatchery. Chinook spawning escapements to the upper Bulkley were up from the previous year, with 1,100 chinook adults estimated in 1998 as compared to 764 spawners during 1997. The wild component of the escapement was over 62 %, and totalled close to 690 chinook spawners.





Coho returns to most upper Skeena tributaries in 1998 were up substantially from 1997, when just 394 spawners were estimated in the Toboggan Creek system. The Toboggan escapement in 1998 was 2,470 coho spawners. Escapements to the upper Bulkley River system were also very much improved, with 580 coho spawners in 1998 as compared to only 88 in 1997. As a result of the higher Bulkley escapements we were able to achieve our egg targets of over 140,000 coho eggs in 1998. The egg collection on Toboggan went well, and our egg target was easily achieved.

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 the peak migration of wild smolts to the ocean. Pondering to release survivals usually exceed 95.0 %, a period of 12 months. Two full-time personnel are required to operate the facility and extra manpower is hired during the summer and fall periods as needed.

The coho counting fence panels were installed on July 30<sup>th</sup> this year. This enabled an accurate assessment of our eleventh major return of hatchery-produced coho to Toboggan Creek. The fence data indicated hatchery returns of 440 marked coho in 1998, from a release of 33,255 smolts this is a 1.3 % return. This is vastly improved from the 1997 escapement when only 73 marked coho escaped for a return of only 0.2 %, and slightly higher than the eight-year average of 1.2 % survival to spawn. This illustrates the dramatic yearly differences in ocean productivity and survivals that can occur. The data indicate a total adult recruitment of 555 coho from the release, at a 1.7 % survival it is still well below average success from smolt to adult. The rate of exploitation was down dramatically from 1997, dropping back to around 21 % in 1998 from 55 % the previous year. Previous to this exploitation rates have regularly exceeded levels of 70 %.

Around 17.8 % of Toboggan coho handled in 1998 were adipose-clipped hatchery salmon, and we estimate the makeup of the stock was approximately the same. The marked coho appear to make up a larger proportion later in the migration, but this difference was fairly small in 1998.

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 (1998/99)

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.

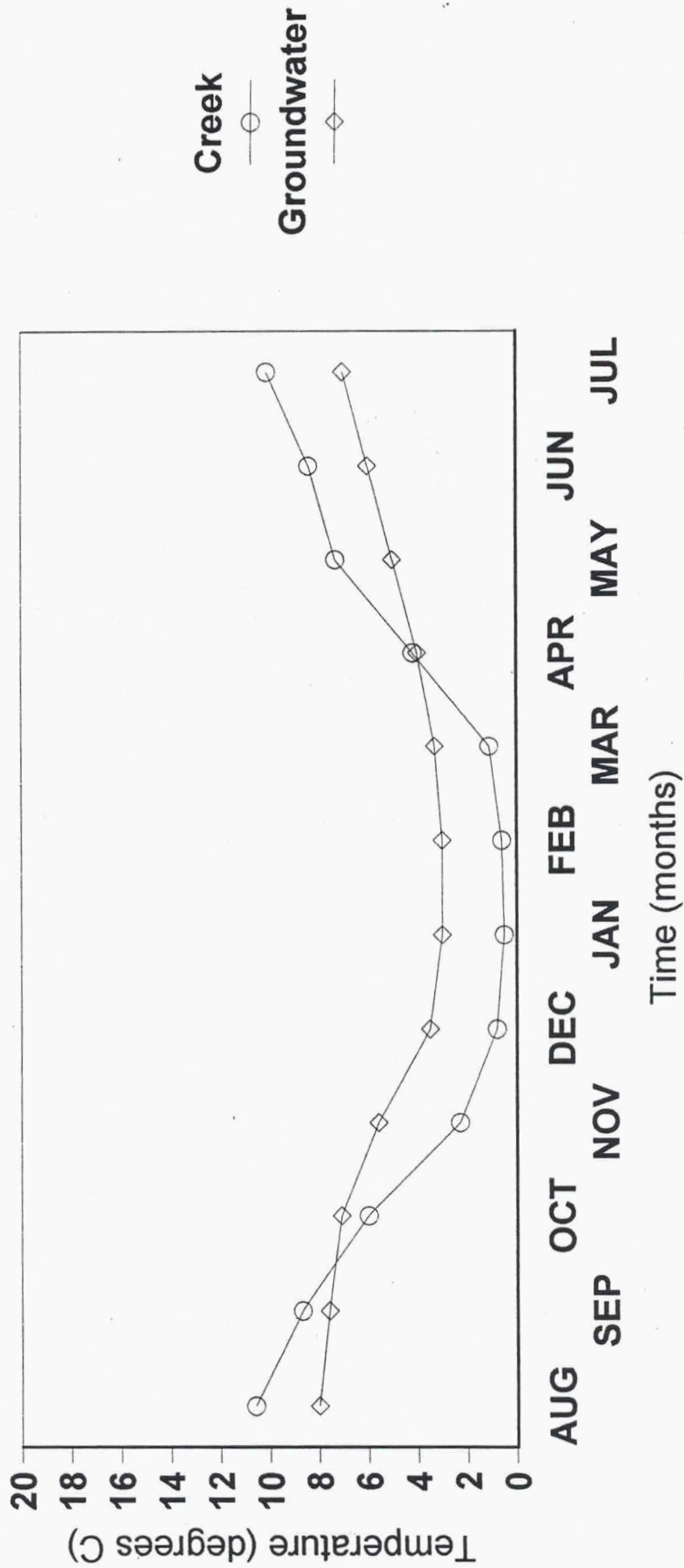
The creek water supply is used for year-round rearing and has a maximum flow of approximately 4,500 litres per minute, the normal operating flow is 1,600 to 1,800 litres per minute. In most cases the creek supply is also used for egg incubation, the exception being during periods of silty runoff flow 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 1998/99 were noticeably cooler than in 1997/98. The creek temperatures increased very slowly in the spring this year. Average temperatures in June, 1999 were 2.7 degrees cooler than the same month in 1998. Fall 1998 temperatures were close to normal (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 1998, due in part to the fact that Toboggan Creek is glacier fed. Again, the levels of this year followed the pattern of 1997 very closely with no substantial flooding during the fall freshet. Winter flows seemed fair to good through the winter period and dewatering of coho salmon redds did not seem to be a factor in 1999. Flows during the steelhead spawning period, early May through June, were somewhat more volatile than last year, which may have reduced survivals from the egg stage to the swim-up fry stage of this species. As in previous years, many steelhead fry were observed in Toboggan Creek this summer. Freshwater production in 1998/99 should still have been very good.



**Fig. 2 Temperatures at Toboggan Creek Hatchery (1998/99)**





## TOBOGGAN CREEK HATCHERY - SALMON BROOD YEAR SUMMARIES

### Bulkley River Chinook (1997 brood)

Growth of the 1997 brood chinook fry was good from the first of August until freezeup in late December. These salmon went from 4.0 grams in early August to 9.5 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 1997 brood chinook smolts commenced April 22 and were completed on April 29, 1999. A total of 87,873 chinook smolts were taken in batches of up to 9,500 fish to the upper Bulkley River, near Houston, B.C. These smolts averaged 12.1 grams in weight. As release conditions were good throughout the spring we spread these chinook smolts evenly between the groundwater site near McQuarrie Creek and the mainstem site near Topley, B.C. An additional 32,350 chinook from this same brood year were released, as fed fry, prior to this. These fry averaged 3.8 grams at release, and all of these salmon were left-ventral clipped for future assessment purposes. These fry were released from August 4<sup>th</sup> thru 6<sup>th</sup>, 1998 into an area of the upper Bulkley system near Goosly Lake. Location of the smolt releases this spring are as follows:

Topley road crossing	38,533
McQuarrie groundwater area	49,340
Total released	87,873

Releases took six work days to complete this year, and we had just one crew and vehicle working. Releases took 11 individual trips to complete. Everything went very well during all these releases and we observed very few mortalities in total. Using the 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 91.4 % over a 20 month period from mid August, 1997 to late April of 1999. This group of smolts looked to be extremely healthy at the time of release.

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 (1998 brood)

Broodstock collection for 1998 brood Bulkley chinook began on August 17, 1998 and by August 25<sup>th</sup> we had attained our target of 90,000 eggs. A total of 24 female and 68 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 samples were removed from all females, and were sent to the Pacific Biological Station for BKD screening. None of these fish tested BKD positive.

Chinook assessment was carried out, in conjunction with these egg takes, including a helicopter count of salmon spawners on August 17, 1998. A total of 604 chinook were observed between the Morice River junction and Bulkley Lake, with almost three quarters of the run spawning upstream of the McQuarrie Creek confluence this year. These salmon were well spread out into the upper reaches this year, benefitting from good flows through the summer and fall. We sampled a total of 377 different chinook during and after broodstock collection, and we also had 27 additional chinook recaptures, identified by operculum punches. The overall composition of the run this year was 63.0 % wild and 37.0 % adipose-clipped chinook.

Assessment carried out during egg collection allowed us to collect a total of 23 scale samples from adult chinook, and 56 heads were collected for CWT analysis. Neither DNA samples or larger numbers of scale samples were requested by the DFO Assessment Division in 1998.

Results of the helicopter count were as follows:

	<u>Aug. 17<sup>th</sup></u>
Above Bulkley Falls	12 chinook
Meanwhile Creek	52 chinook
Topley	44 chinook
Richfield Creek	200 chinook
Perow Station	134 chinook
McQuarrie Creek	12 chinook
Below McQuarrie Creek	100 chinook
Below Knockholt	0 chinook
Houston	50 chinook
in Buck Creek	No Count
Total observed / flight	604 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 1,100 chinook adults in 1998. We captured and sampled over 34 % of this year's chinook escapement into the upper Bulkley.

All of the individual 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 CWT lab it appears a large proportion of the spawners in 1998 were five year old chinook. Both the wild and adipose clipped portions of the run showed an abundance of five year olds, and as in 1997, these chinook were larger in size than normal. This further indicates good ocean survivals and growth for the 1993 brood year smolts, as was evidenced last year with the abundance of four year olds in the Bulkley River escapement.

Shocking and picking of the 1998 brood Bulkley River chinook eggs was completed in late September 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 88.5 % in 1998 (Table I). Volume estimates done at eyed stage verified our spawning estimate of close to 90,000 eggs collected from the Bulkley chinook stock.

Development of the 1998 brood chinook eggs was slowed down in the incubators to aim at a later ponding date, as was done in 1997. This was done in an effort to reduce the stress from ponding in cold water. Ponding of chinook fry was completed on April 07, 1999, which was six weeks later than in some previous years. Results of this later ponding were positive and survivals were excellent. The number of chinook ponded in 1999 was 76,882 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 increased in weight from 0.4 grams up to 1.1 grams. Growth of this stock has continued strongly, and as of the end of July these chinook fry averaged over 4.5 grams in weight (Fig. 3). The 1998 brood chinook continue to feed actively and survivals of these fish since ponding have been very good.

Coded-wire tagging occurred between June 13<sup>th</sup> and June 16<sup>th</sup>, 1999 and this tag group is now rearing in compartments "B/C" of the outdoor rearing channel. In total, 72,040 chinook were tagged and adipose clipped. Since tagging we have marked the few remaining surplus chinook fry with a right-ventral clip. These fish will be released as fed fry in early to mid August of 1999.

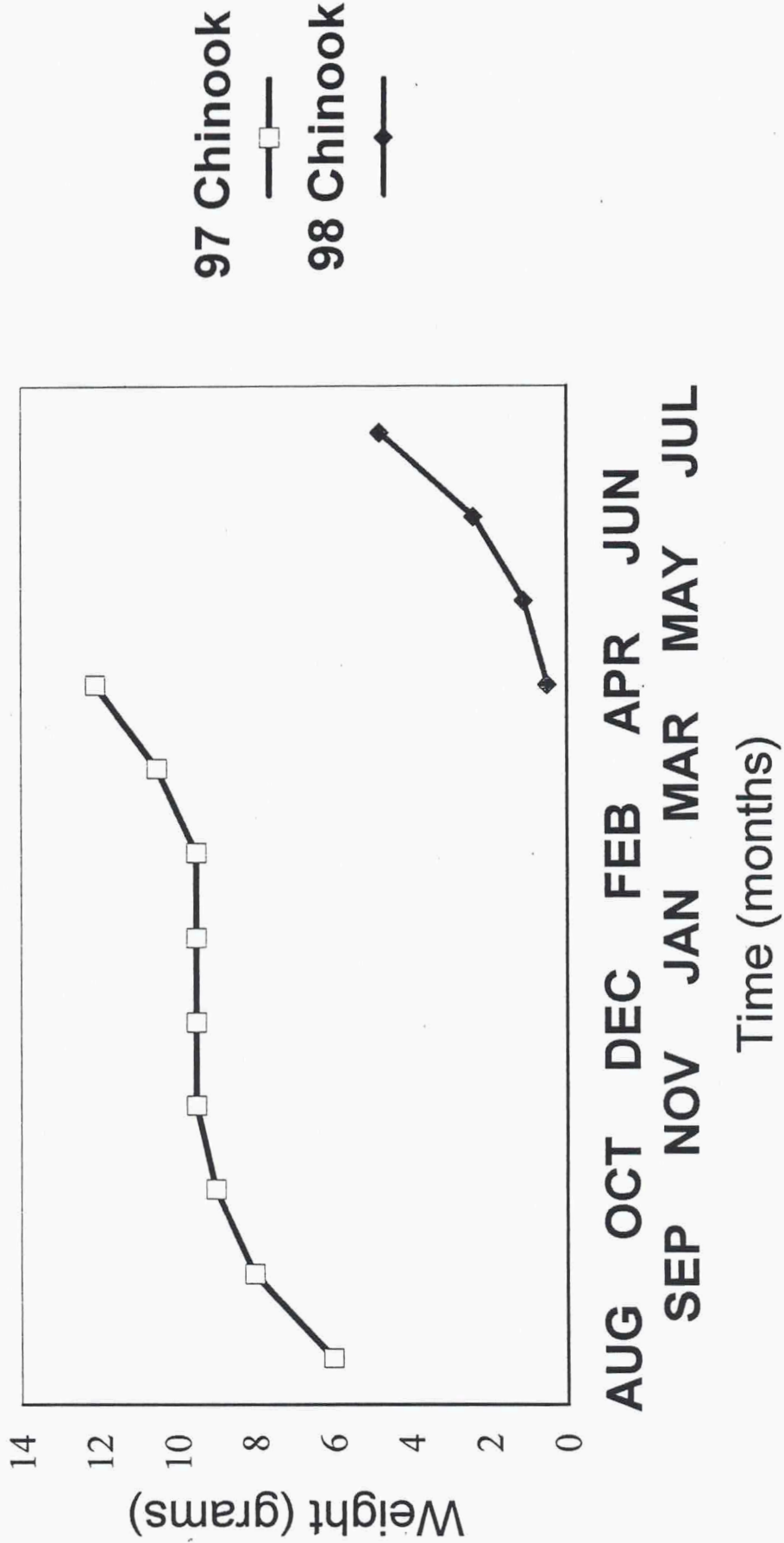
Data Codes	Total Tagged	Fin Clip
18-32-44/45/46	72,040	adipose



Table I. Shocking and Picking Summary for the 1998 Brood Bulkley River Chinook Eggs Incubating at the Toboggan Creek Salmon Hatchery.

<u>Tray #</u>	<u>Females</u>	<u>Pre-Shock</u>	<u>Post-Shock</u>	<u>50 ml Sample</u>	<u>Volume (mls)</u>	<u>Survival(%)</u>
M1-2	2	43	469	125(2.50)	3,870	9,206(94.7)
M1-3	3	44	715	132(2.64)	3,560	8,683(92.0)
M1-4	3	330	1,026	125(2.50)	4,940	11,324(89.3)
M1-5	2	24	180	104(2.08)	4,060	8,265(97.6)
M1-6	3	76	1,432	112(2.24)	3,650	6,744(81.7)
M2-3	2	100	1,416	121(2.42)	4,390	9,208(85.9)
M2-4	3	125	1,739	122(2.44)	3,740	7,387(79.9)
M2-5	3	377	1,232	137(2.74)	3,720	8,961(84.8)
M2-6	3	160	677	129(2.58)	3,550	8,482(91.0)
<hr/>						
<u>Totals</u>	<u>24</u>	<u>1,279(1.4%)</u>	<u>8,886(10.1%)</u>	<u>123(2.46)</u>	<u>35,480</u>	<u>78,260(88.5)</u>
<hr/>						

Figure 3. Growth of Chinook Salmon at the Toboggan Hatchery (1998/99)



### Chinook Hatchery Returns (1992, '93, '94 and '95 broods)

Marked hatchery returns made up close to 37 % of the chinook escapement to the upper Bulkley River this year, an estimated 411 finclipped hatchery chinook and 689 unclipped wild salmon returned to this system in 1998.

These escapement estimates were determined as a result of the intensive assessment carried out by hatchery staff in 1998, 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 604 chinook in the upper Bulkley system.

A total of 377 different chinook were randomly sampled during and after broodstock collection by hatchery staff, the sample represented close to 34 % of the total estimated escapement. As a result of this sampling it was found that 37 % of these chinook spawners were of hatchery origin. Almost all of the clipped salmon observed in 1998 were adipose clipped coded-wire tags. We found one right-ventral and one left-ventral clipped chinook in the sampling, these two would be from fry releases of 1994 brood and 1993 brood chinook respectively. Hatchery chinook were sampled for heads and pins and 56 chinook heads were collected, with 47 of them carrying pins.

<u># of Chinook</u>	<u>Tag Code</u>	<u>Brood Year</u>
3	18/10/06-07-08	1992
40	18/14/42	1993
2	18/12/40	1994
2	18/16/54	1995

These coded-wire tag data indicate that escapement of marked chinook to the upper Bulkley in 1998 was predominantly 5 year old fish, making up 85.1 % of the adipose-clipped return. The 4 year old fish made up 4.3 %, as did the 6 year old fish, and 3 year old chinook made up 6.3 % of the hatchery escapement sampled in 1998. This is somewhat different from last year's results.

Based on this year's data, it appears that we had 405 salmon return from adipose-clipped releases of 1992, 1993, 1994 and 1995 brood chinook. This represents smolt to spawner survivals of 0.41 % for the 5 year old age class of the 1993 brood release. The survival for the four and five year old component is 0.56 % for the 1993 brood release when combined for the last two years. This is an extremely good result for an interior chinook stock. This again indicates very good ocean conditions when these chinook smolts migrated out in 1995.

### Toboggan Creek Coho (1997 brood)

Growth of the 1997 brood Toboggan coho increased rapidly in the summer and fall of 1998, from 3.5 grams near the end of July up to 9.7 grams by the last week of November (Fig. 4). This growth slowed considerably at this time 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.

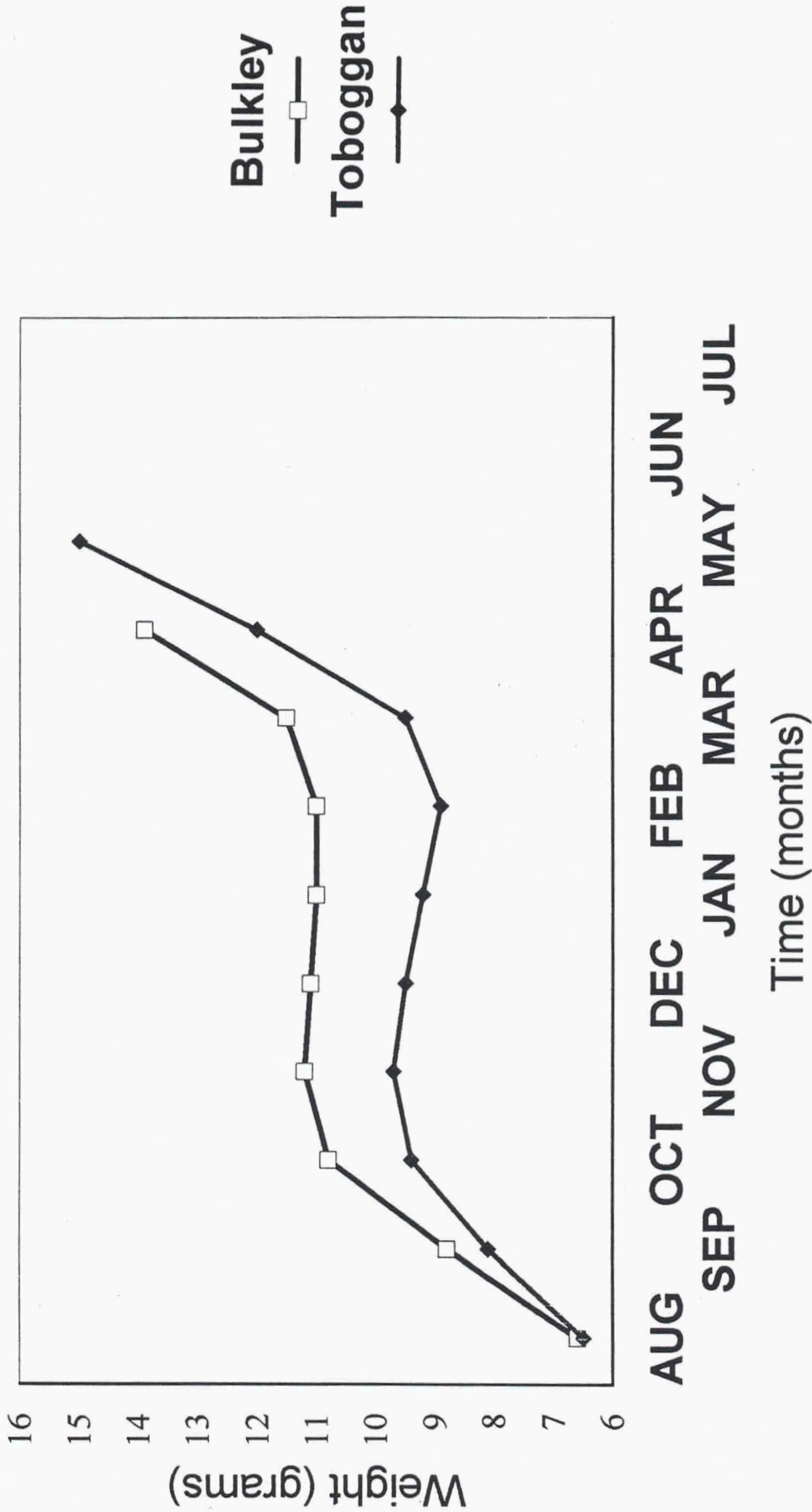
These coho fry were split into 3 Capilano troughs in mid July and moved again into our two new troughs (7 cubic metres) during August, prior to the tagging crew's arrival. Overall fish health of this stock was very good throughout the rearing cycle, and salmon survivals from ponding to release were 98.9 %, a period of 13 months. These are some of the best survivals we have seen.

Coded-wire tagging of this stock was completed on September 13<sup>th</sup> and 14<sup>th</sup> of 1998. A total of 40,568 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 5,100 coho were released. These fry were transferred to the Bulkley Valley Rod and Gun Club P.I.P. project earlier in the summer and released on October 29, 1998. The coded-wire tagged group was moved outdoors to the rearing channel immediately after tagging was completed.

<u>Tag Code</u>	<u># Tagged</u>
18-35-12	11,732
18-35-13	11,588
18-35-14	8,377
18-35-15	8,871
Total Tagged	40,568

Survivals were excellent after tagging and through the winter period and we released 40,468 coded-wire tagged smolts during the spring of 1999, the screens were pulled on May 12<sup>th</sup> and all of these 15.0 gram smolts had migrated out by June 1<sup>st</sup>. Observations of smolts indicated a peak movement on May 26<sup>th</sup>. Hatchery staff assisted members of the Bulkley Valley Rod and Gun Club in the transfer of all coho fry to their P.I.P. project on Club Creek in August of 1998. These coho fingerlings averaged 8.0 grams in weight at release, and were in very good condition.

Fig. 4 Growth of 1997 Brood Coho at Toboggan Hatchery (1998/99)





### Bulkley River Coho (1997 brood)

As with the Toboggan stock, growth of the 1997 brood Bulkley coho accelerated throughout the summer and fall periods, and they went from 3.0 grams near the end of July up to 11.2 grams by the first week of November (Fig. 4). This very rapid growth slowed down later in November then came to a halt in the months from December through March. In early April of 1999 their growth accelerated again, due to the increasing water temperatures, and this stock managed to get to an average weight 13.9 grams prior to their release in late April and early May.

These coho fry were split into two Capilano troughs in mid July, into three troughs later that same month, and four troughs in August prior to the tagging crew's arrival. Overall fish health of the stock was good, the Bulkley River coho survivals from ponding to release were 91.3 % over a period of 12 months. Most of this stock's mortalities occurred at the very early fry stage.

Coded-wire tagging of these salmon was completed on the 12<sup>th</sup> and 13<sup>th</sup> of September, 1998. A total of 23,254 coho fry were tagged and adipose clipped. Remaining Bulkley River coho that were too small to tag at this time were left-ventral clipped, with 2,400 salmon being clipped. The coded-wire tagged group of these Bulkley coho was reared inside the hatchery then moved to a compartment of the outdoor rearing channel. They then overwintered in the outdoor channel.

<u>Tag Code</u>	<u># Tagged</u>
18-35-10	11,578
18-35-11	11,676
Total Tagged	23,254

Survivals after coded-wire tagging, and right through to the release date of this tag group, were excellent and exceeded 99.8 %. Releases of these smolts were completed on May 5<sup>th</sup>, 1999 and a total of 23,212 smolts were transported by truck to the upper Bulkley River at this time. Releases of ventral clips surplus to the tag group occurred on May 30<sup>th</sup>, 1999. A total of 2,354 left-ventral clipped smolts were released at 20.7 grams, they were extremely healthy and vigorous.

Coho Egg Collection (1998 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 in 1992 after three years of smolt production, but enhancement of this stock was recently revived in 1998. The Bulkley River stock is enhanced most years, with levels of enhancement depending on abundance of wild adult broodstock. The Toboggan Creek stock has been enhanced yearly since we commenced operations in 1985. Coho egg targets for 1998/99 were as follows :

Kathlyn Creek	20,000
Toboggan Creek	40,000
Bulkley River	140,000
Morice River	40,000
<hr/>	
Total Egg Target	240,000

Kathlyn Creek Coho (1998 brood)

As in previous years no coho eggs were collected from Kathlyn Creek in 1998 due to non-existent 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 in the past few years, with adult coho returning in the hundreds. An accurate assessment of this stock was conducted in 1998 with funding from Fisheries Renewal BC, and indicated over 400 spawning coho.

This system will again be the recipient of a coho transplant from wild Toboggan Creek broodstock, using fry surplus to our tag group. This has been the case for the past twelve years.

### Toboggan Creek Coho (1998 brood)

All of our 1998 brood coho eggs collected from Toboggan Creek this fall were taken from adult coho intercepted at our fence operation. A total of 42 coho were collected and transported back to the hatchery for egg take purposes. We took eggs from coho broodstock on October 9<sup>th</sup>, 14<sup>th</sup>, and 21<sup>st</sup>; the females surplus to our egg-take needs were released back into the stream. All of the eggs were disinfected with an iodine solution prior to being placed in the moist incubators.

Eggs were taken from a total of 14 ripe female coho and sperm was taken from 32 males. Each female's eggs were fertilized by using at least 6 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 3.8 kg, while overall the average length was 570 mm. The scales were sent to the DFO scale lab for analysis, six of the females were 4 years of age in 1998 and eight were 3 year olds. Of a total of 164 readable scales sent to the lab from 1998 we saw a very similar age structure ; 36% four-year olds and 64% three-year olds.

Shocking and picking of the 1998 brood Toboggan Creek coho eggs began on December 18<sup>th</sup> and was completed on December 29, 1998. Coho egg survivals to this stage were excellent, and a total of 52,571 eggs survived (Table II). Fecundities of Toboggan coho averaged 3,940 eggs per female in 1998, as compared to 3,340 in 1997.

In some previous years, eyed coho eggs were transferred to the P.I.P. project at the Chicago Creek site. None were transferred in 1999. Eggs began hatching at 400.0 A.T.U.'s and peak hatch occurred at 420.0 thermal units. The survivals during hatch were excellent. Ponding of this stock occurred between May 4<sup>th</sup> and May 12<sup>th</sup>, 1999 at 610.0 A.T.U.'s. In total, 52,312 coho fry were ponded into one Capilano trough and they began feeding actively shortly after ponding. At present, these fry are averaging 3.8 grams in weight, have been transferred to the outdoor channel to reduce densities, 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 2000. Up to 35,000 of these fish will be released into Toboggan Creek, as coded-wire tagged salmon, and another 6,000 coho smolts will be transplanted into the Kathlyn Creek drainage. The remaining fry surplus to these numbers will be released as 6.0 gram fish into Lake Kathlyn sometime in August, 1999. The c.w.t. tagging crew showed up early this year to tag and clip the 1998 brood coho stocks on hand. Data will be included in the 1999/2000 report.

Survivals of this stock have been excellent since ponding and they continue to appear very healthy. We presently have over 51,767 coho fry from this stock on hand at the hatchery.



Table II. Shocking and Picking Summary for the 1998 Brood Toboggan Creek Coho Eggs Incubating at the Toboggan Creek Salmon Hatchery.

<u>Tray #</u>	<u>Females</u>	<u>Pre-Shock</u>	<u>Post-Shock</u>	<u>50 ml Sample</u>	<u>Volume (mls)</u>	<u>Survival(%)</u>
M1-5	3	165	634	153(3.06)	3,690	10,657(93.0)
M2-3	3	161	309	191(3.82)	3,370	12,564(96.4)
M2-4	3	237	375	151(3.02)	3,420	9,953(94.2)
M2-5	2	31	150	150(3.00)	2,800	8,250(97.8)
M2-6	3	100	409	167(3.34)	3,460	11,147(95.6)
<hr/>						
<u>Totals</u>	<u>14</u>	<u>694(1.3%)</u>	<u>1,877(3.4%)</u>	<u>163(3.26)</u>	<u>16,740</u>	<u>52,571(95.3)</u>
<hr/>						

### Bulkley River Coho (1998 brood)

A total of 92 adult coho salmon were collected in the Bulkley River during October of 1998. All of the fish were taken at the Bulkley River counting fence, which was operated by the Nadina Community Futures Society with funding from Fisheries and Oceans Canada being used to operate the fence. All of these salmon were transported back to the Toboggan Creek Hatchery and were held until ripe in covered Capilano troughs. As with the Toboggan Creek coho, the fish entered 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 estimated escapement to the Bulkley River in 1998 was 580 coho.

Eggs were taken from a total of 44 ripe female coho and sperm was taken from 44 male coho. The coho eggs were fertilized by using at least 6 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 3.3 kg overall and average length 550 mm. The scale samples indicated 23% of the wild broodstock were four-year olds.

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 4 females were left unspawned, while all of the males were released after expression of sperm. Coho eggs were taken between October 9<sup>th</sup> and October 29<sup>th</sup>, 1998 which was only slightly later than last year's dates.

Shocking and picking of the 1998 brood Bulkley River coho eggs began on December 15<sup>th</sup>, 1998 and the last batch was done on January 22<sup>nd</sup>, 1999. Egg survivals to this stage were good and a total of 130,695 eggs survived (Table III). Fecundities of the Bulkley coho were 3,745 eggs per female in 1998, well up from 1997 at 2,665 and up 10% from the 3,425 in 1996. The numbers of eggs per female in 1998, and the size of the females, were the highest we have ever seen..

Hatching of the coho eggs began at 370.0 A.T.U.'s with peak hatch occurring at 410.0 thermal units. Ponding of coho fry from this stock occurred between May 4<sup>th</sup> and May 13<sup>th</sup>, 1999 at about 600.0 A.T.U.'s. Survivals to ponding were very good and we began feeding 129,831 Bulkley coho fry, which initially were ponded in two Capilano troughs. At the present time coho from this stock are averaging 2.2 grams with a c.c. of 1.12. Growth of this stock has been slower than last year but we expect them to reach an 11.0 to 12.0 gram smolt size prior to release in 2000.

Approximately 36,500 of these coho will be reared to smolt at the hatchery, and released as coded-wire tagged fish in May of 2000. An additional 80,462 coho have been coded-wire tagged and will be released as 4.0 gram fed fry into Buck Creek in August of 1999. The remaining coho surplus to these two tag groups will be right-ventral clipped and released as smolts in May, 2000.

Table III. Shocking and Picking Summary for the 1998 Brood Bulkley River Coho Eggs Incubating at the Toboggan Creek Salmon Hatchery.

<u>Tray #</u>	<u>Females</u>	<u>Pre-Shock</u>	<u>Post-Shock</u>	<u>50 ml Sample</u>	<u>Volume (mls)</u>	<u>Survival(%)</u>
M1-1	2	254	1,311	219(4.38)	1,860	6,835(81.4)
M1-2	3	3,824	2,310	220(4.40)	2,070	6,798(52.6)
M1-3	3	924	2,800	161(3.22)	3,100	7,182(65.8)
M1-4	3	161	3,763	207(4.14)	2,990	8,616(68.7)
M1-6	4	2,148	1,740	189(3.78)	2,800	8,844(69.5)
M2-1	4	589	2,515	236(4.72)	2,910	11,220(78.3)
M2-2	3	302	2,479	192(3.84)	3,280	10,116(78.4)
M3-2	3	128	818	191(3.82)	3,370	12,055(92.7)
M3-3	3	32	929	198(3.96)	3,190	11,703(92.4)
M3-4	4	35	1,158	183(3.66)	3,210	10,591(89.9)
M3-5	4	280	1,981	186(3.72)	3,130	9,663(81.0)
M3-6	2	28	674	183(3.66)	2,680	9,135(92.9)
M4-5	3	78	742	164(3.28)	2,980	9,032(91.7)
M4-6	3	395	1,703	156(3.12)	3,400	8,905(80.9)
<hr/>						
<u>Totals</u>	<u>44</u>	<u>9,178(5.6%)</u>	<u>24,923(15.1%)</u>	<u>190(3.80)</u>	<u>40,970</u>	<u>130,695(79.3)</u>
<hr/>						



### Morice River Coho (1998 brood)

The Morice River coho enhancement program was restarted in 1998 after being discontinued in 1992. The egg target was set at 40,000 eggs with constraints on where hatchery staff were allowed to try and capture broodstock. Initially adult capture efforts were focussed on the Morice River in the vicinity of Owen Creek, as the progeny were to be released into this creek. No coho were captured or observed in this section of the Morice River at this time.

As the project went on the area of broodstock collection was expanded to include the Morice River from Bymac Park upstream to Lamprey Creek. Even so, it was extremely difficult to find coho spawners in areas where they could be captured. There were higher abundances of coho upstream of Lamprey but it was decided by DFO, that for 1998 at least, no eggs would be collected from this section of river. Most of the coho captured were obtained from the section of river directly downstream of Lamprey Creek. One coho, an adipose clipped male that was later identified as a Bulkley CWT, was captured at the confluence of Owen Creek in late October.

A total of 12 coho ( 5 females and 7 males ) were captured for broodstock purposes and transported back to the hatchery for holding. Over a period of seven weeks the female coho all ripened and their eggs were incubated. Scales, weights and lengths were taken from all of the broodstock captured. The average weight of the brood females was 3.4 kgs and the average length was 555 mm. The scale samples were sent to the DFO scale lab and revealed that of the eleven readable samples there were 4 four-year old coho (36%) and 7 three-year olds (64%). Three out of the five brood females (60%), however, were aged at four years old.

After the egg takes were completed the remaining male coho were returned to the Morice River. The coho eggs were taken on three different dates between October 21<sup>st</sup> and November 19<sup>th</sup>. The shocking and picking of this stock occurred between December 28, 1998 and February 16, 1999. A total of 15,453 eggs survived to this stage (Table IV). Fecundities were 3,943 eggs per female.

Eggs from this stock began hatching at 380.0 A.T.U.'s with peak hatch at 406.0 thermal units. We began ponding the Morice coho fry on May 12<sup>th</sup> and finished on May 25<sup>th</sup>, with the average A.T.U.'s at 620.0 when the fry were ready to emerge. Survivals were good and a total of 15,257 coho fry were ponded in one Capilano trough. At present these fry are averaging 2.25 grams in weight with a c.c. of 1.15, and they are continuing to feed actively.

The Morice River coho fry from the 1998 brood are scheduled to be released into Owen Lake in August of 1999. Coded-wire tagging of this stock is complete and survivals have been very good.

Table IV. Shocking and Picking Summary for the 1998 Brood Morice River Coho Eggs Incubating at the Toboggan Creek Salmon Hatchery.

<u>Tray #</u>	<u>Females</u>	<u>Pre-Shock</u>	<u>Post-Shock</u>	<u>50 ml Sample</u>	<u>Volume (mls)</u>	<u>Survival(%)</u>
M4-2	1	28	270	221(4.42)	820	3,354(91.8)
M4-3	3	264	897	155(3.10)	3,050	8,558(88.0)
M4-4	1	4	134	147(2.94)	1,250	3,541(96.2)
<hr/>						
<u>Totals</u>	<u>5</u>	<u>296(1.7%)</u>	<u>1,301(7.7%)</u>	<u>164(3.28)</u>	<u>5,120</u>	<u>15,453(90.6)</u>
<hr/>						



## Assessment of Coho Escapement in 1998

### Toboggan Creek Fence

The Toboggan Creek coho counting fence commenced operation on July 30<sup>th</sup>, 1998. The fence was monitored twice daily from this date through to November 9<sup>th</sup>, 1998 at which time the aluminum panels were removed due to freezing conditions.

A total of 1,920 coho were passed through the fence, with coho migration into the creek peaking in the first week of October. There was also a smaller peak of migration in late October due to low flows in the middle of the month. In addition to our normal sampling, we floy tagged and operculum punched approximately 1,870 salmon at the fence. Different colored tags were installed at intervals throughout the escapement. Later assessment, done visually, found 2,251 spawning coho salmon upstream of the fence of which only 41 (1.8%) were documented as being untagged. Weekly counts were done starting on October 13<sup>th</sup> and finishing on November 17<sup>th</sup>.

We were able to estimate the total number of coho which were above the fence, by means of the weekly spawner counts. Spawning appeared to have started around October 12<sup>th</sup>, 1998, and peak spawn occurred in the fourth week of October. We also observed some spawning coho downstream of the counting fence and, as a result of counts done on the same dates as those upstream of the fence, we estimated that 500 coho spawned in this section of the creek. Of 67 untagged, dead coho sampled eleven fish did not have an operculum punch, and is conclusive in proving that we missed less than 2.0 % of the coho that spawned upstream of the counting fence in 1998. The complete spawner estimate, including salmon broodstock removed at the fence by hatchery personnel and salmon spawning downstream of the counting fence, was 2,470 coho.

Approximately 17.8 % of the salmon handled at the fence were coded-wire tagged hatchery returns from the 1995 brood. This represents a total of 440 spawners returning from a release of 33,255 smolts, a 1.3 % return overall. Adipose-clipped coho made up over 99.0 % of the marked coho escapement with only three ventral clipped fish observed in 1998, likely strays from coho released into the upper Bulkley system in the spring of 1997.

### Bulkley River Fence

The Bulkley fence operated from September 4<sup>th</sup> until November 10<sup>th</sup>, 1998 and a total of 317 coho were sampled. This was not a total count, as the fence design discourages fish entry and there is a displacement of spawners. The total coho run was estimated at 580 coho spawners in 1998, based on comparisons of Bulkley coded-wire tag abundances in the Alaskan catch compared to Toboggan cwt's. A total of 219 coho caught at the fence were clipped hatchery fish indicating that 69.1 % of the upper Bulkley escapements in 1998 were hatchery produced returns.

### Coho Hatchery Returns (1995 brood)

All of the upper Skeena waters were closed to harvest of coho, and any directed angling, in 1998 due to conservation concerns. Anglers were not allowed to even fish for salmon after the second of August. The only angling that occurred after this date was for fish species that were under the jurisdiction of the Province of BC; namely steelhead, trout and char. Anglers continued to fish at the confluence of Toboggan Creek and the Bulkley River and some coho salmon were caught by anglers targetting steelhead.

A creel survey was carried out from mid August through to mid October at the Toboggan Creek confluence, with funding supplied by DFO. Coho catches were down considerably due to the salmon closure. As a result of this survey it was determined that the level of participation was also down substantially from other years. While coho catches were low steelhead catches, on the other hand, were very good. This high success for steelhead was similar to 1997.

Head Depot returns of hatchery salmon saw a large number of chinook heads turned in but no coho, which was expected. Given the few coho that were estimated to have been caught by anglers in 1998, and the well documented high survival rates for released salmon in freshwater, it is likely that few if any adipose-clipped coho were removed from the coho escapement to this site.

As a result of sampling done at the fence and on the spawning grounds we were able to collect 57 coho heads from Toboggan Creek coho spawners, of these 52 carried pins while 4 of them did not have pins found and one pin was lost. We did not have a problem acquiring heads in 1998.

Thirty-one heads were taken from Bulkley River coho in 1998, all 31 heads carried pins and were from 1995 brood coho released in 1997. Results of the Toboggan sampling were as follows :

<u># of Coho</u>	<u>Tag Code</u>
17	18/11/44
14	18/11/45
16	18/11/46
4	NO PIN

All of these 47 pinned heads were from 1995 brood coho salmon reared and released at the Toboggan Creek Hatchery site. There were, however, five heads that were collected from Toboggan that were identified as 1995 brood Bulkley coho. As well, one head collected from a clipped coho captured by hatchery staff on the Morice River turned out to be a 1995 brood Bulkley fish. This was unusual and indicates straying was a large factor in the 1998 escapement.



## Exploitation of 1995 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 arrive at 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 Native food fish catch has also been studied to some extent and gives insight in this regard.

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

Escapement	-	Toboggan Hatchery / Fisheries and Oceans Canada
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
Native Food	-	Toboggan Hatchery / Fisheries and Oceans Canada

Exploitation rates indicated by the data suggest that coded-wire tagged coho from the Toboggan Creek stock were harvested at rates of approximately 20.7% in 1998 (Fig. 5). Commercial catches by Alaskan vessels were responsible for over 83.5 % of the mortalities, BC Native food fishermen took 10.5 %, while anglers had a 4.2 % share. The BC commercial fishery was estimated at a 1.8 % mortality rate in 1998. This is the lowest exploitation rate ever documented. Coho spawning escapements to Toboggan Creek in 1998 were 79.3 % of the total adult stock.

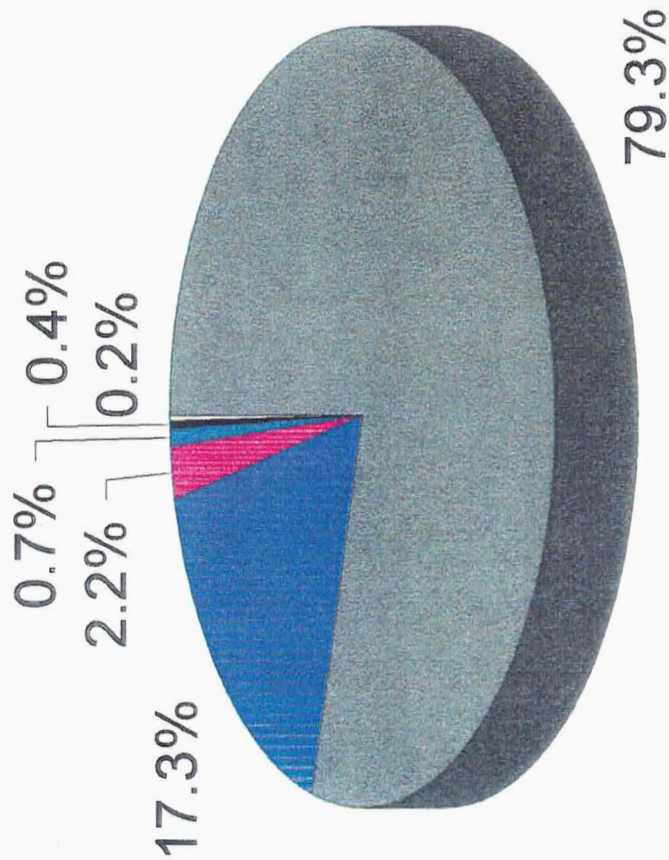
Alaskan commercial fishermen caught many more coho than those that were landed by B.C. fishermen, due to non-retention fisheries in Canada and total closures in some areas. This indicates that Alaskan interests were responsible for over 97.5 % of the commercial exploitation in 1998. The breakdown of Alaskan catches by gear type was not made available to us this year.

Survivals of hatchery-produced coho smolts from this facility were relatively low in 1998. Assuming the catch rates are accurate we saw smolt to adult survivals of 1.7 %, with about 555 coho produced from a release of 33,255 Toboggan Creek coho smolts. These survival rates are slightly better than half the eight-year average of 3.0 % and indicate the poor ocean conditions for both wild and hatchery coho in 1997, when the 1995 brood smolts reached the ocean. By comparison we have seen hatchery coho survivals of 6.3 % from smolt to adult, almost four times that of 1998. As recently as 1994, we produced over 2,000 adult coho with 32,600 smolts.

Given the low ocean survivals that are now known, the management action in 1998 was needed.

**Fig. 5 Catch of Toboggan CWT Coho (1998)**

**CATCH/ESCAPEMENT**



## Administration Report

This section covers hours spent from August 1, 1998 through to July 31, 1999. The 1998/99 report represents the fifth year of reporting since a shift from the March 31<sup>st</sup> operational year end.

The following is a breakdown of hours spent carrying out the contract in 1998/99 :

<u>Activity</u>	<u>Man-hours</u>
Project Management	576.0
Facility Operations	3161.0
Broodstock Collection	660.0
Assessment	610.0
Coho Fence	800.0
Statutory Holidays	248.0
<hr/>	
Total Hours in 1997/98	6,055.0

The contract went very well again in 1998/99 and our hours of work spent in each category were consistent with most of the past few years. Hours spent operating the coho fence and collecting assessment data were higher than last year, while facility operation hours were down somewhat.

Total employment generated by the hatchery in 1998/99 added up to 209 full work-weeks, employing 19 different people for varying lengths of time during the twelve month period. These last figures include separate contracts we have undertaken via the Challenge Student Employment Program, the Fisheries Renewal BC fund, the HRSEP initiative, the Strategic Stock Enhancement Program, and the Habitat Conservation Trust Fund. All during the 1998/99 period.

Labour costs were two percent lower than budgetted for in the contract period. As well, the costs of our hatchery operations were also very close to the budgeted amounts. Overall, we were on budget for the total contracted amount of \$ 151,300.00 in 1998/99.



The following is a summary of expenditures made in carrying out the 1998/99 contract:

<u>Category</u>	<u>Expenditures</u>	<u>Contract</u>
Direct Labour	90,636.76	92,276.14
Overhead Costs	22,659.19	23,069.04
Capital Equipment	0.00	0.00
Operations	38,017.68	35,954.82
<hr/>		
Totals	151,313.63	151,300.00
<hr/>		

The labour and overhead portions of this table only include activities directly attributable to the main C.E.D.P. contract. They do not include time spent collecting Morice River coho broodstock and the associated egg takes, time spent collecting the extra Bulkley coho eggs for fry planting, operation of the Toboggan fence for steehead in the spring of 1999, student labor contracted through the Challenge '99 Program, or the coho assessment carried out in 1998 under FsRBC.

## Development and Maintenance of the Facility

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 more maintenance this year as a followup to work done in previous years to stabilize the water intake feeding the settling pond. The creek has been scouring away at the banks at the intake since a new bridge was installed recently
- iv) Two students were hired for 6 weeks again during the summer, as a result of funding from the federal Challenge '99 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 during broodstock collection.
- v) A "School Release Day" organized by our C.A., Brenda Donas, was carried out in May, 1999. Hundreds of schoolkids, who reared coho from egg to fry in classroom incubators, came out to release their fry. We also helped in October of 1998 to collect coho eggs for the same classrooms. Both activities were very successful and beneficial.
- vi) During the past seven springs we have operated the Toboggan Creek 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 funding 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 to cover labour costs. In 1996 funding came from Skeena Green Plan for the count, which identified 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. The 1998 count was funded by the Habitat Conservation Fund and an estimated 380 fish spawned above the fence and many more spawned below.

In 1999, we identified an escapement of 357 steelhead upstream of the fence. The funding came from Fisheries Renewal BC for this study.

## Operating Plan for 1999/2000

As in previous years we will begin releasing the chinook and coho smolts in April and May. The 1998 brood Bulkley chinook will be the first to go in mid to late April, followed later by the 1998 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 close to 114,000 salmon smolts to the Bulkley River and more than 35,000 smolts will go into the Toboggan Creek system. Also, 6,000 coho smolts from Toboggan stock will be transplanted into the Kathlyn Creek watershed in late May, and will involve members of the Bulkley Valley Rod and Gun Club.

Our chinook target was increased back to 100,000 eggs for 1999 to allow for a c.w.t. release group of 75,000 smolts. We took less eggs in 1998 (90,000) but were about 3,000 under our marking target as a result. We usually send kidney samples to the Biological Station for B.K.D. screening but will not be in 1999 as this stock has been declared a very low risk. Egg takes will happen in late August and we plan to produce 12.0 gram smolts for release in April of 2001.

Coho egg targets will remain at the level of last year, and 240,000 eggs will be taken in 1999; Bulkley River (140,000), Toboggan Creek (45,000), and Kathlyn Creek (15,000). We will also try to collect 40,000 Morice River coho eggs in 1999. Most of these coho will be reared for fed fry releases but 70,000 will be smolted, 12.0 to 15.0 grams, and released in the spring of 2001.

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

We intend on continuing with enumeration of steelhead trout spawners into Toboggan Creek in the spring of 2000. We hope to incorporate a tagging program at the Toboggan Creek mouth just prior to the fence count, as we have done previously. Funding is available from FsRBC again.

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 summer of 2000 to encourage people to come out and view the facility, see the successes of the Society, 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 some areas where I believe changes can be made that will be beneficial to our operation, the public, and the salmon resource :

- 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. We have noticed an improvement in harvesting methods and reporting in the past few years, and the people of the community have taken a real interest in learning more about salmon escapements.
- iii) Coded-wire tagging of chinook should continue to be done in June and coho done no later than mid July, allowing us to keep salmon pre-marking densities at acceptable levels and reduce the amount of stress on the fish.
- iv) Measures were taken in 1998 and 1999 to reduce coho exploitation and allow more spawners to reach the freshwater tributaries. Coho returns to some tributaries continued to show low numbers, but returns to Toboggan Creek were good. 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. In years of good ocean survival, however, we are seeing strong returns of our healthier stocks that result in harvestable surpluses. It would be of great benefit to the local community if anglers were allowed to harvest some coho from these surpluses in such years. The Alaskan fishery in July of each year provides a good indicator of abundance of Toboggan Creek CWT's. This information could be utilized to provide for a low risk terminal opportunity of Toboggan Creek coho, a fishery that could commence in August of such years.

Some of the recommendations are the same as past years. They are still the most important things that affect our longterm success, and will provide benefits to the resource and our community.

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 3,051,560 salmon and steelhead smolts and fry. We continue to see good returns of hatchery-produced salmon to the Bulkley River and Toboggan Creek systems. 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 the coded-wire tag recoveries from the commercial operations from B.C. and Alaska it is now quite evident at what rate these coho stocks were being exploited. Catch reductions have been initiated in recent years as a result of this documentation of the very high exploitation rates.

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, and other various initiatives, has allowed us to continue and expand our salmon enhancement and assessment operations in the past two years.

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 sixteenth season of operation we continue to 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. This is a very rewarding aspect of SEP.

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

A handwritten signature in black ink, appearing to read "Mike O'Neill". The signature is stylized and cursive, with the first name "Mike" and the last name "O'Neill" clearly distinguishable.

Mike O'Neill, Hatchery Manager

APPENDIX "A"

Statement of Work - 1998/99



**TOBOGGAN CREEK HATCHERY CONTRACT STATEMENT OF WORK  
FOR AUGUST 1, 1998 TO JULY 31, 1999**

**PAYMENT OF CLAIMS**

**PAYMENT SCHEDULE**

- August Advance : 20% upon signing the contract and receipt of April to July 1998 claims.
- October Advance : 25% upon receipt of August and September 1998 claims.
- January Advance : 20% upon receipt of Oct., Nov. and Dec. 1998 claims.
- April Advance : 35% upon receipt of Jan., Feb. and Mar 1999 claims.

Note that the deadline for the annual report will be January 31, 1999. A \$2500 penalty will be imposed on contractors who do not produce an Annual Report by the January 31, 1999 deadline date.

**MONTHLY CLAIM/PROGRESS PAYMENT REQUEST**

The claim for payment will be accompanied by a form which breaks all Operation and Maintenance 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 bi-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, 1999. March claims should be submitted to the Community Advisor no later than April 10, 1999. Please note that contract monies advanced prior to March 31, 1999 (advances for August 1998 to March 1999), must be spent by March 31, 1999.

**CAPITAL**

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

TOBOGGAN CREEK HATCHERY AUGUST 1, 1998 TO JULY 31, 1999

BASIS OF PAYMENT :

The contractor shall be paid for time expended and other costs reasonably and properly incurred in carrying out the required work from the effective contract date in accordance with the terms set out in the contract.

1) for Direct Labour at firm hourly rates :

Category	PMV	FSIV	FORIII	CRT1	
Hourly rate	\$17.90	\$15.48	\$13.46	\$8.00	
<b>Activity</b>					
Proj. Man.	575	0	0	0	575
Fac. Ops.	695	1125	863	230	2913
Fence Ops.	74	168	290	0	532
Broodstock	476	463	375	0	1314
Assessment	102	166	175	0	443
Stat. Holiday	78	78	56	0	212
Ttl hours	2000	2000	1759	230	5989
Total Cost\$	\$ 35,800.00	\$30,960.00	\$ 23,676.14	\$ 1,840.00	\$ 92,276.14

Total Labour Cost	\$92,276.14
Overhead Cost @ 25% of Direct Labour	\$23,069.04
Subtotal	\$115,345.18

3) for Direct Expenses at actual cost incurred without mark-up :

MATERIALS (estimates) :

Fish food/frt.	\$7500	
Alarm monitoring	\$ 600	
Hydro	\$ 850	
Telephone	\$1300	
Oxygen tank rental	\$ 200	
Equip. rental	\$ 200	
Equip. maint.	\$ 600	
Facility Ops.	\$3700	
Facility Main.	\$1500	
Project Ins.	\$1600	
Stove Fuel	\$1000	
TOTAL DIRECT EXPENSES (EST.)		\$19,050.00

4) For Authorized Travel and Living Expenses at firm rates where shown and at actual cost incurred where applicable without mark-up:

a) Vehicles

Fuel and Oil		\$0
Maintenance	\$0	
Truck Ins.	\$0	
Priv. veh. mil.	\$15,904.82	

b) Project Travel \$1,000.00(meal claims)

TOTAL TRAVEL AND LIVING (EST) \$16,904.82

TOTAL LIMITATION OF EXPENDITURE \$151,300



## 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.

## PROJECT MANAGEMENT AND ADMINISTRATION

Section 1.1. : Submit the Annual Report no later than January 31, 1999. If the report is not submitted by this date, a \$2500 penalty will be imposed.

## Section 3. FACILITY MAINTENANCE

1. The hatchery roof requires new (sealed) screws and the chimney requires repair.

## Section 4. FACILITY IMPROVEMENTS

No funding 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
- monthly flow and water level monitoring on both Toboggan Creek and Brandt Brook

Annual Report : should include all of the above information in summary form (tables and graphs to be included) 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 and recommendations.

Financial claims must also be submitted bi-monthly.

#### Section 6. PRODUCTION PLAN

##### **1997 BROOD TOBOGGAN CREEK COHO**

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

##### **1997 BROOD UPPER BULKLEY RIVER COHO**

Continue rearing of the 30,000 Upper Bulkley River coho. Approximately 30,000 will be retained for yearling releases. Target size for the yearling release is 12 to 18 grams per fish.

##### **1997 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 1998. Target size for the yearling release is 12 to 18 grams per fish.

##### **1998 BROOD TOBOGGAN CREEK COHO, UPPER BULKLEY COHO AND UPPER BULKLEY RIVER CHINOOK**

1998 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. The contractor will operate the Toboggan Creek assessment fence in order to capture broodstock and assess returning coho. 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 initiation 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 standard 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.

#### 1998 BROOD EGG TARGETS

STOCK	SPECIES	NO. EGGS REQUIRED
Upper Bulkley	chinook	90,000
Toboggan Creek	coho	60,000
Upper Bulkley	coho	140,000
Morice River	coho	40,000*

\* A Morice River coho program will be initiated if funding for the program becomes available.

#### 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 bi-monthly reports.

#### 7.4 Marking

Marking is proposed as follows :

1. 1997 brood Toboggan Creek coho : 30,000 AD/CWT and the remaining fry will be clipped.
2. 1997 brood Upper Bulkley R. coho : 30,000 AD/CWT and any remaining fry will be clipped.
3. 1997 Upper Bulkley River chinook : 75,000 will be AD/CWT and any remaining fry will be clipped.
4. The 100,000 coho that are part of the Upper Bulkley River fry release program, will be marked with a **maxillary clip**.

#### 7.5 Release

The 1997 brood Toboggan Creek coho fry releases will be into Lake Kathlyn in the late summer to early fall of 1998. The 1997 Toboggan Cr. coho yearling releases will occur in the spring of 1999. Target release size is 12 to 18 grams/fish.

1997 brood Bulkley coho fry releases will be into the Upper Bulkley River in the late summer to early fall of 1998. The 1997 Bulkley River coho yearling releases will occur in the spring of 1999. Target release size is 12 to 18 grams/fish.

1997 brood Bulkley chinook fry releases will be into the Upper Bulkley River in the fall of 1998. The 1997 Bulkley River chinook yearling releases will occur in the spring of 1999. Target release size is 12 to 18 grams/fish.

1997 brood Bulkey River coho that are part of the fry release program to the Upper Bulkley River will be released either in the late spring of 1998 or early fall of 1998. Direction on release timing will be available prior to the spring of 1998.

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 and/or the Stock 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 bi-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.

## Section 10 **OTHER**

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 January 31, 1999 for the 1998/99 contract year will result in a reduction of \$2,500 from this contract. The deduction will be taken from the October 1999 advance.
3. All movement of fish or eggs requires Transplant Permit prior to movement. Contact your Community Advisor on how to apply for a permit.