

**ANNUAL REPORT FOR TOBOGGAN CREEK
HATCHERY OPERATIONS IN 2002/2003**

Prepared for : **Fisheries and Oceans Canada**

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ANNUAL REPORT FOR TOBOGGAN CREEK HATCHERY OPERATIONS 2002/2003

Table of Contents

	Page
INTRODUCTION	1
OBJECTIVES	4
WATER SUPPLIES	5
SALMON BROOD YEAR SUMMARIES	7
Bulkley River Chinook (2000 brood)	7
Bulkley River Chinook (2001 brood)	8
Bulkley River Chinook (2002 brood)	8
Chinook Hatchery Returns in 2002	11
Toboggan Creek Coho (2000 brood)	12
Bulkley River Coho (2000 brood)	12
Toboggan Creek Coho (2001 brood)	13
Bulkley River Coho (2001 brood)	15
Toboggan Creek Coho (2002 brood)	16
Bulkley River Coho (2002 brood)	18
ASSESSMENT OF COHO ESCAPEMENT IN 2002	20
COHO HATCHERY RETURNS (1999 BROOD)	21
WILD vs. HATCHERY SMOLT SURVIVALS	22
EXPLOITATION OF 1999 BROOD COHO	23
ADMINISTRATION REPORT	25
DEVELOPMENT AND MAINTENANCE OF THE FACILITY	27
OPERATING PLAN FOR 2003/2004	28
RECOMMENDATIONS	29

List of Figures

	Page
Figure 1. Location of the Toboggan Creek Hatchery near Smithers, British Columbia	2
Figure 2. Temperatures at Toboggan Creek Hatchery (2002/03)	6
Figure 3. Growth of Coho Salmon at Toboggan Creek Hatchery (2002/03)	14
Figure 4. Catch of Toboggan Creek CWT Coho (2002)	24

List of Tables

	Page
Table I. Shocking and Picking Summary for the 2002 Brood Bulkley River Chinook Salmon Eggs Incubating at the Toboggan Creek Hatchery	10
Table II. Shocking and Picking Summary for the 2002 Brood Toboggan Creek Coho Salmon Eggs Incubating at the Toboggan Creek Hatchery	17
Table III. Shocking and Picking Summary for the 2002 Brood Bulkley River Coho Salmon Eggs Incubating at the Toboggan Creek Hatchery	19

ANNUAL REPORT FOR TOBOGGAN CREEK HATCHERY ACTIVITIES, 2002/03

Contract # : F1678-1-0002
Financial Code : 5G600-440-120-4107-50302
Contract Period : April 1, 2002 - March 31, 2003

Introduction

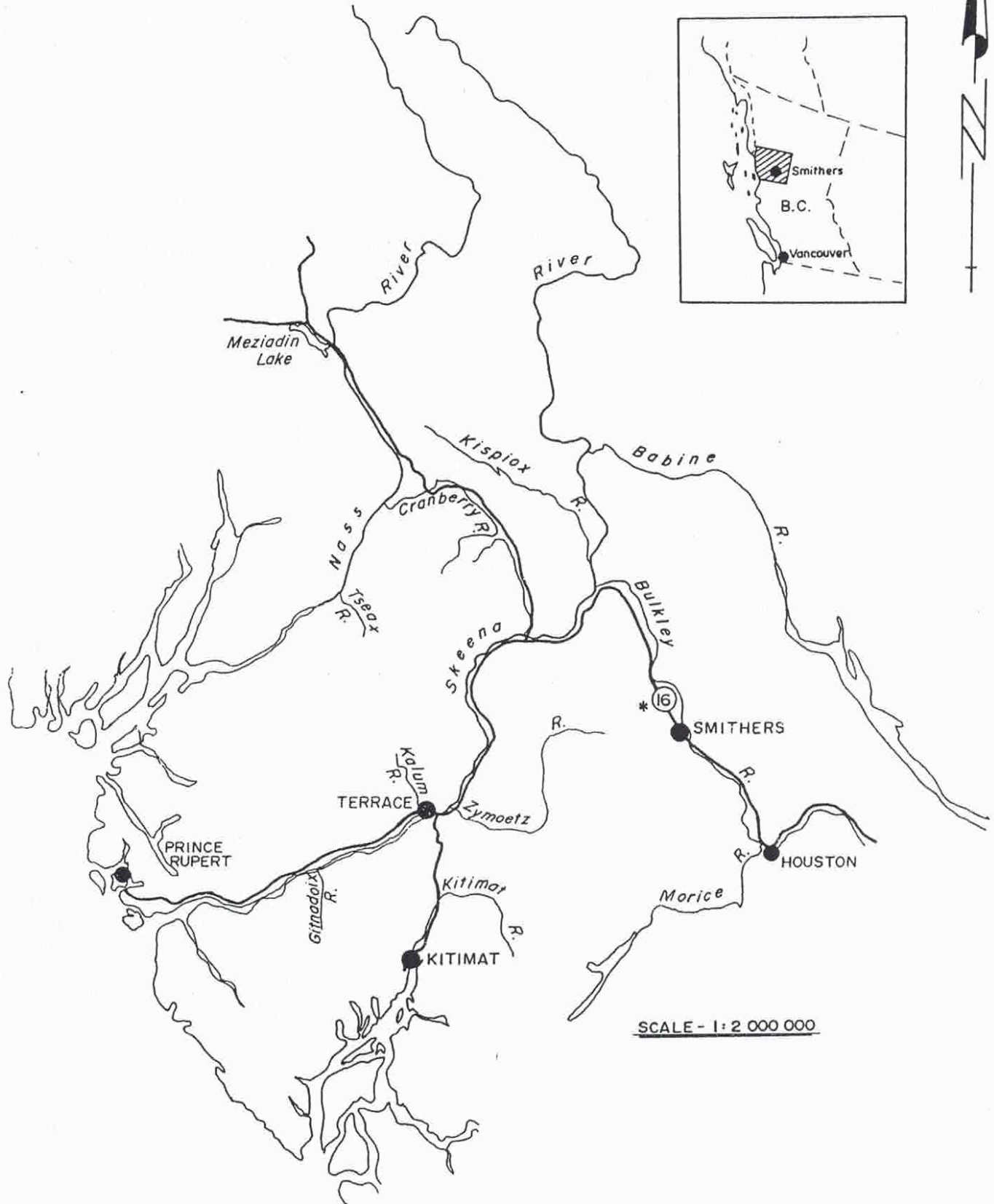
The Toboggan Creek Salmon Hatchery, under the direction of the Toboggan Creek Salmon and Steelhead Enhancement Society, has just completed its eighteenth year of successful operations. The Toboggan Creek Hatchery facility is located thirteen kilometers north-northwest of Smithers, British Columbia, on Highway 16 West (Fig. 1). The facility is located on C.N.R. right-of-way, which was purchased by the Society from C.N.R. in 1997. Funding for the hatchery contract is provided yearly by the Department of Fisheries and Oceans under the Community Involvement Division, and the 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 became even more of an issue with coho due to very poor ocean survivals in the 1997 return year. Chinook have had somewhat better escapements recently although some stocks are still at depressed levels. The upper Bulkley chinook stock, a genetically unique population, had seen only 150 to 200 wild spawners in the mid 1980's. This stock has historically been impacted by a gaff fishery at Moricetown Falls and by angling pressure, it also suffers from degraded freshwater habitat conditions.

The Toboggan Creek facility, constructed during 1984/85, has been attempting to preserve and enhance stocks of both of the aforementioned salmon species. During the 2002/03 contract period our Society reared and released some 64,000 coho and 58,000 chinook salmon smolts from the 2000 brood year, as well as 58,000 coho fry from the 2001 brood year. Successful rearing of another 62,000 coho from the 2001 brood continues, with these salmon being reared through to smolt for release in the spring of 2003. We do not have any 2001 brood chinook on hand as no eggs were taken that year due to record chinook escapement of 5,600 adult spawners.

Egg takes for the 2002 brood chinook from the upper Bulkley River went very well, and at present we have 55,000 chinook alevins incubating at the hatchery. Chinook spawning escapements to the upper Bulkley were reasonably strong this year, with 1,100 chinook adults estimated in 2002. The wild component of the escapement was 56 % in 2002 which is strong, although down from the record high of 76% observed in 2001.

Figure 1. Location of the Toboggan Creek Hatchery near Smithers, British Columbia *



Coho returns to the upper Skeena tributaries in 2002 were generally strong. The Toboggan Creek escapement in 2002 was 3,980 coho, representing the fourth consecutive large return. Escapements to the upper Bulkley River system were very strong with close to 4,000 coho estimated in 2002, and represents the second consecutive year of good returns. While the Bulkley return was high the fence captured less than 25% of the run. Our target of 40,000 Bulkley River coho eggs was attained from broodstock collected at the fence, which was funded and operated by DFO. Egg collection on Toboggan also went well, and the 40,000 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. Ponding 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 August 1st this year. This enabled an accurate assessment of our fourteenth major return of hatchery-produced coho to Toboggan Creek. The fence data indicated Toboggan hatchery returns of 1,130 coded-wire tagged coho in 2002, and from a release of 33,984 smolts this is a 3.3% return. This return is the fourth best on record, and continues the trend away from the very poor 1997 return of only 73 CWT's (0.2%). This illustrates the dramatic yearly differences in ocean productivity and survivals that can occur. The data indicate a total adult recruitment of 1,660 coho from the release, and at a 4.9% survival rate this is a slightly above average. The rate of exploitation on the Toboggan CWT's was about 32% in 2002, with the Alaskan catch accounting for less than half of this. Previous exploitation rates, prior to 1998, have ranged from 55% to well over 70%.

Around 33.8 % of Toboggan coho handled in 2002 were adipose-clipped salmon, and we estimate the makeup of the stock was approximately the same. Marked coho in this return year were not all hatchery coho, and it was estimated from CWT sampling that clipped wild coho made up 11% of the adipose-clipped escapement this year. As well, approximately 5% of the CWT's were identified as stray coho from the Bulkley and Morice stocks. As a result, it is estimated that hatchery coho from the Toboggan stock made up 84% of the marked return. Total estimates of Toboggan Creek coho escapement, exploitation and survival have been adjusted to reflect this.

The Toboggan Creek Hatchery facility is frequented by 2,000 to 3,000 visitors on a yearly basis and our Society encourages the public to learn more about the salmonid resource in British Columbia. Our community appreciates the opportunity to be involved in these continued efforts.

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 both wild and 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 on these stocks.

- iv) maintain a high public profile of the facility to inform the local population of the benefits and goals of both the Community Involvement Program and Salmonid Enhancement Program of Fisheries and Oceans Canada.

- 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 and stock assessment in the upper Bulkley - Morice drainages.

Water Supplies (2002/03)

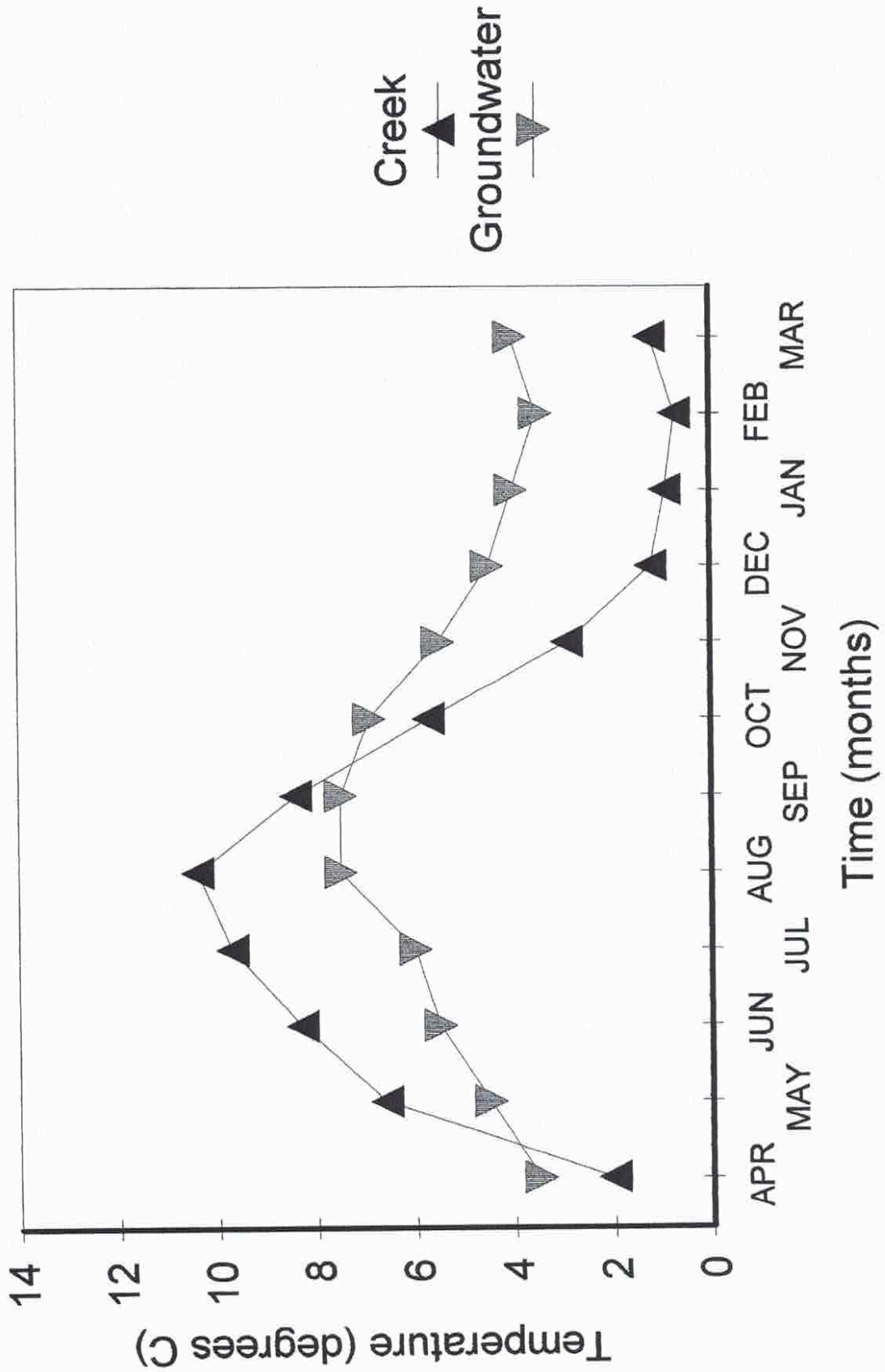
As for the previous years, the average daily temperatures of the three hatchery water sources were recorded and average weekly temperatures have been calculated. We depend on two of the water sources for egg incubation and fish rearing, ground water from an underground collection system and surface water 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 2002/03 were similar to those of past years. The creek temperatures increased slowly in the spring this year, as they did last year. Average temperatures in the summer period were similar to most years, while fall 2002 creek temperatures were slightly above normal (Fig. 2). On average, the creek supply fluctuates in between 0.5 and 12.0 degrees and the ground supply from 3.5 to 8.0 degrees Celsius on a yearly cycle.

Water levels and flows were relatively stable during the summer and fall of 2002, with the exception of a high water event in mid September. The levels of this year followed the pattern of other years fairly closely, although they were generally higher through the late fall and early winter period due to extended periods of warm weather and rain. Winter flows were very good through this period and dewatering of coho salmon redds did not seem to be a factor in 2002/03. Coho egg to fry survivals should be very good over the late winter and early spring periods. Flows during the steelhead spawning period, early May through June, were quite stable in the spring of 2002 which may have improved survival from the egg stage to the swim-up fry stage of this species. Many steelhead fry were observed in Toboggan Creek this past summer. Freshwater production of steelhead in 2002/03 should have been very good.

Fig. 2 Temperatures at Toboggan Creek Hatchery (2002/03)



TOBOGGAN CREEK HATCHERY - SALMON BROOD YEAR SUMMARIES

Bulkley River Chinook (2000 brood)

Releases of the 2000 brood chinook smolts commenced April 22 and were completed on May 03, 2002. A total of 57,874 chinook smolts were taken in batches of up to 6,000 fish to the upper Bulkley River, near Houston, B.C. These smolts averaged 14.5 grams in weight. As release conditions were good throughout the spring we spread these chinook smolts between three sites; the groundwater site along Highway 16 West, the mainstem site near Topley, and another site at McQuarrie Creek. All of the smolts released were coded-wire tagged. There were approximately 4,500 left-ventral clipped fry from this brood year released previously, during August of 2001.

Locations and numbers of the smolt releases this spring are as follows:

Topley road crossing	22,950
McQuarrie Creek confluence	7,800
Highway 16 groundwater area	27,124
Total released	57,874

Releases took six work days to complete this year, and we had just one crew and vehicle working. The releases took 12 individual trips to complete, everything went very well during all these releases and we observed very few mortalities in total. We have had good success using the 1,500 litre transport tank for releases, and we vary the amount of smolts taken on each trip depending on water temperatures and the length of the individual trip. Green egg to release survivals of this stock were 95.7 % over a 20 month period from mid August, 2000 to late April of 2002. 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 (2001 brood)

The 2001 return of chinook was the strongest we have seen since enhancement of this stock began in 1985. Over 5,500 adult chinook returned to spawn, and they were very well distributed throughout the Bulkley River system.

As a result of this strong return, which was predominated by wild fish produced from hatchery spawners that returned in 1996, it was decided by DFO to cancel the chinook egg take in 2001.

Bulkley River Chinook (2002 brood)

Broodstock collection for 2002 brood Bulkley chinook began on August 19th and by August 27th we had attained our target of 60,000 eggs. A total of 15 female and 54 male chinook had eggs or sperm collected from them, all of the 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 not taken due to advice from the Pacific Biological Station, and the stock is now deemed BKD free.

Chinook assessment was carried out, in conjunction with these egg takes, including a helicopter count of salmon spawners on August 19, 2002. A total of 673 chinook were observed between the Morice River junction and Bulkley Falls, with over 73% of the run spawning upstream of Knockholt to the Richfield Creek confluence this year. These salmon were well spread out into the lower reaches of this section of river, but very few fish were observed upstream of Perow Station. We sampled a total of 300 different chinook during and after broodstock collection and we also had 17 additional chinook recaptures, identified by operculum punches. The overall composition of the run this year was 56% wild, 39% adipose-clips, and 5% ventral clips.

Assessment carried out during egg collection resulted in scales taken from all ventral clipped chinook and 300 POH lengths, additional scales were not requested by DFO biologists this year. We managed to collect a total of 55 heads from spawned-out adipose clips this year as well.

Results of the helicopter count were as follows:

	<u>Aug. 19th</u>
Above Bulkley Falls	0 chinook
Meanwhile Creek	0 chinook
Topley	2 chinook
Richfield Creek	8 chinook
Perow Station	173 chinook
McQuarrie Creek	48 chinook
Below McQuarrie Creek	267 chinook
Below Knockholt	26 chinook
Houston	94 chinook
in Buck Creek	55 chinook
Total observed / flight	673 chinook

From these observations, and an instantaneous ground count done at the same time as the helicopter count, we came to estimate the spawning escapement at approximately 1,100 chinook adults (four to six year old spawners) in 2002. We captured and sampled over 27 % 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 the results was distributed to DFO staff.

Looking at the aging information done at the head dissection lab, it appears that the five year old age class dominated the hatchery escapement in 2002. The ages of the CWT escapement heads sampled were 60% five year olds, 38% four year olds, and with three year olds at 2%. The sport catch on the other hand was predominantly four year olds. Of 26 sport-caught heads decoded in 2002 there were 5 three year olds (19%), 12 four year olds (46%), and 9 five year olds (35%).

Shocking and picking of the 2002 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 excellent and averaged 95.8 % in 2002 (Table I). Volume estimates done at eyed stage verified our spawning estimate of close to 60,000 eggs collected from the Bulkley River chinook stock. Hatching of these eggs peaked at 570.0 A.T.U.'s this year, and survivals since hatch have been very good. Presently we have approximately 55,000 chinook alevins still incubating.

Development of the 2002 brood chinook eggs was slowed down in the incubators to aim at a later ponding date, as has been done in previous years. This was done in an effort to reduce the stress from ponding in cold water. At this time it appears ponding will occur in early to mid April.

Table I. Shocking and Picking Summary for the 2002 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>
M1-1	2	67	267	144(2.88)	2,700	7,509(95.7)
M1-2	3	6	101	150(3.00)	3,760	11,179(99.1)
M1-3	2	2	43	139(2.78)	3,430	9,492(99.5)
M1-4	2	59	231	143(2.86)	3,640	10,179(97.2)
M1-5	3	17	828	139(2.78)	3,290	8,318(90.8)
M1-6	3	13	781	137(2.74)	3,560	8,973(91.9)
<hr/>						
<u>Totals</u>	15	<u>164(0.3%)</u>	<u>2,251(3.9%)</u>	<u>142(2.84)</u>	<u>20,380</u>	<u>55,650(95.8)</u>
<hr/>						

Chinook Hatchery Returns (1996, '97, '98 and '99 broods)

Marked hatchery returns made up close to 44 % of the adult chinook escapement (four to six year olds) to the upper Bulkley River this year, an estimated 484 finclipped hatchery chinook adults and 616 unclipped wild salmon returned to this system in 2002. There were also reasonably large numbers of three year old jacks observed in the escapement last year.

These escapement estimates were determined as a result of the intensive assessment carried out by hatchery staff in 2002, 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 673 chinook in the upper Bulkley River system.

A total of 300 different chinook were randomly sampled during and after broodstock collection by hatchery staff, the sample represented close to 27 % of the total estimated escapement. As a result of this sampling it was found that 44 % of these chinook spawners were of hatchery origin. Most of the clipped salmon observed in 2002 (90%) were adipose clipped coded-wire tags, with the remainder being left-ventral clips. Adipose-clipped chinook were sampled for heads and pins and 55 chinook heads were collected, of these 53 of them carried pins.

<u># of Chinook</u>	<u>Tag Code</u>	<u>Brood Year</u>
32	18-32-28/29/30	1997
20	18-32-44/45/46	1998
1	18-44-42	1999

These coded-wire tag data indicate that escapements of marked adult chinook to the upper Bulkley in 2002 were predominantly 5 year old fish, making up 60.4% of the adipose-clipped returns. Four year old fish made up 37.7%, while three year olds accounted for 1.9%.

Based on this year's data, it appears that we had 432 adult salmon return from adipose-clipped releases of 1997 and 1998 brood chinook. Approximately 52 ventral clipped chinook were present in the 2002 escapement as well. The ventrals were all 5 year old fish from the 1997 brood, and were released into the Buck Creek drainage. The adipose-clipped return represents smolt to spawner survivals of 0.31 % for the 5 year old age class of the 1997 brood release. The survival for the four year old component of the 1998 brood release is 0.23%, with the majority of this brood year expected to return as five year olds in 2003. These are fairly good survivals when it is recognized that this stock also contributes substantially to freshwater food and sport fisheries.

Toboggan Creek Coho (2000 brood)

Survivals were excellent during April and May of 2002, prior to this stock's release. A total of 34,333 coded-wire tagged smolts were released during the spring of 2002, the screens were pulled on May 10th and all of these 16.3 gram smolts had migrated out by June 8th. Growth of this stock of coho was very good from April 1st until release, increasing from 11.0 to 16.3 grams.

Observations of smolts leaving the channel outflow in the evenings indicated peak movements during the last week of May. These coho were in very good condition at time of release and were showing visible signs of smolting prior to the peak migration. Fry surplus to this group were released at a size of 5.6 grams on September 09, 2001 into Kathlyn Lake, they were unclipped.

Bulkley River Coho (2000 brood)

Releases of coho smolts from this stock commenced on May 29th and were completed on June 12th. These releases in 2002 were delayed as per advice from DFO biologists. Two different tag codes of smolts were released, with the first tag code (18-48-28) released on May 29th and the second tag code (18-48-29) released on June 11th and 12th. The first tag group consisted of 14,952 smolts averaging 11.5 grams, while the second tag group numbered 15,056 smolts that averaged 14.2 grams in weight. All of these coho were transported to the groundwater area along Highway 16 and released there, as the release pond constructed on Buck Creek had been destroyed by high water that eroded the banks and flooded into the pond. These smolts were exhibiting obvious signs of smolting prior to the first release on May 29th, and by early June the remaining group was concentrated at the back of the release channel trying to exit.

Growth of this stock of coho accelerated in April and May, with the increasing water temperatures, and went from 8.0 grams up to 11.5 grams in this two month period. The fry group from this same brood year was released during mid August of 2001 as 3.2 gram coded-wire tags.

Toboggan Creek Coho (2001 brood)

Ponding of the 2001 brood Toboggan coho was completed by May 19th, 2002. Growth of these coho increased rapidly in the summer and fall of 2002, from 1.5 grams near the end of June up to 9.0 grams by the end of October (Fig. 3). This growth slowed considerably at that time and dropped right off during the winter period, from December through March. As the ice has now melted off of the outdoor channel we are able to feed again, and we expect growth to accelerate.

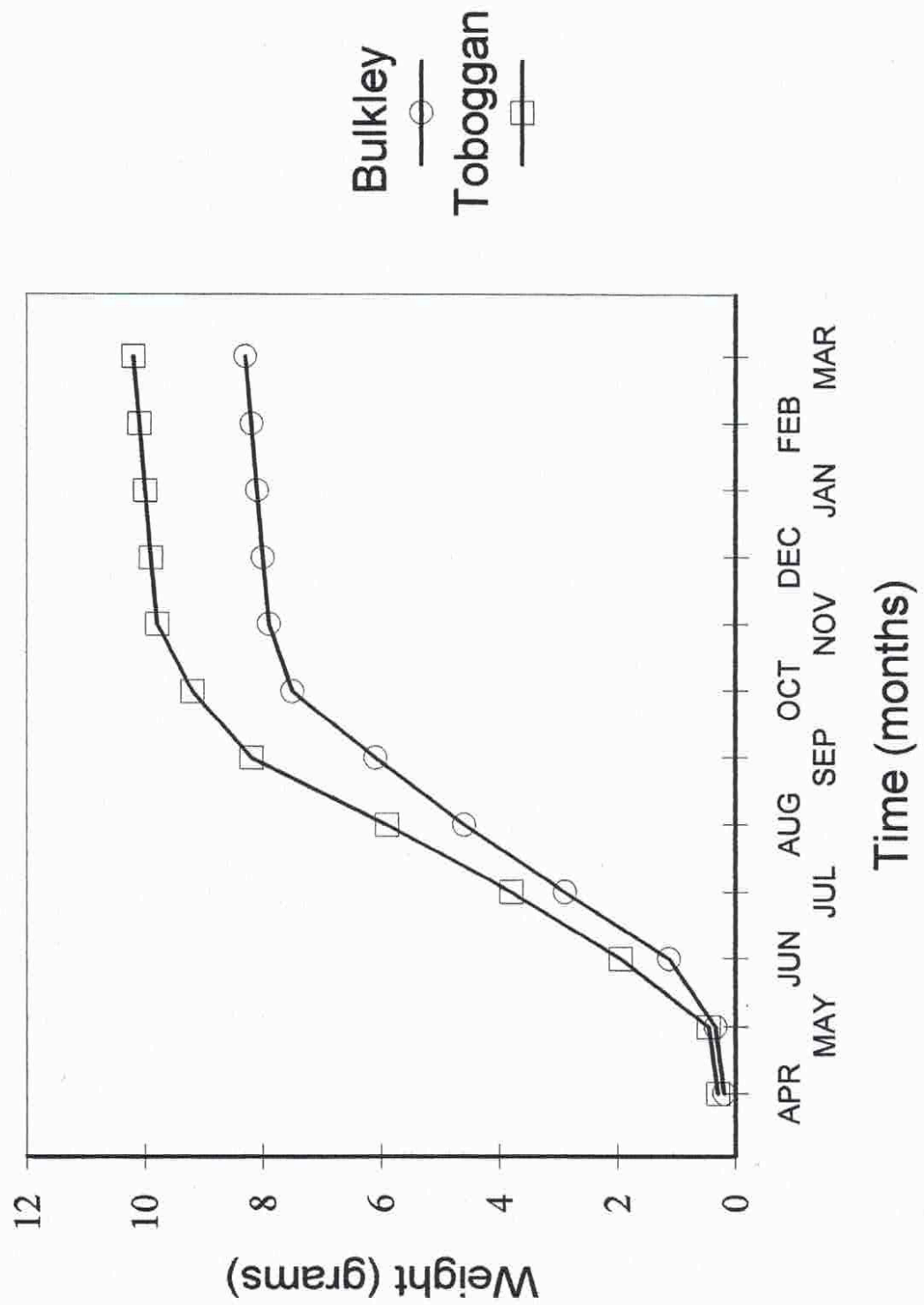
These coho fry were split into 2 Capilano troughs in late May and split again into four troughs in mid June. Some of these coho had to be moved to the outdoor rearing channel prior to coded-wire tagging due to the late tagging dates for this stock in 2002. Overall health of this stock was excellent throughout the rearing cycle, and survivals from fry ponding in May, 2002 to smolt size in late March, 2003 were over 96 %. These are normal survival rates for this coho stock.

Coded-wire tagging of this stock was completed September 11th and 12th, 2002. A total of 34,915 coho salmon fry were tagged and adipose clipped. Some remaining Toboggan coho that were surplus to this group were released into Kathlyn Lake, as fed fry, where a total of 9,800 unclipped coho were released. These fry were released at 9.7 grams in weight on October 30, 2002. No surplus coho were reared to smolt size and released into Club Creek, a tributary to Kathlyn Lake, as has been the case in recent years. The coho stock in Club Creek now appears to be self sustaining as a result of previous smolt releases in the late 1990's.

<u>Tag Code</u>	<u># Tagged</u>
18-35-27	11,694
18-35-28	11,601
18-35-29	11,620
Total Tagged	34,915

Survivals were excellent after tagging and through the winter period and we expect to release 34,700 Toboggan Creek coho smolts in the spring. We plan on pulling the channel screens on or about May 10th, 2003 after the Bulkley River smolts rearing downstream of them are released.

Fig. 3 Growth of 2001 Brood Coho Salmon in 2002/03.



Bulkley River Coho (2001 brood)

Ponding of the 2001 brood Bulkley coho fry was completed by May 10th, 2002 and, as with the Toboggan stock, growth of these salmon accelerated throughout the summer and fall periods. They went from 1.2 grams near the end of June up to 7.5 grams by the end of October (Fig. 3). This very rapid growth slowed down after this date, then came to a halt in the months from December through March when feeding was not possible due to ice cover on the rearing channel.

These coho fry were split into four Capilano troughs in mid May, and split again into the two large indoor troughs in June to reduce densities. In August, 2002 the Bulkley coho were divided into 6 troughs, where they remained until tagging. Overall health of the stock was poor this year and we lost close to half of these 2001 brood coho, between ponding in May and tagging in September, due to a gram negative swim bladder infection as a result of poor water quality.

Coded-wire tagging of this stock was completed between September 7th and 10th, 2002. A total of 23,220 coho fry were tagged and adipose/maxillary clipped as a smolt release group. Most of the remaining Bulkley River coho surplus to the smolt group were adipose clipped and coded-wire tagged for a fed-fry release, a total of 47,756 surplus fry were tagged. Another 5,680 coho fry surplus to both tag groups were left-ventral clipped and combined with the smolt group. The smolt group was moved to the outdoor channel, while the fry group was kept inside until release. The releases for the coded-wire tagged Bulkley fry were completed from October 2nd - 4th, 2002 utilizing both trucks and a helicopter, and a total of 47,750 fry averaging 6.1 grams were released.

<u>Tag Code</u>	<u># Tagged</u>
18-53-08	42,723
02-05-09	5,033
18-22-08	11,711
18-22-09	11,509
Total Tagged	70,976

Survivals after coded-wire tagging were good, with most of the mortalities observed related to complications from the maxillary clipping. We expect to release 28,000 Bulkley smolts, which will represent a tagging to release survival rate of over 98% for the 2001 brood. The smolts, which will be transported by tank truck for release, are presently averaging 8.5 grams in weight.

Toboggan Creek Coho (2002 brood)

Most of the 2002 brood coho eggs collected from Toboggan Creek this fall were taken from adult coho intercepted at our fence operation. A total of 72 coho were collected and transported back to the hatchery for egg take purposes. We conducted three egg takes between October 10th and October 29th, and all females surplus to our egg-take needs were released back into the stream. All 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 50 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 in the moist incubators. Scales, weights and lengths were taken from all the brood females. Average weight was 3.5 kgs, while overall the average length was 545 mm. The scales from the 14 brood females were sent to the DFO scale lab for analysis, and of the 13 readable scale samples 38% were aged at 4 years old and 62% were aged at 3 years old. Of 136 readable samples out of the total sample of 150 sent to the lab from the 2002 return we saw an age structure of 45% three-year olds and 55% four-year olds.

Shocking and picking of the 2002 brood Toboggan Creek coho eggs began on December 3rd, 2002 and was completed on January 31st, 2003. The coho egg survivals to this stage were excellent (97.5%), and a total of 43,209 eggs survived (Table II). Fecundities of Toboggan coho averaged 3,170 eggs per female in 2002, as compared to 3,330 in 2001 and 3,250 in 2000.

As in some previous years, a few eyed coho eggs were transferred to local P.I.P. school projects in late 2002. The remaining eggs began hatching at 390.0 A.T.U.'s and peak hatch occurred at 420.0 thermal units. The survivals during hatch were excellent, and ponding of this stock will likely occur in mid to late May of 2003.

Coho from these egg takes will be reared at the hatchery to a size of 14.0 to 16.0 grams and released as smolts in May of 2004. Up to 34,000 of these fish will be released into Toboggan Creek, as coded-wire tagged coho smolts, and any remaining surplus coho fry will be transplanted into the Kathlyn Creek drainage after tagging is completed. The c.w.t. tagging crew is scheduled to show up in early August to tag and clip the 2003 brood coho stocks on hand.

Survivals of our Toboggan coho since hatch have been excellent and they continue to appear very healthy. We presently have over 43,000 coho alevins from this stock incubating at the hatchery.

Table II. Shocking and Picking Summary for the 2002 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>
M1-2	4	105	533	169(3.38)	4,110	13,362(95.4)
M1-3	4	24	112	156(3.12)	3,790	11,714(98.9)
M2-3	2	3	67	212(4.24)	1,620	6,810(99.0)
M2-4	4	19	268	207(4.14)	2,800	11,323(97.5)
<hr/>						
<u>Totals</u>	<u>14</u>	<u>151(0.3%)</u>	<u>980(2.2%)</u>	<u>179(3.58)</u>	<u>12,320</u>	<u>43,209(97.5)</u>
<hr/>						

Bulkley River Coho (2002 brood)

A total of 60 adult coho salmon (25 females/35 males) were collected in the Bulkley River during September and October of 2002. All of these fish were taken at the Bulkley River counting fence, which was funded and operated by Fisheries and Oceans Canada. All of these salmon were transported back to the Toboggan Creek Hatchery and were held until ripe in covered Capilano troughs and outdoor rearing tubs. Unlike the Toboggan Creek coho, the fish collected at the Bulkley fence were tight and had to be held for 3 to 4 weeks before we were able to take eggs. A total of 990 coho were captured at the fence this year, which represented only 25% of the stock, and the total estimated escapement to the Bulkley River in 2002 was close to 4,000 coho.

Eggs were taken from a total of 17 ripe female coho and sperm was taken from 35 males in 2002. The first coho broodstock were collected on September 20th, we took our first eggs on October 9th and we completed our final egg take on October 17th, 2002. The eggs were fertilized by using at least 6 different males per female, and were water hardened for one hour prior to initial incubation in the moist incubators. Weights, lengths, and kidney samples were taken from all of the brood females, with the kidneys being sent to PBS for analysis. The average weight of the brood females was 2.8 kgs overall and the average length was 535 mm. Of the 11 scale samples sent in from the wild females there were ten 3-year old coho (91%) and one 4-year old (9%).

Shocking and picking of the 2002 brood Bulkley River coho eggs began on December 3rd, 2002 and the last batch was done on January 2nd, 2003. Egg survivals to this stage were good (94.3%) and a total of 45,500 eggs survived (Table III). Fecundities of the Bulkley coho were 2,840 eggs per female in 2002, down from the 3,080 eggs of 2001, and 2000 when they averaged 3,330 eggs per female. All of the female coho used for broodstock in 2002 tested negative for BKD.

Hatching of these coho eggs began at 380.0 A.T.U.'s with peak hatch occurring at 400.0 thermal units. Survivals of the Bulkley coho eggs during hatch were excellent, and we expect to begin ponding coho fry from this stock in mid to late May. A few eyed eggs from the Bulkley River coho stock were provided to P.I.P. school projects in Topley and Granisle in early 2003.

Coho from these egg takes will be reared at the hatchery to a size of 11.0 to 12.0 grams and released as smolts in May of 2004. Up to 34,000 of these fish will be released into the Upper Bulkley River, as coded-wire tagged coho smolts, and any remaining surplus coho fry will be released into Bulkley Lake in the fall of 2003 after tagging is completed.

Survivals of the Bulkley coho since hatch have been excellent and they continue to look quite healthy. We presently have over 45,000 coho alevins from this stock incubating at the hatchery.

Table III. Shocking and Picking Summary for the 2002 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>
M1-4	3	3	225	194(3.88)	2,070	7,812(97.2)
M1-5	4	146	614	207(4.14)	2,700	10,560(93.3)
M1-6	4	10	895	209(4.18)	2,960	11,475(92.7)
M2-5	2	13	367	180(3.60)	1,250	4,130(91.6)
M2-6	4	5	482	183(3.66)	3,280	11,523(95.9)
<hr/>						
<u>Totals</u>	<u>17</u>	<u>177(0.4%)</u>	<u>2,583(5.3%)</u>	<u>196(3.92)</u>	<u>12,260</u>	<u>45,500(94.3)</u>
<hr/>						

Assessment of Coho Escapement in 2002

Toboggan Creek Fence

The Toboggan Creek coho counting fence commenced operation on August 1st, 2002. The fence was monitored a least twice daily from this date through to November 4th at which time the aluminum panels were removed due to freezing conditions.

A total of 2,548 coho were passed through the fence in 2002, with the first coho captured on August 9th and with the spawning migration into the creek peaking from September 15th through 28th. No coho were captured after October 29th. In addition to our normal sampling, we floy tagged and operculum punched a large number of coho. A total of 600 coho were tagged at the fence in 2002, approximately one out of every four coho captured. Weekly spawner counts began October 16th and carried on until November 6th, and a total of four different counts were conducted on the spawning grounds.

We were able to estimate the total number of coho which were above the fence by utilizing the weekly spawner counts. Spawning appeared to have started around October 4th, 2002 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 2.3% of the coho spawned in this section of the creek. Of the adult counts conducted upstream of the fence a total of 2,538 coho were observed spawning, and of these 380 were tagged. The tagged proportions in the spawner sample were much lower than those at time of marking (0.15:1 as compared to 0.25:1) and, after accounting for tag loss, it was estimated that the total spawning escapement upstream of the fence was 3,734 coho spawners. The complete Toboggan Creek estimate in 2002 was 3,980 coho; including natural spawners above the fence (3,734), broodstock and coded-wire tag samples removed at the fence by hatchery personnel (153), and salmon spawning downstream of the counting fence (93).

Approximately 28.4 % of the salmon handled at the fence were estimated to be coded-wire tagged hatchery returns from the 1999 brood Toboggan Creek smolt release group. This represents a total of 1,130 spawners returning from a release of 33,984 smolts, and a 3.3 % survival to spawn.

Bulkley River Fence

The Bulkley fence operated from August 30th until October 31st, 2002 and a total of 990 coho were sampled. This was not a total count, as the fence operation discourages fish entry and there is a displacement of spawners. The total coho run was estimated at 4,000 coho spawners in 2002, based on comparisons of Bulkley and Toboggan coded-wire tag abundances in the Moricetown Canyon sample. Bulkley CWT's were 94% as abundant in the Moricetown sample as Toboggan CWT's, but they were only 23% as abundant in the escapement. These data indicate the Bulkley River fence operation captured and passed through only one quarter of this coho stock in 2002.

Coho Hatchery Returns (1999 brood)

All of the upper Skeena waters were closed to the harvest of coho at the beginning of the 2002 season due to conservative management by DFO. When projections from Alaska in July indicated a strong return of Toboggan Creek coded-wire tags, based on good in-season catches in their commercial fisheries, the DFO managers opened up various areas of the mid and upper Skeena River, the Bulkley and the Morice Rivers to the retention of hatchery and wild coho.

No creel surveys were conducted last fall but, based on head depot returns of coded-wire tagged coho in 2002, a catch estimate was developed. There were a total of 35 heads turned in by anglers last fall with 30 carrying pins that indicated they were from the Toboggan Creek stock. Two CWT's were identified as Owen Creek stock and one was Bulkley stock, and there were also two no pins. We estimated a participation rate of 50% (lower than normal due to the wider expanse of the area open to harvest) indicating a total harvest of 60 CWT's and 118 unmarked wild Toboggan coho in 2002. The total harvest as a direct result of the angling opportunity this season accounted for just over 4% of the available Toboggan Creek coho stock.

As a result of sampling done at the fence and on the spawning grounds we were able to collect 303 coho heads from marked adult spawners in Toboggan Creek during 2002, and of these 287 carried pins. Twenty three heads were also taken from Bulkley River coho used for broodstock purposes last fall and 22 of these carried pins, all 22 were 1998 and 1999 brood Bulkley CWT's. The proportions of the Toboggan Creek smolt group in the sampling, by code, were as follows :

<u># of Coho</u>	<u>Tag Code</u>
78	18-35-42
86	18-35-43
77	18-35-44

Of these 241 pinned heads, all were from 1999 brood coho salmon reared and released at the Toboggan Creek Hatchery site. There were, however, 2 more heads that were collected from Toboggan that were identified as Owen Creek coho, 13 that were found to be Bulkley coho (1998 and 1999 brood), and another 31 heads that were from a wild Toboggan smolt group marked in the spring of 2001. The portion of the marked escapement not attributable to the Toboggan Creek Hatchery smolt group was not included in any of the calculations of total escapement or survival for the 1999 brood hatchery release.

Wild vs. Hatchery Smolt Survivals

For the past three years a wild versus hatchery coho smolt survival study has been carried out on Toboggan Creek. The 2002 return year represents the last year of this study, and the data available at this time suggest that hatchery smolt survival rates are very similar to those of wild smolts. In fact, this year's results indicate that the Toboggan Creek hatchery smolts released in 2001 survived at a rate 17% better than the wild smolts marked in the spring of the same year.

In 2002, a total of 480 coded-wire tags were recovered from Toboggan Creek coho adults captured in various fisheries. A total of 48 were recovered in the Alaskan fishery, 130 were taken in the Moricetown fishery, 30 in the freshwater sport fishery, and 272 were sampled in the Toboggan Creek escapement. Of the 480 heads that carried pins there were 53 from the wild group and 427 from the hatchery group.

	<u>Wild Smolts</u>	<u>Hatchery Smolts</u>
Alaskan Catch	5	43
Moricetown	13	117
Sport Catch	4	26
Escapement	<u>31</u>	<u>241</u>
Total Sample	53	427
Tag Group Size	4,930	33,984
Survival Rate	1.08%	1.26%

These data indicate that the survival of wild smolts to catch was 1.08%, compared to the hatchery smolt survival rate of 1.26% in 2002. All of this sampling is thought to be random, and should accurately reflect a true comparative abundance of these tag groups in the adult coho population.

Exploitation of 1999 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:

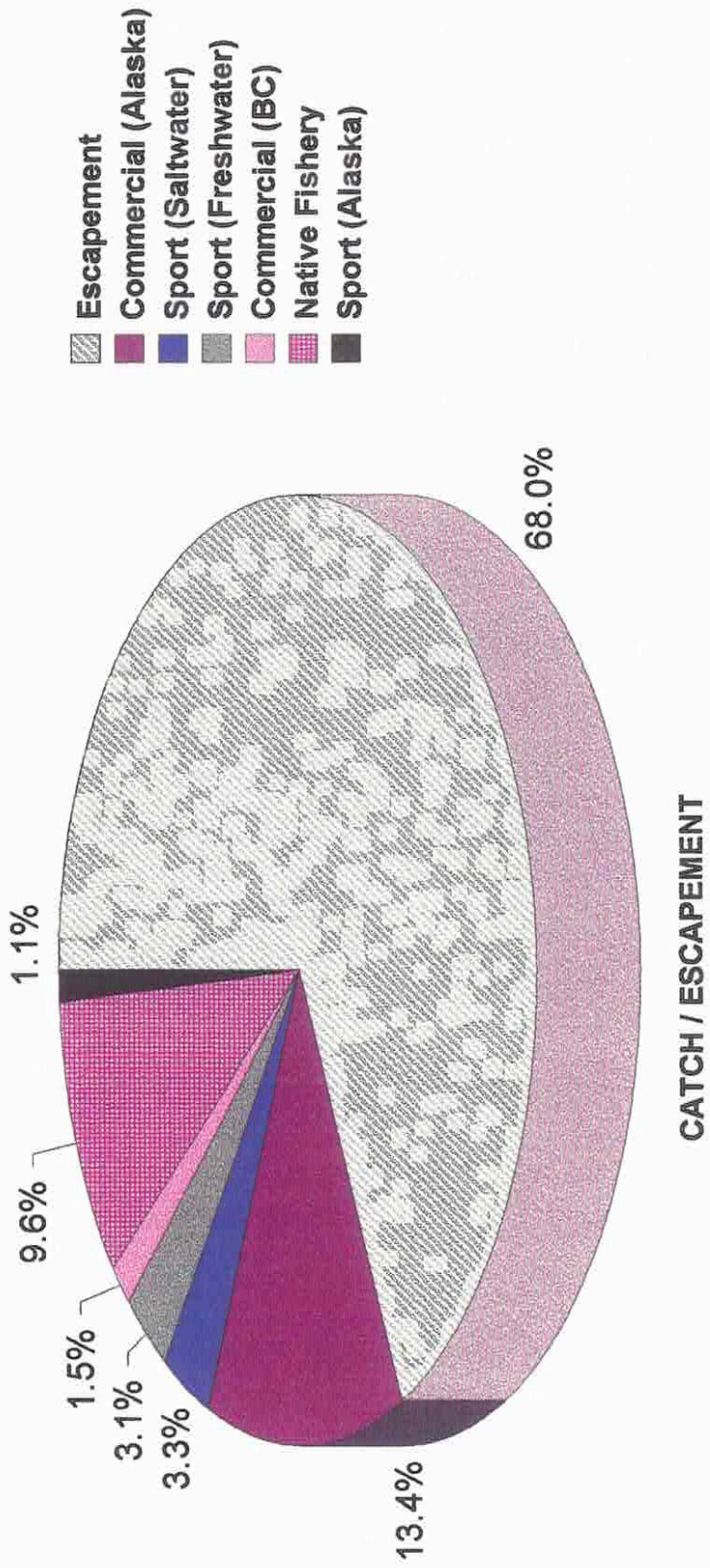
Escapement	-	Toboggan Hatchery
B.C. Commercial	-	Fisheries & Oceans Canada
Alaskan Commercial	-	Alaska Department of Fish and Game
B.C. Sport	-	Fisheries & Oceans Canada / Toboggan Hatchery
Alaskan Sport	-	Alaska Department of Fish and Game
Native Food	-	Fisheries & Oceans Canada / Toboggan Hatchery

Exploitation rates indicated by the data suggest that coded-wire tagged coho from the Toboggan Creek stock were harvested at a rate of approximately 32% in 2002 (Fig. 4). Commercial catches by Alaskan vessels were responsible for 42% of the mortalities in 2002, native food fishermen caught 30% (although the great majority of these were at the request of DFO to collect a random sample of CWT heads at Moricetown Canyon), BC anglers took 20%, BC commercial fishermen took 5%, and Alaskan anglers took 3%. This is the third lowest exploitation rate seen in recent years, and is the fifth consecutive year where exploitation of this stock was below 40%. The coho spawning escapement to Toboggan Creek in 2002 represented 68% of the total adult stock.

Alaskan commercial fishermen caught many more coho than those that were landed by B.C. commercial fishermen, this due to non-retention in most Canadian fisheries and total closures in some areas. These data indicate that Alaskan interests were responsible for 90% of the commercial mortalities in 2002. The breakdown of Alaskan commercial catch by gear type was again dominated by the troll fishery, which was responsible for 66% of their catch. The Alaskan purse seine fishery took 11%, while the gillnet fishery took 23%.

Survivals of hatchery-produced coho smolts from this facility were above average in 2002. Assuming the catch rates are accurate we saw smolt to adult survivals of just under 5% for the 1999 brood, with about 1,660 adult coho produced from a release of 33,984 Toboggan Creek smolts. These survival rates are in the top five or six out of the last thirteen years of data, and indicate continued strength in ocean productivity. This is graphically different from the 1997 return where we saw smolt to adult survivals of only 0.5%. Along with the higher exploitation rates evidenced back in 1997 we saw only 73 coded-wire tags back to the creek that year, as compared to a return in 2002 of 1,130 adult hatchery spawners from the Toboggan Creek stock.

Fig. 4 Catch of Toboggan CWT Coho (2002)



Administration Report

This section covers hours spent from April 1st, 2002 to March 31, 2003. The 2002/2003 report represents the first full reporting year since a shift back to a March 31st operational year end.

The following is a breakdown of hours spent carrying out the contract in 2002/2003 :

<u>Activity</u>	<u>Man-hours</u>
Project Management	492.0
Facility Operations	4146.0
Broodstock Collection	430.0
Assessment	162.0
Coho Fence	410.0
Statutory Holidays	240.0
<hr/> <u>Total Hours in 2002/03</u>	<hr/> <u>5,880.0</u>

It is becoming more and more difficult to carry out the contract each year due to a lack of adequate funding, as we have not seen a reasonable increase in funds for close to twelve years. In 2002/03 our hours of work spent in most categories were lower than, or close to the same as, in other years; with the exception of the facility operations category which was higher.

Total employment generated by the hatchery in 2002/2003 added up to 188 full work-weeks, employing 12 different people for varying lengths of time during the twelve month period. These last figures include separate contracts we have undertaken via the provincially-funded Fisheries Renewal BC initiative and the federally-funded Strategic Stock Enhancement program.

Labour costs were almost \$4,000.00 more than what was budgetted for in the contract period, due to the fact that the hatchery program has been subsidized by other contracts taken on by the Toboggan Creek Enhancement Society in the past. Without taking on extra contracts such as creel surveys and steelhead fence counts we have now run a deficit. While labour, overhead and supply costs have risen steadily over the past 12 years our DFO funding has remained unchanged.

The following is a summary of expenditures made in carrying out the 2002/2003 contract :

<u>Category</u>	<u>Expenditures</u>	<u>Contract</u>
Direct Labour	98,485.20	94,546.00
Overhead Costs	24,621.30	22,500.00
Capital Equipment	0.00	0.00
Operations	34,146.16	37,254.00
<hr/>		
Totals	157,252.66	154,300.00
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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 rearing and releasing extra Bulkley River coho for fry planting, extra assessment of coho juveniles and adult returns, or the operation of the Toboggan fence for steehead in the spring of 2002.

Development and Maintenance of the Facility

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

- i) The outdoor rearing channel was again 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. We now do this yearly.
- 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 the banks near the intake since a new bridge was installed recently.
- iv) A "School Release Day" organized by the C.A., Brenda Donas, was carried out in May, 2002. Many schoolkids, who reared coho from egg to fry in classroom incubators, came out to release their fry. We also helped in October of 2002 to collect coho eggs for the same classrooms. Both activities were very successful and beneficial.
- v) During the past ten springs we have operated the Toboggan Creek counting fence for steelhead enumeration. In 1993 we estimated an escapement of 435 steelhead spawners, and in 1994 there were 237 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 330 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 120 steelhead above the fence with many hundreds spawning below the fence. In 1997 we were unable to obtain funding but operated the fence again, 543 steelhead were estimated. The 1998 count was funded by the Habitat Conservation Fund and an estimated 381 fish spawned above the fence and many more spawned below. In 1999, we identified an escapement of 357 steelhead upstream of the fence, and in the year 2000 an estimated 286 steelhead spawned above the fence. In 2001, the fence operations indicated 414 spawning steelhead in the area upstream of the counting fence and in 2002 the estimate for the same area was 356 steelhead spawners. The funding for this came from Fisheries Renewal BC for all of the last four steelhead counts.
- vi) Repairs had to be made to the brook intake line this spring when a break occurred in the line and the pipe plugged with gravel and sand. Don Hjorth from the DFO engineering division completed and paid for these repairs with the assistance of hatchery staff. This intake will require further work and upgrading in 2003/04 to be safe to use.

Operating Plan for 2003/2004

As in previous years we will begin releasing the coho smolts in May. The 2001 brood Toboggan Creek coho will be the first to go in mid to late May, followed later by the Bulkley River coho. 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 28,000 salmon smolts to the Bulkley River and more than 34,000 smolts will go into the Toboggan Creek system. There will be no chinook smolts released in the spring of 2003 as eggs were not taken from the Bulkley stock in 2001.

Our chinook target has been reduced to 60,000 eggs in recent years, and eggs will only be taken if the escapement is under 5,000 spawners in 2003. We plan to continue with assessment of chinook returns whether or not egg takes occur. This year will be our twelfth year of assessment of CWT and total chinook returns to the upper Bulkley River.

Coho egg targets will remain the same as in 2002 and 80,000 eggs will be targetted in 2003, with the Bulkley River target at 40,000 eggs and Toboggan Creek at 40,000. No coho eggs will be taken for transplant into Kathlyn Creek. These coho will all reared to smolt size, at 12.0 to 15.0 grams, and released in the spring of 2005.

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 do not intend on continuing with enumeration of steelhead trout spawners into Toboggan Creek in the spring of 2003. Last year was our tenth consecutive year of assessing the steelhead return to Toboggan Creek, and there seems to be little interest from the provincial Fisheries Branch to continue documenting the large escapements indicated by locally initiated studies such as this. Steelhead tagged at Moricetown in recent years have also indicated very large runs of steelhead present in the Bulkley-Morice escapement.

As usual, we will attempt to keep the public in this area well informed of our activities, goals and accomplishments in the area of fish culture and assessment on the Bulkley/Morice system. We are open to public tours year round and we 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

We have had a successful year, as in previous years. 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 would be greatly improved if we could get more accurate data from the Moricetown Native fishery in the summer season. Each year thousands of chinook are landed by the Native fishermen at Moricetown Falls, on the Bulkley River. In previous years there have been few clipped hatchery chinook turned in from 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) Egg targets and fry densities last year were reasonable, allowing for flexibility in our rearing program. Egg targets of no more than 180,000 should be maintained.
- iv) Measures were taken in the past few years to reduce coho exploitation and allow more spawners to reach the freshwater tributaries. Coho returns to many tributaries have shown up much stronger recently and returns to Toboggan Creek were good. Each year more opportunities have been given for coho harvest, especially in the ocean where large numbers of coho were harvested in the saltwater sportfishery in 2002. Despite this, few if any CWT heads have been turned in by anglers and lodges participating in this fishery. Conversely, in freshwater very limited opportunities have been made available but anglers have shown strong participation in the CWT head recovery program. As well, losses of coho through catch and release mortalities in all saltwater fisheries do not seem to be accounted for. This scenario does not bode well for understanding the limiting factors affecting coho returns in the future. It would be of great benefit to improve the head recovery program for sport-caught salmon on the Northcoast in 2003, as well as encouraging retention of badly damaged fish caught by anglers and commercial fishermen. Otherwise, these salmon will not show up in the catch or the escapement.

These 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 communities.

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 3,798,000 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. As a result of the previous 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 few 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 seventeenth 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.