GITKSAN – WET'SUWET'EN WATERSHED AUTHORITIES

SEASON END REPORT - 1992

Gitksan — Wet'suwet'en Watershed Authorities
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Introduction

This report summarises the activities of the Gitksan and Watershed Authorities during the 1992 field season. It summaries and presents the field data, including the tagging programme and offers discussion in regard to its interpretation.

This report consists of three main sections: review of activities by sector; management biology and quantified data summary.

Plans for the 1993 field season will be ready in February 1993 and presented in a separate cover. Various figures and maps have been added throughout to help the reader with orientation.

1.0 Summary of Activities

The Gitksan and Wet'suwet'en Watershed Authorities were involved in a number of coordinated activities through the whole of the territories. The areas of activity can be divided roughly into management biology and commercial fishing.

At policy, there is no separation of these sectors. All fishing is a management activity and must been seen as such in planning and in implementation of services, especially those of regulatory enforcement. Though it is possible to distinguish between fish taken for food or to be traded or bartered and sold (as indeed we do in subsequent sections) all fish and fishing activity is viewed from the point of view of the aboriginal right to the resource.

If we embrace this as a fundamental tenet of aboriginal participation in management, and thus then in any form of fishing activity, this will provide for the reader or observer a coherent framework from which to contextualise the activity of the GWWA, both in this season and in those to come.

Though in a technical sense this is the second year of activity in co-operation with DFO, it is only the first year of the implementation of the Aboriginal Fishing Strategy. Notwithstanding, it has not been practical to design in any detail a long term management or data collection plan: agreements have tended to come too late in the season and funding levels have not been constant.

We are now looking to the implementation of a long term agreement which will allow us rationality and consistency in planning and implementation field and enforcement activities. Various staff person of DFO have knowledge of the details of the long term agreement, and meetings with divisional and local personnel will take place in the very near future to bring along a smooth implementation.

This season was the pilot season for the long term agreement. Both GWWA and DFO personnel learned volumes, that will be extremely valuable in the next several years, about dealing with each other, dealing with the fishers and dealing with the resource . Keeping in mind that quantitative data is presented further on in this report, it is useful now to consider the various activities engaged in by sector and offer an evaluation of the approach taken and relative success of each.

1.1 Organisational Activities

Gitksan and Wet'suwet'en territories include the headwaters of the Nass including Mezziadin Lake, the headwaters of the Kemano Project and a part of the eastern flowing watershed of the Fraser River drainage, the Nechako River. We have also been approached by the Takla and Bear Lake people so that their area might be included within the GWWA administrative region.

Within this large territorial base, it is important to understand the operating indigenous system of land holding and fishing site ownership. These indigenous principles, as governed by traditional Gitksan and Wet'suwet'en law, form the organisational basis for the GWWA.

There are two distinct types of territory within Gitksan and Wet'suwet'en law: hunting grounds and fishing sites. Both are owned by the Houses (the matrilineal kinship units and land holding entities). Hunting grounds are best left for another forum of discussion.

All sites for fishing, on the main stems and on the tributaries are owned by a House. They are viewed as extremely valuable commodities and are thus closely guarded and regulated. At law, all the fish taken from a particular site belong to the House that owns the site, and can be disposed of as the House sees fit.

Also within the law are provisions for the regulation of catch, whether by any single House or by all Houses, to what the resource can yield without harm. Traditional law strictly prohibits waste.

This results in all Houses being bound together in a network of laws and regulations in relation to the resource that, as their foundation, ensure the health and continuance of the salmon stocks. The challenge for the GWWA is to make this ethos workable in the modern context, with modern fishing pressures at the Coast and within a cash driven industry that promotes sharp business practices.

The Houses as a community have decided that the traditional ways must be followed and that traditional law is the only law that informs the administration of their business in relation to all resources. This is manifested in GWWA policies that require a controlled and monitored catch of all fish and a controlled commercial sale. This is viewed as ensuring the continued survival of the resource. It must be remembered that the health of the salmon is not taken lightly. Gitksan and Wet'suwet'en cultures have been indelibly shaped by the fact of the fish in the rivers.

As a community the Houses also realise that there will be those who will weigh the requirement for the long term protection of the salmon, and the short term cash gain offered by disregard for these principles; and choose for cash gain. It is recognised that this is in fact human nature. Houses also recognise that it might be more convenient to some, to not strictly practise traditional methods in relation to the salmon. However, it must also be said that the system that provides Houses for the exclusive ownership of fishing sites also polices its self by virtue of its own structure. Inasmuch as the continued survival and health of the resource is the right of every House, no one House may, at law, violate that rights of other Houses for its own gain. If this happens, the law provides both the mechanism and the means to correct this problem.

It is important also to remember that the aboriginal right to the resource is a collective right; it is not individual. In Gitksan and Wet'suwet'en society, all persons fish only by the virtue of their membership in a House. Being either Gitksan or Wet'suwet'en is isomorphic with House membership. There are no Gitksan or Wet'suwet'en who are not House members. Thus individuals fish under the collective auspices of their House. The House in turn has nothing less that a covenant with all other Houses. Those that attempt to work outside of this system break traditional law and are also in violation of GWWA regulations. This extends all the way through the system, from catch to brokering to processing.

Given this context, the GWWA acts as the regulatory and monitoring agent for the Houses. As Gitksan and Wet'suwet'en Houses are organised into North, East, West (including Gitanyow) and Wet'suwet'en aggregations for the purposes of self-government administration, so to are the Watershed Authorities for resource administration.

For fisheries administration, the West includes the area of the Skeena drainage between Legate Creek and Chicago Creek north to Mezziadin Lake. The East runs from Chicago Creek through to the Suskwa River and up the Kispiox River. The North is the Skeena River drainage above Caribou Creek through to Babine River, Bear Lake and the upper Nass. TheWet'suwet'en area is that on the Bulkley-Morice drainage from the Suskwa through to the Francois Lake and Ootsa Lake systems. The area under discussion is outlined on the sketch map found at the end of the document.

The legalistic mechanism that binds together Gitksan and Wet'suwet'en Houses in the GWWA is the same mechanism that brings together all nations on the Skeena Watershed in the Skeena Fisheries Commission.

The fundamental tenet of traditional law relating to the riparian zone and the fisheries resource is that no one nation can endanger either the long term or short term health of the resource by over-fishing.

1.2 Field Activities

As the quantified data presented later in this report indicate, this season was one of tremendous activity. The major emphasis was that of collecting fundamental base line data from which a good descriptive picture of the stocks and the fishery could be developed. From this data, particularly in later years, inferential propositions can be entertained.

It is important to remember that for the GWWA, all fishing is viewed as a management activity. In a sense it is the prime management activity is as much as it makes a direct and measurable impact of the wellbeing of the stocks. While we can, from a methodological perspective separate data into various sectors both by technique of collection and associated activity, it is the overall view of these data together that help form the model of the stock and the fishery that will inform and direct specific activities.

Rather than considering the detail of data interpretation which is presented further on tin this document, this section is meant to briefly discuss the rationale behind how when and where field work is carried out.

A terminal fishery requires centrally good, reliable information regarding run timing. This information can come from two sources: cultural knowledge and scientific data. When brought together these data are usually sufficient to satisfy all interested parties, no matter their point of view.

The verification of fish behaviour is sought and recapitulated through discussion on an on going basis with people who are culturally recognised as having knowledge in this area. It is this type of data that drives all cultural activity relating to harvest, especially timing. The anomaly within this spectrum are the enhanced stocks that return to the Babine channels. Notwithstanding the relative species balance, it can be said with some surety that these sockeye are indeed fish like any other and are thus affected by the same variables that impact upon the timing of wild runs.

Discussions with DFO are now underway to employ more exact methods to determine run timing and stock identification in the coming seasons. This will refine the information required to effectively manage the terminal fishery.

The remainder of this report preesents technical infromation and statistical data relating to the field activity of this last season. It is rpesented under separate headings with the appropriate attachments. A summary of 1993 field plans completes this report.

The Gitksan-Wet'suwet'en Watershed Authorities

Fish Harvest Monitoring 1992

January 1993

The Gitksan-Wet'suwet'en Watershed Authorities
Fish Harvest Monitoring 1992
Report by: Chris Barnes

Objectives

The objective of this study was to monitor the Indian food fishery of the Gitksan- Wet'suwet'en territories to produce total catch estimates of all salmon species for this year. The purpose for collecting this information was to demonstrate the size of the Native fishery. We also collected data to demonstrate the timing of the passage of the Babine Lake stocks and collect information on gear types and fishing efficiency (catch per unit effort).

Procedures - Skeena

The idea was to estimate the numbers of nets being fished in the river and accumulate information on how many fish were caught in a typical net and then calculate an estimate of the number of fish caught.

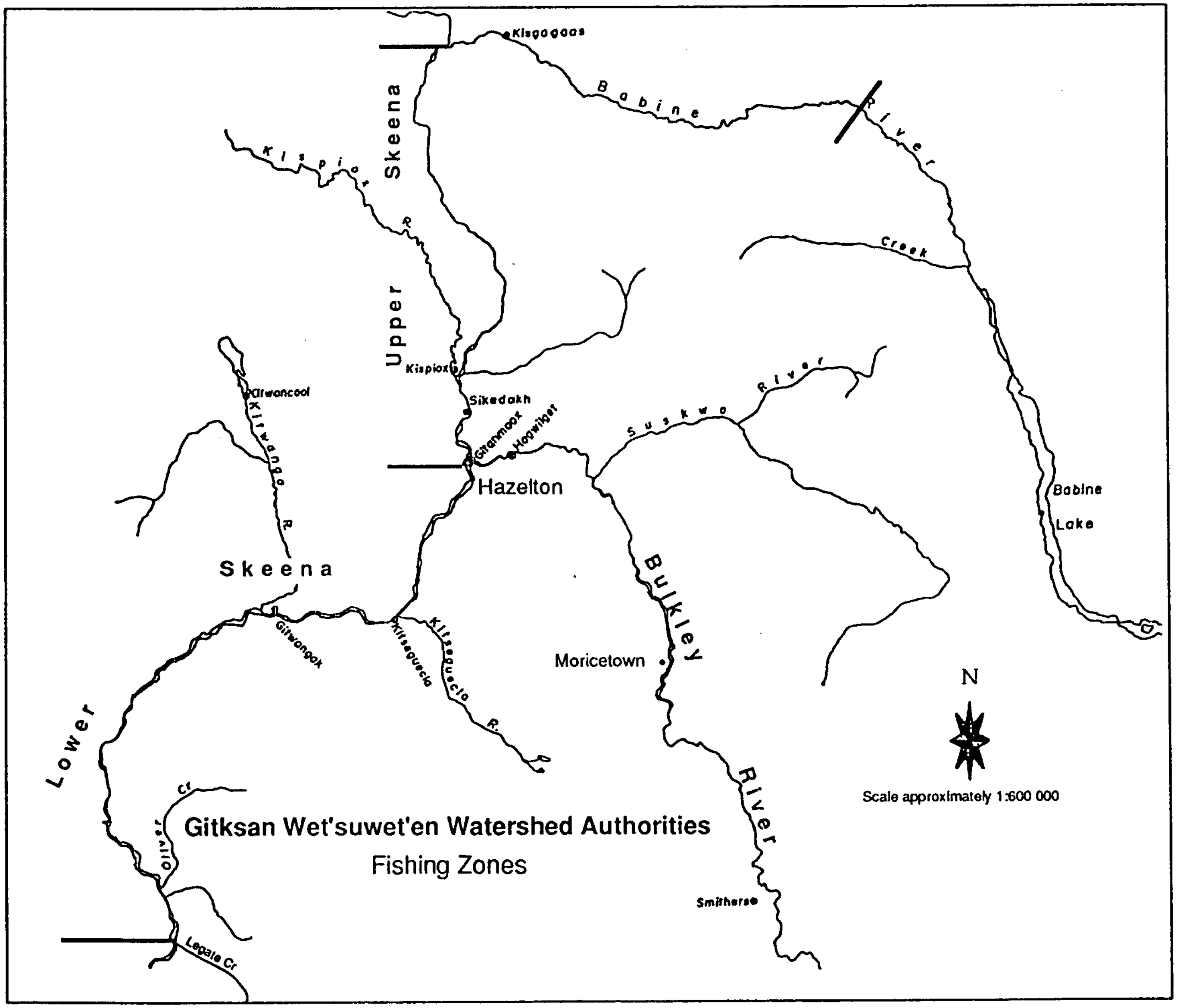
A net survey was performed by river boat survey 2-3 times per week. We collected information to see how many nets were being used.

We interviewed fishers to find out when fishermen were fishing, how many sets they made per day, and tried to get their cooperation in recording catch information in log books that we supplied.

When we had the chance we did direct sampling, where we recorded the number of fish caught, their weights, species, sex, and physical condition

A number of fishermen cooperated in this survey by recording the number of fish they caught, the number of sets and their dates and wherever or not the net was still in at the end of the day.

Standard errors were calculated for catch per set on a weekly basis. Errors were assigned for the number of sets to estimate the maximum and minimum number of sets for days without data.



Gitksan Wet'suwet'en Watershed Authorities
Fishing Zones

Procedures - Moricetown

One or two technicians observed and recorded the number of fish caught each day in the native fishery at Moricetown canyon. In general observations were made for 8 hours / day, with the observations evenly distributed across all of the available fishing hours. In addition, technicians collected information on the sports fishery below Moricetown falls. Fish entering the commercial markets were counted, providing complete sampling of this component.

Results

Skeena River Fishery

In the Skeena River fishery, the total sockeye catch appears to have increased somewhat to approximately 66,431 plus or minus 26,943. This is a 40% error. The error number is conservative, with approximately equal errors due to catch per unit effort and effort estimates.

The best estimate of our sockeye catch was 15,000 to 20,000 fish above the levels of 1982 and 1985. This number includes a catch under the Gitksan-Wet'suwet'en Homeland Fishery Agreement of approximately 8000 pieces.

It seems that the timing of most of the sockeye catch in the Skeena was late enough that the stocks going to the Morice River and Kispiox river where not affected by the extras fishing effort.

To put it in perspective the commercial catch on the coast was about 1.2 million sockeye. We have usually taken about 5% of the commercial coastal fish catch. This year we might have increased that slightly.

This year as in past years, there were about 300 000 sockeye locked out at the spawning grounds in Babine Lake. We may have taken about a fifth of those extra Babine fish and with a timing that would have minimal impact on other fish stocks.

Bulkley River Fishery

We accumulated a good set of data on the Native fishery at Moricetown Canyon, on the Bulkley River. About 45% of the available hours for fishing were monitored.

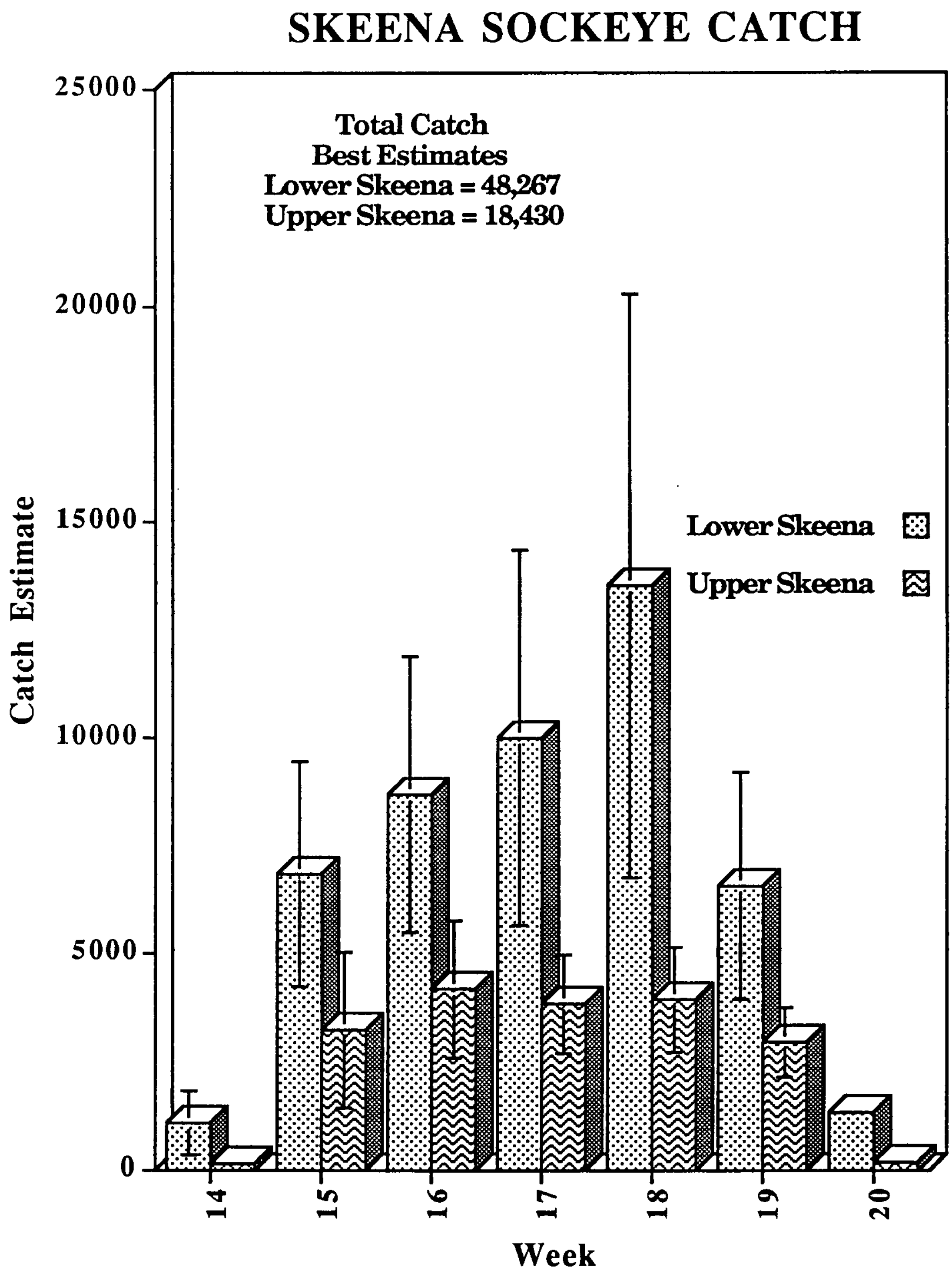
The pink salmon fishery greatly expanded. The best estimate of the catch was 75,979 pieces, within narrow confidence limits. Of these, about 71,000 pinks were sold under the provision of the Gitksan-Wet'suwet'en Homeland Fishery Agreement.

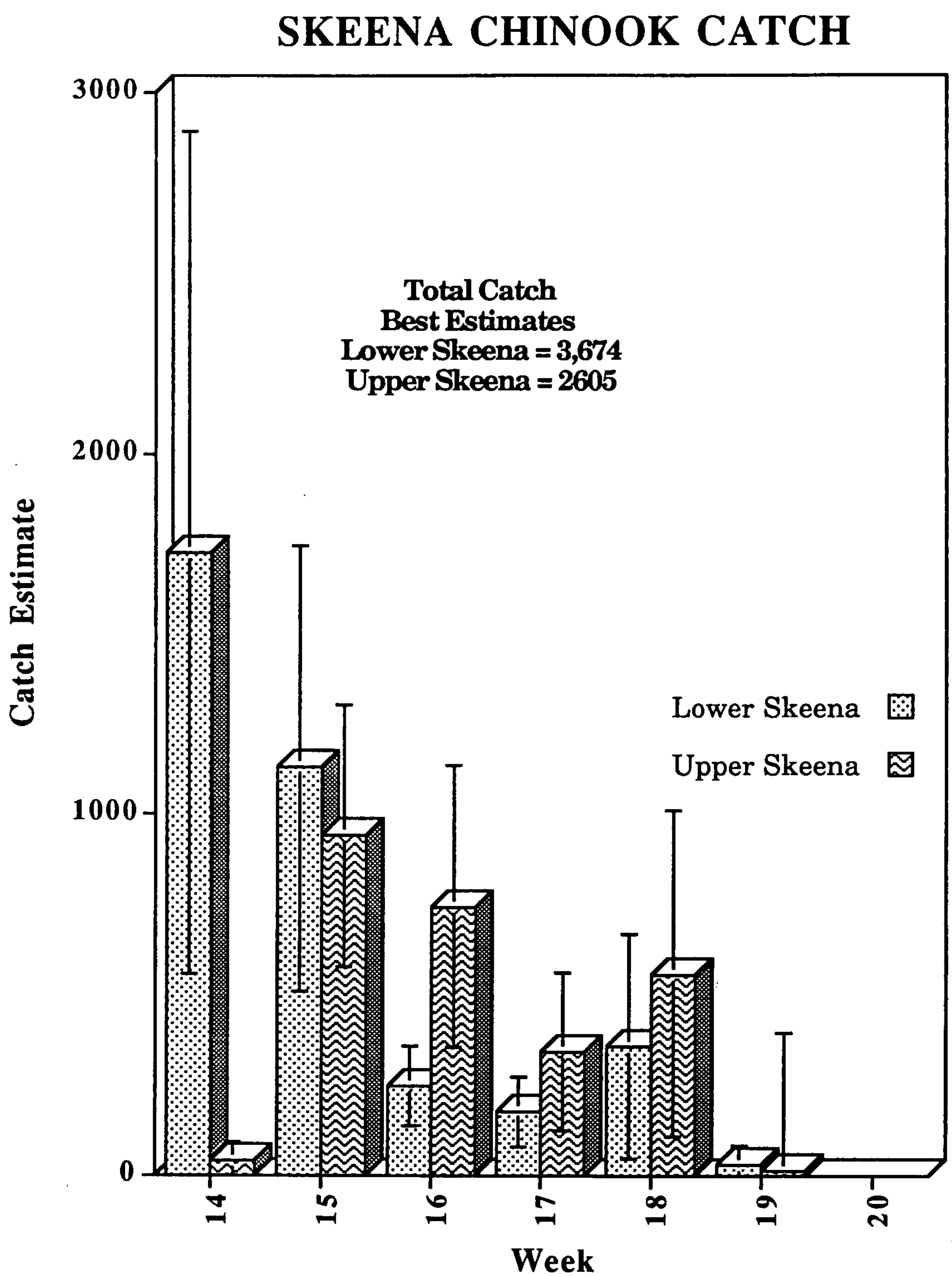
Our best estimate for the sockeye catch is 30,337 pieces.

Two thirds of the steelhead catch of 270 (best estimate) were released to promote conservation of the Bulkley River steelhead stocks.

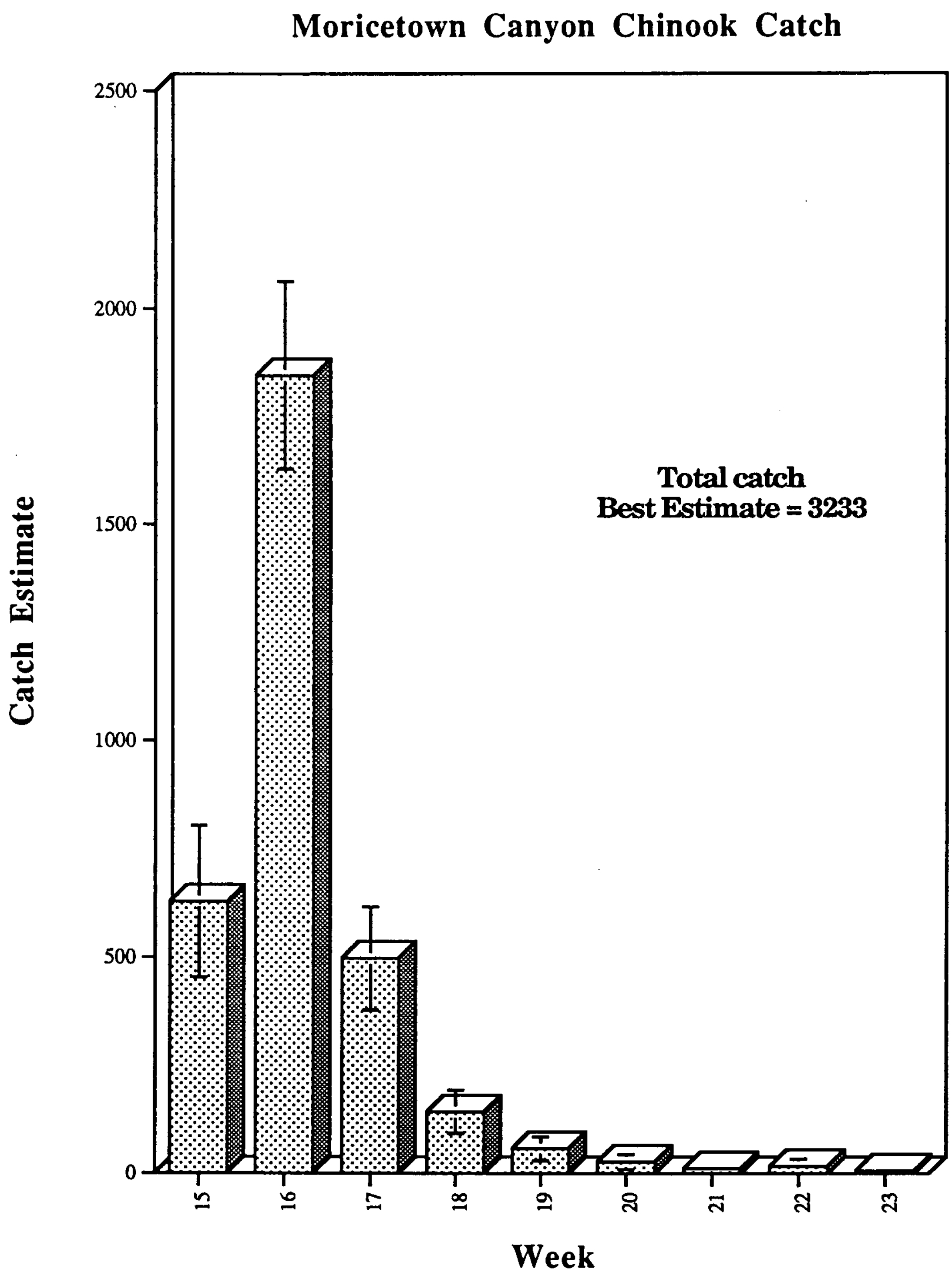
Statistical Week	1992 Dates
14	July 6-12
15	July 13-19
16	July 20-26
17	July 27-August 2
18	August 3-9
19	August 10-16
20	August 17-23
21	August 24-30
22	August 31-September 6

Dates of 1992 Statistical Weeks

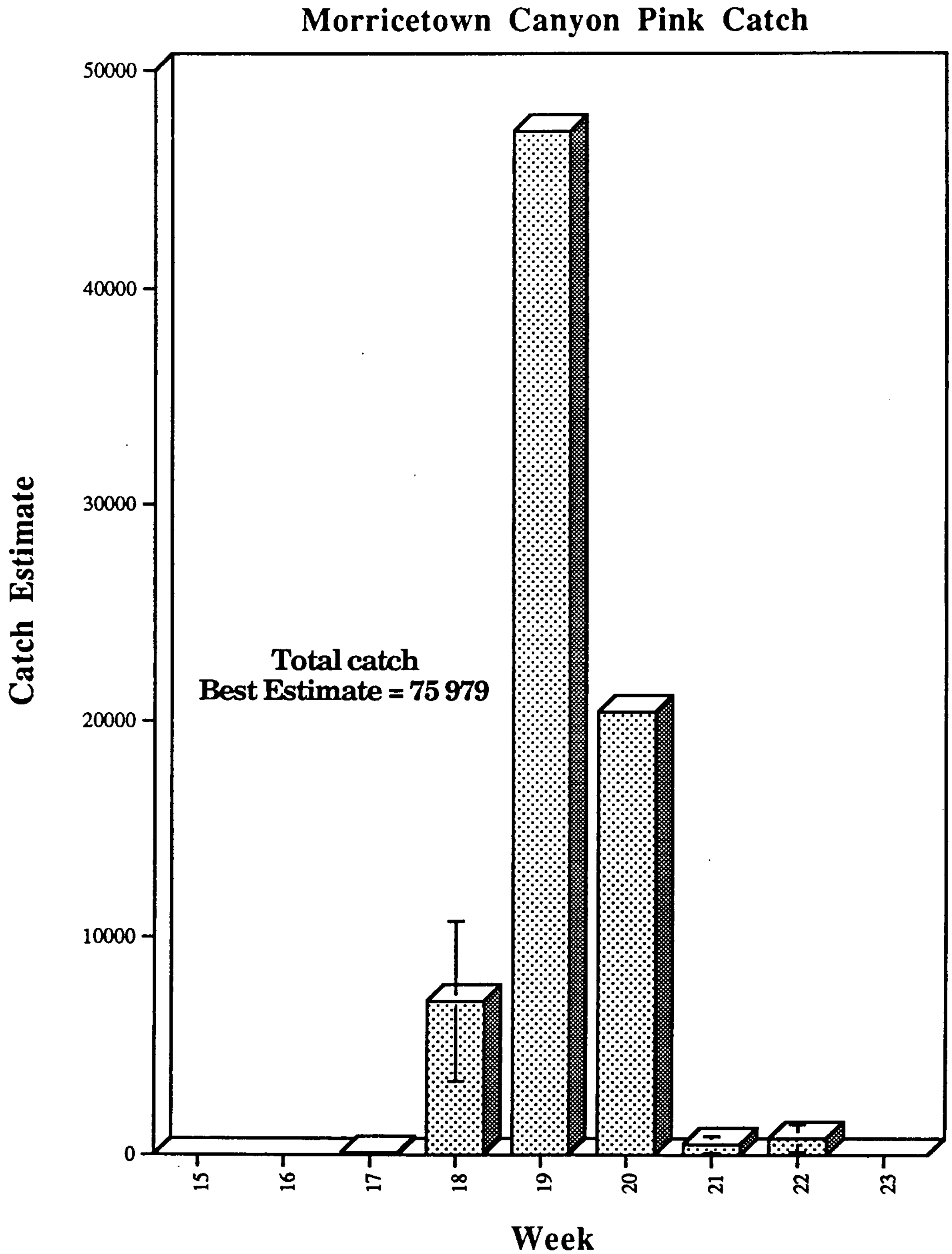

SKEENA SOCKEYE CATCH
Total Catch
Best Estimates
Lower Skeena = 48,267
Upper Skeena = 18,430
Lower Skeena
Upper Skeena
Catch Estimate
25000
20000
15000
10000
5000
0
14
15
16
17
18
19
20
Week



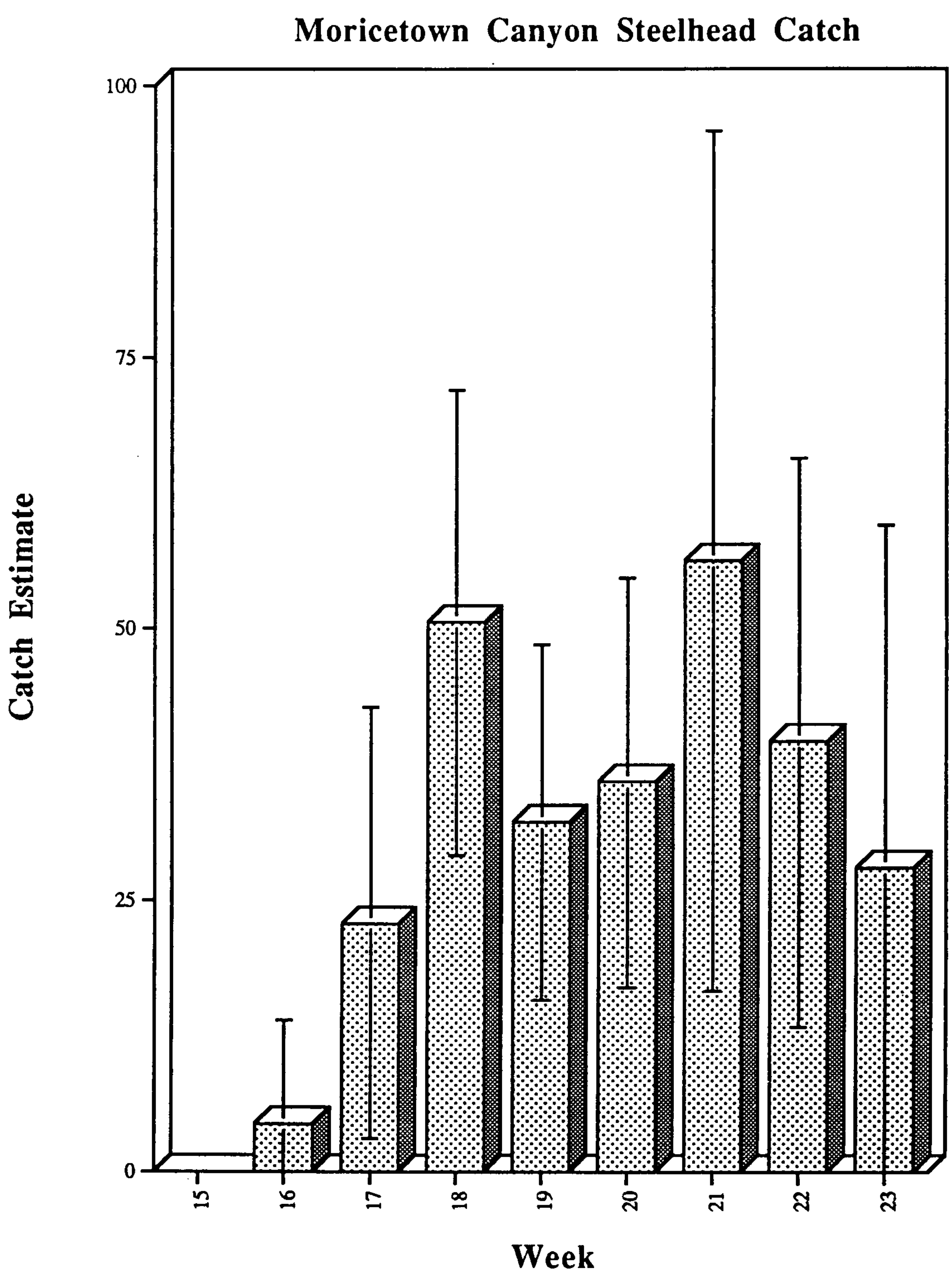
SKEENA CHINOOK CATCH
3000
2000
1000
0
Catch Estimate
Total Catch
Best Estimates
Lower Skeena = 3,674
Upper Skeena = 2605
Lower Skeena
Upper Skeena
14
15
16
17
18
19
20
Week



Moricetown Canyon Chinook Catch
Catch Estimate
2500
2000
1500
1000
500
0
15
16
17
18
19
20
21
22
23
Week
Total catch
Best Estimate = 3233



Morricetown Canyon Pink Catch
Catch Estimate
50000
40000
30000
20000
10000
0
Total catch
Best Estimate = 75 979
15
16
17
18
19
20
21
22
23
Week


Moricetown Canyon Steelhead Catch
Catch Estimate
100
75
50
25
0
15
16
17
18
19
20
21
22
23
Week

Gitksan - Wet'suwet'en Watershed Authorities

Tagging Programme Report

1992

February 1993

Gitksan and Wet'suwet'en Watershed Authority
1992 Tagging Programme Report

by: Charlie Muldon

1. Introduction

The 1992 Tagging Programme ran as a joint project between the members of the Skeena Fisheries Commission, the D.F.O., and the Ministry of Environment as a pilot project between the Native, Provincial, and Federal Governments. Tags were to be put on salmon and steelhead at the coast, the Skeena River estuary, the Kasiks River, and Kitselas Canyon by the Tsimpshian and the D.F.O. Further up river at Klootch Canyon, and Moricetown Canyon by the Gitksan and Wet'suwet'en and at the Babine River Fence by the Nat'oot'en. Once the tags were put on, it was the goal to recover them in the fisheries on the coast and inland, at river fences, and on the spawning grounds.

2. Objectives

The main objectives of the Tagging Programme were to identify individual stock timing of salmonids as they migrate through the fisheries at the coast and inland, obtain data on migration rates, and begin to develop in-season tools to determine the abundance of individual stocks. Other objectives were: to coordinate the programme between all groups involved in the Skeena River fisheries and its management, develop appropriate selective live capture gear for in-river use, create employment and training for the Nations of the Skeena River, and foster awareness and education about the the Tagging Programme among the public and the resource users.

3. Procedures

Our initial plan was to use river traps at Klootch Canyon (Ritchie) to capture all species of salmon and steelhead for tagging.

Floy tags were applied to the base of the dorsal fin of fish with the date, location, species, sex, length, tag number and colour, and notes taken about the fish. The tags were applied to the fish with guns with sharp needles that could go through the fish and implant the Floy tag to the base of the dorsal fin.

The live-capture traps tested were not successful, the problems seemed to be the lack of fences that were to guide the fish into the actual traps.The seine web used for the trap fences could not be properly secured to the river bottom to ensure that no fish escaped under the web, the may have also seen this web, causing them to turn and swim around the fence in the deeper waters.

Both traps were designed with floats secured to the shore which supported the actual traps. The smaller trap was constructed of an aluminum frame and seine web to enclose the holding area of the trap. The trap design is similar to the trap near Metlakatla Alaska, but at a much smaller scale. The small trap was not adequate for use in the canyons or faster moving waters of the Skeena River, but can be used in the smaller tributaries. The small trap was also tested later on in the slower, shallower waters across the river from Price Creek, again the seine web fence did not serve its purpose. The bigger trap floats were strong enough for use in the Skeena River but the trap was positioned too far back on the floats which made it difficult to connect the trap to the fence properly.

Because of the time factor involved with salmonids migrating upriver another method had to be tried. Beach Seines were tested in various locations in the Kitwanga area to find a spot where a set could be made consistently. The site selected for using the Beach Seine was the right bank across from Price Creek, three kms below Gitwangak. Two types of web were tested with the beach seine, a heavier 3" seine web and 2" monofilament herring web (mono). At first we tested with black 3" seine web which caught some fish but was too heavy in the current to manage and too cumbersome in a river boat. Fish were able to see and avoid this web even in somewhat murky water which also hindered the catch at the beginning of the actual tagging operation. The seine web gilled some of the smaller sockeye and seemed not to catch the jack sockeye. We then tried the 2" mono we found it a lot easier to handle in the current and it seemed harder for the fish to see, which increased the catch per set. The only problems with the monofilament were its low strength, and not being able to repair it properly once it had torn by snags or from the larger Chinook tearing through the web. Once the sets could be done in a consistent procedure the catch levels increased and the time required to tag the fish increased. With a longer holding period some fish tangled in the web and exhausted themselves, which caused recovery and release time to be longer. To solve this problem a brailer enclosure was set up and tested in the shallow waters at Price Creek to hold the fish in a comfortable amount of water without them getting tangled in the mesh as they were being held for the tag and release process.

To recover tags caught by the various fishermen and the people recovering tags on the spawning grounds, meetings were set up with the Gitksan and Wet'suwet'en people to discuss what the GWWA hoped to accomplish in the 1992 season. At these meetings a lottery and prizes were discussed for those who recovered and returned tags.

The prizes offered were:

1. Trip to Vancouver
2. Helicopter ride from Canadian Helicopters
3. Guided fishing trip
4. Fishing rods
5. Smoker
6. Earrings
7 Dinner for two
8. Calculator

Tags returned to the GWWA were recovered from the Native Fisheries in our territories at Gitseguecla, Moricetown, Glen Vowell, and Gisgagaas, the sports fishermen in the Bulkley, Morice and Kispiox Rivers, and on the spawning grounds by the Kispiox Hatchery, the GWWA, and the Nat'oot'en.

The GWWA conducted spawning ground recovery surveys in the Kitwancool River, Nangeese River, Swan and Stephens Lake system, Kispiox River mainstem, Morice Lake, Maxan Lake, Fiddler Creek, and the Fulton River. On the spawning grounds very few tags were recovered, except for the Fulton River, which is an enhanced stock with a counting fence. Most of the GWWA returned tags were recovered at the Babine Fence by the Nat'oot'en.

During the recovery surveys estimates were taken about the various stocks, their numbers and the spawning habitat available for them. With the spawning ground recovery effort the large amount of work that needs to be accomplished in our territories in terms of individual stream Stock Identification and Timing, Habitat Inventory, and Environmental Impact Assessment became apparent.

The data collected in the 1992 season was entered into the program Excel for analysis with computers. Migration rates were calculated by the distance travelled divided by the days that it took for the fish to get there. Minimum and maximum rates were given to show the variation in migration rates. To get the days of travel the tag date was subtracted from the recovery date which gave the days of travel. Travel distances were measured on 1:50 000 topographic maps. Distances were measured from Price Creek to Moricetown (104 kms), Price Creek to the Babine Fence (268 kms), and Gisgagaas to the Babine Fence (146 kms). The date and location of tagging and recovery gives an estimate of the timing of fish stocks travelling through the Gitksan fisheries.

4. Results

Summaries of tagging data and graphs showing the analysis are included in the appendix.

There were 687 sockeye, 1928 pink, 12 chinook, 8 steelhead, 24 coho, and 4 chum tagged. 136 tags put on fish by the Gitksan were recovered, 72 sockeye, and 64 pink tags recovered. No Gitksan tags on other species were recovered. Approximately 200 tag records are missing from the original data files which have not been included in the totals of tagged fish.

The overall recovery rate for all species was low at 5.11 %, but the sockeye recovery rate at 10.48% is normal for most tagging programmes. However the pink recovery rate was quite low at 3.32 %, for reasons unknown.

Some of the reasons for the low number of tagged and recovered fish may be: the late start and early finish of the 1992 Gitksan Tagging Programme which affected the total numbers tagged, a drop in stock abundance due to a mixed stock fishery, the fact that about 90 % of fish are from the Babine, and the lack of public awareness. For spawning ground recovery surveys, the lack of manpower and field equipment available at the spawning grounds at the beginning, peak, and end of the spawning cycle limited recoveries of several stocks.

Migration rates for sockeye and pink salmon (see appendix) were estimated for the Bulkley and Babine Rivers. The sample sizes in the Bulkley are small but these samples do have valid data, perhaps some stocks travel faster than others.

The sample size for the Babine is larger and shows a wider range of migration rates for pink and sockeye. The sockeye averaged 22.62 kms/day from Price Creek to the Babine Fence, 19.15 kms/day from Gisgagaas to the Babine Fence, and 52 kms/day from Price Creek to Moricetown. The average time from Price Creek to the Babine Fence was 12.26 days, from Gisgagaas to the Babine Fence it took sockeye 7.67 days, and from Price Creek it took the two sockeye recovered 2 days to travel to Moricetown.

It should be noted that the 1992 Tagging Programme was just the pilot year for a 5 or 6 year study on stock abundance, migration and timing in and through the Gitksan and Wet'suwet'en territories. With this in mind, testing different harvesting techniques for the purpose of live capture was a priority since it has not been done in our rivers since the D.F.O. passed laws to do away with the traditional ways of fishing in the early 1900's.

Despite our low success rate with river traps,they should not be abandoned for future years. The problems that occurred in 1992 are a stepping stone in the right direction for the return of the Gitksan and Wet'suwet'en traditional ways of fishing. The smaller trap design could be used in smaller tributaries. Perhaps with modifications to the entrance and holding area of the larger trap, it could be used with a different type of guide in front of it. It was my impression at the outcome of the tests done with traps that the beginning of the fences were the beginning of the trap and in order for the traps to work in the deeper waters, once the fish enter the mouth of the trap they must not be able to escape under the fence or be able to turn around within the entrance. In order to keep the fish from going under the trap entrance a bottom should be added to the entrance in the deeper waters. Baffles can be used to ensure that fish do not follow the entrance edges back to open water. The beach seine did catch fish in ideal conditions but it is not the most cost effective means of live capture in terms of the equipment and manpower needed to maintain harvesting.

5. Recommendations

1. The 1993 Tagging Programme should begin as soon as the spring floods permit and continue until the fall floods arrive. Because of the lack of proven live capture gear other than beach seines, the beach seine method should be used until suitable gear can be developed for harvesting. For the seine web an appropriate 2" nylon mesh should be ordered to be ready for the 1993 season.

2. The development of live capture methods should continue to be tested in the lower Gitksan territories. Some monies should be set aside for this purpose alone.

3. Two crews of for people should be hired to keep the tagging effort consistant every day during the 1993 season, this to raise the possibilty of tagging stocks of salmon and steelhead other than the Babine and Bulkley stocks.

4. The data collected as fish are being tagged should be entered into computers as it is being collected, this will save time when the data is ready for analysis, and help to keep the data from being lost. A laptop computer should be made availlable for the tagging crews.

5. Three or four field crews should be trained and ready for the field work during the chinook spawning and continue until the coho spawning has peaked. These people should be trained for habitat inventory, population estimates, and stock identification techniques. These crews will need access to computers to enter the data as it is collected to avoid the massive pile of data at the end of the 1993 season. There will be a slow period during the fall floods that these people will have to gather and maintain their field equipment, and organize the data collected. Because of the timing of the spawning cycle of different stocks it is necessary to have the manpower and equipment required to get to the spawning grounds at the beginning, peak, and end of the different spawning stocks within the Gitksan and Wet'suwet'en watershed.

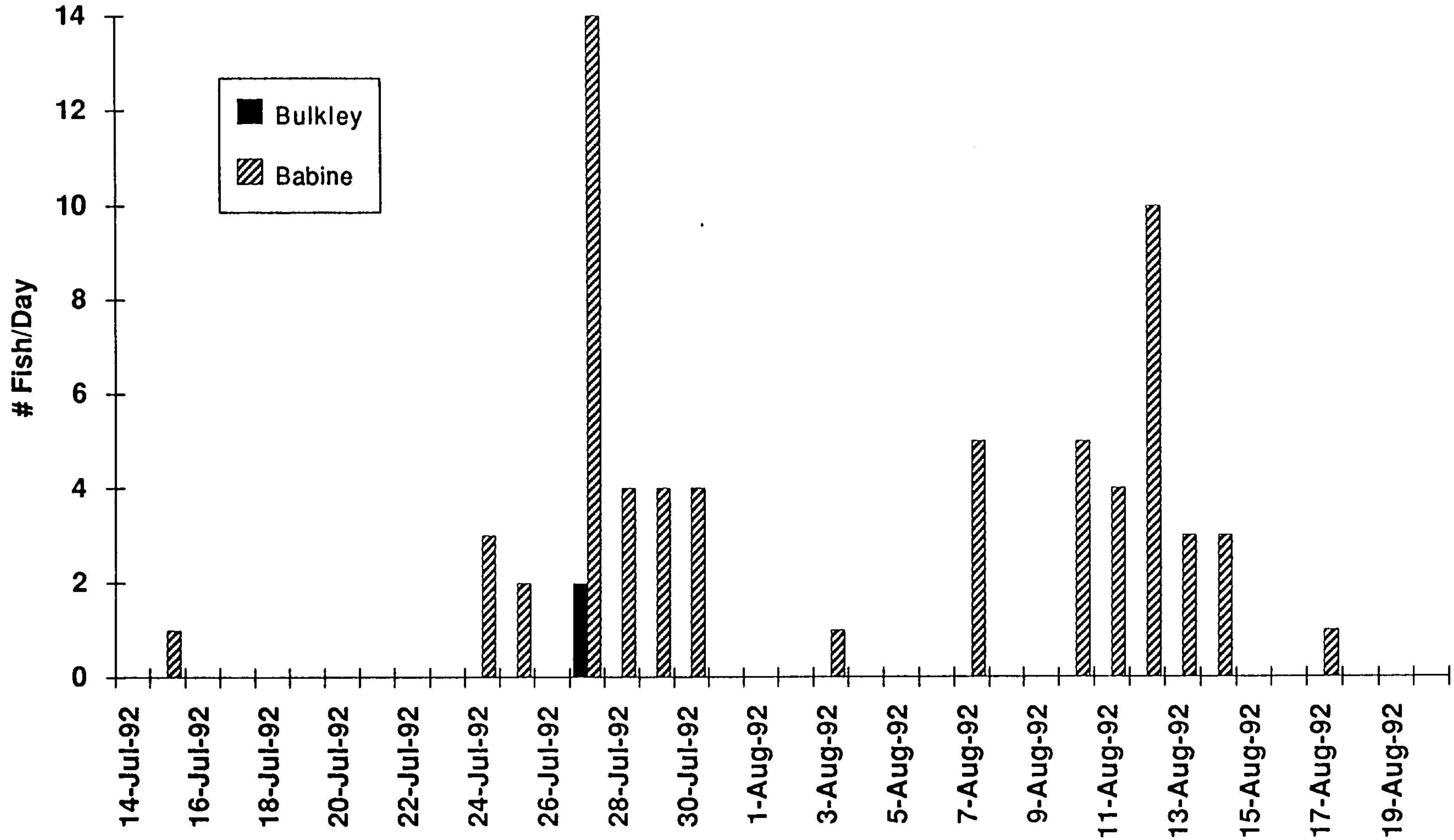
1992 Gitksan Tagging Summary Tables

Totals Tagged		2663				
	Sy	Pk	Cn	Sthd	Co	Cm
	687	1928	12	8	24	4
Totals Recovered		136				
	Sy	Pk	Cn	Sthd	Co	Cm
	72	64	0	0	0	0
Recovery Percentages		5.11%				
	Sy	Pk	Cn	Sthd	Co	Cm
	10.48%	3.32%	0	0	0	0

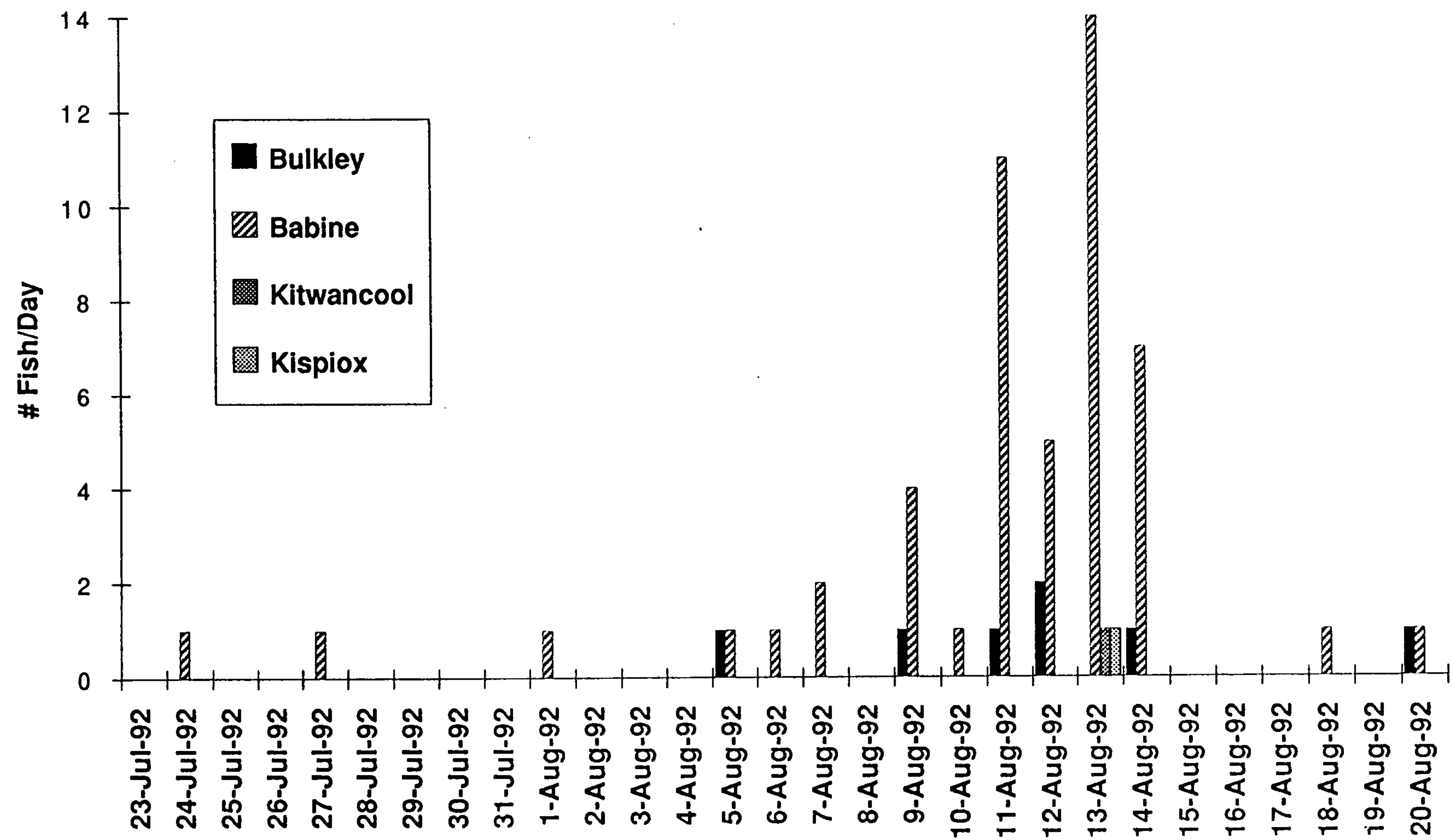
Skeena River Salmon Migration Rates

	Min.Kms	Avg.Kms	Max.Kms	Min.Days	Avg.Days	Max.Days
Sockeye						
Gisgagaas to Babine Counting Fence	16.22	19.31	20.86	7.00	7.67	9.00
Price Cr. to Babine Fence	4.54	21.86	33.50	8.00	12.26	59.00
Price Cr. to Moricetown	52.00	52.00	52.00	2.00	2.00	2.00
Pinks						
Price Cr. to Babine Fence	5.47	18.27	33.50	8.00	18.40	49.00
Price Cr. to Moricetown	5.20	6.88	8.00	13.00	15.67	20.00

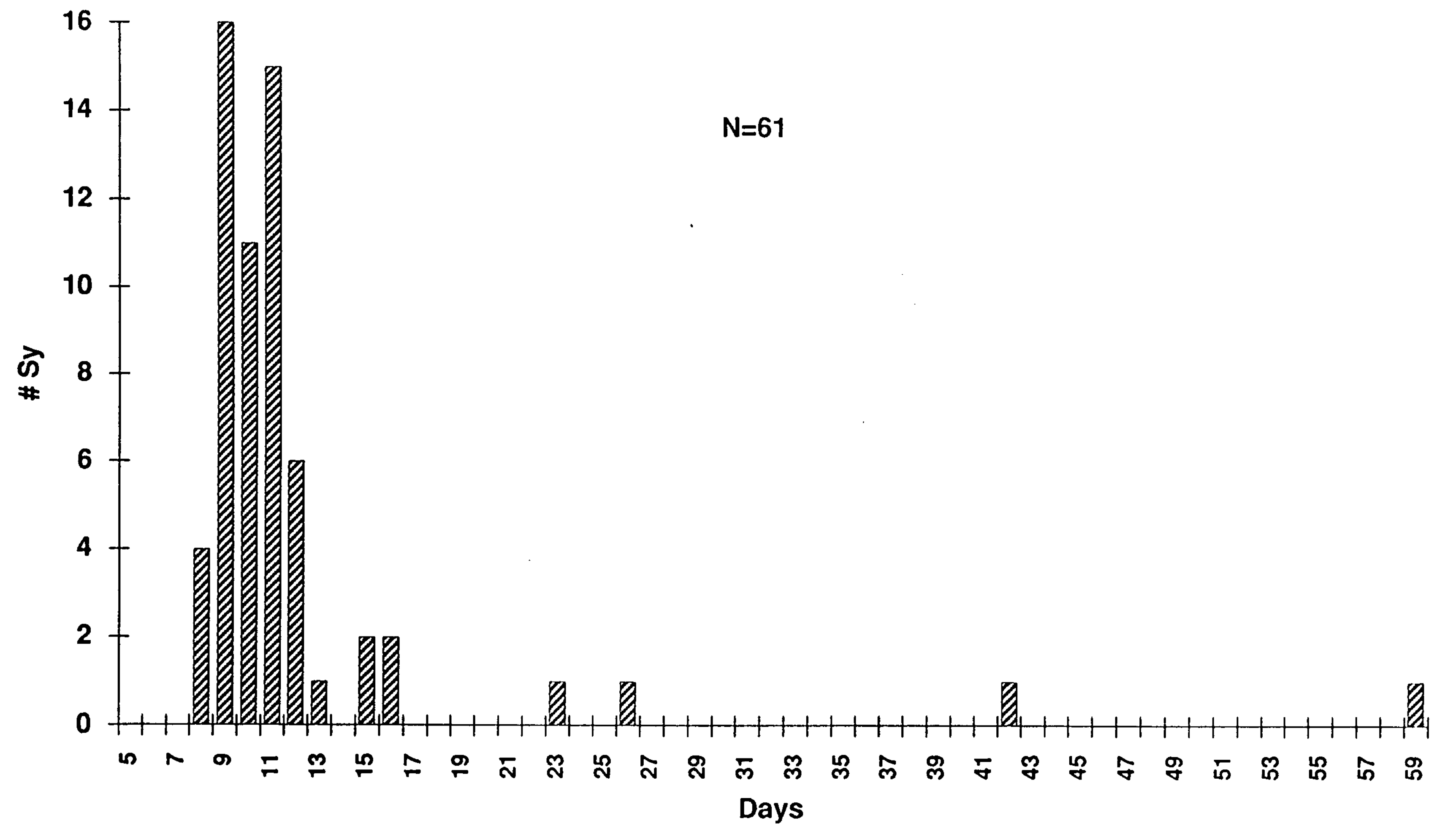
Sockeye Timing at Price Cr.



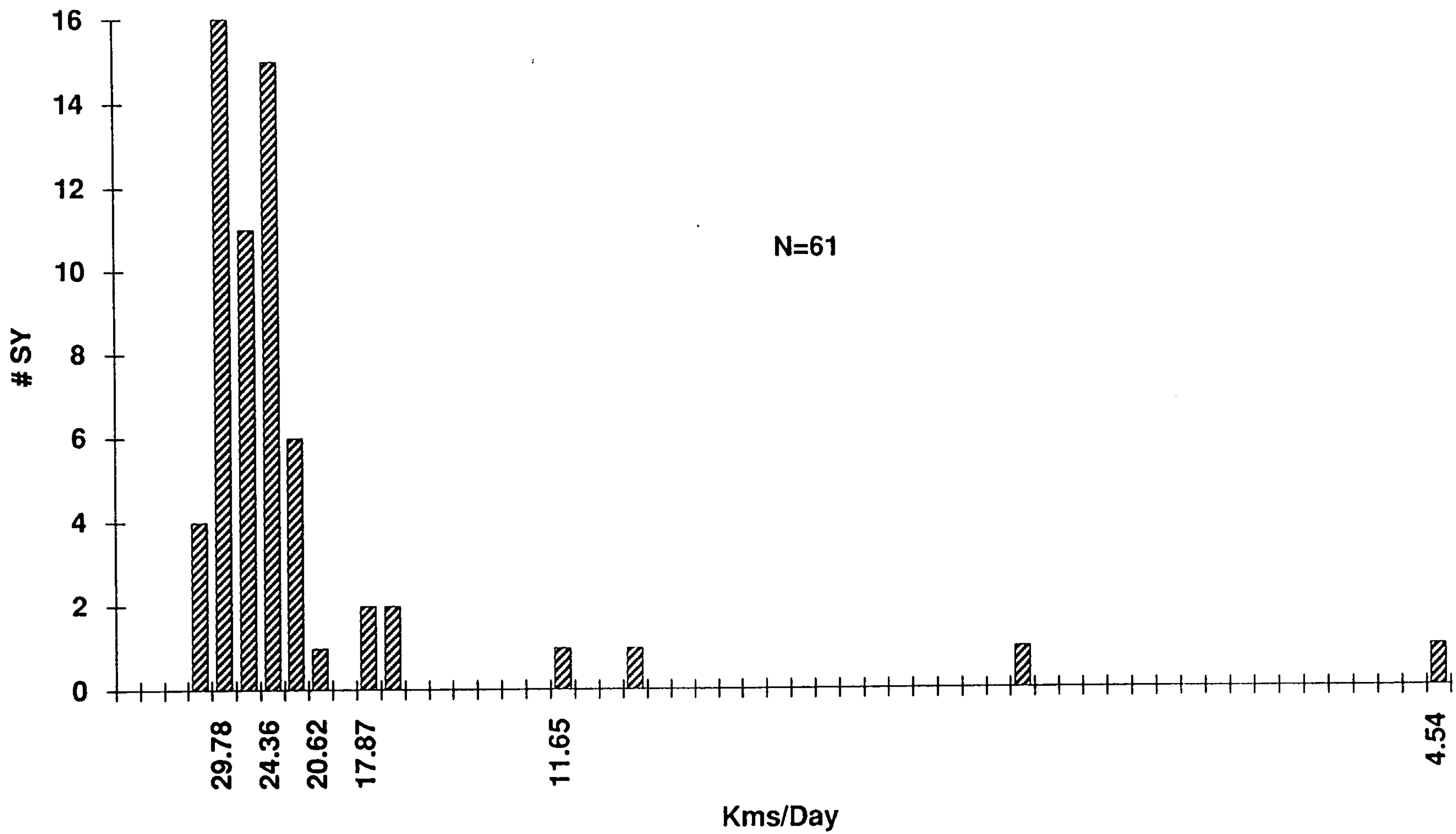
Pink Timing at Price Cr.

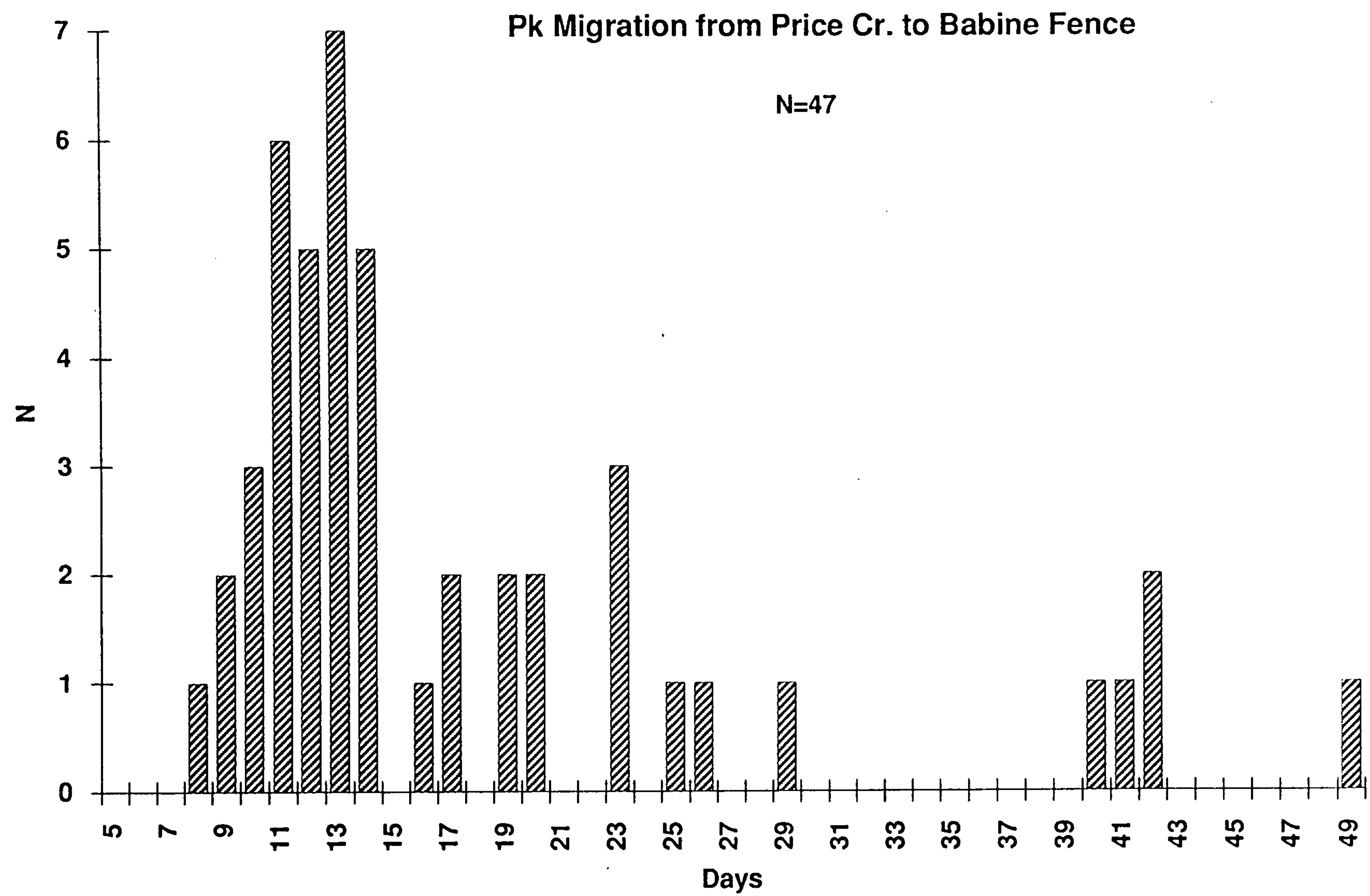


Sy Migration from Price Cr. to Babine Fence



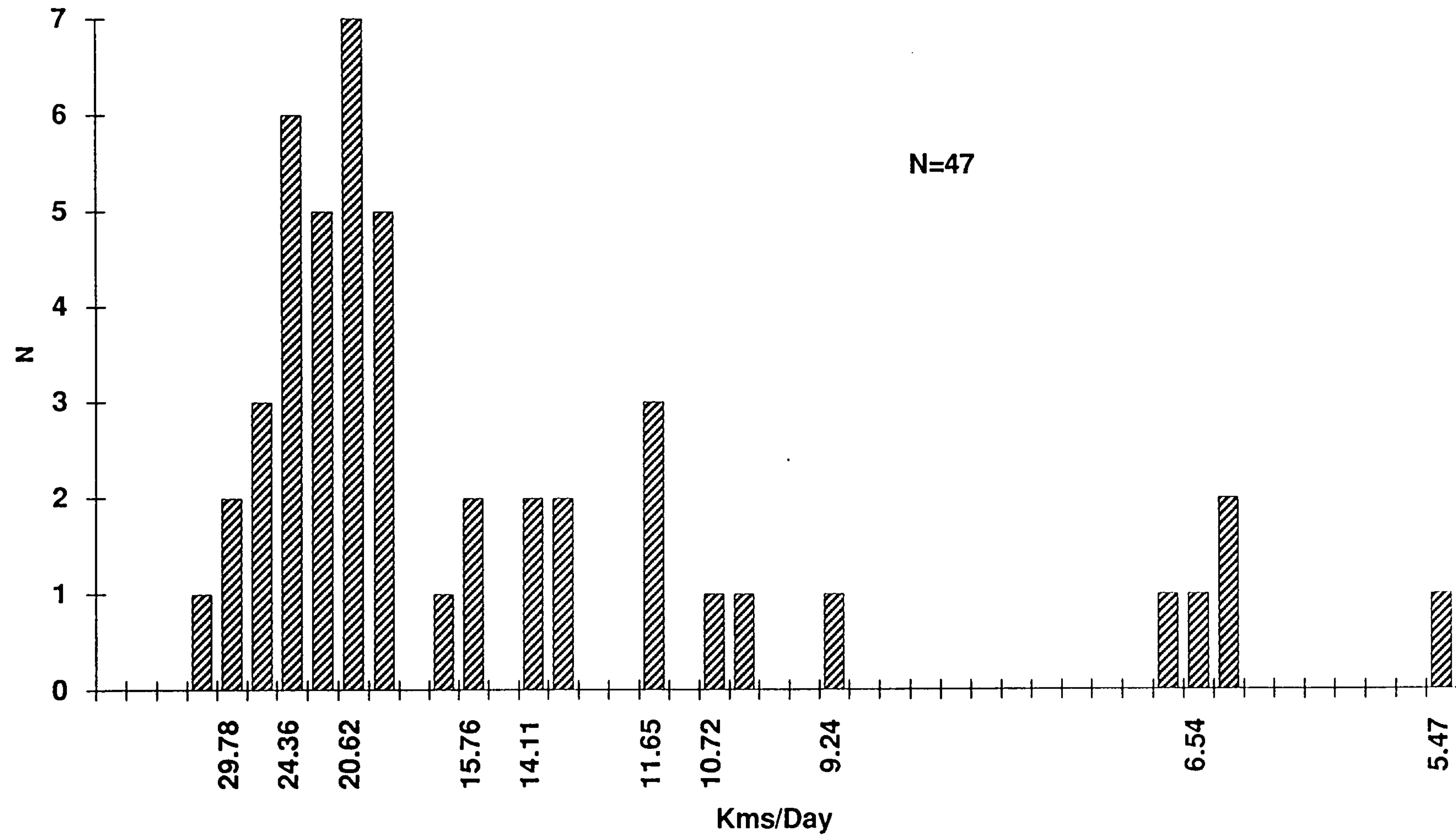
Sy Migration Rates Price Cr. to Babine Fence

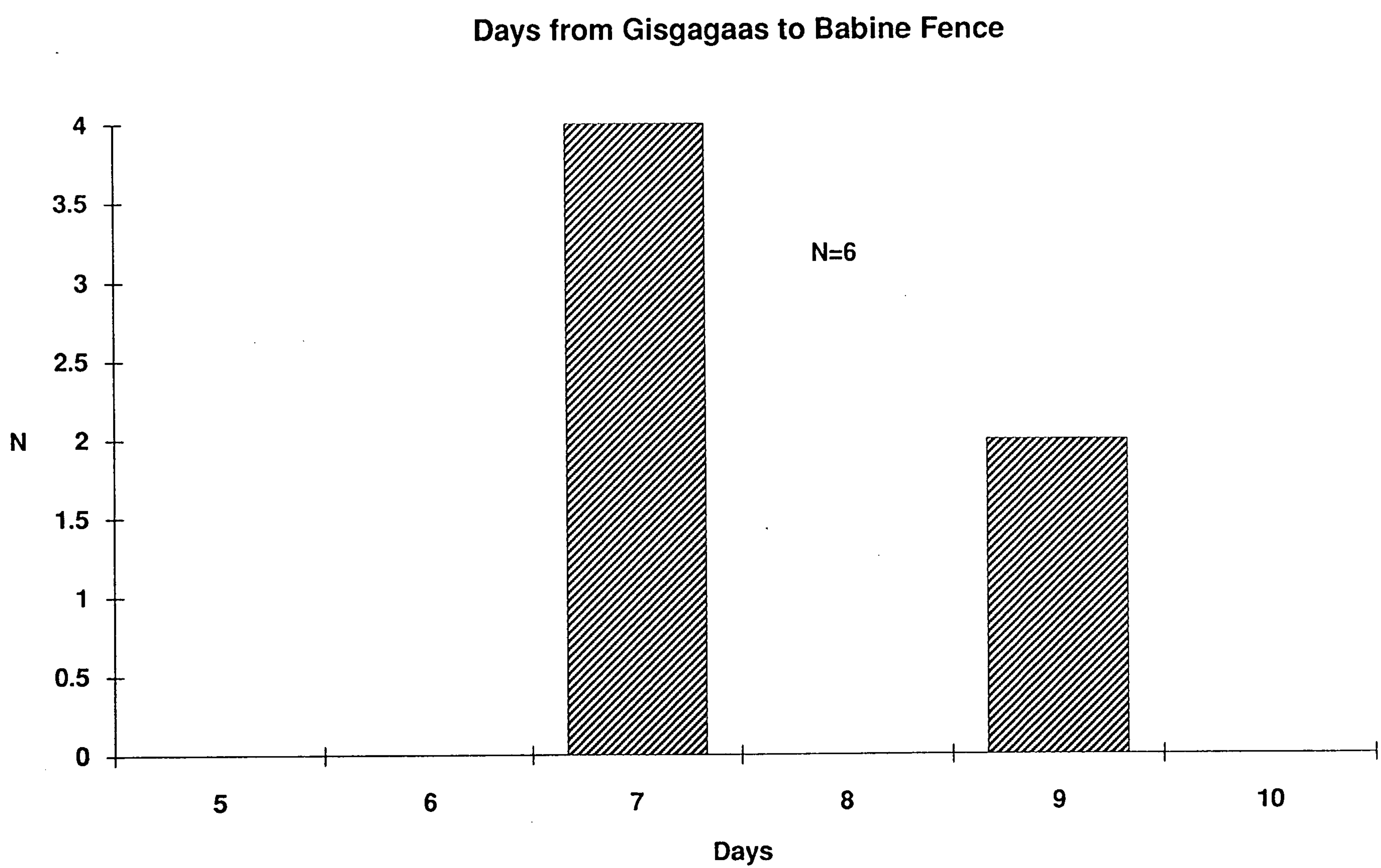




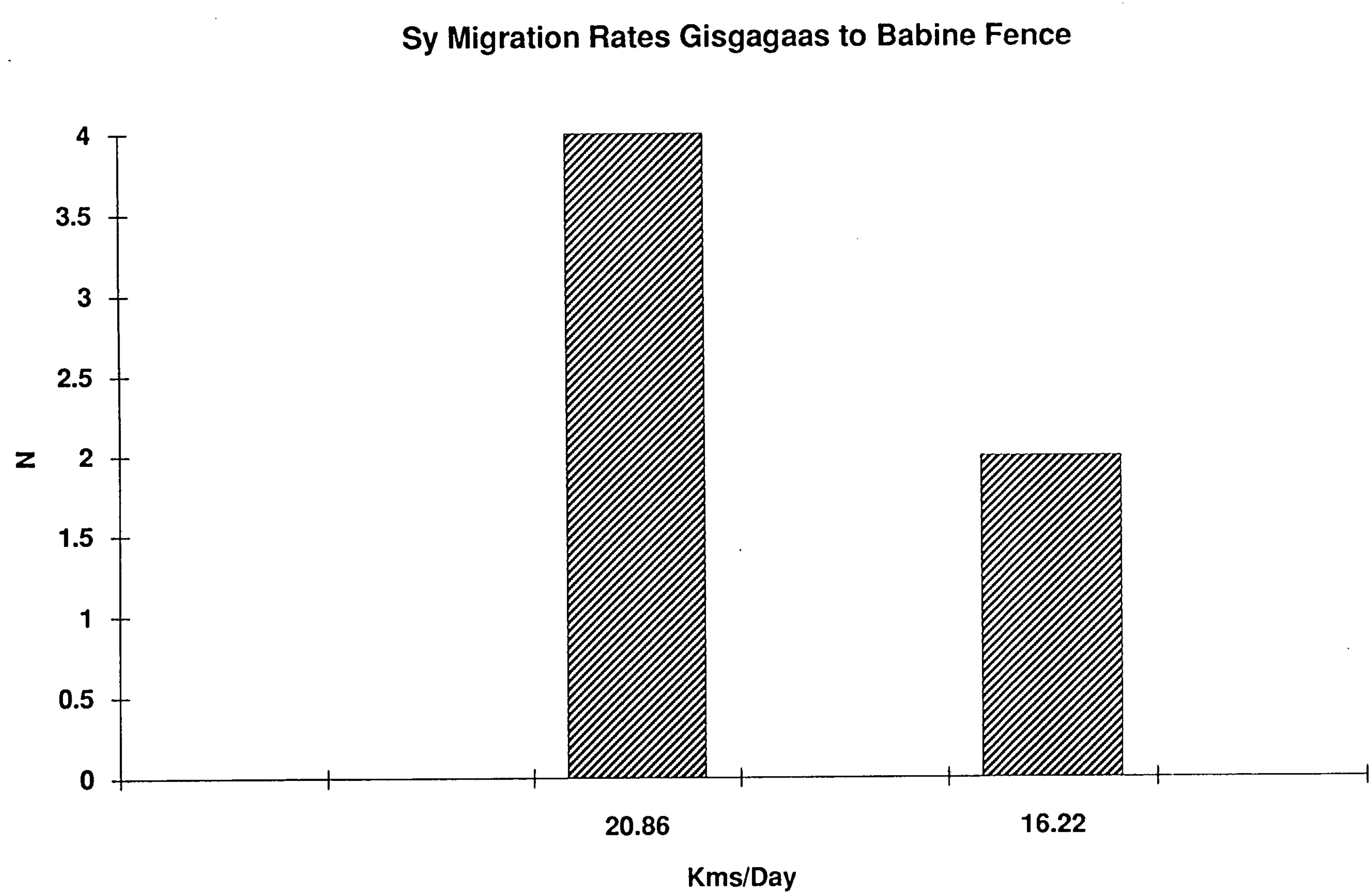
Pk Migration from Price Cr. to Babine Fence
N=47
N
Days
0
1
2
3
4
5
6
7
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
43
45
47
49

Pk Migration Rates Price Cr. to Babine Fence





Days from Gisgagaas to Babine Fence
N=6
N
4
3.5
3
2.5
2
1.5
1
0.5
0
5
6
7
8
9
10
Days


Sy Migration Rates Gisgagaas to Babine Fence
N
4
3.5
3
2.5
2
1.5
1
0.5
0
20.86
16.22
Kms/Day

Gitksan - Wet'suwet'en Watershed Authorities

Preliminary Fiddler Creek Stream Assessment

January 1993

Preliminary Fiddler Creek Stream Assessment

by: Charlie Muldon
Allen S. Gottesfeld

1. Objectives

a) Estimate the coho spawning escapement.

b) Divide the stream into reaches.

c) Identify rearing, holding, and spawning areas.

d) Locate unstable deposits.

e) Identify areas and causes of stream bed change.

f) Prepare preliminary Coho habitat map.

2. Procedures

Fiddler Creek was examined on the ground on October 28, 1992. Two other trips attempted in October and November of 1992 were cancelled because of bad flying conditions. Approximately 12 km of the 15 km of accessible salmon habitat were inspected. Our protocol was to:

a) View study area from helicopter to get a sense of the reaches within the system for comparison with sampled area.

b) Choose the area to be sampled for inventory allowing time to walk out.

c) Examine rearing, holding, and spawning habitat within the specified area of study.

d) Chart location of finds on aerial photos and 1:50 000 topographic maps.

e) Note areas and reasons for stream bed changes.

3. Results

From the helicopter the Fiddler creek main stem was viewed. Because of low visibility Knauss Creek, Hampson Creek, and the left fork in the upper reach were not viewed.

The reaches were set on the basis of fish habitat and the stream characteristics. Five reaches were determined within the study area:

Reach 1

Reach 1 (Figure 1) begins at the confluence of Fiddler Creek and the Skeena River and continues upstream to the confluence of Knauss Creek, 3930 metres above the mouth. The stream bed drops about 90 metres within this distance. The average gradient is about 2%.

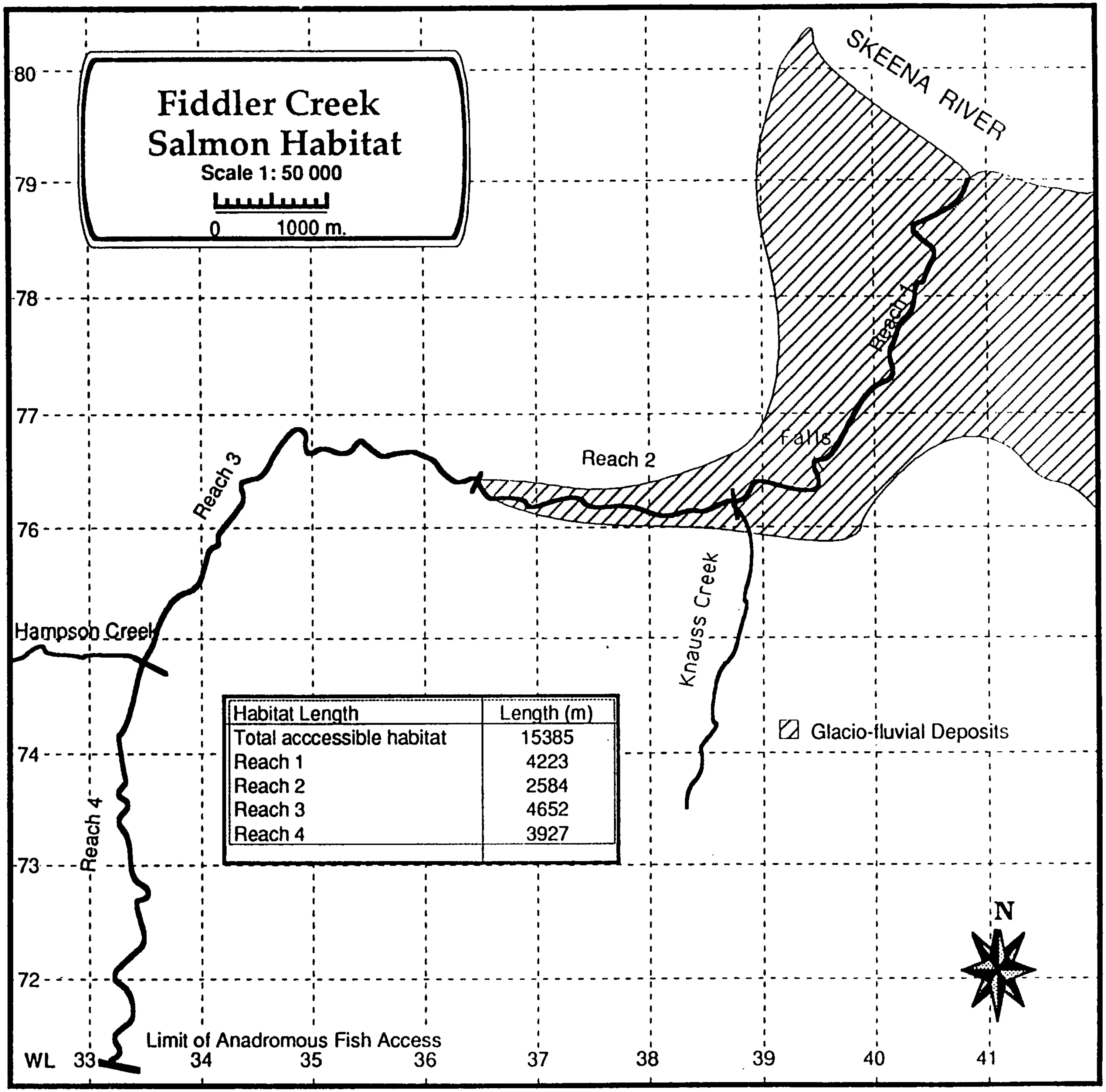
This reach is swift and the main channel is well defined with few side channels. There is a canyon and low waterfall about 3 km above the mouth. The stream bed is made up mostly of large rocks and boulders. It appears subject to less change than the upper reaches of Fiddler Creek because of the influence of the bedrock canyon, and boulder bed. However there are a few large cut banks that are presently being eroded by the creek in this reach.

Knauss Creek, which heads in a rock glacier area, contributes the majority of the turbidity to Fiddler Creek and the visibility in the greyish coloured water was near zero, except in the shallow waters. Clay deposits in Reach 2 also contribute to the turbidity.

At the mouth of Knauss Creek a large gravel deposit has built up, caused by recent floods and a log jam above the mouth that has diverted the main flow of Fiddler Creek to the opposite bank. This gravel fan has increased in size since August 1988. This gravel deposit was about two meters above the Fiddler Creek water level at the time it was observed, The deposit fans over a large area along Fiddler Creek and extends 2000 m up Knauss Creek.

There were no adult coho or juvenile salmonids observed in this reach, but access to the side channels was limited by the swiftness of the current and the steepness of the river banks. It was not possible to stay along the creek for the entire length of Reach 1, but what could be seen within safety limits, was observed. A pink carcass was seen along this section above the railway crossing, which suggests pink salmon spawn in this reach.

There were areas that seemed suitable for spawning, holding areas, and some rearing. To confirm this, other research of different species is required and the timing of this research should be set to correspond with spawning periods for each species.



Habitat Length	Length (m)
Total acccessible habitat	15385
Reach 1	4223
Reach 2	2584
Reach 3	4652
Reach 4	3927

Reach 2

Reach 2 begins at Knauss Creek and continues 2580 metres upstream from Knauss Creek. In this section the stream bed drops about 60 m in the 2.5 kilometres for a gradient of about 2%. The water is slightly grey in colour from erosion clay and silt deposits along this reach. This turbidity did not seriously restrict visibility. The upper limit of the reach is set just upstream of the first clay deposit affecting the water quality of Fiddler Creek.

The unstable fine-grained deposits are located on both sides of the creek along the steep slopes of this reach. The elevation of these deposits, about 900 feet above sea level, is consistent with the elevation of the thick gravel deposit near the confluence that leads up Mount Knauss. At the time of the end of the Ice Age it is presumed that the Skeena Valley was full of ice. This ice acted as a plug causing a lake to form in the Fiddler Valley. Within this lake, fine and coarse sediment washed in forming thick deposits.

In Reach 2 the valley bottom begins to widen somewhat, with signs of historical stream bed movement. However, the stream bed is relatively unchanged when compared to the 1988 aerial photos and topographic maps based on aerial photos from the late 1960's.

The side channels in the lower sections of this reach do not have abundant flow, and do not seem to have changed much in recent years. They have mostly large rocks and boulders in them. Where the stream had split into two channels, the current was usually swift in both channels.

The back channels, which were once the main stream bed, have water in them, and are filling up with sediment during the floods.

Within this reach the fish habitat available is limited. There are possible spawning and rearing areas, but few deep pools for holding. No fish were noted in this area at the time it was observed. The side and back channels observed did not seem to be utilised for rearing during the fall season. To see if this habitat is utilised for spawning and rearing will require further studies that should correspond with studies done in Reach 1.

Reach 3

Reach 3 begins roughly 2.5 kilometres upstream from Knauss Creek and continues 4650 metres upstream to the confluence of Hampson Creek. The creek bed drops about 45 metres in this reach. This is an average gradient of about 1%.

Reach 3 is well suited for coho and steelhead spawning and rearing habitat, with deep pools for holding, good clean gravel for spawning, slow moving side and back channels as well as beaver ponds for rearing.

The main stem in this reach wanders considerably, caused by log jams and the erosion of stream banks during floods. Log jams were started by large trees that became hung up during the floods and other debris piling up against it, thus blocking the channel, diverting the main stream flow, and creating side channels downstream of the log jams.

The water was clear and visibility was excellent, with the help of polarised sun glasses, even the bottoms of the deepest pools were visible. The lack of in-stream cover also made much easier to locate the holding coho and rearing juvenile salmonids.

With three people walking the stream bed, we were able to see all of the channels within this reach, and suspect that not many adult coho could have avoided being seen. It is difficult to get an estimate of the amount of juvenile salmonids rearing in this reach, but the information gathered shows the use and location of side channels for rearing.

Rearing habitat in the side channels and main stem was easily visible, but the lack of in-stream cover could limit the rearing capacity of the stream within this reach. There are beaver ponds and back channels that are suitable for rearing along the stream. The accessibility to these back channels and beaver ponds for juvenile salmon depends on spring and fall flood levels. The back channels and beaver ponds were not inspected to see if rearing juveniles were present.

A number of coho and juvenile salmonids were present below Hampson Creek, the adults in the deep pools, and the juveniles in the side channels. data on these sightings were recorded on the 1:20 000 aerial photos.

Eight adult coho were observed below Hampson Creek. To get an estimate of the total escapement for this stream, a formula used by the local D.F.O. has been used. The formula is crude but because of the fact that the whole system could not be seen from the ground, it will give us a rough estimate of the total escapement. To justify this formula, the visibility in Reach 1 hampered any chance of adult counts and and the upper 2 1/2 to 3 kilometres of reach 4 were not sampled. Also, the presence of a grizzly bear and eagles in the upper part of Reach 4 suggests that coho were in this area.

The D.F.O. formula is based on the assumption that every coho spotted, represents 8 to 10 that are there.With this formula the total escapement estimate ranges from 64 to 80 coho that returned to spawn in 1992.

Reach 4

Reach 4 begins at Hampson Creek and extends to the mouth of the canyon 3930 metres upstream from Hampson Creek. The stream bed drops about 75 metres in this four kilometres. The average slope is approximately 1.9%.

Reach 4 is comparable to Reach 3 in the sense that the stream has abundant shifting gravel bars and the stream is affected by log jams. The difference in this reach from Reach 3 is that there are no beaver ponds and few back channels.

The gravel in Reach 3 is clean and appropriate size for spawning gravel. There are deep pools, and side channels. However there were no coho, or juvenile salmonids in the section of the reach that we observed. The upper 2.5 to 3 kilometres of this reach was not observed.

A grizzly bear and eagles were present in the upper sections of this reach, which presumably indicates that fish are present in the area. From the helicopter the gravels of Reach 4 are suitable for spawning.

Reach 5

Reach 5 begins at the canyon four kilometres above Hampson Creek and continues upstream to Fiddler Lake. From here the creek is very steep all the way to Fiddler Lake.

With the view from the helicopter it was considered that fish could not migrate upstream beyond this canyon. In the canyon area the gradient is approximately 12%. There were cascading water falls and above the tree line the creek was too steep for any type of fish habitat.

For fisheries research this reach does not need studies other than environmental impact assessment, including soil stability studies, if other resources are to be used.

Habitat mapping

Coho rearing and spawning habitat were mapped based on field observations and air photo interpretation. For 1992 the principal rearing area was Reach 3. Reach 2 and 4 are also utilised. The coho observed on October 28 were holding in deep pools and probably spawn in Reach 3 and 4.

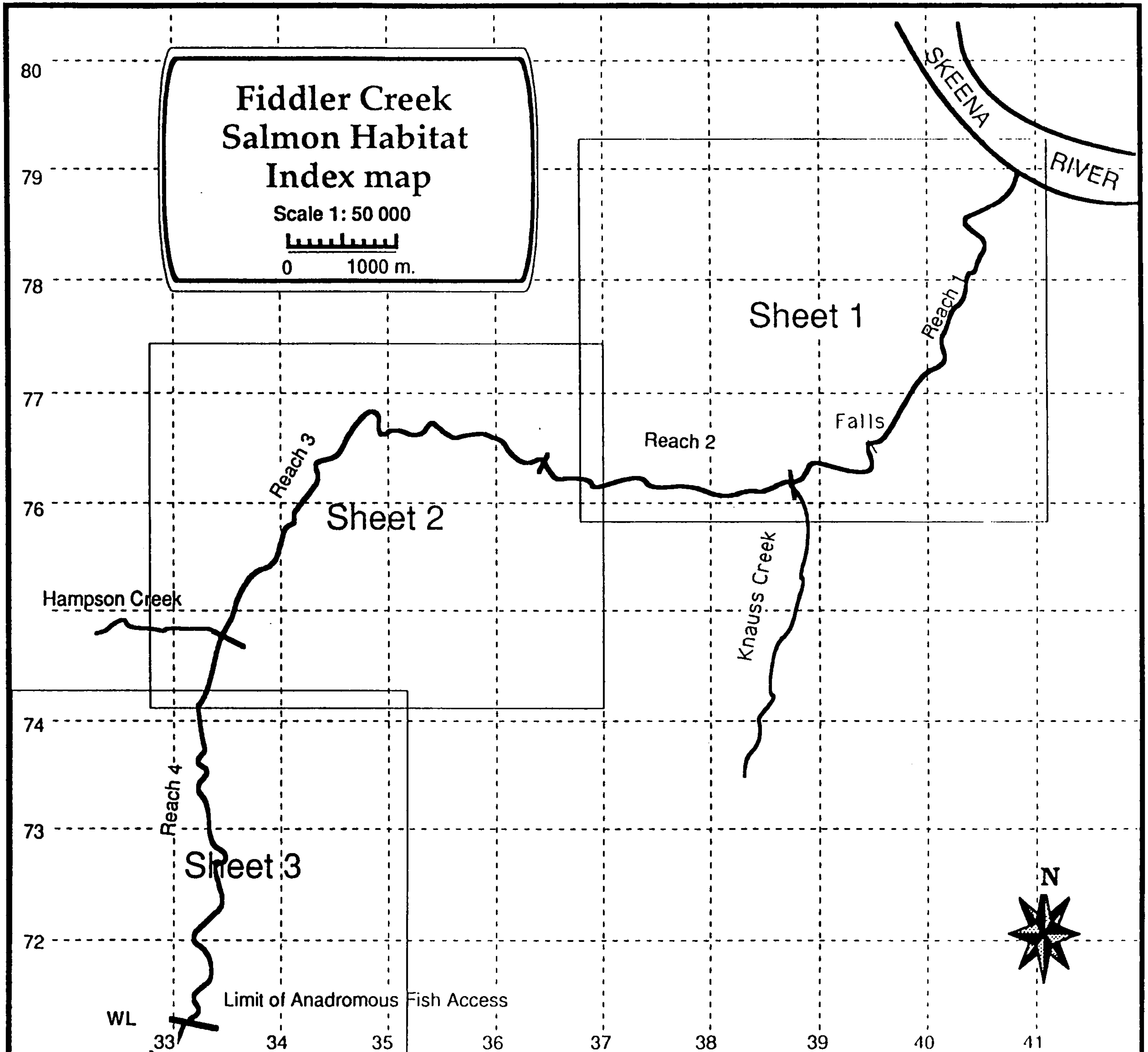
The three habitat maps presented in the following pages, are mapped on an airphoto base that has been partially corrected to reflect a 1:20 000 scale at the elevation of Fiddler Creek. Airphoto mosaics were assembled on a GIS system where necessary to provide the base maps.

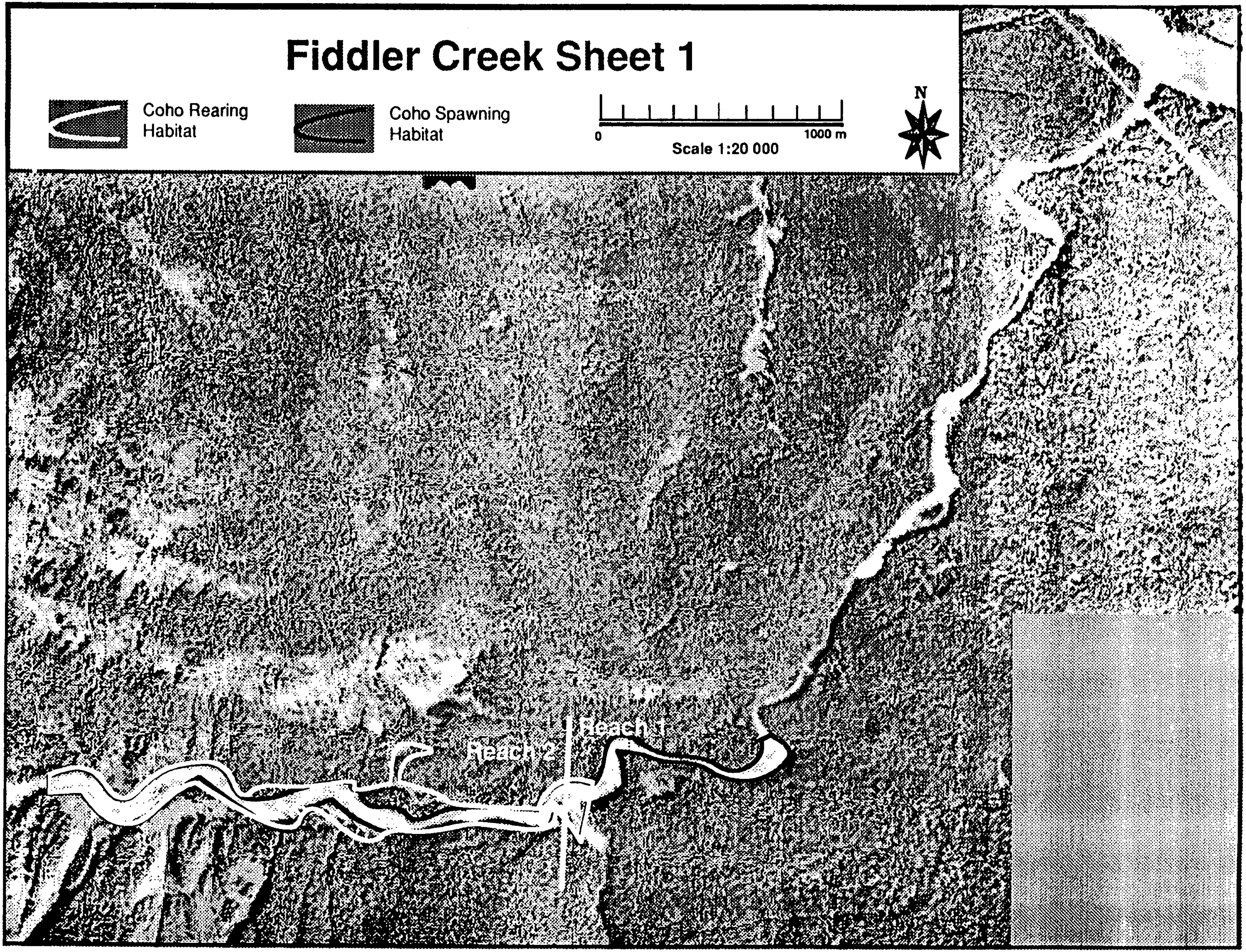
Coho habitat occurs along the main stem of Fiddler Creek, with use of side channel and beaver dam habitat in the Valley bottom. Based on airphoto interpretation it is likely that coho utilise the lower 500 m of Hampson Creek.

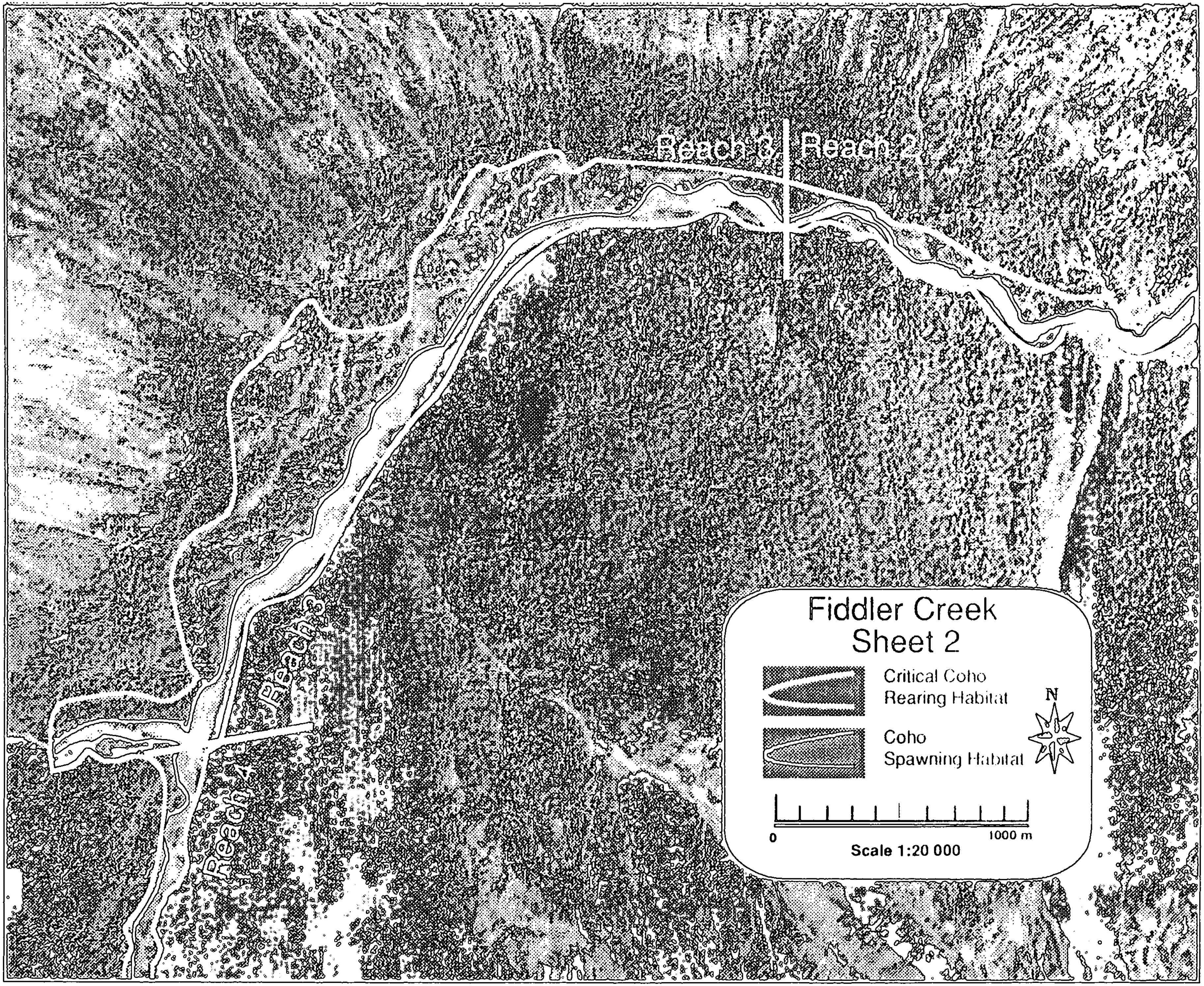
Protection of the Coho spawning and rearing habitat will require strict controls over the introduction of sediment and logging debris into first order tributaries which extend down to Fiddler creek.

Wildlife Observations

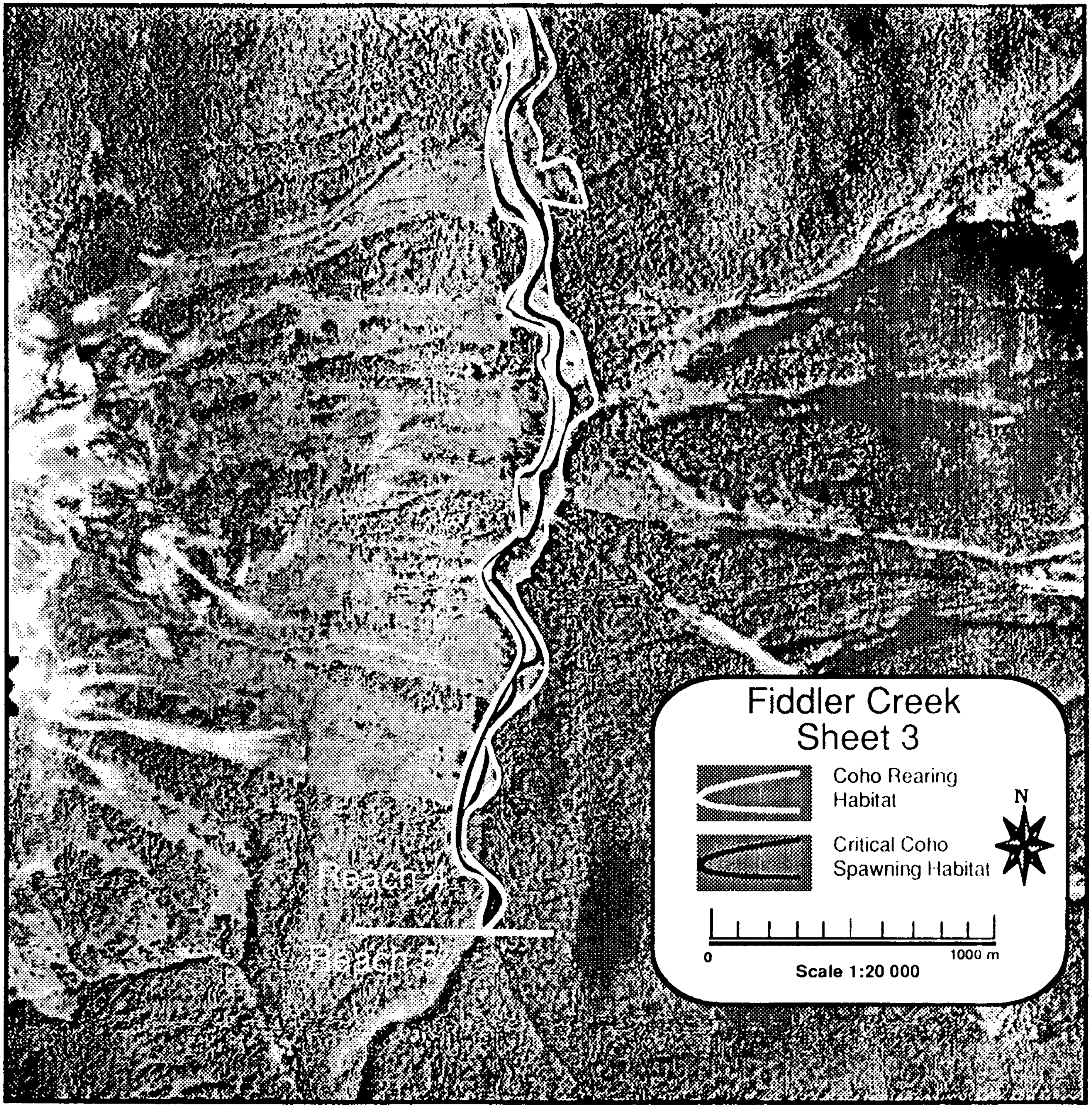
During the helicopter flight mountain goats were seen on the cliffs above the left bank below Hampson Creek, and eagles and a grizzly bear were seen along sections of Reach 4. During the field study, moose and wolf tracks were seen along the entire creek. Caribou tracks were seen in areas along Reach 3 at UTM WL369762. Numerous rabbits were seen in the young growth near the mouth of Fiddler Creek.


Fiddler Creek
Salmon Habitat
Index map
Scale 1: 50 000
0 1000 m.
SKEENA RIVER
Sheet 1
Sheet 2
Sheet 3
Reach 1
Reach 2
Reach 3
Reach 4
Falls
Knauss Creek
Hampson Creek
Limit of Anadromous Fish Access
WL
N
80
79
78
77
76
74
73
72
33
34
35
36
37
38
39
40
41


Fiddler Creek Sheet 1
Coho Rearing Habitat
Coho Spawning Habitat
0
1000 m
Scale 1:20 000
N
Reach 1
Reach 2



Reach 3
Reach 2
Reach 3
Reach 4
Fiddler Creek
Sheet 2
Critical Coho
Rearing Habitat
Coho
Spawning Habitat
N
0
1000 m
Scale 1:20 000


Fiddler Creek
Sheet 3
Coho Rearing Habitat
Critical Coho Spawning Habitat
N
0
1000 m
Scale 1:20 000
Reach 4
Reach 5

4. Conclusions and Recommendations

Reach 1 and 2 have potential for salmonids, but do not seem to be suitable for coho. To get an idea of which species use these reaches and what these uses are, will require additional field studies. Other salmon species, such as chinook, pinks, chum, and steelhead, have been noted in the DFO and MOE escapement catalogues as spawning in these reaches, so further studies of these reaches should be scheduled to take place during their spawning periods.

Reach 3 is the critical area for coho rearing habitat. It is likely that the bulk of the Coho spawning takes place in Reach 4. All coho observed on October 28, 1992 were holding in the deep pools, it did not appear that they were spawning at this time. Other coho studies should be scheduled for the first week of November.

The spawning population of Coho is low compared to previous DFO estimates of 200 to 750 spawners in 1965 to 1979. A field survey in 1993 would be useful to see if the poor escapement in 1992 is representative of the present population size.

Fiddler Creek transports a high volume of sediment. channels abandoned since 1988 are nearly full of gravel and sand. The abundant sources of fine and coarse sediment found in Reach 1 and 2 and those derived from Knauss Creek have the potential to greatly affect the lower portion of the creek if sediment supply is increased. Unstable snow slide and landslide areas in Reach 3 and 4 are also a potential source of channel changing volumes of sediment. Terrain analysis and sediment delivery potential mapping are necessary components integrated management planning for this watershed.

Gitksan - Wet'suwet'en Watershed Authorities

Swan Lake Sockeye Habitat Studies

1992

February 1993

Swan Lake Sockeye Habitat Studies, 1992

By: Vincent Jackson
Charlie Muldon

1. Objectives

The objectives of the study within the Swan and Stephens Lake watershed were to get an estimate of the sockeye escapement for the watershed, chart areas of fish habitat and use, identify areas where habitat studies are required in the future, and recover tags in coordination with the Skeena Fisheries Commission (S.F.C.) Tagging Programme.

2. Procedures

From September 22 - 24, 1992 four members of the Gitksan and Wet'suwet'en Watershed Authorities (GWWA) visually inspected habitat areas within the Swan and Stephens Lakes watershed. Small inflatable rafts with motors were used to travel through the lakes. Spawning areas were walked and sampled for tags and escapement estimates.

Escapement estimates were done on the tributaries by counting the fish in the streams and the dead pitch adjacent to the streams. Where there were abundant spawners two or three technicians made separate counts. These counts were recorded and an average of the tallies was used for the escapement estimate in that area.

By sampling the tributaries systematically, future areas for study were established and streams with no apparent spawning habitat were ruled out for future escapement studies.

All finds during these surveys were charted on a 1:50 000 topographic map (103 P/15 Brown Bear Lake).

Dip nets and a small seine net were carried along to capture any fish that may have been tagged by one of the S.F.C. tagging stations.

3. Results

Nine of a possible sixteen tributaries were observed within the Swan Lake – Stevens Lake watershed (see Figure 1). Two new streams in the north-northwestern corner of Swan Lake in which sockeye spawn were identified. The UTM map coordinates on the 1:50 000 Brown Bear Lake map sheet are WM198853 and WM192853. These two tributaries have not been named on the topographic maps and so have been named by the GWWA as Jackson Creek (192853) and Barnes Creek (198853) for identification purposes. The remaining seven tributaries inspected showed no evidence of spawning activity.

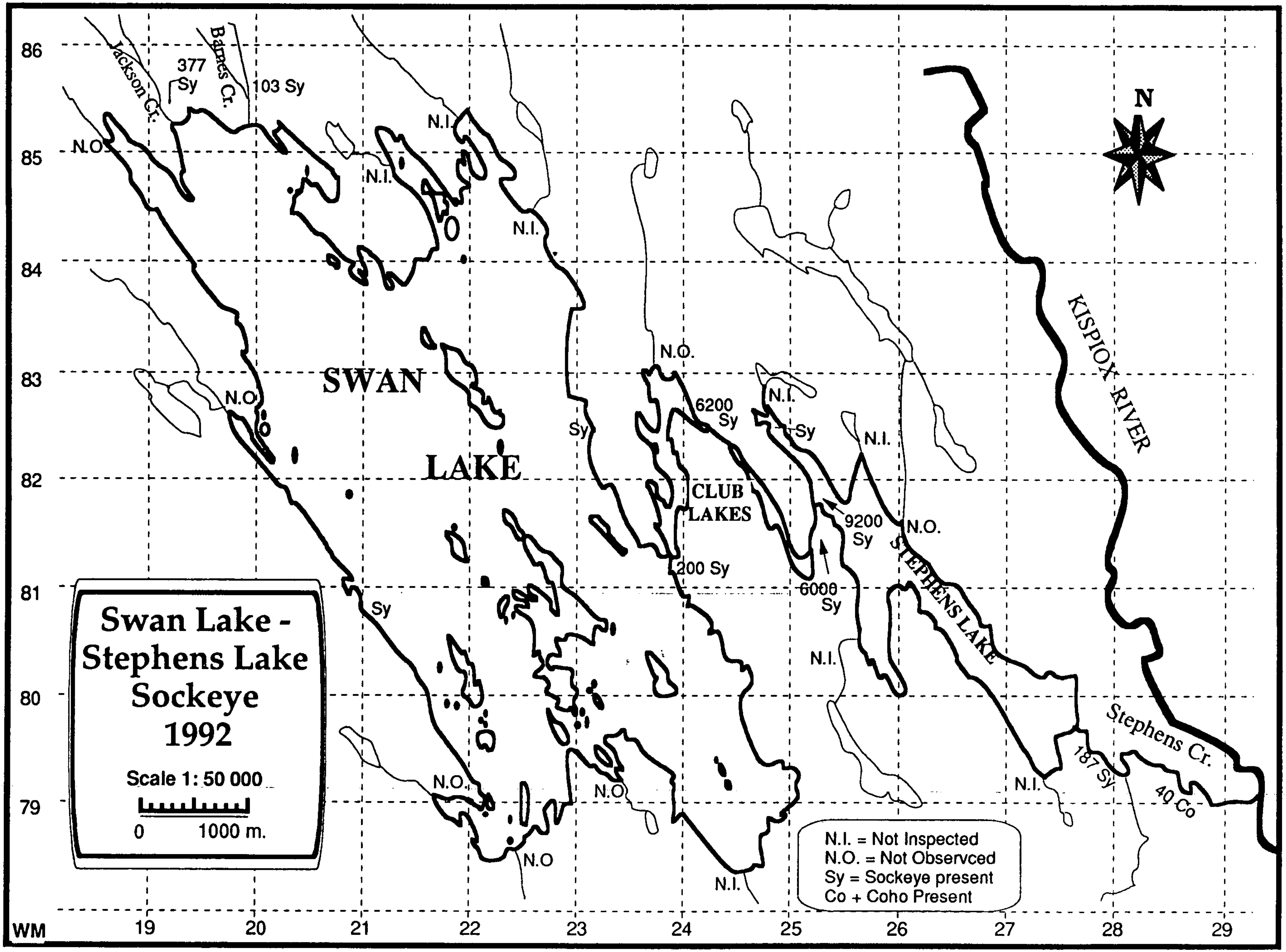
Approximately 200 meters of Jackson Creek was observed and within this section of the creek 377 sockeye were counted; 150 meters of Barnes Creek was observed with a count of 103 sockeye. These numbers do not represent a total escapement or calculation of total spawning habitat available within Jackson and Barnes Creeks, although these sockeye counts were used to estimate the total escapement of the Swan and Stephens Lakes watershed. The water in both creeks was slightly brown in appearance, perhaps from swamp influences further upstream as indicated on the 1:50 000 topographic map. The streams meandered and had areas of divided channel. The gravel was fairly uniform in both creeks ranging from 2 - 10 centimetres. The narrow creeks had abundant crown cover and instream cover. Beaver dams and side channels were present in both streams. Heavy bear predation was evident in both streams which caused a small area to be sampled.

Club Creek connects a series of small lakes which connect Swan lake to Stephens Lake. It was broken down into four reaches for the purpose of identifying individual spawning areas within the Club Lakes system (Figure 2). Reach 1, the most downstream, is located at the outlet of Lower Club Creek, including the lake spawning area in Stephens Lake, and extends upstream about 200 meters. Reach 1 and 2 are separated by a pond at the top of Reach 1. Reach 2 extends from this pond to the outlet of Lower Club Lake, about 200 meters. Reach 3 is located between Lower Club Lake and Upper Club Lake, and is about 300 meters long. Reach 4 is extends from Upper Club Lake to Swan Lake. Reach 4 also includes the lake spawning habitat at the outlet of Swan Lake. It is about 75 meters in length.

Reach 1 and 2 had the most concentrated spawning populations in the 1992 study area. These two reaches have sockeye spawning gravels 2 - 10 centimetre in diameter, with some larger rocks.

Reach 1 of Club Creek had an estimated sockeye count of 9200 including an estimate of the lake spawners at the outlet of Club Creek. Reach 2 had an estimated count of 6 000 sockeye.

Reach 3 had an estimated count of 6 200 sockeye, the bed of the stream consisted mainly of rocks from 15 - 30 centimetres, with some smaller gravel between the larger rocks. This spawning habitat did not seem to be typical when compared to spawning habitat of other sockeye spawning areas.



Swan Lake - Stephens Lake Sockeye 1992
Scale 1: 50 000
0
1000 m.
N.I. = Not Inspected
N.O. = Not Observced
Sy = Sockeye present
Co + Coho Present
SWAN
LAKE
CLUB
LAKES
STEPHENS LAKE
KISPIOX RIVER
Stephens Cr.
Jackson Cr.
Barnes Cr.
377
Sy
103 Sy
6200
Sy
9200
Sy
6000
Sy
200 Sy
187 Sy
40 Co
N
WM
86
85
84
83
82
81
80
79
19
20
21
22
23
24
25
26
27
28
29

Reach 3 had an estimated count of 6 200 sockeye, the bed of the stream consisted mainly of rocks from 15 - 30 centimetres, with some smaller gravel between the larger rocks. This spawning habitat did not seem to be typical when compared to spawning habitat of other sockeye spawning areas.

Reach 4 had an estimated count of 200 sockeye, this count includes the sockeye that were spawning in Swan Lake outlet. The bedload in this reach was similar to that of Reach 3 with the average of the rocks being 15 - 30 centimetres.

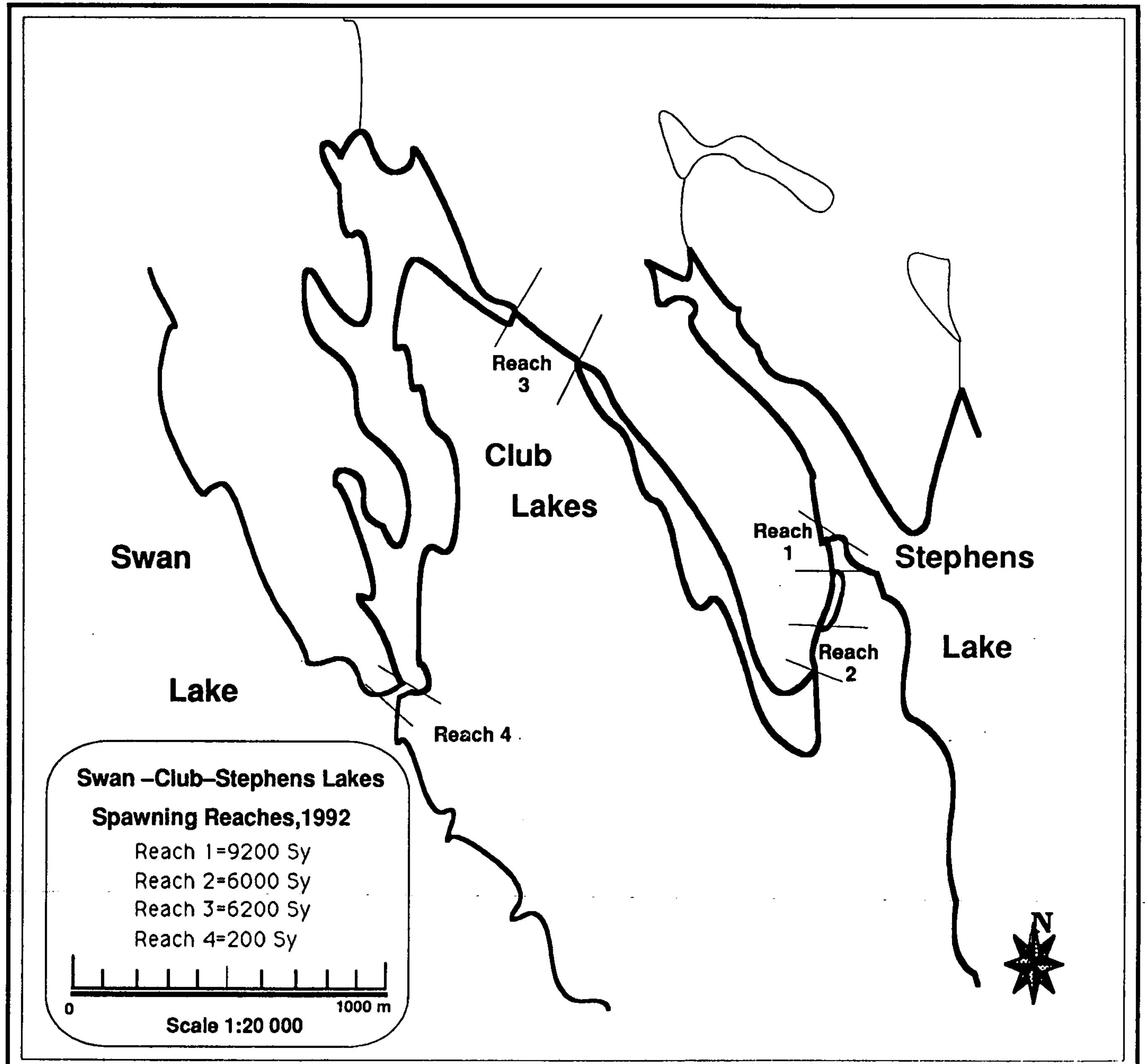
Stephens Creek is about three kilometres in length and joins Stephens Lake to the Kispiox River system.

Stephens Creek had an estimated count of 187 sockeye and 40 coho. Evidence of large redds throughout Stephens Creek indicate that there is a significant chinook escapement to the Swan and Stephens Lakes watershed. The creek has good spawning habitat, with back and side channels, instream and crown cover, and a uniform bedload ranging from 2 - 30 centimetres. fine sediments were present in the upper portion of Stephens Creek with scattered sockeye redds.

Sockeye and coho were observed migrating through Swan and Stephens Lakes, these observations are noted on the topographic maps.

The total estimated escapement for the Swan and Stephens Lakes watershed for 1992 is 22 270 sockeye and 100 coho as of September 24, 1992. This estimate is considered conservative because some of the tributaries were not inspected and Jackson and Barnes Creek were not fully inspected.

Although there was a significant number of returning sockeye in 1992, no tags were seen or recovered in this watershed.



Swan
Lake
Club
Lakes
Stephens
Lake
Reach 1
Reach 2
Reach 3
Reach 4
N
Swan –Club–Stephens Lakes
Spawning Reaches,1992
Reach 1=9200 Sy
Reach 2=6000 Sy
Reach 3=6200 Sy
Reach 4=200 Sy
0
1000 m
Scale 1:20 000

Conclusions:

Our three day survey identified two new spawning areas. There is heavy grizzly bear and eagle utilisation of this area.

Sockeye utilise gravels of a wide range of size (up to 30 cm) use areas with fine fine sediment overlying gravel and spawn in Lake and pond habitat.

DFO air surveys estimated a sockeye escapement of 10 000. Our incomplete ground survey estimates 22 000. In this region of narrow spawning tributaries ground survey is superior.

Based on the condition of the sockeye spawners throughout the Swan and Stephens Lakes watershed the GWWA crew arrived on the spawning grounds near the end of the sockeye spawning cycle. The sockeye seemed to be protecting their redds and the females sampled appeared to have already spawned.

Recommendations:

Stock and habitat assessment studies should be continued in 1993.

The remaining minor stream tributaries need to be inspected.

More thorough habitat studies on Barnes & Jackson Creeks should be performed.

More time should be spent next year on ground surveys.

Sockeye studies in this watershed should begin in late August and continue to late September.

Egg survival should be investigated in the unusual spawning areas of coarse cobbles and areas with fine sediment cover over the gravel.

Gitksan - Wet'suwet'en Watershed Authorities

Gitksan-Wet’suwet’en Fisheries Data Report 1992

February 1993

The 1992 Gitksan Wet'suwet'en Fisheries Data Report

By : Allen S. Gottesfeld

Introduction

The Gitksan territories are in the Skeena River and its tributaries with areas extending into the upper Nass River drainage. The Wet'suwet'en territories include the drainage of the Bulkley River, a major tributary of the Skeena River which joins at Hazelton. The Wet'suwet'en area extends into the drainage of the upper Nechako River.

This report is prepared as part of the activities funded by a 1992 pilot aboriginal fisheries agreement between the Skeena River Watershed Authority and the Department of Fisheries and Oceans. The report describes fishing activities and aboriginal harvest levels within the Gitksan and Wet'suwet'en territories of the Skeena River Drainage.

Traditional Gitksan and Wet'suwet'en fishing technology relied heavily on weirs and traps (Morrell 1985). In the late nineteenth century gillnets were introduced. Their use was enforced by federal Fisheries officers in 1904 to 1906. Recent fishing in the Skeena River has relied heavily on gillnets. In the Bulkley River, gaffs, dipnets, and jigs provide the bulk of the catch to native fishers.

Mixed stock fisheries in the coastal region and in river has depleted all but a few fish stocks of the Skeena system. It appears likely that a return to selective fishing technology will have beneficial effects on reduced fish stocks. The Gitksan Wet'suwet'en Watershed Authority is attempting to reintroduce selective fishing technology to the Skeena River watershed. In 1992 the first commercial sales took place of selectively fished salmon from the Skeena and Bulkley Rivers.

The Gitksan and Wet'suwet'en Fishery

The Gitksan and Wet'suwet'en Fishery is divided into several components for analysis. The components are:

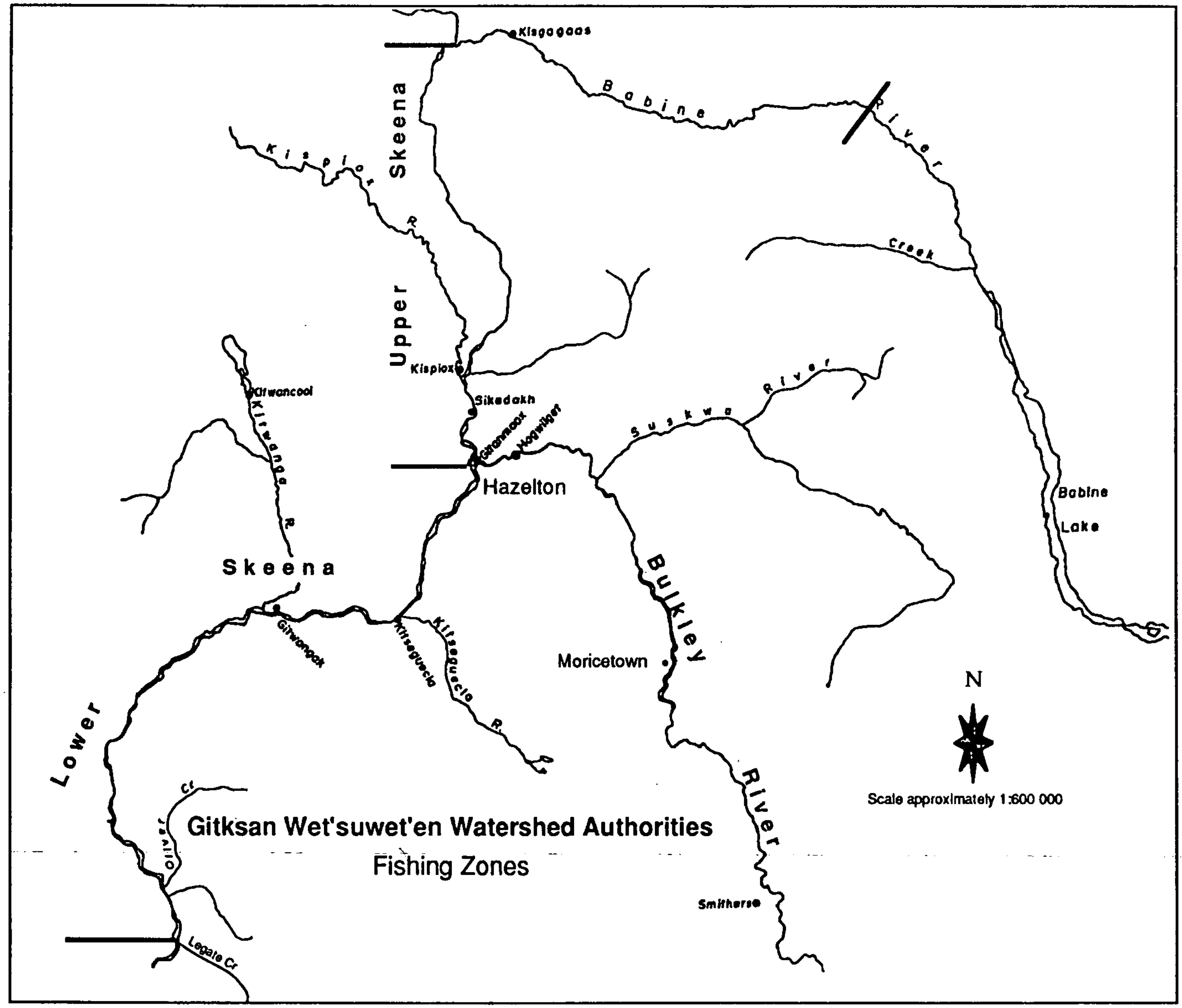
- Lower Skeena Fishery
  - gillnet and selective gear
- Upper Skeena fishery
  - gillnet and selective gear
- Moricetown Fishery
  - gaff, and jig
- Gisgagaas
  - gillnet and selective gear
- Minor fisheries
  - Lower Skeena Drift net fishery
  - Upper Skeena Drift net fishery
  - Bulkley River Gillnet fishery

The division of the Skeena River and Bulkley River into fishing zones is shown in Figure 1.

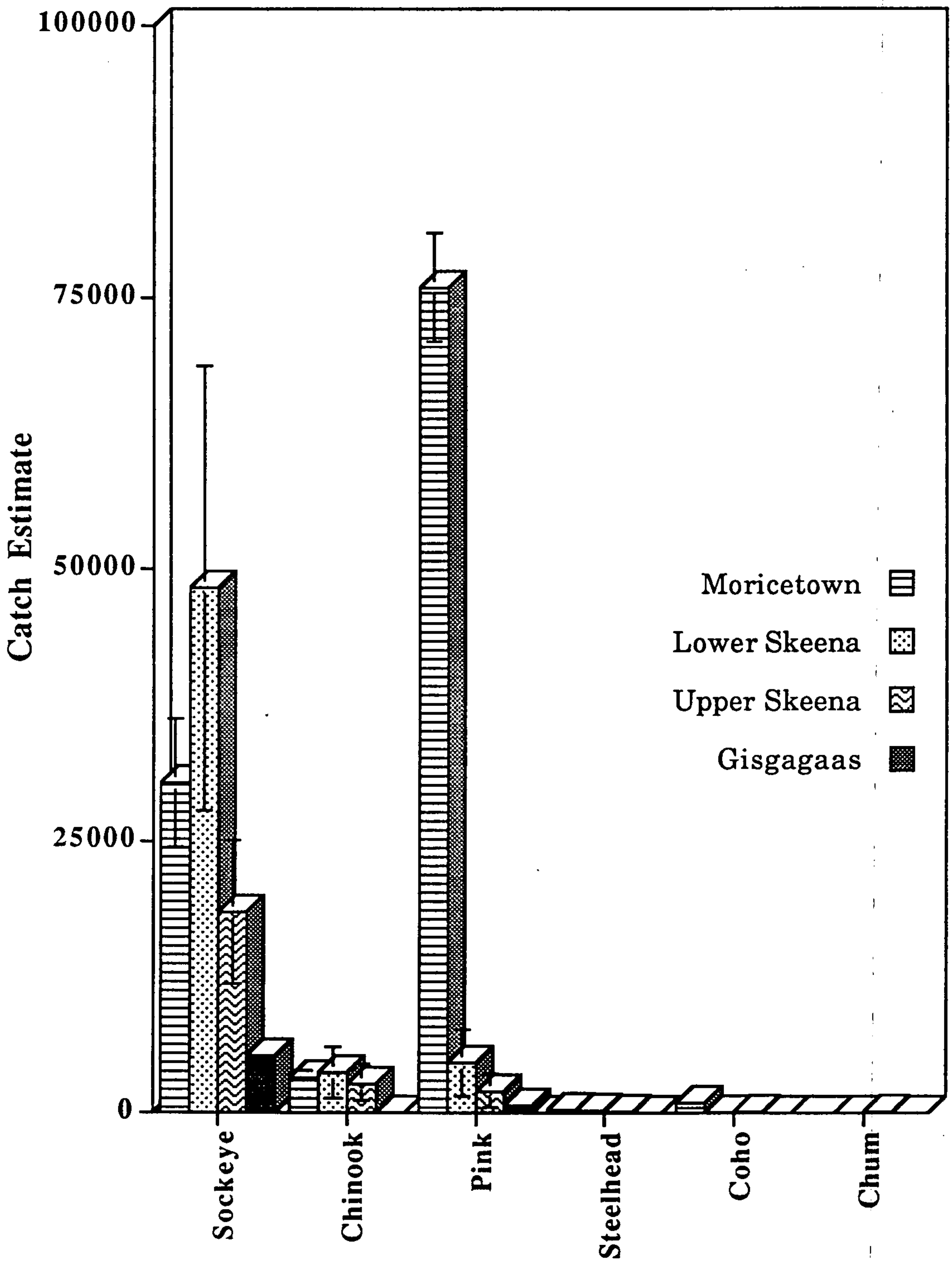
The 1992 annual catches for the four major fisheries are shown in Figure 2. The Lower and Upper Skeena fisheries are similar in their reliance on gillnets with minor use of selective fishing gear. The techniques of sampling these fisheries will be discussed together, but the data are separated to permit comparison with the fisheries of 1982 and 1985.

The Skeena Gillnet Fishery

The Skeena gillnet fisheries of the Upper and Lower Skeena are two of the three large aboriginal fisheries within the study area. The extent of the fishery is estimated by determining the number of sets and the catch per unit effort (CPUE). The procedure followed is that of Morrell 1985, which records the 1982 fishery, and Morrell, Barnes, and Harris 1985, which deals with the 1985 fishery. Morrell 1985 discusses the theory and strategy for sampling the Skeena Gillnet fisheries. We decided to use this technique to ensure comparability with the earlier studies. The explicit assumptions of this technique permit assigning confidence limits to catch estimates and represent a significant improvement over earlier techniques of aboriginal fisheries harvest monitoring.


Gitksan Wet'suwet'en Watershed Authorities
Fishing Zones
Upper Skeena
Lower Skeena
Skeena
Kisgagaas
Babine River
Creek
Kispiox R.
Kispiox
Sikedakh
Hagwilget
Hazelton
Suskwa River
Babine Lake
Kitwanga R.
Gitwancool
Gitwangak
Kitsegucla
Kitsegucla R.
Bulkley River
Moricetown
Smithers
Oliver Cr
Legate Cr
N
Scale approximately 1:600 000

SKEENA RIVER TOTAL CATCH 1992



Data on the Skeena River fishery was analyzed by dividing the fishing season into statistical weeks. Each statistical week starts on a Monday and ends on a Sunday. The dates corresponding to these statistical weeks are given on Figure 3.

Statistical Week	1992 Dates
14	July 6-12
15	July 13-19
16	July 20-26
17	July 27-August 2
18	August 3-9
19	August 10-16
20	August 17-23
21	August 24-30
22	August 31-September 6

Figure 3. Statistical Weeks in 1982

A gillnet set is used as the unit of fishing effort. A set is defined as a period in excess of two hours during which a net is fishing. The number of sets is determined by twice weekly river boat surveys supplemented by interviews with fishermen, by direct samples taken by technicians, and by land based observation. GWWA technicians are familiar with all of the gillnet sites and know the fishers using them in almost all cases. This results in accurate effort estimates from riverboat surveys. In many cases interview data provides information on the number of sets per day. Logbooks maintained by some fishermen also provide estimates of the number of sets per day.

The uncertainty in the number of sets per day and number of days per week is assigned its high limit by assuming that nets are fished continuously between observations of days in which the net is fishing and for all days between observations of the day the net is fishing and the day that it is not fishing. If the pattern of net use and knowledge of the fishers habits suggests a short overall period of fishing then intervals before the first observation and after the last observation are assigned as not fishing.

The uncertainty in fishing effort is assigned a low limit by assuming that nets are fished continuously between observations of days in which the net is fishing and not fished all days between observations of the day the net is fishing and the day that it is not fishing. One set per day was assigned where there are no data on number of sets per day.

The number of sets per day is assumed to be one or two and is assigned on the basis of data collected either as interviews, log books or direct observation. Where there is no basis for assigning a number of sets the number used for the high estimate is two sets per day. In a few cases three or four sets per day were used as high estimates.

Estimates of the fishing effort were made for each week of the fishery. The best estimate of fishing effort used was the weekly median of the high estimate and the low estimate.

Table 1 shows the estimates of the number of sets and the sampling rate based on the best estimate of the number of sets.

SKEENA RIVER SET NET EFFORT SURVEY

LOWER SKEENA — TOTAL SETS

WEEK	BEST ESTM	LO ESTM	HI ESTM
13	23	1	45
14	178.5	58	299
15	194.5	120	269
16	207.5	131	284
17	280.5	148	413
18	367	176	558
19	101.5	49	154
20	9	6	12
Total	1361.5	689	2034

UPPER SKEENA — TOTAL SETS

WEEK	BEST ESTM	LO ESTM	HI ESTM
13	6.5	0	13
14	54	18	90
15	151	109	193
16	193.5	120	267
17	187.5	132	243
18	182	126	238
19	120.5	97	144
20	0	0	0
Total	895	602	1188

Sampling rate	
Lower Skeena sets	18.73%
Upper Skeena sets	11.17%

Table 1. Skeena River gillnet sets.

The catch per unit effort is estimated on the basis of logbook entries of cooperating fishers, direct counts taken during observation of the river fishery and interviews with fishers about the days catch. Logbook records comprise most of the samples. Estimates of the Skeena River set net fishery are based on data from 255 sets for the Lower Skeena and 100 sets for the Upper Skeena. The sampling rate of sets was 19% for the lower Skeena and 11% for the Upper Skeena gillnet fisheries. These data are analyzed assuming random distribution to calculate a mean and standard error.

Catch per unit effort data for the Upper Skeena and Lower Skeena gillnet fishery are presented as Tables 2 and 3.

The best estimate of the catch level is calculated by multiplying the best estimate of effort times the mean catch per unit effort. Confidence limits on catch estimates were assigned by assigning errors around the best estimate based on either: the assumption of good catch per unit effort and variable effort data or good effort data and variable catch per unit effort.

In the first case, the low estimate of the catch is derived by multiplying the low estimate of the fishing effort by the mean of the catch per unit effort. The high estimate is derived by multiplying the high estimate of fishing effort by the mean of the CPUE

In the second case, the low estimate of the catch is derived by multiplying the low estimate of CPUE, which is two standard errors below the mean, by the best estimate of the fishing effort. The high estimate of the catch is derived by multiplying the high estimate of CPUE, which is two standard errors above the mean, by the best estimate of the fishing effort.

These two sets of assumptions provide similar error estimates for the Skeena River gillnet fishery. The season low estimate is calculated by summing the lower value for each week of the two estimates. The season high estimate is calculated by adding up the higher of the two values for each week.

Lower Skeena Set Net CPUE Calcs

Week	N	Sy	SyLo	SyHi	Cn	Jcn	TotCn	CnLo	CnHi	Pk	PkLo	PkHi	Sthd	SthdLo	SthdHi	Co	CoLo	CoHi	Cm	CmLo	CmHi
14	28	6.11	3.38	8.83	8.71	0.96	9.68	6.10	13.26	0.00	0.00	0.00	0.07	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00
15	52	35.13	28.62	41.65	5.81	0.00	5.81	2.63	8.98	0.10	0.00	0.20	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
16	58	41.81	33.79	49.84	1.05	0.15	1.20	0.67	1.74	0.54	0.24	0.85	0.17	0.06	0.28	0.00	0.00	0.00	0.02	0.00	0.05
17	57	32.84	27.77	37.92	0.46	0.18	0.63	0.29	0.98	1.12	0.45	1.80	0.18	0.06	0.29	0.02	0.00	0.05	0.02	0.00	0.05
18	48	35.44	30.34	40.53	0.81	0.17	0.98	0.13	1.83	8.19	2.78	13.60	0.25	0.10	0.40	0.06	0.00	0.13	0.00	0.00	0.00
19	8	50.20	35.12	65.28	0.20	0.10	0.30	0.00	0.82	8.20	0.38	16.02	0.30	0.00	0.64	0.30	0.00	0.78	0.10	0.00	0.32
20	4	29.50	11.94	47.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.75	0.25	0.00	0.75	0.75	0.00	2.25

Total Set Net Catches Sampled =255

Upper Skeena Set Net CPUE Calcs

Week	N	Sy	SyLo	SyHi	Cn	Jcn	TotCn	CnLo	CnHi	Pk	PkLo	PkHi	Sthd	SthdLo	SthdHi	Co	CoLo	CoHi	Cm	CmLo	CmHi
14	4	2.75	0.25	5.25	0.75	0.00	0.75	0.00	1.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	21	21.43	9.59	33.27	5.57	0.67	6.24	3.85	8.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	21	21.52	16.11	26.94	3.05	0.81	3.86	1.84	5.87	0.14	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	18	20.39	16.09	24.69	1.56	0.28	1.83	0.66	3.01	2.00	0.83	3.17	0.11	0.00	0.26	0.11	0.00	0.33	0.00	0.00	0.00
18	27	21.56	15.93	27.18	2.89	0.19	3.07	0.59	5.55	4.33	1.85	6.82	0.44	0.20	0.69	0.11	0.00	0.23	0.22	0.00	0.47
19	9	24.00	17.43	30.57	0.11	0.00	0.11	0.00	3.30	6.33	0.00	14.04	0.11	0.00	0.33	0.44	0.00	1.03	0.67	0.00	1.41

Total Set Net Catches Sampled =100

The Skeena River Selective fishery

The Gitksan Wet'suwet'en Watershed Authorities is attempting to reintroduce selective in-river fishing. The objective of this fishery is to target fishing on the enhanced Babine Lake stocks and the rapidly expanding Pink stocks, while passing through other fish which belong to depleted stocks. Coho, steelhead, chinook and other sockeye stocks are in the depleted category.

Selective fishing in the Skeena River is by fish trap and river seine net. Efforts to construct efficient river traps were unsuccessful in 1992. Consequently the relatively small selective catch of sockeye and pinks were from river seine nets. Nearly all of the selective harvest was sold through the Git-Wet Corporation under the terms of the pilot aboriginal fisheries agreement.

Catch statistics are in the following section. There are no confidence limits assigned to the selective fishery, since accurate counts were made of catches and sales.

The Skeena River Drift Net Fishery

A small fishery using drifting gillnets took place on the Skeena River. We collected catch data for a portion of this fishery (60 samples) but do not have data in a form permitting estimating the CPUE. It is likely that the Lower Skeena drift net fishery caught several thousand salmon this year and involved less than 10 fishermen. We expect to improve this part of the harvest monitoring in 1993.

Only a single drift net was fished in the Upper Skeena. We obtained data on 4 catches of this very small fishery. The total catch is probably less than one thousand fish.

The Gisgagaas Fishery

The Gisgagaas fishery is on the lower part of the Babine River on the Kisgegas Reserve. Most of the fishery at Gisgagaas was a selective fishery harvested by dipnet. The dipnet fishery was targeted to catching Babine Lake Sockeye and upper Babine River pinks. Fish caught in this dipnet fishery were sold as part of the pilot aboriginal fisheries agreement.

Only a single gillnet was fished for three weeks. The catch statistics which follow include the total catch by both methods. There are no confidence limits assigned to the Gisgagaas fishery, since accurate counts were made of the selective fishery which is nearly all of the fishing effort.

The Skeena River 1992 Catch

In the tables of Skeena River catch estimates (Tables 4 and 5) the gillnet fishery and the selective fishery catches are presented together. The bulk of the catch is by gillnet and all of the error in catch is from sampling the gillnet fishery The first column of estimates of high and low catches includes the gillnet catch calculated with the first set of assumptions described in the Skeena Gillnet Fishery section. The second estimate includes the gillnet fishery calculated according to the second set of assumptions described. The weekly estimate used for calculating the seasonal low or high estimate is shown bold-faced.

Total catch estimates for 1992 Skeena River Fisheries are shown in Table 3. These numbers are the sum of the gillnet fishery and the selective fishery. Totals of the selective fishery alone are given in Table 7. Graphs of weekly catches by species for the Lower Skeena and the Upper Skeena follow.

1992 Total Gitksan Skeena River Catch

	LOWER SKEENA	UPPER SKEENA	GISGAGAAS
Sockeye Estm	**48267**	**18430**	**5223**
Sy Lo Estm	27870	11795	2
Sy Hi Estm	68663	25065	700
Chinook Estm	**3674**	**2645**	**7**
Cn Lo Estm	1339	1170	2
Cn Hi Estm	6031	4503	
Pink Estm	**4588**	**1995**	
Pk Lo Estm	1537	384	
Pk Hi Estm	7640	4549	
Steelhead Estm	**225**	**115**	
Sthd Lo Estm	66	36	
Sthd Hi Estm	408	215	
Coho Estm	**61**	**95**	
Co Lo Estm	0	0	
Co Hi Estm	149	230	
Chum Estm	**25**	**121**	
Cm Lo Estm	0	0	
Cm Hi Estm	79	255	

Table 3. 1992 catch summary data for the Skeena River fisheries.

TABLE 4. 1992 SKEENA RIVER CATCH ESTIMATES

LOWER SKEENA	Week	Sy Estm	Sy LoEstm1	Sy LoEstm2	Sy HiEstm1	Sy HiEstm2	Cn Estm	Cn LoEstm1	Cn LoEstm2	Cn HiEstm1	Cn HiEstm2
	14	1090	354	603	1826	1577	1728	561	1089	2894	2367
	15	6834	4216	5566	9451	8101	1130	697	512	1562	1747
	16	8676	5478	7012	11875	10341	250	158	139	342	361
	17	9990	5639	8567	14342	11413	177	93	80	261	274
	18	13513	6744	11643	20281	15382	359	172	47	546	672
	19	6557	3922	5027	9193	8088	30	15	0	46	83
	20	1607	1518	1448	1695	1765	0	0	0	0	0
Totals		48267	27870	39866	68663	56667	3674	1696	1866	5651	5504

LOWER SKEENA	Week	Pk Estm	Pk LoEstm1	Pk LoEstm2	Pk HiEstm1	Pk HiEstm2	Sthd Estm	Sthd LoEstm1	Sthd LoEstm2	Sthd HiEstm1	Sthd HiEstm2
	14	0	0	0	0	0	13	0	0	21	38
	15	19	12	0	26	38	4	0	0	5	11
	16	113	71	49	154	176	35	22	12	48	58
	17	315	166	125	464	505	49	26	17	72	81
	18	3005	1441	1020	4569	4990	92	44	36	140	147
	19	832	402	38	1263	1626	30	15	0	46	65
	20	305	305	305	305	305	2	2	0	3	7
Totals		4588	2397	1537	6780	7640	225	108	66	336	408

LOWER SKEENA	Week	Co Estm	Co LoEstm1	Co LoEstm2	Co HiEstm1	Co HiEstm2	Cm Estm	Cm LoEstm1	Cm LoEstm2	Cm HiEstm1	Cm HiEstm2
	14	0	0	0	0	0	0	0	0	0	0
	15	0	0	0	0	0	0	0	0	0	0
	16	0	0	0	0	0	4	2	0	5	11
	17	5	3	0	7	15	5	3	0	7	15
	18	23	11	0	35	49	0	0	0	0	0
	19	30	15	0	46	79	10	5	0	15	33
	20	2	2	0	3	7	7	5	0	9	20
Totals		61	30	0	91	149	25	14	0	36	79

TABLE 5. 1992 SKEENA RIVER CATCH ESTIMATES

UPPER SKEENA	Week	Sy Estm	Sy LoEstm1	Sy LoEstm2	Sy HiEstm1	Sy HiEstm2	Cn Estm	Cn LoEstm1	Cn LoEstm2	Cn HiEstm1	Cn HiEstm2
	14	149	50	14	248	284	41	0	0	68	92
	15	3236	2336	1447	4136	5024	942	680	581	1204	1303
	16	4165	2583	3118	5747	5212	746	463	357	1030	1136
	17	3823	2691	3017	4955	4629	344	242	124	446	564
	18	3923	2716	2899	5130	4948	559	387	108	732	1011
	19	2945	2381	2154	3509	3736	13	0	0	16	398
	20	190	190	190	190	190					
Totals		18430	12946	12838	23914	24022	2645	1772	1170	3494	4503

UPPER SKEENA	Week	Pk Estm	Pk LoEstm1	Pk LoEstm2	Pk HiEstm1	Pk HiEstm2	Sthd Estm	Sthd LoEstm1	Sthd LoEstm2	Sthd HiEstm1	Sthd HiEstm2
	14	0	0	0	0	0	0	0	0	0	0
	15	0	0	0	0	0	0	0	0	0	0
	16	28	17	0	38	68	0	0	0	0	0
	17	375	264	156	486	594	21	15	0	27	49
	18	789	546	336	1031	1241	81	56	36	106	126
	19	763	614	0	912	1691	13	11	0	16	40
	20	41	41	41	41	41					
Totals		1995	1482	533	2508	3635	115	81	36	149	215

UPPER SKEENA	Week	Co Estm	Co LoEstm1	Co LoEstm2	Co HiEstm1	Co HiEstm2	Cm Estm	Cm LoEstm1	Cm LoEstm2	Cm HiEstm1	Cm HiEstm2
	14	0	0	0	0	0	0	0	0	0	0
	15	0	0	0	0	0	0	0	0	0	0
	16	0	0	0	0	0	0	0	0	0	0
	17	21	15	0	27	63	0	0	0	0	0
	18	20	14	0	26	43	40	28	0	53	85
	19	54	43	0	64	124	80	65	0	96	170
	20										
Totals		95	72	0	117	230	121	93	0	149	255

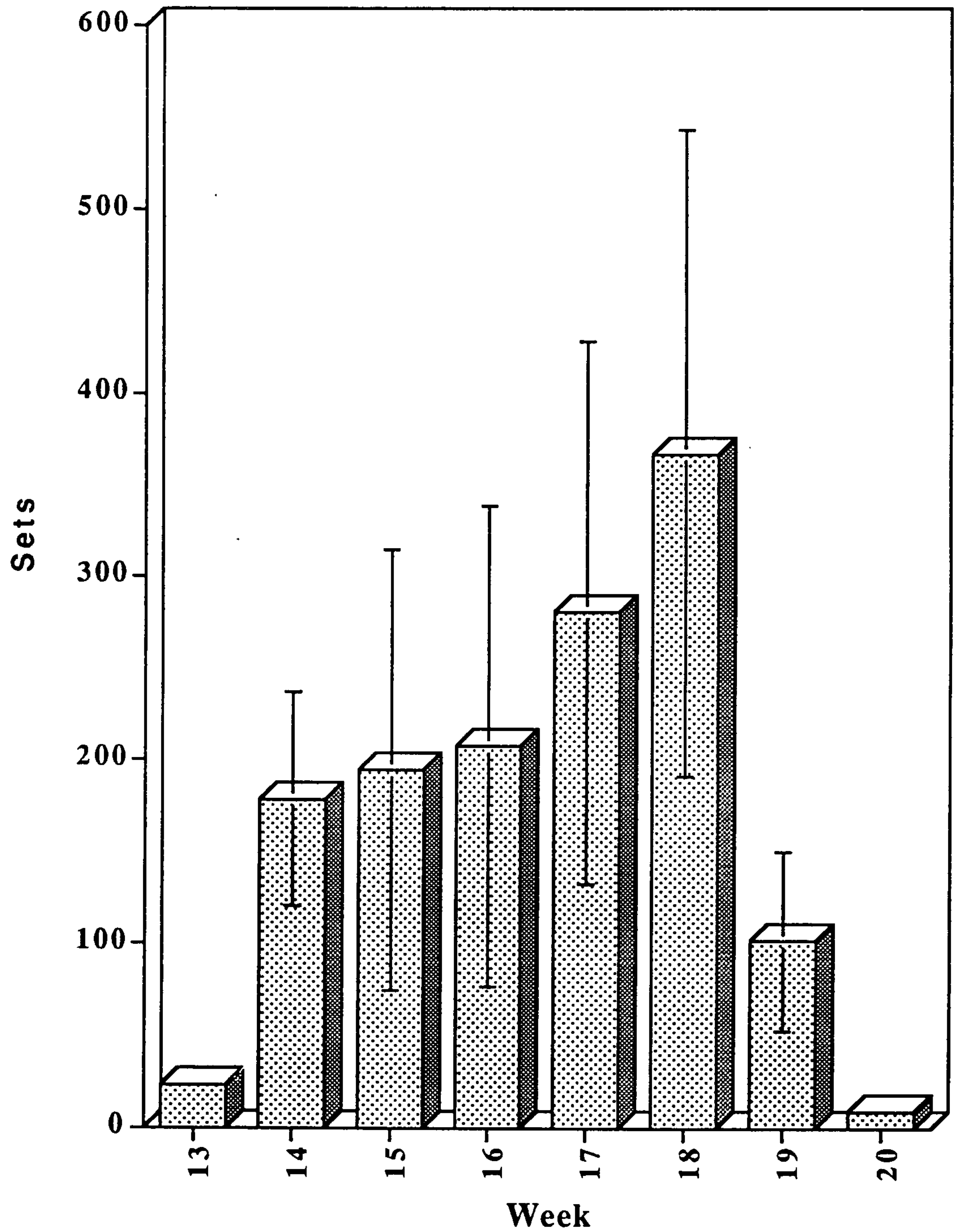
Weekly Live Capture Sockeye Catch			
Week	Lower Skeena	Upper Skeena	Gisgagaas
17	778	0	0
18	507	0	0
19	1462	53	0
20	1341	190	1747
21	0	0	1883
Totals	4088	243	3630

Weekly Live Capture Pink Catch			
Week	Lower Skeena	Upper Skeena	Gisgagaas
20	305	41	690

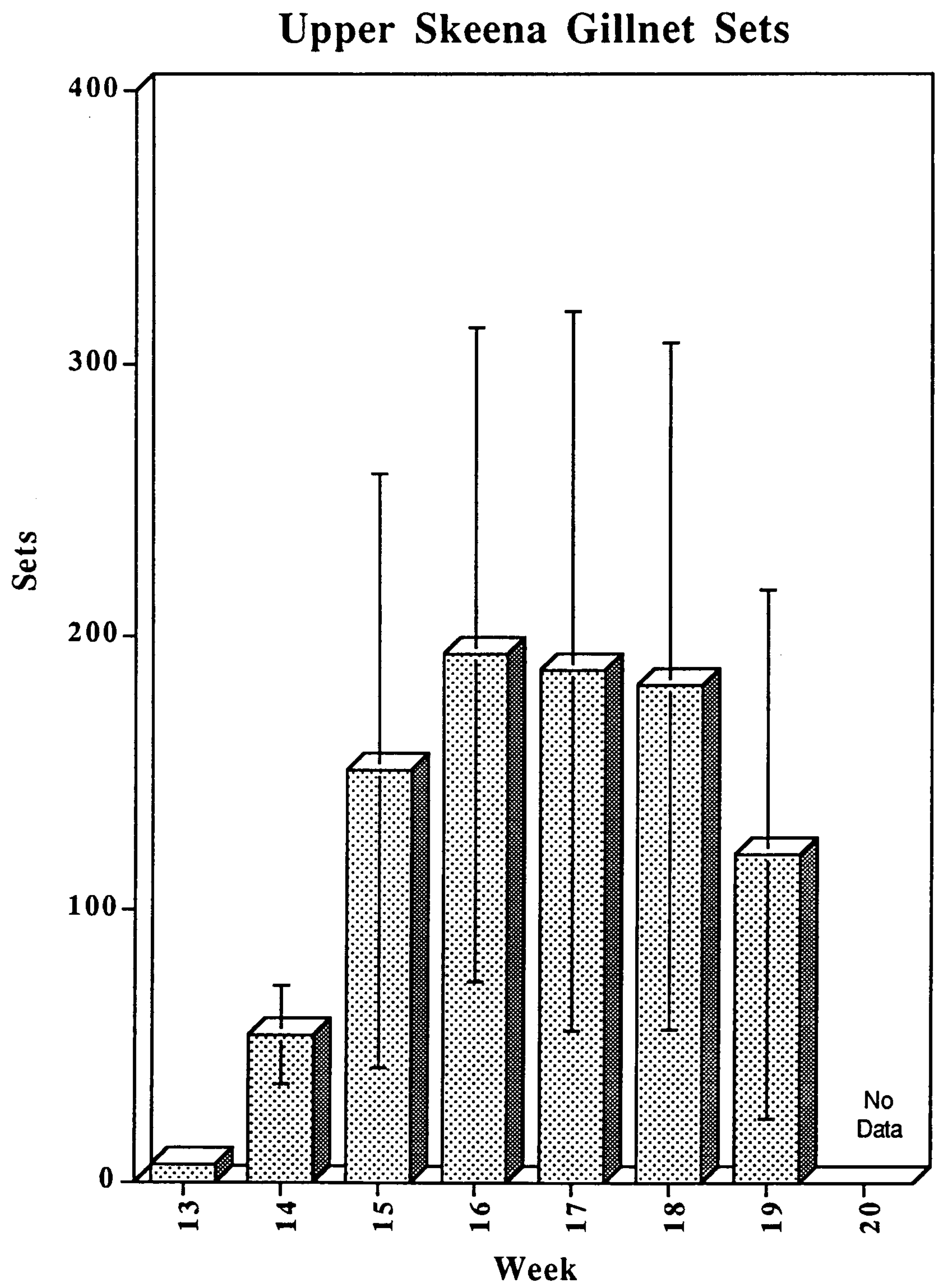
Table 6. 1992 Skeena River selective fishery catch.

TABLE 7. 1992 SKEENA RIVER CATCH ESTIMATES						
Gisgagaas	Week	Sy	Cn	Pk	Sthd	Co
	14					
	15					
	16	99				
	17	72				
	18	394			3	
	19	239	2			
	20	1865		690	4	2
	21	2268		10		
	22	286				
Totals		5223	2	700	7	2

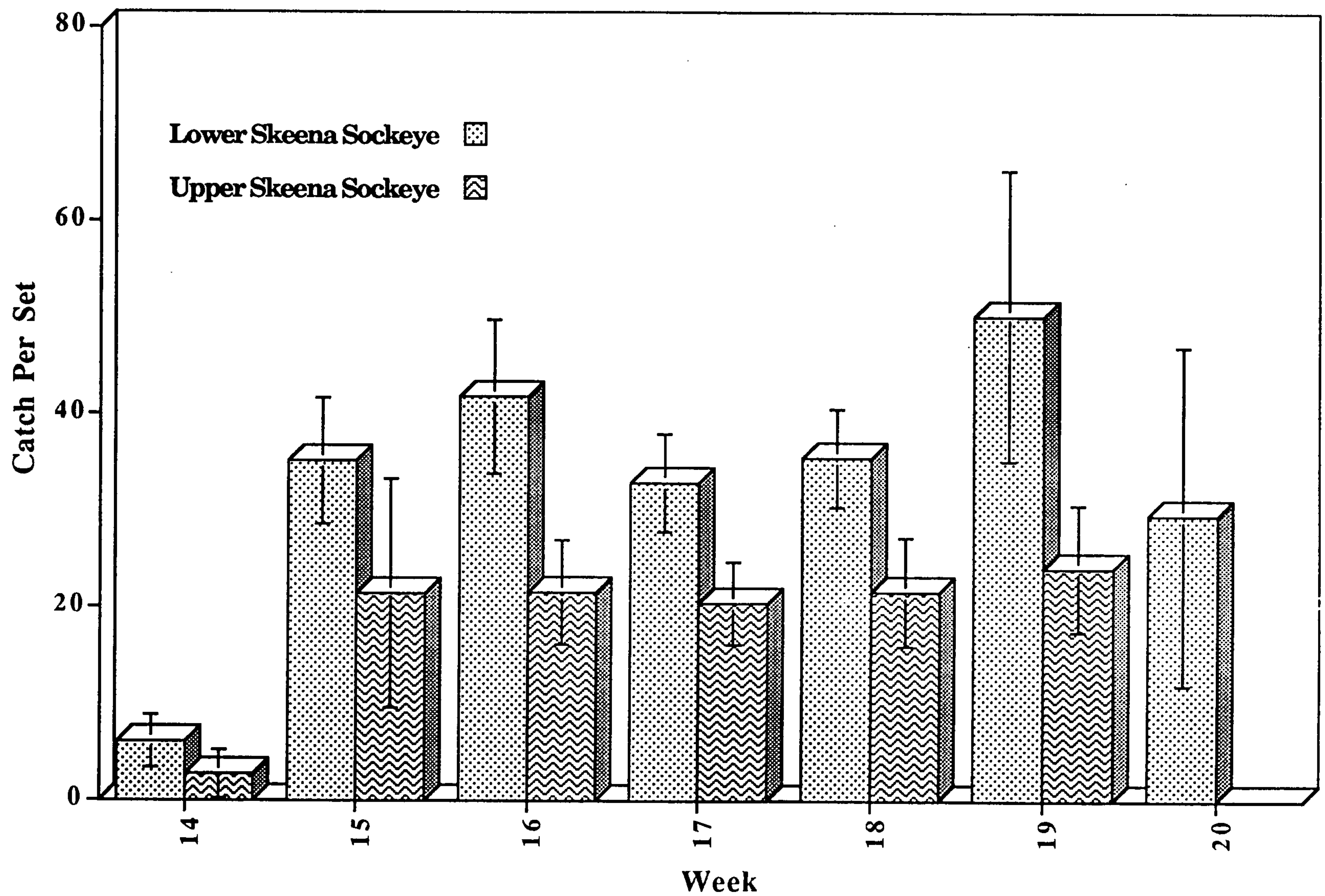
Lower Skeena Gillnet Sets

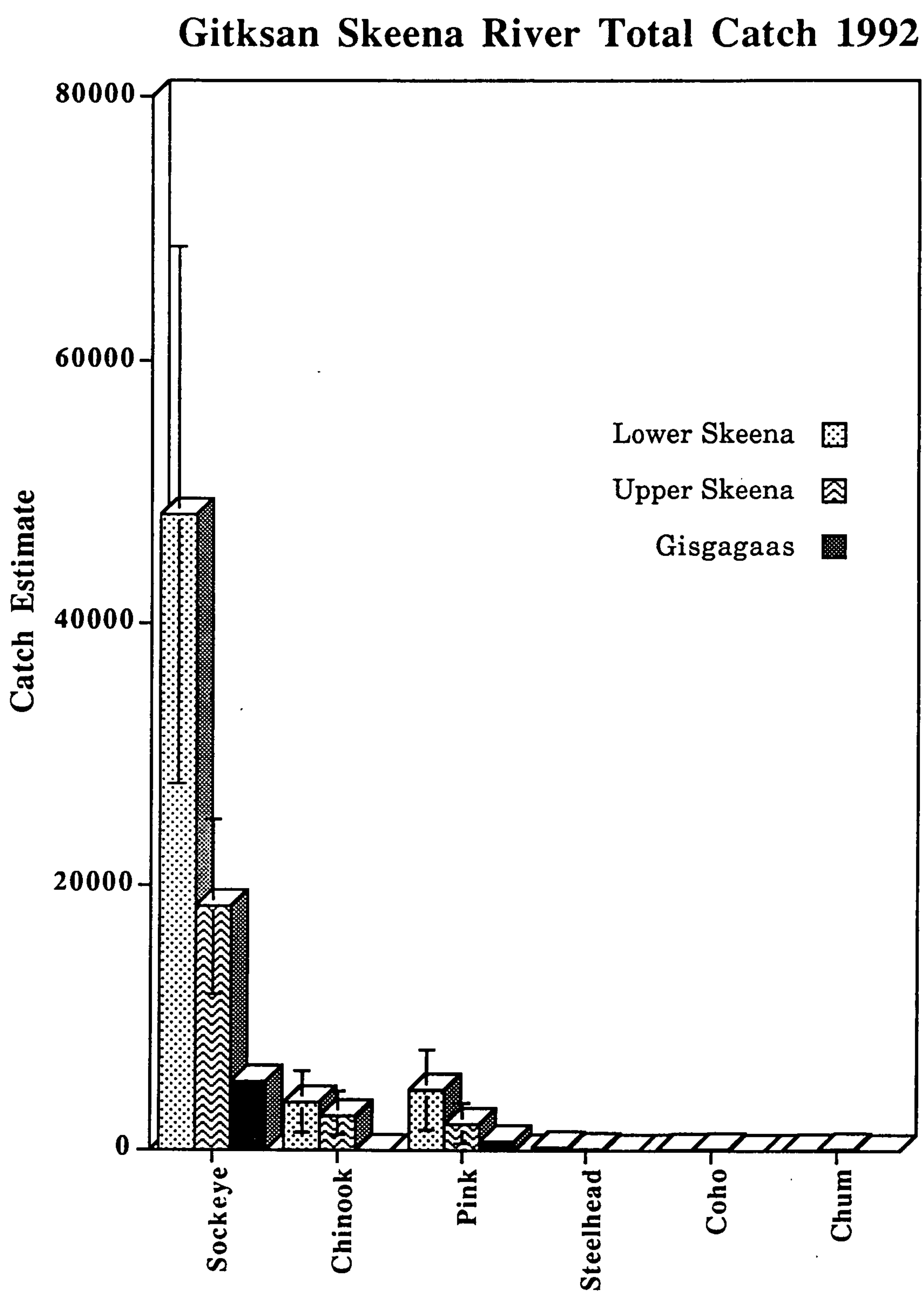


Sets

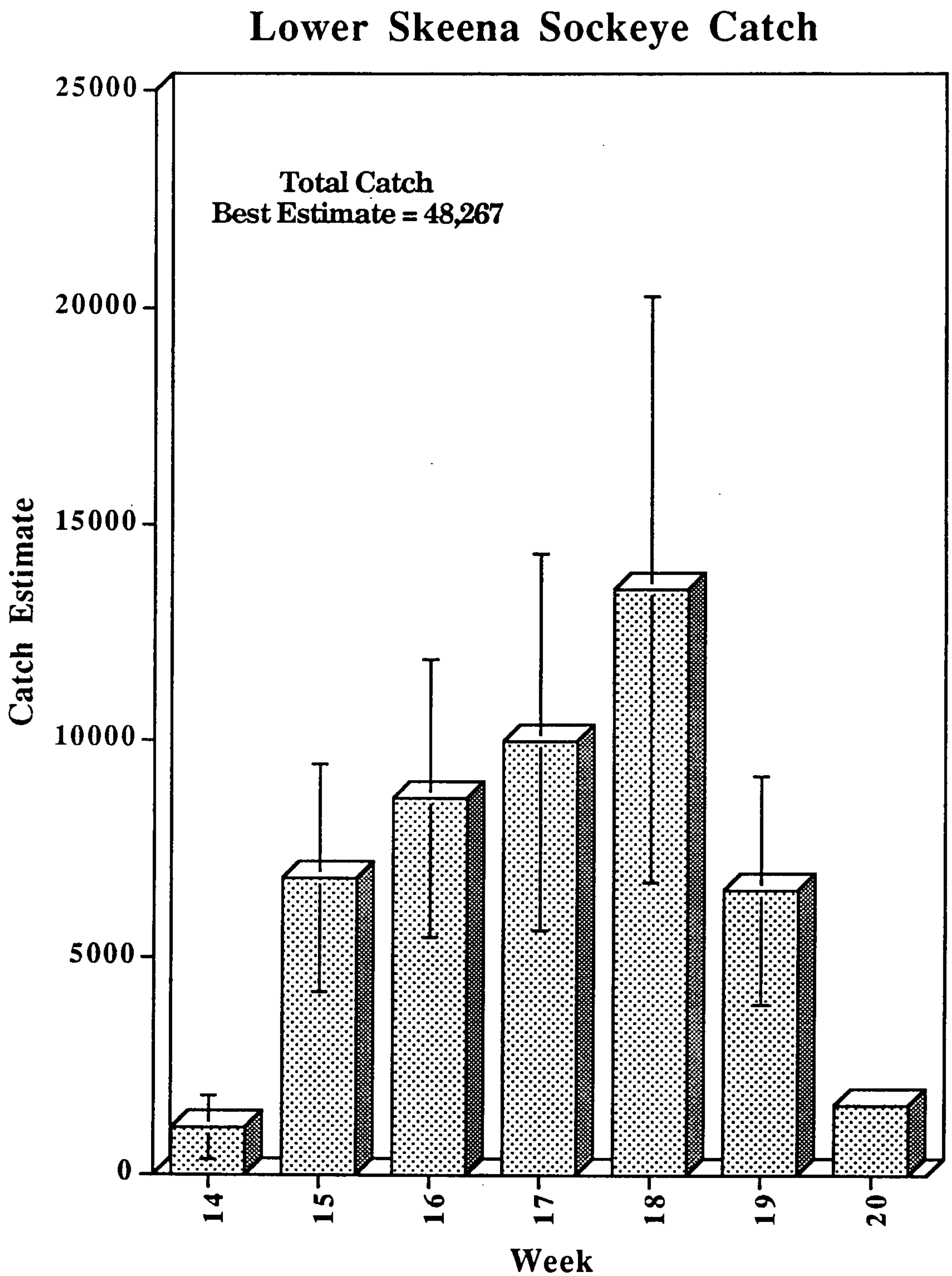

Upper Skeena Gillnet Sets
400
300
200
100
0
Sets
No
Data
13
14
15
16
17
18
19
20
Week

Skeena River Gitksan Fishery
1992 Catch Per Unit Effort

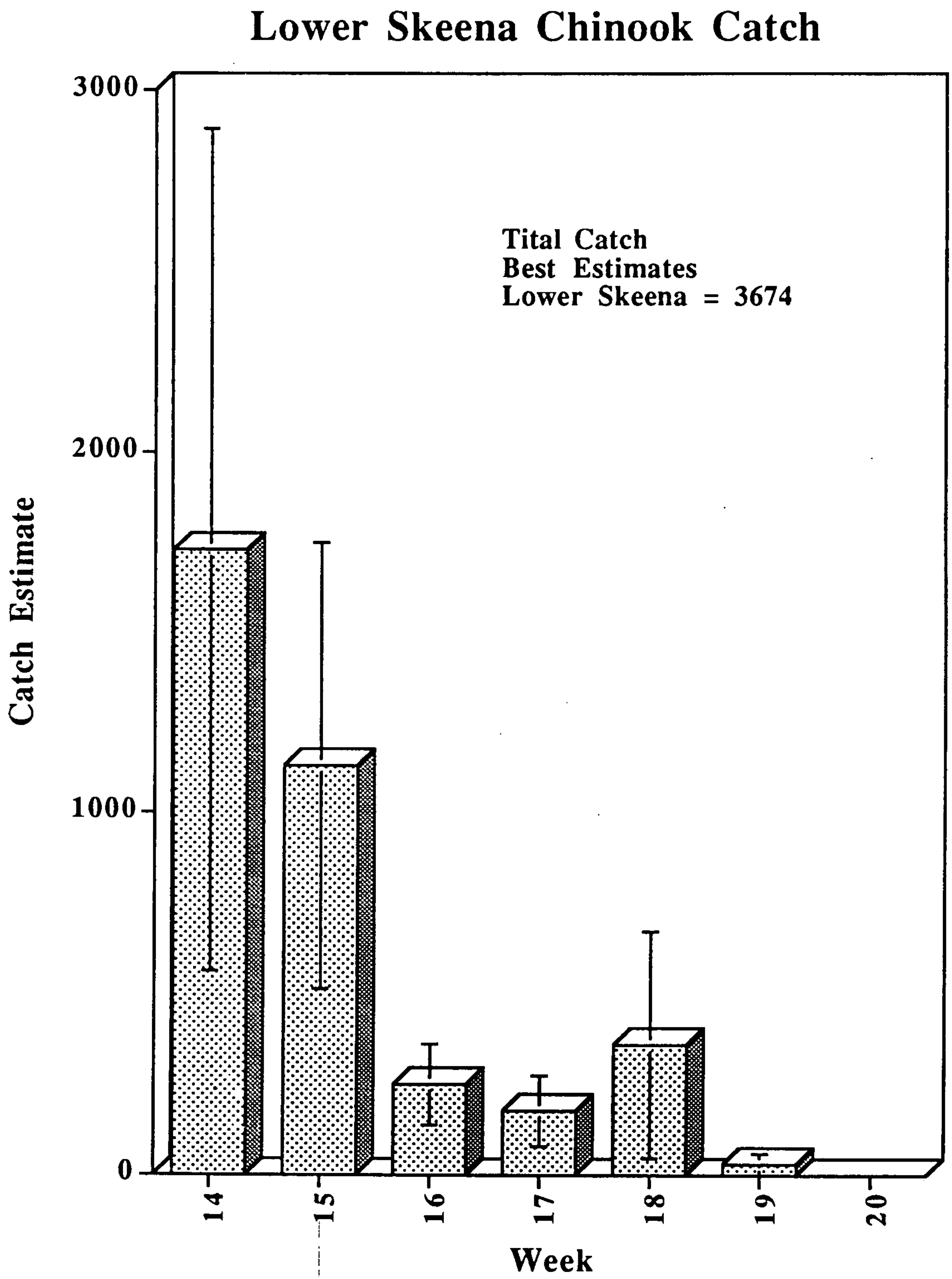




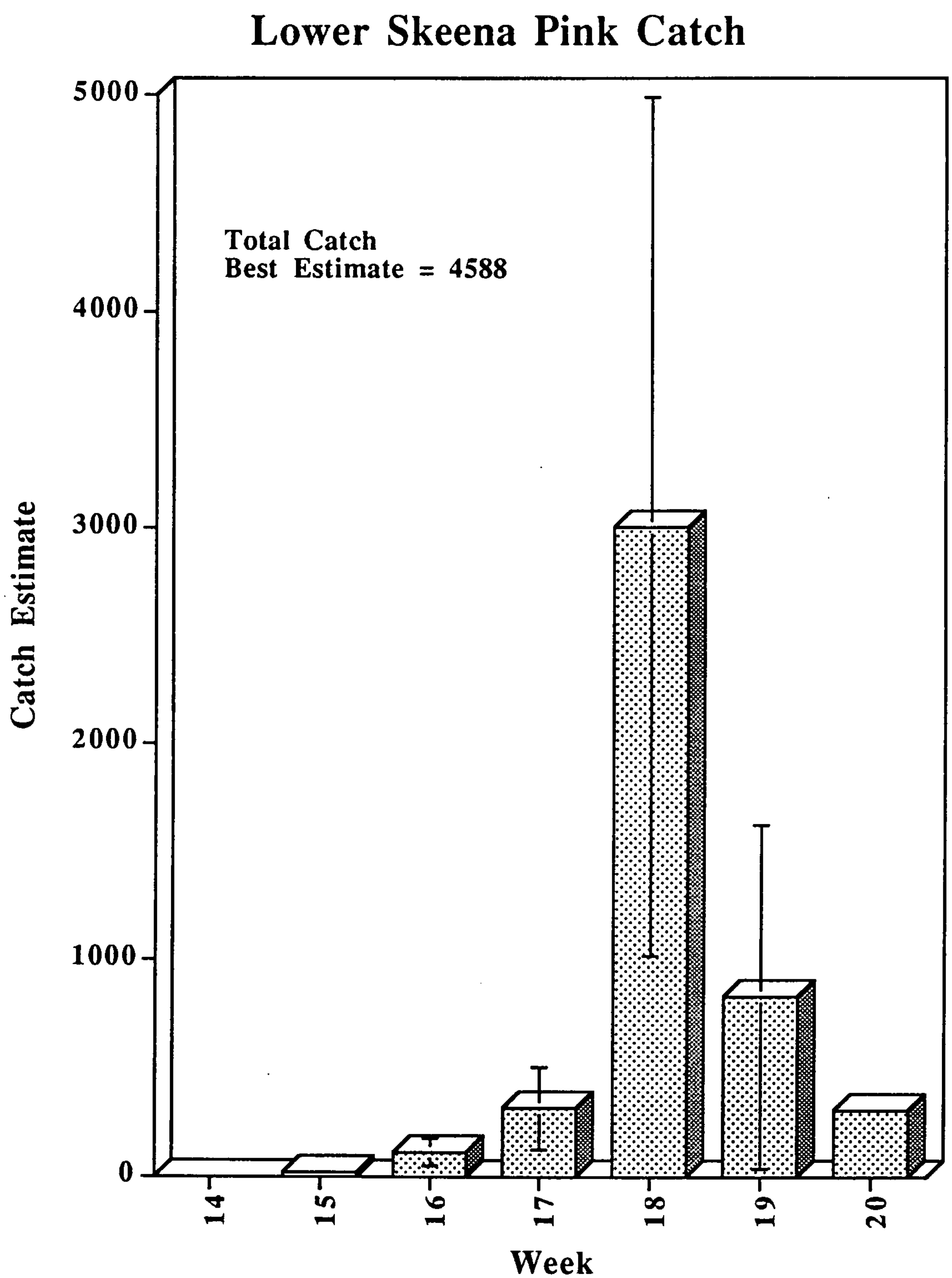
Gitksan Skeena River Total Catch 1992
Catch Estimate
80000
60000
40000
20000
0
Lower Skeena
Upper Skeena
Gisgagaas
Sockeye
Chinook
Pink
Steelhead
Coho
Chum

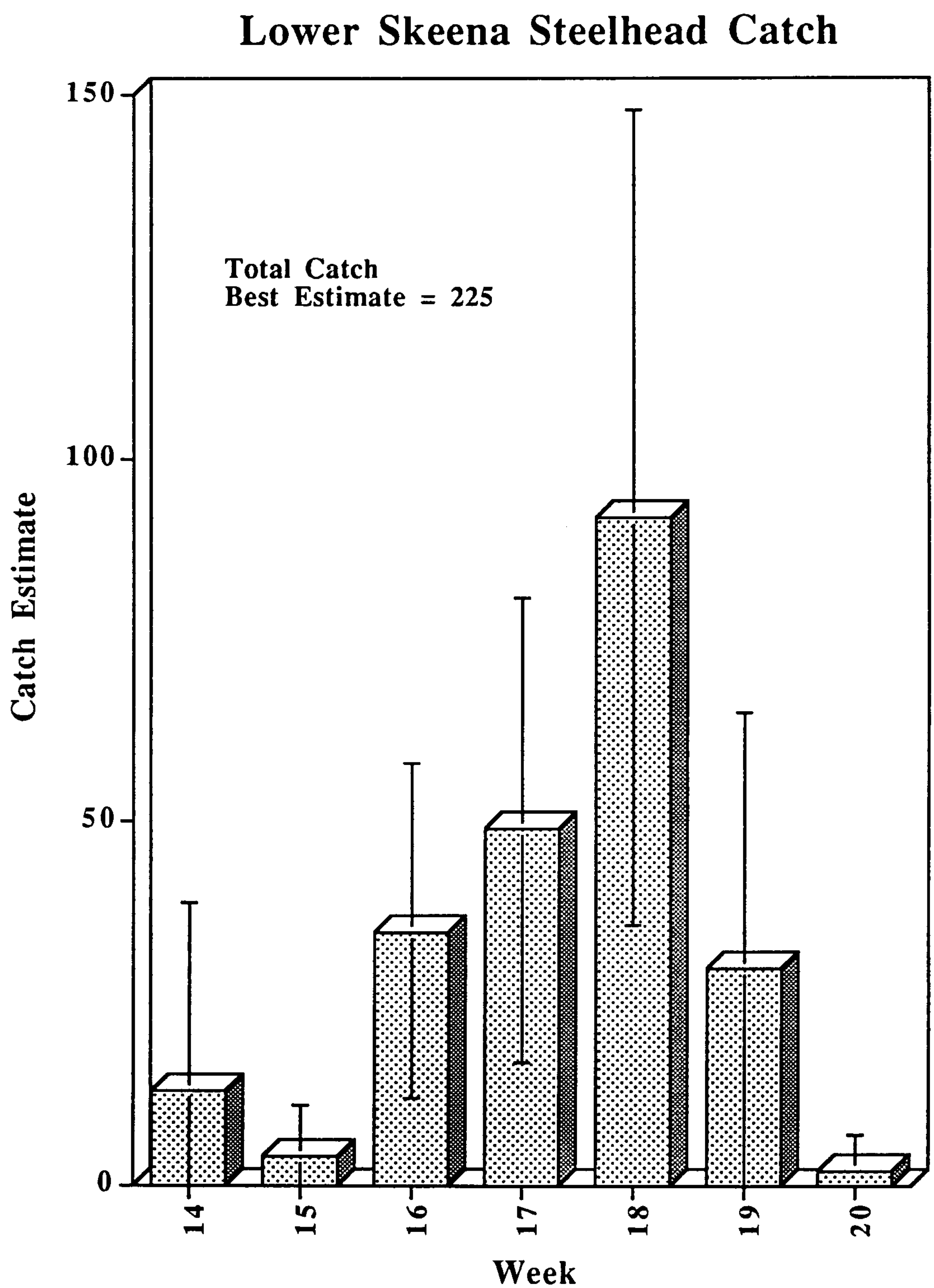


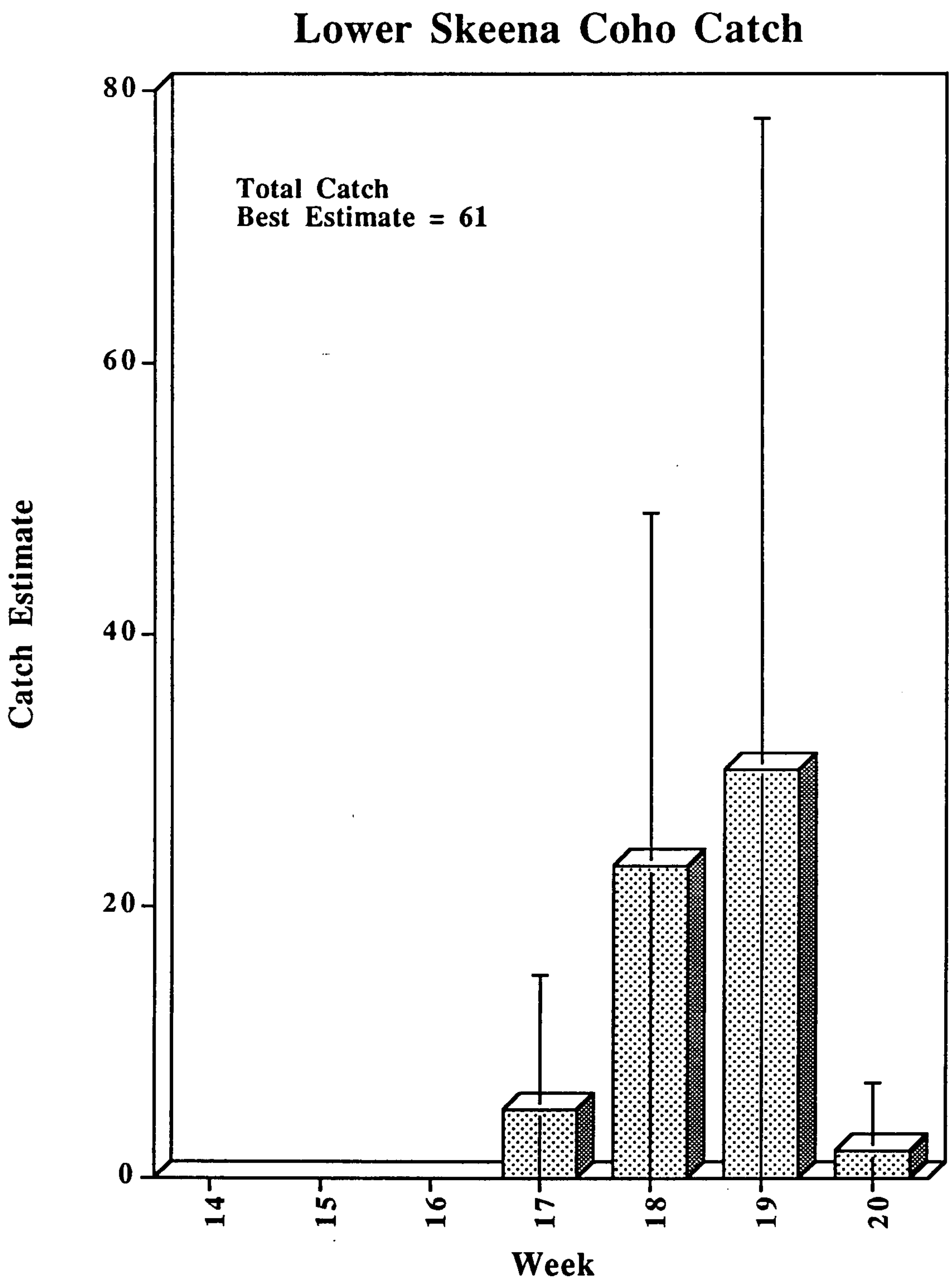
Lower Skeena Sockeye Catch
Total Catch
Best Estimate = 48,267
Catch Estimate
25000
20000
15000
10000
5000
0
14
15
16
17
18
19
20
Week



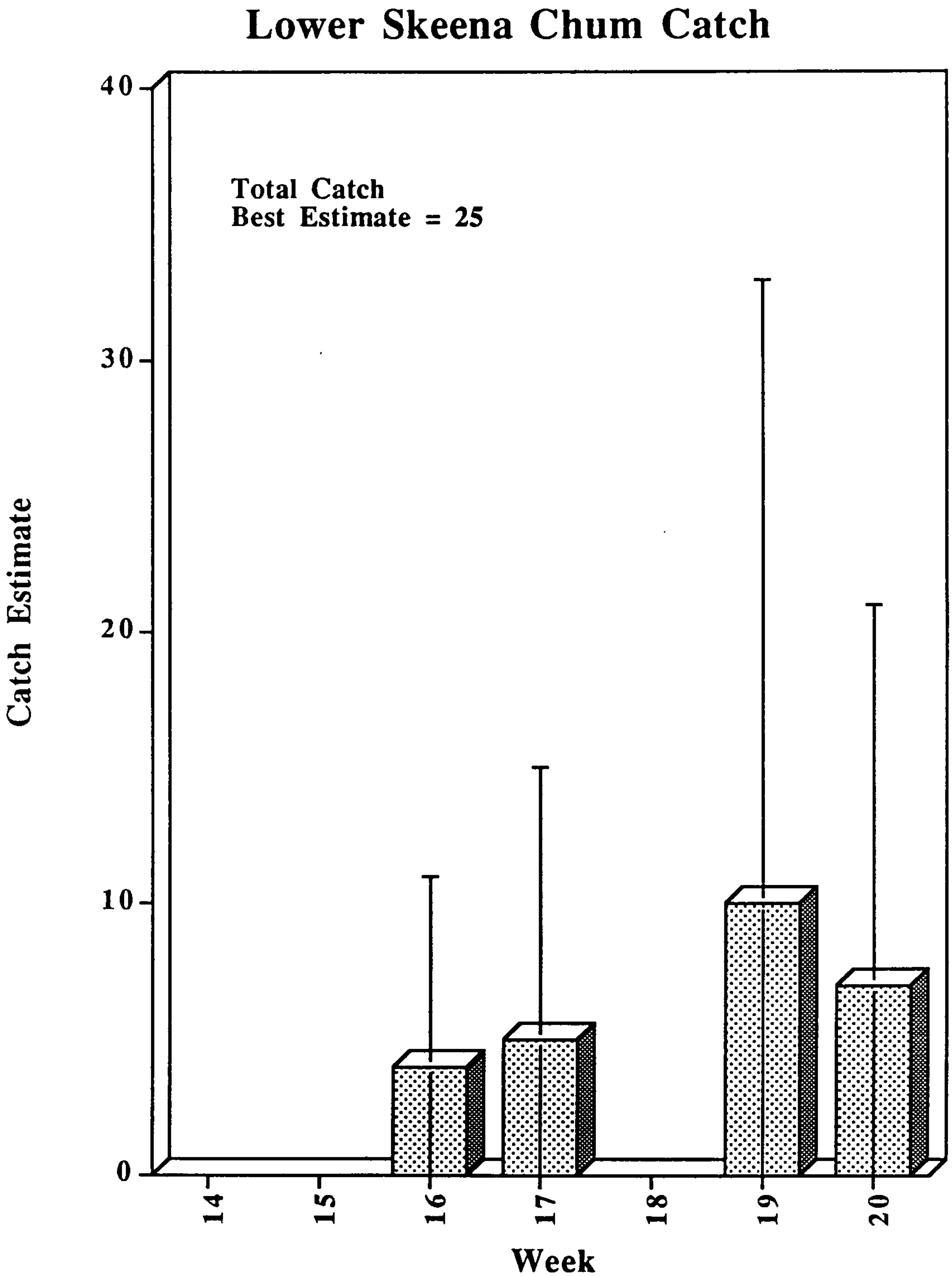
Lower Skeena Chinook Catch
Tital Catch
Best Estimates
Lower Skeena = 3674
Catch Estimate
3000
2000
1000
0
14
15
16
17
18
19
20
Week

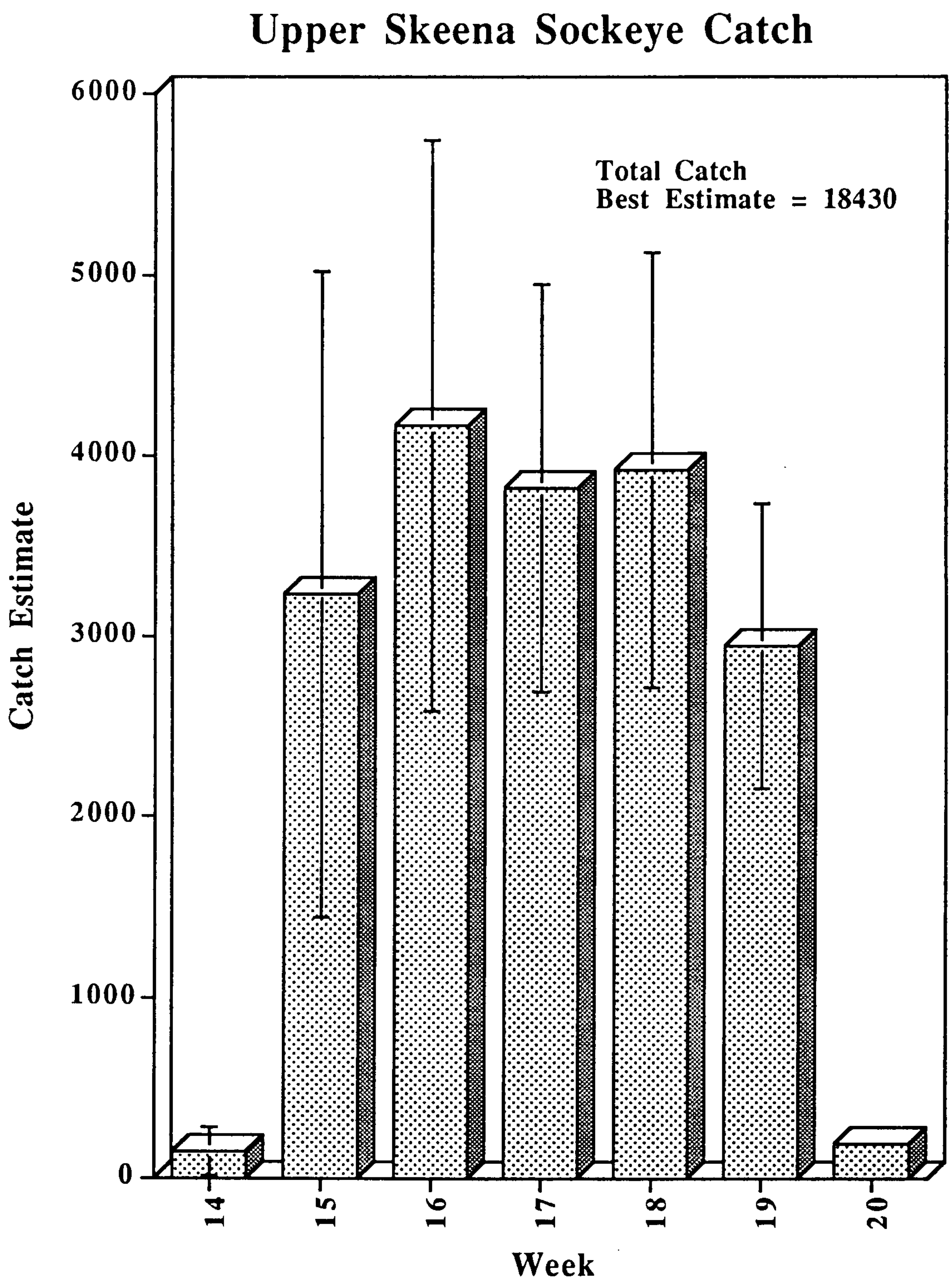

Lower Skeena Pink Catch
Total Catch
Best Estimate = 4588
Catch Estimate
5000
4000
3000
2000
1000
0
14
15
16
17
18
19
20
Week

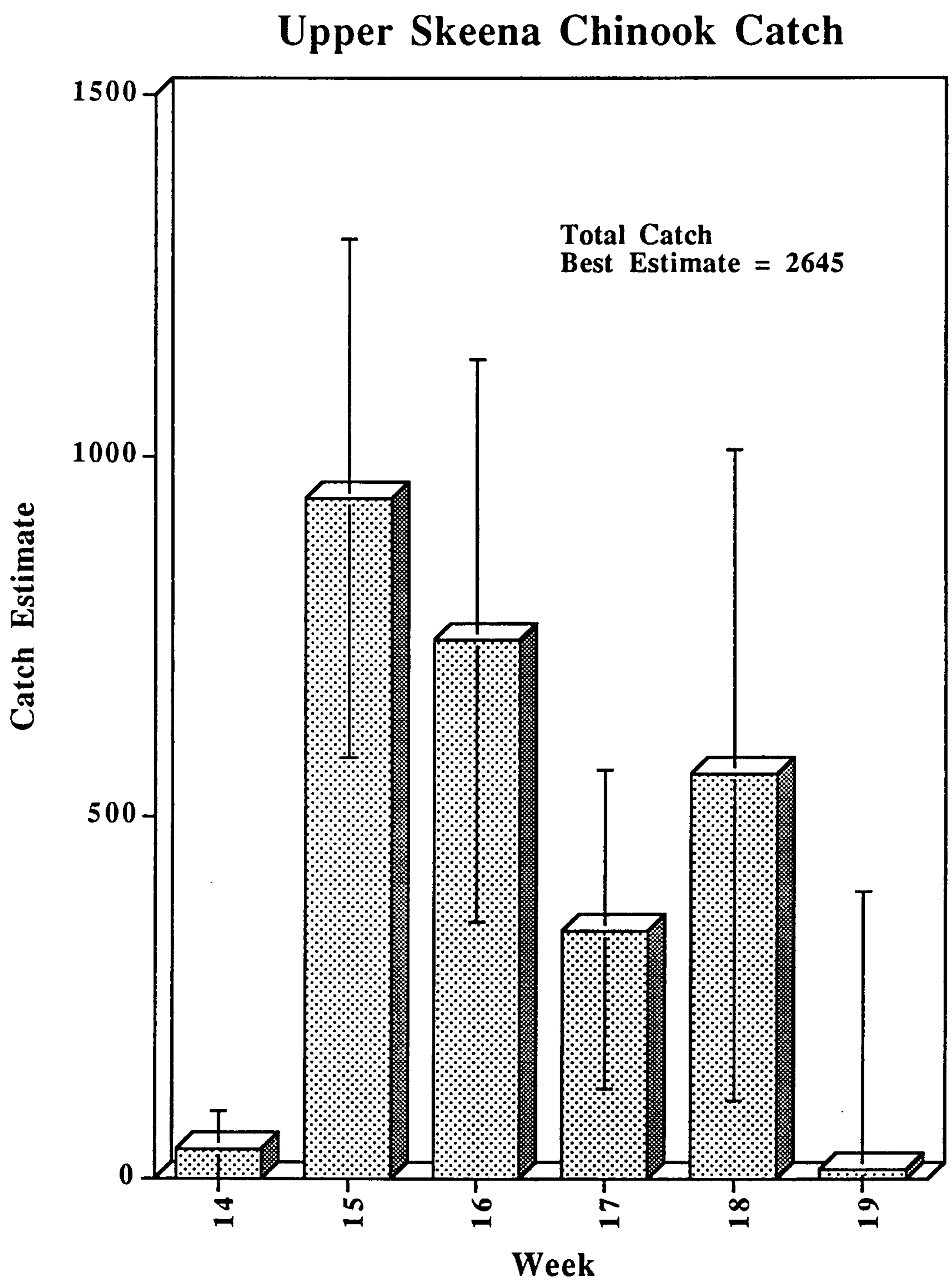

Lower Skeena Steelhead Catch
Total Catch
Best Estimate = 225
Catch Estimate
150
100
50
0
14
15
16
17
18
19
20
Week

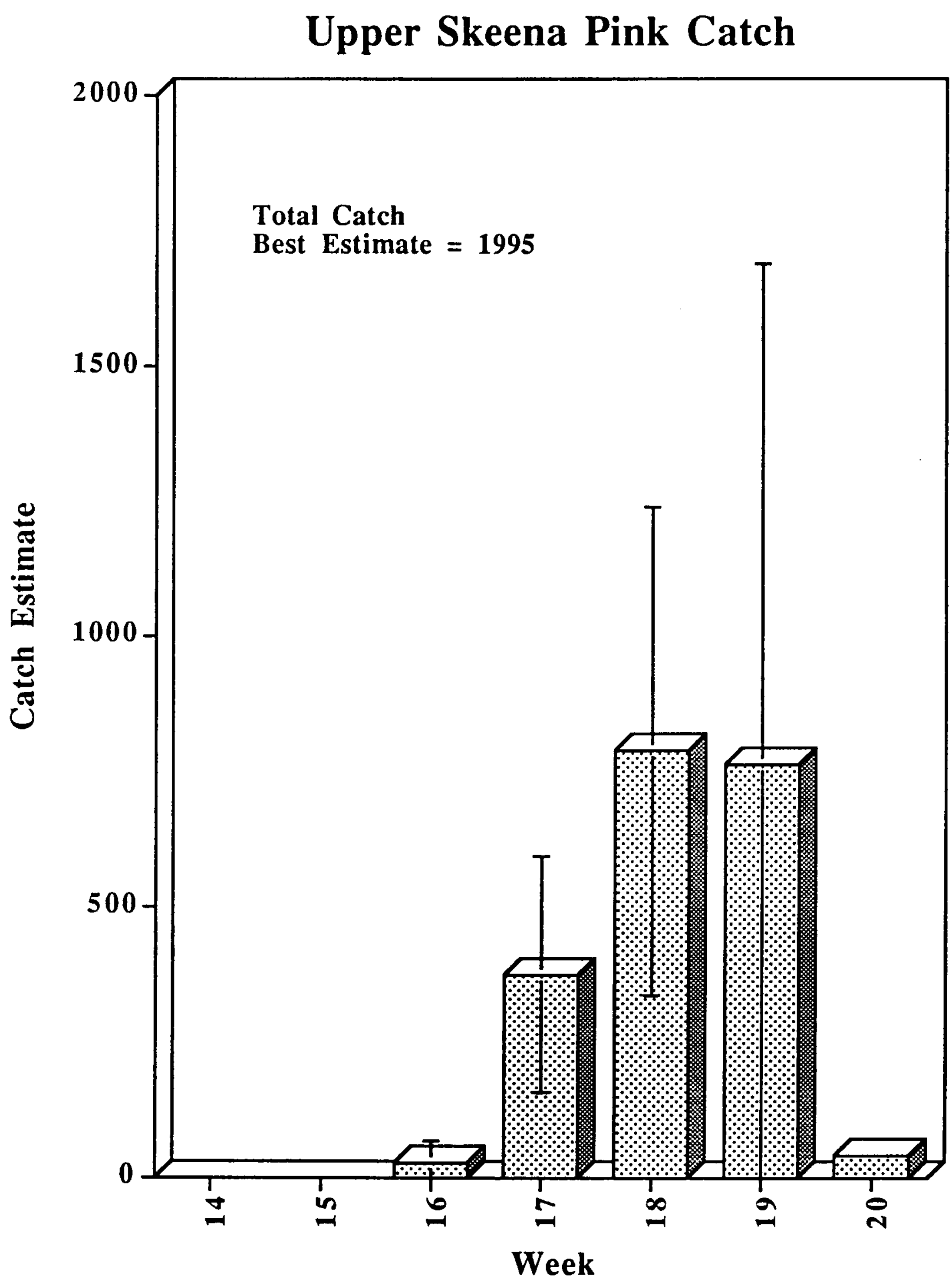


Lower Skeena Coho Catch
Total Catch
Best Estimate = 61
Catch Estimate
0
20
40
60
80
14
15
16
17
18
19
20
Week

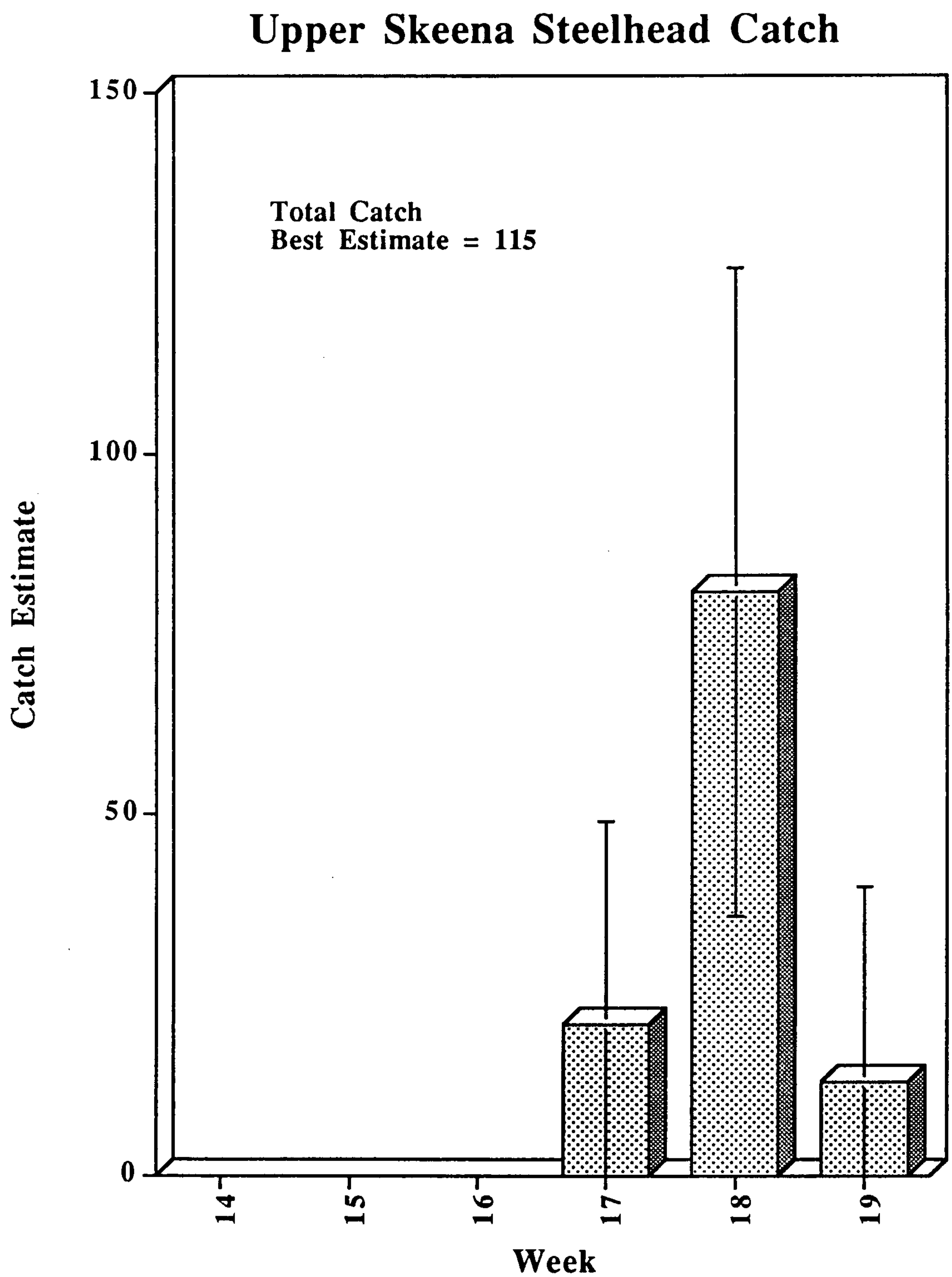

Lower Skeena Chum Catch
Total Catch
Best Estimate = 25
Catch Estimate
40
30
20
10
0
14
15
16
17
18
19
20
Week

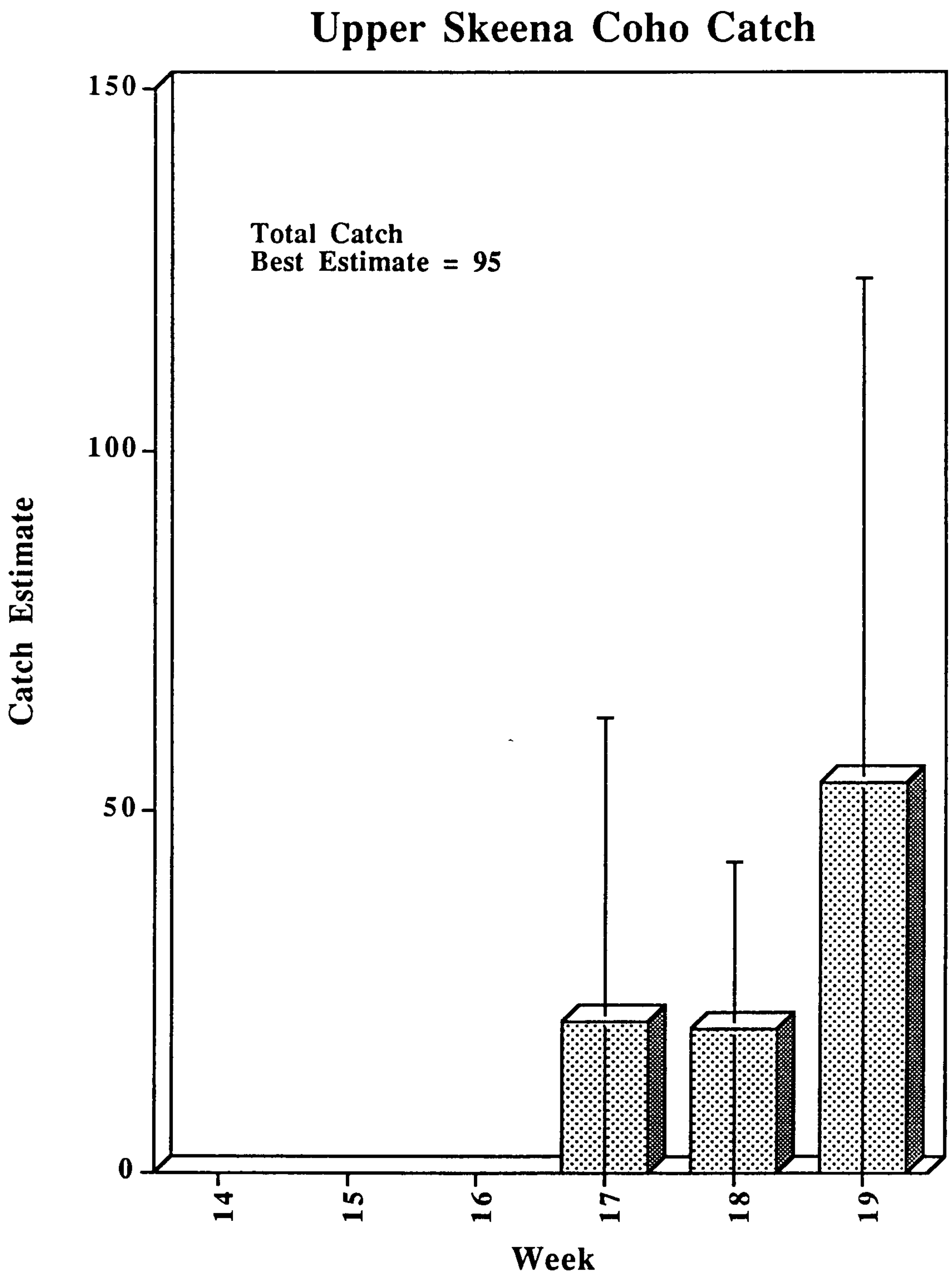

Upper Skeena Sockeye Catch
Total Catch
Best Estimate = 18430
6000
5000
4000
3000
2000
1000
0
Catch Estimate
14
15
16
17
18
19
20
Week


Upper Skeena Chinook Catch
1500
1000
500
0
Catch Estimate
Total Catch
Best Estimate = 2645
14
15
16
17
18
19
Week

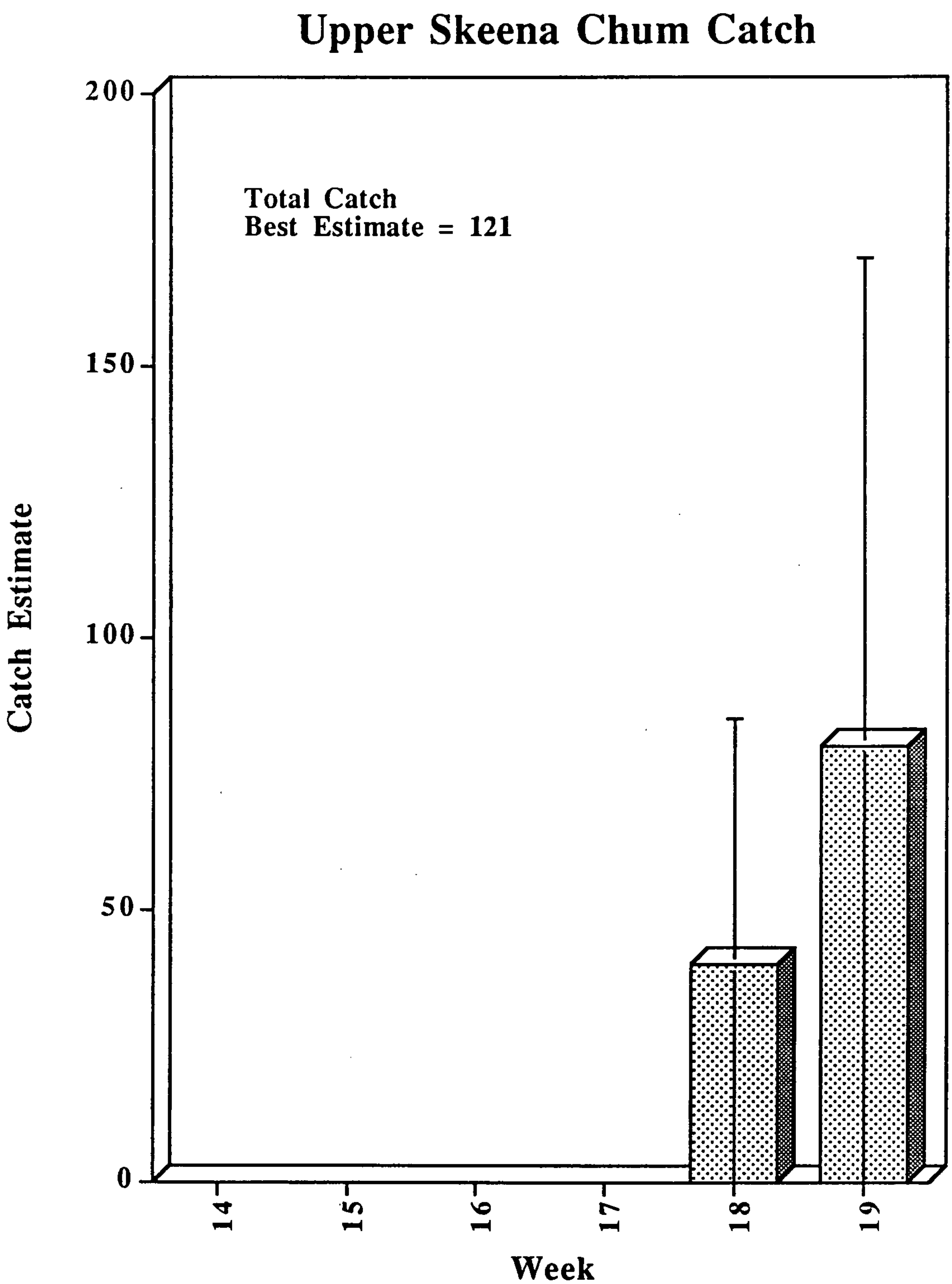


Upper Skeena Pink Catch
Total Catch
Best Estimate = 1995
Catch Estimate
2000
1500
1000
500
0
14
15
16
17
18
19
20
Week


Upper Skeena Steelhead Catch
Total Catch
Best Estimate = 115
150
100
50
0
Catch Estimate
14
15
16
17
18
19
Week



Upper Skeena Coho Catch
Total Catch
Best Estimate = 95
150
100
50
0
Catch Estimate
14
15
16
17
18
19
Week



Upper Skeena Chum Catch
Total Catch
Best Estimate = 121
Catch Estimate
200
150
100
50
0
14
15
16
17
18
19
Week

The Moricetown Fishery

The Moricetown fishery takes place at the falls of the Bulkley River at Moricetown Canyon. Salmon accumulate while attempting passage of the falls and are fished by a variety of techniques including gaff, dipnet, and jig. A jig is a large weighted single or treble hook attached to a short pole by a length of heavy line.

The important species of salmon taken are chinook, pink and sockeye. Smaller catches of steelhead and coho are taken as well. Chum salmon do not occur this far upriver.

In the 1992 fishery, chinook were mostly taken with gaffs (79%) with the remainder evenly divided between dipnet and jig gear. All other species were taken mostly with dipnets. About 80% of sockeye and steelhead were taken by dipnet with the remainder evenly divided between gaffs and jig gear. Nearly all of the pinks and coho were taken with dipnets.

The fishery at Moricetown canyon is enumerated by direct observation. A single technician can observe all of the active fishing sites at the Moricetown canyon. With the help of binoculars fish caught and retained or released can be identified to species. Captured fish were identified to species 99.61% of the time. In the gaff fishery, fish may be lost under the surface of the water. These cannot be determined to species.

In 1992 the fishery was observed for 429 hours during which 15012 fish were caught. The hours of observation are distributed throughout the daylight hours but tend to miss some of the early morning periods when few fishermen are present. Hours assumed available for fishing range from 119 hours/week in July to 84 hours per week in September. This distribution of hours probably slightly exceeds the number of hours actually fished but is consistent with those assumed by Morrell, Barnes, and Harris (1985) for the 1985 fishery. Observation of fishing activity took place over 46% of all hours available for fishing.

Catch Estimation

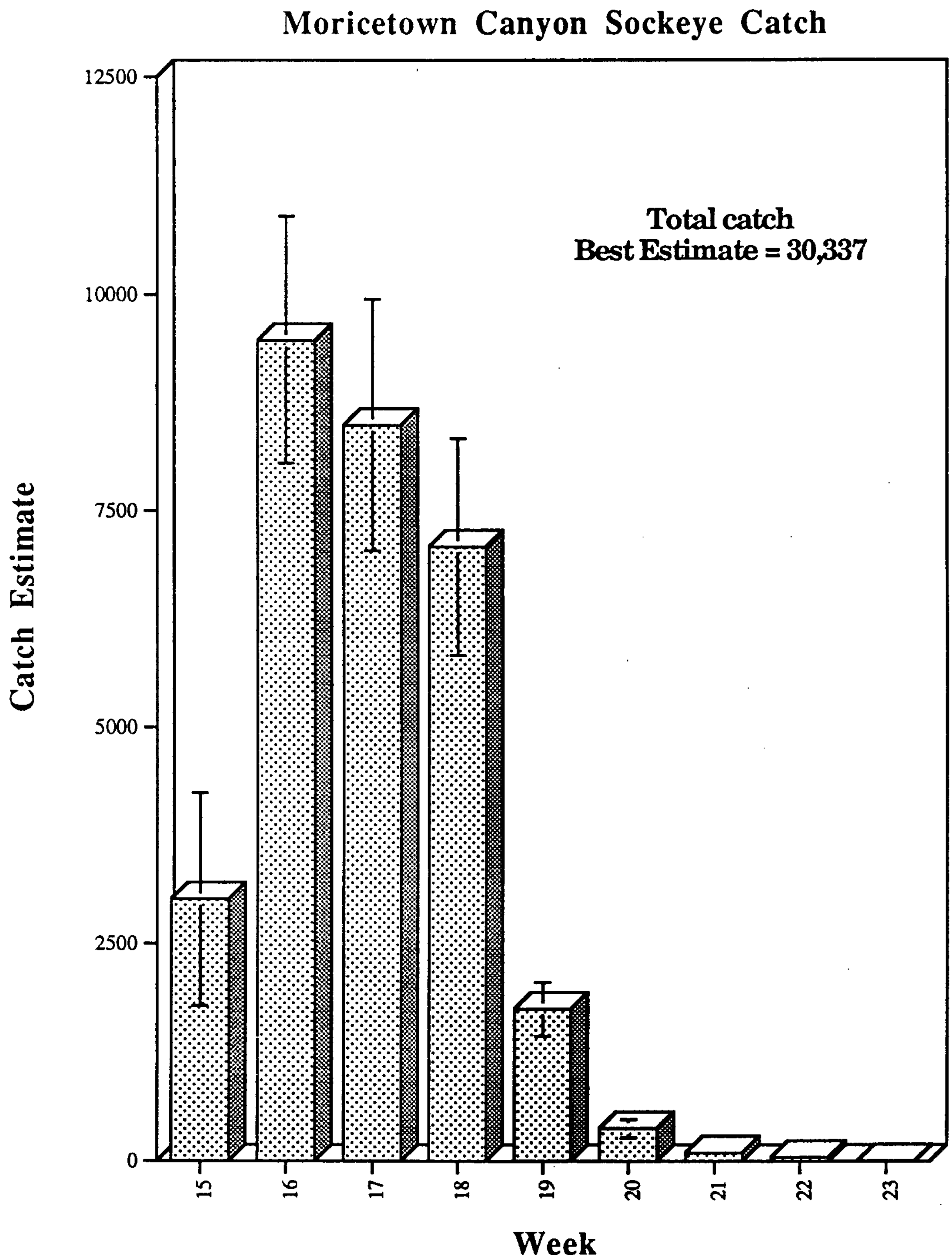
Estimates of the Moricetown canyon catch were made by using one hour of fishing as the standard of effort. The catch per hour was calculated for each week of the fishery (Table 7). Two standard errors below and above the mean value give estimates of the confidence limits. If the catch data are randomly distributed then two standard errors give 95% confidence limits with large sample size. Assuming that catches are not randomly distributed but show a central tendency, then two standard errors give at least 75% confidence limits.

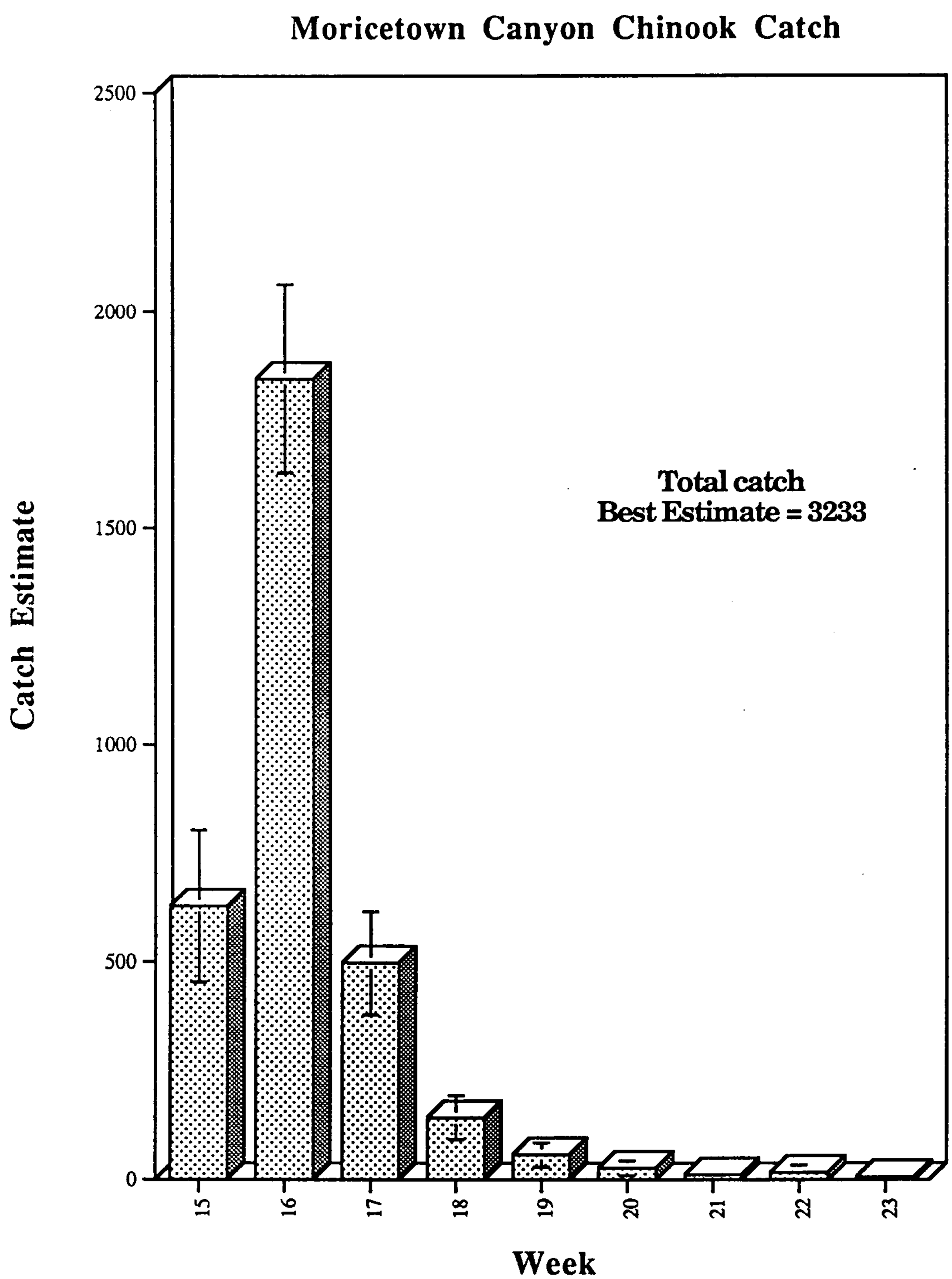
MORICETOWN CANYON CPUE SUMMARIES							
WEEK	HRS OBSV	CN CPUE	SY CPUE	CO CPUE	STHD CPUE	PK CPUE	UNK CPUE
15	58.00	5.27	25.32	0.00	0.00	0.00	0.17
16	54.75	15.51	79.62	0.00	0.04	0.00	0.26
17	57.27	4.17	71.37	0.00	0.19	0.72	0.77
18	54.08	1.20	59.52	0.07	0.43	31.64	0.65
19	61.00	0.59	17.82	1.38	0.33	1.79	0.59
20	43.75	0.27	3.86	3.47	0.37	0.23	1.53
21	40.05	0.12	0.97	1.62	0.57	4.79	0.10
22	25.50	0.20	0.55	1.18	0.47	9.10	0.04
23	12.00	0.08	0.08	2.17	0.33	0.00	0.00

Table 7. Moricetown Canyon catch per hour summaries.

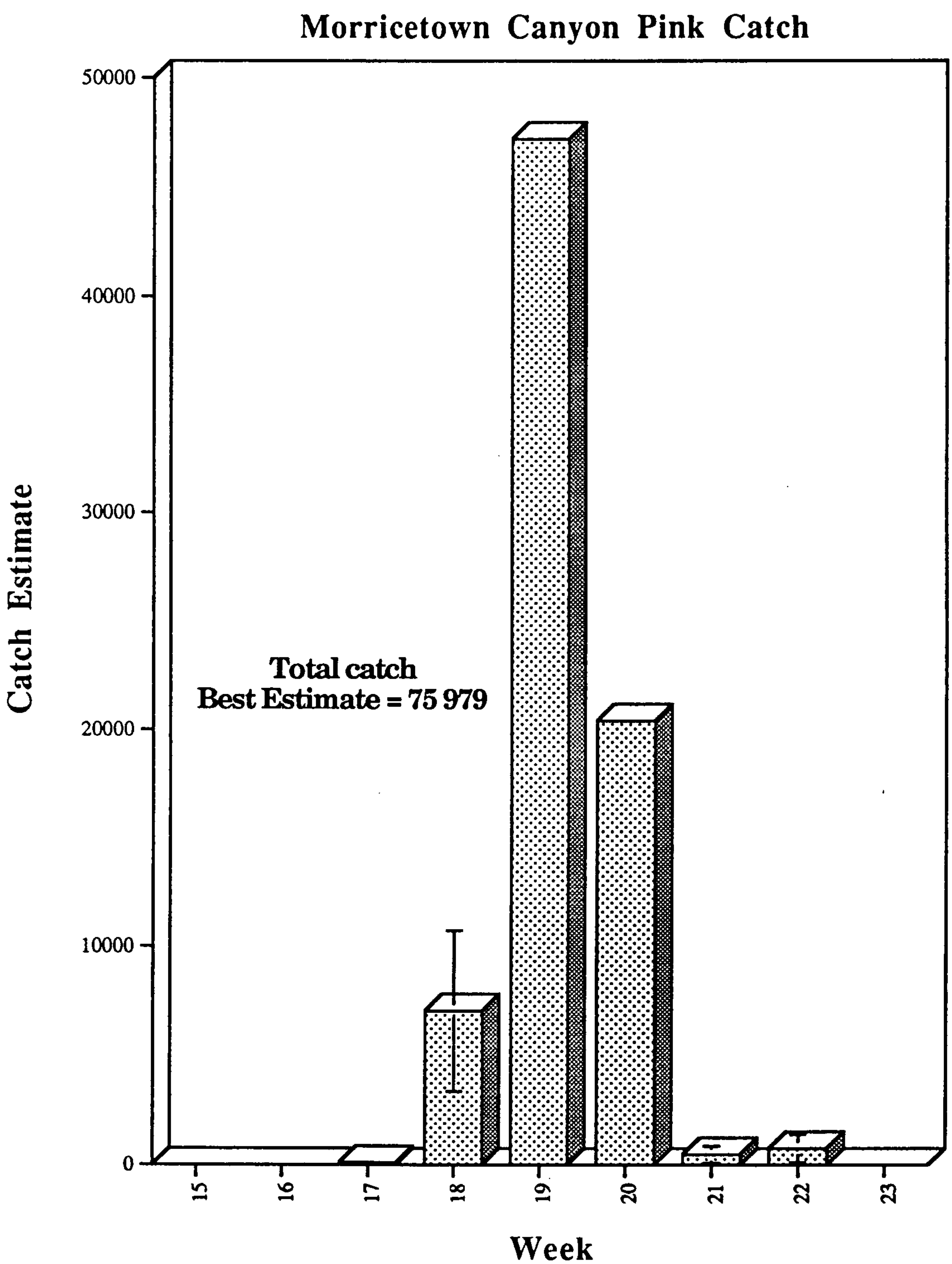
The mean value of catch per hour and the lower and upper limits are multiplied by the number of hours available for fishing to provide low, best, and high estimates of the catch. Catch estimates based on this procedure are presented in Table 8. This is followed by a series of graphs of weekly catch with confidence limits for each of the species of salmon in the fishery. The confidence limits are shown by the thin line extending above and below the top of the columns in the column graphs.

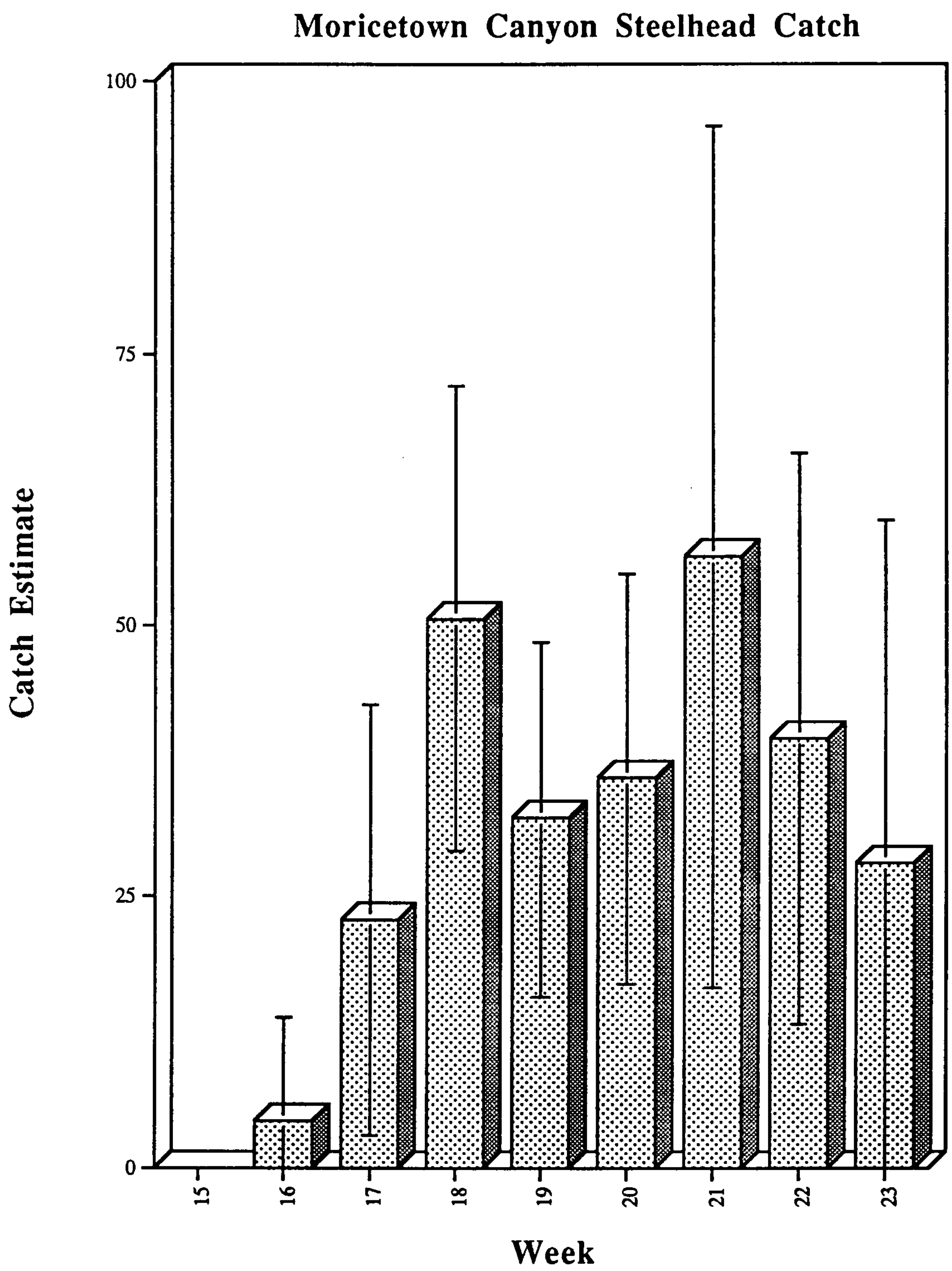
MORICETOWN CANYON 1992 CATCH ESTIMATES								
Week	HrsObsv	HrsEstm	Chinook	Sockeye	Coho	Steelhead	Pink	Unknown
15	81.0	119	627	3013	0	0	0	21
16	54.7	119	1845	9474	0	4	0	30
17	57.3	119	497	8493	0	23	85	91
18	54.1	119	143	7083	9	51	7051	77
19	61.0	98	58	1746	135	32	47198	58
20	43.8	98	27	379	340	36	20411	150
21	40.1	98	12	95	159	56	470	10
22	25.5	84	16	46	99	40	764	3
23	12.0	84	7	7	182	28	0	0
TOTALS	429	938	3233	30337	924	270	75979	440
LOWER CONFIDENCE LIMITS			2594	24461	552	95	71023	
UPPER CONFIDENCE LIMITS			3879	36219	1296	453	80983	

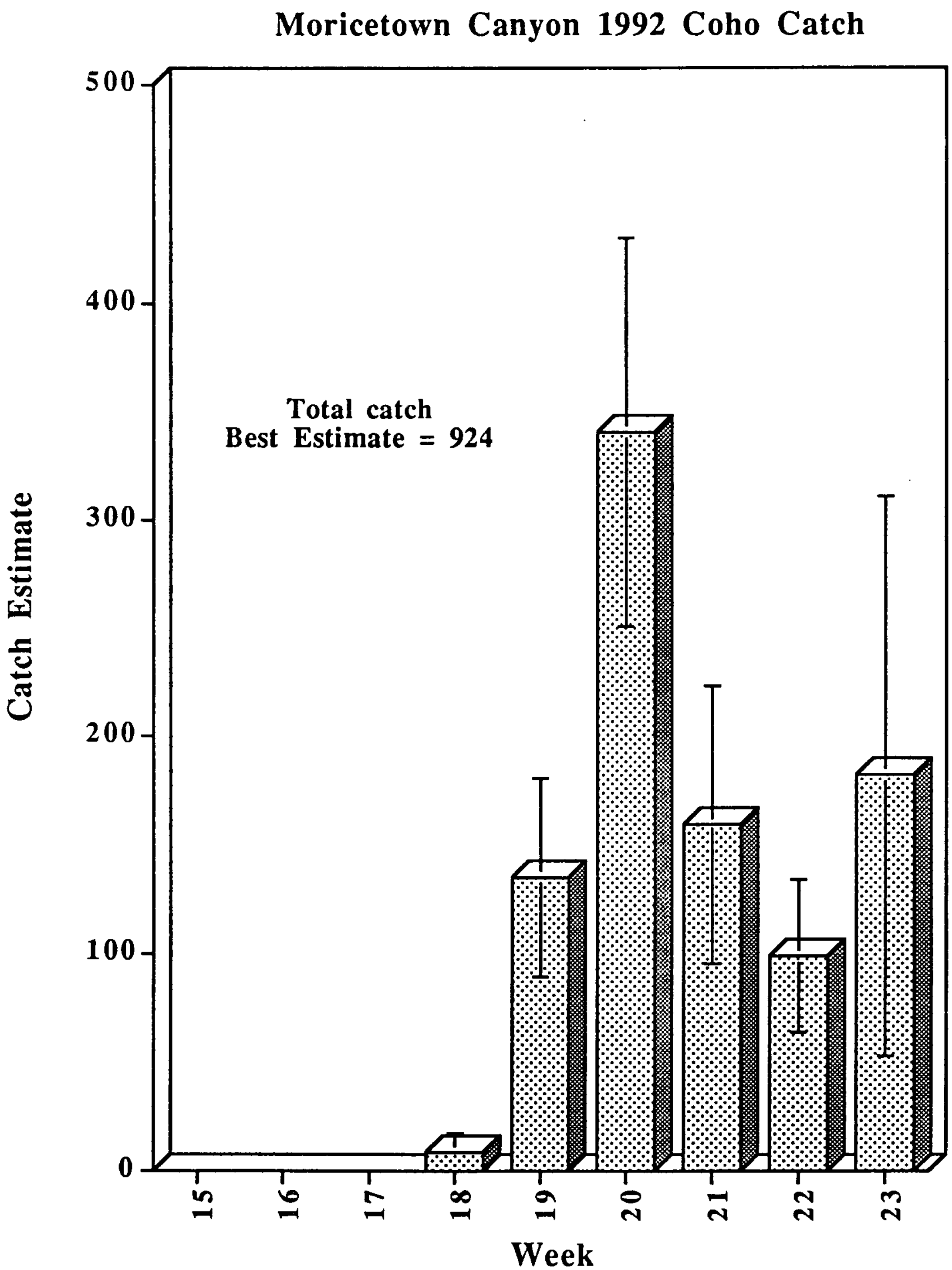

Moricetown Canyon Sockeye Catch
Total catch
Best Estimate = 30,337
Catch Estimate
12500
10000
7500
5000
2500
0
15
16
17
18
19
20
21
22
23
Week



Moricetown Canyon Chinook Catch
Catch Estimate
2500
2000
1500
1000
500
0
Total catch
Best Estimate = 3233
15
16
17
18
19
20
21
22
23
Week


Morricetown Canyon Pink Catch
Catch Estimate
50000
40000
30000
20000
10000
0
Total catch
Best Estimate = 75 979
15
16
17
18
19
20
21
22
23
Week


Moricetown Canyon Steelhead Catch
Catch Estimate
100
75
50
25
0
15
16
17
18
19
20
21
22
23
Week



Moricetown Canyon 1992 Coho Catch
Total catch
Best Estimate = 924
Catch Estimate
500
400
300
200
100
0
15
16
17
18
19
20
21
22
23
Week

Moricetown Fisheries Release Data

The use of selective gear to catch the bulk of the fish at Moricetown canyon permits the release of fish that belong to non-target species. In 1992 more than two thirds of the steelhead that were caught in the dipnet fishery were released. Pink salmon caught at times when the commercial fishery was not being pursued were generally released. The overall release rate for pink salmon was 17%.

MORICETOWN CANYON 1992 RELEASE ESTIMATES					
WEEK	STEELHEAD	SOCKEYE	COHO	PINKS	CHINOOK
15	0	6	0	0	0
16	0	85	0	4	7
17	8	91	0	2130	0
18	51	117	7	5131	29
19	87	39	5	1629	51
20	69	13	11	1389	2
21	110	17	17	1943	15
22	49	0	3	425	0
23	196	0	14	322	0
TOTALS	571	368	57	12969	103
Rel.Ratio	212%	1.21%	6.17%	17.07%	3.20%

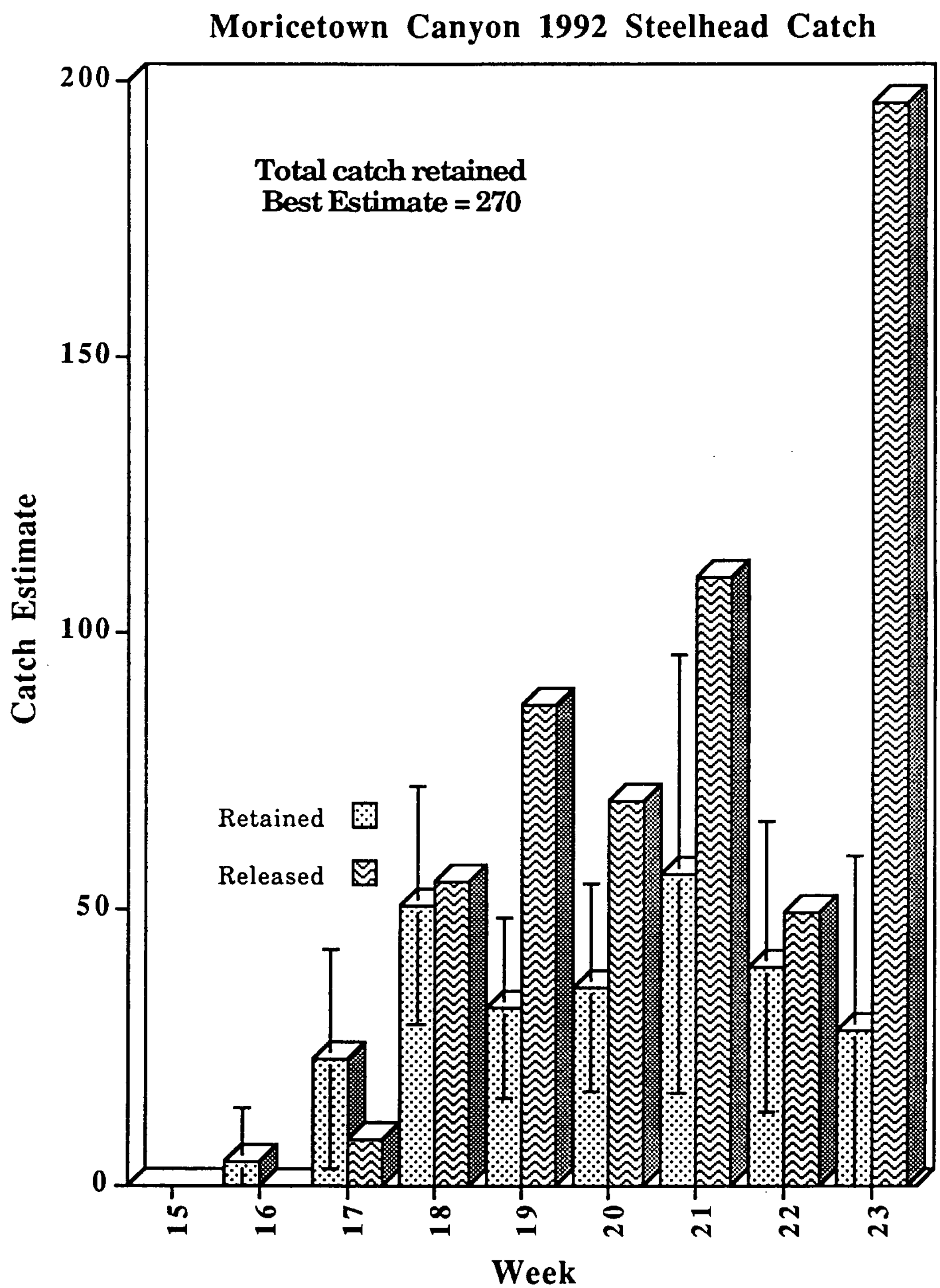
Table 9. Ratios of released to retained salmon at Moricetown Canyon

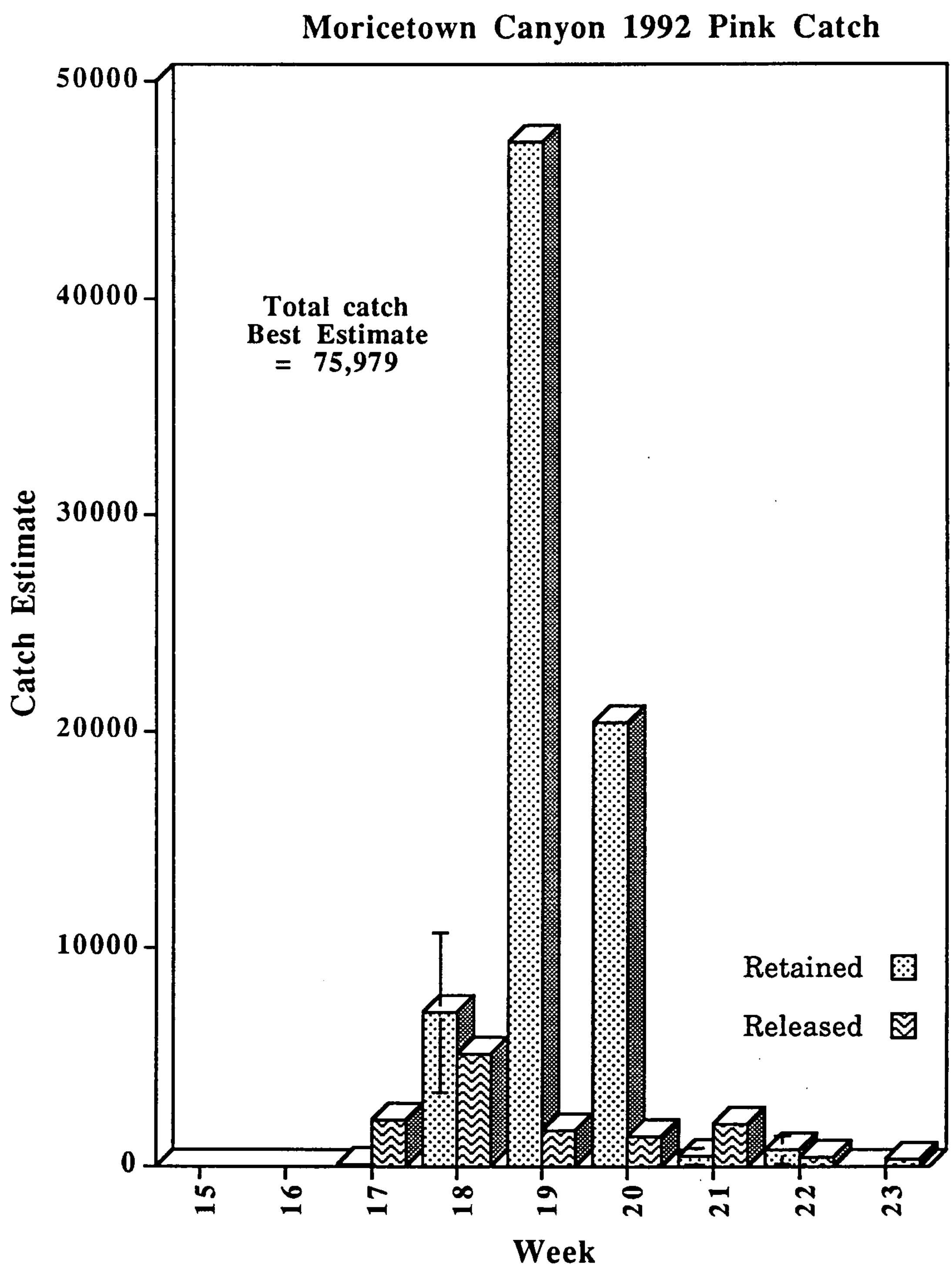
Graphs of the weekly release rate for steelhead and pinks are shown on the following pages.

The Moricetown Commercial Pink Fishery

In the 1992 season 70698 pinks were taken by dipnet in early August. These fish were sold under the provisions of the pilot aboriginal fisheries agreement. Since these fish were harvested specifically for this sale, and the catch was counted, they are not used for calculation of the catch per hour. They are included however, in the catch statistics presented in Table 8.

The pink stock targeted by this fishery is one that is rapidly expanding into the upper Bulkley River watershed. Before the fish ladder was built at Moricetown canyon in 1959 there were no pinks above the falls. In the last ten years pink salmon reached the Morice River and escapements in both odd and even years have risen above 100 000. The expansion of this new stock provides an opportunity for a sustainable economic resource for Moricetown.


Moricetown Canyon 1992 Steelhead Catch
Total catch retained
Best Estimate = 270
Retained
Released
Catch Estimate
0
50
100
150
200
15
16
17
18
19
20
21
22
23
Week



Moricetown Canyon 1992 Pink Catch
Catch Estimate
50000
40000
30000
20000
10000
0
Total catch
Best Estimate
= 75,979
Retained
Released
15
16
17
18
19
20
21
22
23
Week

Discussion

The Skeena River Fisheries

Salmon returns to the Skeena River are dominated by Sockeye and Pinks. The most numerous sockeye stocks, contributing 90% to 95% of the total Skeena River escapement, are the sockeye runs to the Babine River, the largest of which are the enhanced Pinkut Creek and Fulton River stocks. These stocks contribute 1 to 3 million fish per year (Sprout and Kadowacki 1987).

Pink salmon runs to the Skeena System are nearly as large, but many of the fish spawn below the Gitksan and Wet'suwet'en area. Pinks are the second most abundant species within the Gitksan and Wet'suwet'en territories.

In contrast to these stocks, some of the wild stocks are severely depressed. The Kitwancool River historically supplied most of the sockeye for the village of Kitwancool. This year our weir counts and spawning escapement survey indicated a spawning escapement to the Kitwancool River of about 12 fish. If this one year's data is indicative of the size of the Kitwancool River stock, then it is near extinction.

Mixed stock fishing problems are a severe test of salmon management ability and will. If fishing access is set by the ability of the enhanced stock to sustain fishing pressure then most natural stocks will decline. Moving a portion of the fishery upriver serves to alleviate this problem. If selective fishing takes place upriver, with the release of threatened species, then there is the potential to avoid some of the negative consequences of mixed stock fishing. If techniques are developed for in-season separation of sockeye stocks, regulation of fishing openings combined with selective fishing may avoid most of the negative effects of the mixed stock fishery.

The Gitksan Skeena River fishery is dominated by the sockeye harvest which makes up 83% of the total salmon caught. It is likely that the main part of the Gitksan fishing effort is late enough to miss the Upper Skeena sockeye runs, such as that to Bear Lake. It is also late enough to avoid part of the Morice Lake (Nanika River etc.) runs. Furthermore these runs are only harvested in the Lower Skeena Gitksan fishery. It is therefore likely that the Gitksan Skeena River Fishery is composed of about 80% Babine Lake Sockeye. The sockeye fishery is composed of over 95% Babine Lake fish.

Catches of Chinook are significant with about 5300 fish caught. Although the size of this catch is relatively small it may represent 10% to 25% of the spawning escapement. Catches of steelhead, coho, and chum are small, in part due to their extremely depressed population levels in the Skeena River.

The Moricetown Fishery in 1992

The Moricetown fishery in 1992 was concentrated on pinks, sockeye and chinook. The large pink fishery (70000) was almost entirely collected by selective fishing (dipnet) and sold under the pilot fisheries agreement.

Most sockeye were taken with dipnets (79%). The sockeye catch was larger than in previous years. A catch of 30000 fish would not have been possible prior to the recovery of the Nanika River stock to pre-1954 levels in the past few years (Hancock et al. 1983). The catch of sockeye probably exceeds the size of the spawning escapement, although accurate spawning escapement numbers were not obtained by either the DFO or the GWWWA due to severe fall weather.

Chinook catches have declined when compared to previous years. Most chinook are taken with gaffs. Some chinook escape injured by the gaff. The ratio of injured chinook to landed chinook is 11%. This number is conservative since many injured chinook escape without being identified to species and are recorded as "unknown lost".

The use of dipnets for a significant part of the Moricetown fishery was introduced by the Chiefs of Moricetown in 1983 as a move toward a selective fishery and as an attempt to decrease the loss of fish injured by gaff fishing. Its increase to the position as dominant fishing gear is significant for stock conservation. Gaffs are still in use for chinook fishing, since dipnets are not large enough to catch most of the chinook which range up to 25 kilograms in weight.

The shift to selective fishing gear (dipnets) for sockeye, pinks, and steelhead provides an opportunity to regulate the size and composition of the Moricetown catch. This year, as a result of a cooperative arrangement with the British Columbia Ministry of Environment, two thirds of the steelhead caught were released. A successful Pink fishery was held. The opportunity now exists to set a target allocation for sockeye as well as pinks. This allocation should be directed to to maximising economic benefits to Moricetown while allowing for further expansion of the pink and sockeye stocks.

Accuracy of the catch estimates

Catch estimates for the Skeena River Fisheries are dependent on effort data and CPUE data. In the 1992 data, the confidence limits based on the effort estimate and the CPUE estimate are similar suggesting a good distribution of sampling attention.

The effort data are good for days of fishing activity and are presumably unbiased. Estimates of the number of sets per day are dependent on the cooperation of fishers and frequency of inspection. It is possible that fishermen who are involved in illegal fish sales will be less likely to give accurate data, or any data, regarding the number of sets per day. This likely to be a problem in only a small proportion of the fishing sites. It is probable that the confidence limits used are wide enough to easily allow for this potential bias.

Catch per unit effort numbers are largely obtained by the use of set net log books. Frequent visits by field technicians help to maintain the cooperation of fishers and result in improving the quality of the data recovered. Since acquisition of fishing effort and catch data have been carried on in previous years, many fishers are familiar with the set net log books and readily cooperate. The cooperation of these members of the community is gratefully acknowledged.

Catch per unit effort numbers for the Skeena gillnet fishery have a wide distribution. This is probably due to the variability between fishing sites, the pulse-like migration of fish, and varying efficiency of net sites with different stage levels of the river. Probably the estimates of CPUE are unbiased despite the large variation in values. Probably the variation of CPUE would not be much decreased with large increases in the sample size.

The data on the fishery at Gisgagaas is assumed to be accurate since there is almost a total sample.

The data at Moricetown has a high degree of reliability. The catch estimate is based on observations of the Moricetown fishery and counts of pink salmon taken in the commercial pilot fishery. Approximately 46% of the fishing hours were observed. The ability of the technicians to identify fish caught and the number of fish caught is indicated by the ability to identify fish caught to species more than 99% of the time. The hours of fishing used are likely to be slightly conservative. If this bias is present the real value of the catch may be lower than that assumed but is probably is well within the confidence limits.

Comparison of the 1992 Fisheries with Previous Years

Collection of 1992 catch statistics in a manner comparable to earlier studies permits simple comparison with earlier years data. The 1982 estimate of the catch on the lower Skeena River is probably biased toward low values because of incomplete effort survey. On the other hand both the 1982 and 1985 data on CPUE were more complete in the Upper Skeena than the 1992 survey data. The 1992 data for the Upper Skeena are probably not biased because of this lower effort sample (11% of sets) but have larger confidence limits.

Comparison of the 1992 fishery with the 1980's fishery shows:

1) An increase in the size of the Lower Skeena Sockeye catch and a decrease in the size of the Upper Skeena Sockeye catch.

2) The total Skeena River sockeye catch has increased modestly from 47000 in 1985 to 72000 in 1992. The increase in size of the Skeena River Fishery by about 25 000 fish includes the 8000 Sockeye selectively caught and sold under the pilot aboriginal fisheries agreement.

3) The Moricetown sockeye fishery has grown greatly from 5000-6000 in the 1980's to 30000 in 1992. The increase in sockeye catch accompanies a recovery of spawning escapement to the Nanika River to pre-1953 levels.

4) Chinook catches have changed in a complex manner with increases in the Upper Skeena and decreases at Moricetown.

5) The pink salmon fishery declined on the Skeena River but expanded greatly at Moricetown. The increase in catch corresponds to a dramatic growth in the size of the Bulkley River pink escapement.

6) Steelhead, Coho and Chum fisheries have declined greatly. This reduction indicates the serious state of decline of these stocks.

	Year	Lower Skeena	Upper Skeena	Gisgagaas	Moricetown
SOCKEYE	1982	20135	27652		6043
	1985	34966	16369	5762	5229
	1992	48267	18430	5223	30337
CHINOOK	1982	805	463		5605
	1985	5482	716	8	4556
	1992	3674	2645	2	3233
PINK	1982	1092	2865		2374
	1985	9565	2230	375	13144
	1992	4588	1995	700	75979
STEELHEAD	1982	983	1837		442
	1985	2269	675	67	1167
	1992	225	115	7	270
COHO	1982	694	2080		425
	1985	405	163	33	670
	1992	61	95	2	924
CHUM	1982	75	590		0
	1985	537	167	0	0
	1992	25	121	0	0

Data Source: 1982, Morrell 1985
1985, Morrell, Barnes and Harris 1985
1992, this report

The Relative Size of the Aboriginal Fishery

The total sockeye catch for the Gitksan and Wet'suwet'en fisheries is 102,000. Although final numbers were unavailable at the time of report preparation, the commercial coastal catch of Skeena River fish for 1992 was approximately 1.2 million. The proportion of the Gitksan and Wet'suwet'en catch is therefore about 8%. In 1992 there was an excess escapement to the Babine spawning channels of about 300 000. The Gitksan fisheries were concentrated on this excess escapement.

Recommendations for 1983

General

1. Continue development of selective gear.
   Additional research and development of fish trap technology and beach seining should be pursued. Fish wheel technology should be explored.

2. Continue the recording of commercial fish sales through Git-Wet Corp.

Skeena River Gitksan Fisheries

1. Target the Skeena River fishery on the enhanced Babine stocks.

2. Continue the effort and CPUE surveys of the Skeena River gillnet fisheries as carried out in 1992. Increase the rate of set net CPUE data collection in the Upper Skeena to a level comparable to that of the Lower Skeena. On the Lower Skeena change the data collection strategy for the drift net fishery so that CPUE calculations can be made.

3. At Gisgagaas continue the catch monitoring effort at the level of 1992. If the commercial selective fishery is expanded, a higher level of monitoring will be necessary.

4. Develop information on the timing and rate of movement of various sockeye stocks through the Gitksan fishery. Initiate research on in-season stock identification.

Bulkley River Wet'suwet'en fisheries

1. Continue the Moricetown monitoring programme at the level of the 1992 surveys.

2. Carry out research to establish a rationale for an allocation of Nanika River sockeye. Develop a management plan to limit fishing to the allocation level.

3. Reinitiate data collection on the set net fishery on the Bulkley River as carried out in 1982.

4. If a selective fishery is established at Dizklee, establish a record keeping system for this fishery.

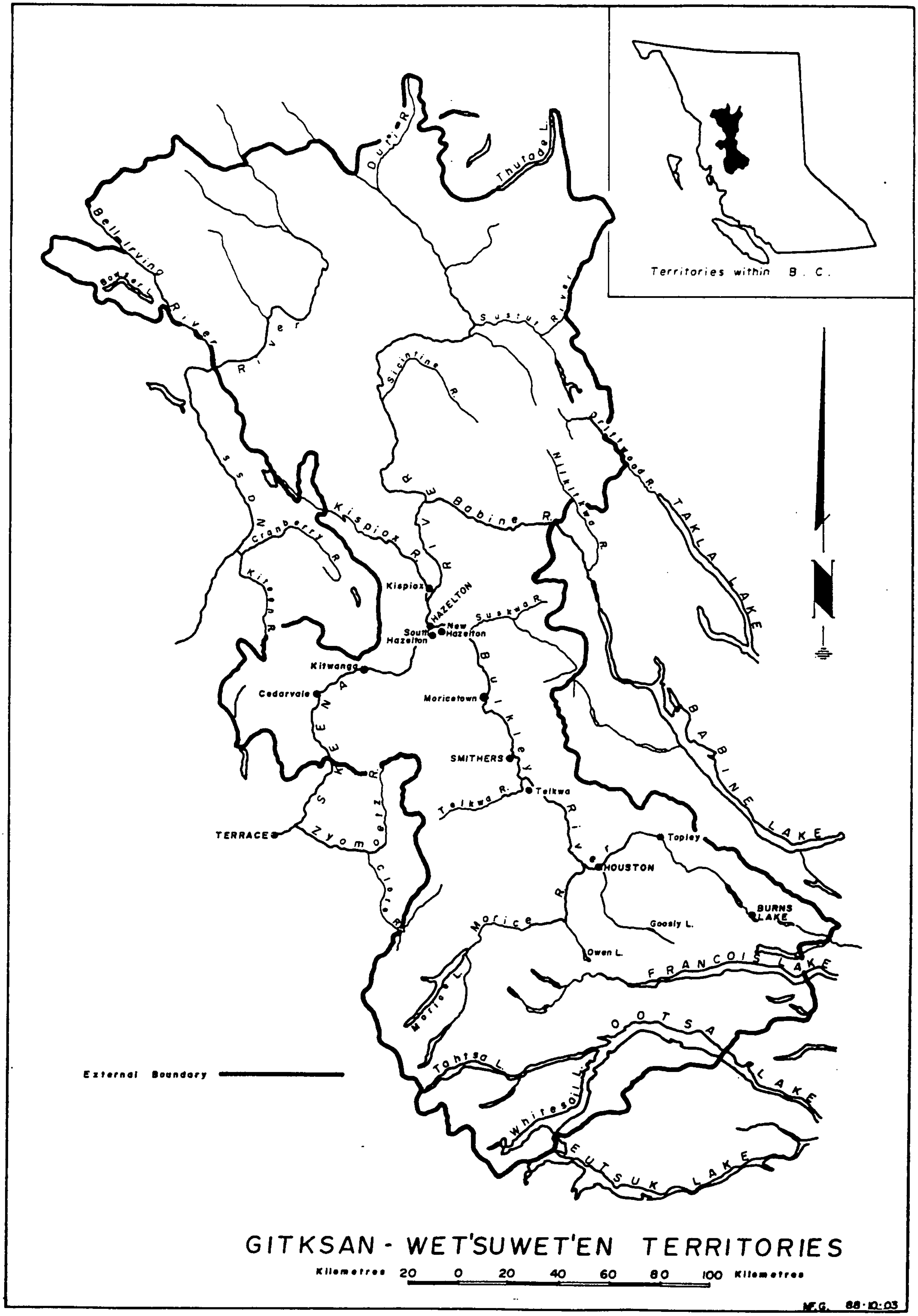
References:

Hancock, M.J., Leaney-East, A.J. and Marshall, D.E. 1983. Catalogue of salmon streams and spawning escapements of statistical area 4 (Upper Skeena River). Canadian Data Report of Fisheries and Aquatic Sciences No. 394.

Morrell, Mike. 1985. The Gitksan and Wet'suwet'en Fishery in the Skeena River System. Gitksan-Wet'suwet'en Tribal Council, Hazelton, British Columbia.

Morrell, Mike; Barnes, Chris; and Harris, Gerry. 1985. The Gitksan and Wet'suwet'en Fisheries in the Skeena River System: 1985 Data Report. Gitksan-Wet'suwet'en Tribal Council, Hazelton, British Columbia.

Sprout, P.E., and Kadowacki, R.K., 1987. Managing the Skeena River Sockeye salmon (*Onchorhynchus nerka*) Fishery — the process and the problems. p. 385-395 In H.D. Smith, L. Margolis, and C.C. Wood (ed.) Sockeye salmon (*Onchorhynchus nerka*) population biology and future management. Can. Spec. Publ. Fish. Aquat. Sci. 96.


Territories within B.C.
Bell-Irving River
Bowser L.
Duti R.
Thutade L.
Sustut River
Sicintine R.
Driftwood R.
TAKLA LAKE
Nilkitkwa R.
Babine R.
Kispiox River
Cranberry R.
Kitsegas R.
Kispiox
HAZELTON
New Hazelton
South Hazelton
Suskwa R.
Kitwanga
Cedarvale
SKEENA R.
Moricetown
Bulkley River
SMITHERS
Telkwa R.
Telkwa
TERRACE
Zymoetz R.
Clore R.
Topley
HOUSTON
BABINE LAKE
BURNS LAKE
Goosly L.
Owen L.
Morice R.
Morice L.
FRANCOIS LAKE
OOTSA LAKE
Tahtsa L.
Whitesail L.
EUTSUK LAKE
External Boundary
GITKSAN - WET'SUWET'EN TERRITORIES
Kilometres 20 0 20 40 60 80 100 Kilometres
M.F.G. 88·10·03