Ned'u'ten Fisheries Commission 1996/97

Prepared by: Leanne Olinyk and Bill Spenst

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Introduction

The Ned'u'ten Fisheries Commission continues to evolve into a natural resource information centre for the Lake Babine Nation. Although the focus of the NFC is and always will be the salmon resource of Babine Lake, they have continued to educate themselves on issues that impact on salmon and their habitats and issues that impact the people of the Lake Babine Nation. The Lake Babine Nation (with the involvement of the NFC) has approached other government agencies with the idea of forming co-management agreements similar to the one that the NFC and DFO share.

The stream enumerations were carried out as in previous years with some improvements in certain areas. There is still a significant beaver problem that needs some creative thought. The slower winter months have again been utilized for more training and fish/forestry related planning.

Many of the planned projects for this year were not carried out because of the extended harvest in August and September. Although the harvest was an incredible opportunity for the Lake Babine Nation. It took up all the time of 2 of our NFC staff for a period of time, and projects that they were to be involved in had to be delayed until the upcoming season.

Ned'u'ten Fisheries Staff- 1996/7

Director/ Senior Manager	Joe Michell
Biologist/ Program Manager	Leanne Olinyk
Project Manager	Bill Spenst
Project Manager	Donna Macintyre
Foreman, Donald's Landing	Bernard Patrick
Foreman, Fort Babine	Robbie Reid
Elder's Advisor	Gordon Joseph
Administration Officer	Debbie Dennis

Seasonal Staff (1996):

Tachet Fisheries Crew Member	William George

Environmental Youth Team:

Tachet Fisheries Crew	Mason Dennis
Donald's Landing Crew	Bruce Alec
Donald's Landing Crew	Eugene Patrick
Challenge Student, Burns Lake	Leona Prince
Challenge Student, Fort Babine	Colin Williams

The Lake Babine Nation also provided 120 people with short term employment for the harvest that took place near the Pinkut and Fulton spawning channels.

Projects:

Stream Enumerations:

Stream enumerations were carried out as in previous years, with 3 crews covering all of the creeks; Fort Babine crews covered from Boucher Creek down to Smithers Landing, Tachet crews from Smithers Landing to Sand Point and Donald's Landing crews from Sand Point to the end of the lake (Portage).

The sockeye counts for this year were as follows:

Boucher Creek	20
Teszakwa Creek	800
5 Mile Creek	350
9 Mile Creek	2,100
Tachek Creek	2,100
Sockeye Creek	3,500
Morrison Creek	5,100
Twain Creek	11,000
Pierre Creek	16,500
Cross Creek	650
Donald's Creek	0 (dry)
Bernann (Deep) Creek	
4 Mile Creek	9,500
6 Mile (Gullwing) Creek	1,343

When compared to the brood year, 1992, most of the numbers are 'in the ballpark'. Some creeks had more fish while others had less (Appendix 1). It was interesting to see that the 'large run of 1996' didn't really have much of an effect on the wild stocks, leading one to believe they were mostly channel fish. In fact the large run was estimated at about 2,056,205 sockeye (including those fished missed due to high water and Fence opening late). Last year (1995) the run was counted at 2,279,903 which is roughly 220,000 more fish. The Fence report is contained in Appendix 2.

One thing to note was the high water was evident through all the creeks at the beginning of the season, and in some areas remained quite high through out the summer. The Babine Fence was put in late for this very reason, the water was too high to install it. Because of this some of the first run of fish went uncounted and the total count for the season is an estimated one.

Habitat Monitoring:

The Tachet and Donald's Landing crews both reported having problems again with beaver colonizing the salmon creeks. The dams were usually caught at their early stages and a section broken through to let the salmon up. As in previous years the dams that went up after the fish were through were left, they will most likely be blown out with the spring run off, and in the meantime will provide some habitat.

The NFC has also been keeping a 'list' of habitat projects that they would like to under take if and when funding becomes available. Most of these projects involve erosion control and gravel deposition at creek mouths.

Impacts and potential impacts on streams due to logging has become an increasing role that the NFC has taken on. To that end they have been training through short courses on what impacts to look for. The Fort Babine crew has taken a leading role in that area and have identified many impacts to the Ministry of Forests. Most of the impacts noted have been siltation in creeks which have then been remedied. The Fort Babine crew has also begun monitoring in the Boucher Creek area as a local forest company has started to log there. They have placed thermographs in the creek to see if there any changes in temperature due to the logging activity. This will be an on going study which will increase in scope next summer (1997).

Stream profiles were done on many of the creeks that are regularly monitored. These profiles have shown that there hasn't been much of a change in the creeks since the NFC began monitoring them in 1992. The profiles for 1996 are contained in Appendix 3.

Other Fisheries Projects:

Many of the projects that the NFC wanted to do this year where not done due to either the high water or the harvest. We had planned to tag the first part of the sockeye run through the Fence but as I've already stated the water was too high to put the Fence in and the run had started to go through. As well many of the other projects we had planned were not carried out because Donna and Bill our project leaders were seconded over to the harvest.

Environmental Youth Team (E Team):

The NFC applied for and received funding for three positions through the Ministry of Environment's E Team initiative. It was hoped that we would be able to put one position with each of the crews. There were no applicants from Fort Babine so rather than let that position go it was filled by someone in Burns Lake. The successful candidates were integrated into the stream crews after an 8 day training period.

Summer Challenge Students:

The NFC again applied for 3 summer students and we received 2 positions. We filled them with the same students we had last year. The students have shown an interest in fisheries and one of them is now studying biology at the University of Northern BC. It is hoped that by providing the summer employment more LBN members will go on to university and college to study Natural Resources.

Metal Levels in Fish Study:

The final decision reached after going through the results of the Metal Levels in Fish from Babine Lake is that more study is needed. Some of the levels are high and others are borderline high. A much more stringent study is needed to see if these data are anomalies or if they present a true reading of the levels of metal found in fish tissues.

The full report of the Greenplan funded Metal Survey has been completed and is included in Appendix 4. At the time of writing the NFC has received some money from the HEAL committee (Heal and Environment of Aboriginal Lands) to continue the study.

Training and Education:

Guardianship:

Once again the NFC tried to get some Phase 2 training for the crew, and at first it seemed it might be possible, but again things were cancelled. I've given up trying for this course for the crew. Each year they get their hopes up and every nothing happens.

First Aid:

In May and June of 1996 the year-round stream crew all took their Level 3 Occupational First Aid. It was an intensive 2 week course, but 3 out 4 of the crew got their tickets. It was felt that this first aid course was best suited to the crew because of the remoteness of the worksites from a first aid facility.

Fisheries Training:

The NFC sponsored a few short courses at the local college for the new staff. These courses were required for the E Team members of the NFC and it was thought that the summer and seasonal staff would benefit from them as well. The courses were: Level 1 First Aid with a transportation endorsement, bear safety, WHMIS, and Transportation of Dangerous Goods.

Following this I taught a 3 day introductory course to the fisheries work we do. This course included fish identification and nomenclature, life cycles, the how to's of fish enumerations and stream profiles, fish/forestry interactions etc.

Management Training:

The year round staff also took part in a 3 part, 9 day management training course on Sept, Oct and Nov. This course was also offered by the local college. None of the staff had had previous management training and with the Nation evolving as it is with more authority being handed down the line it was felt that the staff would benefit from the training. Indeed in the months following this course many of the skills taught were used in decision making within the NFC.

Upgrading:

The crew continues to upgrade in the winter months. It is hoped that by next fall some of them will be able to start some post secondary training.

Harvests:

The 1996 harvest was the most successful harvest yet; both in terms of fish harvested and in jobs created. The Lake Babine Nation was allocated a total of 150,000 sockeye. 110,000 sockeye were harvested at the Fulton river and Pinkut creek sites, the remaining 40,000 pieces were harvested at the Babine river counting fence. (See Appendix 5)

The Fulton and Pinkut harvests generated a total of 122 jobs for the Lake Babine Nation, although they were short term. Fort Babine Enterprises conducted the fence harvest, and as of the present time NFC does not know how many people were employed.

For the Fulton and Pinkut harvest Ocean Fisheries Ltd paid a price of $1.00 per pound for the harvested fish. The wages for these two harvest totalled $175,000.00 with a further $33,000.00 spent on supplies and equipment. Financial data for the Fort Babine harvest is unknown by NFC, but is available from Fort Babine Enterprises.

Plans for 1997-98:

Many of the projects that were not carried out last year will be revisited this year. To make sure that happens, each of the year round staff has been 'assigned' (through mutual consent) a project to oversee. This will give everyone their one pet project and will pass some of the leadership authority down to the other members of the NFC crew.

The biologist, Leanne Olinyk will be continuing on the Metals Study. She is going to get more samples from more fish and have them analyzed. The NFC crew will be utilized for the catching and sampling of the fish. She is working in conjunction with researchers from UNBC and Health Canada.

Project co-ordinator Bill Spenst will be setting up the Resident Spawning time project. We will most likely conduct the project on 4 Mile creek. If it goes well we hope to expand this study to other creeks in the following years. The project will, in the future, enable us to more accurately enumerate creeks as we will now how often to count the creeks. The entire crew will be involved in this project as it will serve as a learning tool as well as a 'research project'. It is hoped that we can involve some Elder's as well by setting up a traditional weir to use as a counting/ tagging fence.

Our other Project Coordinator Donna Macintyre is in charge of a logging impact study in her area (Fort Babine). Boucher Creek has recently seen an increase in logging activity and we have had thermographs in the creek for 2 years. What we want to do there is set up more thermographs to see if there are changes in temperature near the logging blocks. This study will also try to determine other changes in the stream over the course of the next few years (eg increased siltation, higher run off etc.)

Bernard Patrick our Donald's Landing Foreman recently participated in a video course where he learned how to film, produce and edit a film. We will be utilizing his new skills to make a short video on the Fisheries program. One of the problems we encounter when interacting with many of the Elder's is the language barrier. So we hope to produce the video in both English and Carrier. The video will be about the program, what we do on a day to day basis and what we are doing on our special projects.

Our final 'special' project will be lead by Fort Babine foreman Robbie Reid. He will organize the crew to investigate other creeks in the area. These creeks run

into the Babine watershed but not into Babine directly. We will be looking for changes in water quality that could effect salmon streams. He will also be looking more closely at the Morrison area.

Finances 1997-98:

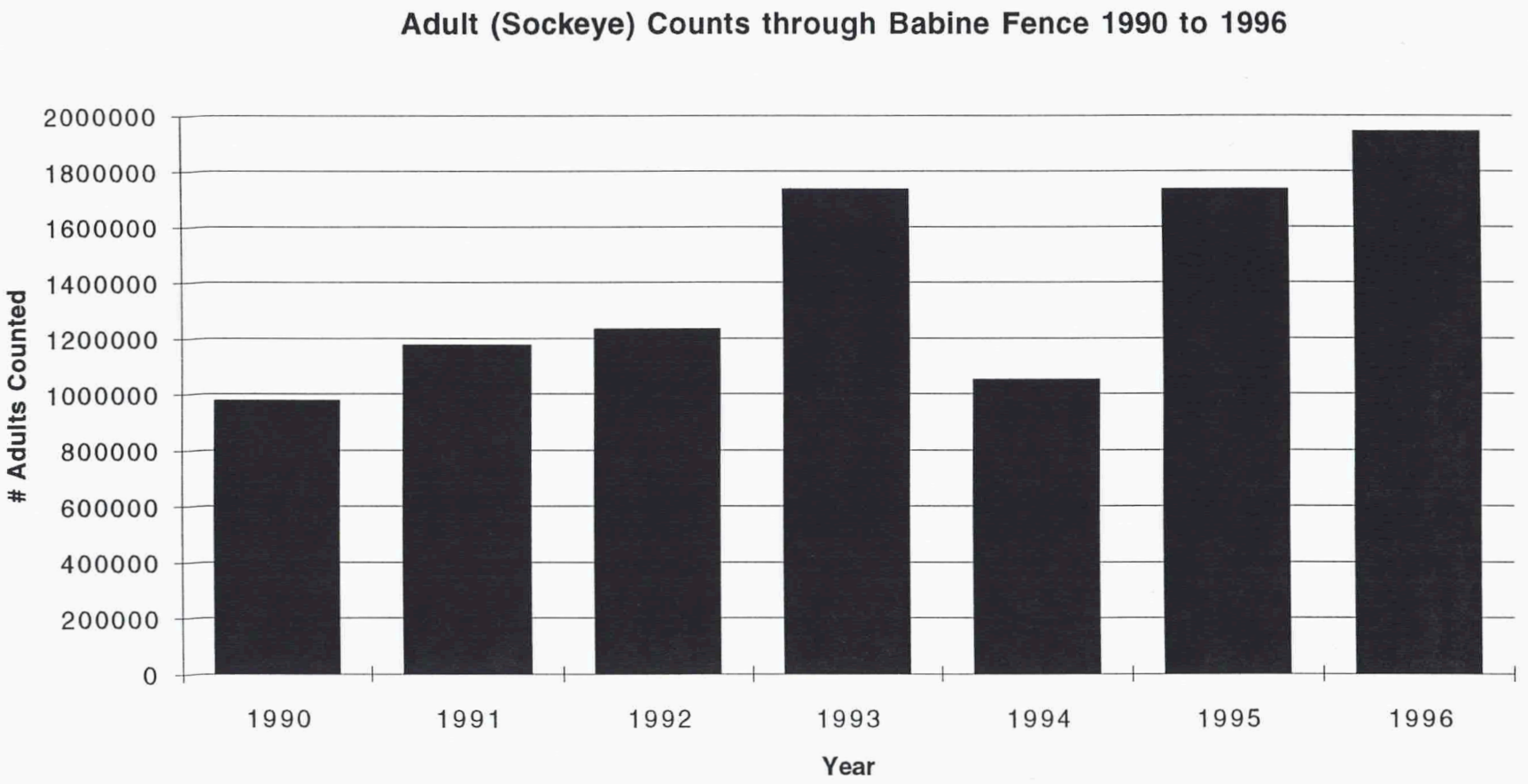
The following is a simplified proposed budget for the upcoming year:

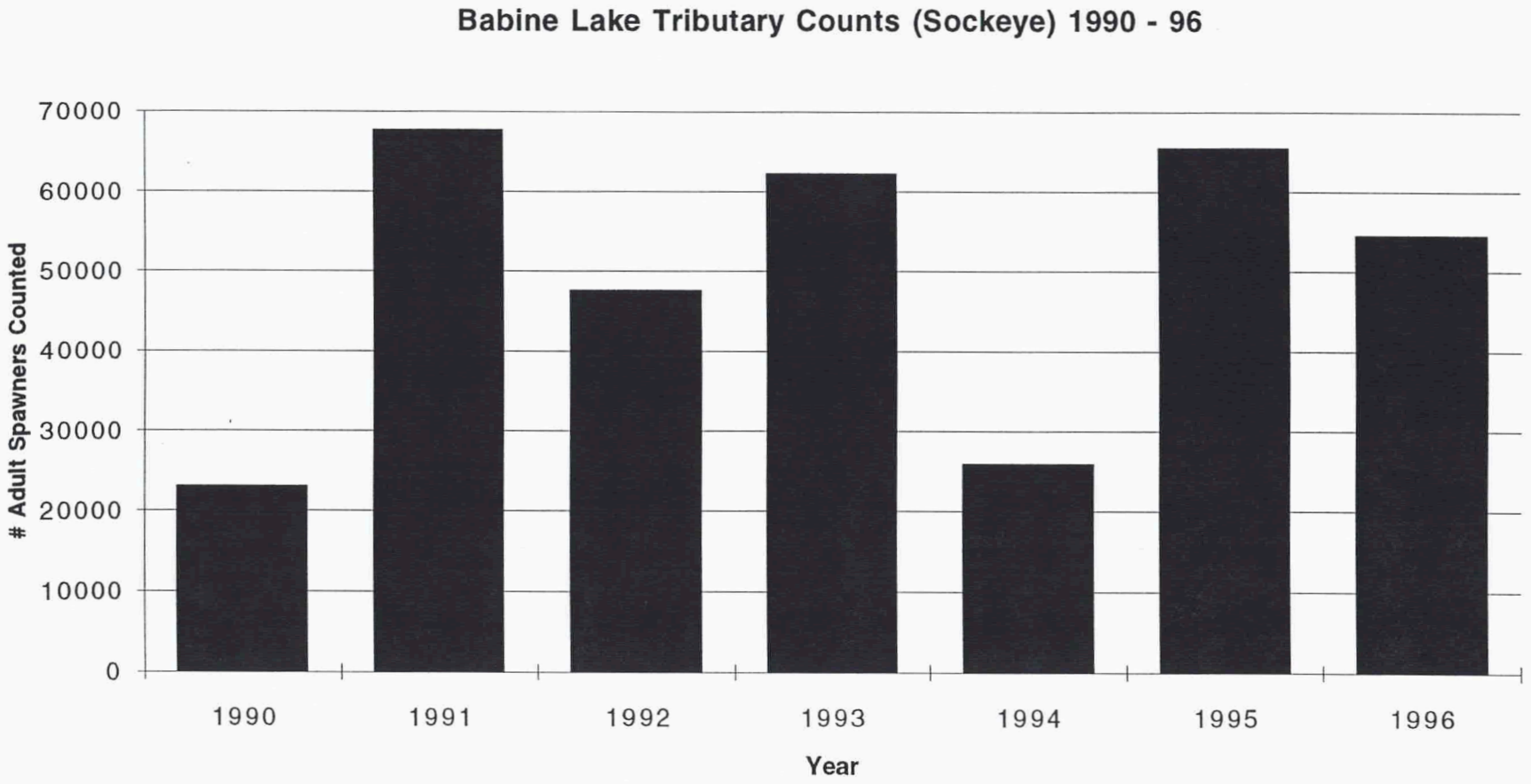
Wages, Travel, Benefits, Administration	384,045
Supplies, Capital Expenditures	49,605
Training	6,500
Special Projects	34,850
TOTAL	475,000

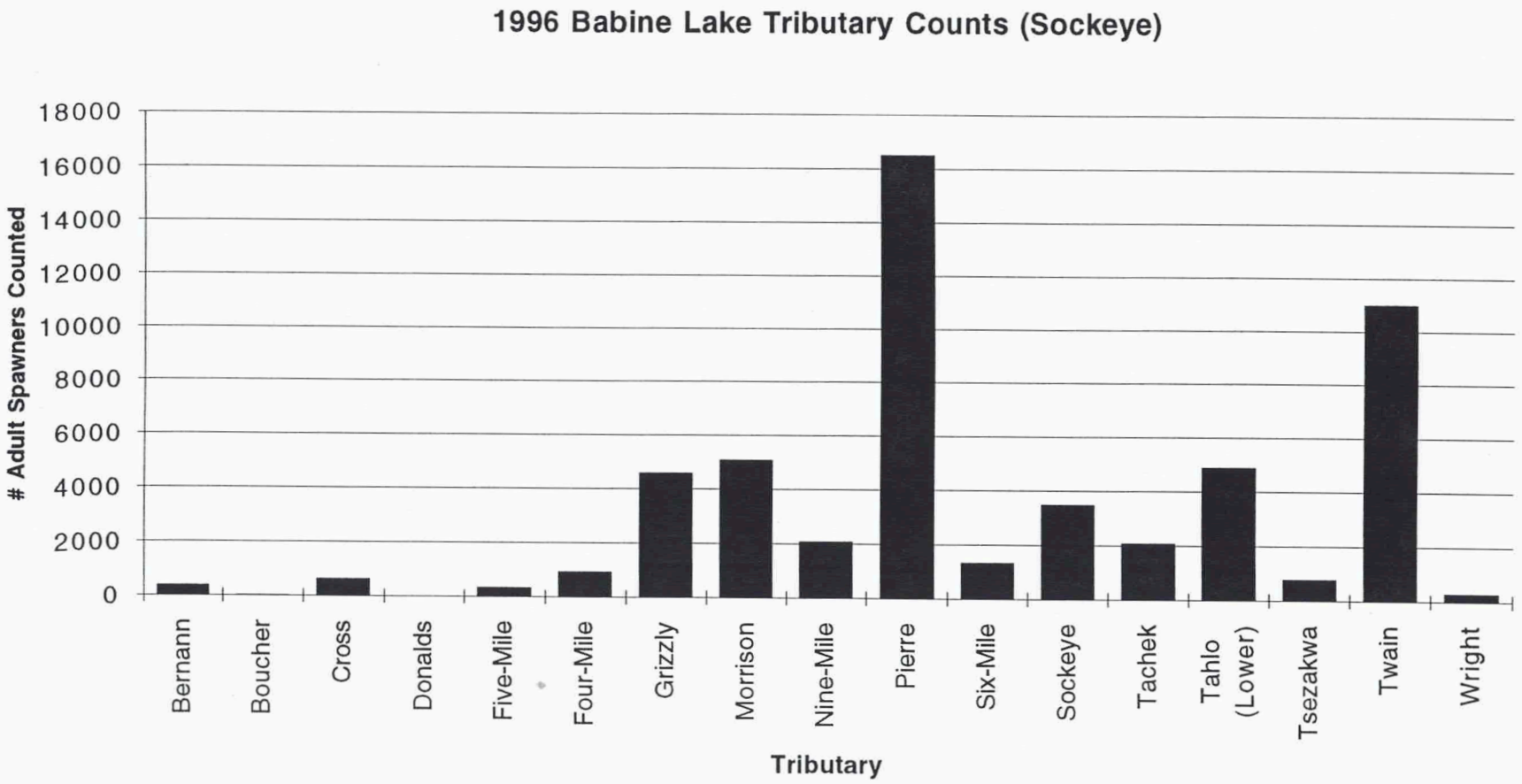
A Special Mention

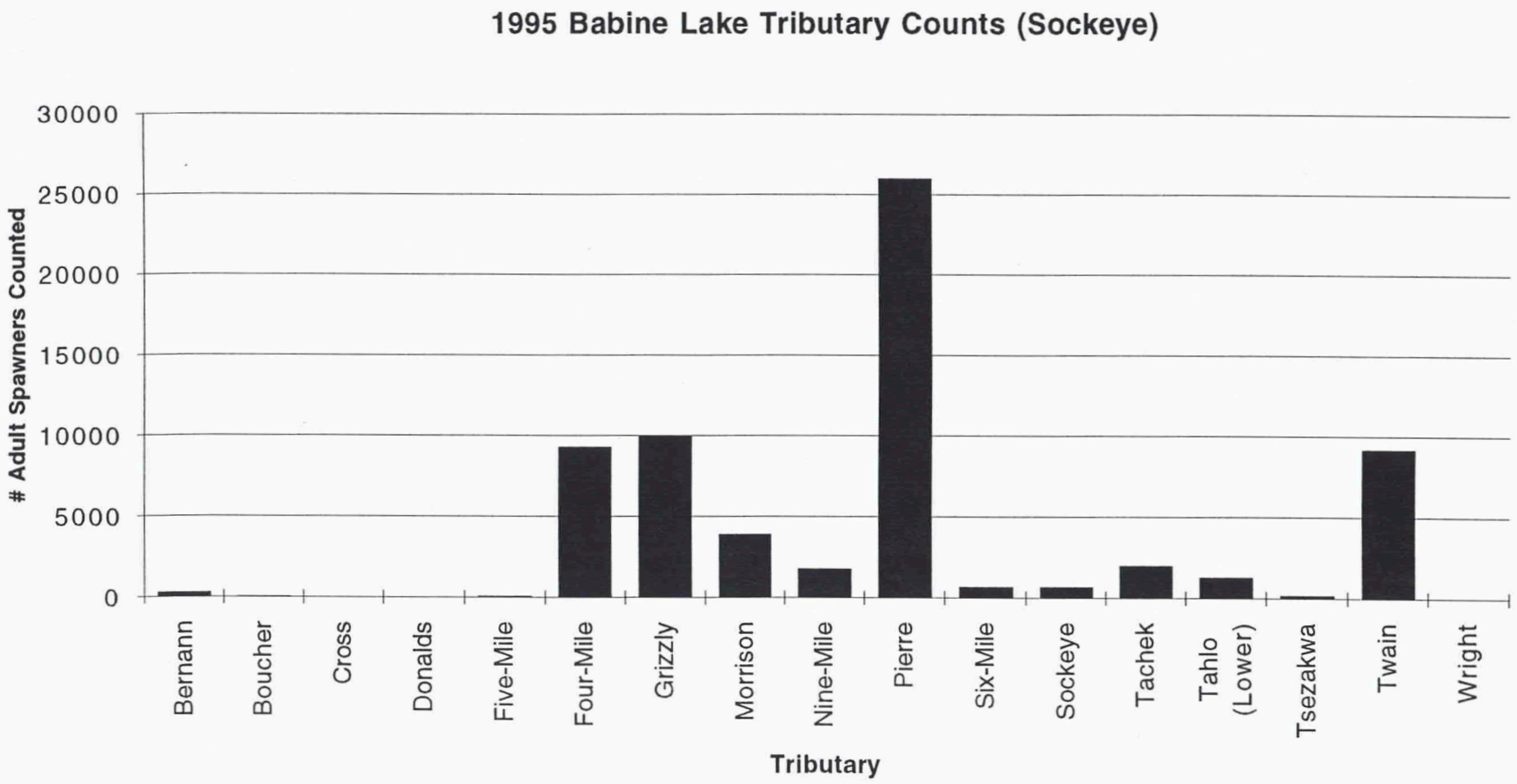
On February 9th, 1996 the Elder's Advisor for the Ned'u'ten Fisheries Commission passed away. Gordon Joseph was an integral part of the NFC and the Office of the Hereditary Chiefs (the office that the NFC works out of). He accompanied many of the NFC staff to various meetings and was the voice of the of the Elder's.

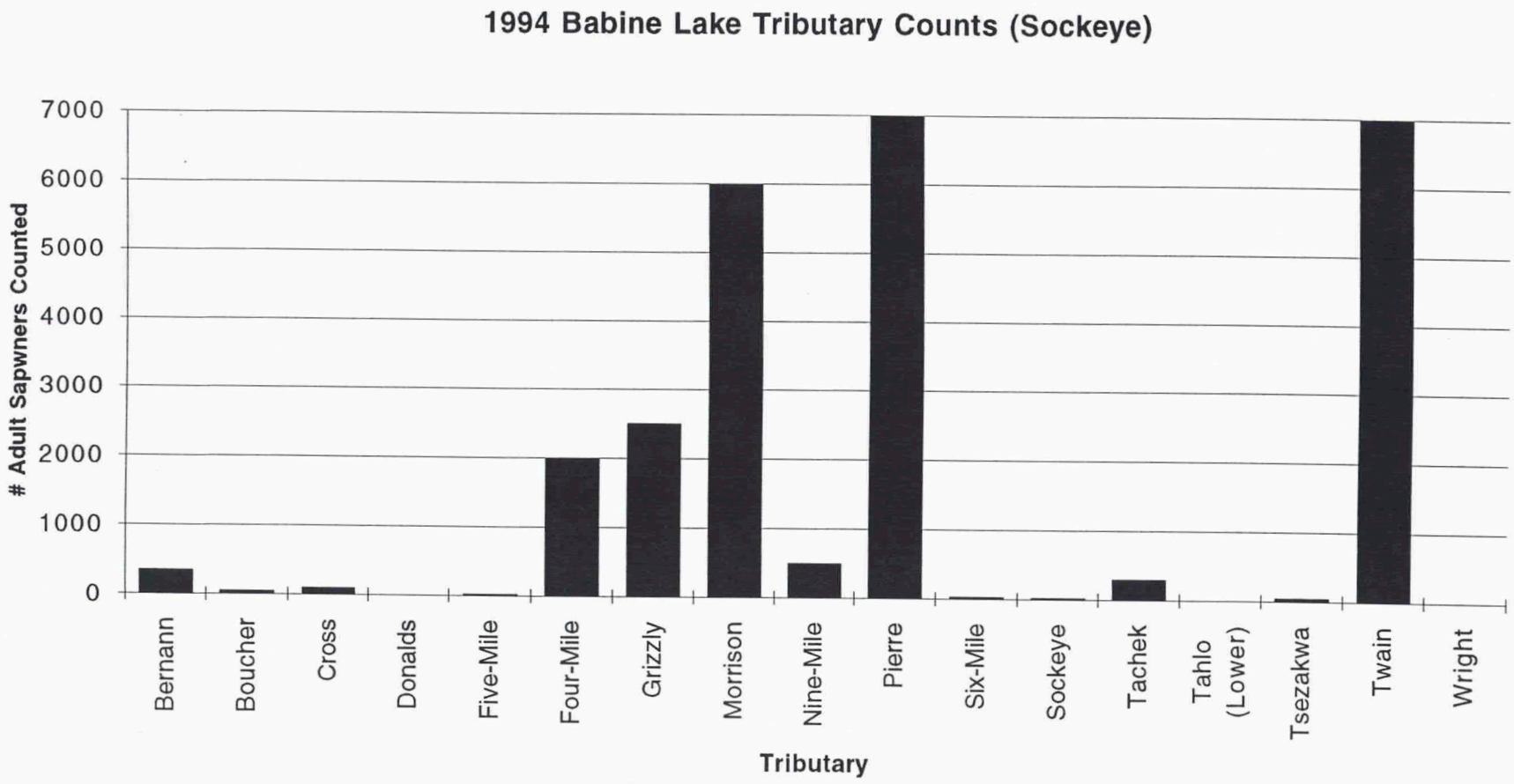
There was a smile and a "Good Morning" from him every day and that will be missed. He was valued in the office for his wisdom and his humour. We depended on him for much of our traditional information. He taught us in subtle ways and after his passing many of us realized just how much he had influenced us. One of Gordon's main teachings to the NFC was to protect the environment for the next generations. He wanted the stream crews to learn as much as they could about the natural resources in the LBN traditional lands so they could protect them for his "grandchildren's grandchildren.".


Adult (Sockeye) Counts through Babine Fence 1990 to 1996
Adults Counted
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
1990
1991
1992
1993
1994
1995
1996
Year


Babine Lake Tributary Counts (Sockeye) 1990 - 96
70000
60000
50000
40000
30000
20000
10000
0
Adult Spawners Counted
1990
1991
1992
1993
1994
1995
1996
Year


1996 Babine Lake Tributary Counts (Sockeye)
Adult Spawners Counted
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Bernann
Boucher
Cross
Donalds
Five-Mile
Four-Mile
Grizzly
Morrison
Nine-Mile
Pierre
Six-Mile
Sockeye
Tachek
Tahlo (Lower)
Tsezakwa
Twain
Wright
Tributary


1995 Babine Lake Tributary Counts (Sockeye)
Adult Spawners Counted
30000
25000
20000
15000
10000
5000
0
Bernann
Boucher
Cross
Donalds
Five-Mile
Four-Mile
Grizzly
Morrison
Nine-Mile
Pierre
Six-Mile
Sockeye
Tachek
Tahlo (Lower)
Tsezakwa
Twain
Wright
Tributary


1994 Babine Lake Tributary Counts (Sockeye)
Adult Sapwners Counted
7000
6000
5000
4000
3000
2000
1000
0
Bernann
Boucher
Cross
Donalds
Five-Mile
Four-Mile
Grizzly
Morrison
Nine-Mile
Pierre
Six-Mile
Sockeye
Tachek
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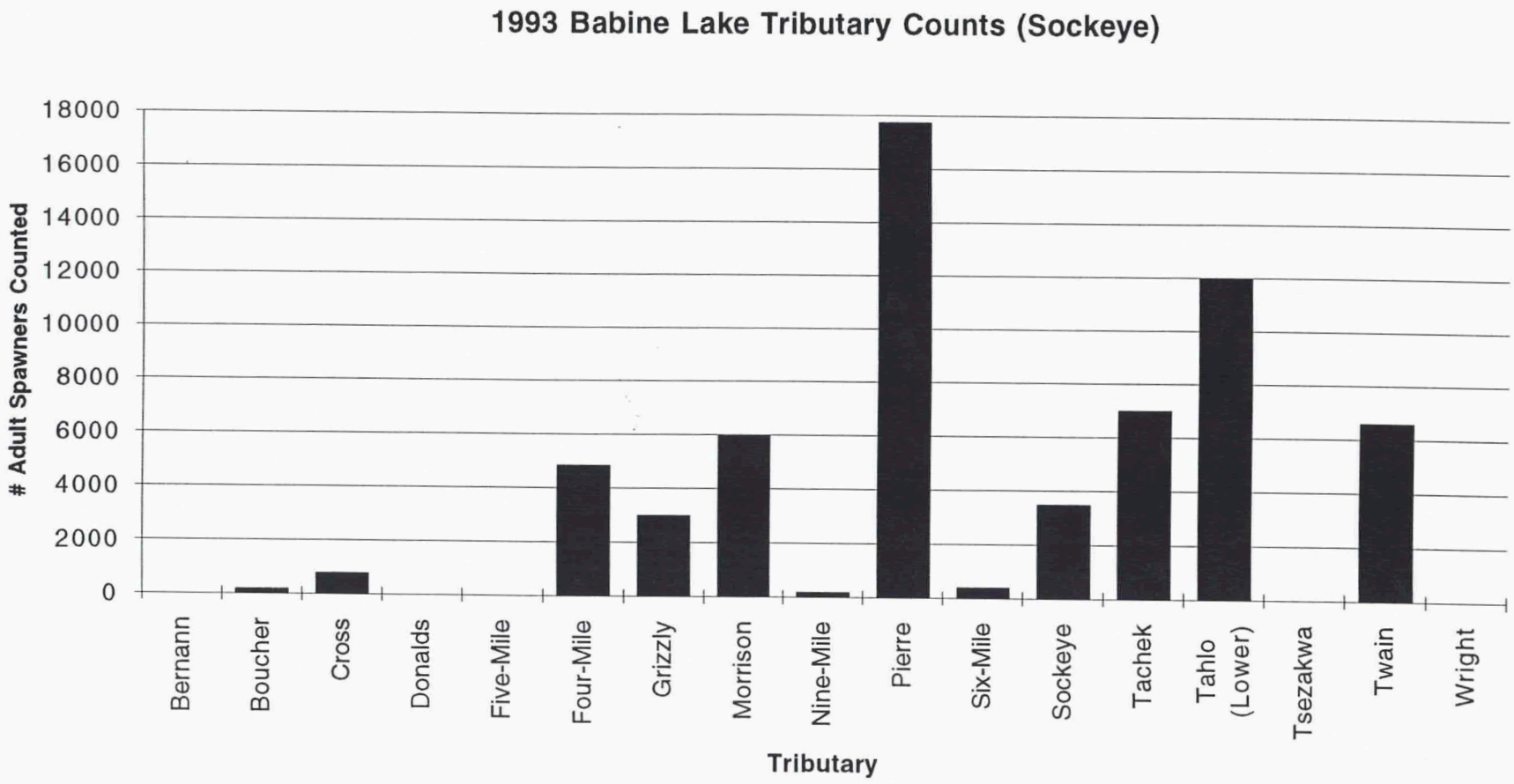
Tsezakwa
Twain
Wright
Tributary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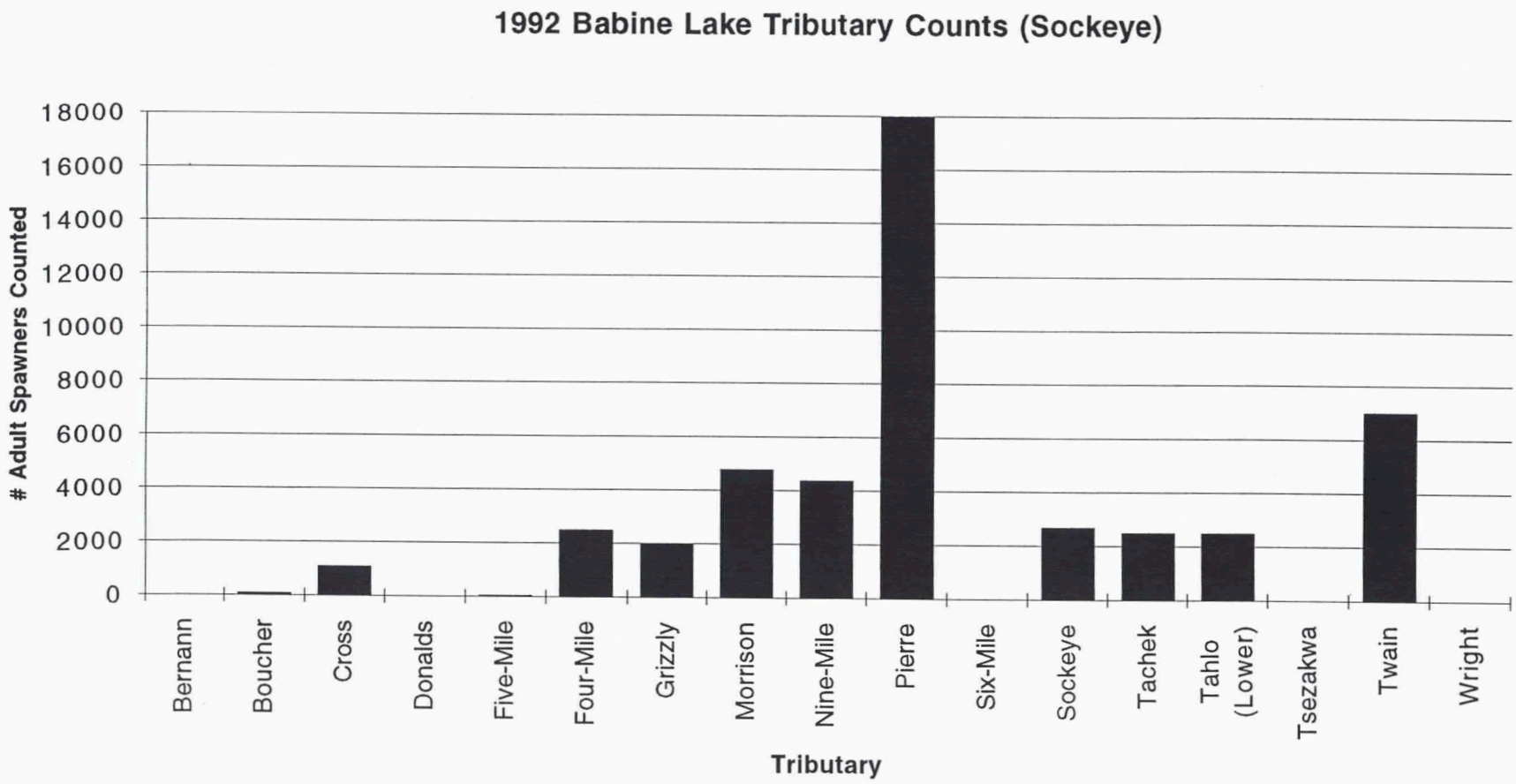
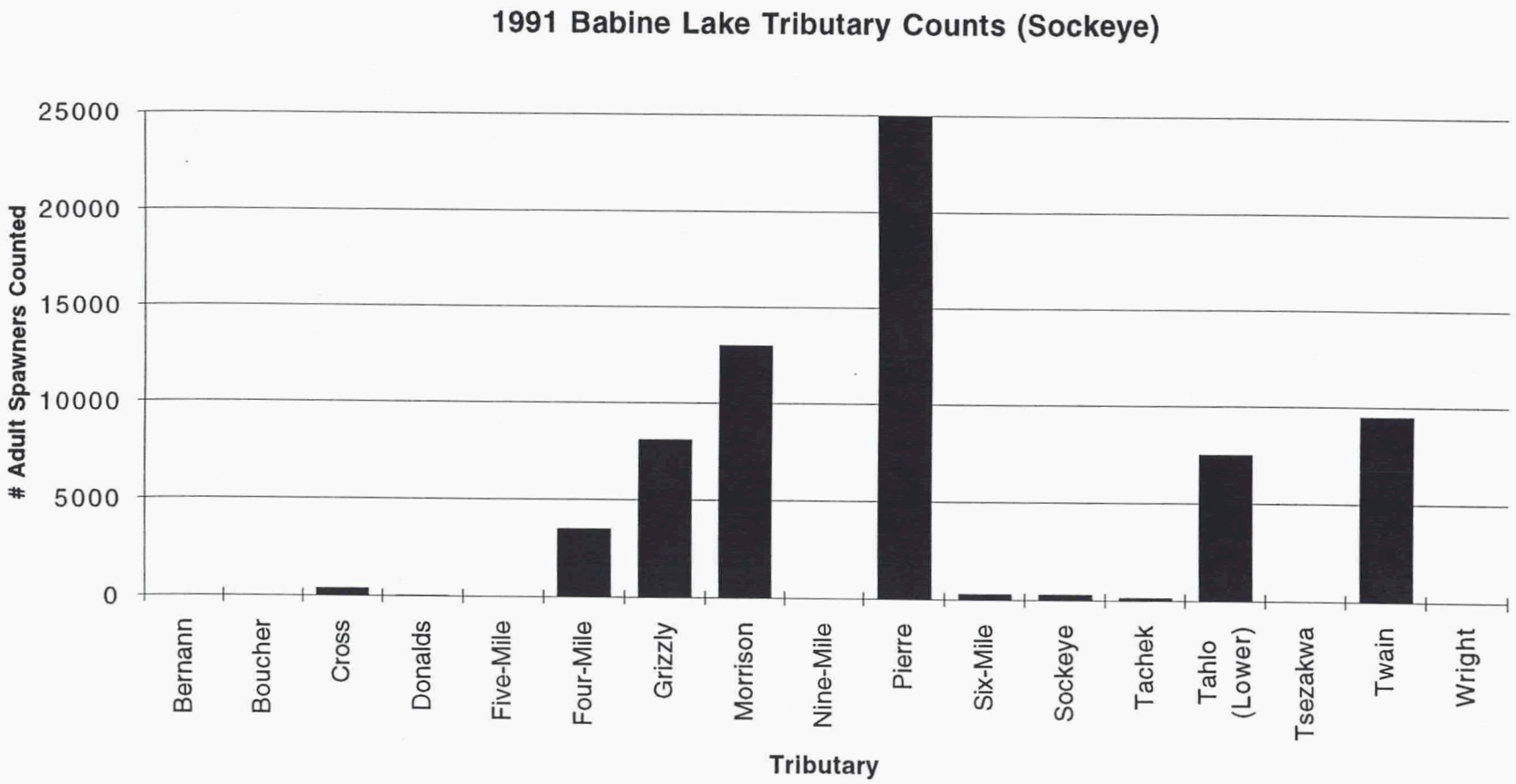

1992 Babine Lake Tributary Counts (Sockeye)
Adult Spawners Counted
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Bernann
Boucher
Cross
Donalds
Five-Mile
Four-Mile
Grizzly
Morrison
Nine-Mile
Pierre
Six-Mile
Sockeye
Tachek
Tahlo (Lower)
Tsezakwa
Twain
Wright
Tributary


1991 Babine Lake Tributary Counts (Sockeye)
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20000
15000
10000
5000
0
Bernann
Boucher
Cross
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Grizzly
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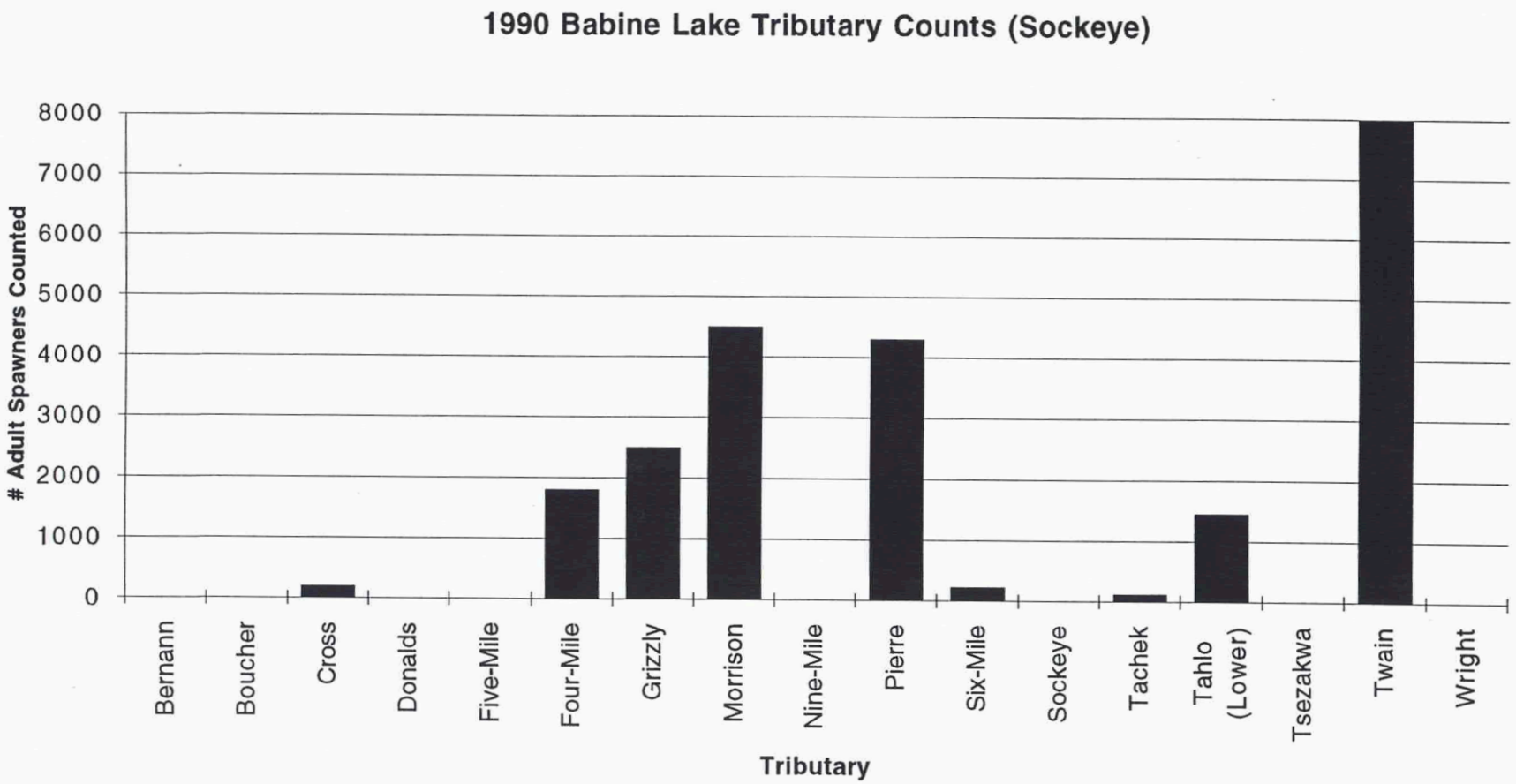
Nine-Mile
Pierre
Six-Mile
Sockeye
Tachek
Tahlo (Lower)
Tsezakwa
Twain
Wright
Tributary


1990 Babine Lake Tributary Counts (Sockeye)
Adult Spawners Counted
8000
7000
6000
5000
4000
3000
2000
1000
0
Bernann
Boucher
Cross
Donalds
Five-Mile
Four-Mile
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Six-Mile
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Tachek
Tahlo (Lower)
Tsezakwa
Twain
Wright
Tributary

Date: 11/08/96

To: Dave Peacock . Senior Biologist

S.A.D. North Coast Salmon.

From: Mike Jakubowski, Project Technician

Subject: Babine Fence Counts For 1996.

Due to exceptionally high-water in July the Babine River Counting fence was not installed until July 27. Constant checking and repairing holes using dive gear made the fence fish proof on the evening of July 29. This years programs were carried out by one technician, Two natives from Fort Babine, one Co - Sep student three students one agency personnel as well as up to three contact personnel at a time. As in recent years the fence was left in later than the norm to enumerate Coho with November 4 being the last day of enumeration in 1996. Included in this memo are daily and cumulative counts for all species of salmon arriving at the fence (harvested fish are included in daily counts) as well as tallies of Sockeye harvested by natives from Fort Babine. Total escapements through the Babine Fence are as follows:

Sockeye: 1,944,067

Large, 1,900,591

Jack, 43,476

Chinook: 1,945

Large, 1,893

Jack, 52

Pink, 314,041

Coho, 2,669

Steelhead, 29

Chum, 4

Babine Fence Counts for 1996.

1996 saw poor returns for Jack sockeye and this reflected in a native harvest of only 6,212 over a 16 day period. Large Sockeye were also harvested beginning on August 12 and ending on Aug. 20 . Between these dates 40,421 large Sockeye were harvested.

Sockeye spawning in the upper and lower Babine River were estimated by a couple of aerial counts from a helicopter. It should be noted that on both days of flying the weather was less than ideal and these estimates are not as reliable in previous years. The upper Babine River (from Smokehouse Island to the Fort Babine Bridge.) was estimated to have 100,000 Sockeye Spawning. While the lower River (Nilkitka Lake to the counting fence) had 15,000 Sockeye in it.

Chinook spawning directly below the counting fence were estimated at 1,000.

It's obvious that a number of Sockeye migrated through the fence before it was installed . The only method of estimating this is to take the average percentage of Sockeye migrating through the fence in previous years before July 29 and apply this to 1996 numbers. This done the total escapement of Sockeye through the Babine Fence for 1996 would be 2,056,205

1996 BABINE FENCE COUNTS.

DATE	DAILY J.K. SOCKEYE	ACCUM. J.K. SOCKEYE	DAILY. LRG. SOCKEYE	ACCUM. LRG. SOCKEYE	DAILY TOTAL SOCKEYE	ACCUM. TOTAL SOCKEYE
9-Sep	243	39802	10245	1,799,025	10488	1838827
10-Sep	280	40082	8949	1,807,974	9229	1848056
11-Sep	380	40462	10241	1,818,215	10621	1858677
12-Sep	180	40642	10279	1,828,494	10459	1869136
13-Sep	188	40830	8344	1,836,838	8532	1877668
14-Sep	244	41074	7155	1,843,993	7399	1885067
15-Sep	244	41318	8105	1,852,098	8349	1893416
16-Sep	264	41582	5650	1,857,748	5914	1899330
17-Sep	131	41713	4478	1,862,226	4609	1903939
18-Sep	156	41869	3935	1,866,161	4091	1908030
19-Sep	101	41970	2987	1,869,148	3088	1911118
20-Sep	137	42107	2788	1,871,936	2925	1914043
21-Sep	124	42231	3261	1,875,197	3385	1917428
22-Sep	127	42358	2376	1,877,573	2503	1919931
23-Sep	154	42512	2467	1,880,040	2621	1922552
24-Sep	178	42690	2925	1882965	3103	1925655
25-Sep	147	42837	2170	1885135	2317	1927972
26-Sep	133	42970	1925	1887060	2058	1930030
27-Sep	102	43072	2229	1889289	2331	1932361
28-Sep	65	43137	1992	1891281	2057	1934418
29-Sep	81	43218	1747	1893028	1828	1936246
30-Sep	61	43279	1468	1894496	1529	1937775
1-Oct	41	43320	804	1895300	845	1938620
2-Oct	18	43338	438	1895738	456	1939076
3-Oct	17	43355	320	1896058	337	1939413
4-Oct	22	43377	373	1896431	395	1939808
5-Oct	25	43402	492	1896923	517	1940325
6-Oct	16	43418	260	1897183	276	1940601
7-Oct	15	43433	240	1897423	255	1940856
8-Oct	8	43441	296	1897719	304	1941160
9-Oct	4	43445	334	1898053	338	1941498
10-Oct	2	43447	362	1898415	364	1941862
11-Oct	7	43454	295	1898710	302	1942164
12-Oct	5	43459	228	1898938	233	1942397
13-Oct	2	43461	222	1899160	224	1942621
14-Oct	2	43463	177	1899337	179	1942800
15-Oct	3	43466	137	1899474	140	1942940
16-Oct	1	43467	132	1899606	133	1943073
17-Oct	1	43468	113	1899719	114	1943187
18-Oct	2	43470	64	1899783	66	1943253
19-Oct	0	43470	79	1899862	79	1943332
20-Oct	1	43471	100	1899962	101	1943433
21-Oct	0	43471	97	1900059	97	1943530

1996 BABINE FENCE COUNTS.

DATE	DAILY J.K. SOCKEYE	ACCUM. J.K. SOCKEYE	DAILY. LRG. SOCKEYE	ACCUM. LRG. SOCKEYE	DAILY TOTAL SOCKEYE	ACCUM. TOTAL SOCKEYE
22-Oct	1	43472	83	1900142	84	1943614
23-Oct	1	43473	86	1900228	87	1943701
24-Oct	0	43473	127	1900355	127	1943828
25-Oct	0	43473	42	1900397	42	1943870
26-Oct	0	43473	39	1900436	39	1943909
27-Oct	0	43473	36	1900472	36	1943945
28-Oct	1	43474	19	1900491	20	1943965
29-Oct	1	43475	17	1900508	18	1943983
30-Oct	0	43475	19	1900527	19	1944002
31-Oct	1	43476	17	1900544	18	1944020
1-Nov	0	43476	23	1900567	23	1944043
2-Nov	0	43476	10	1900577	10	1944053
3-Nov	0	43476	14	1900591	14	1944067

1996 Daily and Accumulative counts of Jack and Large Sockeye harvested at the Babine Fence.

DATE	DAILY JK. SOCKEYE	ACCUM. JK. SOCKEYE	DAILY LRG. SOCKEYE	ACCUM. LRG. SOCKEYE
7-Aug	384	384	0	0
8-Aug	287	671	0	0
9-Aug	408	1,079	0	0
10-Aug	371	1,450	0	0
11-Aug	476	1,926	0	0
12-Aug	342	2,268	7200	7,200
13-Aug	842	3,110	4487	11,687
14-Aug	574	3,684	5420	17,107
15-Aug	589	4,273	5803	22,910
16-Aug	0	4,273	0	22,910
17-Aug	0	4,273	0	22,910
18-Aug	0	4,273	0	22,910
19-Aug	324	4,597	6963	29,873
20-Aug	619	5,216	10548	40,421
22-Aug	579	5,795		
23-Aug	417	6,212		

1996 BABINE FENCE COUNTS.

DATE	DAILY J.K CHINOOK	ACCUM. J.K. CHINOOK	DAILY. LRG CHINOOK	ACCUM. LRG. CHINOOK	DAILY TOTAL CHINOOK	ACCUM. TOTAL CHINOOK
28-Jul	0	0	0	0	0	0
29-Jul	0	0	0	0	0	0
30-Jul	0	0	1	1	1	1
31-Jul	0	0	1	2	1	2
1-Aug	0	0	0	2	0	2
2-Aug	0	0	1	3	1	3
3-Aug	0	0	1	4	1	4
4-Aug	0	0	4	8	4	8
5-Aug	0	0	4	12	4	12
6-Aug	0	0	2	14	2	14
7-Aug	0	0	1	15	1	15
8-Aug	0	0	1	16	1	16
9-Aug	1	1	5	21	6	22
10-Aug	0	1	0	21	0	22
11-Aug	1	2	7	28	8	30
12-Aug	0	2	0	28	0	30
13-Aug	0	2	11	39	11	41
14-Aug	0	2	2	41	2	43
15-Aug	0	2	3	44	3	46
16-Aug	0	2	23	67	23	69
17-Aug	0	2	9	76	9	78
18-Aug	1	3	16	92	17	95
19-Aug	0	3	2	94	2	97
20-Aug	0	3	2	96	2	99
21-Aug	0	3	26	122	26	125
22-Aug	0	3	9	131	9	134
23-Aug	0	3	20	151	20	154
24-Aug	3	6	87	238	90	244
25-Aug	2	8	22	260	24	268
26-Aug	1	9	68	328	69	337
27-Aug	3	12	15	343	18	355
28-Aug	1	13	18	361	19	374
29-Aug	2	15	57	418	59	433
30-Aug	1	16	32	450	33	466
31-Aug	0	16	61	511	61	527
1-Sep	0	16	65	576	65	592
2-Sep	1	17	32	608	33	625
3-Sep	1	18	29	637	30	655
4-Sep	2	20	6	643	8	663
5-Sep	1	21	13	656	14	677
6-Sep	3	24	8	664	11	688
7-Sep	1	25	3	667	4	692
8-Sep	6	31	45	712	51	743

1996 BABINE FENCE COUNTS.

DATE	DAILY J.K CHINOOK	ACCUM. J.K. CHINOOK	DAILY. LRG CHINOOK	ACCUM. LRG. CHINOOK	DAILY TOTAL CHINOOK	ACCUM. TOTAL CHINOOK
9-Sep	3	34	56	768		802
10-Sep	2	36	34	802	36	838
11-Sep	1	37	37	839	38	876
12-Sep	2	39	96	935	98	974
13-Sep	0	39	45	980	45	1,019
14-Sep	0	39	69	1,049	69	1,088
15-Sep	0	39	40	1,089	40	1,128
16-Sep	1	40	38	1,127	39	1,167
17-Sep	3	43	37	1,164	40	1,207
18-Sep	1	44	58	1,222	59	1,266
19-Sep	0	44	26	1,248	26	1,292
20-Sep	2	46	20	1,268	22	1,314
21-Sep	1	47	34	1,302	35	1,349
22-Sep	0	47	23	1,325	23	1,372
23-Sep	1	48	17	1,342	18	1,390
24-Sep	0	48	208	1,550	208	1,598
25-Sep	0	48	70	1,620	70	1,668
26-Sep	1	49	57	1,677	58	1,726
27-Sep	1	50	55	1,732	56	1,782
28-Sep	1	51	22	1,754	23	1,805
29-Sep	0	51	54	1,808	54	1,859
30-Sep	0	51	29	1,837	29	1,888
1-Oct	0	51	36	1,873	36	1,924
2-Oct	1	52	1	1,874	2	1,926
3-Oct	0	52	0	1,874	0	1,926
4-Oct	0	52	0	1,874	0	1,926
5-Oct	0	52	5	1,879	5	1,931
6-Oct	0	52	1	1,880	1	1,932
7-Oct	0	52	6	1,886	6	1,938
8-Oct	0	52	1	1,887	1	1,939
9-Oct	0	52	0	1,887	0	1,939
10-Oct	0	52	1	1,888	1	1,940
11-Oct	0	52	1	1,889	1	1,941
12-Oct	0	52	0	1,889	0	1,941
13-Oct	0	52	2	1,891	2	1,943
14-Oct	0	52	0	1,891	0	1,943
15-Oct	0	52	0	1,891	0	1,943
16-Oct	0	52	1	1,892	1	1,944
17-Oct	0	52	1	1,893	1	1,945
18-Oct	0	52	0	1,893	0	1,945
19-Oct	0	52	0	1,893	0	1,945
20-Oct	0	52	0	1,893	0	1,945
21-Oct	0	52	0	1,893	0	1,945

1996 BABINE FENCE COUNTS.

DATE	DAILY J.K CHINOOK	ACCUM. J.K. CHINOOK	DAILY. LRG CHINOOK	ACCUM. LRG. CHINOOK	DAILY TOTAL CHINOOK	ACCUM. TOTAL CHINOOK
22-Oct	0	52	0	1,893	0	1,945
23-Oct	0	52	0	1,893	0	1,945
24-Oct	0	52	0	1,893	0	1,945
25-Oct	0	52	0	1,893	0	1,945
26-Oct	0	52	0	1,893	0	1,945
27-Oct	0	52	0	1,893	0	1,945
28-Oct	0	52	0	1,893	0	1,945
29-Oct	0	52	0	1,893	0	1,945
30-Oct	0	52	0	1,893	0	1,945
31-Oct	0	52	0	1,893	0	1,945
1-Nov	0	52	0	1,893	0	1,945
2-Nov	0	52	0	1,893	0	1,945
3-Nov	0	52	0	1,893	0	1,945

1996 BABINE FENCE COUNTS

DATE	DAILY PINK	ACCUM. PINK	DAILY COHO	ACCUM. COHO	DAILY STHD.	ACCUM. STHD.
28-Jul	0	0	0	0	0	0
29-Jul	0	0	0	0	0	0
30-Jul	0	0	0	0	0	0
31-Jul	0	0	0	0	0	0
1-Aug	0	0	0	0	0	0
2-Aug	0	0	0	0	0	0
3-Aug	0	0	0	0	0	0
4-Aug	0	0	0	0	0	0
5-Aug	1	1	0	0	0	0
6-Aug	7	8	0	0	0	0
7-Aug	103	111	0	0	0	0
8-Aug	126	237	0	0	0	0
9-Aug	226	463	0	0	0	0
10-Aug	332	795	0	0	0	0
11-Aug	736	1,531	0	0	0	0
12-Aug	555	2,086	0	0	0	0
13-Aug	2347	4,433	0	0	0	0
14-Aug	2624	7,057	0	0	0	0
15-Aug	6412	13,469	1	1	0	0
16-Aug	6955	20,424	1	2	0	0
17-Aug	7817	28,241	0	2	0	0
18-Aug	6323	34,564	0	2	0	0
19-Aug	2370	36,934	0	2	0	0
20-Aug	12157	49,091	1	3	0	0
21-Aug	16574	65,665	0	3	0	0
22-Aug	11705	77,370	0	3	0	0
23-Aug	15110	92,480	2	5	0	0
24-Aug	17369	109,849	5	10	2	2
25-Aug	12776	122,625	4	14	0	2
26-Aug	7849	130,474	0	14	0	2
27-Aug	5602	136,076	2	16	1	3
28-Aug	19309	155,385	1	17	1	4
29-Aug	32195	187,580	3	20	0	4
30-Aug	20562	208,142	3	23	1	5
31-Aug	16032	224,174	11	34	1	6
1-Sep	13488	237,662	18	52	1	7
2-Sep	15603	253,265	10	62	0	7
3-Sep	13067	266,332	17	79	2	9
4-Sep	8065	274,397	11	90	0	9
5-Sep	8746	283,143	24	114	0	9
6-Sep	5725	288,868	27	141	0	9
7-Sep	4750	293,618	26	167	0	9
8-Sep	4460	298,078	72	239	0	9

1996 BABINE FENCE COUNTS

DATE	DAILY PINK	ACCUM. PINK	DAILY COHO	ACCUM. COHO	DAILY STHD.	ACCUM. STHD.
9-Sep	3310	301,388	54	293	0	9
10-Sep	2596	303,984	76	369	0	9
11-Sep	2459	306,443	76	445	0	9
12-Sep	1970	308,413	115	560	0	9
13-Sep	1531	309,944	80	640	0	9
14-Sep	1076	311,020	141	781	0	9
15-Sep	1132	312,152	117	898		9
16-Sep	588	312,740	128	1,026		9
17-Sep	424	313,164	56	1,082		9
18-Sep	357	313,521	52	1,134	1	10
19-Sep	135	313,656	64	1,198		10
20-Sep	107	313,763	49	1,247		10
21-Sep	151	313,914	102	1,349		10
22-Sep	48	313,962	86	1,435		10
23-Sep	43	314,005	39	1,474		10
24-Sep	15	314,020	152	1,626		10
25-Sep	5	314,025	89	1,715		10
26-Sep	6	314,031	94	1,809		10
27-Sep	3	314,034	87	1,896		10
28-Sep	1	314,035	114	2,010	1	11
29-Sep	2	314,037	161	2,171	2	13
30-Sep	2	314,039	86	2,257	1	14
1-Oct	1	314,040	62	2,319		14
2-Oct	0	314,040	19	2,338		14
3-Oct	0	314,040	8	2,346		14
4-Oct	0	314,040	12	2,358		14
5-Oct	0	314,040	16	2,374		14
6-Oct	0	314,040	11	2,385		14
7-Oct	0	314,040	9	2,394		14
8-Oct	0	314,040	5	2,399	3	17
9-Oct	0	314,040	8	2,407	2	19
10-Oct	0	314,040	37	2,444	3	22
11-Oct	0	314,040	41	2,485	4	26
12-Oct	1	314,041	25	2,510	1	27
13-Oct	0	314,041	35	2,545	0	27
14-Oct	0	314,041	11	2,556	1	28
15-Oct	0	314,041	16	2,572	1	29
16-Oct	0	314,041	7	2,579	0	29
17-Oct	0	314,041	11	2,590	0	29
18-Oct	0	314,041	7	2,597	0	29
19-Oct	0	314,041	3	2,600	0	29
20-Oct	0	314,041	4	2,604	0	29
21-Oct	0	314,041	5	2,609	0	29

1996 BABINE FENCE COUNTS

DATE	DAILY PINK	ACCUM. PINK	DAILY COHO	ACCUM. COHO	DAILY STHD.	ACCUM. STHD.
22-Oct	0	314,041	7	2,616	0	29
23-Oct	0	314,041	5	2,621	0	29
24-Oct	0	314,041	3	2,624	0	29
25-Oct	0	314,041	3	2,627	0	29
26-Oct	0	314,041	2	2,629	0	29
27-Oct	0	314,041	5	2,634	0	29
28-Oct	0	314,041	1	2,635	0	29
29-Oct	0	314,041	4	2,639	0	29
30-Oct	0	314,041	1	2,640	0	29
31-Oct	0	314,041	5	2,645	0	29
1-Nov	0	314,041	4	2,649	0	29
2-Nov	0	314,041	6	2,655	0	29
3-Nov	0	314,041	5	2,660	0	29
4-Nov	0	314,041	9	2,669	0	29

1996 Adipose clipped Chinook and Coho through the Babine Fence.

	CHINOOK				COHO		
Date	Clipped	Unclipped	Unchecked	Date	Clipped	Unclipped	Unchecked
27-Jul	0	0	0	27-Jul	0	0	0
28-Jul	0	0	0	28-Jul	0	0	0
29-Jul	0	0	0	29-Jul	0	0	0
30-Jul	0	0	1	30-Jul	0	0	0
31-Jul	0	0	1	31-Jul	0	0	0
1-Aug	0	0	0	1-Aug	0	0	0
2-Aug	0	0	1	2-Aug	0	0	0
3-Aug	0	0	1	3-Aug	0	0	0
4-Aug	0	0	4	4-Aug	0	0	0
5-Aug	0	0	4	5-Aug	0	0	0
6-Aug	0	0	2	6-Aug	0	0	0
7-Aug	0	0	1	7-Aug	0	0	0
8-Aug	0	0	1	8-Aug	0	0	0
9-Aug	0	0	6	9-Aug	0	0	0
10-Aug	0	0	0	10-Aug	0	0	0
11-Aug	0	0	8	11-Aug	0	0	0
12-Aug	0	0	0	12-Aug	0	0	0
13-Aug	0	0	11	13-Aug	0	0	0
14-Aug	0	0	2	14-Aug	0	0	0
15-Aug	1	1	1	15-Aug	0	0	1
16-Aug	3	12	8	16-Aug	0	0	1
17-Aug	0	6	3	17-Aug	0	0	0
18-Aug	6	6	5	18-Aug	0	0	0
19-Aug	0	0	2	19-Aug	0	0	0
20-Aug	0	1	1	20-Aug	1	0	0
21-Aug	12	8	6	21-Aug	0	0	0
22-Aug	2	4	3	22-Aug	0	0	0
23-Aug	3	14	3	23-Aug	1	0	1
24-Aug	21	53	16	24-Aug	0	2	3
25-Aug	2	10	12	25-Aug	0	3	1
26-Aug	20	32	17	26-Aug	0	0	0
27-Aug	0	0	18	27-Aug	0	2	0
28-Aug	8	9	2	28-Aug	0	1	0
29-Aug	18	32	9	29-Aug	0	0	3
30-Aug	16	15	2	30-Aug	0	3	0
31-Aug	23	30	8	31-Aug	0	8	3
1-Sep	33	16	16	1-Sep	1	14	3
2-Sep	13	14	6	2-Sep	1	7	2
3-Sep	15	13	2	3-Sep	2	14	1
4-Sep	1	3	4	4-Sep	0	9	2
5-Sep	5	6	3	5-Sep	3	18	3
6-Sep	4	7	0	6-Sep	8	15	4

1996 Adipose clipped Chinook and Coho through the Babine Fence.

	CHINOOK				COHO		
Date	Clipped	Unclipped	Unchecked	Date	Clipped	Unclipped	Unchecked
7-Sep	1	2	1	7-Sep	3	17	6
8-Sep	14	31	6	8-Sep	17	47	8
9-Sep	16	38	5	9-Sep	7	44	3
10-Sep	7	26	3	10-Sep	2	66	8
11-Sep	5	30	3	11-Sep	0	0	76
12-Sep	24	60	14	12-Sep	12	98	5
13-Sep	11	30	4	13-Sep	7	68	5
14-Sep	16	47	6	14-Sep	9	120	12
15-Sep	12	22	6	15-Sep	5	95	17
16-Sep	14	18	7	16-Sep	9	89	30
17-Sep	5	18	17	17-Sep	2	39	15
18-Sep	16	41	2	18-Sep	4	45	3
19-Sep	4	20	2	19-Sep	8	45	11
20-Sep	6	14	2	20-Sep	6	32	11
21-Sep	10	19	6	21-Sep	14	68	20
22-Sep	5	16	2	22-Sep	16	65	5
23-Sep	7	9	2	23-Sep	5	25	9
24-Sep	72	132	4	24-Sep	25	123	4
25-Sep	26	43	1	25-Sep	10	70	9
26-Sep	17	35	6	26-Sep	8	73	13
27-Sep	13	38	5	27-Sep	7	74	6
28-Sep	7	14	2	28-Sep	12	88	14
29-Sep	16	37	1	29-Sep	12	132	17
30-Sep	8	21	0	30-Sep	5	72	9
1-Oct	13	23	0	1-Oct	4	57	1
2-Oct	0	1	1	2-Oct	1	16	2
3-Oct	0	0	0	3-Oct	1	7	0
4-Oct	0	0	0	4-Oct	1	7	4
5-Oct	2	3	0	5-Oct	1	15	0
6-Oct	1	0	0	6-Oct	1	8	2
7-Oct	1	4	1	7-Oct	2	5	2
8-Oct	1	0	0	8-Oct	0	5	0
9-Oct	0	0	0	9-Oct	1	7	0
10-Oct	0	1	0	10-Oct	1	36	0
11-Oct	0	1	0	11-Oct	4	37	0
12-Oct	0	0	0	12-Oct	1	24	0
13-Oct	0	2	0	13-Oct	4	31	0
14-Oct	0	0	0	14-Oct	0	11	0
15-Oct	0	0	0	15-Oct	1	15	0
16-Oct	0	0	1	16-Oct	0	4	3
17-Oct	0	0	1	17-Oct	1	2	8
Total	556	1088	301	18-Oct	0	7	0

1996 Adipose clipped Chinook and Coho through the Babine Fence.

CHINOOK				COHO			
Date	Clipped	Unclipped	Unchecked	Date	Clipped	Unclipped	Unchecked
				19-Oct	0	3	0
				20-Oct	1	2	1
				21-Oct	1	4	0
				22-Oct	2	5	0
				23-Oct	1	4	0
				24-Oct	0	3	0
				25-Oct	0	2	1
				26-Oct	0	2	0
				27-Oct	1	4	0
				28-Oct	0	1	0
				29-Oct	0	4	0
				30-Oct	0	1	0
				31-Oct	2	3	0
				1-Nov	1	2	1
				2-Nov	3	3	0
				3-Nov	0	5	0
				4-Nov	3	6	0
				Total	261	2039	369

Distribution

To:David Southgate

Les Jantz

Dan Wagner

Steven Cox - Rogers

Terry Turnbull

Colin Harrison

Dave Einarson

Jim Steward

Brenda Donas

1996 BABINE FENCE COUNTS.

DATE	DAILY J.K. SOCKEYE	ACCUM. J.K. SOCKEYE	DAILY. LRG. SOCKEYE	ACCUM. LRG. SOCKEYE	DAILY TOTAL SOCKEYE	ACCUM. TOTAL SOCKEYE
28-Jul	19	19	1,141	1,141	1,160	1,160
29-Jul	63	82	5,428	6,569	5,491	6,651
30-Jul	36	118	26,710	33,279	26,746	33,397
31-Jul	235	353	88,638	121,917	88,873	122,270
1-Aug	1,116	1,469	163,394	285,311	164,510	286,780
2-Aug	572	2,041	100,969	386,280	101,541	388,321
3-Aug	443	2,484	50,154	436,434	50,597	438,918
4-Aug	373	2,857	35,789	472,223	36,162	475,080
5-Aug	413	3,270	33,336	505,559	33,749	508,829
6-Aug	625	3,895	32,478	538,037	33,103	541,932
7-Aug	829	4,724	34,758	572,795	35,587	577,519
8-Aug	816	5,540	33,352	606,147	34,168	611,687
9-Aug	1,199	6,739	62,598	668,745	63,797	675,484
10-Aug	1,198	7,937	47,599	716,344	48,797	724,281
11-Aug	1,324	9,261	68,664	785,008	69,988	794,269
12-Aug	568	9,829	13,013	798,021	13,581	807,850
13-Aug	1,746	11,575	78,796	876,817	80,542	888,392
14-Aug	1,226	12,801	57,654	934,471	58,880	947,272
15-Aug	1,477	14,278	64,312	998,783	65,789	1,013,061
16-Aug	1,305	15,583	101,824	1,100,607	103,129	1,116,190
17-Aug	1,504	17,087	76,621	1,177,228	78,125	1,194,315
18-Aug	1,310	18,397	74,145	1,251,373	75,455	1,269,770
19-Aug	576	18,973	12,438	1,263,811	13,014	1,282,784
20-Aug	1,779	20,752	36,591	1,300,402	38,370	1,321,154
21-Aug	2,341	23,093	62,776	1,363,178	65,117	1,386,271
22-Aug	1,775	24,868	33,137	1,396,315	34,912	1,421,183
23-Aug	1,652	26,520	49,838	1,446,153	51,490	1,472,673
24-Aug	1,350	27,870	52,281	1,498,434	53,631	1,526,304
25-Aug	1,168	29,038	41,740	1,540,174	42,908	1,569,212
26-Aug	992	30,030	30,602	1,570,776	31,594	1,600,806
27-Aug	906	30,936	23,042	1,593,818	23,948	1,624,754
28-Aug	1,516	32,452	26,735	1,620,553	28,251	1,653,005
29-Aug	920	33,372	25,553	1,646,106	26,473	1,679,478
30-Aug	876	34,248	21,113	1,667,219	21,989	1,701,467
31-Aug	896	35,144	19,166	1,686,385	20,062	1,721,529
1-Sep	821	35,965	19033	1,705,418	19,854	1,741,383
2-Sep	723	36688	15202	1,720,620	19756	1757308
3-Sep	538	37226	13442	1,734,062	15740	1771288
4-Sep	512	37738	11405	1,745,467	13954	1783205
5-Sep	518	38256	12918	1,758,385	11923	1796641
6-Sep	502	38758	8735	1,767,120	13420	1805878
7-Sep	347	39105	9156	1,776,276	9082	1815381
8-Sep	454	39559	12504	1,788,780	12958	1828339

Stream Profiles for Babine Lake Tributaries - 1996

	Boucher	Deep	Five-mile	Pierre	Six-mile	Tsezakwa
Average Channel Width (m)	12.3	3.02	8.5	7.7		22.7
Average Wetted Width (m)	7	2.8	3.7	7.3		10.3
Average Max. Riffle Depth (cm)	20.9	10	11.58	17	18.7	23.4
Average Max. Pool Depth (cm)	77.12	27.2	57.36	63	53.4	91.3
Cover (%):						
Deep Pool		3		10	5	
LOD		10		10	25	
Boulder		2		5	5	
In Stream Vegetation		5		10		
Overhanging Vegetation		70		15	20	
Cutbanks		10		50	45	
Crown Closure (%)	30	35	70	30	70	70
Bed Material (%):						
Fines	15	2	20	5	20	10
Gravels - Small	5	30	5	30	10	10
Gravels - Large	10	30	5	30	15	10
Cobble - Small	15	20	5	20	35	20
Cobble - Large	15	10	5	5	15	20
Boulder	40	8	60	7	5	30
Bedrock				3		
Compaction (low,med or high)	med	med	med	med	med	med
Confinement (not,occas,frequ,conf)		confined		frequently	occasionally	
Water Temperature (Celcius)	12.5	8	10	9	8	10.3
Obstructions (yes or no)		yes		yes		
Height (m)		6.3		10		
Type		waterfalls		chute		
Location		660m		1708m		

Trace Metal Survey of Lake Trout (*Salvelinus namaycush*) and Burbot (*Lota lota)* from Babine Lake

Introduction

In 1970 Noranda Bell Copper opened a copper mine on the shores of Babine Lake in northern B.C. It operated an open pit copper mine on the Newman Peninsula for about 20 closing, down in the early 1990's. At the same time another mine, Granisle Copper also operated a mine on MacDonald and Sterrit islands located on the lake (Figure 1). In 1992 Noranda Bell Copper submitted a closure plan to the Ministry of Environment for review and comment. Granisle Mines has not to date submitted a closure plan.

The Lake Babine Nation has lived on the shores of Babine Lake for hundreds if not thousands of years. Their entire culture is intimately related to the lake and the surrounding areas. Many of the Nation members are still very traditional people and they depend on what the area provides for food and income. One of the staples in the Nation's diet is fish, and many fishers follow the fishing cycles (salmon in the late summer, lake trout in the late fall, burbot in the spring etc.).

Gordon Joseph, an Elder and Hereditary Chief of the Lake Babine Nation, said that previous to the mines operations in the area the islands around the Newman Peninsula were important fishing grounds. In early to mid June people would travel to the area to troll for lake trout and in the fall families would return to the area to camp for about 2 weeks. Each family had their own island camps and there people would set nets and prepare their winter supply of lake trout. Since the advent of the mines people have noticed a difference in the fish and are now scared to fish in the area. The fish camps are no longer used. Many people have expressed concern because the fish are "too soft", and they "don't taste right". When preparing the fish, members have said that there are changes in how the fish looks. Before, when they boiled the fish, the broth was milky and now it is clear. The fish used to have a lot of fat on them and now there is very little. As well community members have been catching fish with tumors and lesions on them.

The concern for the fish is greatest in the communities of Tachet and Old Fort because of their close proximity to both the Granisle and Noranda Bell Copper mines. The concern centres around the fact that the mines are located close to the lake. There is a fear of metal contamination of both water and the organisms that live in it by mine seepage, waste run off etc.

There has been some metal testing done in the past, in the mid 1970's Health Canada issued a health warning with the following guidelines:

* During pregnancy women should refrain from consuming char from Babine Lake
* Consumers should alternate consumption of char from Babine Lake with other species of fish.

Because of this warning many of the members have decreased their consumption of their traditional foods. This had also increased the fear of other fish in the lake.

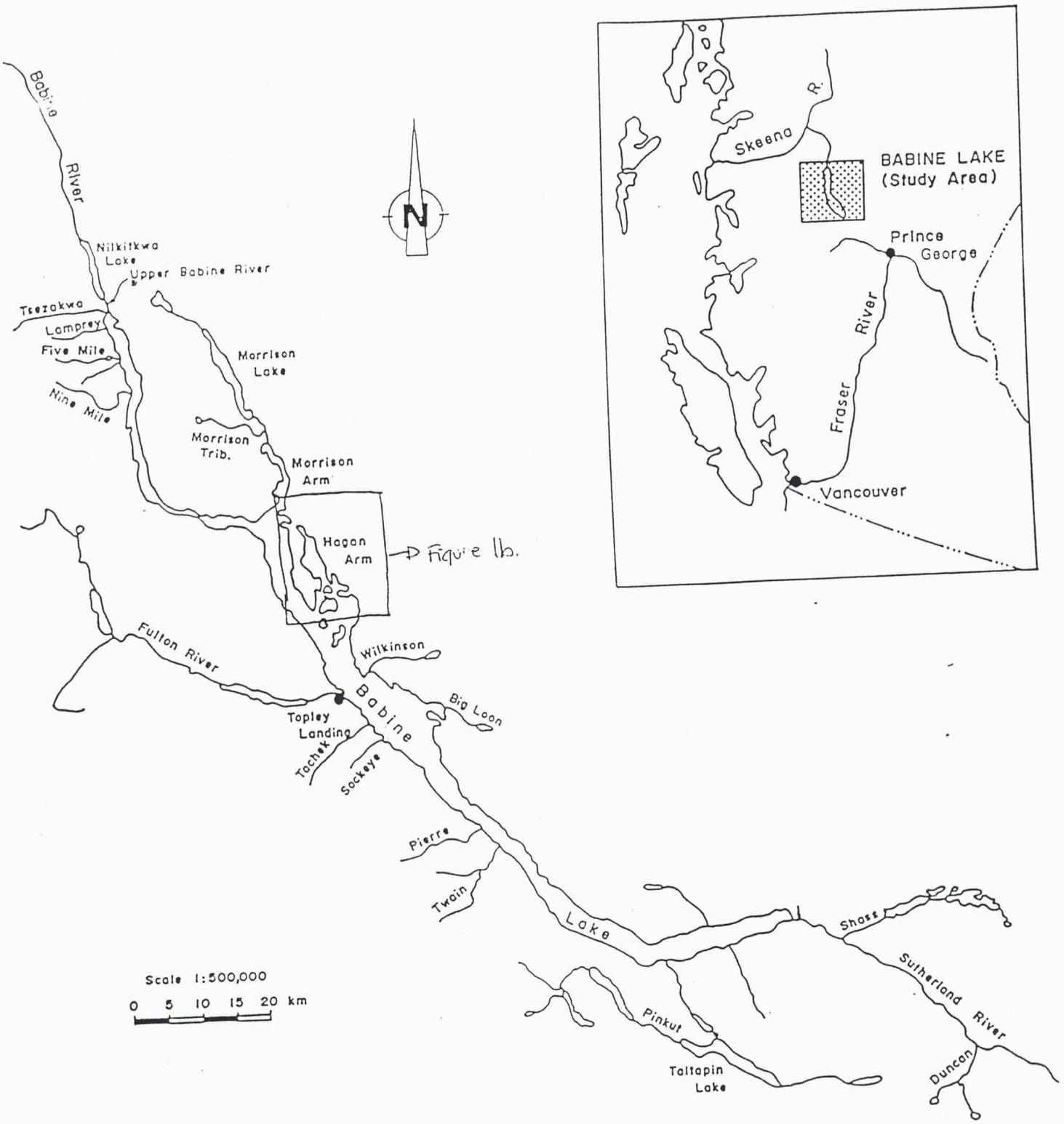


Figure 1a. Location of Babine Lake and main tributaries.

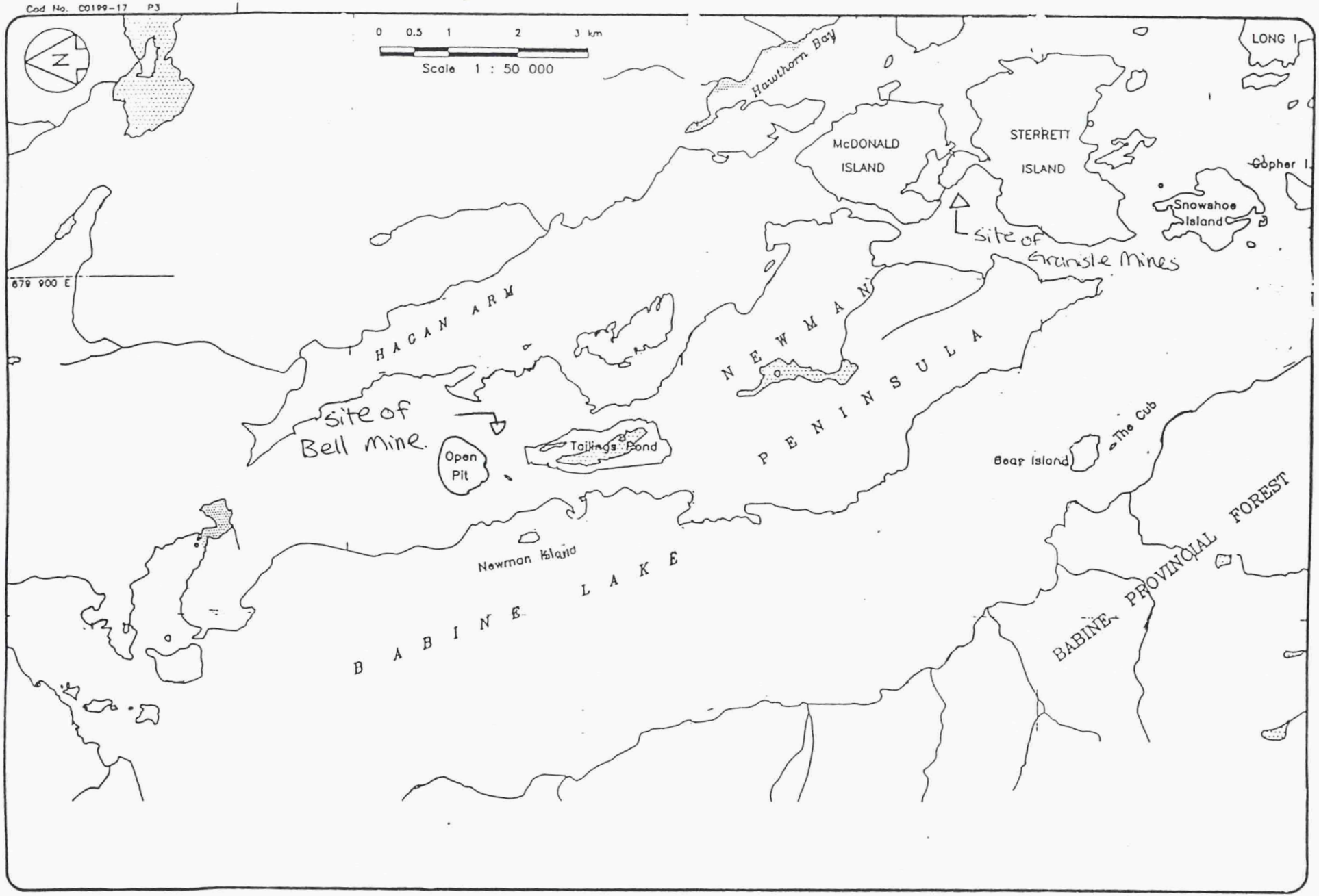


Figure 1b - Mine sites.

In 1995 the Department of Fisheries and Oceans, funded a small survey of the fish in the lake. The following are the results of this survey.

Methods:

Lake Trout

The fish were caught using set nets. We tried to catch fish via angling in Hagan Arm but this proved very difficult. After consulting with the Elder's they told us that we would only be able to catch the lake trout on their spawning grounds in Wright's Bay. After setting net there we netted 22 lake trout on Oct. 6th, 1995.

The fish were brought back to the community of Tachet and sampled on shore there. They were sampled for length and sex. Using a disposable scalpel the liver and the first three vertebrae from behind the skull were excised and put in new labeled ziplock bags and were then put on ice. The entire sample was then frozen and shipped out to Quanta Trace laboratories in Burnaby. There the samples were treated in the following way:

"Preparation: The sample was dried at 55 Celsius and the % moisture determined. The dried sample was then ground in a stainless steel mill.

Digest: A portion (0.5 grams) of the dry, ground sample was digested in a sealed Teflon vessel using microwave heating (EPA Method 3051)

Analysis: Metals were determined on the resulting solution by UNICP-AES (EPA Method 200.15). Mercury was determined by cold vapour- UV (EPA Method 245.1).

Results: Results are expressed as micrograms of element per gram of dry sample (ug/dry g).

QA/QC: Certified Reference Materials, DOLT-1 (Dogfish Liver) and IAEA Animal Bone were digested and analyzed concurrently to monitor the accuracy of the analysis. One in ten samples was also digested and analyzed in duplicate."

- Taken from the Methodology of Analysis of Biological Samples provided with results from Quanta Trace laboratories inc. in Burnaby

The samples were received in ug/ dry g and were then converted to ug/ wet g for the following data tables.

Burbot

In late March 1996 the NFC contracted 2 Elder's to set line and catch burbot around Newman Peninsula. The 21 burbot were set whole to the lab and were dissected there.

In the lab the only difference in techniques used were that 2 grams of tissue rather than .5 g were measured. The tissue sample used was muscle taken from the lateral side behind the dorsal fin. A Certified Reference Material used in this analysis was NRC DORM-1 dogfish muscle.

Results and Discussion:

Tables 1 through 3 contain all the data received from the Quanta Trace laboratories. Note that in Table 1 the data points have been converted from ug / dry g to ug/ wet g. Many of the data points were below the detection levels of the equipment used and are displayed with the < symbol.

This survey was undertaken to give the Lake Babine Nation an idea of the levels of metals found in their major food source, and therefore comments on the effects of the levels on fish or human health are beyond the scope of the present work.

'Comparisons' with Metal Levels in other Lakes

Table 4 presents the summary data of tables 1 through 3 as well as comparable data from fish samples taken province wide. The first 3 columns present the summarized data from the Babine samples. Note that when there were some data points below the detection levels they were dropped from the calculation (thus the change in the sample size (n)). If there were more data points below the detection level than above the mean. etc. were not calculated. There are quite a few blank areas in Table 4 and this is because the levels of metal for that particular tissue were below the detection levels. Note that all of the reported levels are in ug/g wet weight.

Many of the metals investigated do not as yet have accepted criteria levels and thus discussion on "high" or "low" levels is not possible. What can be done is to compare levels between this study and others. There are a few metals which do have accepted criteria, and the criteria for others is still in the development stages.

Aluminum is quite toxic to fish at lower pH's, however Babine has an average Ph of about 7 (Levy et al., 1985). There is not a lot of data on acute or sub acute effects of aluminum on fish at mid range pHs, however the data that is available shows that aluminum is more benign at these pH's (Butcher, 1988). The tentative limit set for aluminum in water to protect aquatic life is 0.1 mg/L (Butcher, 1988) In September 1996 the Ministry of Environment tested the water in Babine Lake near the mines sites and the aluminum in those waters were all less than .06 mg/L (MOE, unpublished data). From a water quality point of view then the waters of Babine Lake fall well within the levels set for 'safe' water quality. However, as Table 4 shows the levels of aluminum in some fish tissues is significantly higher than provincial averages and averages from a lake near Babine Lake (Nellian Lake eventually flows into Babine through the Pinkut system, it is therefore in the same biogeoclimatic and tectonic zones) (lake trout vertebrae 60.28, liver

Table 1: Metal Levels in Burbot Dorsal Muscle (ug/ wet g)

	1	2	3	4	5	6	7	8	9	10	11	12	13
Length (cm)	50	48	45	48	55	53	62	47	53	65	53	51	55
Sex	M	M?	F?	M	F	F	F?	M	M	F?	M?	M	F
Aluminum	1	1	1	1	1	<.2	<.2	<.2	<.2	<.3	<.2	<.2	<.2
Antimony	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	<0.5	0.6	0.5	<0.5	<.4	0.7	<.4	<..5	<..5	<..5	<.4	<.5	<.5
Barium	0.653	0.23	0.533	0.237	0.05	0.263	0.024	0.046	0.277	0.044	0.259	0.042	0.598
Beryllium	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005	<.005
Bismuth	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5
Cadmium	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Calcium	2520	965	2360	936	214	1170	150	213	852	255	966	199	2930
Chromium	0.1	0.07	0.1	0.2	0.1	0.1	0.1	0.05	0.06	0.08	0.08	0.09	0.1
Cobalt	<.03	<.03	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.03	<.02	<.02	<.02
Copper	0.31	0.54	0.47	0.37	0.31	0.3	0.2	0.47	0.41	0.28	0.39	0.31	0.65
Iron	8.17	5.71	9.37	4.82	9.11	3.81	5.29	6.8	5.69	3.92	10	5.2	7.49
Lead	<.3	<.3	<.3	<.3	<.2	<.2	<.2	<.2	<.2	<.3	<.2	<.2	<.2
Lithium	<.05	<.05	<.05	<.05	<.04	<.2	<.04	<.05	<.05	< .05	<.04	<.05	<.05
Magnesium	243	239	256	268	249	214	230	212	210	229	224	234	274
Manganese	0.82	0.65	1.1	1.3	0.38	0.48	0.24	0.2	1.2	0.46	0.44	0.33	0.75
Mercury	0.2	0.07	0.08	0.07	0.15	0.13	0.18	0.08	0.08	0.14	0.19	0.24	0.43
Molybdenum	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Nickel	<.05	<.05	<.05	<.05	<.04	0.07	<.04	0.06	<.05	<.05	0.1	<.05	<.05
Phosphorus	2790	2390	2930	2430	1950	2410	1680	1710	2160	1770	2320	1860	3300
Potassium	3200	3090	3310	3220	3150	3110	2770	2800	2810	2210	2920	2920	3500
Selenium	<.05	<.04	<.04	<.04	<.04	<.04	<.04	<.5	<.5	<.5	<.4	<.5	<.5
Silicon	2	2	3.1	2.5	3	2.9	2	2	2.5	2	2	2	2
Silver	<.02	<.02	<.02	<.02	<.02	0.03	<.02	<.02	0.03	<.03	0.05	<.02	<.02
Sodium	808	915	928	754	942	972	846	793	870	933	903	971	967
Strontium	5	2	4.7	2	0.4	2	0.2	0.3	2	0.4	2	0.3	5.6
Sulphur	2340	2210	2440	2660	2290	2250	2240	2160	2030	2240	2200	2220	2750
Thorium	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.3	<.2	<.2	<.2
Tin	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.3	<.2	<.2	<.2
Titanium	0.1	0.09	0.1	0.1	0.1	0.1	0.08	0.1	0.1	0.09	0.1	0.09	0.1
Uranium	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vanadium	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Zinc	6.16	6.54	7.19	5.95	5.06	5.33	4.39	5.5	6.19	5.38	7.15	5.4	8.6
Zirconium	<.02	<.02	<.02	<.02	<.02	0.05	<.02	<.02	<.02	<.03	<.02	<.02	<.02

Table 1 Metal Levels in Burbot Dorsal Muscle (ug/wet g)

	14	15	16	17	18	19	20	21
Length (cm)	52	55	51	45	47	40	65	60
Sex	M		M		M		M	F
Aluminum	<.2	<.2	<.2	2	<.2	2	0.6	<.3
Antimony	<.5	<.5	<.5	<.4	<.5	<.4	<.5	<.5
Arsenic	<.5	<.5	<.5	<.4	<.5	<.4	<.5	<.5
Barium	0.044	0.039	0.041	0.11	0.051	0.25	0.11	0.043
Beryllium	<.005	<.005	<.005	<.004	<.005	<.004	<.005	0.006
Bismuth	<.5	<.5	<.5	<.4	<.5	<.4	<.5	<.5
Cadmium	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Calcium	185	161	196	317	239	843	223	152
Chromium	0.06	0.07	0.04	0.08	0.08	0.07	0.06	0.07
Cobalt	<.0	<.0	<.0	<.0	<.0	<.0	<.0	<.02
Copper	0.24	0.2	0.4	0.32	0.48	0.3	0.98	0.2
Iron	5.9	6.01	8.12	11.7	8.87	8.79	13.9	7.41
Lead	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Lithium	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Magnesium	246	233	253	233	233	206	203	256
Manganese	0.25	0.2	0.54	0.4	0.69	0.84	0.27	0.29
Mercury	0.36	0.06	0.2	0.08	0.06	0.07	0.15	0.28
Molybdenum	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Nickel	0.05	0.06	<.0	<.0	<.0	0.08	0.06	<.05
Phosphorus	1730	1440	1760	2110	2100	1880	1790	1820
Potassium	2900	2570	2280	3150	3200	2490	2990	3340
Selenium	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5
Silicon	2	1	2	5.9	2	4.7	3.9	2
Silver	<.02	<.02	<.02	<.02	<.02	<.02	<.02	0.04
Sodium	1060	864	907	886	934	684	950	637
Strontium	0.3	<.2	0.3	0.6	0.3	2	0.4	0.3
Sulphur	2310	2080	2330	2160	2570	2140	2120	2090
Thorium	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Tin	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Titanium	0.1	0.07	0.09	0.2	0.1	0.2	0.1	0.1
Uranium	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vanadium	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Zinc	5.76	4.81	4.37	5.77	5.61	6.49	6.37	4.11
Zirconium	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02

Table 2: **Metal Levels in Char Vertebrae**

	1	2	3	4	5	6	7	8	9	10	11	12	13
Length (cm)	626	547	704	598	544	566	597	558	757	530	614	605	633
Sex	F	M	F	F	M	M	F	F	M	M	F	M	F
Aluminum	22	262	22	62	253	67	27	52	34	15	7	19	<1
Antimony	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Arsenic	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Barium	1.12	2.85	1.49	1.37	3.69	1.68	1.37	0.985	1.43	1.28	1.43	2	1.49
Beryllium	< .02	< .02	< .02	< .02	< .02	< .02	< .02	< .02	< .02	< .02	< .02	< .02	< .02
Bismuth	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Cadmium	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Calcium	50200	56600	91100	74000	66200	62700	49200	46300	90600	63600	85300	92700	128000
Chromium	0.7	1.1	0.7	0.7	1.2	1.2	0.6	0.5	0.98	0.7	0.7	1	1.1
Cobalt	<.09	< 0.1	< 0.1	< 0.9	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.09	< .1
Copper	< .2	0.7	< .2	< .2	3.9	5.5	1	0.4	< .2	< .2	< .2	< .2	< .2
Iron	62.1	696	84.5	183	1180	145	110	91.1	101	74.2	71.8	92.4	25.1
Lead	< 0.9	< 1	< 1	< 0.9	< 1	< 1	< 1	< 1	< 0.9	< 1	< 1	< 1	< 1
Lithium	0.3	0.6	0.6	0.6	0.7	0.5	0.3	0.3	0.5	0.6	0.6	0.6	0.8
Magnesium	917	1090	1190	1070	1080	1190	842	994	1270	1060	1180	1300	1400
Manganese	1.5	11.6	2.1	4.2	23.8	3.2	1.7	1.6	3.3	1.4	1.9	1.7	0.8
Mercury	0.4	0.2	0.6	0.3	0.3	0.2	0.3	0.3	0.4	0.4	0.3	0.7	0.2
Molybdenum	0.5	< 0.5	< 0.5	< 0.5	1	0.5	< 0.5	< 0.	0.9	< 0.5	0.6	0.5	1.1
Nickel	0.5	1	0.3	0.5	1	0.8	0.7	0.5	29.6	0.6	0.5	0.5	0.4
Phosphorus	27600	30500	46500	36200	33700	33000	27200	27700	42300	34900	43700	43400	58900
Potassium	6390	5980	4500	6860	4870	6490	7010	9110	5980	7640	5870	7300	5250
Selenium	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Silicon	18	108	17	28	102	30	19	34	35	23	18	35	6
Silver	< .0	< .0	< .0	< .0	0.2	0.1	0.1	0.2	0.4	0.3	0.2	0.3	0.3
Sodium	3260	3070	4620	3070	4360	3440	3230	3330	4430	3780	4720	4600	4170
Strontium	51	63	87	66	77	73	45	52	95.3	71	85	93.1	132
Sulphur	4730	4580	4020	4930	4990	4780	5180	6040	4440	5760	4650	5520	3220
Thorium	< .9	< 1	< 1	< .9	< 1	< 1	< 1	< 1	< .9	< 1	< 1	< .9	< 1
Tin	< .9	< 1	< 1	< .9	< 1	< 1	< 1	< 1	< .9	< 1	< 1	< .9	< 1
Titanium	0.5	10.2	2.9	7.8	11	0.8	0.9	2.4	0.92	0.8	0.3	0.6	< 0.
Uranium	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Vanadium	1.3	2.7	1.4	1.2	3.2	1.8	0.8	1.4	1.5	1.8	1.3	1.2	< .2
Zinc	30.3	36.2	41.6	35.4	43	35.6	27.3	30.5	41.1	38.5	42.6	47.9	44.8
Zirconium	< .09	< .1	< .1	< .1	0.1	< .1	< .1	< .1	< .09	< .1	< .1	< .09	< .1

Table 2: Metal Levels in Char Vertebrae

	14	15	16	17	18	19	20	21	22
Length (mm)	510	559	595	544	570	591	549	535	648
Sex	F	M	M	M	F	M	M	M	F
Aluminum	30	34	<0	139	14	21	<0	<0	5
Antimony	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	3
Arsenic	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Barium	1.52	1.61	1.86	2.47	1.52	1.52	1.73	1.53	1.51
Beryllium	< .02	< .02	< .02	< .02	< .02	< .02	< .02	< .02	< .02
Bismuth	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Cadmium	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Calcium	73400	53500	111000	100000	76200	91600	102000	74600	115000
Chromium	0.6	0.7	0.8	1.1	0.6	0.8	0.8	0.5	0.94
Cobalt	< .1	< 0.09	< 0.09	< 0.09	< .1	< .1	< 0.09	< 0.09	< 0.09
Copper	< .2	107	< .2	206	41.1	62.4	22.8	99	37.3
Iron	87.5	120	28.9	153	51.4	63.4	19.7	33.4	84.7
Lead	< 1	< 0.9	< 0.9	1	< 1	< 1	< 1	< 0.9	< 1
Lithium	0.5	0.5	0.7	0.7	0.5	0.6	0.6	0.5	0.8
Magnesium	1150	1080	1280	1280	1210	1300	1380	1230	1330
Manganese	2.2	2.6	1.2	2.7	1.1	2.4	1.3	1.2	1.7
Mercury	0.2	0.6	0.2	0.4	0.3	0.6	0.1	0.2	0.3
Molybdenum	0.9	< 0.5	0.9	0.8	0.7	0.9	0.6	0.6	1.2
Nickel	0.4	4.8	0.4	4.5	0.3	1	0.4	0.96	0.6
Phosphorus	38900	30200	51200	47500	43200	48200	48200	41400	52700
Potassium	7550	7110	6610	5570	8860	8180	7050	9420	3960
Selenium	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Silicon	25	29	11	53	24	21	8	8	24
Silver	< 0	< 0	0.2	< .1	< .1	< .1	< .1	< .1	0.2
Sodium	3100	3790	3950	4800	4040	3510	2440	3090	5250
Strontium	77	63	107	103	91	97	115	82	114
Sulphur	4840	5430	3760	4550	4910	4640	3390	5130	3990
Thorium	< 1	< .9	< .9	< .9	< 1	< 1	< .9	< .9	< .9
Tin	< 1	< .9	< .9	< .9	< 1	< 1	< .9	< .9	< .9
Titanium	0.8	0.8	<.09	2.3	0.3	0.3	< .0	< .0	0.1
Uranium	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Vanadium	1.9	2	0.3	0.9	1.9	1.8	0.9	1.7	0.3
Zinc	35.3	43.2	47.6	45.2	41	41.6	36.5	37.7	56.2
Zirconium	< .1	< .09	< .09	< .09	< .1	< .1	< .09	< .09	< .09

Table 3:

Metal Levels in Char Livers (ug/wet g)

	1	2	3	4	5	6	7	8	9	10	11	12	13
Length (mm)	626	547	704	598	544	566	597	558	757	530	614	605	633
Sex	F	M	F	F	M	M	F	F	M	M	F	M	F
Aluminum	2.63	83.38	0.95	0.9	48.94	10.68	<.294	2.28	6.27	8.51	<.347	3.95	62.17
Antimony	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76
Arsenic	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76
Barium	0.03	0.68	0.02	0.07	0.6	0.11	0.03	0.04	0.08	0.11	0.03	0.06	0.37
Beryllium	<.008	<.008	<.008	<.008	<.008	<.008	<.008	<.008	<.008	<.008	<.008	<.008	<.008
Bismuth	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Cadmium	0.095	0.069	0.155	0.197	0.173	0.128	0.099	0.059	0.04	0.091	0.104	0.347	0.172
Calcium	75.04	156.33	103.05	129.27	0.182	98.97	166.992	82.152	69.888	182.196	371.29	838	228
Chromium	0.114	0.116	0.071	0.09	0.122	0.061	< .029	0.065	<.045	0.038	< .035	0.1	0.2
Cobalt	<0.1	0.116	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	5.91	81.45	29.99	64.41	128.59	63.01	49.98	50.53	100.8	44.04	38.86	85.16	11.45
Iron	48.89	223.88	91.87	152.32	182.4	71.91	107.89	69.11	69.44	71.82	194.32	332.76	188.14
Lead	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Lithium	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Magnesium	198.6	170.61	113.76	119.1	159.6	153.08	198.16	145.72	114.24	44.04	38.86	332.76	188.14
Manganese	1.74	5.64	1.071	1.13	4.3	2.1	1.29	1.239	1.702	1.323	1.215	1.8	3.92
Mercury	0.303	0.193	0.785	0.316	0.426	0.356	0.294	0.228	0.941	0.284	0.416	1.04	0.53
Molybdenum	< 0.19	< 0.193	0.143	0.181	0.182	0.214	<.147	<.163	<.224	0.132	0.208	0.3	< .2
Nickel	< 0.076	0.193	0.048	0.068	0.152	0.107	< .059	0.065	< .09	0.057	< 069	0.08	0.2
Phosphorus	3540	2439	2999	3503	2921.44	3061	4380.6	3455.6	2710.4	1716.12	2890.51	4004	3432
Potassium	2827	1605	1923	1756	2134.08	2196.52	2857.68	2262.44	1939.84	1166.13	2151.4	1805	2466
Selenium	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76
Silicon	4.93	27.4	8.33	4.068	25.84	8.9	4.116	6.846	11.2	1.89	2.429	5	20
Silver	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038
Sodium	1390	1100	1021	955.98	1100.48	1299.4	2287.32	1437.66	1115.52	824.04	1856	1150	1472
Strontium	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379
Sulphur	1902	2011	1808	1717.6	2216.16	2484.88	2763.6	1975.56	1859.2	960.12	2047	2538	2536
Thorium	< 0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379
Tin	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379
Titanium	0.08	3.47	0.05	0.14	1.7	0.39	< 0.029	0.163	0.493	0.36	0.069	0.254	2.168
Urainium	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9
Vanadium	< 0.06	0.36	0.048	0.048	0.152	< 0.071	< .059	< .065	< .09	< .038	< 07	0.1128	0.245
Zinc	24.64	37.25	38.32	33.22	51.98	51.62	42.23	38.14	45.25	24.38	42.33	42.02	31.7
Zirconium	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038

	Table 3: Metal Levels in Char Livers (ug/wet g)								
	14	15	16	17	18	19	20	21	22
Length (mm)	510	559	595	544	570	591	549	535	648
Sex	F	M	M	M	F	M	M	M	F
Aluminum	2.15	0.59	0.62	0.79	<.3	0.6	<.4	1.29	139.6
Antimony	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76
Arsenic	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76	<.76
Barium	0.07	0.03	0.02	0.04	0.02	0.03	0.16	0.02	2.2
Beryllium	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01
Bismuth	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Cadmium	0.055	0.126	0.09	0.198	0.329	0.035	0.048	0.103	0.077
Calcium	106	115	49	65	99	126	844	84	148
Chromium	<.03	0.03	< .03	0.08	0.16	< .03	< .03	0.06	0.26
Cobalt	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	23.36	139.47	21.3	101.9	49.02	25.12	56.8	34.13	51.52
Iron	84.73	46.59	121.29	71.28	72.38	77.74	36.04	125.58	327.24
Lead	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Lithium	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01
Magnesium	211.52	113.1	93.92	148.67	148.71	97.47	159.6	121.39	229.07
Manganese	2	1.6	1.4	1.9	1.09	1.2	1.6	1.7	7.19
Mercury	0.154	0.674	0.311	0.528	0.263	0.508	0.28	0.161	0.62
Molybdenum	< .8	0.2	< .2	0.2	< .16	< .1	< .1	< .1	< .1
Nickel	0.1	0.1	< .07	0.08	0.1	0.1	0.1	0.1	0.1
Phosphorus	4728	2930	2448	3379	3323	2452	3280	3381	2971
Potassium	4052	1764	1337	2128	2142	1498	1440	1546	1993
Selenium	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76
Silicon	5	4	3	3	< 1.6	4.5	22	34	54
Silver	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038
Sodium	795	1527	958	1156	1089	1316	1152	1133	1147
Strontium	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379
Sulphur	2579	2022	1431	2719	1882	1552	1716	1133	1711
Thorium	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379
Tin	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379	<0.379
Titanium	0.154	0.117	0.498	0.158	0.03	0.06	0.06	0.06	5.51
Uranium	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9	< 1.9
Vanadium	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	5.25
Zinc	32.5	50.1	26.03	57.29	45.4	31.4	42.8	36.39	44.06
Zirconium	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038	< 0.038

ıble 4: Summary Statistics for Metal Levels in Fish Tissue for Babine Lake (ug / g wet weight)					
˜LEMENT*	Burbot Dorsal Muscle	Lake Trout Vertebrae	Lake Trout Liver	Prv. Lk Trout Liver**	Nellian Lake Rainbow Liver
Aluminum x		60.28	20.91	2.2	6.09
SD		75.94	37.34	3.51	6.67
n		18	18	19	6
range		5 - 262	.29 - 139.6		
Barium	0.19	1.7	0.23	0.28	0.31
	0.19	0.59	0.47	0.09	0.16
	21	22	22	19	6
	.02 - .65	.985 - 3.69	.02 - 2.2		
Cadmium			0.13	0.28	0.31
			0.08	0.09	0.16
			22	19	6
			.04 - .35		
Calcium	764	79718.18	188	60.6	66.76
	826.28	22397	218	25.8	13.45
	21	22	22	19	6
	150 - 2930	46300 - 128000	.18 - 844		
Chromium	0.08	0.82	0.1		
	0.03	0.22	0.06		
	21	22	15		
	.04 - .2	.5 - 1.2	.03 - .26		
Copper	0.39	48.93	57.13	13.6	47.74
	0.18	59.51	35.28	6.71	9.94
	21	12	22	19	6
	.2 - .98	.4 - 206	5.91 - 128.59		
Iron	7.43	161.7	125.8	382	201.01
	2.5	259.3	82.37	237	58.15
	21	22	22	19	6
	3.8 - 13.9	19.7 - 1180	36.04 - 332.76		
Lithium		0.56			
		0.14			
		22			
		.3 - .8			
Magnesium	235	1173.8	150		
	19.35	142.07	62.31		
	21	22	22		
	203 - 274	842 - 1400	36 - 333		
Manganese	0.56	3.41	2.19	1.19	1.47
	0.32	4.94	1.58	0.47	0.42
	21	22	22	19	6
	.2 - 1.3	.8 - 23.8	1.07 - 7.19		
Mercury	0.16	0.34	0.44	0.09	0.31
	0.1	0.16	0.24	0.04	0.06
	21	22	22	3	3
	.06 - .43	.2 - .7	.15 - 1.04		
Molybdenum		0.78			
		0.22			
		15			
		.5 - 1.2			
Nickel		2.28	0.1	1.41	1.56
		6.08	0.04	0.46	0.49
		22	16	19	6
		.3 - 29.6	.05 - .2		
Phosphorus	2110	40322.7	3179		
	456.29	8798	649		
	21	22	22		
	1440 - 3300	27200 - 58900	1716 - 4728		

Table 4:	Burbot Dorsal Muscle	Lake Trout Vertebrae	Lake Trout Liver	Prv. Lk Trout Liver**	Nellian Lake Rainbow Liver
P[illegible]sium	2949	6707	2045	2696	2670.75
	334	1404	611	527	460.4
	21	22	22	19	6
	2210 - 3500	3960 - 9420	1166 - 4052		
Silicon	2.55	30.73	12.4		
	1.08	25.73	13.2		
	21	22	21		
	1 - 5.9	6 - 108	1.89 - 54		
Sodium	882	3820	1240		
	98	711	329		
	21	22	22		
	684 - 1060	2440 - 5250	795 - 2287		
Strontium	1.56	83.61			
	1.67	22.08			
	20	22			
	.2 - 5.6	45 - 132			
Sulphur	2278	4703	1980		
	184.33	694	475		
	21	22	22		
	2080 - 2750	3220 - 6040	960 - 2764		
Titanium	0.11		0.76		
	0.03		1.36		
	21		21		
	.08 - .2		.03 - 5.51		
V[illegible]adium		1.5			
		0.68			
		21			
		.3 - 3.2			
Z[illegible]	5.82	39.95	39.5	28	25.51
	1.03	6.43	8.83	2.87	4.47
	21	22	22	19	6
	4.37 - 8.6	27.3 - 56.2	24.38 - 57.29		
* The first row of each metal is the mean measure (x), the second is the standard deviation (SD), the third is the sample size (n) and the fourth is the range of measurements					
** both the provincial average for Lake Trout, and the averages for Nellian Lake were taken from: "Metal concentrations in Fish Tissue from uncontaminated B.C. Lakes, published by the B.C. Environment, Water Management Division by K Rieberger, August 1992"					

20.91 as opposed to provincial lake trout average of 2.2 and Nellian Lake rainbow trout average of 6.09).

Barium levels in Babine Lake were similar to levels found elsewhere (Burbot (B) muscle .19, Lake Trout (LT) vertebrae 1.7, LT liver .23 Provincial LT average .28 and Nellian Lake Rainbow Trout .31). Cadmium is lower (LT liver .13, Provincial LT .28), Calcium is higher (LT liver 188, provincial LT 60.6). Copper in Babine is higher than the provincial level but similar to levels found in Nellian Lake (LT liver 57.13, provincial LT 13.6, Nellian Lake 47.74). Iron is lower in Babine than both provincial and Nellian Lake (LT liver 125.8, provincial LT 382 and Nellian Lake 201).

Chromium, Lithium, Magnesium, Molybdenum, Phosphorus, Silicon, Sodium, Strontium, Sulphur, Titanium and Vanadium were not tested for in the province wide investigation. There is very little data on the effects of these metals on fish and therefore it is difficult to discuss the results.

Mercury and it's effect on fish has had a lot of study, due to its toxicity and its availability for bioaccumulation. For human consumption the recommended maximum concentration of total mercury should not exceed 0.5 ug/g wet weight (Nagpal, 1989). There level is lower for people whose diet is based primarily on fish (Nagpal, 1989). The burbot in the Babine sample was all under the 0.5 ug/g level (Table 1) with an average level of .16 ug/g. At this level the recommended weekly consumption rate is between 1050 and 525 grams for persons whose diet is primarily based on fish (Nagpal, 1989).

Lake Trout samples from Babine Lake were higher, in the vertebrae sample 18 % of the samples were over the 0.5 ug/g mark. If one looks at the 0.3 ug/g (the weekly 'safe quantity' amount at this level is 350 g) the percentage rises to 68%. The liver samples are very significant in this area, at the 0.5 ug/g mark 36% are above and at the 0.3 ug/g mark the level is 73%. Although it may be argued that the samples are bone and liver it should be noted that the Lake Babine Nation members can a lot of fish. During the canning process the bones dissolve and are eaten with the meat. As well many of the more traditional members consider lake trout liver a delicacy.

Manganese was slightly higher in the Babine samples (LT liver 2.19, provincial LT 1.19). Nickel was under the detection levels for the B muscle, 2.28 for LT vertebrae, .1 for LT liver. The provincial levels for Ni are 1.41 while for Nellian Lake it is 1.56. Potassium levels were similar (LT liver 2045, provincial 2696, Nellian Lake 2670.75). The zinc levels in Babine were slightly higher for the Lake Trout 39.5 as opposed to the provincial level of 28 and the Nellian Lake level of 25.51.

'Comparisons' between Present and Past Metal Level Surveys in Babine Lake

To date I have been able to find 3 other testing programs for metals on Babine Lake. During the 1970's Health Canada conducted a study focusing on mercury levels (from which the Health Warning was issued). In 1983 and 1984 Environment Canada

conducted a chemical and biological survey of Babine Lake. The third survey was conducted by Bell Mine for it's closure plans.

There are a few problems encountered when trying to compare the results of all these studies. The first one encountered is that the species of fish used in all of the surveys differ (ours was Lake Trout and Burbot, Environment Canada's was Rainbow trout, suckers and squawfish while Bell Mine's was predominately Kokanee with rainbow trout). The next problem encountered was that we tested for more metals than did the other surveys.

The Environment Canada survey found " significant differences between hatchery reared rainbow trout and living trout in Hagan Arm for copper, zinc, and iron, and significant difference with living tout in Babine Lake main arm for zinc and iron. " (Godin, et al. 1985) This was for liver tissue. The copper level of Main Arm fish was higher than Hagan Arm fish. (Godin. et al .1985)

The average level of copper in the liver tissues of the fish from this survey was 87.14 ug/g wet weight (Godin et al. 1985) which is significantly higher than what we found (Table 4). The average for iron was 233.46 ug/g wet weight and again this is higher than what we found. The levels for zinc are similar to what we found 32.7 ug/g wet weight vs burbot 5.82, lake trout 39.95 and 39.5 (vertebrae and liver respectively). An important note here is that the averages for the Environment Canada survey are from different fish species than the ones we looked at.

In its closure plan Bell Mine's consultants samples 39 fish for metals (As, Cd, Cu, Fe, Pb, Hg and Zn). Of these fish 28 were kokanee, 9 were rainbow trout, one was a burbot and one was a white fish. (Closure Plan, support document H). They also samples 4 lake trout and 4 burbot using the metallothionein stress test and 2 fish (burbot and lake trout) using the Molecular Indices of Metal Stress (MIMS) test. Both the metalothionein and the MIMS tests are no longer used as their results are considered unreliable by most of the scientific community. Another thing to note is that kokanee are non-anadromous sockeye salmon. They have a limited life span of 4 or 5 years, and therefore their amount of metal bioaccumulation would most likely be less than that of a longer living fish.

There are again difficulties in relating Bell Mine's figures to the ones obtained in this study as different fish species were used. If we compare tissues then we can find similar results when comparing our burbot muscle tissue to their pooled fish muscle tissue. They reported their results in terms of areas where the fish were caught and therefore have several averages for each metal. Table 6 compares the averages from the Bell Mine report to those found in this report.

Table 6: Comparison between Bell Mine metal level averages and those in this report									
	Site 1*	Site 2	Site 3	Site 4	Site 5	Site 6	Burbot	LT Vertet	LT liver
Copper	0.609	0.638	0.499	0.464	0.657	0.425	0.39	48.93	57.13
Iron	4.221	4.328	4.088	3.315	5.561	3.409	7.43	161.7	125.8
Mercury	0.039	0.057	0.03	0.048	0.045	0.041	0.16	0.34	0.44
Zinc	7.561	11.166	7.224	8.206	10.539	5.4	5.82	39.95	39.5
	*Sites 1 through 3 are from Hagan Arm and 4 through 6 are fromthe main arm								

It is difficult to draw any concrete conclusions from the data presented here. Some of the metals in the present study are found at higher levels than both previous studies on the same lake and studies of other lakes. This may or may not be having an effect on the fish in the lake. The matter is further confused because of all the factors which influence metal toxicity (fish age, fish sex, fish species, life stage, pH, water's complexing ability, alkalinity, hardness, ...). I do think that a larger scale study will provide some of the answers.

References:

Bell 92 Project Closure Plan. Support Document H. Existing Environmental Conditions of Babine Lake in the Vicinity of Bell Mine. 1992.

Butcher, G.A. 1988. Water Quality Criteria for Aluminum: Tecnical Appendix. Ministry of Environment and Parks. Water Quality Unit. Province of British Columbia

Godin, B. Ross, M. Jones, M. 1985. Babine Lake- Data from Chemical and Biological Surveys May 83, May 84, July 84. Environment Canada, Pacific and Yukon Region, Regional Program Report 85-15

Levy, D.A. and Hall, K.J. 1985. A Review of the Limnology and Sockeye Salmon Eclogy of Babine Lake. Westwater Technical Report No. 27. Westwater Research Centre. Vancouver B.C.

Ministry of Environment, Smithers B.C. unpublished data from water and sediment sampling on Babine Lake Sept. 1996

Nagpal, N.K. 1989. Ambient Water Quality Criteria for Mercury: Technical Appendix. Ministry of Environment. Water Management Branch. Province of British Columbia.

Rieberger, K. 1992. Metal Concentrations in Fish Tissue from Uncontaminated B.C. Lakes. Ministry of Environment. Water Quality Section. Province of British Columbia.

Stream Profiles for Babine Lake Tributaries - 1996

	Boucher	Deep	Five-mile	Pierre	Six-mile	Tsezakwa
Average Channel Width (m)	12.3	3.02	8.5	7.7		22.7
Average Wetted Width (m)	7	2.8	3.7	7.3		10.3
Average Max. Riffle Depth (cm)	20.9	10	11.58	17	18.7	23.4
Average Max. Pool Depth (cm)	77.12	27.2	57.36	63	53.4	91.3
Cover (%):						
Deep Pool		3		10	5	
LOD		10		10	25	
Boulder		2		5	5	
In Stream Vegetation		5		10		
Overhanging Vegetation		70		15	20	
Cutbanks		10		50	45	
Crown Closure (%)	30	35	70	30	70	70
Bed Material (%):						
Fines	15	2	20	5	20	10
Gravels - Small	5	30	5	30	10	10
Gravels - Large	10	30	5	30	15	10
Cobble - Small	15	20	5	20	35	20
Cobble - Large	15	10	5	5	15	20
Boulder	40	8	60	7	5	30
Bedrock				3		
Compaction (low,med or high)	med	med	med	med	med	med
Confinement (not,occas,frequ,conf)		confined		frequently	occasionally	
Water Temperature (Celcius)	12.5	8	10	9	8	10.3
Obstructions (yes or no)		yes		yes		
Height (m)		6.3		10		
Type		waterfalls		chute		
Location		660m		1708m		

1996 Pinkut & Fulton Harvest Report

Background:

For the 1996 fishing season the size of the Sockeye Salmon run into the Babine Lake system was two million fifty six thousand (estimated).

Seeing that the run was going to be so large the Department of Fisheries and Oceans declared a "Conservation Concern." DFO had fears that overcrowding in front of the Pinkut & Fulton Spawning Channels would cause an outbreak of a disease called "ICH". Ich is a parasite that causes salmon to die before they spawn. DFO biologists say warm water temperatures and overcrowding are two major causes of these disease outbreaks. For the previous two summers there have been major outbreaks of "ICH" at both spawning channels. The result of these outbreaks was that all of the salmon in both channel sites died before spawning. These fish had to be flushed out into the lake and the channels reloaded. DFO raised concerns that a third consecutive year of uncontrolled outbreaks of this disease would seriously jeopardize future salmon runs into Babine Lake and all of its tributaries.

In July of this summer DFO contacted the various members of the Skeena Fisheries Commission (made up of the Tsimshian, Gitxsan & Lake Babine Nations) with a proposal to harvest as much of the surplus fish as possible, at the spawning channels before the "ICH" parasite has a chance to break out. After three weeks of planning and meetings an agreement was reached between the SFC members to conduct the harvest. The agreement reached between the SFC nations was that the Tsimshian & Gitxsan nations would provide fishing boats and the crews needed to run them; the Lake Babine Nation would provide the labour force necessary to load the fish onto the trucks and provide whatever fishing equipment and crews we have.

The harvest/fishing plan was simple and consisted of catching the fish with a seine boat and beach seines. Once the fish were caught they were then dipped/brailled out of the nets into boats called punts which then transported them to the landing sites where they were loaded into containers and packed to the reefers where they were counted and iced for transport to the canneries.

Agreements were reached to purchase harvested fish with two different buyers. The first agreement was with Ocean Fisheries Ltd from Richmond. The agreement with Oceans was that they would buy only buy fish that had been allocated to the Lake Babine Nation and from no other source; they agreed to pay $1.00 per pound for our fish. The second agreement was with Mr. Dennis Maihara who is a fish broker from Vancouver. Mr. Maihara agreed to buy surplus fish that was allocated to the Skeena Fisheries Commission; he agreed to pay $.67 per pound. The reason we accepted a lower price from Mr. Maihara was that he agreed to purchase fish later into the season which were of a lesser quality than the other buyer would accept. As a result of these two agreements the fishing plan was amended and it was agreed among the three nations that we would catch the LBN allocation first as Oceans paid more money than Maihara.

Employment Summary:

Before any hiring was done it was decided that we had to set out some of the requirements, roles and responsibilities of the harvest workers; they were as follows:

- main requirements were to have a strong back and to be unemployed at the date of hiring (we wanted to make sure that unemployed people got the jobs.)
- to show up at the appointed pick up site on time and ready to work.
- to assist the other two nations as much as possible (work with their crews).
- to work on the beach seine crews, ours as well as the other nations.
- to unload the fish packers (punts) and put the fish into small containers, then pack the fish to the reefer trucks, to unload the containers into the totes and ice the fish down while counting them individually.

Pinkut:

After all of the preliminary planning and meetings were done a hiring panel was established, this panel was made up of elders reps, council reps, fisheries crew reps and LBN administration reps. The hiring panel chose the workers for the Pinkut harvest and who the two supervisors were. At the outset of the project it was decided that two crews of twelve would be hired and that the crew members would receive $13.00/hr and the supervisors would get $15.00/hr. Besides the crew that was hired a standby list of ten people was decided upon. Once the harvest began we found that there was a need to hire more than the original 24 people; this was necessary because it soon became apparent that the crews were not big enough and the other two nations requested that we provide additional people for their crews; also we lost a few people who either quit or got fired. Once the project was finished we had employed a total of thirty six of our members for a period of six days.

Fulton:

Hiring for the Fulton phase of the harvest was done by the Tachet Harvest Board. Interviews were not conducted to decide who would be hired or not. The rate of pay for the workers was the same as for the Pinkut crew. As with Pinkut two crews of twelve and a standby list was in place at the beginning of the project. Fulton turned out to be a much larger project than Pinkut as we were utilizing two landing sites because we increased our fishing effort. An additional landing crew was hired and as with Pinkut we had to increase the size of each crew. Unlike the Pinkut site we had our own fishing crews at work. At the Fulton site we experienced a high turnover rate due to people quitting and getting fired. The Fulton harvest lasted a period of eighteen days and employed a total of 86 people during its duration.

A total of 122 people were employed when figures from Pinkut & Fulton are combined.

Catch Figures:

Catch figures are on separate data sheets in this report, following is a brief summary:

Pinkut:

- 18,454 fish caught and sold to Ocean Fisheries Ltd.
- 45,587 fish caught and sold to Mr. Dennis Maihara

Total - 64,041 fish caught and sold

Fulton:

- 140,687 fish caught and sold to Ocean Fisheries Ltd.
- 66,643 fish caught and sold to Mr. Dennis Maihara

Total - 207,330 fish caught and sold

Section 35 food fish - 13,120 for CSTC
- 7,500 for LBN

Combined totals for both sites - 291,991 fish caught and sold.

Lake Babine Nation was allocated a total of 150,000 salmon to harvest, of these 40,250 were harvested at the fence by FBES and sold to B.C. Packers. The remainder of LBN's allocation was 109,750 salmon and was harvested at Pinkut & Fulton. Once we reached the end of our allocation we transferred a portion of the left over Tsimshian allocation to LBN, this transfer was 49,391 fish and was sold to Ocean Fisheries Ltd. A deal between the Tsimshian Tribal Council and LBN regarding how the proceeds from this transfer must still be worked out.

Besides the fish that were harvested and sold to the buyers we also harvested section 35 food fish for the Carrier Sekani Tribal Council and Lake Babine Nation. For CSTC we harvested a total of 13,120 fish, for LBN we harvested 7500 fish in total. When the section 35 numbers are combined with the numbers sold to the buyers the final number fish harvested comes to **291,991**.

Finances:

Ocean Fisheries Ltd was again the principal buyer for the fish that was harvested at the Fulton River site; and also purchased fish from the Pinkut Creek site. the price that Oceans paid for the fish was one dollar per pound.

110,000 fish caught X 4.84lb average per fish = 484,112.2lbs in total

484,112.2lbs X $1.00lb = $484,112.20 paid to LBN from Ocean Fish Ltd for LBN's own allocation of 150,000 sockeye.
The remainder of the allocation (40,000 sockeye) was harvested at the Babine counting fence by Fort Babine Enterprise Ltd.

Expenses:

Wages and benefits for workers at both the Fulton and Pinkut sites totalled $155,115.37
Supplies and equipment for both the Fulton and Pinkut sites totalled $54,086.28; which brings the total expenses for both sites to $209,115.37 For a complete breakdown of expenses see appendices at the end of this report.

Recommendations:

The following are recommendations for next years and future years harvests:

1 - Put all of the workers on a daily rate
2 - Buy a time clock with punch cards to keep track of individuals times
3 - Offer a bonus to those that start and finish the job - hopefully this will cut down on the high turn over rate we experienced this year
4 - Strict enforcement of rules that were in place this year:
    - no non-members
    - no one under 18 years old
    - zero tolerance when it comes breaking the rules set forth in the LBN Administrative Procedures Manual
5 - Strict control of hiring midstream in the project - only the person who is in charge of the project overall should have the authority to hire. This year there were too many bosses.
6 - All hiring for both sites be conducted via the interview process that was done for Pinkut this year - this will hopefully cut down on the controversy that happened in Tachet.
7 - A work plan be developed for next year - to be done by Nancy, Bill & Donna.
8 - Everyone involved in the project should know what their role is - as noted before there were too many bosses; there should be 1 co-ordinator who is responsible overall, 1 person to assist the co-ordinator, crew foremen for every 12 to 15 people. If there is to be involvement from other sources such as harvest boards it should be limited to hiring the initial crew and providing ideas on how the project is managed. The co-ordinator will provide progress reports to the General Manager & Harvest board(s).
9 - On site communications were very difficult especially when the second site at Tachet was started; hand held radios for those in charge would make things run a lot smoother and cut down on the need to run back and forth between the sites.
10 - A portion of the harvest proceeds should be used to purchase equipment for the future.

11 - Purchase any equipment that we will need for next year this fall/winter.
- Equipment List:
  - 2 punts complete with engines for transporting the fish to the loading sites, these can also be used to set the beach seine nets. Purchasing these punts will also eliminate the need of renting boats & motors from our members.
  - Buy the raw materials necessary to construct our own seine nets: webbing, corks, lead line and purse line. If we buy these items in bulk it will save a lot of money over custom ordering finished nets. Additional training and employment will also be created because there will have to be members trained in the art of net making and repairing.
  - A five ton truck complete with a hiab/crane would be necessary for the transporting of boats, punts, etc. Could also be used for the delivery of food fish. Every year we have to rent trucks during the surplus and food fisheries.
  - A proper central compound/storage building should be constructed to store all of the harvest and fisheries equipment.

A budget for this list will be prepared and submitted.

Summary:

The 1996 harvest was unprecedented in a number of ways. It was the first time that all three nations in the Skeena watershed have worked together on such a huge scale. It was the largest harvest undertaken on Babine Lake in modern times in terms of the number of fish taken and also in terms of the number of people who were employed.

At the outset of this years harvest we knew it was a learning experience for all those involved; at the end of the project we identified the areas where we can make improvements in the future. Although a few improvements are needed for future years it should be noted that the amount of knowledge and experience that was gained this year, especially by those who managed the harvest was invaluable.

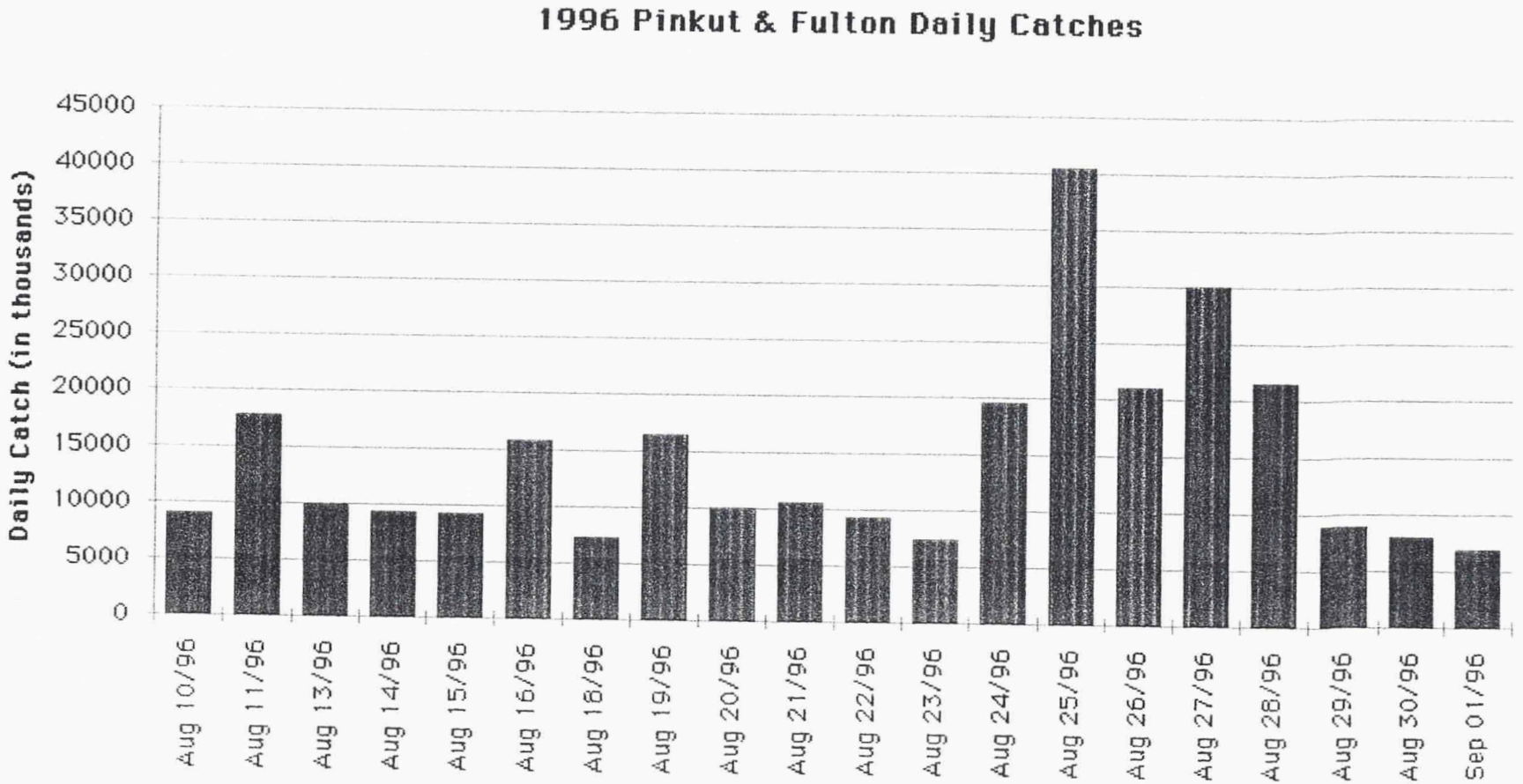
Everyone involved worked hard, learned a lot and for the most part had fun. By learning from this year the future years should be even more successful and profitable for everyone.

Bill Spenst
Harvest Co-ordinator

	1996 Pinkut & Fulton Harvest Expenses.	
Category	**Items**	**Cost**
Crew Travel	Rental of van for transportation	$1,675.94
	of crews to Pinkut site.	
First Aid Supplies & Equip.	Rental & Purchase of Equipment	$905.92
Boat Rental	Rental of Boats to Transport the	$1,890.52
	fish to the landing sites	
Supplies & Equipment	Chest Waders, Tarps, Lumber,	$6,494.75
	Gloves, Rope, etc.	
Sanitary	Rental & Cleaning of Portable	$2,398.04
	Toilets	
Harvest Equipment	Seine Net, Boat & Motor,Hand	$26,017.66
	Totes	
Fuel	Gas, Diesel & Oil for boats and	$5,950.98
	Vehicles*	
Travel	Travel paid to Bill & Donna includes	$3,971.15
	Mileage & Meals	
Accomodations		$3,650.52
Meals	Meals for workers at both sites	$1,130.80
Wages	Wages for Workers & Harvest	$155,029.09
	Managers at both sites.	
	TOTAL	**$209,115.37**

	1996 Pinkut & Fulton Catch Numbers		
	For fish sold to Ocean Fisheries Ltd.		
Date	**# of Fish/Truck**	**Company**	**Site**
August 10/96	9073	Oceans	Pinkut
August 11/96	9381	Oceans	Pinkut
August 16/96	7407	Oceans	Fulton
August 18/96	7321	Oceans	Fulton
August 19/96	6957	Oceans	Fulton
August 19/96	6547	Oceans	Fulton
August 20/96	7080	Oceans	Fulton
August 21/96	7574	Oceans	Fulton
August 22/96	7357	Oceans	Fulton
August 23/96	7450	Oceans	Fulton
August 24/96	7379	Oceans	Fulton
August 25/96	7686	Oceans	Fulton
August 25/96	7889	Oceans	Fulton
August 25/96	7725	Oceans	Fulton
August 25/96	8159	Oceans	Fulton
August 26/96	7774	Oceans	Fulton
August 26/96	5250	Oceans	Fulton
August 27/96	7518	Oceans	Fulton
August 27/96	7050	Oceans	Fulton
August 28/96	7126	Oceans	Fulton
August 28/96	2551	Oceans	Fulton
August 28/96	6887	Oceans	Fulton
Totals	**159141**		

	1996 Pinkut & Fulton Catch Numbers		
	For fish sold to Mr. Dennis Maihara		
Date	**# of Fish/Truck**	**Company**	**Site**
August 11/96	8440	Maihara	Pinkut
August 13/96	9979	Maihara	Pinkut
August 14/96	9398	Maihara	Pinkut
August 15/96	9292	Maihara	Pinkut
August 16/96	8478	Maihara	Pinkut
August 24/96	10202	Maihara	Fulton
August 25/96	9046	Maihara	Fulton
August 26/96	8032	Maihara	Fulton
August 27/96	8425	Maihara	Fulton
August 27/96	7008	Maihara	Fulton
August 29/96	8950	Maihara	Fulton
August 30/96	8025	Maihara	Fulton
Sept. 01/96	6955	Maihara	Fulton
Totals	**112230**		


1996 Pinkut & Fulton Daily Catches
Daily Catch (in thousands)
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
Aug 10/96
Aug 11/96
Aug 13/96
Aug 14/96
Aug 15/96
Aug 16/96
Aug 18/96
Aug 19/96
Aug 20/96
Aug 21/96
Aug 22/96
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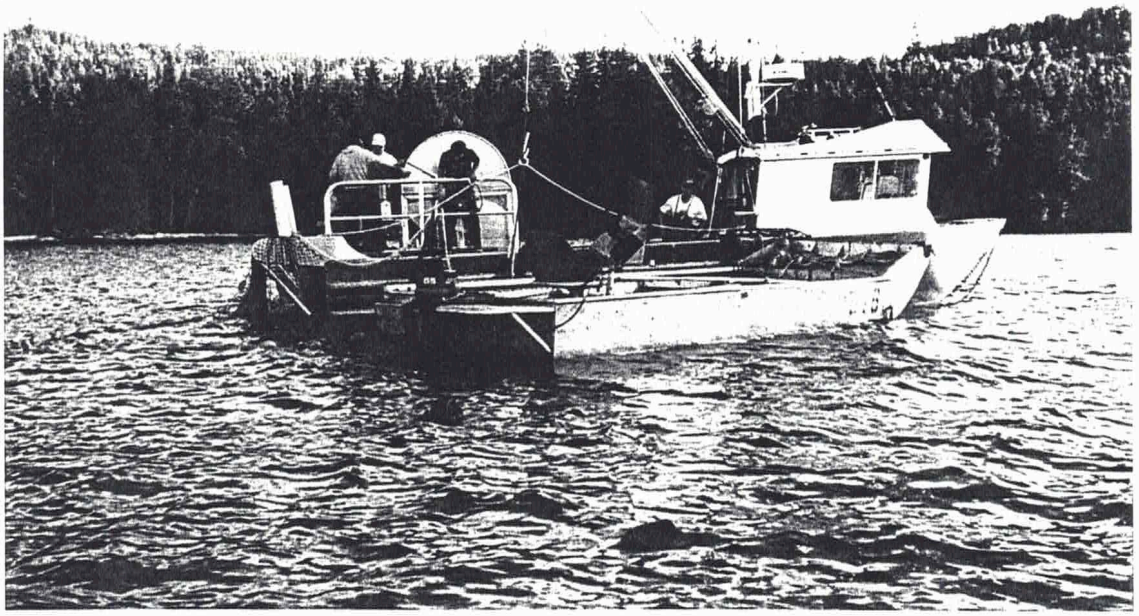
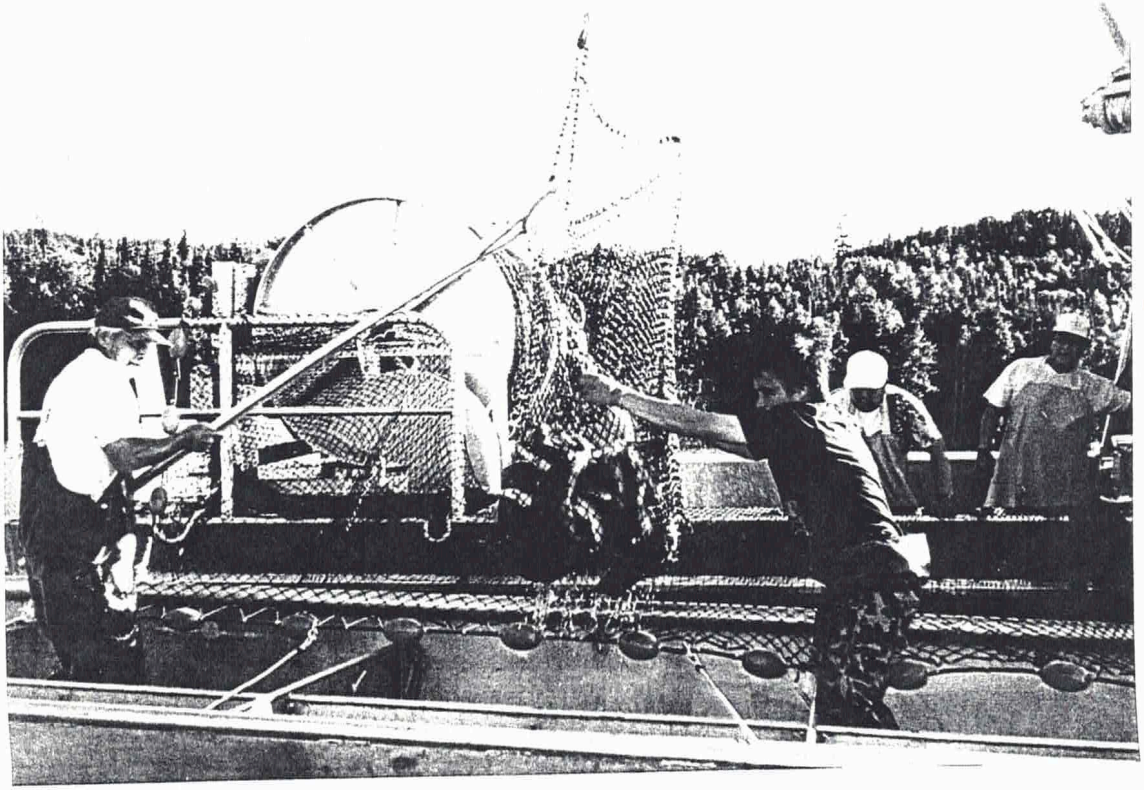
Aug 30/96
Sep 01/96



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