Kathie Lake

Recreational Fishery Stock Assessment

2004 Final Report

Project Tracking Number:

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EXECUTIVE SUMMARY

Stocking assessments were completed on Kathie Lake in Eskers Provincial Park in 1999 and 2003. The purpose of these assessments was to 1) document the status of this fishery, including changes in fish growth and 2) to confirm and investigate the level of naturalized recruitment from the descendants of eastern brook trout stocked before 1997. Kathie Lake currently contains both rainbow and eastern brook trout. Standard BC Resource Inventory and Standards Committee methods were used to complete the surveys. Naturalized brook trout recruits were captured in a gill net, and mature brook trout were observed during the course of the survey. Growth rates and lengths-at-age of naturalized brook trout in Kathie Lake were found to be less than brook trout identified in other Omineca lakes and have declined since 1991. Declining growth, high relative catch per effort and the spawning survey results are supporting evidence that the Kathie Lake EB population is growing and recruitment is not limited by spawning habitat. In contrast, the growth rates and size-at-age of all female rainbow trout stocked into Kathie Lake are relatively high and have remained stable between years. The average length of age three RB was found to be 361 mm. Based upon the results of this survey it is recommended that Kathie Lake should be assessed through opportunistic creel surveys and periodic stock assessments in an effort to monitor the growing population of EB as well as to ensure continued performance of the RB fishery.

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INTRODUCTION 1.0

This report presents the results of two recent stock assessments of Kathie Lake with comparison to a stock assessment completed in 1991 (Van Schubert 1991). The first assessment was completed on August 9, 2000 under a partnership arrangement between the Ministry of Environment, Lands and Parks (now the Ministry of Water Land and Air Protection- hereafter M.W.L.A.P.) and the Carrier Sekani Tribal Council (CSTC), with funding obtained from Fisheries Renewal B.C. through the Upper Fraser-Nechako Fisheries Council. Field activities were carried out by Margo French and Lawrence Ward of the CSTC. The second assessment was completed in October 2, 2003 by the M.W.L.A.P. with funding obtained through the Small Lakes Management and Conservation Initiative (SLMCI). Analysis and reporting of the field results were conducted by the author. Peer review of this report was completed by regional fisheries staff. Inquiries pertaining to this report should be directed to the M.W.L.A.P. in Prince George.

Kathie Lake is a closed drainage system (Table 1, Figure 1, Photo 1) located 32 km northwest of Prince George in Eskers Provincial Park. The lake was initially surveyed in 1985 and was determined to be barren of fish based on gill net and minnow trap surveys (Phillip, 1985). The lake was subsequently stocked with rainbow trout (*Oncorhynchus mykiss*) in 1986, 1988 and 1989 and eastern brook trout (*Salvelinus fontinalis*) in 1988-1989 (Appendix 2, Table 1). The original fishery management objective for Kathie Lake was to provide a high a yield put and take fishery for rainbow trout and brook trout (MWLAP Lakes Files). Stocking was suspended at the request of the Parks Branch after 1989 as the result of concerns by Parks staff regarding uncontrolled angler access to the lakes in Eskers Park, which was occurring in response to the stocking program but in advance of the completion of adequate trail infrastructure to support the increased angler use.

After the stocking program ceased, unconfirmed reports were submitted to Fisheries and Parks staff that some of the lakes were continuing to produce brook trout, presumably through natural recruitment. Reports were also received that indicated that fish may have been transferred between lakes, a situation which, if true, would have a direct bearing on the management objectives for each of the lakes initially stocked. In 1996, Parks Branch requested that the stocking program be re-invoked, as it was felt that angler use could now be controlled given the state of the park's infrastructure. Stocking of RB was reinitiated in Kathie Lake in 1997 on an alternate year basis at a rate of 239 yearlings/ha (Appendix 2,Table 1). This stocking rate was reduced to 144 yearlings/ha in 1999. In 2002 the stocking frequency was changed to once per year (Appendix 2, Table 1). Brook trout have not been stocked into Kathie Lake since 1989 although, in February 1997 Parks staff observed an angler that had captured two mature brook trout from Kathie Lake. One of these fish contained a juvenile fish (~ 120 mm) that was tentatively identified as a brook trout (M.W.L.A.P. Lakes Files).

Kathie Lake was assigned status as a high priority lake for stock assessment in 2000 as only one survey had been completed since the lake had been initially stocked and this

survey was completed in 1991 (Van Schubert 1991) only two years after stocking had been re-initiated and only four years after brook trout had been initially stocked. As part of ongoing monitoring, a second assessment was completed in October 2003 to visually assess the extent of spawning by eastern brook trout and to evaluate the success of rainbow trout stocking in Kathie Lake.

BACKGROUND 2.0

Kathie Lake is one of five stocked lakes that are managed within Eskers Provincial Park, located 32 km northwest of Prince George. Access to all of the lakes in Eskers Park is by foot or by canoe portage through a developed trail system. Fish stocking in Eskers Park coincided with the initial park development in 1987 and was meant to provide a variety of angling opportunities utilizing "put and take" fisheries (BC Parks 1990). Currently within Eskers Park, there are five lakes that are intentionally stocked with sterile, all-female triploid (AF3N) eastern brook trout and two that are stocked with all female (AF) rainbow trout. These lakes include Bow, Butterfly, Byers, Camp and Kathie. The stocking of reproductively capable eastern brook trout prior to 1998 has resulted in several populations of brook trout that successfully shore-spawn in lakes within the park.

Eskers Provincial Park currently supports a regionally important recreational fishery during both summer and winter months and Kathie Lake supports an important component of that fishery. However, stocking errors and possible illegal transfer of reproductively capable brook trout between the lakes in Eskers Park have compromised future recreational fishing quality and opportunities, as well as conservation of biodiversity objectives in adjacent unstocked lakes in the Park.

METHODS 3.0

August 2000 3.1

A 91.4 m, 2.4 m deep sinking monofilament gill net with experimental mesh sizes was set in Kathie Lake on August 9, 2000, according to the methods specified in the Resource Inventory Committee document Fish Collection Methods and Standards (RIC 1997). The net was deployed at 12:15 hrs and retrieved on August 9 at 14:45 hrs, for a total soak time of 26.5 hours. The net was set from the north shore near the constriction in the middle of the lake (Figure 2), and extended in a SSE orientation. The net ranged in depth from the surface to approximately 12 m. (Figure 2).

All trout collected were sampled for fork length (mm), weight (g), sex, maturity and stomach contents. Weight was measured to the nearest 10 g and length was measured to the nearest mm. Otoliths were collected from all brook trout and scales were collected from rainbow trout for age structure analyses by Birkenhead Scale Analyses (Lone Butte, BC).

October 2003 3.2

A 91.4 m, 2.4 m deep floating monofilament gill net with experimental mesh was set at 16:30 hrs on October 1, 2003 in the north end of Kathie Lake (Figure 2) according to the methods specified in the Resource Inventory Committee document Fish Collection Methods and Standards (RIC 1997). The net was retrieved on October 2 at 11:40 hrs for a total soak time of 23.2 hours. The net was extended west on the surface from the shore of the island into approximately 6 meters of water (Figure 2). All trout collected were sampled for fork length (mm), weight (g), sex, and maturity. Weight was measured to the nearest 10 g and length was measured to the nearest mm. Otoliths were collected from all brook trout and scales were collected from rainbow trout for age structure analyses by Birkenhead Scale Analyses (Lone Butte, BC). A qualitative visual assessment of potential spawning habitat was also completed during this survey.

RESULTS 4.0

Catch summary 4.1

Rainbow trout (RB) and brook trout (EB) were captured in all three sampling events between 1991 and 2003 (Table 2, Figure 3, Figure 4) and the raw assessment data for all sample years can be found in Appendix 3. Catch per unit effort for EB varied widely between sampling events and ranged from 1.55- 10.00 fish per net hour (Table 2). The catch results for rainbow trout were also variable and ranged from 0.4-2.75 fish per net hour (Table 2). It is difficult to interpret these data as catch success may be dependant upon a variety of factors including post stocking survival of yearling RB or seasonal variation in preferred habitat at the time of the surveys.

The sex ratio for EB was roughly equal in 2003 and 2000. The 2003 catch was slightly biased towards males with 44% females and 56% males. The 2000 catch was slightly biased to females with 56% female and 44% male. Both the 2000 and 2003 catches contained maturing brook trout. In 2000, the samples were identified as 100% maturing whereas in 2003 there was a variety of maturity states observed. At the time of sampling in 2003, 53% of the fish were in a late maturity state with 25% of these fish being ready to spawn (Figure 5). Only 25% of the 2003 EB sample was immature. In the 2003 catch >80% of the three-year-old EB were mature whereas less than 20% of the two-year-olds were mature (Figure 6). All of the mature two-year-old EB were male. Rainbows that have been stocked into Kathie Lake since 2000 have been all female (AF), thus maturity states and sex ratios were not analyzed in detail for this report.

Length Frequency, Condition and Growth 4.2

Eastern Brook Trout 4.2.1

In 2003 the EB catch ranged in length from 225 mm to 322 mm ($\bar{x}$ = 279 mm) (Table 3, Figure 3). EB from the 2000 sample ranged from 204 mm up to 368 mm ($\bar{x}$ = 279 mm). The mean length of three-year-old Kathie Lake EB was similar across sample years (Table 4) even though the 2000 and 2003 sampling periods occurred later in the growth season (Figure 7).

The mean body condition of EB in 2003 (1.18) was slightly higher compared with previous surveys in 1991 and 2000 (1.06 for both). Condition-at-age was comparable for all ages across sample years (Table 4) with the exception of three-year-olds in 2003. Three-year-old EB in 2003 were in higher condition than in other years and this may be in part due to the late stages of maturity of these fish and favourable growing conditions that year. The 2003 sample was collected in early October when the gonad mass would be at a maximum just prior to spawning. For the three sample years EB weight increased as the power of length according to the following equations (Figure 98)**:**

1991 $W = .0003L^{2.4038}$ **(R^2=0.72)**
1999 $W = .0001L^{2.5713}$ **(R^2=0.90)**
2003 $W = .0000L^{2.8682}$ **(R^2=0.93)**

The exponent value in the length-weight relationship can be used as a relative measure of fish condition. A value of three indicates isometric growth (growth without change in body shape). Values less than three indicate a drop in mass relative to length as the fish grows (negative allometric growth).

Rainbow Trout 4.2.2

Rainbow trout condition in Kathie Lake remained relatively constant between 1.0 and 1.1 for all ages observed through the three survey years. Furthermore, Kathie Lake rainbows have exhibited relatively good growth as they age (Table 4). For the 2003 sample RB weight increased as power of length according to the following equation (Figure 8):

2003 $W = .000006L^{3.0349}$ **(R^2=0.99)**

Unlike the EB samples, size-at-age for RB in Kathie Lake appears to be relatively stable. In 1991 RB's caught at the start of the growth season had a mean length of 341 mm and in 2003 RB's caught near the end of the growth season had a mean length of 361 mm (Table 4).

Visual Spawner and Spawning Habitat Survey 4.2.3

The 2003 stocking assessment was completed in early October 2003 during the time period when EB spawning activity would likely have been at its highest intensity. Extensive schools of mature EB exhibiting spawning colour and morphology were observed cruising the littoral zone of the lake, frequently in less than one meter of water. Redd locations as well as sites where digging had occurred were also observed in the near shore areas throughout the north-west end of the lake and around the west side of the island (Figure 1).

DISCUSSION 5.0

Eastern Brook Trout 5.1

The stocking of reproductively viable brook trout in the late 1980's has resulted in a naturalized brook trout population that may be exhibiting high levels of intraspecific competition, resulting in density dependent growth effects.
At first glance the mean length-at-age of Kathie Lake three-year-old EB appears to be relatively stable (Figure 7), however, the 2000 and 2003 data were collected late in the growth season and both are slightly lower than the mean length at three-years in 1991 (Table 4). Factoring in a partial season of growth for 2000 and nearly a full season of growth in 2003, the mean lengths-at-age of 2000 and 2003 fish are likely more representative of the length-at-age of four year old fish. Kathie Lake brook trout also appear to be less conditioned compared to other populations of brook trout in the region. For comparison, samples of EB from Shere and Ferguson lakes from two stock assessments in 1998-99, exhibited near isometric growth with growth exponent values of 3.128 and 3.097 respectively (Zimmerman 1999a, 1999b). Kathie Lake in contrast demonstrated negative allometric growth in 2003 with a growth exponent of 2.87 (Figure 8). Our field observations at Kathie Lake are consistent with anecdotal reports from anglers of relatively poor body condition of Kathie Lake EB compared with other local lakes stocked with EB.

Decreased growth rates may be reflective of increasing levels of intraspecific competition for limited food resources in this population of naturally reproducing fish as it increases. Stocked brook trout populations capable of reproduction are prone to stunting as they grow in a confined area and reach carrying capacity, and Kathie Lake is likely following this tendency.

Based on the visual surveys for spawning habitat, it is likely that recruitment in Kathie Lake in not spawning habitat limited. Most of the shoreline of Kathie Lake is composed of a loose mixture of gravels and sands overlain with a thin layer of organic material (Photo 2). There are few areas of overland drainage in Eskers Park and Kathie Lake has no tributary or outlet streams. As a result the drainage of precipitation from Kathie Lake is subsurface which, in combination with the porous shoreline substrate, provides for

extensive, high-quality shore-spawning habitat. It is unclear how much of this shore habitat allows for successful egg and larval incubation.

The presence of naturalized brook trout populations in Kathie Lake also presents hazards in terms of conservation of biodiversity and sport fishing quality, where there is illegal fish transfer between lakes within the Park. At present the hazard from Kathie Lake is low as the three lakes in the Park immediately adjacent (within 200 m) to Kathie Lake presently contain stocked brook trout. Two of these lakes (Bow and Butterfly; Williamson 2004a, 2004b) are known to contain naturalized brook trout and a third (Byers) is suspected to contain lower levels of reproducing brook trout, although this has not been confirmed. Given that the lakes adjacent to Kathie already contain brook trout, the incentive for anglers to move fish is low and it is more likely that fish would be moved from the lakes adjacent to Kathie Lake rather than from Kathie Lake itself.

Options to reduce the hazards to biodiversity values and fishing quality could include:

1) Increase in brook trout quotas to reduce wild naturalized population sizes
2) Eradication through the use of gillnets or trapnets in the smaller lakes (ex Butterfly, Redstart and Kinglet)
3) Park signage explaining the hazards and risks.

At a minimum a communication plan including signage should be established to inform anglers in the park the hazards of fish transfer to biodiversity and sport fishing quality as well as the legal consequences of transferring fish.

At present EB population levels, Kathie Lake has the potential to provide a high yield brook trout fishery. However if the population continues to grow and size-at-age and growth rates continue to decline, the quality of the fishery may decline to the point where anglers may divert their fishing effort elsewhere. Under this scenario fishing effort may be diverted to other higher quality lakes within Eskers Park or to lakes outside of the park. Monitoring of this fishery will be required to explain patterns of angling effort so that staff can adequately plan for and manage park use.

Rainbow Trout 5.2

Kathie Lake rainbows continue to show relatively good growth rates, however there is some question about post stocking survival based upon the net catch per unit effort in 2000. In that year only one rainbow was captured, whereas in 2003 a more reasonable sample was obtained that represented all three age classes that could have been present in the lake. A variety of factors including, differential habitat selection, interspecific competition either by direct predation, resource competition or interference competition may be responsible for the low catch of rainbows in 2000. The 2003 sample as well as preliminary unpublished creel data from the winter of 2003/2004 indicate that there are sufficient numbers of rainbow trout in Kathie Lake to provide a fishery attractive to anglers, however monitoring will be required to ensure that this remains a trend.

RECOMMENDATIONS FOR FUTURE MANAGEMENT 6.0

1. Continue monitoring the RB fishery through annual opportunistic creel surveys and stocking assessments on a three year cycle.
2. Continue monitoring the EB fishery and population levels through annual opportunistic creel surveys and stocking assessments at a three year interval.
3. Change the brood stock requests for RB to include a preference for 20 g yearlings to reduce the likelihood that predation by brook trout is reducing post stocking survival of RB.
4. Complete an updated angling management and stocking plan for all Eskers lakes that reflects the presence of naturalized brook trout in Eskers Park and balances the need for conservation while providing for quality recreational opportunities.
5. Establish a communication plan to reduce the incidence of fish transfer in the park.
6. If populations of naturalized EB continue to grow in Kathie Lake, management options such as: 1) Increases to EB quotas, or 2) eradication methods (ex. removal by gill nets or trapnets) could be considered to protect biodiversity and fishery values.

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TABLES 8.0

Table 1. Attributes of Kathie Lake.*

Attributes	
Waterbody identifier	01241STUR
Water surface area	44.6 m2
Area above 6 m contour	20.9 Ha
Shoreline perimeter	5300 m
Maximum depth	20.9
Volume	3178000 m3
Mean depth	7.1
Elevation	760 m
T.D.S.	108 mg/L
Morphoedaphic index	15

*from Philip (1985)

Table 2. Catch Summary for the years 1991-2003; CPUE- Catch per unit effort.

	Brook Trout		Rainbow Trout		Set Time	
Year	Catch	Net CPUE	Catch	Net CPUE	(Hours)	Set Date
1991	41	1.66	68	2.75	24.75	22-May-91
2000	25	10.00	1	0.40	2.5	09-Aug-00
2003	36	1.55	14	0.60	23.2	02-Oct-03

Table 3. Mean length, weight and condition for EB captured in all sample years.

Brook Trout		**Length (mm)**				**Weight (g)**				**Condition (k)**				
Sample Year	Sample Size	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
2003	36	279	225	322	23.7	261	150	370	64.1	1.18	1.00	1.32	0.08	0.01
2000	25	280	204	368	42.1	242	109	480	96.6	1.06	0.63	1.37	0.14	0.02
1991	41	301	260	350	20.1	291	200	410	56.0	1.06	0.79	1.32	0.11	0.01

Table 4. Physical attributes of brook trout and rainbow trout sampled in Kathie Lake 1991-2003 broken down by age class.

Brook Trout			Length (mm)				Weight (g)				Condition (k)				
Sample Year	Age	Sample Size	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
2003	2	17	259	225	288	15.3	204	150	270	32.2	1.17	1.00	1.32	0.1	0.01
2000	2	6	223	204	242	15.0	134	109	163	23.1	1.20	1.04	1.37	0.1	0.01
2003	3	19	297	276	322	12.8	313	250	370	34.5	1.19	1.06	1.29	0.1	0.01
2000	3	14	290	255	350	26.5	253	120	420	75.0	1.01	0.63	1.17	0.1	0.02
1991	3	41	301	260	350	20.1	291	200	410	56.0	1.06	0.79	1.32	0.1	0.01
2000	4	4	323	294	368	31.9	345	270	480	93.3	1.01	0.96	1.06	0.0	0.00

Rainbow Trout			Length (mm)				Weight (g)				Condition (k)				
Sample Year	Age	Sample Size	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
2003	1	5	142	124	172	18.5	30	20	49	11.5	1.0	1.0	1.1	0.1	0.00
2003	2	5	315	290	343	19.4	334	300	420	49.8	1.1	0.9	1.2	0.1	0.01
2000	2	1	308	308	308		330	330	330		1.1	1.1	1.1		
2003	3	4	361	311	385	34.0	513	320	590	129.7	1.1	1.0	1.1	0.0	0.00
1991	3	14	341	300	390	28.5	443	340	570	85.3	1.1	0.9	2.1	0.3	0.09
1991	4	2	385	380	390	7.1	570	540	600	42.4	1.0	1.0	1.0	0.0	0.00

FIGURES 9.0

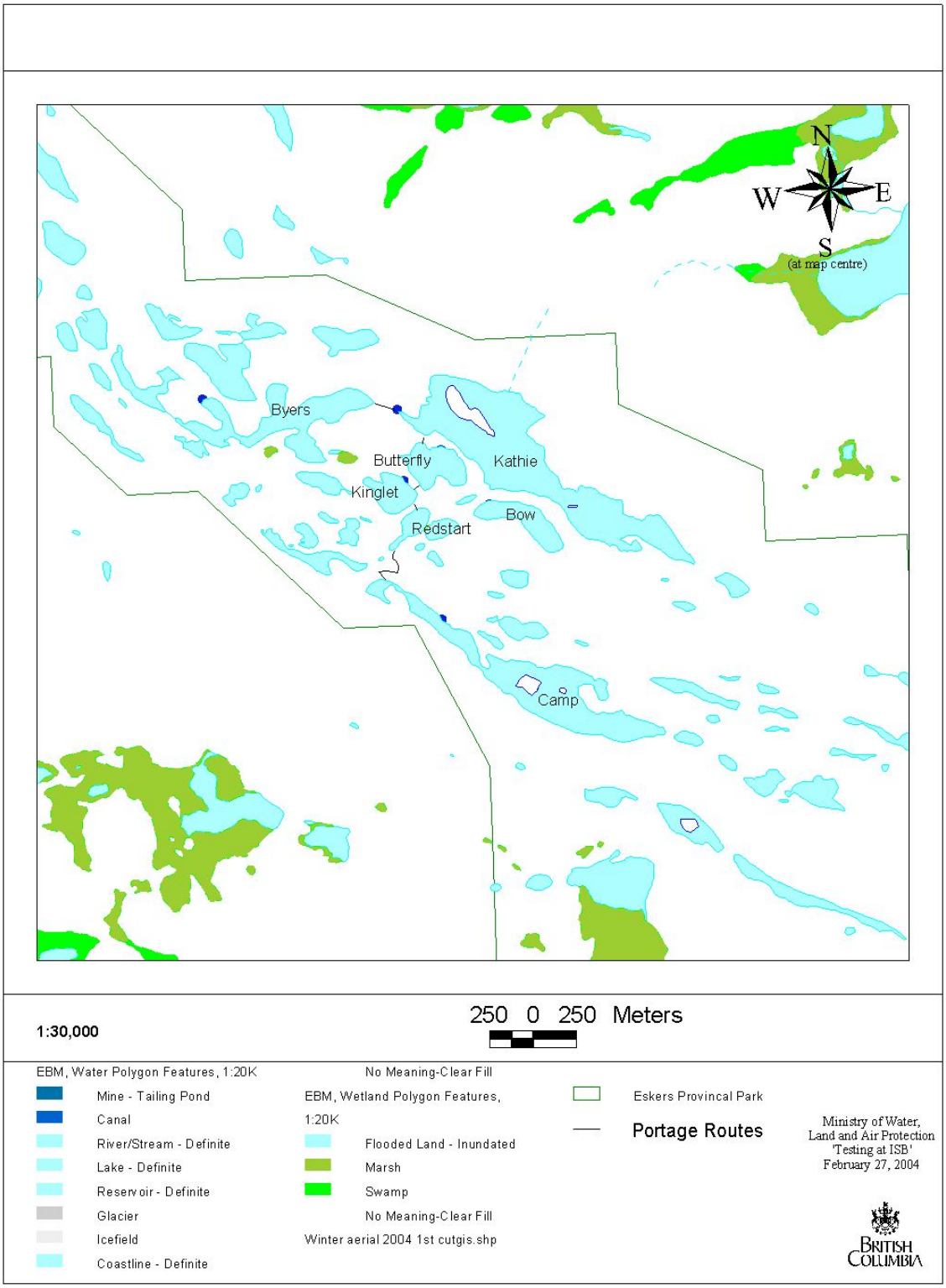


Figure 1. Map of Eskers Provincial Park showing lakes that were included in the 2003 survey (Note Byers Lake was not assessed in 2003).

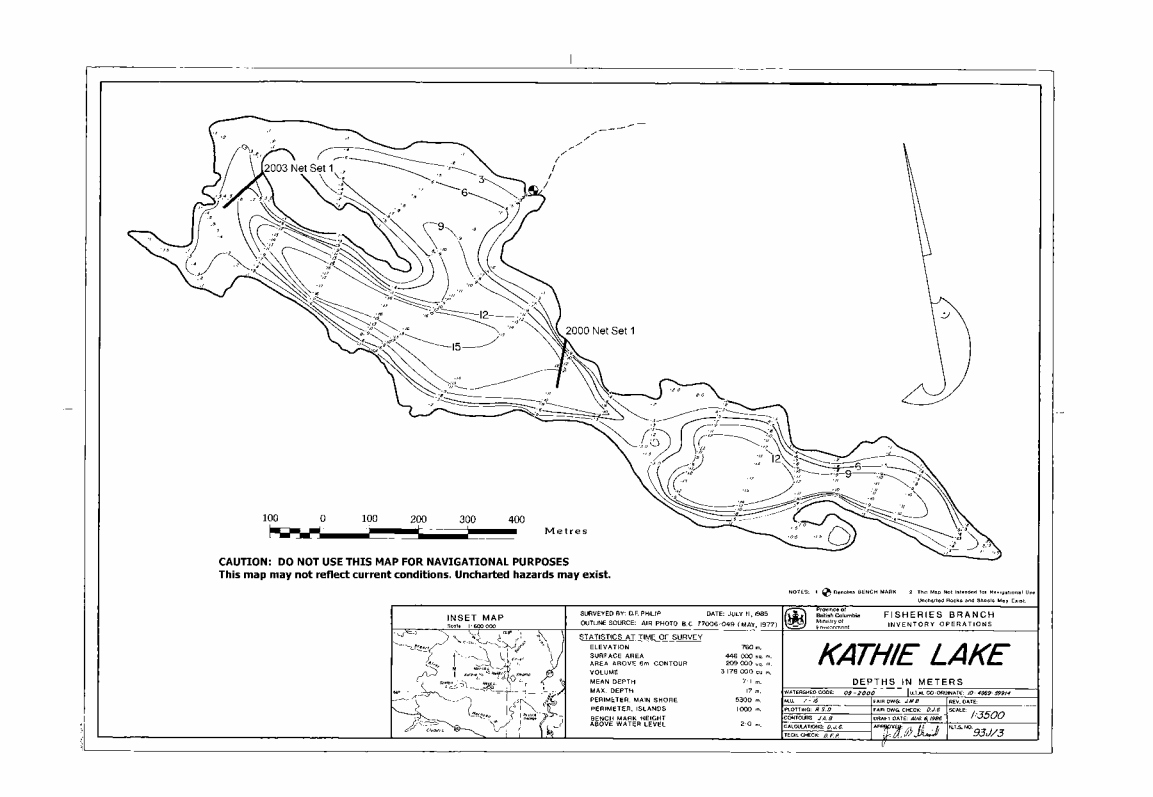


Figure 2. Bathymetric map of Kathie Lake showing gill net sets in August, 2000 and in October 2003. (see Appendix 1 Figure 1 for full size image).

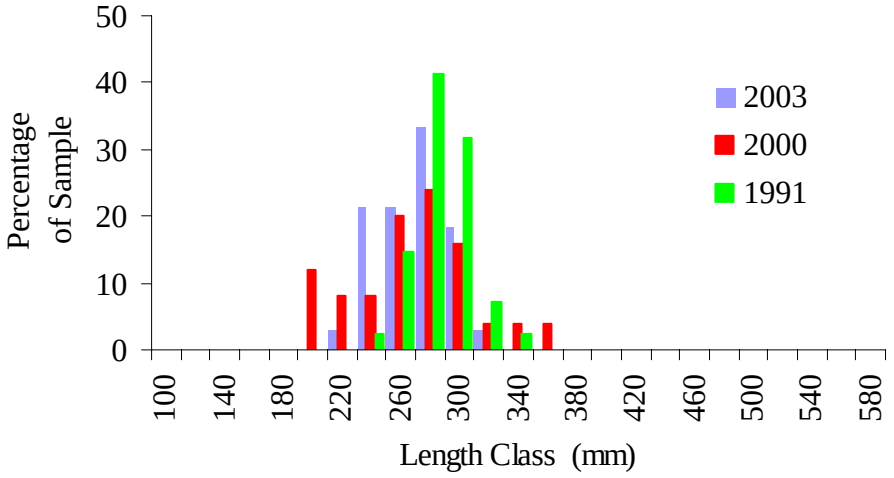


Figure 3. Length frequency distribution for the 2003, 1999 and 1991 gill net samples for Kathie Lake eastern brook trout (EB). 2003, n=36; 2000, n=2; 1991, n=41.

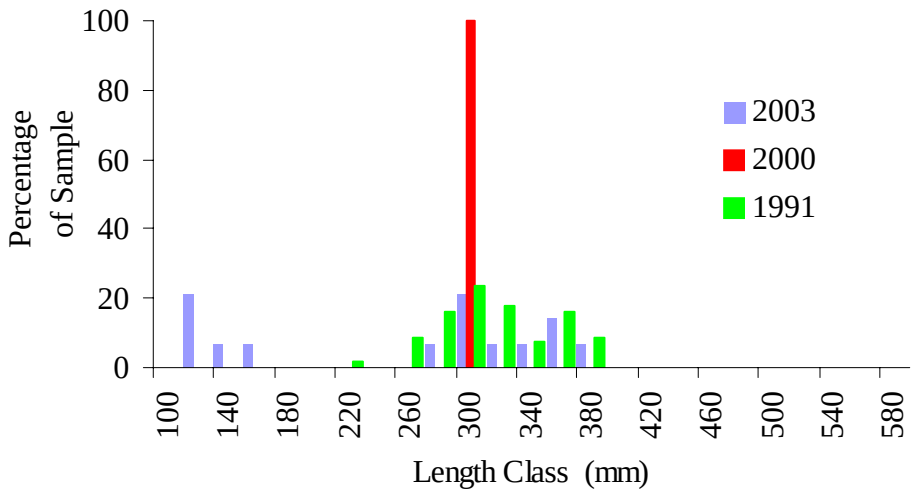


Figure 4. Length frequency distribution for the 2003, 1999 and 1991 gill net samples for Kathie Lake rainbow trout (RB). 2003, n=14; 2000, n=1; 1991, n=68.

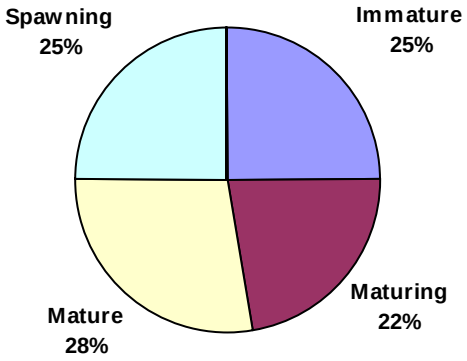


Figure 5. Maturity states of EB captured in 2003 listed by percent.

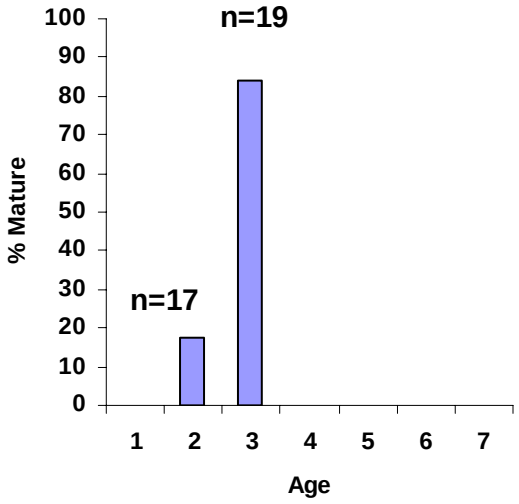


Figure 6. Percentage of mature EB in each age class for 2003.

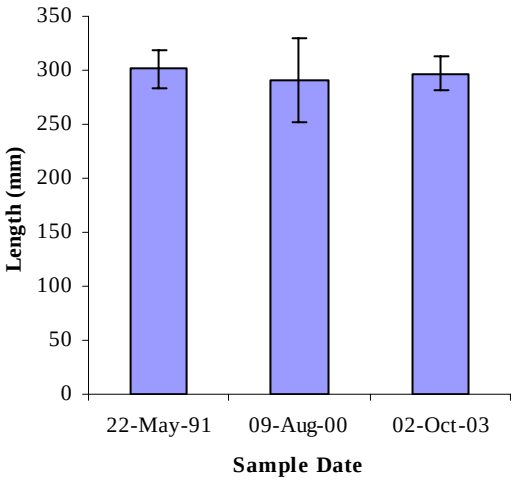


Figure 7. Mean length of three-year-old eastern brook trout captured in Kathie Lake, with 95% confidence limits.

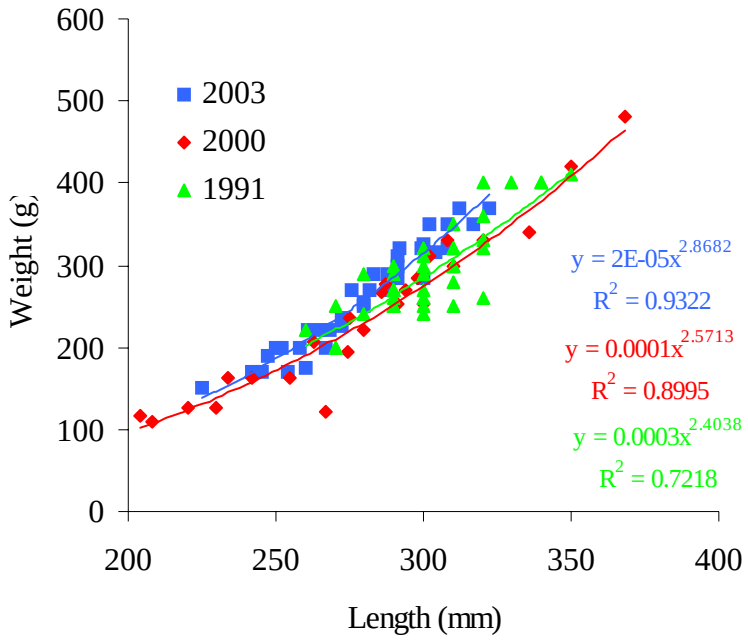


Figure 8. Length weight relationship for Kathie Lake brook trout (EB) for 1991, 2000, and 2003.

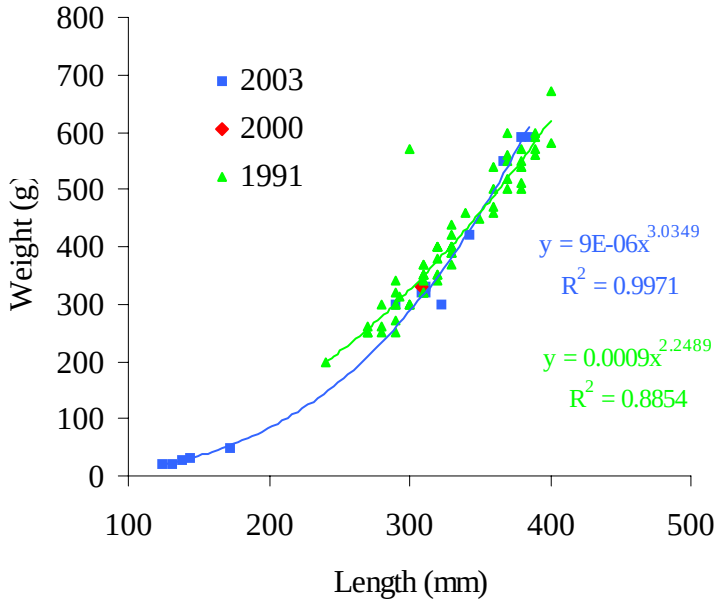


Figure 9. Length weight relationship for Kathie Lake rainbow trout (RB) for 1991, 2000 and 2003.

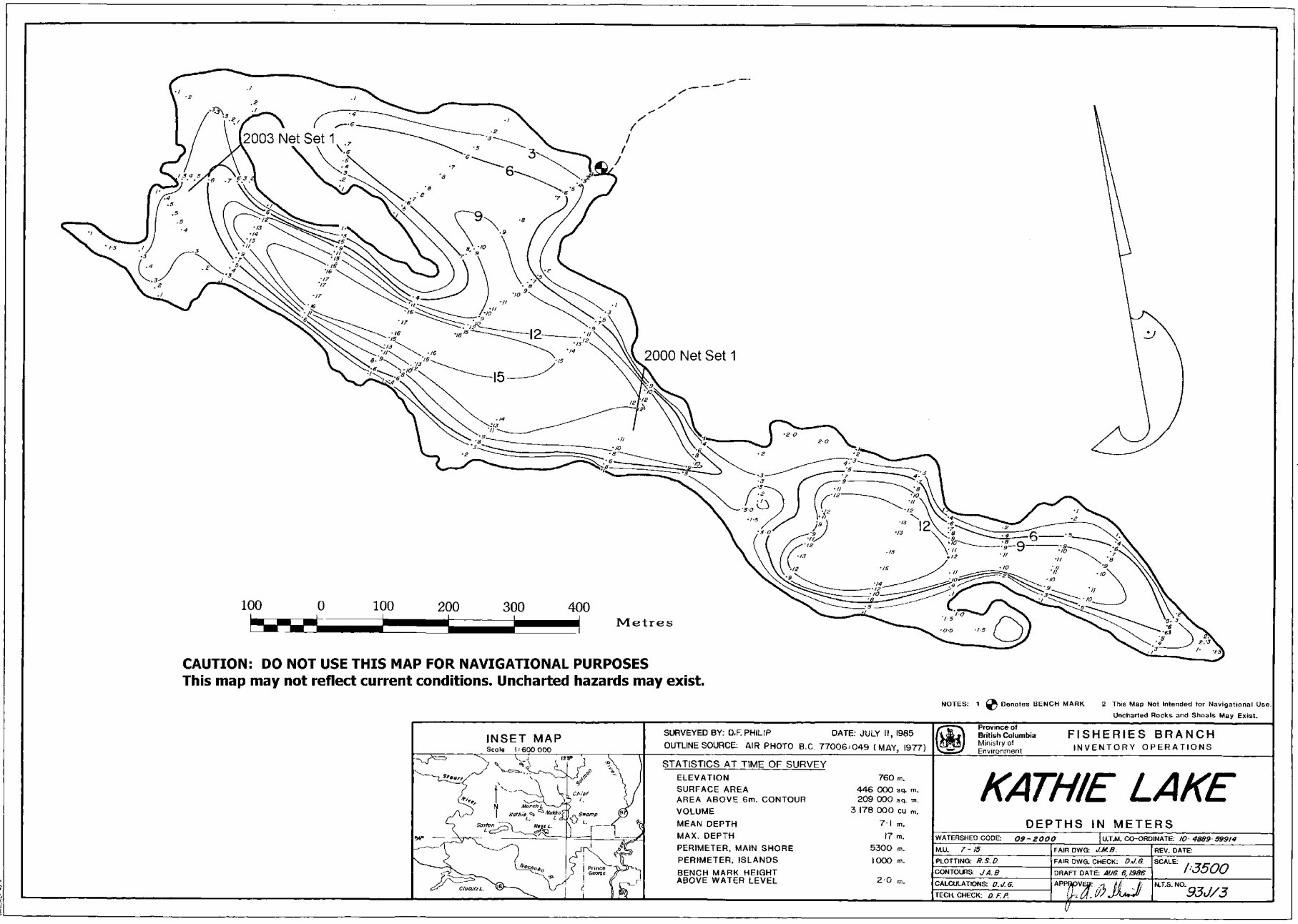
Photos 10.0

Photo 1. View of Kathie Lake looking north towards the Island (Philip, 1985).

Photo 2. Typical shoreline observed in Kathie Lake (Philip, 1985).

APPENDICES 10.0

Appendix 1 Figure 1. Bathymetric map of Kathie Lake showing the 2000 and 2003 gill net sets.



Appendix 2 Table 1. Stocking history and recent brood requests for Kathie Lake.

Release Date	Gazetted Name	Region	Species Name	Fish Count	Stocking Density (fish/Ha)	Stock	Mark	Average Size (g)	Life Cycle Stage	Watershed Code	Waterbody Identifier
Requested for 2005	Kathie Lake	7A	Rainbow Trout	3000	144	PENNASK PENN AF		20	Yearling	182-209700	01241STUR
Requested for 2004	Kathie Lake	7A	Rainbow Trout	3000	144	PENNASK PENN AF			Yearling	182-209700	01241STUR
11-Jun-03	Kathie Lake	7A	Rainbow Trout	3000	144	PENNASK PENN AF		5.56	Yearling	182-209700	01241STUR
19-Jun-02	Kathie Lake	7A	Rainbow Trout	3000	144	PENNASK BV AF		10	Yearling	182-209700	01241STUR
4-Jun-01	Kathie Lake	7A	Rainbow Trout	3000	144	PENNASK BV AF		12.72	Yearling	182-209700	01241STUR
5-Jun-99	Kathie Lake	7A	Rainbow Trout	3000	144	PENNASK BEAV AF		15.15	Yearling	182-209700	01241STUR
17-Jun-97	Kathie Lake	7A	Rainbow Trout	5000	239	BADGER TUNKWA		8.33	Yearling	182-209700	01241STUR
1-Jun-89	Kathie Lake	7A	Rainbow Trout	10000	478	TUNKWA		10.3	Yearling	182-209700	01241STUR
1-Aug-87	Kathie Lake	7A	Rainbow Trout	5000	239	DRAGON		0.9	Unknown	182-209700	01241STUR
1-Aug-86	Kathie Lake	7A	Rainbow Trout	5000	239	TUNKWA		0.6	Unknown	182-209700	01241STUR
1-Jun-89	Kathie Lake	7A	Brook Trout	10000	478	AYLMER		2.5	Fry	182-209700	01241STUR
1-Jun-88	Kathie Lake	7A	Brook Trout	10000	478	AYLMER		2.7	Unknown	182-209700	01241STUR

Appendix 3 Table 1. Stock assessment data for Kathie Lake eastern brook trout in 2003.

Lake	Sample#	Set #	Species Caught	Age	Length (mm)	Weight (grams)	Condition (k)	Scale Age	Structure	Cond. Code	Clip	Sex	Maturity	Ageing Comments	Comments	Date
kathie	1	GN1	eb	2	280	255	1.2	2+	ot	1	n	f	im			02-Oct-03
kathie	3	GN1	eb	2	272	235	1.2	2+	ot	1	n	f	mt			02-Oct-03
kathie	4	GN1	eb	2	250	200	1.3	2+	ot	1	n	m	sp			02-Oct-03
kathie	7	GN1	eb	2	268	220	1.1	2+	ot	1	n	f	mt			02-Oct-03
kathie	11	GN1	eb	2	272	225	1.1	2+	ot	1	n	m	im			02-Oct-03
kathie	17	GN1	eb	2	245	170	1.2	2+	ot	1	n	f	mt			02-Oct-03
kathie	18	GN1	eb	2	260	175	1.0	2+	ot	1	n	m	m			02-Oct-03
kathie	21	GN1	eb	2	252	200	1.2	2+	ot	1	n	m	m			02-Oct-03
kathie	22	GN1	eb	2	267	200	1.1	2+	ot	1	n	m	im			02-Oct-03
kathie	23	GN1	eb	2	265	220	1.2	2+	ot	1	n	m	im			02-Oct-03
kathie	26	GN1	eb	2	288	270	1.1	2+	ot	1	n	m	im	wide 2nd year growth		02-Oct-03
kathie	30	GN1	eb	2	258	200	1.2	2+	ot	1	n	f	im			02-Oct-03
kathie	31	GN1	eb	2	247	190	1.3	2+	ot	1	n	f	mt			02-Oct-03
kathie	32	GN1	eb	2	261	220	1.2	2+	ot	1	n	f	mt			02-Oct-03
kathie	34	GN1	eb	2	254	170	1.0	2+	ot	1	n	f	mt			02-Oct-03
kathie	35	GN1	eb	2	242	170	1.2	2+	ot	1	n	f	mt			02-Oct-03
kathie	36	GN1	eb	2	225	150	1.3	2+	ot	1	n	f	mt			02-Oct-03
kathie	2	GN1	eb	3	308	350	1.2	3+	ot	1	n	f	m			02-Oct-03
kathie	5	GN1	eb	3	283	290	1.3	3+	ot	1	n	m	sp			02-Oct-03
kathie	6	GN1	eb	3	288	290	1.2	3+	ot	1	n	m	sp			02-Oct-03
kathie	8	GN1	eb	3	304	315	1.1	3+	ot	1	n	m	sp			02-Oct-03
kathie	9	GN1	eb	3	300	285	1.1	3+	ot	1	n	m	im			02-Oct-03
kathie	10	GN1	eb	3	280	250	1.1	3+	ot	1	n	f	m			02-Oct-03
kathie	12	GN1	eb	3	291	285	1.2	3+	ot	1	n	f	m			02-Oct-03
kathie	13	GN1	eb	3	292	320	1.3	3+	ot	1	n	m	sp			02-Oct-03
kathie	14	GN1	eb	3	322	370	1.1	3+	ot	1	n	m	m			02-Oct-03
kathie	15	GN1	eb	3	291	300	1.2	3+	ot	1	n	f	m			02-Oct-03
kathie	16	GN1	eb	3	312	370	1.2	3+	ot	1	n	m	sp			02-Oct-03
kathie	19	GN1	eb	3	276	270	1.3	3+	ot	1	n	f	m			02-Oct-03
kathie	20	GN1	eb	3	302	350	1.3	3+	ot	1	n	m	sp			02-Oct-03
kathie	24	GN1	eb	3	299	320	1.2	3+	ot	1	n	m	sp			02-Oct-03
kathie	25	GN1	eb	3	300	325	1.2	3+	ot	1	n	f	m			02-Oct-03
kathie	27	GN1	eb	3	317	350	1.1	3+	ot	1	n	m	im			02-Oct-03
kathie	28	GN1	eb	3	308	320	1.1	3+	ot	1	n	m	im			02-Oct-03
kathie	29	GN1	eb	3	282	270	1.2	3+	ot	1	n	m	m			02-Oct-03
kathie	33	GN1	eb	3	291	310	1.3	3+	ot	1	n	m	sp			02-Oct-03

Appendix 3 Table 2. Stock assessment data for Kathie Lake eastern brook trout in 2000.

Lake	Sample#	Set #	Species Caught	Age	Length (mm)	Weight (grams)	Condition (k)	Scale Age	Structure	Cond. Code	Clip	Sex	Maturity	Ageing Comments	Comments	Date
Kathie	2	GN1	Ebt	2	204	116.6	1.37	2+	otolith	1	n	f	mt			09-Aug-00
Kathie	3	GN1	Ebt	2	208	109.3	1.21	2+	otolith	1	n	m	mt			09-Aug-00
Kathie	4	GN1	Ebt	2	220	125.4	1.18	2+	otolith	1	n	f	mt			09-Aug-00
Kathie	5	GN1	Ebt	2	230	127.1	1.04	2+	otolith	1	n	m	mt			09-Aug-00
Kathie	8	GN1	Ebt	2	234	162.7	1.27	2+	otolith	1	n	m	mt			09-Aug-00
Kathie	6	GN1	Ebt	2	242	162.5	1.15	2+	otolith	1	n	f	mt			09-Aug-00
Kathie	1	GN1	Rbt		308	330	1.13	2+	scale	1	n	f	mt	scale age of '2' was omitted as suspect		09-Aug-00
Kathie	7	GN1	Ebt	3	255	162	0.98	3+	otolith	1	n	f	mt			09-Aug-00
Kathie	11	GN1	Ebt	3	263	207.5	1.14	3+	otolith	1	n	f	mt			09-Aug-00
Kathie	23	GN1	Ebt	3	267	120.4	0.63	3+	otolith	1	n	f	mt	weight is small, could it actually be 220.4?		09-Aug-00
Kathie	12	GN1	Ebt	3	274	195.1	0.95	3+	otolith	4	n	m	mt	otolith sheared		09-Aug-00
Kathie	13	GN1	Ebt	3	275	236	1.13	3+	otolith	1	n	f	mt			09-Aug-00
Kathie	9	GN1	Ebt	3	280	220.7	1.01	3+	otolith	1	n	m	mt			09-Aug-00
Kathie	10	GN1	Ebt	3	286	266.7	1.14	3+	otolith	1	n	m	mt			09-Aug-00
Kathie	14	GN1	Ebt	3	287	277	1.17	3+	otolith	1	n	f	mt			09-Aug-00
Kathie	22	GN1	Ebt	3	291	252	1.02	3+	otolith	1	n	m	mt			09-Aug-00
Kathie	16	GN1	Ebt	3	298	285	1.08	3+	otolith	1	n	f	mt			09-Aug-00
Kathie	15	GN1	Ebt	3	300	252.5	0.94	3+	otolith	1	n	f	mt	otolith opaque		09-Aug-00
Kathie	17	GN1	Ebt	3	302	310	1.13	3+	otolith	1	n	f	mt			09-Aug-00
Kathie	18	GN1	Ebt	3	336	340	0.90	3+	otolith	1	n	m	mt			09-Aug-00
Kathie	24	GN1	Ebt	3	350	420	0.98	3+	otolith	1	n	m	mt			09-Aug-00
Kathie	19	GN1	Ebt	4	294	270	1.06	4+	otolith	1	n	f	mt			09-Aug-00
Kathie	21	GN1	Ebt	4	310	300	1.01	4+	otolith	1	n	m	mt			09-Aug-00
Kathie	20	GN1	Ebt	4	320	330	1.01	4+	otolith	4	n	f	mt	otolith sheared, age estimate		09-Aug-00
Kathie	25	GN1	Ebt	4	368	480	0.96	4+	otolith	1	n	m	mt			09-Aug-00

Appendix 3 Table 3. Stock assessment data for Kathie Lake eastern brook trout in 1991.

Lake	Sample#	Set #	Species Caught	Age	Length (mm)	Weight (grams)	Condition (k)	Scale Age	Structure	Cond. Code	Clip	Sex	Maturity	Ageing Comments	Comments	Date
Kathie		GN1	eb	3	260	220	1.25	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	290	270	1.11	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	340	400	1.02	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	270	250	1.27	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	290	270	1.11	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	310	350	1.17	n/a					IM			23-May-91
Kathie		GN1	eb	3	310	300	1.01	n/a					IM			23-May-91
Kathie		GN1	eb	3	300	260	0.96	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	310	300	1.01	n/a					IM			23-May-91
Kathie		GN1	eb	3	270	200	1.02	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	300	290	1.07	n/a					IM			23-May-91
Kathie		GN1	eb	3	300	270	1.00	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	300	300	1.11	n/a					IM			23-May-91
Kathie		GN1	eb	3	270	200	1.02	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	330	400	1.11	n/a					IM			23-May-91
Kathie		GN1	eb	3	280	290	1.32	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	320	360	1.10	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	290	260	1.07	n/a					IM			23-May-91
Kathie		GN1	eb	3	290	270	1.11	n/a					IM			23-May-91
Kathie		GN1	eb	3	350	410	0.96	n/a				F	mt	age of 3 assigned to all fish given stocking history/ growth condition and comparative size at age from other lakes/ assessments		23-May-91
Kathie		GN1	eb	3	280	240	1.09	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	290	290	1.19	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	300	240	0.89	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	310	320	1.07	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	340	400	1.02	n/a					IM			23-May-91
Kathie		GN1	eb	3	320	260	0.79	n/a					IM			23-May-91
Kathie		GN1	eb	3	320	330	1.01	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	290	250	1.03	n/a					IM			23-May-91
Kathie		GN1	eb	3	290	250	1.03	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	310	300	1.01	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	310	250	0.84	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	290	250	1.03	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	290	300	1.23	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	310	280	0.94	n/a				F	IM			23-May-91
Kathie		GN1	eb	3	310	320	1.07	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	300	320	1.19	n/a					IM			23-May-91
Kathie		GN1	eb	3	300	310	1.15	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	320	320	0.98	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	270	200	1.02	n/a				F	mt			23-May-91
Kathie		GN1	eb	3	320	400	1.22	n/a					IM			23-May-91
Kathie		GN1	eb	3	300	250	0.93	n/a				F	mt			23-May-91

Appendix 3 Table 4. Stock assessment data for Kathie Lake rainbow trout in 2003.

Lake	Sample#	Set #	Species Caught	Age	Length (mm)	Weight (grams)	Condition (k)	Scale Age	Structure	Cond. Code	Clip	Sex	Maturity	Ageing Comments	Comments	Date
kathie	47	GN1	rbt	1	172	49	1.0	1+	sc	1	n	unk	im			02-Oct-03
kathie	48	GN1	rbt	1	144	32	1.1	1+	sc	1	n	f	im			02-Oct-03
kathie	49	GN1	rbt	1	124	20	1.0	1+	sc	1	n	f	im			02-Oct-03
kathie	50	GN1	rbt	1	131	22	1.0	1+	sc	1	n	f	im			02-Oct-03
kathie	51	GN1	rbt	1	138	28	1.1	1+	sc	1	n	f	im			02-Oct-03
kathie	37	GN1	rbt	2	290	300	1.2	2+	sc	2	n	f	mt	possible 3+ on scale edge		02-Oct-03
kathie	41	GN1	rbt	2	309	320	1.1	2+	sc	1	n	f	mt			02-Oct-03
kathie	42	GN1	rbt	2	311	330	1.1	2+	sc	1	n	f	mt			02-Oct-03
kathie	45	GN1	rbt	2	322	300	0.9	2+	sc	1	n	f	im			02-Oct-03
kathie	46	GN1	rbt	2	343	420	1.0	2+	sc	1	n	f	im			02-Oct-03
kathie	38	GN1	rbt	3	366	550	1.1	3+	sc	1	n	f	mt			02-Oct-03
kathie	39	GN1	rbt	3	380	590	1.1	3+	sc	1	n	f	mt	stress in 2nd year		02-Oct-03
kathie	40	GN1	rbt	3	311	320	1.1	3+	sc	1	n	m	mt			02-Oct-03
kathie	44	GN1	rbt	3	385	590	1.0	3+	sc	1	n	f	mt	3rd annulus on scale edge		02-Oct-03

Appendix 3 Table 5. Stock assessment data for Kathie Lake rainbow trout in 2000.

Lake	Sample#	Set #	Species Caught	Age	Length (mm)	Weight (grams)	Condition (k)	Scale Age	Structure	Cond. Code	Clip	Sex	Maturity	Ageing Comments	Comments	Date
Kathie	1	1	rb	2	308	330	1.1	2+	sc	1		f	mt			09-Aug-00

Appendix 3 Table 6. Stock assessment data for Kathie Lake rainbow trout in 1991.

Lake	Sample#	Set #	Species Caught	Age	Length (mm)	Weight (grams)	Condition (k)	Scale Age	Structure	Cond. Code	Clip	Sex	Maturity	Ageing Comments	Comments	Date
Kathie		GN1	RB		240	200	1.4					F	na			23-May-91
Kathie		GN1	RB		270	260	1.3					na	na			23-May-91
Kathie		GN1	RB		270	250	1.3					F	na			23-May-91
Kathie		GN1	RB		270	250	1.3					F	na			23-May-91
Kathie		GN1	RB		280	300	1.4					M	na			23-May-91
Kathie		GN1	RB		280	260	1.2					F	na			23-May-91
Kathie		GN1	RB		280	250	1.1					M	na			23-May-91
Kathie		GN1	RB		290	320	1.3					M	na			23-May-91
Kathie		GN1	RB		290	270	1.1					F	na			23-May-91
Kathie		GN1	RB		290	300	1.2					F	na			23-May-91
Kathie		GN1	RB		290	250	1.0					M	na			23-May-91
Kathie		GN1	RB		290	340	1.4					M	na			23-May-91
Kathie		GN1	RB		290	300	1.2					M	na			23-May-91
Kathie		GN1	RB	3	300	570	2.1	3.0	sc			F	na			23-May-91
Kathie		GN1	RB		300	300	1.1					F	na			23-May-91
Kathie		GN1	RB		300	300	1.1					F	na			23-May-91
Kathie		GN1	RB		300	300	1.1						na			23-May-91
Kathie		GN1	RB	3	310	350	1.2	3.0	sc				na			23-May-91
Kathie		GN1	RB	3	310	340	1.1	3.0	sc				na			23-May-91
Kathie		GN1	RB		310	320	1.1						na			23-May-91
Kathie		GN1	RB		310	370	1.2						na			23-May-91
Kathie		GN1	RB		310	350	1.2						na			23-May-91
Kathie		GN1	RB		310	370	1.2						na			23-May-91
Kathie		GN1	RB		310	350	1.2						na			23-May-91
Kathie		GN1	RB		310	320	1.1						na			23-May-91
Kathie		GN1	RB		292.4	311.6	1.2						na			23-May-91
Kathie		GN1	RB	3	320	340	1.0	3.0	sc				na			23-May-91
Kathie		GN1	RB		320	380	1.2						na			23-May-91
Kathie		GN1	RB		320	400	1.2						na			23-May-91
Kathie		GN1	RB		320	350	1.1						na			23-May-91
Kathie		GN1	RB		320	400	1.2						na			23-May-91
Kathie		GN1	RB		320	400	1.2						na			23-May-91
Kathie		GN1	RB		320	350	1.1						na			23-May-91
Kathie		GN1	RB		320	400	1.2						na			23-May-91
Kathie		GN1	RB	3	330	400	1.1	3.0	sc				na			23-May-91
Kathie		GN1	RB	3	330	400	1.1	3.0	sc				na			23-May-91
Kathie		GN1	RB	3	330	390	1.1	3.0	sc				na			23-May-91
Kathie		GN1	RB	3	330	370	1.0	3.0	sc				na			23-May-91
Kathie		GN1	RB		330	400	1.1						na			23-May-91
Kathie		GN1	RB		330	420	1.2						na			23-May-91
Kathie		GN1	RB		330	390	1.1						na			23-May-91
Kathie		GN1	RB		330	440	1.2						na			23-May-91
Kathie		GN1	RB		330	400	1.1						na			23-May-91
Kathie		GN1	RB		330	400	1.1						na			23-May-91
Kathie		GN1	RB		330	390	1.1						na			23-May-91
Kathie		GN1	RB		340	460	1.2						na			23-May-91
Kathie		GN1	RB	3	350	450	1.0	3.0	sc				na			23-May-91
Kathie		GN1	RB	3	360	460	1.0	3.0	sc				na			23-May-91
Kathie		GN1	RB		360	470	1.0						na			23-May-91
Kathie		GN1	RB		360	500	1.1						na			23-May-91
Kathie		GN1	RB		360	540	1.2						na			23-May-91
Kathie		GN1	RB	3	370	560	1.1	3.0	sc				na			23-May-91
Kathie		GN1	RB	3	370	500	1.0	3.0	sc				na			23-May-91
Kathie		GN1	RB		370	550	1.1						na			23-May-91
Kathie		GN1	RB		370	600	1.2						na			23-May-91
Kathie		GN1	RB		370	520	1.0						na			23-May-91
Kathie		GN1	RB	3	380	500	0.9	3.0	sc				na			23-May-91
Kathie		GN1	RB	4	380	540	1.0	4.0	sc				na			23-May-91
Kathie		GN1	RB		380	570	1.0						na			23-May-91
Kathie		GN1	RB		380	540	1.0						na			23-May-91
Kathie		GN1	RB		380	510	0.9						na			23-May-91
Kathie		GN1	RB		380	550	1.0						na			23-May-91
Kathie		GN1	RB	3	390	570	1.0	3.0	sc				st			23-May-91
Kathie		GN1	RB	4	390	600	1.0	4.0	sc				sp			23-May-91
Kathie		GN1	RB		390	590	1.0						na			23-May-91
Kathie		GN1	RB		390	560	0.9						na			23-May-91
Kathie		GN1	RB		400	580	0.9						na			23-May-91
Kathie		GN1	RB		400	670	1.0						na			23-May-91

PROJECT EVALUATION 11.0

Project Budget Summary:

Budget allocated: 5000
Budget spent: 5000
Cost savings: 0

The project was:

√ on budget
☐ over budget Why? _____
☐ under budget Why? _____

Was the project completed as planned?

☐ Yes.
√ No. If not, describe problems that arose and changes made to address problems. We were unable to complete the Bow/ Butterfly Lake paired lake study as the result of a fish stocking error. A follow-up survey is planned for 2004.

Would the proponent recommend changes to similar projects in the future?

√ No.
☐ Yes (Please provide details). _____

Contractor performance:

√ Not applicable. No contractor employed.
☐ Acceptable. Would employ again.
☐ Acceptable. But some concerns (please provide details): _____
☐ Unacceptable. Would not recommend for future projects (please provide reasons): _____