

# **Kinglet and Redstart Lakes**

## **Recreational Fishery Stock Assessment**

### **2004 Final Report**

Project Tracking number:

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## **EXECUTIVE SUMMARY**

Stocking assessments were completed on Kinglet and Redstart Lake in Eskers Provincial Park in 2003. The purpose of these assessments was to investigate reports of fish presence and investigate the level of naturalized eastern brook trout (EB) recruitment in Kinglet and Redstart lakes. Both Kinglet and Redstart lakes are not part of the provincial stocking program and the presence of eastern brook trout in these lakes would be due to stocking errors or illegal fish transfer. Standard BC, Resource Inventory and Standards Committee methods were used to complete the surveys. Stocked all female triploid (AF3N), naturalized 2N EB recruits were captured in gillnets and schools of mature brook trout were observed during the course of the survey in Kinglet Lake. After the completion of the surveys it was determined that AF3N EB were unintentionally stocked into Kinglet Lake in 2001 as the result of a map error and it is probable that the 2N EB population observed was also the result of a similar stocking error, before 1997. One large, well conditioned female eastern brook trout was captured in Redstart Lake. Growth rates and lengths-at-age of naturalized brook trout in Kinglet Lake were found to be greater than for eastern brook trout sampled from other Eskers Park lakes as well as for EB inhabiting other quality lakes in Omineca Region. Populations of EB in both Kinglet and Redstart appear to be relatively low based on the high growth rates and low gillnet catch. Three key recommendations follow from this survey: 1) Implement quality assurance procedures at the time of stocking to eliminate stocking errors in future; 2) Kinglet and Restart lakes should be assessed through annual opportunistic creel surveys and periodic stock assessments (3-5 year interval) in an effort to monitor these populations of EB; and 3) Establish a communications plan to inform the public the hazards and risks associated with illegal fish transfer, as well as the legal consequences.

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## **INTRODUCTION 1.0**

This report presents the results of stock assessments on Kinglet and Redstart lakes. Both assessments were completed on October 1, 2003, by the Ministry of Water Land and Air Protection (hereafter 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.

Redstart and Kinglet lakes are both closed drainage systems (Table 1, Figure 1) located 32 km northwest of Prince George in Eskers Provincial Park. Both lakes were formerly fishless and have not intentionally been part of the provincial small lakes stocking program, however it came to the attention of the M.W.L.A.P. in 2002 that Kinglet Lake contained eastern brook trout (*Salvelinus fontinalis*)(EB) and was attracting fishing effort during the winter ice-fishery. Prior to the surveys in 2003 it was presumed that a likely route of fish transfer would be from Butterfly Lake which located on the east side of Kinglet Lake (Figure 1). Until 2003, it was not known if Redstart Lake contained fish as well. Redstart Lake is located immediately to the south of Kinglet Lake (Figure 1), and all three lakes are connected via a trail system that is used as a canoe portage route through the park. Each of these lakes is separated by a series of gravel eskers that range from a few meters in height to several tens of meters high. The trail system between Kinglet, Redstart and Butterfly lakes traverses over the gravel eskers that separate each lake. These trail segments only gain three-to five meters elevation above the water surface and there is between 15 and 30 m horizontal distance separating each lake. The short distance between lakes would allow relatively easy transfer of fish from Butterfly Lake to Kinglet Lake and from Kinglet Lake to Redstart Lake.

The presence of EB in these two lakes is inconsistent with fisheries management and conservation of biodiversity objectives for Eskers Park. Therefore, as a result the reports of fish presence, indications of angling effort on Kinglet Lake, and due to close proximity of Kinglet and Redstart lakes, both lakes were assigned a high priority for investigation for EB presence in 2003.

## **BACKGROUND 2.0**

Kinglet and Restart lakes are nested among five stocked lakes that are managed within Eskers Provincial Park; all are located 32 km northwest of Prince George (Figure 1). 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 site development in 1987 and was intended 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 all female rainbow trout

(*Oncorhynchus mykiss*). These lakes include Bow, Butterfly, Camp, Kathie and Byers. The main objective for fish stocking was to provide of a variety of angling opportunities in the park utilizing “put and take” fisheries (BC Parks 1990). However the stocking of reproductively capable eastern brook trout prior to 1997 has led to the establishment of 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. 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**

A 91.4 m floating monofilament gill net with standard experimental mesh sizes was set in Redstart and Kinglet lakes September 30, 2003 according to the methods specified in the Resource Inventory and Standards Committee document Fish Collection Methods and Standards (RIC, 1997) (Figure 1). The net in Redstart Lake was deployed at 12:40 PM and retrieved on October 1 at 14:30, for a total soak time of 26.2 hours. The net was set from shore near the constriction in the middle of the lake into the north basin and extended in a westerly direction. The deep end of the net was situated on the surface and the depth of the lake was greater than 15 meters.

The net in Kinglet Lake was deployed at 14:20 hrs on September 30 and was retrieved October 1 at 15:45 hrs, for a total soak time of 25.25 hours. The net was set from the North West end of the lake and extended from the shoreline in a SE orientation. Detailed bathymetry is not available for either lake.

All EB collected were sampled for fork length (mm), weight (g), sex, maturity. Weights were measured to the nearest 10 g and lengths were measured to the nearest 1 mm. Otoliths were collected from all brook trout for age structure analyses by Birkenhead Scale Analyses (Lone Butte, BC).

### **RESULTS 4.0**

#### Catch summary 4.1

Brook trout (EB) were captured in both lakes (Table 2) and the raw assessment data can be found in Appendix 1. One mature EB female was captured in Redstart Lake (Table 2, Appendix 1, Table 2) for a total net CPUE of 0.04 fish per hour. A total of 79 EB were captured in Kinglet Lake for a total CPUE of 3.01 fish per net hour. Fifty-eight fish in the Kinglet Lake catch were all female triploids (AF3Ns). AF3N EB were differentiated from 2N EB by the presence of adipose fin clips on the AF3N fish which had been clipped for the Bow/Butterfly paired lakes study (Williamson 2004b and 2004c; Zimmerman 1999a and 199b).

In Kinglet Lake the sex ratio for reproductive (2N) EB was approximately equal although the sample size was small (14). Most of the AF3N EB appeared to be immature (n=57); however one AF3N fish was observed with secondary sexual characteristics and had male gonads that were classified in the field as maturing. In Kinglet Lake, 53% of the catch was in an advanced state of maturity (Figure 2) and ten out of eleven of these fish were near spawning or had recently spawned. Within the 2N catch 72.7% of the three-year-old cohort was mature and the one four year-old captured was mature (Figure 4)

#### Length Frequency, Condition and Growth 4.2

In the 2003 catch from Kinglet Lake, the 2001 cohort of AF3N EB ranged in length from 284 mm to 355 mm ( $\bar{x} = 321$  mm) (Table 3, Figure 3). 2N EB ranged from 125 mm up to 392 mm. The mean body condition of 2N EB in Kinglet Lake was ( $k=1.10$ ) and was slightly lower than the mean body condition of three-year-old AF3Ns ( $k= 1.14$ ) (Table 4). Condition-at-age was comparable for all ages (Table 4) with the exception of the one six-year-old which was in poor body condition. The single fish captured in Redstart Lake was much better conditioned ( $k= 1.55$ ) compared with the Kinglet Lake samples. In Kinglet Lake, EB weight increased as power of length according to the following equations (Figure 4)

$$\begin{aligned} 2N W &= 0.00001 L^{3.016} \quad (\mathbf{R^2=0.9897}) \\ AF3Ns W &= 0.0001 L^{2.5651} \quad (\mathbf{R^2=0.80190}) \end{aligned}$$

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 (increase in length without change in body shape). Values less than three indicate a drop in mass relative increase in length (negative allometric growth). With a growth constant of 3.016 Kinglet Lake 2N brook trout are exhibiting near isometric growth. The growth exponent for the AF3N Kinglet Lake EB was 2.5651 which is low; however this sample only included one age class of fish, so it is difficult to interpret.

#### Visual Spawner and Spawning Habitat Survey 4.3

The 2003 stocking assessments were completed in early October 2003 during the time period when EB spawning activity would likely have been at its highest intensity. Schools of mature EB exhibiting spawning colour and morphology were observed cruising the littoral zone in Kinglet 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 and around to the south west end of the lake (Figure 1). At the time of these surveys, the water in Redstart Lake was turbid and it was difficult to visually assess the lake for spawning activity, although there did appear to be many areas where the digging of redds may have taken place.

## DISCUSSION 5.0

The stocking of reproductively viable brook trout in the late 1980's and in 1997 into lakes in Eskers Park has resulted in several naturalized brook trout populations. Kinglet and Redstart lakes, both of which were previous barren of fish, were found to contain eastern brook trout. During the assessment of Kinglet Lake, a large number of marked AF3N brook trout from the provincial hatchery program were also captured. Likely mechanisms for this occurrence include stocking errors or illegal fish transfer. Further investigation has revealed that the 3000 marked EB intended for the 2001 stocking of Butterfly Lake were accidentally stocked into Kinglet Lake (Appendix 1 Table 1)(Williamson 2004b).

Discussion with staff from the Freshwater Fisheries Society of BC (FFSBC- formerly the Fish Culture section of BCFisheries) has revealed that a paper map error was a contributor to the mis-stocking of Kinglet Lake (Grant Gale, pers comm.). All of the lakes stocked in Eskers Park are stocked by helicopter and 1:50,000 scale NTS paper maps have been previously used as a guide for stocking. Apparently Kinglet Lake was hand-marked as "Butterball" on the map used for stocking in 2001 and the fish intended for Butterfly Lake were placed into Kinglet Lake. At present this lake does not have a gazetted name and therefore the official map showing Kinglet Lake as an unnamed body of water. It is likely the map used for the 2001 stocking was also used during previous stocking events and it is probable that the presence of naturalized EB in Kinglet Lake is in part the result of previous stocking errors. Regardless of the mechanism of introduction, the presence of reproducing EB in Kinglet and Redstart lakes has the potential to alter the natural invertebrate and vertebrate community structure through predation and resource competition in both lakes, with unknown consequences for biodiversity.

Another result of the mis-stocking of Butterfly Lake EB in Kinglet Lake has been a delay in the completion of the Bow/Butterfly paired lake study (Zimmerman 1999a, 1999b; Williamson 2004b, 2004c) which was aimed at comparing the relative growth and performance of 2N and AF3N EB, although this event has provided a means to assess the relative abundance of 2N EB in Kinglet Lake. Less than 33% of the catch in Kinglet Lake was comprised of 2N fish suggesting the total population of reproducing EB is likely much less than the 3000 AF3N EB that were stocked in 2001. Assuming equal survival to age-three and assuming equal vulnerability to the gill net of 2N and AF3N EB a rough population estimate (Peterson estimate) for Kinglet Lake 2N brook trout fingerlings in 2001 is 568 fish or approximately 153 fingerlings/ha compared with 3000 fingerlings or 879 fingerlings/ha of stocked AF3N EB. Although approximate, this estimate can be used as a reference point for relative population size in future stock assessments.

Kinglet Lake 2N brook trout appear to be growing well. The mean length-at-age of three-year-old 2N ( $\bar{x}$  = 332 mm, Table 5) and AF3N ( $\bar{x}$  = 321 mm, Table 5) EB was relatively high compared with other lakes in Eskers Park, suggesting that growth



conditions are better and intraspecific competition is less important in Kinglet Lake. For comparison, Kathie Lake EB from 2003 had a mean length-at-age three of 297 mm (Williamson 2004a). Growth of the female EB captured in Redstart Lake was exceptional by regional standards (454 mm at age-five), and was comparable to a fish captured in Byers Lake (455 mm at age-four) and samples ( $\bar{x} = 405\text{mm}$  at age-four) from Shere Lake in two 1999 stock assessments (Zimmerman 1999a, 1999c). The rapid growth of this fish is likely indicative of a low abundance of fish in the Redstart Lake in addition to very abundant food resources. At the time of the survey, it was noted that *Gammarus sp.* abundance was very high. In fact, fish roe that was left in minnow traps overnight in Redstart Lake was completely consumed by *Gammarus sp.* within 24 hours.

Based on the catch composition and the visual surveys for spawners, it is apparent that the fish in Kinglet Lake are capable of successful reproduction. The shoreline in both Kinglet and Redstart lakes is composed of a loose mixture of gravels and sands overlain with a thin layer of organic material (Photo 1), although Redstart Lake appears to have more substantial deposits of organic material and spawning habitat may be more limited there. In Eskers Park, there are few areas of overland drainage and both Kinglet and Redstart do not have inlet or outlet streams. The drainage of precipitation from Kinglet and Redstart lakes is therefore subsurface which, in combination with the porous shoreline substrate provides for extensive shore-spawning habitat. Despite apparently high levels of habitat availability, it is however unclear how much of this shore habitat would allow for successful egg and larval incubation. Furthermore, as the result of the apparently lower relative abundance of EB in both lakes it is also unclear whether EB recruitment is spawning habitat limited or whether populations of these fish are still expanding. It is however apparent that some unknown level of successful spawning is taking place. In the 2003 Kinglet Lake sample, four confirmed age-one fish and three others within the same size range were captured with a mean length of 124 mm. It is unlikely that these fish were caught by anglers in another lake and transferred to Kinglet Lake as brook trout are not typically vulnerable to anglers until they are larger than 20 cm (M.W.L.A.P. unpublished creel data). The presence of multiple year classes also supports the idea that at least some spawning and successful incubation has taken place in the past.

Given the presence of naturalized populations that are capable of successful reproduction in Kinglet and Redstart lakes, options to reduce the hazards to biodiversity and fishing quality in the Park could include:

- 1) Increases 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 risks and hazards.

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. It is also recommended that future

stocking of lakes in Eskers Park, and indeed stocking of all provincial lakes be undertaken with quality assurance procedures that will ensure that stocking errors are eliminated. A combination of paper maps and GPS units programmed with the appropriate UTM co-ordinates for each stocked lake could be used for this purpose.

In summary, both Kinglet and Redstart lakes were found to contain reproductively viable brook trout that were capable of successful spawning. It is likely that some of these fish were present as the result of one or more fish stocking errors in Kinglet Lake. The presence of EB in Restart Lake is likely the result of illegal fish transfer by anglers, however additional stocking errors cannot be ruled out. Population levels in both lakes appear to be low and growth does not appear to be constrained by competition for food resources. Future creel and gillnet assessments of these lakes will be required to monitor the status of these feral populations.

## **RECOMMENDATIONS FOR FUTURE MANAGEMENT 6.0**

1. Quality assurance procedures should be implemented to eliminate fish stocking errors such as the one observed at Kinglet Lake.
2. EB population levels and fishing effort in Kinglet and Redstart lakes should be monitored through annual opportunistic creel surveys by Parks staff when they are available and stock assessments at a three-year interval.
3. An updated angling management and stocking plan should be completed for all Eskers Park lakes that reflects the presence of naturalized brook trout in the park and balances the need for conservation while providing for quality recreational opportunities.
4. A communication plan should be established with the objective of informing park users the biological and legal consequences of fish transfer between lakes in the park.
5. Given the presence of naturalized EB in Kinglet and Redstart lakes, consideration should be given to management options such as: 1) Increases to EB bag limits, 2) closure of non-stocked lakes or 3) eradication methods (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 Redstart and Kinglet Lake\***

	Kinglet Lake	Redstart Lake
<b>Attributes</b>		
UTM Coordinates	10.488020.5991600	10.488136.5991337
Nearest Center	33 Km NW Prince George	33 Km NW Prince George
Waterbody identifier	01257STUR	01263STUR/ 01272STUR
Watershed Code	182-209700-94700	n/a
Water surface area	3.745 ha	3.78 ha
Littoral area		
(above 6 m contour)	n/a	n/a
Shoreline perimeter	0.817 km	1.23 km
Maximum depth	n/a	> 17 m
Volume	n/a	n/a
Mean depth	n/a	n/a
Elevation	755 m.	755 m
T.D.S.	n/a	n/a
Morphoedaphic index	n/a	n/a

\*both names are aliases and are not gazetted.

**Table 2. Catch Summary for the Redstart and Kinglet lakes; CPUE- Catch per unit effort; AF3N- all female AF3N (AF3N); 2N- diploid**

Year	Brook Trout		Set Time	Set Date
	Catch	Net CPUE	(Hours)	
Kinglet 2003 AF3N	58	2.21	26.2	30-Sep-03
Kinglet 2003 2N	21	0.80	26.2	30-Sep-03
Redstart 2N	1	0.04	25.25	30-Sep-03

**Table 3. Physical attributes for AF3N and 2N brook trout captured in Kinglet Lake in 2003.**

Sample Year	Sample Size	Length (mm)				Weight (g)				Condition (k)				
		Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
2003 2N	21	270	107	392	108.9	303	14	560	213.2	1.10	0.77	1.35	0.16	0.03
2000 AF3N	58	321	284	355	13.7	378	250	480	45.2	1.14	1.02	1.31	0.07	0.00

**Table 4. Physical attributes of brook trout sampled in Kinglet and Redstart lakes in 2003 displayed by age class.**

Sample Year	Age	Sample Size	Length (mm)				Weight (g)				Condition (k)				
			Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
<b>Kinglet Lake</b>															
2003 2N	1	4	131	125	139	6.5	25	20	32	5.3	1.09	1.02	1.19	0.1	0.01
2003 AF3N	3	58	321	284	355	13.7	378	250	480	45.2	1.14	1.02	1.31	0.1	0.00
2003 2N	3	11	332	296	380	27.3	422	330	500	61.9	1.17	0.77	1.35	0.2	0.03
2003 2N	4	1	378				560				1.04				
2003 2N	6	1	392				560				0.93				
<b>Redstart Lake</b>															
2003 2N	5	1	454				1450				1.55				

**FIGURES 9.0**

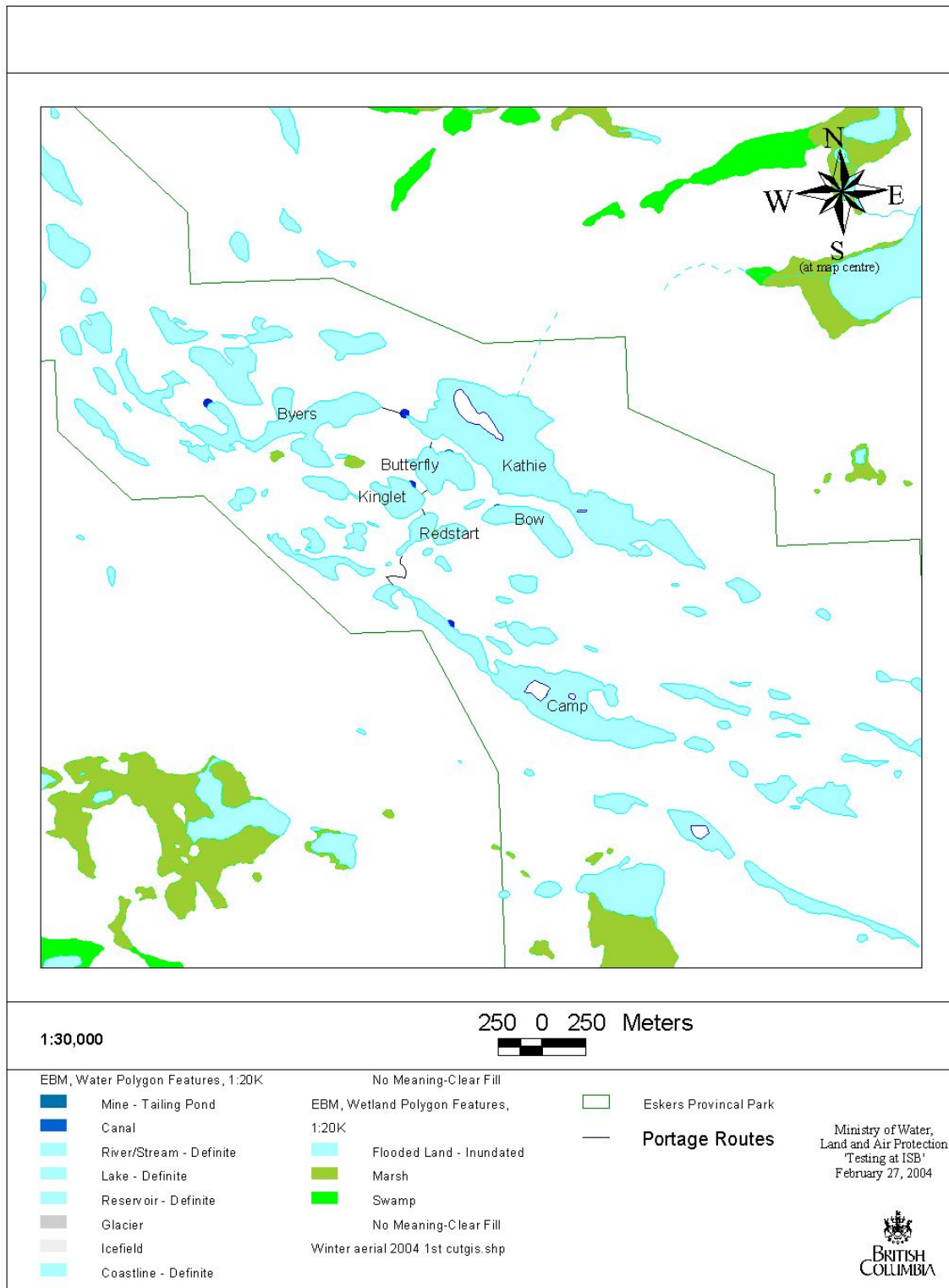


Figure 1. Map of Eskers Provincial Park showing lakes that were included in the 2003 survey.

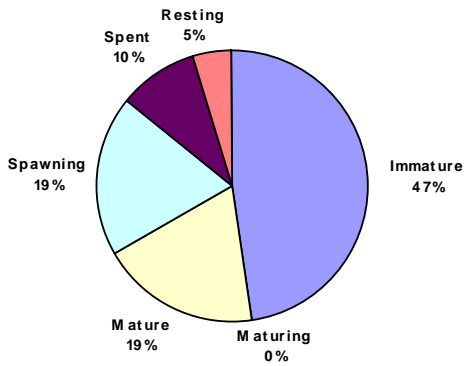


Figure 2. Maturity states of 2N EB captured in Kinglet Lake in 2003 listed by percent.

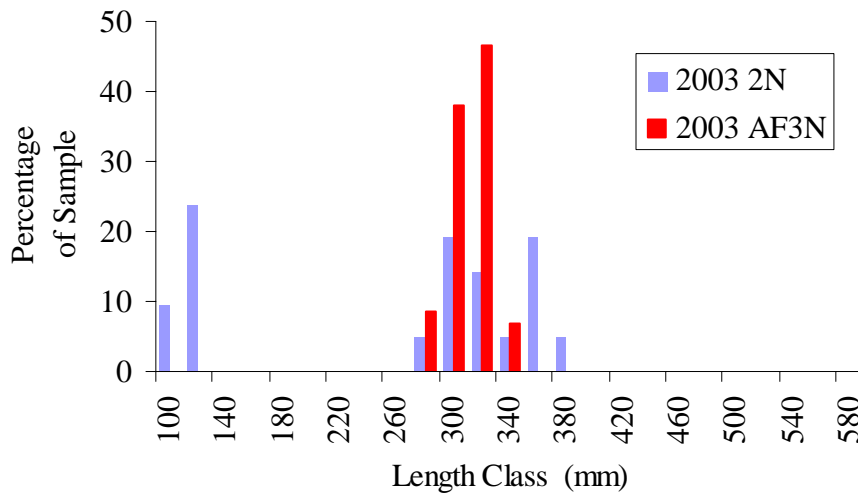


Figure 3. Length frequency distribution for the 2003 AF3N (n=58) and 2N (n=21) gill net samples for Kinglet Lake.

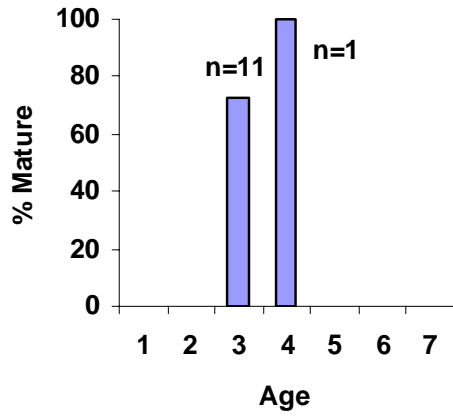


Figure 4. Percentage of mature 2N EB in each age class for Kinglet Lake in 2003

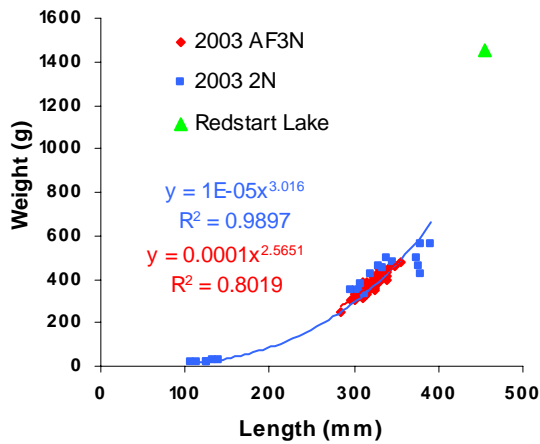


Figure 5. Length weight relationship for Kinglet and Redstart Lake brook trout from 2003.



**PHOTOS 10.0**



**Photo 1. Typical shoreline of lakes in Eskers Park. (Photo from Camp Lake, Phillip, 1985).**

## APPENDICES 11.0

**Appendix 1 Table 1. Stocking history for Kinglet Lake.**

Release Date	Gazetted Name	Alias	Region	Species Name	Fish Count	Stock	Mark	Average Size (g)	Life Cycle Stage	Watershed Code	Waterbody Identifier
4-Jun-01	Kinglet Lake		7A	Brook Trout	3000	AYLMER AF3N	Adipose	7.4	FINGERLING	182-209700-94700	01257STUR

**Appendix 1 Table 2. Stock assessment data for Kinglet Lake 2N 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
Kinglet	81	GN1	EB	1	125	20	1.0	1+	OT	1	N	unk	im			01-Oct-03
Kinglet	82	GN1	EB	1	132	24	1.0	1+	OT	1	N	unk	im			01-Oct-03
Kinglet	83	GN1	EB	1	126	22	1.1	1+	OT	1	N	unk	im			01-Oct-03
Kinglet	84	GN1	EB	1	139	32	1.2	1+	OT	1	N	unk	im			01-Oct-03
Kinglet	67	GN1	EB	3	330	460	1.3	3+	OT	1	N	M	st			01-Oct-03
Kinglet	68	GN1	EB	3	312	330	1.1	3+	OT	1	N	F	sp			01-Oct-03
Kinglet	69	GN1	EB	3	340	500	1.3	3+	OT	1	N	F	m			01-Oct-03
Kinglet	72	GN1	EB	3	345	480	1.2	3+	OT	1	N	M	sp			01-Oct-03
Kinglet	73	GN1	EB	3	380	420	0.8	3+	OT	1	N	F	im	Spawned last year resid eggs		01-Oct-03
														No sexual developme		
														nt looks		
														like 3N		01-Oct-03
Kinglet	74	GN1	EB	3	320	420	1.3	3+	OT	1	N	F	im			01-Oct-03
Kinglet	75	GN1	EB	3	309	380	1.3	3+	OT	2	N	M	m	broken		01-Oct-03
Kinglet	76	GN1	EB	3	306	350	1.2	3+	OT	1	N	M	st			01-Oct-03
Kinglet	78	GN1	EB	3	296	350	1.3	3+	OT	1	N	M	sp			01-Oct-03
Kinglet	79	GN1	EB	3	375	500	0.9	3+	OT	1	N	F	im			01-Oct-03
Kinglet	80	GN1	EB	3	335	450	1.2	3+	OT	1	N	M	sp			01-Oct-03
Kinglet	77	GN1	EB	4	378	560	1.0	4+	OT	1	N	F	m			01-Oct-03
														Spawned last year resid eggs		
Kinglet	70	GN1	EB	6	392	560	0.9	6+	OT	2	N	F	r			01-Oct-03
Kinglet	71	GN1	EB		377	460	0.9	n/a	OT	7	N	F	m			01-Oct-03
Kinglet	85	GN1	EB		125	18	0.9		NONE		N	unk	im			01-Oct-03
Kinglet	86	GN1	EB		114	14	0.9		NONE		N	unk	im			01-Oct-03
Kinglet	87	GN1	EB		107	14	1.1		NONE		N	unk	im			01-Oct-03

**Appendix 1 Table 3. Stock assessment data for Kinglet Lake all female AF3N (AF3N) 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
Kinglet	4	GN1	EB	3	330	400	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	5	GN1	EB	3	310	340	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	6	GN1	EB	3	300	300	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	7	GN1	EB	3	306	340	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	8	GN1	EB	3	318	350	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	9	GN1	EB	3	299	350	1.3	3+	None	Y	3N	NA				01-Oct-03
Kinglet	10	GN1	EB	3	325	390	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	11	GN1	EB	3	341	450	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	12	GN1	EB	3	310	360	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	13	GN1	EB	3	335	430	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	14	GN1	EB	3	314	350	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	16	GN1	EB	3	322	360	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	17	GN1	EB	3	325	390	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	18	GN1	EB	3	305	320	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	19	GN1	EB	3	315	390	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	20	GN1	EB	3	318	350	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	21	GN1	EB	3	310	310	1.0	3+	None	Y	3N	NA				01-Oct-03
Kinglet	22	GN1	EB	3	355	480	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	23	GN1	EB	3	335	450	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	24	GN1	EB	3	309	350	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	25	GN1	EB	3	310	360	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	26	GN1	EB	3	340	430	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	27	GN1	EB	3	306	350	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	28	GN1	EB	3	310	370	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	29	GN1	EB	3	312	320	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	31	GN1	EB	3	300	330	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	32	GN1	EB	3	340	400	1.0	3+	None	Y	3N	NA				01-Oct-03
Kinglet	33	GN1	EB	3	297	300	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	34	GN1	EB	3	326	380	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	35	GN1	EB	3	325	360	1.0	3+	None	Y	3N	NA				01-Oct-03
Kinglet	36	GN1	EB	3	325	400	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	37	GN1	EB	3	324	390	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	39	GN1	EB	3	346	470	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	40	GN1	EB	3	330	420	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	41	GN1	EB	3	322	410	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	42	GN1	EB	3	319	390	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	44	GN1	EB	3	310	360	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	45	GN1	EB	3	329	390	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	46	GN1	EB	3	340	410	1.0	3+	None	Y	3N	NA				01-Oct-03
Kinglet	47	GN1	EB	3	315	350	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	48	GN1	EB	3	327	410	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	49	GN1	EB	3	331	400	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	50	GN1	EB	3	284	250	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	51	GN1	EB	3	330	400	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	52	GN1	EB	3	324	350	1.0	3+	None	Y	3N	NA				01-Oct-03
Kinglet	53	GN1	EB	3	330	450	1.3	3+	None	Y	3N	NA				01-Oct-03
Kinglet	55	GN1	EB	3	322	390	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	56	GN1	EB	3	329	430	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	57	GN1	EB	3	310	350	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	58	GN1	EB	3	322	390	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	59	GN1	EB	3	310	390	1.3	3+	None	Y	3N	NA				01-Oct-03
Kinglet	60	GN1	EB	3	325	380	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	61	GN1	EB	3	348	460	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	62	GN1	EB	3	324	380	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	63	GN1	EB	3	310	330	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	64	GN1	EB	3	328	390	1.1	3+	None	Y	3N	NA				01-Oct-03
Kinglet	65	GN1	EB	3	320	380	1.2	3+	None	Y	3N	NA				01-Oct-03
Kinglet	66	GN1	EB	3	315	330	1.1	3+	None	Y	3N	NA				01-Oct-03

**Appendix 1 Table 4. Stock assessment data for Redstart Lake 2N 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
Redstart	1	1	EB	5	454	1450	1.5	5+	ot	1	N	F	m	vague 3rd annulus		01-Oct-03

## 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): \_\_\_\_\_