

Executive Summary

Echo Lake 2004

A stocking assessment was conducted at Echo Lake on October 26, 2004 to determine the status of the fishery and assess the amount of ongoing natural recruitment from fertile eastern brook trout that were stocked before 1997. The management goal for Echo Lake is to maintain an above average quality eastern brook trout fishery. Echo Lake is 37 ha and is situated 20 km SSE of Fort St. James. Echo Lake has special Regional regulations with a daily quota of two brook trout, one over 40 cm in length, and no power boats.

Two standard sinking gillnets 90 m in length (standard mesh) were set on October 26, 2004. The total sampling effort was 25 hours resulting in a gillnet catch per unit effort (CPUE) of 8.03 fish per hour. At this time the brook trout population appears to be providing for a trophy angling experience with 42% of the fish exceeding 400 mm and 20% exceeding 500 mm in length. In addition, there appears to be a large number of fish in the lake available for capture. There is evidence of natural recruitment occurring as many of the fish sampled were noted to be reproductive (only sterile brook trout are currently stocked). As well, two-hundred brook trout captured during the survey indicates there is a large population of fish in the lake. This poses a serious problem for effective fisheries management of Echo Lake due to the concerns regarding naturalized brook trout populations. There is a considerable risk associated with hybridization with "blue-listed" bull trout if any of these fish are moved to nearby systems such as the Stuart or Nechako Rivers. Furthermore, the fisheries management objective of maintaining a trophy fishery may be compromised as fish growth could become substantially reduced if densities of fertile brook trout increase. Brook trout will all be marked beginning in 2005 and a follow-up assessment will be completed in the fall of 2007 to determine the amount of natural recruitment. Additional management strategies will then be implemented if necessary. Echo Lake should also be given priority for angler creel/satisfaction surveys. The 2004 stock assessment crew provided limited biological information on fertile brook trout captured in the sample. The quality of the current information could therefore be improved by a well designed creel survey.



Figure 1. Photo of Echo Lake in October of 2004. Float tube angler in 1998 with a trophy size brook trout (inset).

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**OMINECA REGION
LAKE STOCK ASSESSMENT REPORT**

LAKE NAME: Echo Lake **BC WBID:** 00438stur

LAKE LOCATION: *Nearest center:* 20 km SSE Fort St. James *Drainage:* FRASER
UTM: 10.420713.6010406

LAKE ATTRIBUTES: *Surface Area:* 33.7 Ha *Elevation:* 845 m
Littoral Area: 20 Ha *T.D.S.:* 50 ppm
Max Depth: 13.7 m *Mean depth:* 5.4 m

MANAGEMENT OBJECTIVE:

- Objective 1 Family Fishery (High CPUE <30 cm)
- Objective 2 Average Quality (30-40 cm)
- Objective 3 Above Average (40-50 cm)
- Objective 4 Trophy (20% > 50 cm for RB, 20% > 40 cm for EB)

MANAGEMENT/SURVEY HISTORY:

Previous gill net assessment(s): no yes Little 1984; Lakes Files 1988; BCCF 2004
 Year(s) Surveyed: 1984; 1988; 2004

STOCKING DATA:

Current Stocking Rate 89 Fish/Ha Annually
Stock Type **AYLMER AF3N**
Species EB, LKC
Previous Stocking Rate 89

SURVEY METHODS:

Method	Date (yy.mm.dd)	Survey Agency	Crew
Fish	SGN 2004-10-25	BCCF	Chad Robertson, Kevin Mernickle
Chem.	DO, Cond 2004-10-25		
Physical	bathymetric		
Temp.	profile 2004-10-25		

Netting Specs: *Net type:* Standard Experimental *Net length:* 90m (3x30m)
Setting: Sinking *Panel Mesh:*

SURVEY RESULTS:

Catch

	RB	EB	RSC	LKC	LSU	CSU	NSC	CAS	BT	LT
2004	0	198	0	58	0	0	0	0	0	0
1988	0	30	0	0	0	0	0	0	0	0

Survey Year	2004	1988	
Effort Hours	24.66	0.66	
RB CUE:	0.00	0.00	RB/Net Hour
EB CUE:	8.03	45.45	EB/Net Hour
# of Sets:	2	1	

Next Assessment **2007**

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SURVEY CONCLUSIONS:

Objective	Objectives Achieved		Reason
	Yes	No	
1. Family	<input type="checkbox"/>	<input type="checkbox"/>	
2. Average	<input type="checkbox"/>	<input type="checkbox"/>	
3. Above Average	<input type="checkbox"/>	<input type="checkbox"/>	Exceeded expectations
4. Trophy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

RECOMMENDATIONS:

Assessment: The next assessment for Echo Lake is scheduled for 2007 to determine the level of natural recruitment in the lake.

Management: Brook trout will be marked with an adipose fin clip beginning in 2005.

COMMENTS: The management object of maintaining a trophy fishery at Echo Lake may be compromised if significant natural recruitment is occurring, and the fertile population expands. There is also a threat to the biodiversity of native fish stocks if reproductive brook trout escape or are physically moved from Echo Lake into other aquatic habitats.

Uncertainties: 1988 CPUE is suspect as equal sample size recorded for each age-class (catch may have been sub-sampled). 2004 catch was sub-sampled for lengths, weights and maturity.

Recent Brood Request Comments:

2005 Annual. Assessed '04. Excellent growth. Natural recruitment. Mark all hatchery fish and re-assess in '08

History of Angling Regulations

Brook trout daily quota = 2 (only one over 40 cm, bait ban, single-barbless hook), power boat restriction.

Reported by: Adrian Clarke

Date: Mar-05

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Table 1. EB Physical Attributes for Sample Years

Sample Year	Sample Size	Length (mm)				Weight (g)				Condition (k)				
		Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
2004	45	342	139	546	125.9	818	26	2975	717.6	1.31	0.89	1.83	0.26	0.07
1988	30	294	178	410	125.9	469	50	990	375.7	1.34	0.89	1.79	0.23	0.05
1900	0	0	0	0	0.0	0	0	0	0.0	0.00	0.00	0.00	0.00	0.00
1900	0	0	0	0	0.0	0	0	0	0.0	0.00	0.00	0.00	0.00	0.00

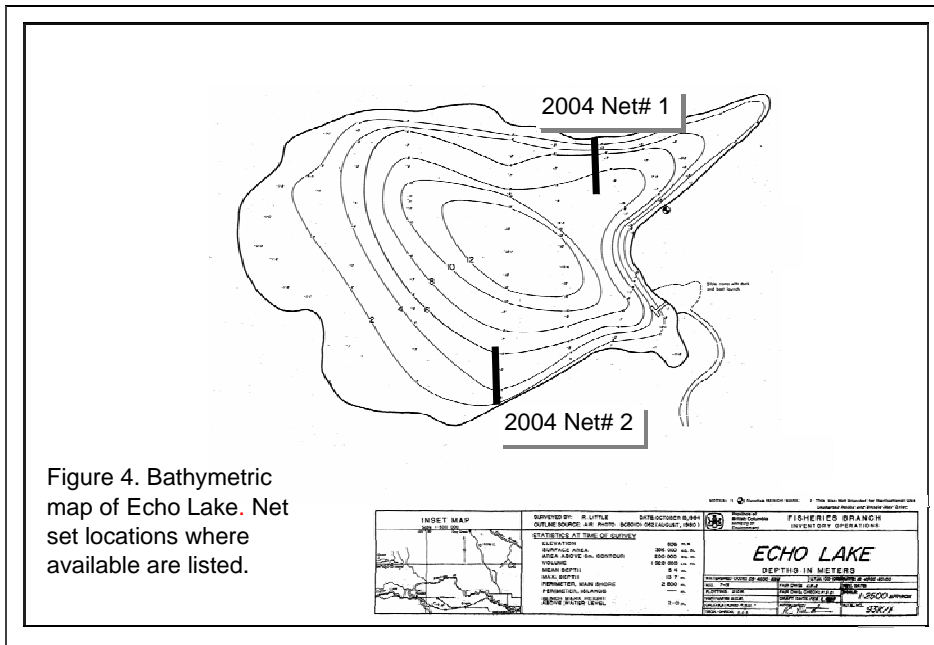
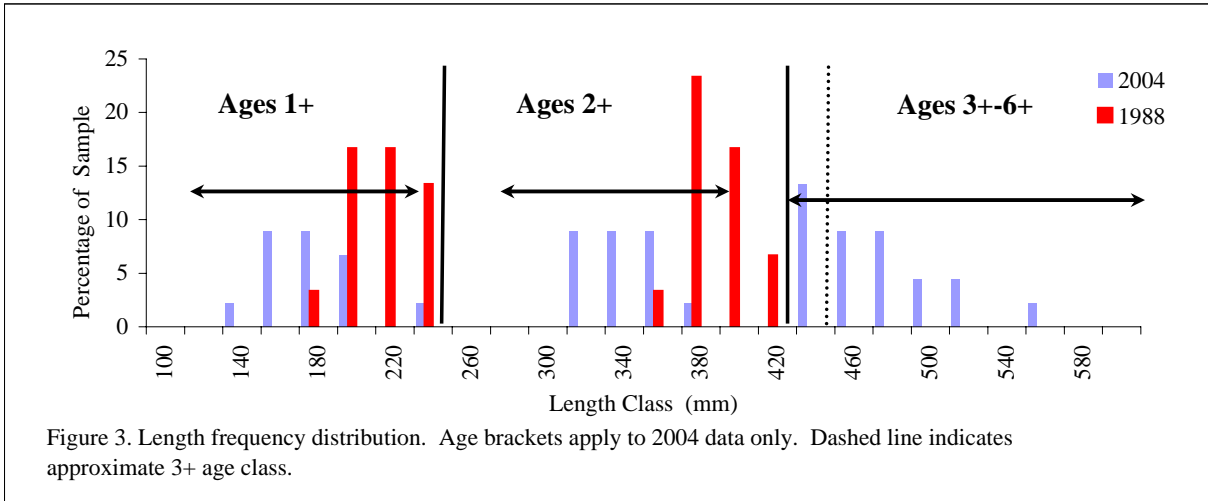
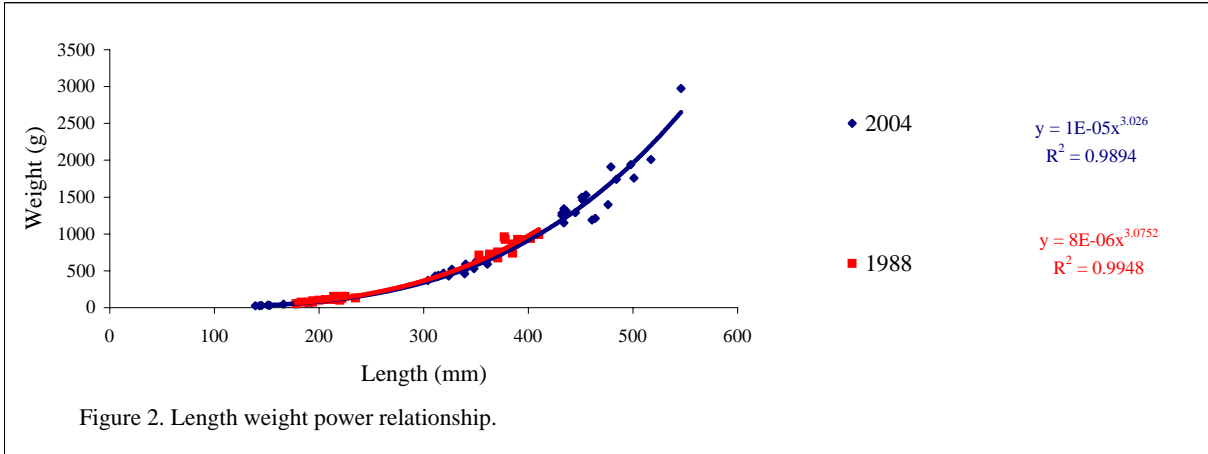
Table 2. Catch summary for all sample years.

Sample Year	Sample Age	Sample Size	Length (mm)				Weight (g)				Condition (k)				
			Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
2004	1	13	171	139	222	24.5	52	26	107	23.3	0.97	0.89	1.04	0.0	0.00
1988	1	15	208	178	235	17.0	108	50	150	31.0	1.17	0.89	1.53	0.2	0.03
2004	2	13	334	304	361	18.6	511	370	640	85.1	1.37	1.18	1.50	0.1	0.01
1988	2	15	380	353	410	15.0	830	675	990	108.2	1.50	1.30	1.79	0.1	0.02
2004	3	11	445	432	476	14.7	1312	1150	1500	106.3	1.50	1.21	1.64	0.1	0.02
2004	4	4	479	455	498	17.9	1780	1530	1940	188.5	1.62	1.53	1.74	0.1	0.01
2004	5	3	508	461	546	43.2	2058	1190	2975	893.5	1.50	1.21	1.83	0.3	0.10
2004	6	1	501						1760						1.40

Table 3. Proportion of Catch (by survey year)

Survey Year	2004	1988
Less than 240 mm	27 %	37 %
Between 240-360 mm	29 %	33 %
Between 240-400 mm	31 %	57 %
Greater than 400 mm	42 %	23 %
Greater than 500 mm	20 %	0 %

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Table 4. Stocking History for Echo Lake to 2004.

Release Date	Species Name	Fish Count	Stock	Mark	Average Size (gm)	Life Cycle Stage
1-Jun-04	EB	3000	AYLMER AF3N		7	FINGERLING
11-Jun-03	EB	3000	AYLMER AF3N		6.59	FINGERLING
22-Jun-02	EB	3000	AYLMER AF3N		11.04	FINGERLING
5-Jun-01	EB	3000	AYLMER AF3N		7.84	FINGERLING
31-May-00	EB	3000	AYLMER AF3N		4.78	FINGERLING
1-Jun-99	EB	3000	AYLMER AF3N		5.9	FINGERLING
28-May-98	EB	5000	AYLMER 3N		4.26	FINGERLING
18-Jun-97	EB	3000	AYLMER		3.01	FINGERLING
31-May-96	EB	5000	AYLMER 3N		3.85	FINGERLING
8-Jun-95	EB	5000	AYLMER		3.92	FINGERLING
12-Jun-94	EB	5000	AYLMER		3.81	FINGERLING
11-Jun-93	EB	5000	AYLMER		4.37	FINGERLING
27-May-92	EB	5000	AYLMER		2.38	FINGERLING
7-Jun-91	EB	5000	AYLMER		3.12	FINGERLING
21-Jun-90	EB	5000	AYLMER		4.4	FINGERLING
14-Jun-89	EB	5000	AYLMER		2.9	FRY
1-Jun-88	EB	10000	AYLMER		2.7	UNKNOWN
1-Jun-87	EB	10000	AYLMER		1.9	UNKNOWN

Table 5. Dissolved Oxygen/ Temperature Profile

16-Oct-84			26-Oct-04					
Depth (m)	DO	Temp. °C	Depth (m)	DO mg/L	DO %sat	Temp. °C	pH	Cond (25°C)
0	11.8	5.2	0	8.82	68.4	4.95	7.1	
1	11.8	5.2	1	8.31	64.8	4.96	7.1	
2	11.9	5.2	2	8.28	64.2	4.96	7.1	
3	11.9	5.2	3	8.41	65.7	4.96	7.1	69
4	11.8	5.3	4	8.38	65.0	4.97	7.1	65
5	11.8	5.1	5	8.29	65.1	4.97	7.1	61
6	11.6	5.2	6	8.32	65.3	4.96	7.1	60
7	11.6	5.1	7	8.29	65.1	4.95	7.1	60
8	11.7	5.1	8	8.24	64.8	4.93	7.1	61
9	11.7	5	9	7.21	57.0	5.09	7.1	68
10	11.7	5	10	2.35	21.6	5.54	6.9	82
11	11.8	4.9	11	6.72	52.3	5.55	6.6	73
12	11.6	5	12					
13	11.6	4.8	13					
14	<2	4.9	14					

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Table 6. Stock assessment data for 2004 (see lakes files for additional survey data).

Lake	Sample#	Site	Species Caught	Age	Length (mm)	Weight (grams)	Condition (k)	Scale Age	Structure	Sex	Ageing Comments	Comments
Echo	1	1	EB	5	546	2975	1.8	5+	OT	F	vague 5th annulus	small skein of eggs/large fat fish
Echo	2	1	EB	5	517	2010	1.5	5+	OT	F		abundant loose eggs
Echo	3	1	EB	3	451	1500	1.6	3+	OT	AF3N		bright/fat fish
Echo	4	1	EB	6	501	1760	1.4	6+	OT	AF3N	translucent	dark fish with red undersides
Echo	5	1	EB	3	436	1310	1.6	3+	OT	AF3N		
Echo	6	1	EB	5	461	1190	1.2	5+	OT	M		small milt pouch present
Echo	7	1	EB	3	445	1290	1.5	3+	OT	AF3N		bright fish
Echo	8	1	EB	4	484	1740	1.5	4+	OT	AF3N	translucent	
Echo	9	1	EB	4	498	1940	1.6	4+	OT	AF3N	translucent	
Echo	10	1	EB	2	327	520	1.5	2+	OT	M		small milt pouches present
Echo	11	1	EB	2	340	590	1.5	2+	OT	M		small milt pouches present
Echo	12	1	EB	2	361	590	1.3	2+	OT	AF3N		no evidence of sex
Echo	13	1	EB	1	143	28	1.0	1++	OT	AF3N		small bright fish
Echo	14	1	EB	1	178	56	1.0	1++	OT	AF3N		
Echo	15	1	EB	1	192	64	0.9	1++	OT	AF3N		
Echo	16	2	EB	3	432	1280	1.6	3+	OT	AF3N		
Echo	17	2	EB	1	177	54	1.0	1++	OT	AF3N		small bright fish
Echo	18	2	EB	1	166	46	1.0	1++	OT	AF3N		
Echo	19	2	EB	2	339	460	1.2	2+	OT	AF3N		bright fish
Echo	20	2	EB	2	319	470	1.4	2+	OT	AF3N		
Echo	21	2	EB	3	476	1400	1.3	3+	OT	AF3N		fat fish/bright
Echo	22	2	EB	4	479	1910	1.7	4+	OT	AF3N		fat bright fish
Echo	23	2	EB	4	455	1530	1.6	4+	OT	AF3N		bright fish
Echo	24	2	EB	1	151	33	1.0	1++	OT	AF3N		
Echo	25	2	EB	1	178	53	0.9	1++	OT	AF3N		
Echo	26	2	EB	1	153	32	0.9	1++	OT	M		small dark fish
Echo	27	2	EB	3	452	1460	1.6	3+	OT	AF3N		slightly dark colouration
Echo	28	2	EB	1	222	107	1.0	1++	OT	AF3N		
Echo	29	2	EB	1	188	69	1.0	1++	OT	AF3N		
Echo	30	2	EB	3	434	1340	1.6	3+	OT	AF3N		
Echo	31	2	EB	1	194	74	1.0	1++	OT	AF3N		
Echo	32	2	EB	2	304	370	1.3	2+	OT	AF3N		
Echo	33	2	EB	2	341	540	1.4	2+	OT	AF3N		
Echo	34	2	EB	2	350	630	1.5	2+	OT	AF3N		
Echo	35	2	EB	2	311	430	1.4	2+	OT	AF3N		
Echo	36	2	EB	2	314	440	1.4	2+	OT	M		small male gametes present/dark
Echo	37	2	EB	3	434	1150	1.4	3+	OT	F		small skein of mixed sized eggs
Echo	38	2	EB	2	348	530	1.3	2+	OT	AF3N		
Echo	39	2	EB	3	432	1250	1.6	3+	OT	AF3N		
Echo	40	2	EB	2	324	430	1.3	2+	OT	AF3N		
Echo	41	2	EB	1	139	26	1.0	1++	OT	AF3N		
Echo	42	2	EB	1	145	29	1.0	1++	OT	AF3N		
Echo	43	2	EB	3	435	1240	1.5	3+	OT	AF3N		
Echo	44	2	EB	2	360	640	1.4	2+	OT	M		small male gametes present
Echo	45	2	EB	3	464	1210	1.2	3+	OT	AF3N		fish appears thin/no evidence of s