

## Executive Summary

## Vivian Lake 2004

A stocking assessment was conducted on Vivian Lake during the fall of 2004. Both a standard sinking and a floating gillnet 90 m in length were set on two separate occasions: September 7, 2004, and November 1, 2004. The total sampling effort was 60.83 hours resulting in a gillnet catch per unit effort (CPUE) of 0.72 fish per hour for rainbow trout, and 0.25 fish per hour for eastern brook trout. The objectives of this assessment were to document the status of the fishery and attempt to determine the level of natural recruitment resulting from fertile brook trout stocked prior to 1997. The management objective for Vivian Lake is to maintain a high-use fishery for brook trout and rainbow trout during both the summer and winter angling periods. The results of the assessment indicated that both brook trout and rainbow trout were growing well and reaching a suitable size to provide an above average angling experience for the Omineca Region, however net CPUE was low in comparison to previous assessments. The mean length of rainbow trout was 303 mm with a maximum length of 479 mm; while, the mean length of eastern brook trout was 429 mm with a maximum length of 549 mm. In 2006, AF3N (sterile) Pennask strain rainbow trout will be introduced to prevent the occurrence of spawnbound rainbows in future. A missing cohort of age one eastern brook trout is cause for some concern as it is not known why these fish were absent from the survey. Based on the relatively high stocking rate, there should have been a substantial number of yearling brook trout caught in the nets.

There is some evidence that natural recruitment is occurring in Vivian Lake as one eastern brook trout four years of age had eggs present, however this only represents 6% of the sample. Based on previous assessment and the stocking history it is recommended that the stocking rate for eastern brook trout be reduced to 10000 per year to increase fish size and angling quality. The next stock assessment for Vivian Lake should be conducted in 2007 to assess the success of introducing AF3N Pennask strain rainbow trout and to evaluate the reduction in the stocking rate for brook trout. At this time, it will be determined if the missing 2004 eastern brook trout cohort was an anomaly or an ongoing problem. Vivian Lake also requires both summer and winter creel census/angler satisfaction surveys. These surveys will complement the proposed aerial census flights scheduled for the spring and summer of 2005. Vivian Lake is an important lake for angling in the Omineca Region and has the potential to provide an above average angling experience; therefore, we need the additional census information to ensure that this lake is being managed effectively.



Figure 1. Photo of trophy eastern brook trout captured at Vivian Lake during the 2004 stock assessment.

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**OMINECA REGION  
LAKE STOCK ASSESSMENT REPORT**

**LAKE NAME:** Vivian **BC WBID:** 01436STUR

**LAKE LOCATION:** *Nearest center:* 31 Km N Prince George *Drainage:* FRASER  
*UTM:* 10.485852.5986476

**LAKE ATTRIBUTES:** *Surface Area:* 45.1 Ha *Elevation:* 779 m  
*Littoral Area:* 41 Ha *T.D.S.:* 115 ppm  
*Max Depth:* 8.2 m *Mean depth:* 4 m

<b>MANAGEMENT OBJECTIVE:</b>		<b>RB</b>	<b>EB</b>
Objective 1	Family Fishery (High CPUE <30 cm)	<input type="checkbox"/>	<input type="checkbox"/>
Objective 2	Average Quality (30-40 cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Objective 3	Above Average (40-50 cm)	<input type="checkbox"/>	<input type="checkbox"/>
Objective 4	Trophy (20% > 50 cm for RB, > 20% 40 cm for EB)	<input type="checkbox"/>	<input type="checkbox"/>

**MANAGEMENT/SURVEY HISTORY:**

Previous gill net assessment(s): no  yes  Ableson, Dixon 1982; MOE 1988; MOE 1996  
 Year(s) Surveyed: 1982; 1988; 1996

**STOCKING DATA:** Rainbow Trout Eastern Brook Trout

*Current Stocking Rate* 111 Fish/Ha Annually 443 Fish/Ha Annually  
*Stock Type* **PENNASK AF** **AYLMER AF3N**  
*Species* RB, EB, mixed  
*Previous Stocking Rate* 111 443

**SURVEY METHODS:**

Method	Date (yy.mm.dd)	Survey Agency	Crew
Fish	sgn 2004-09-07	BCCF	Chad Robertson, Kevin Mernickle
Chem.	DO, pH 1996-07-06	MOE	
Physical	Bathymetric 1996-07-06	MOE	
Temp.	Profile 1996-07-07	MOE	

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

**SURVEY RESULTS:**

**Catch**

	RB	EB	RSC	LKC	LSU	CSU	NSC	CAS	BT	LT
<b>2004</b>	44	15	0	2	0	0	0	0	0	0
<b>1996</b>	20	30	0	0	0	0	0	0	0	0
<b>1988</b>	30	36	0	0	0	0	0	0	0	0
<b>1982</b>	0	8	0	0	0	0	0	0	0	0

Survey Year	2004	1996	1988	1982	
Effort Hours	60.83	5	22.38	8	
RB CUE:	0.72	4.00	1.34	0.00	<b>RB/Net Hour</b>
EB CUE:	0.25	6.00	1.61	1.00	<b>EB/Net Hour</b>
# of Sets:	4	1	1	1	

*Next Assessment* **2007**

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**SURVEY CONCLUSIONS:**

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

**RECOMMENDATIONS:**

**Assessment:** The next scheduled stock assessment is for 2009. Creel/angler satisfaction surveys should be completed in the summer and winter of 2005 to further assess the state of the fishery. These surveys would complement the proposed aerial flight surveys scheduled for the spring and summer of 2005.

**Management:** The management goal for Vivian lake is to maintain a high-use fishery for both the summer and winter angling periods. Both rainbow trout and eastern brook trout are of sufficient size to provide an above average fishery; however, angling catch rates are unknown at this time.

**Comments:** The Vivian Lake dissolved oxygen data collected in 2004 was discarded as the values were suspect. The measured DO values ranged from 1.1-1.8 mg/L which are well below the required oxygen levels necessary for rainbow trout and brook trout. The meter was either calibrated incorrectly or not functioning properly. Field crews should pay closer attention to obviously erroneous values in the future.

**Uncertainties:** There was a missing cohort of age one EB. EB Gillnet CPUE was low and this may reflect the quality of angling experience. An assessment on angling quality need to be conducted to determine if stocking densities are sufficient..

**Recent Brood Request Comments:**

2005 Annual. Assessed in '04. Missing cohort(s) of EB, both EB and RB growth excellent. Changed RB stock to Pennask AF3N vs. AF for 2006 in consultation with FFSBC. Prelim. data suggest missing youngest cohort. Growth in catch of EB and RB was excellent. Stock request for brood '04 was cancelled to reduce competition- will contact FFSBC staff to request extra stock to be planted in spring '05 if available.

**History of Angling Regulations**

No special angling regulations at Vivian Lake.

**Reported by:** Adrian Clarke

**Date:** Feb-05

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**Table 1. RB and EB physical attributes for 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
<b>Rainbow Trout</b>															
2004	1	20	203.9	143	233	25.6	100	32	155	33.9	1.13	0.86	1.28	0.1	0.01
2004	2	3	259.667	254	270	9.0	205	186	234	25.5	1.17	1.14	1.19	0.0	0.00
2004	3	3	334.333	323	353	16.3	441	381	520	71.3	1.17	1.13	1.21	0.0	0.00
2004	4	6	398.167	381	441	21.8	735	650	884	80.9	1.17	1.03	1.30	0.1	0.01
2004	5	11	423.818	370	479	34.5	919	564	1420	264.5	1.18	1.02	1.31	0.1	0.01
2004	6	1	405				740				1.11				
1988	1	16	238	189	301	31.1	198	60	815	175.5	1.26	0.89	2.99	0.5	0.23
1988	2	4	264.5	189	354	68.6	256	75	525	191.4	1.20	1.11	1.29	0.1	0.01
1988	3	5	392	325	431	42.1	797	535	990	169.5	1.40	0.94	2.48	0.6	0.38
1988	4	4	459	427	500	36.3	1261	940	1560	324.1	1.28	1.21	1.38	0.1	0.01
1982	3	2	270	267	273	4.2	310	300	320	14.1	1.57	1.57	1.58	0.0	0.00
1982	4	6	333.833	303	368	23.2	542	400	760	136.0	1.43	1.17	1.60	0.1	0.02
<b>Eastern Brook Trout</b>															
2004	2	4	322.5	288	356	28.3	515	320	780	192.1	1.48	1.34	1.73	0.2	0.03
2004	3	6	432.667	394	499	35.7	1343	1110	2000	329.3	1.65	1.47	1.96	0.2	0.03
2004	4	5	510.6	486	549	23.4	2061	1690	2750	425.1	1.53	1.41	1.66	0.1	0.01
1982	3	2	270	267	273	4.2	310	300	320	14.1	1.57	1.57	1.58	0.0	0.00
1982	4	6	333.833	303	368	23.2	542	400	760	136.0	1.43	1.17	1.60	0.1	0.02

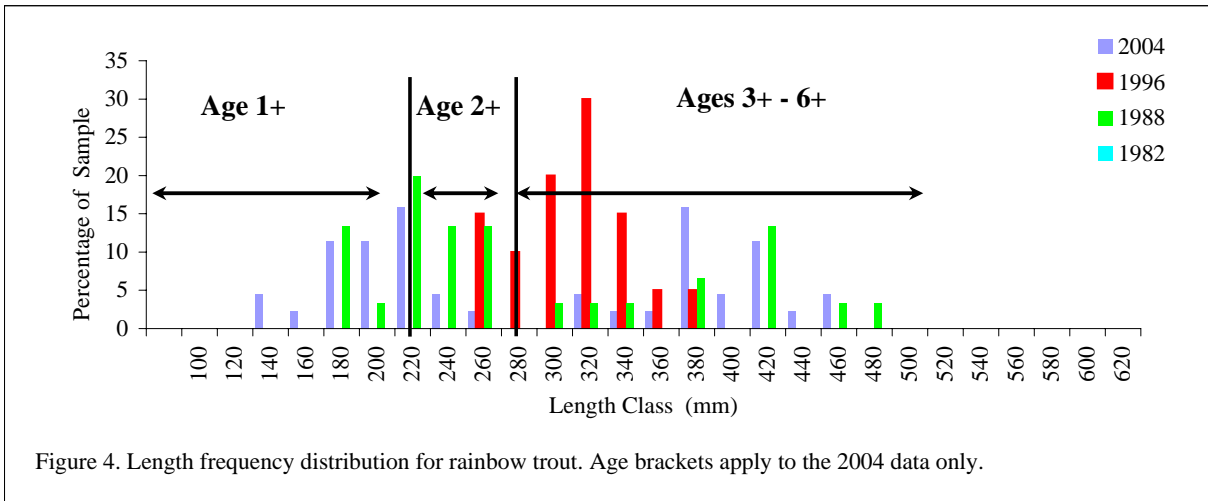
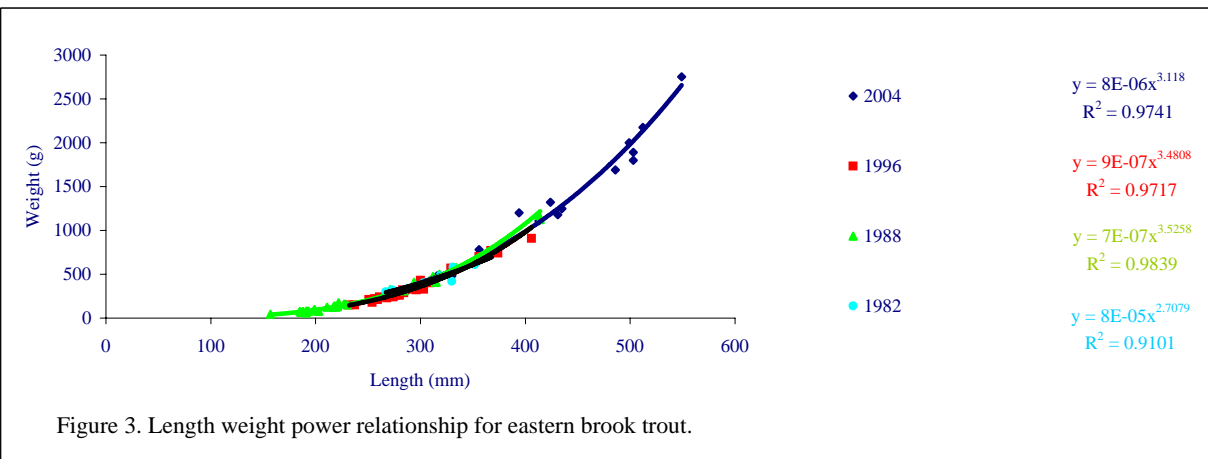
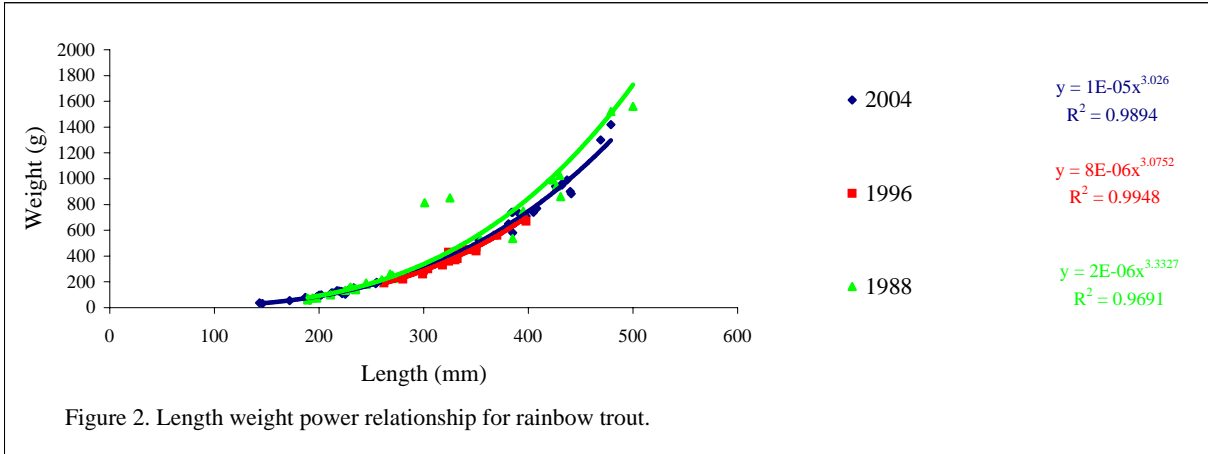
**Table 2. Catch summary for all sample years.**

Sample Year	Sample Size	Length (mm)				Weight (g)				Condition (k)				
		Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Mean	Min	Max	StdDev	Var
<b>Rainbow Trout</b>														
2004	44	303	143	479	103.2	436	32	1420	385.4	1.15	0.86	1.31	0.10	0.01
1996	20	323	262	398	103.2	375	190	670	116.1	1.08	0.97	1.26	0.06	0.00
1988	30	296	189	500	93.6	446	60	1560	435.1	1.28	0.89	2.99	0.42	0.17
<b>Brook Trout</b>														
2004	15	429	288	549	80.1	1362	320	2750	691.3	1.56	1.34	1.96	0.16	0.03
1996	30	289	232	406	80.1	346	150	910	195.6	1.31	1.10	1.60	0.14	0.02
1988	36	277	157	490	91.7	440	45	2280	528.9	1.36	0.86	1.94	0.24	0.06
1982	8	318	267	368	35.5	484	300	760	157.3	1.47	1.17	1.60	0.14	0.02

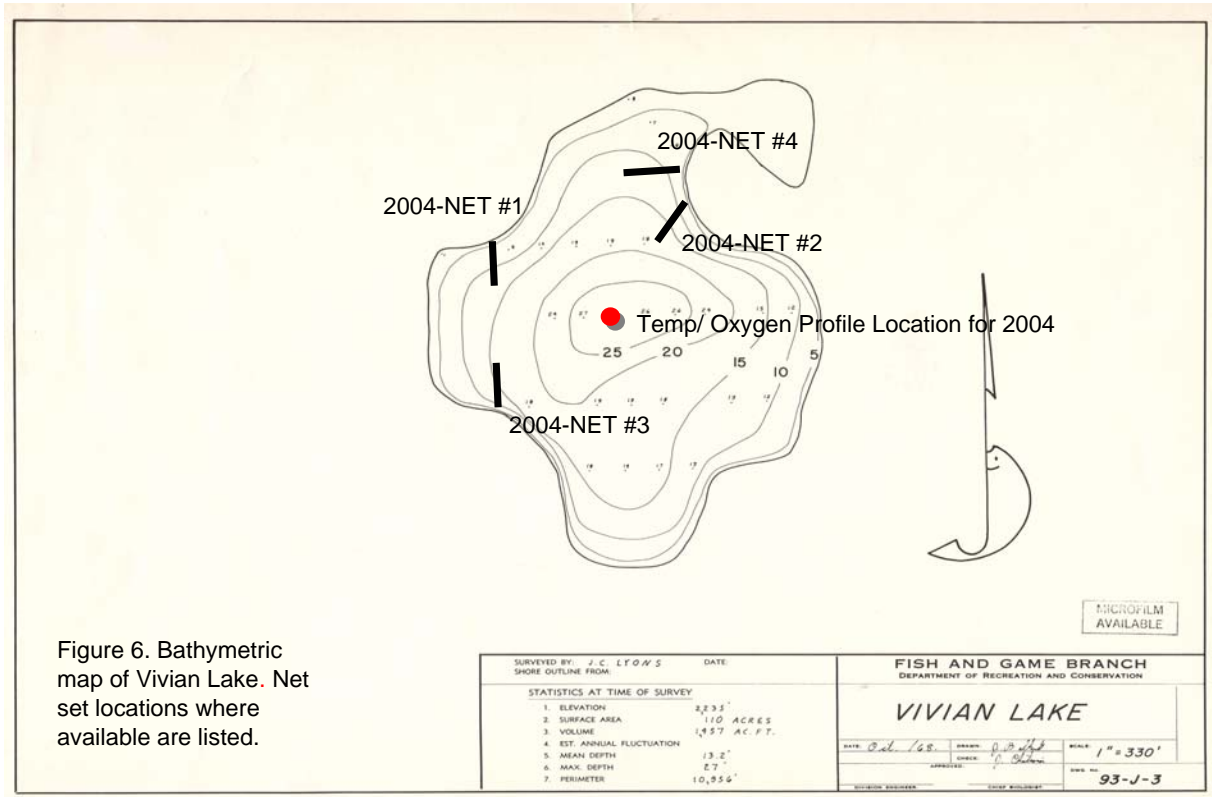
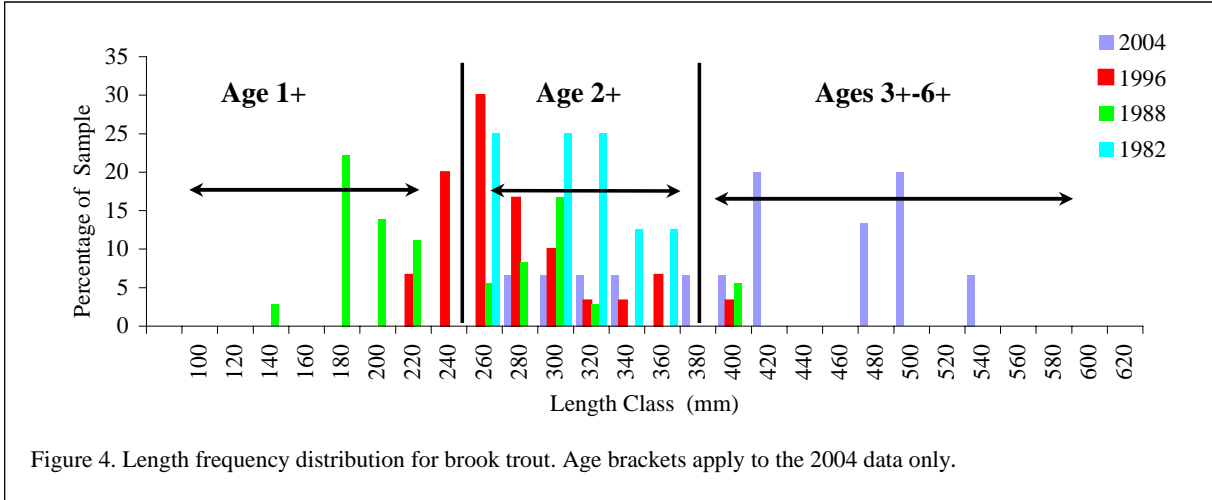
**Table 3. Proportion of Catch (by survey year)**

Survey Year	2004	1996	1988	1982
<b>Rainbow Trout</b>				
Less than 250 mm	45.5 %	0.0 %	46.7 %	
Between 250-350 mm	11.4 %	90.0 %	23.3 %	
Between 250-400 mm	31.8 %	100.0 %	33.3 %	
Greater than 400 mm	22.7 %	0.0 %	20.0 %	
Greater than 500 mm	0.0 %	0.0 %	3.3 %	
<b>Eastern Brook Trout</b>				
Less than 250 mm	0.0 %	6.7 %	50.0 %	0.0 %
Between 250-350 mm	20.0 %	80.0 %	33.3 %	75.0 %
Between 250-400 mm	33.3 %	90.0 %	33.3 %	100.0 %
Greater than 400 mm	66.7 %	3.3 %	5.6 %	0.0 %
Greater than 500 mm	26.7 %	0.0 %	0.0 %	0.0 %

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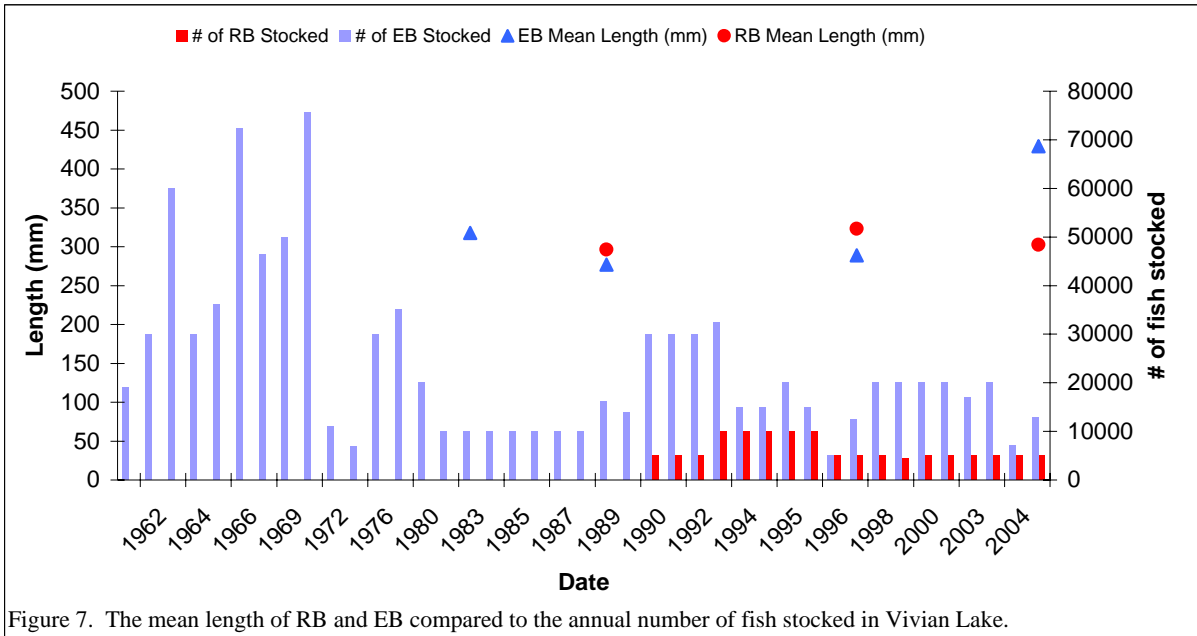


Figure 7. The mean length of RB and EB compared to the annual number of fish stocked in Vivian Lake.

Table 4. Stocking History for Vivian lake to 2004.

Rainbow Trout Release Date	Species	Fish Count	Stock	Mark	Average	Life Cycle
3-Jun-04	RB	5000	PENNASK		21.76	YEARLING
11-Jun-03	RB	5000	PENNASK		5.56	YEARLING
18-Jun-02	RB	5000	PENNASK		10	YEARLING
3-Jun-01	RB	5000	PENNASK		12.72	YEARLING
2-Jun-00	RB	5000	PENNASK		3.74	YEARLING
4-Jun-99	RB	5000	PENNASK		15.15	YEARLING
31-May-98	RB	4500	PENNASK		12.66	YEARLING
28-May-97	RB	5000	PENNASK		17.1	YEARLING
26-May-95	RB	5000	PENNASK		18.52	YEARLING
2-Jun-94	RB	5000	PENNASK		25.59	YEARLING
31-May-93	RB	10000	TUNKWA		2.94	YEARLING
16-Jun-92	RB	10000	NRT		9.01	YEARLING
27-May-91	RB	10000	BADGER		9.62	YEARLING
25-Jun-90	RB	10000	NRT		7.12	YEARLING
31-May-89	RB	10000	TUNKWA		10.8	YEARLING
1-May-88	RB	5000	TUNKWA		11	UNKNOWN
1-Jun-87	RB	5000	NRT		2.4	UNKNOWN
1-May-86	RB	5000	NRT		4.5	UNKNOWN

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Eastern Brook Trout						
Release Date	Species	Fish Count	Stock	Mark	Average	Life Cycle
4-Jun-04	EB	12850	AYLMER AF3N		6.9	FINGERLING
3-Jun-04	EB	7150	AYLMER AF3N		6.99	FINGERLING
11-Jun-03	EB	20000	AYLMER AF3N		6.59	FINGERLING
18-Jun-02	EB	17000	AYLMER AF3N		10.99	FINGERLING
28-May-01	EB	20000	AYLMER AF3N		6.6	FINGERLING
31-May-00	EB	20000	AYLMER AF3N		4.78	FINGERLING
2-Jun-99	EB	20000	AYLMER AF3N		5.9	FINGERLING
28-May-98	EB	20000	AYLMER 3N		4.26	FINGERLING
16-Jun-97	EB	12500	AYLMER		3.01	FINGERLING
3-Jun-96	EB	5000	AYLMER 3N		10.95	FINGERLING
2-Jun-96	EB	15000	AYLMER 3N		3.85	FINGERLING
10-Jun-95	EB	20000	AYLMER		4.02	FINGERLING
12-Jun-94	EB	15000	AYLMER		3.81	FINGERLING
30-May-94	EB	15000	AYLMER		3.64	FINGERLING
12-Jun-93	EB	32367	AYLMER		4.2	FINGERLING
16-Jun-92	EB	30000	AYLMER		3.25	FINGERLING
23-May-91	EB	30000	AYLMER		2.26	FINGERLING
10-Jun-90	EB	30000	AYLMER		4.2	FINGERLING
1-Jun-89	EB	13800	AYLMER		2.5	FRY
31-May-89	EB	16200	AYLMER		2.7	FRY
1-May-88	EB	10000	AYLMER		2.2	UNKNOWN
1-Jul-87	EB	10000	AYLMER		2.1	UNKNOWN
1-May-86	EB	10000	AYLMER		1.4	UNKNOWN
1-May-85	EB	10000	AYLMER		2.5	UNKNOWN
1-May-84	EB	10000	AYLMER		3.7	UNKNOWN
1-May-83	EB	10000	AYLMER		2.4	UNKNOWN
1-May-81	EB	10000	AYLMER		2.6	UNKNOWN
1-Jun-80	EB	20000	AYLMER		3.4	UNKNOWN
1-Jan-79	EB	35000	AYLMER		3.2	UNKNOWN
1-Jan-76	EB	30000	KTH		2.7	UNKNOWN
1-Jan-74	EB	7000	AYLMER		15	FINGERLING
1-Jan-72	EB	11000	KOOTENAY-MOAT		5	FINGERLING
1-Jan-72	EB	75600	KOOTENAY-MOAT		2.5	FRY
1-Jan-69	EB	50000	ONTARIO		15	FINGERLING
1-Jan-67	EB	46500	ONTARIO		15	FINGERLING
1-Jan-66	EB	72200	OREGON		1.5	FRY
1-Jan-65	EB	36000	OREGON		5	FINGERLING
1-Jan-64	EB	30000	OREGON		2.5	FRY
1-Jan-63	EB	60000	OREGON		2.5	FRY
1-Jan-62	EB	30000	OREGON		2.5	FRY
1-Jan-61	EB	19000			2.5	FRY



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**Table 5. Dissolved Oxygen/ Temperature Profile**

09-Jul-96			01-Nov-04 Station UTM 10.0486710.5986211				
Depth (m)	DO (mg/L)	Temp. °C	Depth (m)	DO mg/L	DO %sat	Temp. °C	pH
0	9.2	15	0			3.58	7.9
1	9.4	15	1			3.55	8.1
2	9.4	15	2			3.45	8.2
3	9.4	15	3			3.58	8.4
4	9.5	15	4			3.51	8.4
5			5			3.49	8.4
6			6			3.49	8.4
7			7			3.49	8.5
8			8			3.62	8.5
9			9			3.82	8.4
10			10				
11			11				

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

Lake	Sample#	Site	Species Caught	Age	Length (mm)	Weight (grams)	Condition (k)	Structure	Sex	Maturity	Comments
Vivian	1	1	rb	4	385	740	1.3	ot	f	mt	
Vivian	2	1	rb	5	440	900	1.1	ot	f	st	
Vivian	3	1	rb	4	390	740	1.2	ot	f	mt	
Vivian	4	1	rb	5	479	1420	1.3	ot	f	mt	
Vivian	5	1	eb	2	288	320	1.3	ot	af3N	im	
Vivian	6	2	rb	5	385	580	1.0	ot	f	st	
Vivian	7	2	rb	6	405	740	1.1	ot	f	st	
Vivian	8	2	rb	1	225	105	0.9	ot	f	im	
Vivian	9	2	rb	1	191	60	0.9	ot	f	im	
Vivian	10	2	eb	2	330	480	1.3	ot	af3N	im	
Vivian	11	2	eb	4	503	1890	1.5	ot	f	mt	has eggs-diploid?
Vivian	13	2	rb	5	469	1300	1.3	ot	f	mt	
Vivian	14	2	rb	5	426	940	1.2	ot	f	st	egg bound
Vivian	15	2	rb	5	408	770	1.1	ot	f	mt	
Vivian	16	2	rb	5	437	990	1.2	ot	f	mt	
Vivian	17	2	rb	5	432	950	1.2	ot	f	mt	
Vivian	18	2	rb	5	432	960	1.2	ot	f	mt	
Vivian	19	2	rb	4	398	710	1.1	ot	f	mt	
Vivian	20	2	rb	5	384	740	1.3	ot	f	mt	
Vivian	21	2	rb	3	353	520	1.2	ot	f	mt	
Vivian	22	2	rb	4	381	650	1.2	ot	f	mt	
Vivian	23	2	rb	4	441	884	1.0	ot	f	mt	
Vivian	24	2	rb	4	394	684	1.1	ot	f	mt	
Vivian	25	2	rb	3	323	381	1.1	ot	f	im	
Vivian	26	2	rb	3	327	423	1.2	ot	f	mt	
Vivian	27	2	rb	1	233	155	1.2	ot	f	im	
Vivian	28	2	rb	2	255	195	1.2	ot	f	im	
Vivian	29	2	rb	5	370	564	1.1	ot	f	st	
Vivian	30	2	rb	2	254	186	1.1	ot	f	im	
Vivian	31	2	rb	2	270	234	1.2	ot	f	im	
Vivian	32	2	rb	1	219	128	1.2	ot	f	mt	
Vivian	33	2	rb	1	217	131	1.3	ot	f	im	
Vivian	34	2	rb	1	228	137	1.2	ot	f	im	
Vivian	35	2	rb	1	212	114	1.2	ot	f	im	
Vivian	36	2	rb	1	200	96	1.2	ot	f	im	
Vivian	37	2	rb	1	226	127	1.1	ot	f	im	
Vivian	38	2	rb	1	202	100	1.2	ot	f	im	
Vivian	39	2	rb	1	213	114	1.2	ot	f	im	
Vivian	40	2	rb	1	146	32	1.0	ot	f	im	
Vivian	41	2	rb	1	200	86	1.1	ot	f	im	
Vivian	42	2	rb	1	187	80	1.2	ot	f	im	
Vivian	43	2	rb	1	172	54	1.1	ot	f	im	
Vivian	44	2	rb	1	143	36	1.2	ot	f	im	
Vivian	45	2	rb	1	198	84	1.1	ot	f	im	
Vivian	46	2	rb	1	223	122	1.1	ot	f	im	
Vivian	47	2	rb	1	221	126	1.2	ot	f	im	
Vivian	48	2	eb	4	486	1690	1.5	ot	af3n		
Vivian	49	2	eb	4	503	1800	1.4	ot	af3n		
Vivian	50	2	eb	3	435	1250	1.5	ot	af3n		
Vivian	51	2	eb	3	431	1180	1.5	ot	af3n		
Vivian	52	2	eb	3	424	1320	1.7	ot	af3n		
Vivian	1	1	eb	4	549	2750	1.7	OT	AF3N		large fat fish
Vivian	2	1	eb	3	499	2000	1.6	OT	AF3N		no evidence of gonads
Vivian	3	1	eb	3	394	1200	2.0	OT	AF3N		extremely fat fish
Vivian	4	1	eb	3	413	1110	1.6	OT	AF3N		
Vivian	5	1	eb	2	356	780	1.7	OT	AF3N		
Vivian	6	1	eb	2	316	480	1.5	OT	AF3N		
Vivian	7	2	eb	4	512	2175	1.6	OT	AF3N		fat fish with small skein c
Vivian	8	2	rb	1	222	108	1.0	OT	f	im	skinny fish