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RICHARDSON LAKES FISHERY MANAGEMENT

By

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Interim Summary Report No. 8 (2008-2010)

Summary

The Richardson Lakes support fisheries for landlocked salmon (*Salmo salar*), lake trout (*Salvelinus namaycush*), and brook trout (*Salvelinus fontinalis*). Season-long angler surveys were conducted seven times from 1998 to 2010 to evaluate the status of the sport fishery. Estimates of total angler use and harvest were made in 2002, 2007 and 2010; all indicating an increase in angling activity over that of the late 1990's.

Salmon growth rates had been stable from 1986-91, but declined in succeeding years, prompting a reduction in the salmon stocking rate to restore the abundance of rainbow smelt (*Osmerus mordax*), the primary forage species. Efforts to close Mill and Metallak Brooks to smelt dipping in 1996 were unsuccessful, but with continued poor salmon growth, they were closed effective 2007. Additionally, no salmon were stocked in 2006 in response to the sharp decline in salmon growth. Salmon stocking has since resumed, but at a lower rate to rebuild the forage base. Salmon growth rates and body condition remain relatively low even with reduced stocking rates and a more protected smelt population.

Lake trout and brook trout, which are not as dependent on smelt for forage, grew at acceptable rates over the survey period, and lake trout in particular provided an attractive fishery for large fish. Lake trout numbers are carefully managed by limiting recruitment through lake level manipulation. Wild brook trout are present in low numbers in the Richardsons, and continue to be augmented by increasing numbers of hatchery fish. Brook trout catch rates have improved and provide an increasingly viable angling opportunity.

This report summarizes season long clerk survey data, volunteer angler data, and other data collected by MDIFW during 2010. Summer angler surveys will continue on the Richardson Lakes on a three-year schedule; the next survey year will be 2013.

KEY WORDS: ANGLER EFFORT, ANGLER SURVEY, BKT, FORAGE, HARVEST, LAKE, LLS, LKT, MEAN SIZE, SEASON LONG ANGLER SURVEY

Introduction and Study Area

Upper and Lower Richardson Lakes, located in the Rangeley chain of lakes in Oxford County, are 7,100 acres in size and support fisheries for landlocked salmon, brook trout, and a remnant lake trout population. Water levels in the Richardson Lakes are controlled by Middle Dam, which is owned and operated by FPL Energy Maine Hydro (FPLE).

General law regulations are in effect for salmon and lake trout; more restrictive brook trout regulations have been in effect since 1996. The lakes and their tributaries were closed to smelting in 2007 (Table 1). Previous to complete closure, smelt dipping at Upper Dam Pool was prohibited effective 1996 and the other smelt spawning tributaries, including Mill and Metallak Brooks, were closed to the taking of smelts from midnight until noon each day effective 2005.

The Richardsons are closed to ice fishing. There are public boat launch sites at the extreme ends of the Richardsons; at Mill Brook on the north end and at South Arm on the south end.

The salmon fishery is primarily dependent on annual stockings though there is some drop down of wild Mooselookmeguntic Lake salmon at Upper Dam. The salmon stocking rate was reduced from 3,500 in 1993 to approximately 2,500 or fewer fish in more recent years. Salmon stocking ceased in 2006 due to poor growth attributed to low smelt abundance. Continued poor salmon growth rates, despite reductions in the stocking rate, prompted the closure of the tributaries to recreational smelting in 2007. Salmon stocking has resumed at a reduced rate of approximately 1,700 fish annually.

Lake trout were illegally introduced and efforts continue to reduce their numbers because they compete with salmon for limited forage. Landlocked alewives (*Alosa pseudoherangus*) were stocked in Rangeley Lake in the 1970's and have since become established in the Richardsons. Although they serve as forage for larger salmonids, they are utilized less than smelt (particularly by salmon) and likely compete with smelt for available plankton. Unscheduled brook trout are frequently stocked at the Richardsons, and provide varying rates of returns to anglers.

Methods

Season-long aerial angler counts and clerk creel surveys conducted in 2002, 2007 and 2010 allowed estimation of total angler use as well as catch, harvest, and age composition of the sport fishery. Clerk surveys conducted in 1999, 2003 and 2004 provided information on angler catch rates and fish growth rates, but not on total annual angler use and harvest. Additional information was gathered by trapnetting (1999, 2001, 2005, 2006, 2008, 2010), gillnetting (2003, 2007), and trawling (2005, 2006, 2009). In addition, voluntary angler data are collected annually. The voluntary angler data supplements and corroborates data collected through other methods such as trapnetting. Previous

sampling efforts have been presented in Interim Summary Reports (Bonney 1999, 2000, 2002, 2006, 2008). Previously reported data are included in the summary tables in this report, and comparisons are made when appropriate.

Summary of Findings

Estimates of Angler Use and Harvest

Previous angler use estimates indicated a decline in the number of anglers fishing the Richardson Lakes in the late 1990's (Figure 1). Since the lowest total of 2,352 angler days in 1998, the number of anglers has increased to a total of 8,455 in 2010 (Table 2). The total estimate for 2010 is similar to more recent estimates and estimates from the early to mid 1990's. The decrease in angler use observed in the late 1990's may be attributed to low salmon catch rates. In 1999, it took anglers approximately 49.7 hours to catch a legal salmon. By 2007, the number of hours required to catch a legal salmon had decreased to 7.0. By 2010, however, the number of hours required to catch a legal fish had increased to 30.2. This decrease in angler success for salmon may be related to lower stocking rates.

Lake trout numbers continued to decline in the Richardson Lakes. No lake trout were sampled during the clerk survey, illustrating some level of success in reducing lake trout numbers in the Richardsons. Lake trout still provide an opportunity to catch larger, trophy fish, and are targeted by certain anglers.

Brook trout contribute to the sport fishery in the Richardson Lakes. MDIFW continues to augment the relatively low wild brook trout population with unscheduled hatchery trout (Kennebago strain). In recent years, brook trout stockings have been more frequent and involved larger numbers of fish (Table 1). As a result, angler success has increased from 0.08 legal fish per angler in 1999, to 0.47 legal fish per angler in 2010.

The Salmon Fishery

Salmon were stocked at a rate of 3,500 spring yearlings per year (0.5/acre) from 1981 through 1993. Growth rate concerns prompted a reduction in the stocking rate to 2,500 per year (0.35/acre/year) from 2003 through 2005. Due to a severe decline in growth rates, salmon stocking was suspended for a year in 2006. Stocking resumed in 2007, and as of 2010 remains at a reduced rate of about 1,700 per year (0.2/acre).

Larger fall yearling salmon have been stocked experimentally since 2009. We hypothesize that the lakes' insect production is low due to the lack of extensive littoral areas and from annual dewatering. This may negatively impact first-year growth of spring-stocked salmon, which primarily forage on invertebrates. Larger fall-stocked salmon are less likely to rely on insects and could forage on smelts shortly after planting, thereby boosting growth rates and shortening the time required to recruit to attractive sizes. Voluntary angler reports and trapnetting data suggested that fall yearling salmon stocked in 2009 comprised the majority of the salmon fishery in 2010 as age II fish. This large cohort of relatively young fish likely explains the overall decrease in mean size of salmon observed in the 2010 clerk and voluntary angler surveys (Tables 3-7). Despite the decrease in mean size, and contrary to clerk survey data, volunteer angler data through 2010 showed a continued and rapidly increasing success rate for catching a legal size salmon. Clerk survey data indicate a decreased success rate decrease from 2007 to 2010 (0.95 to 0.18 legal fish per angler), while volunteer angler data showed an increase during the same time period (0.45 to 1.18 legal fish).

All data sources showed a decline in overall condition factor for salmon in the Richardson Lakes. After approximately one year in the system, age II+ salmon exhibit relatively slow growth and low condition factor (condition factor of 0.74). Age III+ hatchery salmon exhibited slightly better condition (0.83) but remained well below historical levels, which may suggest that the lakes' forage base (smelts) continues to be impaired.

Many factors contribute to the salmon forage problems in the Richardsons. Competition for smelt from lake trout contributes to salmon growth problems, although lake trout numbers appear to be stable or in decline. Additional pressure on the smelt population comes from an unknown number of wild salmon that drop down from Mooselookmeguntic Lake. These salmon contribute to the fishery in the Richardsons, but their numbers add an unknown variable to managing smelt predators. Landlocked alewives are not readily utilized by salmon; salmon remain dependant upon high smelt densities to achieve desirable growth and condition. Alewives compete with smelt for food and may be responsible for contributing to a decline in smelt abundance. The only variable within MDIFW's direct control is the salmon stocking rate, which will continue to be adjusted until a balance can be found between predatory species and available forage. The performance of the experimental fall yearling plantings and smelt abundance will be carefully monitored during the next several years as well.

The Lake Trout Fishery

Lake trout were illegally introduced to the Richardsons in the 1970's and were stocked intermittently from 1980 to 1995 until there was evidence that the forage base could not support an

additional predator species. At the request of MDIFW, FPLE implemented a minimum winter drawdown of five feet below the October 1 lake elevation on an annual basis beginning in 2000. This drawdown dewaters and kills lake trout eggs that were deposited in the fall when suitable spawning substrate was still covered with water. This effort appears to be successful, as evidenced by fewer sublegal fish reported and none captured in recent gillnet or trapnetting efforts. Age V+ lake trout collected in 2007 originated from eggs laid after the draw down agreement went into effect in 2000, indicating that not all of the eggs were dewatered. However, no lake trout younger than age V+ were sampled, suggesting that the effort is largely successful in limiting reproduction.

Lake trout in the Richardsons have grown to attractive sizes, and MDIFW recognizes that they have provided an attractive fishery for anglers seeking larger fish. Voluntary anglers reported catching a total of 49 legal-size lake trout from 2001 to 2005, the longest of which was 34 inches, and fish up to age XV+ were taken (Table 8). Hatchery-reared lake trout sampled by trapnetting (Table 9) and wild lake trout sampled by clerk survey and gillnetting (Table 10) also grew to attractive sizes of over 30 inches and 9 pounds or larger. However, due to their high reproductive rates and longevity, and because the lakes' smelt populations continues to be depressed, MDIFW desires to continue efforts to minimize the abundance of lake trout in the Richardsons through winter drawdowns.

Although MDIFW currently seeks to limit lake trout numbers in the Richardsons, conditions may change in the future. If landlocked alewives become overabundant and the smelt population becomes relict, limited maintenance stockings of lake trout could help to reduce landlocked alewife numbers and ultimately benefit smelt and salmon.

The Brook Trout Fishery

The Richardsons do not support a substantial wild brook trout population. This situation may result from a lack of spawning and nursery habitat in the tributaries, the relatively small littoral zone within the lake, the effect of the drawdown regime, or a combination of these factors. FPLE conducts annual surveys to ensure unobstructed tributary access as part of their Federal Energy Regulatory Commission license. This eliminates a possible cause of reproductive failure, and may benefit other species such as smelt.

Unscheduled hatchery brook trout fry, fall fingerling, and recently spring and fall yearling, have frequently been stocked to supplement the small wild population. Both voluntary angler and clerk survey data indicated that brook trout catch rates improved in recent years. Growth rates were comparable to those observed in other large lakes in the chain, and recruitment to older ages clearly occurred; ages I+ through V+ were represented in the catch by anglers and in trapnet samples (Tables

10 and 11). These data are encouraging signs that brook trout stockings could provide significant benefits to Richardson Lakes anglers. Spring yearling brook trout (local Kennebago strain only) will be stocked at rates of about 2500 to 5000 fish annually over the next several years to provide a more consistent fishery.

Forage abundance

Inspections of annual smelt egg deposits suggested slightly improved spawning runs in two major tributaries (Mill Brook and Metallak Brook) in 2009 and 2010 (Table 13). Smelt spawning surveys are based on one or more qualitative observations where smelt egg deposition is visually assessed. The Department's hydroacoustic sampling has ceased due to obsolete equipment and a lack of funding to update and maintain the program.

We will continue to monitor the impact of the 2007 closure of the tributaries to smelt dipping on forage abundance and salmonid growth rates. We will also initiate annual Scuba surveys of the Mill Brook and Upper Dam Pool spawning runs to provide more detailed assessments of these important smelt tributaries, if staffing levels permit.

Recommendations

- Continue stockings of fall yearling salmon at an annual rate of 1,800 to 3,000 (0.25 to 0.35/acre), with the specific rate depending on annual assessments of smelt spawning success and salmon growth rates and body condition.
- Continue to monitor smelt spawning runs, and work to maintain a complete closure of tributaries to smelting.
- Initiate annual brook trout stockings with Kennebago-strain spring yearlings in 2011, but carefully monitor their impact to the lakes' smelt and salmon populations.
- Continue water level manipulations to limit successful lake trout spawning.
- Conduct clerk creel surveys in 2013 (a frequency of one survey every third year) to evaluate changes in angler use, salmon growth rates, lake trout reproduction, and forage preference and abundance.

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Table 1. Stocking and regulation history, Richardson Lakes, 2000-2010.

Year	Stocking History	Special Regulations
2000	2,500 SY LLS 25,760 FR BKT 10,000 FF BKT	No live fish as bait. BKT: 2 fish, min. length 10 in., only 1 may exceed 12 in. LLS and LKT: general law.
2001	2,500 SY LLS 5,000 FR BKT	Same as previous year.
2002	1,500 SY LLS	Same as previous year.
2003	2,500 SY LLS 6,500 FR BKT	Same as previous year.
2004	2,500 SY LLS 4,900 FR BKT	Same as previous year.
2005	2,500 SY LLS 12,850 FR BKT	Same as previous year except lake and tributaries closed to the taking of smelts from midnight until noon each day.
2006	3,956 SY BKT	Same as previous year.
2007	1,700 SY LLS 2,590 FR BKT 92 AD BKT	Same as previous year except lake and tributaries closed to the taking of smelts.
2008	1,700 SY LLS 3,800 FF BKT 198 FY BKT 127 AD BKT	Same as previous year.
2009	1,658 FY LLS	Same as previous year.
2010	1,892 FY LLS 2,750 SY BKT 2,000 FF BKT 175 FY BKT	Same as previous year.

Note: LLS = landlocked salmon; BKT = brook trout; LKT = lake trout;
FR = fry; FF = fall yearlings; FY = fall yearling; SY = spring yearlings; AD = adult;

Figure 1. Angler Use at the Richardson Lakes

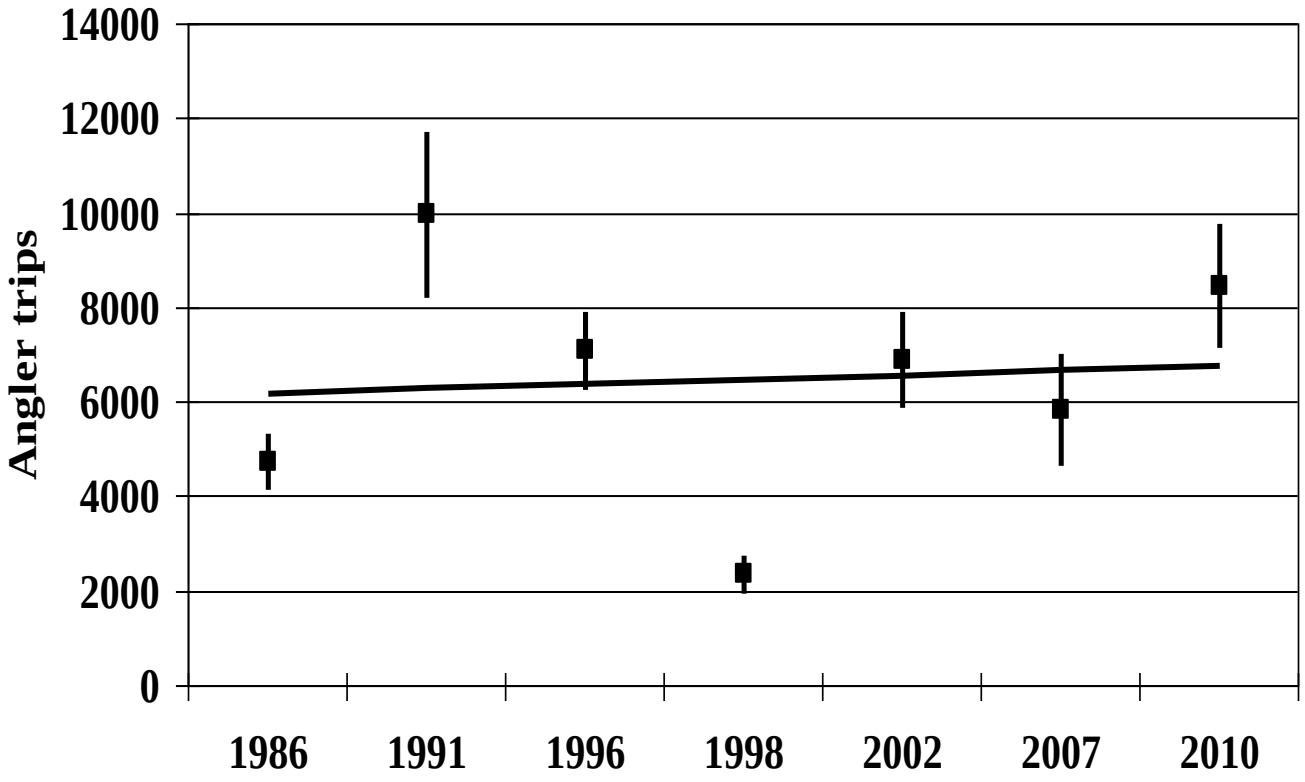

Table 2. Stratified random clerk surveys, 1999-2010.

		CENSUS YEAR					
Statistics	**Species**	**1999**	**2002**	**2003**	**2004**	**2007**	**2010**
No. anglers surveyed		209	110	123	61	122	105
No. angler hours		994	474	643	353	809	575
No.anglers (and %) successful in catching a legal fish	LLS	33 (16)	10 (9)	24 (20)	11 (18)	38 (31)	13 (12)
	LKT	16 (8)	9 (8)	3 (2)	0	13 (11)	2 (2)
	BKT	14 (7)	4 (4)	4 (3)	5 (8)	19 (16)	23 (22)
No. legal fish kept	LLS	17	5	7	3	16	4
	LKT	14	8	1	0	3	0
	BKT (all)	10	1	1	1	12	14
	10-12 in	3	1	0	1	6	12
	GE 12 in	7	0	1	0	6	2
No. (and %) Legal fish released	LLS	3 (60)	20 (80)	39 (85)	26 (90)	100 (86)	15 (79)
	LKT	0 (0)	7 (47)	2 (67)	0	17 (86)	2 (100)
	BKT (all)	6 (38)	3 (75)	23 (96)	3 (75)	23 (66)	35 (71)
	10-12 in	4	3 (75)	16 (100)	0	20 (77)	33
	GE 12 in	2	0	7 (88)		3 (33)	2
No. (and %) sublegal fish released	LLS	102 (69)	80 (76)	149 (76)	85 (75)	73 (39)	53 (74)
	LKT	10 (32)	0	0	0	3 (13)	3 (60)
	BKT	7 (30)	2 (33)	15 (38)	7 (64)	24 (41)	17 (26)
No. legal fish per angler (only those kept)	LLS	0.01	0.24	0.37	0.48	0.95	0.18
	LKT	0.07	0.14	0.02	0	0.17	0.02
	BKT	0.08	0.04	0.20	0.07	0.29	0.47
Hours to catch a legal fish (<u>all</u> legal fish caught)	LLS	49.7	19.0	14.0	12.2	7.0	30.2
	LKT	71.0	31.6	214.3	0	40.5	287.3
	BKT	62.1	118.5	26.8	88.3	23.1	11.7
Mean length in inches±SE (and no.) fish	LLS	16.6±0.4 (20)	16.0±0.5 (5)	16.5±0.4 (8)	16.9 (1)	17.5±0.6 (14)	17.2±0.8 (4)
	LKT	24.7±0.4 (11)	26.7±1.5 (8)	31.1 (1)	21.1 (1)	23.6±2.3 (3)	* *
	BKT	14.5±1.3 (10)	10.8 (1)	14.0 (1)	10.6 (1)	13.7±1.0 (12)	11.7±0.5 (14)
Mean weight in lbs±SE (and no.) of fish sampled	LLS	1.7±0.2 (18)	1.4±0.2 (5)	1.5±0.1 (8)	1.5 (1)	1.9±0.2 (13)	1.7±0.2 (4)
	LKT	6.4±0.4 (11)	6.7±0.8 (7)	11.0 (1)	3.3 (1)	5.1±1.5 (3)	* *
	BKT	1.6±0.6 (10)	0.5 (1)	1.0 (1)	0.4 (1)	1.3±0.4 (12)	0.66±0.0 (14)
Estimated total fish harvested ± CI (@95%) during survey period	LLS		344±51		.	758±155	151±26
	LKT		551±82			117±24	0
	BKT		69±10			583±120	490±84
Estimated total angler days ± CI (@95%) during survey period		.	6,882 (5,863-7,901)	.	.	5,828 (4,637-7,019)	8,455 (7,159-9,751)

Table 3. Voluntary angler surveys, 2006-2010.

		CENSUS YEAR				
Statistics	**Species**	**2006**	**2007**	**2008**	**2009**	**2010**
No. anglers surveyed		49	69	30	30	44
No. angler hours		313	223.25	162.5	151	165
No. anglers(and %) successful in catching a legal fish	LLS LKT BKT	15 (30) 19 (39) 20 (41)	19 (28) 13 (19) 24 (35)	18 (60) 4 (13) 15 (50)	7 (23) 4 (13) 16 (53)	28 (64) 2 (5) 25 (57)
No. legal fish kept	LLS LKT BKT	4 2 0	12 9 10	0 0 0	5 4 1	6 1 3
No. (and %) legal fish released	LLS LKT BKT10-12” BKT>12”	11 (73) 22 (92) 6 (26) 17 (74)	19 (61) 6 (40) 13 (72) 17 (77)	30 (100) 4 (100) 13 (100) 4 (100)	9 (64) 0 43 (100) 22 (96)	46 (88) 4 (80) 18 (90) 13 (93)
No. (and %) sublegal fish released	LLS LKT BKT	41 (73) 0 4 (15)	20 (39) 0 7 (15)	0 0 1 (6)	15 (52) 0 18 (21)	40 (44) 1 (17) 10 (23)
No. legal fish per angler(only those kept)	LLS LKT BKT	0.31 (0.08) 0.49 (0.04) 0.47 (0)	0.45 (0.17) 0.22 (0.13) 0.58 (0.14)	1 (0) 0.13 (0) 0.57 (0)	0.47 (0.17) 0.13 (0.13) 2.20 (0.03)	1.18 (0.14) 0.11 (0.02) 0.77 (0.07)
Hours to catch a legal fish(<u>all</u> legal fish caught	LLS LKT BKT	9.2 43.1 10.4	7.2 14.9 5.6	5.4 40.6 9.6	10.8 37.8 2.3	3.2 33.0 4.9
Mean length in inches ± SE(and no.) fish sampled or reported	LLS LKT BKT	16.6±0.4 (24) 23.4±1.1 (6) 13.9±0.8 (25)	16.1±0.3(27) 22.8±1.3 (15) 13.4±0.4 (39)	16.8±0.3 (30) 14.3±0.7 (12)	16.6±0.6 (12) 32.1±0.3 (4) 12.6±0.2 (69)	15.3±0.2 (51) 24.4±2.1 (5) 12.8±0.4 (29)

Table 4. Average size by age of **hatchery salmon** sampled by **clerks** at Richardson Lakes, summers of 1999-2010.

		Ages					
Year	**Variable**	**III+**	**IV+**	**V+**	**VI+**	**VII+**	**All**
1999	Length	15.8±0.4	17.2±0				16.1±0.4
	Weight	1.4±0.1	1.7±0.1				1.4±0.1
	Condition	0.94±0.01	0.95±0.06				0.94±0.01
	No.	7	2				9
	Mark	Ad	RV				All
2002	Length		17.4	16.5			17.0±0.5
	Weight		2.2	1.5			1.8±0.4
	Condition		1.16	0.89			1.03±0.14
	No.		1	1			2
	Mark		BV	LV			
2003	Length	16.4±0.1					16.4±0.1
	Weight	1.5±0.4					1.5±0.4
	Condition	0.89±0.03					0.89±0.03
	No.	2					2
	Mark	Ad					
2004	Length		16.9				16.9
	Weight		1.5				1.5
	Condition		0.88				0.88
	No.		1				1
	Mark		Ad				
2007	Length	15.2	18.9±0.1		20.2	17.2±0.7	17.8±0.8
	Weight	1.2	2.4±0.7		3.2	1.8±0.3	2.1±0.3
	Condition	0.94	0.97±0.0		1.07	0.99±0.05	0.99±0.03
	No.	1	2		1	3	7
	Mark	Ad	LV		RV	Ad	
2010	Length		15.3		19.0		17.1±1.9
	Weight		1.2		2.0		1.6±0.4
	Condition		0.94		0.80		0.87±0.07
	No.		1		1		2
	Mark		BV		AD		

Table 5. Average size by age of **hatchery salmon** sampled by **trapnetting** at Richardson Lakes, falls of 1999-**2010.**

		Ages						
Year	**Variable**	**I+**	**II+**	**III+**	**IV+**	**V+**	**VI+**	**All**
1999	Length	12.0±0.4		16.7	19.4±0.7	13.6		15.6±1.3
	Weight	0.4±0.07		1.3	2.3±0.3	0.6		1.3±0.3
	Cond.	0.68±0.04		0.78	0.85±0.05	0.68		0.76±0.04
	No.	3		1	3	1		8
2001	Length	10.4±0.2	15.6±1.9	15.4±0.4	18.1±0.4	21.7±2.2	22.4	15.8±0.5
	Weight	0.3±0.01	1.4±0.6	1.1±0.1	2.1±0.2	3.6±1.2	4.3	1.5±0.2
	Cond.	0.69±0.02	0.81±0.06	0.82±0.03	0.93±0.02	0.93±0.05	1.05	0.84±0.02
	No.	10	5	13	18	2	1	49
2005	Length	11.1±7.2	12.5±0.6	13.9±0.2	16.1±1.3			12.8±0.3
	Weight	0.4±0.01	0.6±0.1	0.8±0.05	1.4±0.4			0.7±0.06
	Cond.	0.82±0.04	0.79±0.03	0.83±0.01	0.84±0.08			0.82±0.02
	No.	14	7	14	4			39
2006	Length		12.2	15.6±0.81	16.7±1.0		15.6	15.4±0.63
	Weight		0.35	1.2±0.22	1.2±1.0		1.1	1.08±0.17
	Cond.		0.537	0.827±0.04	0.857		0.805	0.792±0.05
	No.		1	5	2		1	9
2008	Length	11.0±0.03	12.6±0.3		19.1±0.29	21.6	19.9	16.1±0.63
	Weight	0.37±0.01	0.57±0.03		2.3±0.12	3.56	2.62	1.6±0.17
	Cond.	0.78±0.03	0.79±0.03		0.90±0.17	0.98	0.92	0.86±0.02
	No.	5	11		18	1	1	36
2010	Length		14.1±0.1	14.6±0.2	17.2±1.4		20.3±0.5	14.5±0.2
	Weight		0.76±0.0	0.94±0.1	1.53±0.1		2.64±0.2	0.87±0.0
	Cond.		0.74±0.02	0.83±0.02	0.81±0.02		0.86±0.02	0.76±0.04
	No.		86	17	2		4	109

Table 6. Average size by age of **wild salmon** sampled by **clerks** at Richardson Lakes, summers of 1999-2010.

		Ages					
Year	**Variable**	**IV+**	**V+**	**VI+**	**VII+**	**VIII+**	**All**
1999	Length	13.9	16.9	16.7±0.3	18.0±2.5	18.7±0.2	17.2±0.7
	Weight	.	.	1.7±0.3	2.6±1.4	2.0±0.1	2.1±0.4
	Cond.	.	.	0.99±0.13	1.10±0.18	0.84±0.02	0.98±0.07
	No.	1	1	2	2	2	8
2002	Length	14.6	15.7±0.1				15.4±0.4
	Weight	0.9	1.2±0.8				1.1±0.1
	Cond.	0.77	0.87				0.84±0.04
	No.	1	2				3
2003	Length		17.1	16.7±1.2			16.8±0.7
	Weight		1.8	1.2±0.1			1.4±0.2
	Cond.		0.973	0.71±0.12			0.80±0.11
	No.		1	2			3
2004	Length			19.2			19.2
	Weight			.			.
	Cond.			.			.
	No.			1			1
2007	Length	15.0		18.0±1.5	16.9±2.5	17.9±0.4	17.2±0.8
	Weight	1.1		1.9±0.5	2.5	1.5±0.03	1.7±0.2
	Cond.	0.93		0.89	0.95	0.74	0.86±0.04
	No.	1		2	2	2	7
2010	Length			16.7	17.7		17.2
	Weight			1.8	1.8		1.8
	Cond.			1.04	0.88		0.96±0.08
	No.			1	1		2

Table 7. Average size by age of **wild salmon** sampled by **trapnetting** at Richardson Lakes, falls of 1999-2010.

		Ages						
Year	**Variable**	**II+**	**III+**	**IV+**	**V+**	**VI+**	**VII+**	**All**
1999	Length				16.1±2.2	19.1		17.1±1.6
	Weight				1.2±0.5	1.9		1.4±0.4
	Cond.				0.75±0.02	0.75		0.75±0.01
	No.				2	1		3
2001	Length		11.3±0.6	12.0±0.3	14.0±0.5	16.2±1.2	18.7	13.3±0.4
	Weight		0.4±0.04	0.4±0.03	0.8±0.1	1.3±0.4	1.8	0.7±0.1
	Cond.		0.66±0.03	0.67±0.04	0.77±0.04	0.77±0.08	0.75	0.72±0.02
	No.		4	12	11	4	1	32
2005	Length		11.9	11.8	13.0±0.3	13.7±1.1		13.0±0.4
	Weight		0.5	0.4	0.6±0.1	0.8±0.2		0.6±0.01
	Cond.		0.76	0.71	0.72±0.04	0.71±0.06		0.72±0.02
	No.		1	1	5	4		11
2006	Length			13.4	13.8			13.6±0.197
	Weight			0.67	0.771			0.716±0.055
	Cond.			0.763	0.816			0.960±0.082
	No.			1	1			2
2008	Length	9.1±2.3	12.1±0.1	13.5±0.4	14.7±0.4	16.9±0.2	15.8	13.8±0.5
	Weight	0.2±0.1	0.5±0.0	0.7±0.1	0.9±0.1	1.4±0.2	1.0	0.8±0.1
	Cond.	0.87±0.22	0.70±0.02	0.82±0.02	0.77±0.03	0.80±0.08	0.73	0.78±0.02
	No.	2	4	5	10	2	1	24
2010	Length		10.8±0.3	13.7±0.9	13.5±0.9	19.02		13.4±0.7
	Weight		0.3±0.0	0.8±0.2	0.7±0.2	1.65		0.7±0.1
	Cond.		0.76±0.08	0.81±0.03	0.70±0.04	0.67		0.74±0.03
	No.		3	4	6	1		14

Table 8. Average size and age of **hatchery-reared lake trout** sampled by **clerks** at Richardson Lakes, summers of 1999-2010.

		Ages				
Year	**Variable**	**V+**	**VIII+**	**XII+**	**XV+**	**All**
1999	Length	24.7±0.4				24.7±0.4
	Weight	6.2±0.4				6.2±0.4
	Cond.	1.13±0.03				1.13±0.03
	No.	10				10
	Mark	LP				LP
2002	Length		28.9±0.9		34.3	30.7±1.9
	Weight		8.9±0.9		.	8.9±0.9
	Cond.		1.02±0.01			1.02±0.01
	No.		2		1	3
	Mark		LP		LV	
2003	Length			31.1		31.1
	Weight			11.0		11.0
	Cond.			1.02		1.02
	No.			1		1
	Mark			RV		

Table 9. Average size and age of **hatchery-reared lake trout** sampled by **trapnetting** at Richardson Lakes, falls of 1999-2010.

		Ages							
Year	**Variable**	**V+**	**VII+**	**VIII+**	**XI+**	**XII+**	**XIV**	**XVI**	**All**
1999	Length	24.7±0.6		27.3		30.5±0.7			26.5±0.9
	Weight	5.4±0.5		9.5		9.5±0.3			6.6±0.7
	Cond.	0.96±0.04		1.29		0.99±0.06			1.00±0.04
	No.	7		1		3			11
2001	Length		26.9±0.5						26.9±0.5
	Weight		6.7±0.6						6.7±0.6
	Cond.		0.95±0.04						0.95±0.04
	No.		5						5
2005	Length				27.9				27.9
	Weight				8.0				8.0
	Cond.				1.02				1.02
	No.				1				1
2008	Length						32.4		32.4
	Weight						12.0		12.0
	Cond.						0.97		0.97
	No.						1		1
2010	Length							30.8	30.8
	Weight							9.0	9.0
	Cond.							0.86	0.86
	No.							1	1

Table 10. Average size and age of **wild lake trout** sampled at Richardson Lakes, summers of 1999-2010.

			Ages			
Year	**Method**	**Variable**	**V+**	**VII+**	**VIII+**	**All**
1999	Clerk survey	Length		24.8		24.8
		Weight		7.9		7.9
		Condition		1.44		1.44
		No.		1		1
2002*	Clerk survey	Length				23.9±2.1
		Weight				6.4±1.9
		Condition				1.26±0.04
		No.				2
2004	Clerk survey	Length		21.2		21.1
		Weight		3.3		3.3
		Condition		0.97		0.97
		No.		1		1
2007	Clerk survey	Length			17.5±0.4	17.5±0.4
		Weight			1.5±0.03	1.5±0.03
		Condition			0.75±0.06	0.75±0.06
		No.			2	2
2007	Gillnet	Length	18.9±0.4			18.9±0.4
		Weight	2.2±0.12			2.2±0.12
		Condition	0.88±0.03			0.88±0.03
		No.	5			5
2008*	Trapnet	Length				23.6
		Weight				4.2
		Condition				0.88
		No.				1

*Note: Age unknown

Table 11. Average size and age of **brook trout** sampled at Richardson Lakes, summers of 1999-2010

			Ages					
Year	**Method**	**Variable**	**I+**	**II+**	**III+**	**IV+**	**V+**	**All**
1999	Clerk survey	Length			11.8±0.7	13.2	18.9	14.5±1.3
		Weight			0.6±0.1	0.9	2.4	1.6±0.6
		Cond.			1.04±0.11	1.06	1.00	1.07±0.07
		No.			4	1	1	10
2002	Clerk survey	Length			10.8			10.8
		Weight			0.5			0.5
		Cond.			1.034			1.034
		No.			1			1
2003	Clerk survey	Length				14.0		14.0
		Weight				1.0		1.0
		Cond.				1.01		1.01
		No.				1		1
2004	Clerk survey	Length			10.6			10.6
		Weight			0.4			0.4
		Cond.			0.91			0.91
		No.			1			1
2007	Clerk survey	Length		12.2±0.6	11.6±0.4	14.4±2.1	17.7	13.0±0.7
		Weight		0.7±0.2	0.6±0.1	1.6±0.6	2.4	1.0±0.2
		Cond.		1.08±0.07	0.97±0.04	1.17±0.02	1.21	1.07±0.04
		No.		4	4	2	1	11
2007	Gillnet	Length		12.2±2.2	11.4			11.9±1.3
		Weight		0.7±0.5	0.5			0.6±0.3
		Cond.		0.88±0.18	0.87			0.87±0.10
		No.		2	1			
2010	Clerk survey	Length	11.2±0.4	10.4	11.6±0.6	11.3±0.2	16.6	11.7±0.5
		Weight	0.5±0.1	0.4	0.6±0.1	0.5±0.0	2.0	0.6±0.1
		Cond.	1.00±0.02	0.914	0.98±0.05	0.94±0.02	1.20	0.99±0.03
		No.	3	1	6	3	1	14

Table 12. Average size by age of **brook trout** sampled by **trapnetting** at Richardson Lakes, falls of 1999-2010.

		Ages							
Year	**Variable**	**0+**	**I+**	**II+**	**III+**	**IV+**	**V+**	**VI**	**All**
1999	Length			8.1±0.2	14.6	15.0±0.6			11.5±1.3
	Weight			0.2±0.01	1.1	1.1±0.2			0.6±0.2
	Condition			0.91±0.03	0.98	0.92±0.04			0.92±0.02
	No.			4	1	3			8
2001	Length			8.7±0.3	11.1±0.3	17.1±0.7			12.3±1.3
	Weight			0.2±0.01	0.4±0.04	1.8±0.3			0.8±0.3
	Condition			0.87±0.09	0.78±0.03	1.01±0.09			0.89±0.05
	No.			3	3	3			9
2005	Length		6.1	9.2±0.5	10.8±0.6	6.5			9.3±0.5
	Weight		.	0.2±0.02	0.5±0.1	0.1			0.3±0.1
	Condition		.	0.78±0.09	0.91±0.04	1.34			0.89±0.06
	No.		2	6	7	1			16
2006	Length		9.7±0.2		11.0				10.1±0.5
	Weight		0.2±0.0		0.3				0.3±0.0
	Condition		0.676±0.004		0.683				0.678±0.003
	No.		2		1				3
2008	Length	6.9		9.3±0.3	13.0±0.5	16.4	18.3		12.2±0.6
	Weight	0.1		0.2±0.0	0.7±0.1	1.3	2.4		0.7±0.1
	Condition	1.01		0.82±0.03	0.82±0.03	0.80	1.08		0.84±0.02
	No.	1		6	16	1	1		25
2010	Length		10.8±0.2	10.9±0.5	11.2±0.4	14.3	16.1±0.6	22.4	11.6±0.4
	Weight		0.4±0.0	0.4±0.1	0.4±0.0	0.8	1.3±0.2	4.5	0.6±0.1
	Condition		0.81±0.03	0.77±0.02	0.77±0.02	0.75	0.84±0.01	1.11	0.80±0.02
	No.		20	13	4	1	3	1	

Table 13. Smelt spawning observations, Richardson Lake tributaries, 1997-2010

Date	Tributary	Abundance/comments
5/4/97	Metallak Brook	Good run
5/4/97	Mill Brook	Good run
4/15/98	Mill Brook	Run just beginning
4/27/98	Mill Brook	No eggs seen; poor run
5/3/99	Mill Brook	Light to moderate egg deposition
4/21/00	Mill Brook	Good run
5/2/00	Metallak Brook	Light to moderate egg deposition
5/3/00	Mill Brook	Moderate egg deposition
4/16/01	Upper Dam	Light egg deposition
4/28/01	Mill Brook	Heavy run
5/3/01	Mill Brook	Moderate egg deposition
5/8/01	Mill Brook	Water low; smelt spawning in lake
4/21/02	Mill Brook	Poor run
5/6/04	Mill Brook	No eggs
4/25/05	Mill Brook	Light run
4/25/05	Metallak Brook	Moderate run
5/5/05	Mill Brook	No eggs observed
5/16/05	Mill Brook	SCUBA survey: most eggs in 1.5-3' of water along east bank; some eggs 6-8' deep; most had hatched.
4/18-21/06	Metallak Brook	Poor run
4/18-22/06	Mill Brook	Poor run
4/26/07	Mill Brook	No SLT sign, high water
4/31/07	Mill Brook	Few SLT
5/16/07	Metallak Brook	Moderate egg deposition – high water
5/6/08	Mill Brook	No eggs or SLT
5/6/08	Metallak Brook	No eggs observed
4/28/09	Mill Brook	Good run
4/28/09	Metallak Brook	No eggs observed
4/13/10	Mill Brook	Good run
4/22/10	Metallak Brook	Light to Mod egg deposition, pockets of heavy