Lake Roosevelt Fisheries Evaluation Program

Movements and Growth of Marked Walleye Recaptured in Lake Roosevelt

Annual Report 2000 - 2001

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Lake Roosevelt Fisheries Evaluation Program

Movements and Growth of Marked Walleye Recaptured in Lake Roosevelt

Annual Report 2000-2001

Contributions to Fisheries Management in Eastern Washington State Number 4

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Abstract

Walleye (*Stizostedion vitreum*) have been marked with floy tags in Lake Roosevelt since 1997 to estimate abundance, distribution and movement trends. In 2000, walleye were collected and marked during the spawning run in the Spokane River through electrofishing and angling to supplement movement and growth data collected in previous years. Walleye were also collected and marked during the 2000 and 2001 Kettle Falls Governor's Cup Walleye Tournaments.

Seventy-six tag returns were recovered in 2000 and twenty-three in 2001. Walleye migrated into the Spokane River to spawn in mid April and early May. The majority of marked walleye were recovered within 25 km of their original marking location, with a few traveling long distances between recovery locations. Data also verified earlier results that walleye establish summer home ranges. Some walleye remained in the Spokane River, while others moved downstream, or upstream after entering the mainstem of Lake Roosevelt. Those moving upstream moved as far north as Keenlyside Dam in British Columbia (245 km).

Growth data indicated similar trends exhibited in the past. Walleye growth and mortality rates were consistent with other walleye producing waters. Walleye condition was slightly below average when compared to other systems.

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Introduction

Walleye (*Stizostedion vitreum*) were the most abundant piscivore in Lake Roosevelt, Washington, based on catch-per-unit-effort (CPUE) and relative abundance data (Beckman et al. 1985, Peone et al. 1990, Griffith and Scholz 1990, and Cichosz et al. 1999, McLellan et al. 1998, 2001). Diet studies have indicated that walleye were the primary predators of salmonids in the reservoir (Peone et al. 1990, Griffith and Scholz 1990, and Cichosz et al. 1999). Therefore predation was hypothesized as a possible limiting factor for hatchery kokanee (*Oncorhynchus nerka*) and rainbow trout (*O. mykiss*) production.

In 1998, the Washington Department of Fish and Wildlife (WDFW) began using a bioenergetics model to estimate walleye consumption on salmonids (Baldwin et al. 1999). A walleye mark-recapture study was initiated on Lake Roosevelt in 1997 and continued through 1999 to provide population estimates for the bioenergetics model, with secondary goals to determine walleye movements, distribution, age, growth, and mortality (McLellan et al. 1998; 1999; 2001).

In 2000 and 2001, walleye were collected and marked with the primary objective of recapturing walleye to improve movement and distribution data. A secondary objective was to continue to monitor age, growth, and mortality data.

Description of the Study Area

Lake Roosevelt was formed when Grand Coulee Dam impounded the waters of the Columbia River in Northeastern Washington State in 1939 (Figure 1). At full pool the reservoir is 243 kilometers long, inundates 334.9 square kilometers, and has a maximum depth of 122 meters (Stober et al. 1981). At full pool, the lake's surface elevation is 430 m (1,290 ft) above mean sea level (MSL) and minimum operating pool is 403 m (1,208 ft.) above MSL. Grand Coulee Dam was constructed primarily for hydropower, flood control, and irrigation with secondary operations for recreation, fish and wildlife.

Figure 1. Map of Lake Roosevelt sampling sections. Section NP includes the Columbia River from the Little Dalles, near Northport, WA, upstream to the U.S./Canada border. Section BC includes the Columbia River from the U.S./Canada border upstream to Hugh Keenlyside Dam, British Columbia.

Materials and Methods

Field Collection

Walleye were collected and marked during boat electrofishing surveys conducted on the walleye spawning run in the upper Spokane River Arm (April 7th through June 1st 2000; Figure 1). Walleye were also collected by angling on May 6th, 2000 in the Spokane Arm, June 17th, 2000 at Kettle Falls, and June 24th and 25th, 2000 and June 23rd and 24th, 2001 in conjunction with the Governor's Cup Walleye Tournament at Kettle Falls. Additional collection and marking occurred through August 17, 2000 by the Spokane Tribe of Indians (STI) and the Colville Confederated Tribe in conjunction with other research.

All species of fish were collected during electrofishing surveys to standardize catch and effort data. Fish were measured to the nearest millimeter total length (TL) and weighed to the nearest gram (g). All walleye ≥ 150 mm TL were affixed with an individually numbered FD 94, 3/4", monofilament long, "T"- anchor Floy[®] tag (Floy Tag, Inc., Seattle, WA) and immediately released. Tags were inserted at the posterior base of the first dorsal fin as described by Guy et al. (1996). Each tag was printed with the address "EWU CHENEY" so anglers would know where to return them. Anglers who returned a walleye tag were sent a letter with information about their fish.

Movements

Walleye movements were analyzed using the same method as McLellan et al. (2001). The minimum walleye movement from release location to subsequent recapture location was estimated from biologist and angler reported recaptures. Angler recaptures were used through July 1st, 2001. Walleye recaptured within 7 days of release were ignored for movement analysis. Minimum distance traveled (km) between release and recapture location was estimated by measuring the shortest distance from the point of release to the location of recapture using the computer program Maptech[®] (Greenland, NH). Minimum distances moved between release and subsequent recapture location were calculated for walleye tagged during the spawning run in the Spokane Arm each year and recaptured following the spawning run (after June 1st of their mark year), as well as walleye tagged in summer/fall of each year.

Minimum distances traveled between release and subsequent recapture locations of walleye recaptured on more than one occasion were analyzed separate from those recaptured on a single occasion. Movements of those walleye recaptured multiple times were divided into two groups for analysis; those marked on the spawning run and those marked during the summer/fall. Mean time (days) between mark and recapture was calculated for all of the walleye that were included in the movement analysis.

Age, Growth, Mortality, and Condition

Scales from five walleye per 1 cm length class were randomly selected for analysis, to ensure equal representation of all size classes. If fewer than five fish were collected in a length class, all the scale samples from fish in that specific length-class were analyzed. Ages were determined and total lengths (mm) were back-calculated according to the methods described by Devries and Frie (1996). The standard intercept value of 55 was used in all back-calculations (Carlander 1983). An age-length key was created for the walleye aged, to assign ages to fish from which scales were not obtained or analyzed (Anderson and Neuman 1996).

Age frequency information derived from the age-length key was used to develop a catch-curve, according to the method in Ricker (1975). Instantaneous mortality (Z) was calculated via the Baranov method (Ricker 1975), where the absolute value of the slope of the regression line that described the descending limb of the catch-curve was multiplied by 2.3026. The age class at the peak of the curve, and age classes represented by fewer than 10 individuals were ignored for the calculation of the regression equation. Mean annual survival (S) and mean annual mortality (A) were calculated using methods of Ricker (1975).

Condition factors (K_{TL}) were calculated, for walleye collected as an index of how Lake Roosevelt walleye added weight in relation to increasing length (Anderson and Neuman 1996).

Results

2000 Recoveries

A total of 1,354 walleye were marked during 2000. The majority of walleye were marked in Section 8, which corresponded with the Governor's Cup Walleye Tournament (Table 1). During 2000, 116 tags were recovered, of which only 76 had adequate information to analyze movements. A list of all walleye tags and data recovered was summarized in Appendix A.

Thirteen of the 76 recoveries were marked on the spawning run in the Spokane River between 1997 and 2000 (Table 2). The majority of walleye marked on the spawning run were recaptured within 24.9 km of their marking location (n=10; 77%; Table 3). One walleye marked in the Spokane River during the spawning run (4/15/98) was recovered 138 km upstream near Kettle Falls during the Governor's Cup Walleye Tournament (6/25/00; time = 802 days; Table 4).

Table 1. Number of walleye marked per section in Lake Roosevelt, 2000. Section numbers correspond with sections on map.

Section	Section Name	Dates	Number Marked
SP 3	Spawning Run	April 17-June 1	57
SP 2	Angling Day	May 16 th	213
8 and 9 ¹	Sherman Ck- Kettle Falls	June 17 th	36
7,8, 9 and 10 ²	Sherman Ck-Kettle Falls	June 24 th and 25 th	688
All Sites	Other reservoir Research	June 26 th -Nov. 1	360
Total			1,354

¹ Governor's Cup Walleye Tournament Pre-Fish

² Governor's Cup Walleye Tournament, 2000

Table 2. Mean distances of recaptured walleye marked on the spawning run ($\pm$ standard deviation) and the direction of movement from the spawning area, 2000.

Marking Year	n	Mean Distance (km)	Range (km)	Mean Time (days)	Range (days)
1997					
Upstream	0				
Downstream	0				
Spokane Arm	1	14 (n/c)	14	1,115 (n/c)	1,115
1998					
Upstream	1	138 (n/c)	138 (n/c)	802 (n/c)	802
Downstream	0				
Spokane Arm	5	4 ($\pm$ 5)	0 - 10	734 ($\pm$ 12)	720 - 746
1999					
Upstream	0				
Downstream	0				
Spokane Arm	3	2 ($\pm$ 2)	1 - 5	350 ($\pm$ 36)	328 - 392
2000					
Upstream	0				
Downstream	0				
Spokane Arm	3	20 ($\pm$ 13)	6 - 30	27 ($\pm$ 13)	12 - 38
Grand Total	13	18 ($\pm$ 37)	0 - 138	517 ($\pm$ 352)	12 - 1,115

Table 3. The number of walleye marked on the spawning run that were recaptured within specified distances from the mark location in Lake Roosevelt, 2000.

Mark Year	Number of Recaptures with Distance (km) from Mark Location							Total
	0 - 24.9	25 - 49.9	50 - 74.5	75 - 99.9	100 - 149.9	150 - 199.9	$\geq$ 200	
1997	1							1
1998	5				1			6
1999	3							3
2000	1	2						3
Grand Total	10	2	0	0	1	0	0	13

Table 4. Recapture locations, in relation to mark location, of walleye marked during the spawn of 1997-2000 and recaptured in 2000.

Mark	Recapture Location																			Total
	RW	1	2	SP	3	H	4	S1	S2	S3	5	6	7	8	9	K	10	NP	BC	
1997																				
S1																				
S2																				
S3																				
1998																				
S1																				
S2																				
S3																				
1999																				
S1																				
S2																				
S3																				
2000																				
S1																				
S2																				
S3																				
Total																				

Sixty-three walleye recovered were marked during the summer/fall (Table 5). Most walleye marked during the summer/fall were recaptured within 24.9 km of their original marking location (n=51; 81%; Table 6). Four fish were marked in the Kettle Falls area and recovered in subsequent years in the Spokane River during the spawning run (Table 7). A walleye was marked during the 2000 Governor's Cup Tournament and recaptured 52 days later at Waneta Dam (71 km upstream). An angler captured a walleye on July 9th, 2000 at the mouth of the Okanogan River (173 km downstream) that was marked just north of the Spokane River Confluence on July 16th, 1998.

Table 5. Mean distances of recaptured walleye marked in the summer/fall ($\pm$ standard deviation) and the direction of movement, 2000.

Marking Year	n	Mean Distance (km)	Range (km)	Mean Time (days)	Range (days)
1997					
Upstream	1	21 (n/c)	21	1,099 (n/c)	1,099
Downstream	0				
No Movement	0				
1998					
Upstream	3	14 ($\pm$ 13)	1 - 28	753 ($\pm$ 31)	734 - 789
Downstream	6	62 ($\pm$ 74)	5 - 173	721 ($\pm$ 30)	660 - 738
No Movement	1	0 ($\pm$ 0)	0	683 ($\pm$ NA)	683
1999					
Upstream	10	11 ($\pm$ 10)	2 - 35	368 ($\pm$ 47)	292 - 436
Downstream	26	30 ($\pm$ 44)	1 - 155	361 ($\pm$ 38)	257 - 457
No Movement	2	0 ($\pm$ 0)	0	206 ($\pm$ 16)	285 - 307
2000					
Upstream	7	18 ($\pm$ 24)	3 - 71	29 ($\pm$ 16)	15 - 52
Downstream	4	9 ($\pm$ 7)	2 - 16	24 ($\pm$ 18)	15 - 50
No Movement	3	0 ($\pm$ 0)	0	22 ($\pm$ 13)	13 - 37
Grand Total	63	23 ($\pm$ 40)	0 - 173	355 ($\pm$ 239)	13 - 1,099

Table 6. The number of walleye marked in the summer/fall that were recaptured within specified distances from the mark location in Lake Roosevelt, 2000.

Mark Year	Number of Recaptures with Distance (km) from Mark Location							Total
	0 - 24.9	25 - 49.9	50 - 74.5	75 - 99.9	100 - 149.9	150 - 199.9	$\geq$ 200	
1997	1							1
1998	6	2			1	1		10
1999	31	3		1	2	1		38
2000	13		1					14
Grand Total	51	4	1	1	3	2	0	63

Table 7. Recapture locations, in relation to mark location, of walleye marked during the summer and fall of 1997-1998 and recaptured in 2000.

Recapture Location													Recapture Location												
<i>Marked in 1997</i>													<i>Marked in 1998</i>												
Loc.	H	S1	S2	S3	5	6	7	8	9	10	K	Total	H	S1	S2	S3	5	6	7	8	9	10	K	Total	
H																									
S1																									
S2																									
S3																	1							1	
5																									
6																									
7																									
8																				1	1		1	3	
9																	1				1		1	2	
10																				1	1			2	
K																									
Total												0					2		2	3		1		8	

Table 8. Recapture locations, in relation to mark location, of walleye marked during the summer and fall of 1999-2000 and recaptured in 2000.

Recapture Location													Recapture Location												
Marked in 1999													Marked in 2000												
Loc.	H	S1	S2	S3	5	6	7	8	9	10	K	Total	H	S1	S2	S3	5	6	7	8	9	10	K	Total	
H	3											3	1											1	
S1																									
S2			2									2													
S3																									
5																									
6																									
7																				1				1	
8		1					1	2		1	2	7								5	2		1	8	
9				1			1	7	6		1	16								1	1			2	
10	1			1				3	3	2		10									1			1	
K																									
Total	4	1	2	2			2	12	9	3	3	38	1							7	4		1	13	

Two walleye were recaptured on multiple occasions (Table 4). One fish was marked during the spawning run in 1998, recaptured on the 2000 spawning run, and then recaptured again during the Kettle Falls Governor's Walleye Tournament in 2000. The second walleye was marked during the 1999 Kettle Falls Governor's Cup Walleye Tournament, recaptured during the 2000 Governor's Cup Walleye Tournament, and the recaptured again in the Kettle Falls area in September 2000. One walleye not included in the analysis was marked in British Columbia by RL&L Resource Consultants, and recovered in the Spokane River on the spawning run.

2001 Recoveries

Twenty-three walleye were recovered before July 1st, 2001 and used for movement analysis in 2001 (Table 9). Similar to 2000, the majority (82%, n = 18) of walleye recovered were marked during the summer/fall were recaptured within 24.9 km of their original marking location (Table 10). A walleye marked in the Spokane River during August 2000 and was recaptured 109 km north in the Colville River during the 2001 Kettle Falls Governor's Cup Walleye Tournament. Walleye marked during the summer/fall were generally recaptured near their marking location (Tables 11 and 12).

Table 9. Mean distances ($\pm$ standard deviation) and the direction of movement of walleye marked and recaptured during the summer/fall, 2001.

Marking Year	n	Mean Distance (km)	Range (km)	Mean Time (days)	Range (days)
1997					
Upstream	0				
Downstream	0				
No Movement	0				
1998					
Upstream	0				
Downstream	1	24	24	1,100	1,100
No Movement	0				
1999					
Upstream					
Downstream	5	23 ($\pm$ 18)	2 - 46	719 ($\pm$ 36)	655 - 736
No Movement	0				
2000					
Upstream	5	32 ($\pm$ 43)	7 - 109	341 ($\pm$ 35)	298 - 371
Downstream	5	11 ($\pm$ 8)	4 - 20	350 ($\pm$ 24)	322 - 364
No Movement	6	0	0	350 ($\pm$ 24)	304 - 364
Grand Total	22	16 ($\pm$ 24)	0 - 109	467 ($\pm$ 231)	298 - 1,100

Table 10. The number of walleye marked in the summer/fall that were recaptured within specified distances from the mark location in Lake Roosevelt, 2001.

Mark Year	Number of Recaptures with Distance (km) from Mark Location							Total
	0 - 24.9	25 - 49.9	50 - 74.5	75 - 99.9	100 - 149.9	150 - 199.9	$\geq$ 200	
1997	0							0
1998	1							1
1999	2	2	1					5
2000	15				1			16
Grand Total	18	2	1	0	1	0	0	22

Table 11.Recapture locations, in relation to mark location, of walleye marked during the summer/fall of 1997 and 1998, recaptured during the 2001 Governors Cup Walleye Tournament.

Recapture Location											Recapture Location										
<i>Marked 1997</i>											<i>Marked 1998</i>										
Loc.	S1	S2	S3	5	6	7	8	9	10	Total	S1	S2	S3	5	6	7	8	9	10	Total	
S1																					
S2																					
S3																					
5																					
6																					
7																					
8																					
9																		1		1	
10																					
Total										0								1		1	

Table 12. Recapture locations, in relation to mark location, of walleye marked during the summer/fall of 1999 and 2000, recaptured during the 2001 Governors Cup Walleye Tournament.

Recapture Location											Recapture Location										
<i>Marked 1999</i>											<i>Marked 2000</i>										
Loc.	S1	S2	S3	5	6	7	8	9	10	Total	S1	S2	S3	5	6	7	8	9	10	Total	
S1																	1			1	
S2																					
S3																					
5																					
6																					
7																	1			1	
8						2				2							10	1		11	
9							1		1	2							2	1		3	
10							1			1											
Total						2	2		1	5							14	2		16	

Age, Growth, Mortality, and Condition

Walleye collected in Lake Roosevelt in 2000 ranged in age from 1 to 13 (Figure 2). An age length key was used to assign ages to walleye (Appendix B). Back-calculated TL's (mm) at the formation of each annulus were determined for data collected in 2000 (Table 13). Mean instantaneous and mean annual mortality were estimated at 0.71 and 49%, using the catch-curve (Figure 3). Mean K_{TL} of the 215 walleye measured and weighed in 2000 was 0.83 (SD = 0.13). Relative abundance, catch-per-unit-effort (fish/hr), and size range of all fish collected was summarized (Appendix C).

Figure 2. Age frequency distribution of walleye collected in Lake Roosevelt, 2000.

Table 13. Mean back-calculated total lengths ($\pm$ standard deviation) at the formation of each annulus for walleye collected in Lake Roosevelt during 2000.

Cohort	n	Mean Total Length (mm) at the Formation of Each Annulus												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1999	3	211 ($\pm$ 11)												
1998	27	187 ($\pm$ 15)	276 ($\pm$ 30)											
1997	24	167 ($\pm$ 17)	272 ($\pm$ 31)	347 ($\pm$ 27)										
1996	26	176 ($\pm$ 18)	268 ($\pm$ 22)	338 ($\pm$ 31)	393 ($\pm$ 31)									
1995	14	184 ($\pm$ 22)	274 ($\pm$ 29)	344 ($\pm$ 30)	409 ($\pm$ 33)	456 ($\pm$ 31)								
1994	21	189 ($\pm$ 25)	277 ($\pm$ 31)	352 ($\pm$ 45)	406 ($\pm$ 45)	458 ($\pm$ 39)	496 ($\pm$ 38)							
1993	14	192 ($\pm$ 20)	272 ($\pm$ 23)	343 ($\pm$ 27)	415 ($\pm$ 27)	472 ($\pm$ 31)	517 ($\pm$ 32)	551 ($\pm$ 36)						
1992	2	188 ($\pm$ 4)	275 ($\pm$ 43)	341 ($\pm$ 52)	412 ($\pm$ 45)	480 ($\pm$ 26)	517 ($\pm$ 24)	560 ($\pm$ 32)	598 ($\pm$ 24)					
1991	3	171 ($\pm$ 17)	246 ($\pm$ 21)	322 ($\pm$ 48)	393 ($\pm$ 58)	452 ($\pm$ 69)	502 ($\pm$ 84)	559 ($\pm$ 67)	593 ($\pm$ 71)	621 ($\pm$ 67)				
1990	2	197 ($\pm$ 39)	304 ($\pm$ 38)	379 ($\pm$ 22)	454 ($\pm$ 6)	518 ($\pm$ 5)	600 ($\pm$ 11)	654 ($\pm$ 16)	700 ($\pm$ 22)	733 ($\pm$ 37)	779 ($\pm$ 53)			
1989	1	204 (nc)	301 (nc)	410 (nc)	484 (nc)	518 (nc)	570 (nc)	598 (nc)	633 (nc)	684 (nc)	718 (nc)	764 (nc)	799 (nc)	
1988	1	251(nc)	319 (nc)	380 (nc)	427 (nc)	461 (nc)	502 (nc)	556 (nc)	623 (nc)	657 (nc)	711 (nc)	752 (nc)	779 (nc)	806 (nc)
Grand Mean	138	183 ($\pm$ 22)	273 ($\pm$ 28)	346 ($\pm$ 34)	406 ($\pm$ 37)	464 ($\pm$ 37)	510 ($\pm$ 44)	564 ($\pm$ 46)	626 ($\pm$ 58)	667 ($\pm$ 65)	747 ($\pm$ 48)	758 ($\pm$ 9)	789 ($\pm$ 14)	806 (nc)
Mean Annual Growth		183 ($\pm$ 22)	91 ($\pm$ 24)	73 ($\pm$ 21)	61 ($\pm$ 18)	53 ($\pm$ 17)	43 ($\pm$ 14)	41 ($\pm$ 14)	41 ($\pm$ 13)	34 ($\pm$ 11)	45 ($\pm$ 12)	43 ($\pm$ 4)	31 ($\pm$ 5)	27 (nc)

nc = not calculable

Figure 3. Catch-curve of walleye collected in Lake Roosevelt in 2000 and the regression line that described the descending arm.

Discussion

Walleye migratory spawning behaviors have been documented in the Midwest (Crowe 1962, Olson and Scidmore 1962, Ellis and Giles 1965, Jennings et al. 1996, Madenjian et al. 1996). Walleye are known to migrate up rivers and spawn in fast flowing water as well as remain in lakes and spawn in rocky shoals (Jennings et al. 1996). Boat electrofishing surveys conducted during the spring of 1997 and 1998 throughout Lake Roosevelt indicated the Spokane River, near Little Falls Dam, was the only walleye spawning area in reservoir (McLellan et al. 1999, 2002).

Beckman (1985) reported mature walleye at Gifford and the Sanpoil River, however we did not collect any mature walleye at either location during the spawning period. Boat electrofishing in the Kettle River was dangerous during the spring runoff, therefore it was not sampled and could not be excluded as a possible spawning area. Young of the year walleye were captured in the Spokane Arm during the summer months

and not collected in the Kettle River during the summer months. Future sampling should be conducted to determine if the Kettle River is a walleye spawning area.

Tagging studies in Lake Roosevelt documented walleye that migrate into the Spokane River in late April and early May to spawn. After spawning, some of these walleye disperse rapidly throughout the reservoir while others remain in the Spokane River (Beckman et al. 1985, McLellan et al. 1998, 1999, 2002). Portions of fish remain in the Spokane River, while the majority of walleye that leave tend to migrate north towards Kettle Falls (Nigro et al. 1982; Beckman et al. 1985; Hall et al. 1985; Peone et al. 1990; Griffith and Scholz 1991; McLellan et al. 1998, 1999, 2002). After dispersal, walleye appear to set up summer home ranges (SHR; Beckman et al. 1985, Hall et al. 1985, McLellan et al. 1998, 1999, 2002). Sixty-three walleye originally marked in the summer/fall during their SHR were recaptured in 2000, of which the majority were within 25 km of their original mark ($n = 51$; 81%). The results reflect similar patterns found in walleye recaptured between 1997 and 1998, where 384 walleye were recaptured in which 80% were recaptured within 25 km of their original mark ($n = 384$; McLellan et al. 2002). Thirty-nine of the recaptured walleye were collected over one year after they were marked.

Thirteen walleye marked on the spawning run were recaptured in 2000. The majority were recaptured within 25 km of their original mark location ($n = 10$; 77%). Although the sample size was small, the results were similar to the 1997-1999, results where 63% of 104 walleye ($n = 66$) marked on the spawning run were recaptured within 25 km of their original mark location (McLellan et al. 2002). Nine of the 10 walleye were captured within 25 km over a year after they were marked, which indicated they either left the Spokane River and returned to similar locations to spawn, or the walleye never left. The tagging data was not telemetry data, however multiple recaptures indicated that a portion of walleye leave the Spokane River and distribute throughout the Columbia River. Catch-per-unit effort (CPUE) data between 1997 and 2000 also indicated walleye left the spawning area in the Spokane River, near Little Falls, because CPUE (fish/hr) declined after the spawning season (Figure 4).

Figure 4. Catch-per-unit-effort (CPUE) of walleye collected in the Spokane River between 1998 and 2000.

The migratory behavior north has been supported by the 27 walleye recovered in British Columbia, Canada between 1997 and 2001. Areas walleye were recovered in include Trail ($n = 4$), Brilliant Dam ($n = 1$), Waneta Dam ($n = 7$), Hugh Keenlyside Dam ($n = 7$), U.S.- Canadian Border ($n = 6$), and Castlegar ($n = 2$). Seven of the walleye were marked on the spawning run in the Spokane Arm, 1997-2000, while the others were marked at various locations throughout the reservoir including the Sanpoil River, Hawk Creek, and the Kettle Falls area (McLellan et al. 2002). However, four walleye were recovered below Grand Coulee Dam indicating entrainment or emigration. Walleye were recovered from the Nespelem River ($n = 1$), Rufus Woods Reservoir ($n = 1$), Okanogan River ($n = 1$), and Chelan Falls ($n = 1$).

Collecting and marking walleye during the Governor's Cup Walleye Tournament in Kettle Falls has allowed for a large amount of effort in the collection of walleye one month after spawning to verify the migration patterns of some walleye. For example, a walleye was marked on June 2nd, 1998 at the mouth of the Kettle River, recaptured May

25th, 2000 below Little Falls dam during the spawning run, and then recaptured by an angler two months later (July 30th, 2000) two kilometers up the Kettle River.

The tagging data collected during 2000 and 2001 further verified the 1981, 1982, (Beckman et al. 1985) and 1997-1999 (McLellan et al. 2001) movement trends of walleye in Lake Roosevelt. A large walleye spawning congregation occurs in April and May near Little Falls Dam on the Spokane River. After spawning, walleye disperse throughout the reservoir with the majority remaining in the Spokane River, a few migrating south, and a large number moving north. Large numbers of walleye set up SHR in the Kettle Falls area by late June, which coincided with the Kettle Falls Governor's Walleye Tournament each year. Some walleye move as far north as Canada below Brilliant, Keenlyside and Waneta Dams.

The age-frequency distribution of walleye collected in Lake Roosevelt in 2000 was similar to 1980-83, and 1998 (Figure 5). Unlike 1980-83, 1999 and 2000, a large amount of sampling was conducted during the summers of 1997 and 1998 resulting in relatively large number of young walleye (age 1) collected. In 1980-83 and 1998, there were more old walleye collected, which was attributed to efficient sampling years (based on number collected) on the spawning run. The difference in sampling on the spawning runs in 1997 and 1999 were related to the water flows. In 1997 there were extremely high flows in the Spokane Arm that made sampling inefficient and dangerous. Despite average flows in 1999, the reservoir drawdown was greater than average resulting very lower water depths in the upper Spokane Arm which limited sampling. During 1998, flows and the reservoir drawdown were average, which resulted in efficient sampling. The catch-per-unit-effort for walleye collected during the spawning run (April and May) in the Spokane River reflected the differences in water years (Table 14).

Back-calculated total lengths at age of Lake Roosevelt walleye collected in 2000 were relatively similar to those of walleye collected in 1988-90 and 1997-99 as well as the average values from walleye collected in 16 lakes and rivers in the U.S. and Canada (Peone et al. 1990; Griffith and Scholz 1990; McLellan 1998; McLellan et al. 1998, 1999, 2002; Table 15). The similarities were most apparent through age five. Variation increased with older fish, which was probably attributed to small sample sizes.

Walleye mortality rates appeared to be stable and average when compared to other walleye producing waters (Table 16). Walleye condition (K_{TL}) was slightly higher in 1999 and 2000, when compared to 1997 and 1998, but lower when compared to condition factors in 1980-83, 1988, 1989, and 1990 (Table 17). The K_{TL} 's of walleye from Lake Roosevelt were slightly below average when compared to other walleye producing waters (Table 17).

Figure 5. Comparison of age frequency distributions of walleye collected in Lake Roosevelt in 1980-83, 1997, 1998, 1999, and 2000.

Table 14. Catch-per-unit-effort (CPUE) of walleye collected during April and May in the Spokane River during the spawning run (April and May).

Year	n	Effort (hrs.)	CPUE (fish/hr)	Reference
1997	110	5.36	20.52	McLellan et al. 1998
1998	1471	27.23	54.02	McLellan et al. 1999
1999	256	12.92	19.81	McLellan et al. 2002
2000	109	5.60	19.46	Current study

Table 15. Comparison of mean back-calculated total lengths (mm) at annulus formation between an average from 16 lakes and rivers in the United States and British Columbia (average) and Lake Roosevelt (FDR), Washington.

Location	n	Mean Total Length (mm) at Annulus Formation												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Average ^a		177	280	368	431	483	530	554	548	675	675	728		
FDR, 1980-83 ^b	3,248	189	307	385	450	515	569	629	668	702	742	740	761	780
FDR, 1988 ^a	369	204	273	348	410	470	532	590	635	688	689			
FDR, 1989 ^a	467	210	282	351	418	493	571	603						
FDR, 1990 ^c	311	184	295	380	439	511	597	651	698	734				
FDR, 1997 ^d	2,355	172	279	363	424	478	535	617	662					
FDR, 1998 ^e	320	179	290	364	427	481	530	576	616	667	717	748	801	829
FDR, 1999 ^f	171	188	301	375	427	476	518	578	643					
FDR, 2000^g	138	183	273	346	406	464	510	564	626	667	747	758	789	806

^aPeone et al. (1990)

^bBeckman et al. (1985)

^cGriffith and Scholz (1990)

^dMcLellan et al. (1998)

^eMcLellan et al. (1999)

^fMcLellan et al. (2001)

^gCurrent study

Table 16. Comparison of mean annual mortality rates (%) between Lake Roosevelt and other walleye producing waters.

Location	Mean Annual Mortality (%)	Source
20 NW Wisconsin Lakes	47	Klingbiel (1986) ^a
32 N. Cent. Wisconsin Lakes	48	Klingbiel (1986) ^a
Leech Lake, MN	37	Schupp (1972) ^a
Boyd Lake, CO	48	Weber (1976) ^a
Lake of Woods, MN, 1980-84	65	Payer et al. (1987) ^a
W. Blue Lake, Ontario	80	Kelso and Ward (1977) ^a
Manistee Lake, MI (ages 3 to 7)	56	Laarman (1981) ^a
Lake Oneida, NY, 1960-74	34	Forney (1977)
Lake Roosevelt, 1980-83	52	Beckman et al. (1985)
Lake Roosevelt, 1997	48	McLellan et al. (1998)
Lake Roosevelt, 1998	46	McLellan et al. (1999)
Lake Roosevelt, 1999	46	McLellan et al. (2001)
Lake Roosevelt, 2000	49	Current study

^a Cited in Carlander (1997).

Table 17. Comparison of mean walleye condition factors (K_{TL}) and standard deviation (SD) between Lake Roosevelt and other walleye producing waters.

Location	n	Mean K_{TL} ($\pm$ SD)	Source
Black Hawk Lake, IA	74	0.89	McWilliams (1983) ^a
Lake Sakakawea, ND	236	0.86	Wahtola et al. (1972) ^a
Red Rock Reservoir, IA	41	0.92	Paragamian (1975) ^a
Lake Erie, 1983	663	0.84	McWilliams (1984) ^a
Lake Roosevelt, 1980-83	2,477	0.87	Beckman et al. (1985)
Lake Roosevelt, 1988	360	0.92 ($\pm$ 0.20)	Peone et al. (1990)
Lake Roosevelt, 1989	521	0.84 ($\pm$ 0.21)	Peone et al. (1990)
Lake Roosevelt, 1990	333	0.88	Griffith and Scholz (1990)
Lake Roosevelt, 1997	1,553	0.81 ($\pm$ 0.16)	McLellan et al. (1998)
Lake Roosevelt, 1998	4,071	0.82 ($\pm$ 0.17)	McLellan et al. (1999)
Lake Roosevelt, 1999	343	0.83 ($\pm$ 0.13)	McLellan et al. (2001)
Lake Roosevelt, 2000	215	0.83 ($\pm$ 0.13)	Current study

^a Cited in Carlander (1997).

Literature Cited

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in Murphy, B. R. and D.W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Arnason, A.N. and K.H. Mills. 1981. Bias and loss of precision due to tag loss in Jolly-Seber estimates for mark-recapture experiments. Canadian Journal of Fisheries and Aquatic Sciences 38:1077-1095.
- Baldwin, C., M. Polacek, and S. Bonar. 1999. Washington Department of Fish and Wildlife Lake Roosevelt Pelagic Fish Study, 1998. Annual Report 1998. Submitted to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Portland, OR 97283. Contract No. 94BI32148. 67 pp.
- Beckman, L.G., J.F. Novotny, W.R. Persons, and T.T. Terrell. 1985. Assessment of the fisheries and limnology in Lake F.D. Roosevelt 1980-1983. U.S. Fish and Wildlife Service. Final Report to U.S. Bureau of Reclamation. Contract No. WPRS-0-07-10-X0216; FWS-14-06-009-904, May 1985.
- Carlander, K.D. 1983. Standard intercepts for calculating length from scale measurements for some Centrarchid and Percid fishes. Transactions of the American Fisheries Society 111:332-336.
- Carlander, K.D. 1997. Handbook of freshwater fishery biology. Volume 3. Iowa State University Press, Ames, Iowa.
- Cichosz, T.A., J.P. Shields, and K.D. Underwood. 1999. Lake Roosevelt monitoring/data collection program. 1997 annual report. Bonneville Power Administration, Portland, Oregon. Project No. 94-043.
- Crowe, W.R. 1962. Homing Behavior in Walleyes. Transactions of the American Fisheries Society. 91(4):350-354.
- Devries, D.R. and R.V. Frie. 1996. Determination of age and growth. Pages 483-512 in B.R. Murphy and D.W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Ellis, D.V., and M.A. Giles. 1965. The Spawning Behavior of the Walleye, *Stizostedion vitreum* (Mitchell). Transactions of the American Fisheries Society. 94(4):358-362.

- Forney, J.L. 1976. Year-class formation in the walleye (*Stizostedion vitreum vitreum*) population of Oneida Lake, New York, 1966-73. *Journal of the Fisheries Research Board of Canada* 33:783-792.
- Griffith, J.R. and A.T. Scholz. 1990. Lake Roosevelt fisheries monitoring program, 1990 annual report. U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, OR. DOE/BP-91819-3. September 1991. 218 pp.
- Guy, C.S., H.L. Blankenship, and L.A. Nielsen. 1996. Tagging and marking. Pages 353-383 in Murphy, B. R. and D.W. Willis, editors. *Fisheries techniques*, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Hall, J.A., W.R. Persons, and L.G. Beckman. 1985. Post-spawning movement and summer distribution of walleye in Lake Franklin D. Roosevelt, Washington. Appendix 30-1 in L.G. Beckman, J.F. Novotny, W.R. Persons, and T.T. Terrell. *Assessment of the fisheries and limnology in Lake F.D. Roosevelt 1980-1983*. U.S. Fish and Wildlife Service. Final Report to U.S. Bureau of Reclamation. Contract No. WPRS-0-07-10-X0216; FWS-14-06-009-904, May 1985.
- Jennings, M.J., J.E. Clauseen, and D.P. Phillip. 1996. Evidence of Heritable Preference for spawning habitat between two walleye populations. *Transactions of the American Fisheries Society*. 125: 978-982.
- Madenjian, C.P., J.T. Tyson, R.L. Knight, M.W. Kershner, and M.J. Hansen. 1996. First-year growth, recruitment, and maturity of walleyes in Western Lake Erie. *Transactions of the American Fisheries Society*. 125:820-830.
- McLellan, J.G., A.T. Scholz, H.J. Moffatt (McLellan), and B.J. Tucker. 1998. Walleye (*Stizostedion vitreum vitreum*) population dynamics in Lake Roosevelt, Washington, 1997. 1997 Annual Report. Submitted to the Lake Roosevelt Monitoring Program, Spokane Tribe of Indians, Wellpinit, WA.
- McLellan, J.G., H.J. Moffatt (McLellan), and A.T. Scholz. 1999. Assessment of the Lake Roosevelt walleye population, 1998. 1998 Annual Report. Submitted to the Lake Roosevelt Monitoring Program, Spokane Tribe of Indians, Wellpinit, WA.
- McLellan, J.G., H.J. McLellan, and A.T. Scholz. 2002. Assessment of the Lake Roosevelt Walleye Population: A compilation of data from 1997-1999. 1999 Annual Report. Eastern Washington University, Department of Biology, Fisheries Research Center, Cheney, WA. *Contributions to Fisheries Management in Eastern Washington State*, No. 3.
- Nigro, A.A., T.T. Terrell, and L.G. Beckman. 1982. Assessment of the limnology and fisheries in Lake F.D. Roosevelt, 1981 annual report. U.S. Fish and Wildlife

- Service. Report to U.S. Bureau of Reclamation. Contract No. WPRS-0-07-10-X0216; FWS-14-06-009-904.
- Olson, D.E. and W.J. Scidmore. 1962. Homing Behavior of spawning walleyes. Transactions of the American Fisheries Society. 91(4):355-361.
- Peone, T., A.T. Scholz, J.R. Griffith, S. Graves, and M.G. Thatcher. 1990. Lake Roosevelt Fisheries Monitoring Program. Annual Report, 1988-89. U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, OR. DOE/BP-91819-1. May 1991. 234 pp.
- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada, Bulletin 191.

Appendix A

Table A1. Recaptures, time (days) since original mark, and distance traveled (km) of recovered Lake Roosevelt walleye during 2000 used for analysis. Multiple recaptures are in bold. Section numbers correspond to Figure 1.

Tag color/#	Mark Date	Mark Pass	Mark Site #	Mark Lat	Mark Long	Mark Sec	Mark TL (mm)	Mark Crew	Recap Date	Recap Pass	Recap Loc	Recap Lat	Recap Long	Recap Sec	Recap TL (mm)	Recap Crew	Recap R.C.	Time (Days)	Distance (km)
OR 55989	05/13/1997	97	SE12	47.79115	118.06206	S 2	436	EWU	06/01/2000	00	S94	47.82911	117.91966	S 3	559	Angler	K	1115	13.72
OR 57972	06/21/1997	97	E51	48.57372	118.0877	8	360	GCWT97	06/24/2000	00	E59	48.69991	118.02054	10	481	GCWT00	G	1099	20.78
OR 56751	04/15/1998	98	S87	47.83223	117.9672	S 3	466	EWU	06/25/2000	00	333	48.63149	118.10724	9	480	GCWT00	G	802	138.31
OR 56072	04/17/1998	98	S87	47.83223	117.9672	S 3	464	EWU	04/10/2000	00	S82	47.8356	117.98827	S 3	529	EWU	G	724	1.62
OR 58723	04/18/1998	98	S82	47.8356	117.98827	S 3	465	EWU	04/07/2000	00	S82	47.8356	117.98827	S 3	492	EWU	G	720	0
OR 56158	04/21/1998	98	S82	47.8356	117.98827	S 3	492	EWU	05/06/2000	00	S67	47.80615	118.08336	S 2	561	EWU	G	746	9.98
OR 59313	04/25/1998	98	S82	47.8356	117.98827	S 3	419	EWU	05/06/2000	00	S66	47.80601	118.07653	S 2	478	SPAD00	G	742	9.54
OR 56837	04/29/1998	98	S87	47.83223	117.9672	S 3	394	EWU	05/06/2000	00	S57	47.83671	118.12577	S 2	418	SPAD00	G	738	141.97
OR 56837	04/29/1998	98	S87	47.83223	117.9672	S 3	394	EWU	06/25/2000	00	370	48.75207	118.06225	10	440	GCWT00	G	788	155.75
OR 54464	06/02/1998	98	340	48.67271	118.1138	9	300	EWU	07/30/2000	00	K2	48.67684	118.11836	K	381	Angler	K	789	0.63
OR 48645	06/20/1998	98	E53	48.59901	118.12324	9	344	GCWT98	06/27/2000	00	E51	48.57372	118.0877	8	455	EWU	G	738	4.95
OR 52990	06/20/1998	98	E59	48.69991	118.02054	10	411	GCWT98	06/24/2000	00	E52	48.5835	118.13749	8	448	GCWT00	G	735	17.63
OR 52995	06/20/1998	98	E59	48.69991	118.02054	10	389	GCWT98	06/24/2000	00	275	48.39294	118.17453	7	431	GCWT00	G	735	25.09
OR 53006	06/20/1998	98	E57	48.66674	118.06563	9	426	GCWT98	04/10/2000	00	S82	47.8356	117.98827	S 3	449	EWU	G	660	140.72
OR 53754	06/20/1998	98	298	48.49919	118.18734	8	412	GCWT98	06/24/2000	00	275	48.39294	118.17453	7	511	GCWT00	G	735	13.4
OR 53860	06/20/1998	98	298	48.49919	118.18734	8	514	GCWT98	06/24/2000	00	E59	48.69991	118.02054	10	572	GCWT00	G	735	27.6
OR 48989	06/20/1998	98	333	48.63149	118.10724	9	403	GCWT98	06/24/2001	01	285	48.4345	118.19914	8	514.35	GCWT01	G	1100	24.31
OR 54223	06/21/1998	98	286	48.44863	118.22257	8	421	GCWT98	06/24/2000	00	314	48.55976	118.15138	8	463	GCWT00	G	734	14.54
OR 48030	07/16/1998	98	E31	47.95306	118.34502	4	353	EWU	07/09/2000	00	Okanogan River				495	Angler	K	724	172.61
Y 46783	07/20/1998	98	SE14	47.82836	117.91804	S 3	325	STOI	06/02/2000	00	SE14	47.82836	117.91804	S 3	381	Angler	K	683	0
OR 091021	05/06/1999	99	S84	47.83416	117.97443	S 3	538	EWU	06/01/2000	00	S94	47.82911	117.91966	S 3	400	Angler	K	392	4.64
OR 091138	05/16/1999	99	S84	47.83416	117.97443	S 3	545	EWU	04/10/2000	00	S82	47.8356	117.98827	S 3	572	EWU	G	330	1.05
OR 091182	05/18/1999	99	S84	47.83416	117.97443	S 3	539	EWU	04/10/2000	00	S82	47.8356	117.98827	S 3	552	EWU	G	328	1.05
OR 092139	06/19/1999	99	333	48.63149	118.10724	9	370	GCWT99	08/08/2000	00	285	48.4345	118.19914	8	394	Angler	K	416	24.31
OR 092187	06/19/1999	99	311	48.54154	118.13855	8	362	GCWT99	06/24/2000	00	275	48.39294	118.17453	7	395	GCWT00	G	371	19.04

Table A1. Continued

Tag color/#	Mark Date	Mark Pass	Mark Site #	Mark Lat	Mark Long	Mark Sec	Mark TL (mm)	Mark Crew	Recap Date	Recap Pass	Recap Loc	Recap Lat	Recap Long	Recap Sec	Recap TL (mm)	Recap Crew	Recap R.C.	Time (Days)	Distance (km)
OR 092193	06/19/1999	99	E51	48.57372	118.0877	8	441	GCWT99	05/28/2000	00	K6	48.69666	118.12251	K	470	Angler	K	344	17.26
OR 092499	06/19/1999	99	363	48.69661	118.01764	10	471	GCWT99	06/24/2000	00	370	48.75207	118.06225	10	474	GCWT00	G	371	7.21
OR 092508	06/19/1999	99	363	48.69661	118.01764	10	358	GCWT99	06/01/2000	00	S94	47.82911	117.91966	S 3	559	Angler	K	348	154.97
OR 092509	06/19/1999	99	363	48.69661	118.01764	10	381	GCWT99	06/21/2000	00	333	48.63149	118.10724	9	400	Angler	K	368	11.12
OR 092536	06/19/1999	99	363	48.69661	118.01764	10	391	GCWT99	06/16/2000	00	333	48.63149	118.10724	9	0	Angler	K	363	11.37
OR 092540	06/19/1999	99	363	48.69661	118.01764	10	414	GCWT99	06/03/2000	00	318	48.57681	118.13894	8	432	Angler	G	350	19.03
OR 092559	06/19/1999	99	363	48.69661	118.01764	10	445	GCWT99	06/24/2000	00	E52	48.5835	118.13749	8	452	GCWT00	G	371	16.68
OR 092565	06/19/1999	99	363	48.69661	118.01764	10	368	GCWT99	06/25/2000	00	E53	48.59901	118.12324	9	417	GCWT00	G	372	15.61
OR 092578	06/19/1999	99	363	48.69661	118.01764	10	367	GCWT99	06/25/2000	00	HE2	47.8144	118.32616	H	403	Angler	K	372	118.44
OR 092581	06/19/1999	99	363	48.69661	118.01764	10	420	GCWT99	06/24/2000	00	E59	48.69991	118.02054	10	430	GCWT00	G	371	0.41
OR 092757	06/19/1999	99	333	48.63149	118.10724	9	455	GCWT99	07/25/2000	00	K2	48.67684	118.11836	K	533	Angler	K	402	5.33
OR 092785	06/19/1999	99	333	48.63149	118.10724	9	542	GCWT99	06/17/2000	00	275	48.39294	118.17453	7	533	GCPF00	G	364	30
OR 092833	06/19/1999	99	333	48.63149	118.10724	9	401	GCWT99	06/24/2000	00	E52	48.5835	118.13749	8	397	GCWT00	G	371	6.1
OR 092887	06/19/1999	99	333	48.63149	118.10724	9	381	GCWT99	06/25/2000	00	E53	48.59901	118.12324	9	410	GCWT00	G	372	4.1
OR 095455	06/19/1999	99	333	48.63149	118.10724	9	390	GCWT99	06/25/2000	00	314	48.55976	118.15138	8	438	GCWT00	G	372	10.01
OR 119556	06/19/1999	99	298	48.49919	118.18734	8	368	GCWT99	06/24/2000	00	E52	48.5835	118.13749	8	437	GCWT00	G	371	11.97
OR 49358	06/19/1999	99	333	48.63149	118.10724	9	423	GCWT99	06/25/2000	00	E51	48.57372	118.0877	8	450	GCWT00	G	372	8.73
OR 092146	06/19/1999	99	333	48.63149	118.10724	9	433	GCWT99	06/24/2001	01	318	48.57681	118.13894	8	495.3	GCWT01	G	736	7.61
OR 092581	06/19/1999	99	363	48.69661	118.01764	9	420	GCWT99	06/23/2001	01	E 58	48.68897	118.03827	10	457.2	GCWT01	G	735	1.75
OR 092204	06/19/1999	99	E 51	48.57372	118.0877	8	395	GCWT99	06/23/2001	01	267	48.36056	118.16387	7		GCWT01	G	735	29.09
OR 092026	06/20/1999	99	333	48.63149	118.10724	9	468	GCWT99	06/25/2000	00	E53	48.59901	118.12324	9	507	GCWT00	G	371	4.1
OR 092237	06/20/1999	99	E51	48.57372	118.0877	8	497	GCWT99	08/29/2000	00	K2	48.67684	118.11836	K	533	Angler	K	436	11.6
OR 092652	06/20/1999	99	E53	48.59901	118.12324	9	398	GCWT99	06/25/2000	00	314	48.55976	118.15138	8	416	GCWT00	G	371	5.66
OR 092653	06/20/1999	99	E53	48.59901	118.12324	9	368	GCWT99	06/24/2000	00	333	48.63149	118.10724	9	368	GCWT00	G	370	4.1
OR 119403	06/20/1999	99	345	48.64224	118.08169	9	383	GCWT99	06/17/2000	00	333	48.63149	118.10724	9	390	GCPF00	G	363	2.23
OR 119407	06/20/1999	99	345	48.64224	118.08169	9	375	GCWT99	06/27/2000	00	E51	48.57372	118.0877	8	393	EWU	G	373	11.74
OR 119442	06/20/1999	99	345	48.64224	118.08169	9	415	GCWT99	08/24/1999	99	255	48.30451	118.15177	7	402	Angler	K	65	10.03
OR 119936	06/20/1999	99	333	48.63149	118.10724	9	376	GCWT99	06/25/2000	00	311	48.54154	118.13855	8	402	GCWT00	G	371	11.51
OR 119952	06/20/1999	99	383	48.77318	118.0149	10	432	GCWT99	06/24/2000	00	E51	48.57372	118.0877	8	436	GCWT00	G	370	31.81
OR 119997	06/20/1999	99	383	48.77318	118.0149	10	427	GCWT99	06/24/2000	00	E52	48.5835	118.13749	8	449	GCWT00	G	370	27.25

Table A1. Continued

Tag color/#	Mark Date	Mark Pass	Mark Site #	Mark Lat	Mark Long	Mark Sec	Mark TL (mm)	Mark Crew	Recap Date	Recap Pass	Recap Loc	Recap Lat	Recap Long	Recap Sec	Recap TL (mm)	Recap Crew	Recap R.C.	Time (Days)	Distance (km)
OR 119997	06/20/1999	99	383	48.77318	118.0149	10	427	GCWT99	09/22/2000	00	298	48.49919	118.18734	8	483	Angler	G	460	38.43
OR 49276	06/20/1999	99	345	48.64224	118.08169	9	410	GCWT99	09/19/2000	00	333	48.63149	118.10724	9	546	Angler	K	457	2.16
OR 53691	06/20/1999	99	E57	48.66674	118.06563	9	371	GCWT99	04/10/2000	00	S82	47.8356	117.98827	S 3	398	EWU	G	295	140.72
OR 119994	06/20/1999	99	383	48.77318	118.0149	10	379	GCWT99	06/24/2001	01	285	48.4345	118.19914	8	476.25	GCWT01	G	735	45.9
OR 50360	07/29/1999	99	HE1	47.81875	118.34645	H	229	EWU	10/03/2000	00	HE2	47.8144	118.32616	H	372	EWU	G	432	1.94
OR 50382	07/29/1999	99	HE1	47.81875	118.34645	H	221	EWU	07/09/2000	00	HE2	47.8144	118.32616	H	330	Angler	K	346	1.94
OR 094877	08/16/1999	99	E51	48.57372	118.0877	8	335	EWU	06/22/2000	00	386	48.80491	118.01495	10	318	Angler	G	311	35
OR 094837	08/17/1999	99	HE2	47.8144	118.32616	H	348	EWU	05/28/2000	00	HE2	47.8144	118.32616	H	400	Angler	K	285	0
Y 39874	08/24/1999	99	SE11	47.79651	118.07663	S 2	251	EWU	06/01/2000	00	S45	47.87499	118.13901	S 2	330	Angler	K	282	11.21
OR 095919	09/07/1999	99	E54	48.61283	118.1327	9	384	EWU	06/25/2000	00	E57	48.66674	118.06563	9	394	Angler	K	292	8.82
OR 095925	09/07/1999	99	E52	48.5835	118.13749	8	470	EWU	08/06/2000	00	S10	47.9236	118.29061	S 1	521	Angler	G	334	96.06
OR 119287	09/07/1999	99	E49	48.53856	118.17107	8	253	EWU	07/10/2000	00	E49	48.53856	118.17107	8	295	EWU	G	307	0
OR 095923	09/07/1999	99	E 52	48.5835	118.13749	8	480	EWU	06/23/2001	01	267	48.36056	118.16387	7	552.45	GCWT01	G	655	28.55
Y 20441	09/20/1999	99	SE7	47.89176	118.14042	S 2	282	EWU	06/03/2000	00	S45	47.87499	118.13901	S 2	330	Angler	K	257	2.43
OR 117208	05/06/2000	0	S57	47.83671	118.12577	S 2	628	SPAD	06/05/2000	00	S2	47.90029	118.32803	S 1	584	Angler	K	30	25.15
Y 00439	05/06/2000	00	S67	47.80615	118.08336	S2	520	EWU	06/13/2000	00	SE1	47.89898	118.31456	S 1	533	Angler	K	38	29.55
Y 00057	05/25/2000	00	S82	47.8356	117.98827	S 3	370	EWU	06/06/2000	00	S94	47.82911	117.91966	S 3	381	Angler	K	12	5.7
OR 152752	06/17/2000	00	E 49	48.53856	118.17107	8	371	EWU	06/23/2001	01	318	48.57681	118.13894	8	431.8	GCWT01	G	371	7
OR 125179	06/24/2000	0	E53	48.59901	118.12324	9	396	GCWT00	08/14/2000	00	331	48.62273	118.11471	9	381	Angler	K	51	3.3
OR 151515	06/24/2000	0	E59	48.69991	118.02054	10	389	GCWT00	08/13/2000	00	358	48.70133	118.03648	9	400	Angler	K	50	1.74
OR 152289	06/24/2000	0	E51	48.57372	118.0877	8	463	GCWT00	07/20/2000	00	E53	48.59901	118.12324	9	381	Angler	K	26	4.8
OR 152300	06/24/2000	0	314	48.55976	118.15138	8	374	GCWT00	07/09/2000	00	331	48.62273	118.11471	9		Angler	K	15	8.65
OR 125188	06/24/2000	00	E 53	48.59901	118.12324	9	443	GCWT00	06/23/2001	01	E 51	48.57372	118.0877	8	482.6	GCWT01	G	364	4.95
OR 152290	06/24/2000	00	E 51	48.57372	118.0877	8	505	GCWT00	06/23/2001	01	E 51	48.57372	118.0877	8	508	GCWT01	G	364	0
OR 152806	06/24/2000	00	275	48.392943	118.17453	7	425	GCWT00	06/24/2001	01	318	48.57681	118.13894	8	457.2	GCWT01	G	365	22.96
OR 125893	06/25/2000	0	275	48.39294	118.17453	7	367	GCWT00	07/10/2000	00	290	48.46985	118.21513	8	368	Angler	K	15	9.46
OR 152216	06/25/2000	0	E51	48.57372	118.0877	8	477	GCWT00	07/21/2000	00	K14	48.73135	118.12203	K	483	Angler	G	26	21.25
OR 152236	06/25/2000	0	E53	48.59901	118.12324	9	429	GCWT00	07/10/2000	00	E51	48.57372	118.0877	8	455	EWU	G	15	4.95
OR 152376	06/25/2000	0	318	48.57681	118.13894	8	460	GCWT00	07/10/2000	00	290	48.46985	118.21513	8	457	Angler	G	15	14.93
OR 152387	06/25/2000	0	E51	48.57372	118.0877	8	365	GCWT00	07/10/2000	00	E51	48.57372	118.0877	8	362	EWU	G	15	0

Table A1. Continued

Tag color/#	Mark Date	Mark Pass	Mark Site #	Mark Lat	Mark Long	Mark Sec	Mark TL (mm)	Mark Crew	Recap Date	Recap Pass	Recap Loc	Recap Lat	Recap Long	Recap Sec	Recap TL (mm)	Recap Crew	Recap R.C.	Time (Days)	Distance (km)
OR 152401	06/25/2000	0	314	48.55976	118.15138	8	388	GCWT00	07/10/2000	00	E51	48.57372	118.0877	8	383	EWU	G	15	5.4
OR 152414	06/25/2000	0	E51	48.57372	118.0877	8	492	GCWT00	08/16/2000	00	Waneta Dam, BC				610	Angler	K	52	71.35
OR 152022	06/25/2000	00	E 53	48.59901	118.12324	9	436	GCWT00	06/23/2001	01	284	48.43919	118.22143	8	457.2	GCWT01	G	363	19.54
OR 152389	06/25/2000	00	E 51	48.57372	118.0877	8	365	GCWT00	06/23/2001	01	E 51	48.57372	118.0877	8	412.75	GCWT01	G	363	0
OR 152368	06/25/2000	00	311	48.54154	118.13855	8	423	GCWT00	06/23/2001	01	E 51	48.57372	118.0877	8	476.25	GCWT01	G	363	6.49
OR 152216	06/25/2000	00	E 51	48.57372	118.0877	8	477	GCWT00	05/01/2001	01	340	48.67271	118.1138	9	514.35	Angler	K	310	14.61
OR 125555	06/27/2000	0	E51	48.57372	118.0877	8	368	EWU	07/12/2000	00	290	48.46985	118.21513	8	368	Angler	K	15	16.24
OR 125811	06/27/2000	0	E49	48.53856	118.17107	8	389	EWU	07/10/2000	00	E49	48.53856	118.17107	8	415	EWU	G	13	0
OR 125574	06/27/2000	00	335	48.62439	118.10083	9	266	EWU	05/15/2001	01	E 53	48.59901	118.12324	9		Angler		322	5.61
OR 125741	06/27/2000	00	E 51	48.57372	118.0877	8	402	EWU	06/24/2001	01	285	48.4345	118.19914	8	469.9	GCWT01	G	362	19.64
OR 125732	06/27/2000	00	E 51	48.57372	118.0877	8	523	EWU	06/23/2001	01	318	48.57681	118.13894	8		GCWT01	G	361	3.93
GR 125873	06/27/2000	00	E 51	48.57372	118.0877	8	518	EWU	06/23/2001	01	E 51	48.57372	118.0877	8	558.8	GCWT01	G	361	0
OR 125587	06/27/2000	00	E 51	48.57372	118.0877	8	432	EWU	06/24/2001	01	E 51	48.57372	118.0877	8	469.9	GCWT01	G	362	0
OR 125558	06/27/2000	00	E 51	48.57372	118.0877	8	333	EWU	06/08/2001	01	E 51	48.57372	118.0877	8	387.35	Angler	K	346	0
OR 151945	08/23/2000	00	E 52	48.5835	118.13749	8	473	EWU	06/23/2001	01	E 52	48.5835	118.13749	8	495.3	GCWT01	G	304	0
OR 151920	08/27/2000	0	HE2	47.8144	118.32616	H	325	EWU	10/03/2000	00	HE2	47.8144	118.32616	H	362	EWU	G	37	0
OR 152618	08/29/2000	00	SE 4	47.91078	118.18513	S 1	180	EWU	06/23/2001	01	E 51	48.57372	118.0877	8	533.4	GCWT01	G	298	108.7

GCWT = Governor's Cup Walleye Tournament (followed by year).

GCPF = Governor's Cup Pre-fish (followed by year). Pre-fish occurred one week before the tournament.

EWU = Eastern Washington University.

STOI = Spokane Tribe of Indians.

SPAD = Spokane River angling day. Volunteers from the Spokane Walleye Club assisted in angling for walleye on the Spokane River during the spawning run.

Table A.2. Summary of recaptured walleye not used in analysis due to missing information or date. Section numbers correspond to Figure 1.

Tag	Mark	Mark	Mark	Mark	Mark	Mark	Mark	Mark	Recap	Recap	Recap	Recap	Recap	Recap	Recap	Recap	Recap	Time	Distance
color/#	Date	Pass	Site #	Lat	Long	Sec	(mm)	Crew	Date	Pass	Loc	Lat	Long	Sec	(mm)	Crew	R.C.	(Days)	(km)
OR 57972	06/21/1997	97	E51	48.57372	118.0877	8	360	GCWT97	08/19/2001	01	Keenlyside Dam				Canada	515	RL & L	G	1520
OR 57057	06/22/1997	97	E 53	48.59901	118.12324	9	381	GCWT97	06/23/2001	1						Angler	G	1462	
OR 55636	07/29/1997	97	S10	47.9236	118.29061	S1	228	EWU	No Data	00	No data				0	Angler	K		
OR 57329	08/21/1997	97	E43	48.15212	118.23539	6	283	EWU	No Data	00	No data					Angler	K		
OR 56955	10/01/1997	97	E52	48.5835	118.13749	8	606	EWU	06/21/2001	1	E51	48.57372	118.0877	8	730	Angler	K	1359	4.27
OR 56666	04/25/1998	98	S87	47.83223	117.9672	S 3	494	EWU	12/07/2001	01	211	48.13275	118.21845		584	Angler	K	1322	
OR 48692	06/21/1998	98	E53	48.59901	118.12324	9	481	GCWT98	Unknown		305	48.51407	118.14882		616	Angler	K		
OR 48971	06/21/1998	98	E52	48.5835	118.13749	8	432	GCWT98	06/24/2001	01	305	48.51407	118.14882		508	Angler	K	1099	
OR 53799	06/21/1998	98	298	48.49919	118.18734	8	380	GCWT98	06/23/2001	1	Indian Rock				15	GCWT01	G	1098	
OR 56892	07/08/1998	98	E49	48.53856	118.17107	8	271	EWU	No Data	00	No data				0	Angler	K		
OR 48182	07/09/1998	98	E29	47.91791	118.34448	4	195	EWU	No Data	00	No data				0	Angler	K		
OR 092560	06/19/1999	99	363	48.69661	118.01764	9	410	GCWT99	01-Jun	1	KF tag box	48.59901	118.12324	9		Angler	K	713	15.61
OR 092822	06/19/1999	99	333	48.63149	118.10724	9	476	GCWT99	09/27/2001	01	314	48.55976	118.15138		559	Angler	K	831	
OR 092864	06/19/1999	99	333	48.63149	118.10724	9	376	GCWT99	01-Jun	1	KF tag box	48.59901	118.12324	9		Angler	K	713	4.1
OR 092870	06/19/1999	99	333	48.63149	118.10724	9	395	GCWT99	08/27/2001	01	Keenlyside Dam				Canada	472	RL & L	G	800
OR 092876	06/19/1999	99	333	48.63149	118.10724	9	457	GCWT99	10/04/2001	01	E51	48.57372	118.0877	8	565	Angler	K	838	
OR 092911	06/19/1999	99	363	48.69661	118.01764	10	478	GCWT99	2001	01	399	48.81044	117.94754		455	Angler	K		
OR 092925	06/19/1999	99	383	48.77318	118.0149	10	461	GCWT99	July	00	275	48.39294	118.17453	7	476	Angler	G	52	51.71
OR 092419	06/20/1999	99	363	48.69661	118.01764	9	397	GCWT99	01-Jun	1	KF tag box	48.59901	118.12324	9		Angler	K	712	16.68
OR 092631	06/20/1999	99	E51	48.57372	118.0877	8	379	GCWT99	08/20/2000	00	No data				400	Angler	K	427	
OR 119403	06/20/1999	99	345	48.64224	118.08169	9	383	GCWT99	No Data		No data				0	Angler	K		
OR 119408	06/20/1999	99	345	48.64224	118.08169	9	451	GCWT99	10/20/2001	01	Keenlyside Dam				Canada	531	RL & L	G	853
OR 092307	06/27/1999	99	333	48.63149	118.10724	9	411	EWU	June	00	347	48.65304	118.08459	9	425	Angler	G	3	2.9
OR 094877	08/16/1999	99	E 51	48.57372	118.0877	8	335	EWU	01-Jun	1	KF tag box	48.59901	118.12324	9		Angler	K	655	4.95
Y 52250	06/17/2000	00	333	48.63149	118.10724	9	448	GCPF00	06/24/2000	00	E59	48.69991	118.02054	10	452	GCWT00	G	7	10.89
OR 092138	06/19/2000	00	333	48.63149	118.10724	9	400	GCPF00	Unknown		Chelan Falls				Chelan	508	Angler	K	311.37
OR 125770	06/24/2000	00	E52	48.5835	118.13749	8	410	GCWT00	07/23/2000	00	No data				413	Angler	G	29	
OR 125886	06/24/2000	00	E53	48.59901	118.12324	9	427	GCWT00	06/26/2000	00	314	48.55976	118.15138	8	434	EWU	G	2	5.65
OR 125906	06/24/2000	00	399	48.81044	117.94754	10	500	GCWT00	08/22/2001	01	Keenlyside Dam				Canada	552	RL & L	G	424

Table A2. Continued

Tag	Mark	Mark	Mark	Mark	Mark	Mark	Mark	Recap	Recap	Recap	Recap	Recap	Recap	Recap	Recap	Recap	Recap	Time	Distance
color/#	Date	Pass	Site #	Lat	Long	Sec	(mm)	Crew	Date	Pass	Loc	Lat	Long	Sec	(mm)	Crew	R.C.	(Days)	(km)
OR 151505	06/24/2000	00	E59	48.69991	118.02054	10	401	GCWT00	07/21/2000	00	No data				394	Angler	K	27	
OR 151507	06/24/2000	00	E59	48.69991	118.02054	10	425	GCWT00	10/19/2001	01	Keenlyside Dam			Canada	458	RL & L	G	482	
OR 152284	06/24/2000	00	314	48.55976	118.15138	8	425	GCWT00	07/21/2000	00	No data				419	Angler	G	27	
OR 152300	06/24/2000	00	314	48.55976	118.15138	8	374	GCWT00	No Data	00	No data				0	Angler	K		
OR 152312	06/24/2000	00	E50	48.53602	118.13627	8	412	GCWT00	06/27/2000	00	E51	48.57372	118.0877	8	414	EWU	G	3	7.75
OR 152350	06/24/2000	00	E53	48.59901	118.12324	9	427	GCWT00	September	00	No data				0	Angler	K		
OR 152765	06/24/2000	00	370	48.75207	118.06225	10	416	GCWT00	06/27/2000	00	335	48.62439	118.10083	9	416	EWU	G	3	18.76
OR 152789	06/24/2000	00	275	48.39294	118.17453	7	408	GCWT00	August	00	K6	48.69666	118.12251	K	413	Angler	G		36.98
OR 152803	06/24/2000	00	275	48.39294	118.17453	7	386	GCWT00	06/27/2000	00	275	48.39294	118.17453	7	387	EWU	G	3	
OR 152811	06/24/2000	00	275	48.39294	118.17453	7	404	GCWT00	September	00	No data				0	Angler	K		
OR 125913	06/25/2000	0	399	48.81044	117.94754	10	383	GCWT00	01-Jun	1	KF tag box	48.59901	118.12324	9		Angler	K	341	34.94
OR 151899	06/25/2000	00	370	48.75207	118.06225	10	360	GCWT00	08/18/2001	01	Keenlyside Dam			Canada	396	RL & L	G	419	
OR 152239	06/25/2000	00	E53	48.59901	118.12324	9	387	GCWT00	06/27/2000	00	E51	48.57372	118.0877	8	539	EWU	G	2	4.95
OR 152243	06/25/2000	00	E53	48.59901	118.12324	9	452	GCWT00	June	00	347	48.65304	118.08459	9	457	Angler	G		7.07
OR 152400	06/25/2000	00	314	48.55976	118.15138	8	417	GCWT00	06/27/2000	00	E51	48.57372	118.0877	8	419	EWU	G	2	5.4
OR 152408	06/25/2000	00	305	48.51407	118.14882	8	436	GCWT00	06/25/2000	00	305	48.51407	118.14882	8	436	GCWT00	G	0	0
OR 125750	06/27/2000	00	E51	48.57372	118.0877	8	333	EWU	08/30/2001	01	311	48.54154	118.13855		NA	Angler	K	429	
OR 125871	06/27/2000	00	E51	48.57372	118.0877	8	644	EWU	06/27/2000	00	E51	48.57372	118.0877	8	644	EWU	G	0	
OR 125849	07/10/2000	0	E51	48.57372	118.0877	8	323	EWU	08/05/2001	1	E 51	48.57372	118.0877	8	406	Angler	K	391	0
OR 152616	08/29/2000	0	SE 3	47.94197	118.19075	S 1	280	EWU	08/07/2001	1	Castlegar Dam				406	Angler	K	343	218.15
OR 054464	Unknown								06/24/2000	00				8	376	GCWT00	G		
OR 092530	Unknown								06/30/2001	01	347	48.65304	118.08459	9	559	Angler	K		
OR 117023	Unknown								05/29/2000	00	209	48.12778	118.22839	6	292	Angler	K		
OR 125845	Unknown								07/10/2000	00				8	327	EWU	G		
OR 117061	Unknown								07/09/2000	00				8		Angler	K		
OR 117448	Unknown								Unknown					Unknown		Angler	K		
OR 123126	Unknown								Unknown		Unknown					Angler	K		
OR 12563	Unknown								07/16/2000	00	283	48.42974	118.18665		584	Angler	K		
OR 125992	Unknown								06/25/2000	00				8	476	GCWT00	G		
OR 141156	Unknown								07/29/2000	00				8	406	Angler	K		

Table A2. Continued

Tag color/#	Mark Date	Mark Pass	Mark Site #	Mark Lat	Mark Long	Mark Sec	Mark TL (mm)	Mark Crew	Recap Date	Recap Pass	Recap Loc	Recap Lat	Recap Long	Recap Sec	Recap TL (mm)	Recap Crew	Recap R.C. (Days)	Time	Distance (km)
OR 152138	Unknown								08/09/2000	00				S 3	343	Angler	K		
OR 152724	Unknown								No Data										
OR 191138	Unknown								06/15/2000	00				S 1	559	Angler	K		
White Nelson BC	Unknown								05/06/2000	00				S 2	555	EWU	G		
OR 115569	Unknown								04/21/2001	1	E 53	48.59901	118.12324	9		Angler	K		
OR 123312	Unknown								06/23/2001	1	E 51	48.57372	118.0877	8	406	GCWT01	G		
OR 152902	Unknown								06/23/2001	1	267	48.36056	118.16387	7	457	GCWT01	G		

GCWT = Governor's Cup Walleye Tournament (followed by year).

GCPF = Governor's Cup Pre-fish (followed by year). Pre-fish occurred one week before the tournament.

EWU = Eastern Washington University.

STOI = Spokane Tribe of Indians.

SPAD = Spokane River angling day. Volunteers from the Spokane Walleye Club assisted in angling for walleye on the Spokane River during the spawning run.

Table A.3. Walleye recovered above Northport, Washington and walleye recovered below Grand Coulee Dam. Section numbers correspond to Figure 1.

Original Mark				Recapture	
Date	Location	Section	Section #	Date	Location
Recaptures Above Northport, Washington					
06/21/1997	Colville River	8	E 51	08/19/2001	Kennlyside Dam
07/28/1997	Alder Creek	5	E 39	08/19/1999	Above Northport
08/20/1997	Creek East of Fenders	9	E 55	08/26/1998	Border
08/22/1997	Sanpoil River	SP	SPE 5	08/26/1998	Border
09/18/1997	Little Falls Dam	S 3	S 94	08/29/1998	Waneta Dam
04/18/1998	Tribal Boat Launch	S 3	S 82	06/30/1998	Trail
04/25/1998	Tribal BL-Little Falls Dam	S 3	S 87	08/07/1998	Waneta Dam
04/29/1998	Tribal Boat Launch	S 3	S 82	10/11/1998	Above Northport
04/29/1998	Tribal Boat Launch	S 3	S 82	09/14/1998	Kennlyside Dam
05/15/1998	Tribal Boat Launch	S 3	S 82	09/13/1999	Waneta Dam
06/03/1998	Colville River	8	E 51	09/16/1998	Trail
06/20/1998	Sherman Creek	8	E 52	08/25/1998	Waneta Dam
06/21/1998	Marcus Island	9	E 57	08/29/1998	Above Northport
06/21/1998	Kettle Falls Boat Launch	9	E 53	09/02/1998	Waneta Dam
06/21/1998	Bradbury Beach	8	298	08/05/1998	Waneta Dam
06/24/1998	Hawk Creek	H	HE 1	09/07/1998	Castlegar
05/07/1999	Tribal Boat Launch	S 3	S 84	09/30/1999	Trail
06/19/1999	Fenders	9	333	08/27/2001	Nelson
06/19/1999	Evans	9	363	10/08/1999	Trail
06/20/1999	Fenders	9	333	09/04/1999	Above Northport
06/20/1999	Evans	9	363	09/01/1999	Brilliant Dam
06/20/1999	Marcus Flats	9	345	09/20/2001	Kennlyside Dam
06/24/2001	Evans	9	E 59	09/19/2001	Kennlyside Dam
06/24/2001	China Bend	10	399	08/22/2001	Kennlyside Dam
06/25/2000	Colville River	8	E 51	08/16/2000	Waneta Dam
08/29/2000	A Frame	S 1	SE 3	08/07/2001	Castlegar
Recaptures Below Grand Coulee Dam					
06/19/2000	Fenders	9	333	2000	Chelan Falls
07/16/1998	Denison Canyon	4	E 31	07/09/2000	Okanogan River
07/13/1998	Harker Canyon	S 2	SE 11	06/21/1999	Rufus Woods
05/31/1997	Mill Canyon	S 2	SE 12	06/22/1997	Nespelem River

Appendix B

Table B1. Age-length key for walleye collected from Lake Roosevelt by EWU during 2000.

Length Group (cm)	Number of Walleye at Age....															Grand Total
	n	0	1	2	3	4	5	6	7	8	9	10	11	12	13	
7	2	2														2
8	5	5														5
9	9	9														9
10	18	14	4													18
11	10	6	4													10
12	10		10													10
13	6	2	4													6
14	4	1	3													4
15	4	2	2													4
16	5	3	2													5
17	5		5													5
18	6		6													6
19	3		3													3
20	9		7	2												9
21	10		10													10
22	6		6													6
23	5		3	2												5
24	3		3													3
25	25		15	10												25
26	32		19	13												32
27	36		24	12												36
28	34		17	17												34
29	29			29												29
30	33			33												33
31	18			18												18
32	11			11												11
33	25			25												25
34	26			26												26
35	56			45	11											56
36	90			60	30											90
37	71				71											71
38	85				60	25										85
39	79				40	39										79
40	75				37	38										75
41	79				45	34										79
42	80				40	40										80
43	90				11	57	11	11								90
44	54					27	27									54
45	63				13	50										63
46	41				10	31										41
47	55					37		18								55
48	39						20	19								39

Table B.1 Continued

Length Group (cm)	Number of Walleye at Age....														Grand Total	
	n	0	1	2	3	4	5	6	7	8	9	10	11	12		13
49	23						23									23
50	23						16	7								23
51	22						11	11								22
52	19						10	9								19
53	14							9	5							14
54	15							7	8							15
55	11							11								11
56	10							4	4		2					10
57	11							6	5							11
58	9							6	3							9
59	3								3							3
60	3							1	2							3
61	4								3	1						4
62	5								5							5
63	3									3						3
64	3									3						3
65	1									1						1
67	2								1		1					2
68	2									1	1					2
69	1										1					1
78	1											1				1
81	1													1		1
83	1														1	1
85	1											1				1
Grand Total	1,534	44	147	303	368	378	118	119	39	9	5	2	0	1	1	1,534

Appendix C

Relative abundance (R.A.; %) and catch-per-unit-effort (CPUE; fish/hr) of fish collected via boat electrofishing from Lake Roosevelt between April 1st and November 1st, 2000.

Family	Species	n	R.A. (%)	CPUE (Fish/hr)	Size Range (mm)
Salmonidae	Chinook	6	0.09	0.06	425-752
	Kokanee	2830	41.12	30.63	85-562
	Rainbow trout	574	8.34	6.21	30-588
	Cutthroat	1	0.01	0.01	411
	Brown trout	48	0.70	0.52	113-567
	Bull trout/E. brook hybrid	1	0.01	0.01	383
	Bull trout	2	0.03	0.02	417-800
	Eastern brook trout	50	0.73	0.54	73-409
	Mountain whitefish	31	0.45	0.34	109-418
	Lake whitefish	10	0.15	0.11	75-534
Cyprinidae	Northern pikeminnow	81	1.18	0.88	33-599
	Peamouth	10	0.15	0.11	60-293
	Redside shiner	30	0.44	0.32	41-140
	Longnose dace	1	0.01	0.01	35
	Chiselmouth	1	0.01	0.01	113
	Speckled dace	1	0.01	0.01	87
	Carp	65	0.94	0.70	37-760
	Tench	11	0.16	0.12	35-470
Catostomidae	Largescale sucker	607	8.82	6.57	43-682
	Bridgelip sucker	7	0.10	0.08	191-360
	Longnose sucker	25	0.36	0.27	80-498
Ictaluridae	Yellow bullhead	1	0.01	0.01	180
Gadidae	Burbot	39	0.57	0.42	95-601
Centrarchidae	Largemouth bass	27	0.39	0.29	33-447
	Smallmouth bass	210	3.05	2.27	24-325
	Pumpkinseed	3	0.04	0.03	93-103
	Black crappie	44	0.64	0.48	36-257
Percidae	Yellow perch	515	7.48	5.57	40-230
	Walleye	1533	22.27	16.59	66-845
Cottidae	Cottidae	119	1.73	1.29	18-143
Total		6,883	18.00	74.51	