2002 Warmwater Fisheries Survey of Chapman Lake (Spokane County)

by

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June 2004

Acknowledgements

From the Washington Department of Fish and Wildlife (WDFW) we thank Chris Donley, Chris Moan, and John Whalen for assisting with data collection; Lucinda Morrow for aging scales; John Whalen, Chris Donley, and Steve Jackson for providing critiques of this document; and Colleen Desselle for formatting the final report. We also thank Dr. Allen Scholz and students from Eastern Washington University, Department of Biology, for assisting with data collection. This project was funded through the WDFW Warmwater Enhancement Program in an effort to provide greater opportunities to fish for and catch warmwater fish in Washington State.

Abstract

Chapman Lake (Spokane County) was surveyed by Washington Department of Fish and Wildlife biologists on June 3–5, 2002. Fish were captured using boat electrofishing, gill netting, and fyke netting. Nine fish species were collected. Largemouth bass (*Micropterus salmoides)* was the most abundant species by weight (52%) and number (36%). Smallmouth bass (*M. dolumieu*) were also abundant at 12% of the catch by weight. Pumpkinseed sunfish (*Lepomis gibossus*) and yellow perch (*Perca flavescens*) were the most abundant panfish, comprising 12% of the sample by weight. Kokanee (*Oncorhynchus nerka*) and rainbow trout (*O. mykiss*) were also sampled and comprised 13% of the catch by weight. Largemouth and smallmouth bass appear to dominate the warmwater fish community at Chapman Lake. Largemouth bass are most abundant, but both species grow to quality size. Yellow perch and pumpkinseed sunfish, although abundant, likely offer only limited angling opportunity due to their mostly small size. However, these species likely provide a good forage base for bass, which exhibited high condition. Rainbow trout and kokanee were present in multiple size classes, which shows good stocking success. We recommend that managers continue with the current management course, which continues to provide anglers with good opportunities for largemouth bass, smallmouth bass, kokanee, and rainbow trout.

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Introduction

Chapman Lake is a small body of water located approximately 14 kilometers (km) south of Cheney, Washington, in Spokane County (Table 1; Figure 1). The lake lies within the Palouse River drainage on Rock Creek, which flows through the lake as both the inlet and the outlet. Rock Creek originates from springs located on the Turnbull National Wildlife Refuge. Two outlet dams are maintained to keep the lake level approximately three meters above the lakes natural level.

Table 1. Physical parameters of Chapman Lake (Spokane County).

Physical Parameters	Chapman Lake (Spokane County)
Surface Area (hectares)	60
Shoreline Length (kilometers)	9.0
Maximum Depth (meters)	48
Mean Depth (meters)	20
Volume (cubic meters)	12211372

Recreational access to Chapman Lake is available through a private resort located on the south shore. The resort offers boat and shoreline access, as well as RV camping and cabin rentals. A few private cabins are located on the south shore near the resort. Chapman Lake is open to fishing from the last Saturday in April to October 31.

Historically, Chapman Lake has offered anglers kokanee (*Oncorhynchus nerka*) and rainbow trout (*O. mykiss*), as well as, largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolumieu*), and panfish. Kokanee have been stocked as fry in the lake for many years. In the past, the resort owner operated a small hatchery to produce kakanee fry at the lake. Currently, 100,000 kokanee fry are stocked each spring by the Washington Department of Fish and Wildlife. Rainbow trout fingerlings are stocked annually as well. The lake's warmwater fishes were originally stocked in the early twentieth century and have provided consistent fishing opportunity, for smallmouth bass, largemouth bass, yellow perch (*Perca flavescens*) and black crappie (*Pomoxis nigromaculatus*) (WDFW unpublished data). The lake has a reputation of producing quality largemouth and smallmouth bass.

Under current Washington Department of Fish and Wildlife (WDFW) regulations, the following rules apply on Chapman Lake: trout – daily catch limit 5/day, no minimum size; kokanee – daily catch limit 10/day, no minimum size; largemouth and smallmouth bass – daily catch limit 5/day, no minimum size, only bass less than 12 inches or greater than 17 inches may be retained, no more than one over 17 inches may be retained, bass may be caught, retained, and released alive from a livewell until a daily limit is in possession. There is no catch limit on yellow perch, crappie, sunfish (*Lepomis* spp.), or bullhead catfish (*Ameiurus* spp).

Due to its history of providing warmwater fishing opportunity and its reputation as a quality bass water, Chapman Lake was selected by regional fisheries biologists to be surveyed under the Warmwater Fish Enhancement Program. To evaluate warm water fish populations, and to

identify ways to maintain or enhance fishing quality, personnel from the WDFW Warmwater Enhancement Program conducted a fisheries survey on Chapman Lake during June 2002. This report is intended to assist regional fisheries biologists with future management decisions. Additionally, this survey may serve as a baseline fisheries evaluation for comparison with future fishery evaluation efforts.

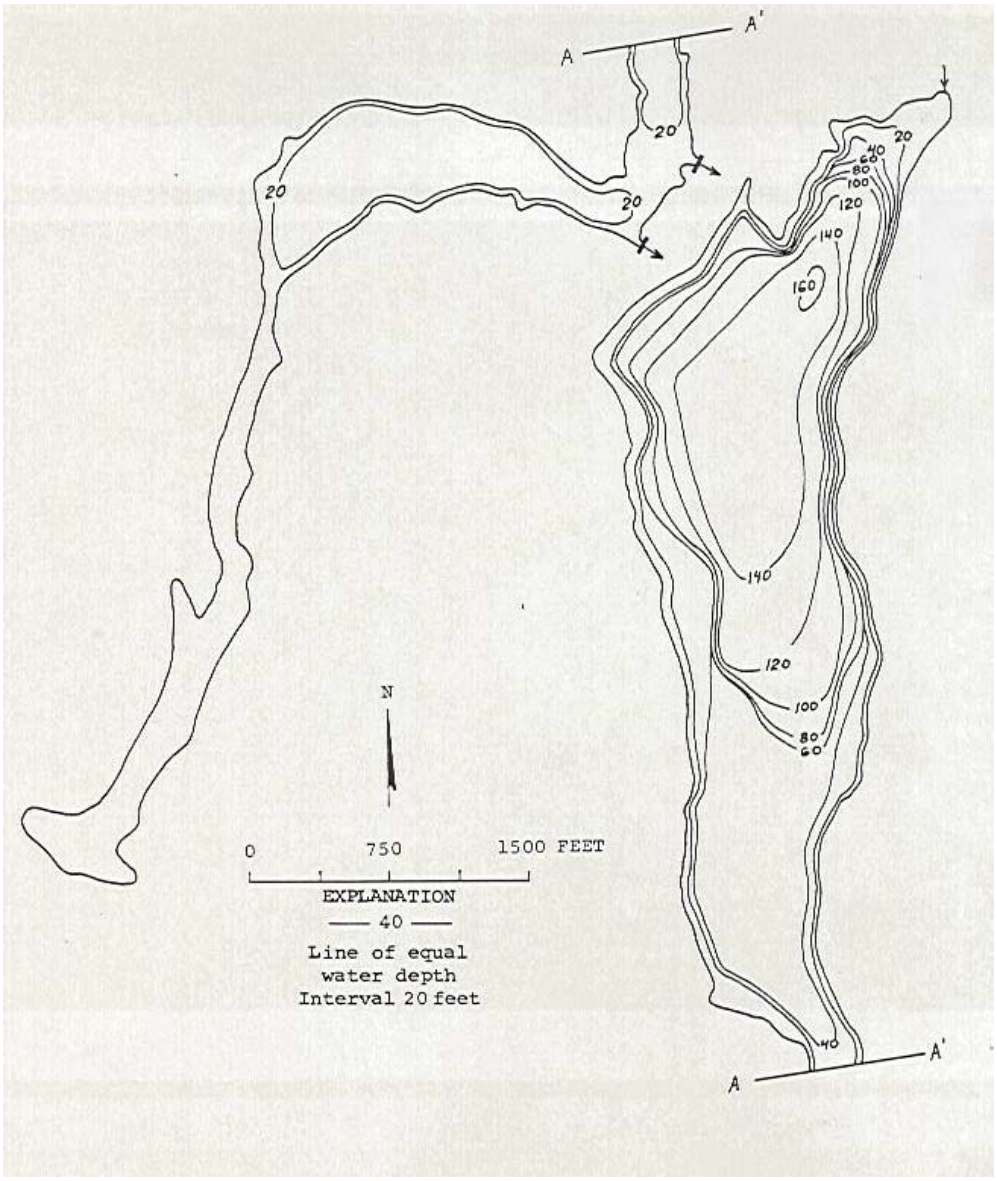


Figure 1. Bathymetric map of Chapman Lake (Spokane County).

Methods

Chapman Lake was surveyed by a 3-person investigation team June 3-5, 2002. Fish were captured using boat electrofishing, gill netting, and fyke netting. The electrofishing unit consisted of a 5.5 meter Smith-Root 5.0 GPP "shock boat" using a DC current of 120 cycles/sec^{-1} at 5 to 6 amps power. Experimental gill nets (45.7 m long x 2.4 m deep) were constructed of four sinking panels (two each at 7.6 m and 15.2 m long) of variable size (1.3, 1.9, 2.5, and 5.1 cm stretched mesh) monofilament. Fyke nets were constructed of a main trap (4.7 m long and 1.2 m in diameter), a lead net (30.5 m long x 1.2 m), and two wings (7.6 m long x 1.2 m deep).

Sampling locations were selected by dividing the shoreline into 24 sections of approximately 400 meters each. Twelve sections were randomly selected for sampling by boat electrofishing, eight by gill netting, and eight by fyke netting. While electrofishing, the boat was maneuvered through the shallows (depth range = 0.2 - 2 m), adjacent to the shoreline (Bonar et al. 2000). Each electrofishing section was sampled "pedal-down" for a total of approximately 600 seconds. This sampling was conducted during evening hours to maximize the size and number of fish captured. Electrofishing is more effective at night because some fish species seek shelter during the day and move freely at night (Reynolds 1996; Dumont and Dennis 1997). The total electrofishing time during the survey was 9018 seconds ("pedal-down" time). Gill nets were set perpendicular to the shoreline with the small mesh end attached onshore and the large mesh end anchored offshore. Fyke nets were set perpendicular to the shoreline with the lead net anchored onshore and the wing nets set at 45-degree angles to the trap. Fyke nets were set so that the trap was no deeper than three meters (Bonar et al. 2000). Gill nets and fyke nets were set in the evening and retrieved the following morning. Each set was considered one net-night of effort.

Each fish captured was identified to species, measured in millimeters (mm) to total length (TL) and weighed to the nearest gram (g). Scales were collected for age and growth analysis from largemouth bass, smallmouth bass, black crappie, yellow perch, pumpkinseed sunfish (*Lepomis gibbosus*), and kokanee. Scale samples (up to five per 10 mm length class for each species) were mounted, pressed, and aged according to Jearld (1983) and Fletcher et al. (1993). Rainbow trout and brown bullhead (*Ameiurus nebulosus*) were not aged.

Data Analysis

Percentages of the total biomass and number of fish collected for each species provides useful information regarding the balance and productivity of the community (Swingle 1950; Fletcher et al. 1993). Species composition by weight (kg) and number was calculated using data collected from the first twelve boat electrofishing sections, all eight gill netting sections, and all eight fyke netting sections. This methodology was utilized to maintain a standardized 1:1:1 ratio of electrofishing to gill netting to fyke netting (1:1:1 -1800 seconds of boat electrofishing: two net-nights of gill netting: two net-nights of fyke netting) to compare the species composition in Chapman Lake with that in other lakes surveyed. This technique is employed to reduce bias between gear types (Fletcher et al. 1993). Fish determined to be less than one year old were excluded from the calculations for species composition. Fry numbers can fluctuate dramatically according to sampling location, sampling methodology, and time of hatches (Fletcher et al.

1993). Including young-of-the-year fish in the calculation of species composition can give a false impression of year class strength due to the abundance of small fish, which can suffer extensive mortality during the first winter (Chew 1974).

Catch per unit of effort (CPUE), by gear type, was determined for each fish species collected (number of fish/hour electrofishing, number of fish/gill net night, and number of fish/fyke net night). The CPUE for each fish species was calculated using stock length fish and longer. Stock length fish, which varies by species, is the length of fish that offers a threshold recreational value to an angler (Anderson 1976). Randomly chosen sample sections can contribute to high variability among samples, therefore, 80% confidence intervals (CI) were calculated for each mean CPUE by species and gear type. Each CI was calculated as the mean $\pm t_{(,N-1)} \times SE$, where t=Student's t for confidence level with N-1 degrees of freedom (two tailed) and SE=standard error of the mean. When standardized sampling is used, CPUE is a useful index to compare lakes within the state of Washington and to monitor changes in relative abundance over time.

Length frequency histograms (percent frequency captured by each gear type) were developed to evaluate the length structure of largemouth bass, smallmouth bass, yellow perch, pumpkinseed sunfish, kokanee, and rainbow trout

Proportional stock density (PSD), calculated as the number of fish-quality length/number of fish-stock length×100, was determined for each warmwater fish species collected that have established stock lengths and adequate sample size (Anderson and Neuman 1996). PSD can provide information about the proportion of various length fish in a population and can be a useful tool when sample size is adequate (Willis et al. 1993; Divens et al. 1998). Stock and quality lengths are based on percentages of world record catch length and vary depending on fish species (Table 2). Stock length (20-26% of the world record) refers to the minimum length fish of recreational value, and quality length (36-41% of the world record) refers to the minimum length fish anglers would like to catch. In addition to stock and quality length, Gabelhouse (1984b) introduced relative stock density (RSD), which includes preferred, memorable, and trophy lengths. Preferred length (45-55% of world record length) refers to the length fish anglers would prefer to catch. Memorable length (59-64% of the world record length) refers to the minimum length fish most anglers remember catching, whereas trophy length (74-80% of world record length) refers to the minimum length fish worthy of acknowledgment. RSD, calculated as the number of fish-specific length/number of fish-stock length×100, was also calculated for each warmwater fish species. Like PSD, RSD can also provide useful information regarding population dynamics and is more sensitive to changes in year class strength. For example, relative stock density preferred (RSD-P), is the percentage of stock length fish preferred length and longer, RSD-M is the percentage of stock length fish memorable length and longer, and RSD-T is the percentage of stock length fish trophy size and longer. Eighty-percent confidence intervals for PSDs and RSDs are provided as an estimate of statistical precision and were calculated using normal approximation (Conover 1980; Gustafson 1988). Bister et al. (2000) developed additional PSD and RSD length categories for 83 additional species, including brown bullhead, which were previously uncategorized.

Table 2. PSD/RSD standared length categories (TL, mm) for fish species sampled at Chapman Lake (Spokane County) in June 2002. Numbers in parentheses represent percentages of world record lengths (Gablehouse 1984).

Species	Standard Length Categories				
	Stock (20-26%)	Quality (36-41%)	Preferred (45-55%)	Memorable (59-64%)	Trophy (74-80%)
Brown Bullhead	150	230	300	390	460
Largemouth Bass	200	300	380	510	630
Pumpkinseed Sunfish	80	150	200	250	300
Smallmouth Bass	180	280	350	430	510
Yellow Perch	130	200	250	300	380

Age and growth of warmwater fishes sampled were evaluated using the direct proportion method (Fletcher et al. 1993) and Lee's modification of the direct proportional method (Carlander 1982). Using the direct proportional method, total length at annulus formation, L_n, was back–calculated as $L_n=(A\times TL)/S$, where A is the radius of the fish scale at age n, TL is the total length of the fish captured, and S is the total radius of the scale at capture. Using Lee's modification, L_n was back–calculated as $L_n=a+A\times(TL-a)/S$, where a is the species-specific standard intercept from a scale radius-fish length regression. Mean back-calculated lengths at age n for each species were presented in tabular form for easy comparison of growth between year classes, as well as between the lake average and what has been found in other areas around the state of Washington (Fletcher et al. 1993) for the same species. Fletcher et al. (1993) calculated state averages using data collected from select warmwater fish populations throughout the state. These growth rates are referred to as the state average in the results section. Although not a true state average, this is likely representative of fish growth for lakes sampled within the state.

The relative weight (W_r) index was calculated to evaluate the condition of fish collected. Relative weight is calculated as the actual weight of a fish divided by the standard weight (W_s) for the same species at the same length times 100 ($W_r=W/W_s\times100$, where W is the weight (g) of an individual fish and W_s is the standard weight of a fish of the same length). The standard weight (W_s) is calculated from the standard log 10 weight-log10 length relationship defined for the species of interest. Standard weight equations have been established for many freshwater game and non-game fish species (Anderson and Neumann 1996; Bister et al. 2000). Relative weights are useful for comparing the condition of different size groups within a single population to determine if all sizes are getting adequate nutrition (ODFW 1997). A W_r value of 100 generally indicates that a fish is in average condition when compared to the national average for that species (Anderson and Gutreuter 1983). Fish collected with relative weights below 85 are underweight and may be an indication of extensive competition for available food resources (Flickinger and Bulow 1993). Anderson and Neumann (1996) list the parameters for the W_r equations of many warmwater fish species, including the minimum length recommendations for their application. Relative weight values from this survey were compared to the national average (W_r=100) for each species.

Results

Species Composition

Nine fish species were sampled at Chapman Lake. Largemouth bass was the most abundant species by both weight (52%) and number (36%) (Table 3). Smallmouth bass were also sampled, but at a lower relative abundance (12% by weight). Panfish, including pumpkinseed sunfish, yellow perch, and black crappie, comprised 13% of the sample by weight.

Table 3. Species composition (excluding young-of-the-year) by weight (kg) and number for fish collected at Chapman Lake (Spokane County) in June 2002.

	Species Composition					
	by Weight		by Number		Size Range (mm TL)	
Species	(kg)	(%w)	(#)	(%n)	Min	Max
Largemouth Bass	83.351	53.40	420	36.55	60	513
Smallmouth Bass	18.977	12.16	108	9.40	64	417
Pumpkinseed Sunfish	14.469	9.27	376	32.72	38	156
Kokanee	15.226	9.76	130	11.31	121	281
Brown Bullhead	14.100	9.03	29	2.52	269	343
Rainbow Trout	6.476	4.15	45	3.92	164	326
Yellow Perch	3.291	2.10	38	3.31	51	223
Black Crappie	.018	.12	1	0.09	227	227
Brook Stickleback	.002	.01	2	0.17	45	54

CPUE

Pumpkinseed sunfish were sampled at the highest rate (fish/hour) by boat electrofishing, followed by largemouth bass, smallmouth bass, and yellow perch (Table 4). Kokanee and rainbow trout were sampled at the highest rate by gill netting. Pumpkinseed sunfish and bullhead catfish were sampled at the highest rate by fyke netting.

Table 4. Mean catch per unit effort and 80% confidence intervals, by sampling method, for fish stock length and larger collected from Chapman Lake (Spokane County) in June 2002.

	Gear Type					
	Electrofishing		Gillnet		Fyke Net	
Species	(# / hour)	Sites	# /GN night	nights	# /FN night	nights
Brook Stickleback	0.80 ± 1.03	15	0	8	0	8
Brown Bullhead Catfish	6.77 ± 3.07	15	0	8	1.88 ± 0.92	8
Black Crappie	0.40 ± 0.51	15	0	8	0	8
Kokanee	1.20 ± 1.11	15	15.88 ± 6.73	8	0	8
Largemouth Bass	82.12 ± 17.00	15	0	8	0.13 ± 0.16	8
Pumpkinseed Sunfish	145.52 ± 29.59	15	0	8	6.63 ± 2.79	8
Rainbow Trout	0.80 ± 1.03	15	1.38 ± 1.08	8	0	8
Smallmouth Bass	17.59 ± 5.64	15	0.13 ± 0.16	8	0	8
Yellow Perch	15.08 ± 12.32	15	0.25 ± 0.32	8	0	8

Stock Density Indices

Sample sizes of fish caught by boat electrofishing for evaluating stock density indices were adequate for largemouth bass and pumpkinseed sunfish (Table 5). Sample sizes of other species were low, and resulting stock density values for these should be viewed with caution. Largemouth bass proportional stock density (PSD) was low, which is indicative of a high-density population. Smallmouth bass PSD and relative stock density (RSD) values were higher, which indicates a higher proportion of large fish in the population. Low pumpkinseed sunfish PSD and RSD values indicate an overabundant population.

Table 5. Traditional stock density indices, including 80% confidence intervals, of fish collected from Chapman Lake (Spokane County) June 2002, by sampling method.

Species	# Stock Length	PSD	RSD-P	RSD-M	RSD-T
		Electrofishing			
Brown Bullhead	17	100 ± 0	76 ± 13	0	0
Largemouth Bass	206	17 ± 3	15 ± 3	1 ± 1	0
Pumpkinseed Sunfish	364	1 ± 1	0	0	0
Smallmouth Bass	44	61 ± 9	23 ± 8	0	0
Yellow Perch	38	34 ± 10	3 ± 3	0	0
		Fyke Netting			
Pumpkinseed Sunfish	53	0	0	0	0

Largemouth Bass

Chapman Lake largemouth bass ranged in length from 60 to 513 mm total length (TL) (Table 3; Figure 2). The age of largemouth bass ranged from one to seventeen years (Table 6). Largemouth bass growth rates were lower than those reported for Washington by Fletcher et al (1993). Length frequency distribution indicates variable year-class strength (Figure 2). Relatively few fish were sampled between 280 and 400 mm TL. This may be an indication of excessive harvest of fish in that size range prior to the implementation of a statewide 305 to 432 mm (12 to 17 inch) restrictive slot-limit regulation in 1999. The condition of largemouth bass was above the national average, indicating abundant forage availability for the species (Figure 3).

Table 6. Back calculated mean length at age (mm) of largemouth bass collected at Chapman Lake (Spokane County) during June 2002. Unshaded values represent length at age calculated using the direct proportion method (Fletcher et al. 1993). Shaded values represent length at age calculated using the Lee's modification method of the direct proportion (Carlander 1982).

		Mean total length (mm) at age																
Year class	**# fish**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
2001	8	74																
		74																
2000	30	54	118															
		65	118															
1999	20	47	102	159														
		62	109	159														
1998	33	57	122	163	209													
		72	131	167	209													
1997	5	46	114	162	202	258												
		62	126	169	206	258												
1996	2	77	148	205	254	299	336											
		92	159	213	259	301	336											
1995	4	50	121	184	240	301	341	365										
		67	134	194	247	305	342	365										
1994	3	61	116	172	216	268	329	369	402									
		78	130	184	225	275	332	371	402									
1993	2	53	127	179	217	264	326	370	409	430								
		71	141	191	227	271	331	373	410	430								
1992	3	49	136	201	249	300	370	408	426	444	458							
		66	150	212	258	306	373	410	428	444	458							
1991	6	41	104	157	213	260	305	367	394	425	445	459						
		59	120	171	223	268	312	371	397	427	446	459						
1990	4	50	120	172	216	275	310	352	401	431	448	464	478					
		68	135	184	227	284	317	357	404	433	450	465	478					
1989	1	38	105	171	235	312	356	384	402	419	445	459	469	480				
		57	121	184	246	319	361	388	405	421	446	459	470	480				
1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
1987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1986	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1985	1	50	93	137	206	260	295	309	329	347	375	391	410	433	457	481	496	509
		68	109	152	218	270	303	317	336	353	380	395	414	436	459	482	497	509
Overall mean		53	118	172	223	280	330	365	395	416	434	443	452	457	457	481	496	509
Weighted Mean		67	124	172	220	282	332	371	402	427	445	456	466	458	459	482	497	509
State Average		60	146	222	261	289	319	368	396	440	485	472	496					

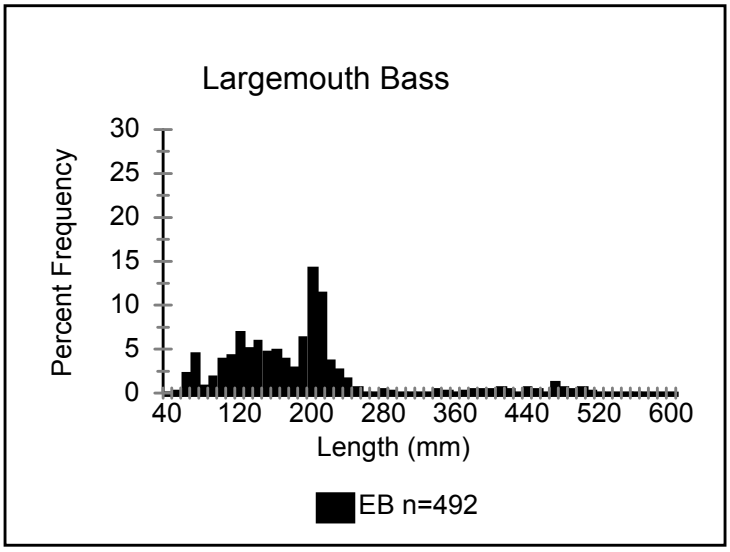


Figure 2. Length frequency distribution of largemouth bass sampled by boat electrofishing (EB) at Chapman Lake (Spokane County) in June 2002.

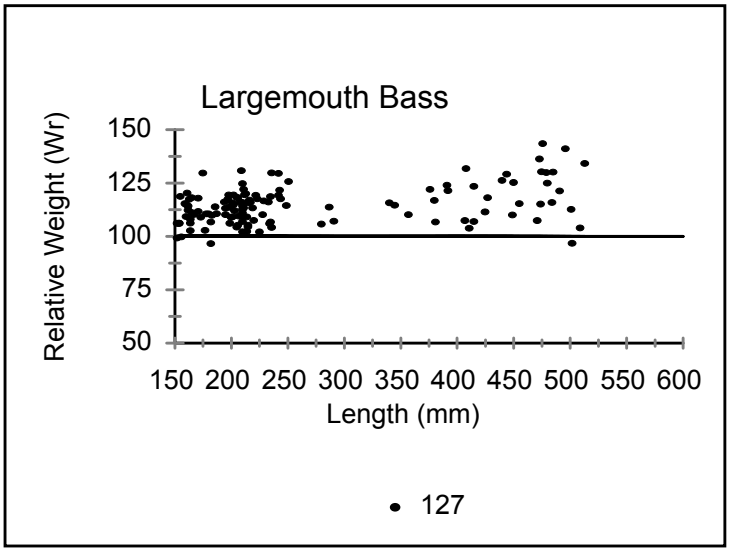


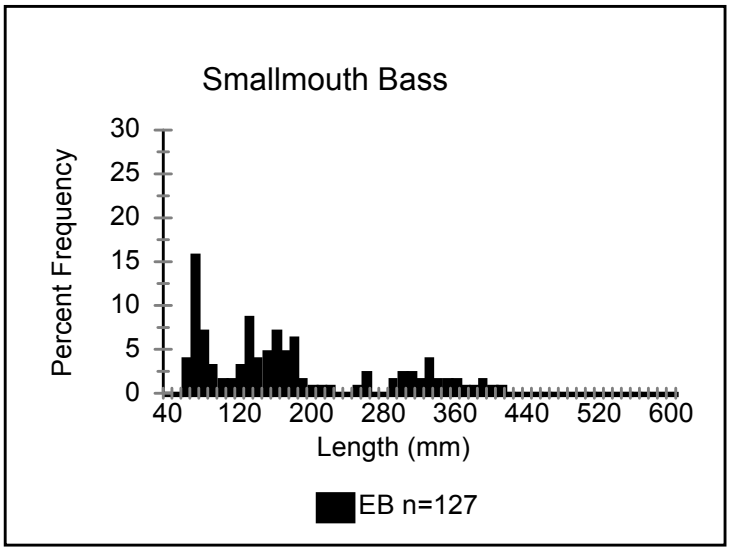
Figure 3. Relative weights of largemouth bass (n=127) sampled at Chapman Lake (Spokane County) in June 2002, compared to the national average, Wr=100 (Anderson and Neuman 1996).

Smallmouth Bass

Chapman Lake smallmouth bass sampled ranged in length from 67 to 417 mm TL (Table 3; Figure 4). The age of smallmouth bass sampled ranged from one to nine years (Table 7). Smallmouth bass growth rates were lower than those reported for Washington by Fletcher et al. 1993. Length frequency distribution indicates stable year-class strength (Figure 4). Smallmouth bass sampled exhibited variable condition, with relative weight values both above and below the national average (Figure 5).

Table 7. Back calculated mean length at age (mm) of smallmouth bass sampled at Chapman Lake (Spokane County) in June 2002. Unshaded values represent length at age using the direct proportion method (Fletcher et al. 1993). Shaded values represent length at age using Lee's modification to the direct proportion method (Carlander 1982).

		Mean total length (mm) at age								
Year class	**# fish**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
2001	12	80								
		82								
2000	19	52	127							
		73	128							
1999	20	50	105	167						
		75	119	168						
1998	5	64	126	172	227					
		89	142	181	227					
1997	0	0	0	0	0	0				
1996	7	51	113	161	215	266	302			
		80	135	177	225	270	302			
1995	9	49	95	143	197	247	292	332		
		78	120	163	211	256	296	332		
1994	9	55	101	145	187	239	283	328	372	
		85	127	166	204	252	291	332	372	
1993	1	50	86	131	179	231	280	319	357	382
		81	113	154	198	245	289	325	359	382
Overall mean		56	108	153	201	246	289	327	365	382
Weighted Mean		78	126	169	214	258	296	332	371	382
State Average		70	146	212	268	334	356	393		



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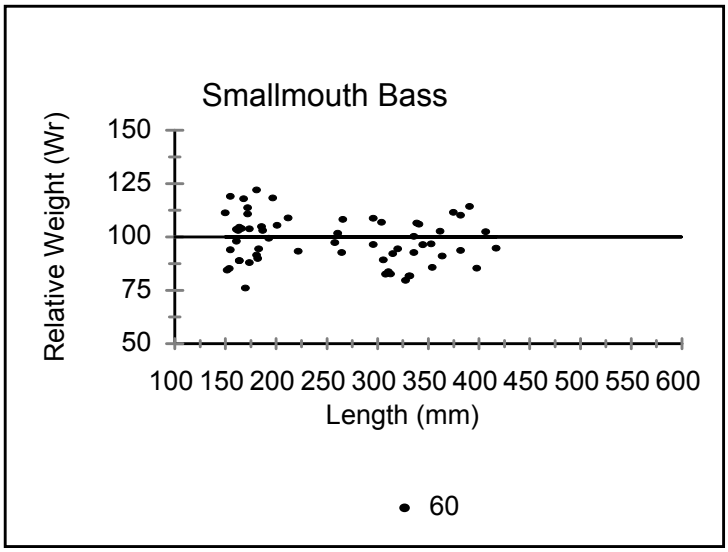


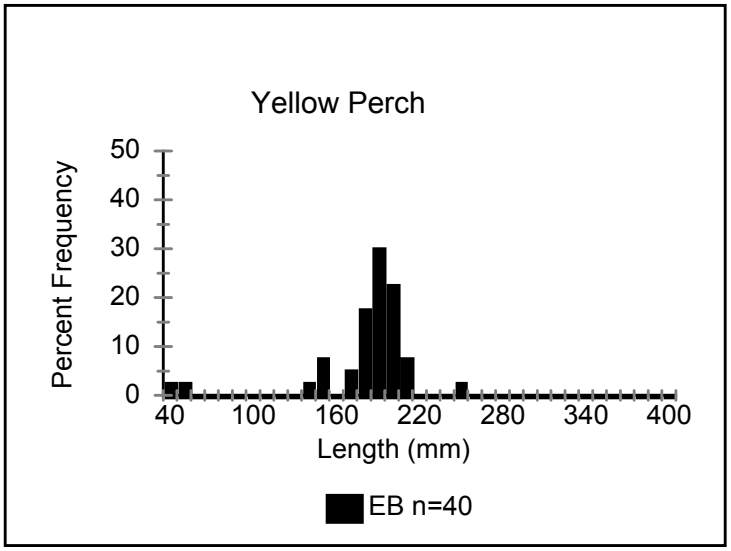
Figure 5. Relative weights of smallmouth bass (n=60) sampled at Chapman Lake (Spokane County) in June 2002, compared to the national average, Wr=100 (Anderson and Neuman 1996).

Yellow Perch

Chapman Lake yellow perch sampled ranged in length from 51 to 223 mm TL (Table 3; Figure 6). The age of yellow perch sampled ranged from two to four years (Table 8). Growth rates were higher than reported for Washington by Fletcher et al. 1993. Yellow perch condition was below the national average (Figure 7).

Table 8. Back calculated mean length at age (mm) of yellow perch sampled at Chapman Lake (Spokane County) in June 2002. Unshaded values represent length at age using the direct proportion method (Fletcher et al. 1993). Shaded values represent length at age using Lee's modification to the direct proportion method (Carlander 1982).

		Mean total length (mm) at age			
Year class	**# fish**	**1**	**2**	**3**	**4**
2001	0	0			
2000	3	50	142		
		70	144		
1999	28	47	123	190	
		70	134	190	
1998	2	58	142	193	236
		80	154	199	236
Overall mean		51	136	191	236
Weighted Mean		70	136	191	236
State Average		60	120	152	193



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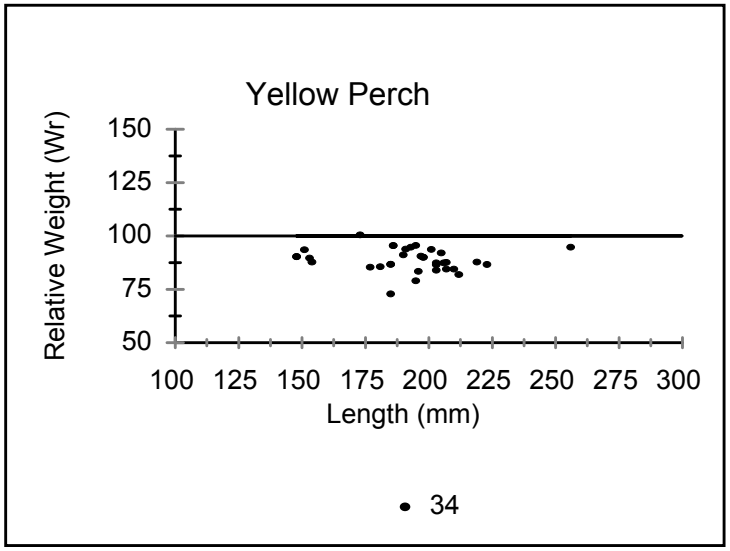

Figure 7. Relative weights of yellow perch (n=34) sampled at Chapman Lake (Spokane County) in June 2002, compared to the national average, Wr=100 (Anderson and Neuman 1996).

Pumpkinseed Sunfish

Chapman Lake pumpkinseed sunfish ranged in length from 38 to 156 mm TL (Table 3; Figure 8). The age of pumpkinseed sunfish sampled ranged from two to five years (Table 9). Pumpkinseed sunfish growth rates were lower than those reported for Washington by Fletcher et al. 1993. Length frequency distribution indicates variable year-class strength (Figure 8). Pumpkinseed sunfish condition was generally at or above the national average (Figure 9).

Table 9. Back calculated mean length at age (mm) of pumpkinseed sunfish sampled at Chapman Lake (Spokane County) in June 2002. Unshaded values represent length at age using the direct proportion method (Fletcher et al. 1993). Shaded values represent length at age using Lee's modification to the direct proportion method (Carlander 1982).

		Mean total length (mm) at age				
Year class	**# fish**	**1**	**2**	**3**	**4**	**5**
2001	0	0				
2000	14	23	71			
		40	73			
1999	3	15	50	92		
		36	62	93		
1998	26	18	52	90	119	
		40	66	96	119	
1997	8	16	54	90	116	132
		38	69	98	119	132
Overall mean		18	57	91	118	132
Weighted Mean		39	68	96	119	132
State Average		24	72	102	123	139

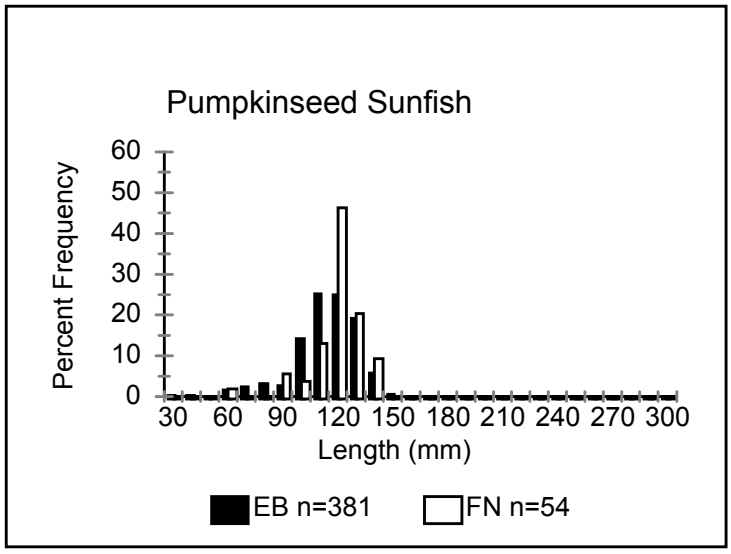

Figure 8. Length frequency distribution of pumpkinseed sunfish sampled by boat electrofishing (EB) and fyke netting (FN) at Chapman Lake (Spokane County) in June 2002.

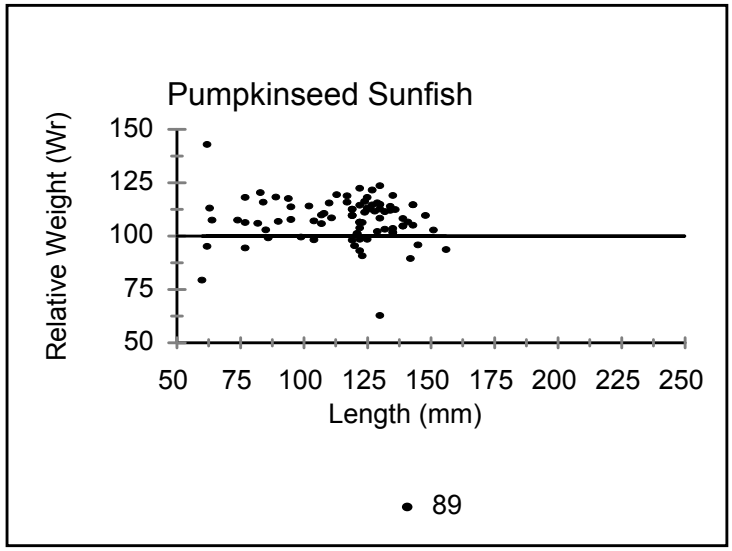

Figure 9. Relative weights of pumpkinseed sunfish (n=89) sampled at Chapman Lake (Spokane County) in June 2002, compared to the national average, Wr=100 (Anderson and Neuman 1996).

Black Crappie

The single black crappie sampled at Chapman Lake in 2002 measured 227 mm TL (Table 3) and was aged at four years, which is near average for Washington (Fletcher et al. 1993). The condition of this fish was similar to the national average for a fish of this length (Figure 10).

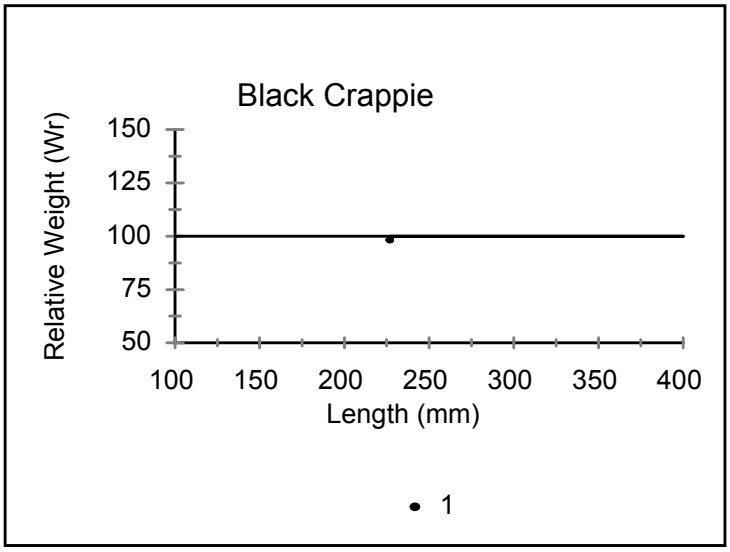

Figure 10. Relative weight of black crappie (n=1) sampled at Chapman Lake (Spokane County) in June 2002, compared to the national average, Wr=100 (Anderson and Neuman 1996).

Brown Bullhead

Chapman Lake brown bullhead catfish sampled ranged in length from 269 to 343 mm TL (Table 3; Figure 11). The condition of brown bullhead sampled was generally at or above the national average (Figure 12).

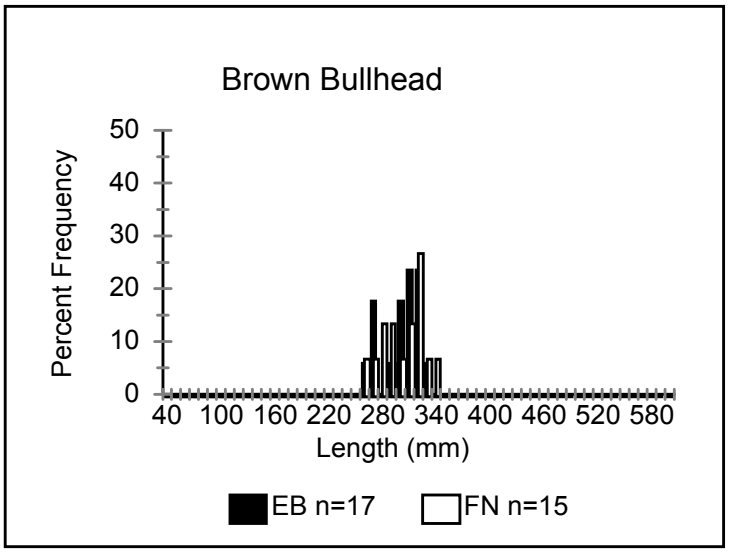

Figure 11. Length frequency distribution of brown bullhead catfish sampled by boat electrofishing (EB) and fyke netting (FN) at Chapman Lake (Spokane County) in June 2002.

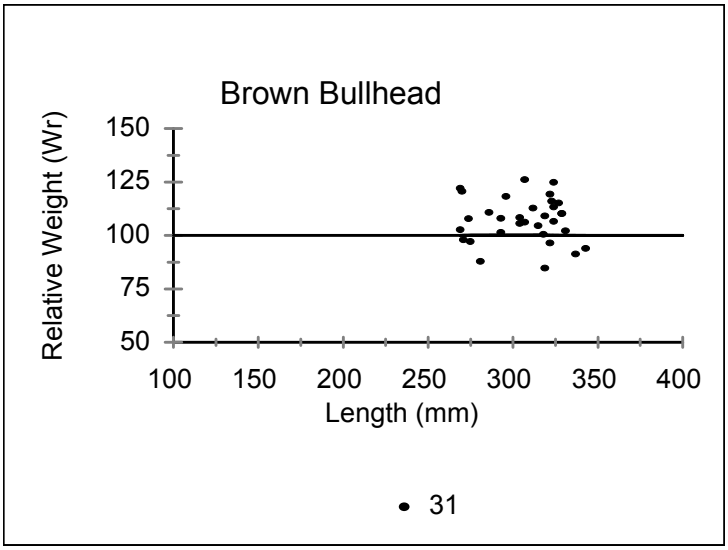

Figure 12. Relative weights of brown bullhead catfish (n=31) sampled at Chapman Lake (Spokane County) in June 2002, compared to the national average, Wr=100 (Anderson and Neuman 1996).

Kokanee

Chapman Lake kokanee sampled ranged in length from 121 to 281 mm TL (Table 3, Figure 13). Kokanee sampled ranged in age from one to five years (Figure 14). The majority of those fish were age two.

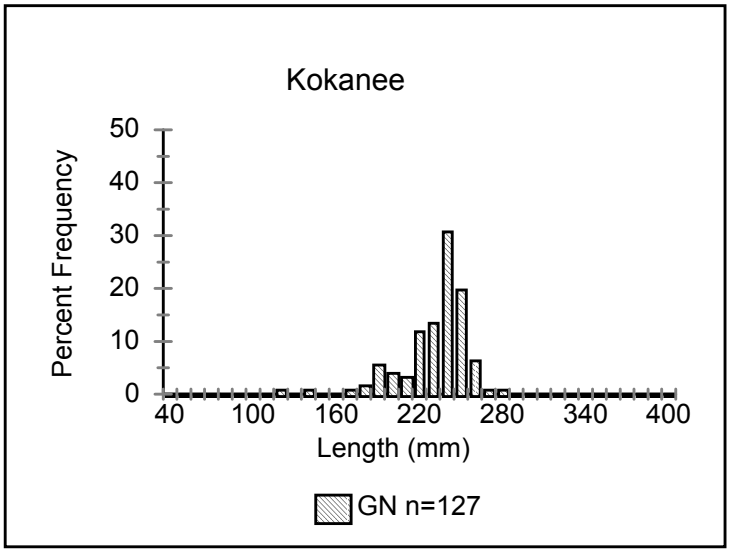

Figure 13. Length frequency distribution of kokanee sampled by gill netting (GN) at Chapman Lake (Spokane County) in June 2002.

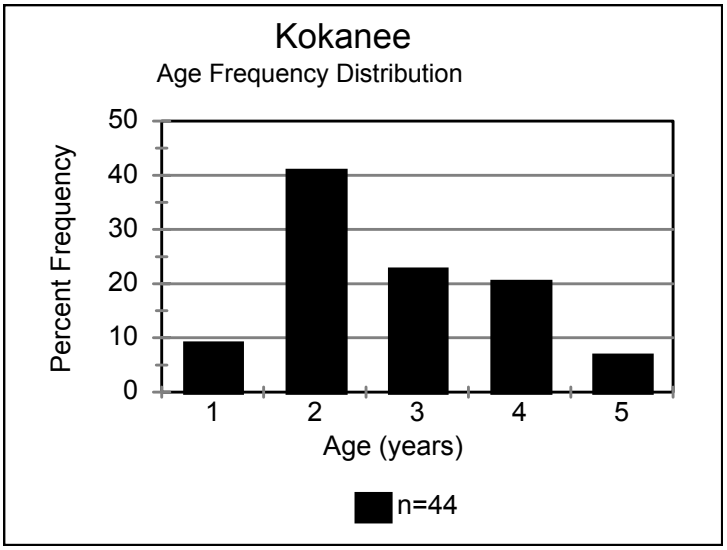

Figure 14. Age frequency distribution of kokanee sampled at Chapman Lake (Spokane County) June 2002.

Rainbow Trout

Chapman Lake rainbow trout sampled ranged in length from 164 to 326 mm TL (Table 3; Figure 15). The condition of rainbow trout sampled was generally below the national average (Figure 16). No age analysis was completed for this species.

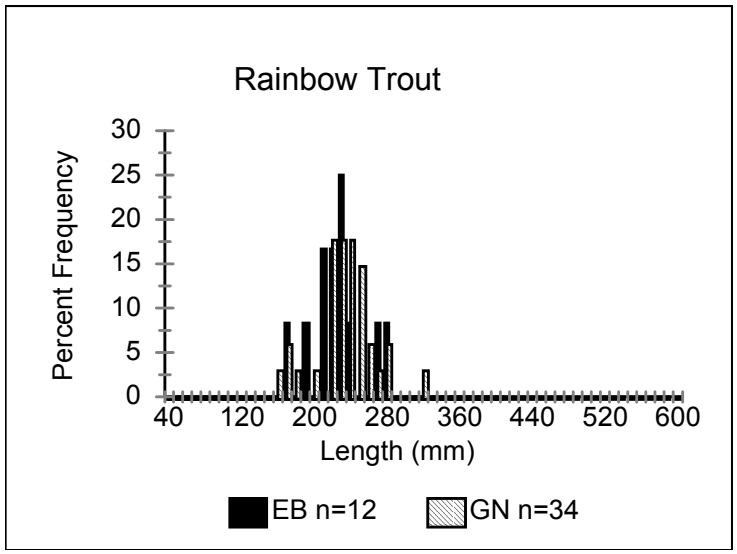

Figure 15. Length frequency distribution of rainbow trout sampled by boat electrofishing (EB) and gill netting (GN) at Chapman Lake (Spokane County) in June 2002.

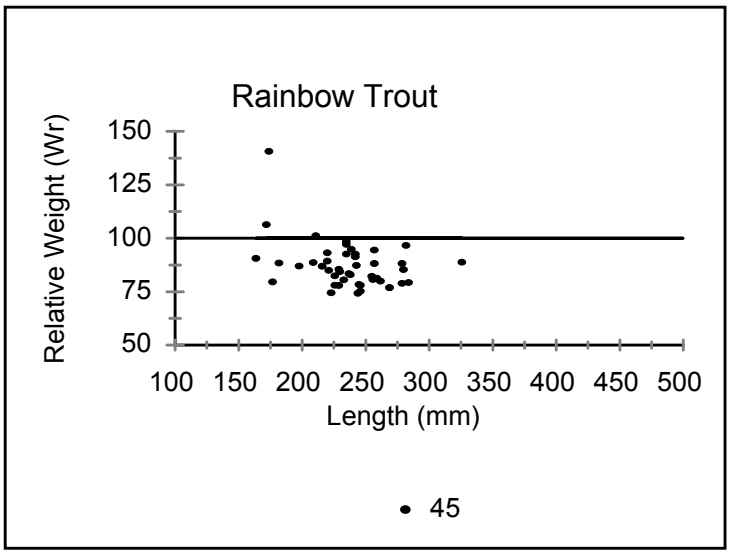

Figure 16. Relative weights of rainbow trout (n=45) sampled at Chapman Lake (Spokane County) in June 2002, compared to the national average, Wr=100 (Anderson and Neuman 1996).

Discussion

The results of this survey indicate that Chapman Lake continues to provide good fishing opportunities for kokanee, rainbow trout, largemouth bass, and smallmouth bass. Kokanee and rainbow trout stocking efforts appear to provide consistent opportunity, with fish of several size classes available to anglers. The warm water fish populations in the lake appear to be dominated by predators, both largemouth and smallmouth bass. Largemouth bass, which are abundant, exhibit high condition, and are long lived, is the dominant species and likely plays a major role in shaping the entire fish community. Pumpkinseed sunfish and yellow perch, although abundant, likely offer only limited fishing opportunity due to their mostly small size. However, these panfish likely provide an abundant forage base for bass. Considering the results of this survey, we recommend that managers continue with the current management strategy.

One recent change in the management of bass is the recent implementation of a statewide 12-to 17-inch slot-limit regulation. The regulation allows anglers: a daily limit of five bass; no minimum size; only bass less than 12 inches or greater than 17 inches may be retained; no more than one over 17 inches may be retained; bass may be caught, retained, and released alive from a livewell until a daily limit is in possession. This regulation was implemented in 1999. Similar to many waters surveyed in Washington, the largemouth bass population in Chapman Lake had relatively fewer fish in the size range the slot limit is intended to protect. Management biologists should consider developing a long-term monitoring plan to document changes in Chapman Lake's bass populations over time. Objectives of such a program should focus on documenting changes in largemouth bass population density and changes in population structure. Additionally, creel survey data should be collected to evaluate angler compliance with the restrictive regulation.

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