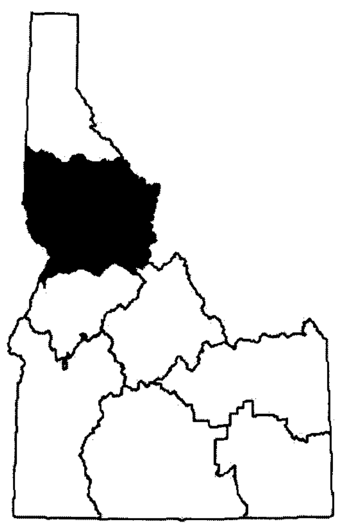
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Cal Groen, Director



CLEARWATER REGION

2004

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PROJECT I. SURVEYS AND INVENTORIES

Clearwater Region 2004 Fisheries Management Report

ABSTRACT

This report details the fisheries management activities conducted in the Clearwater Region during the 2004 calendar year. Regional personnel continue to compile 12 years of mountain lake management data into a comprehensive database/management plan. The plan addresses alpine lake management at the landscape level. Fifth and sixth level hydrologic unit codes (HUCs) were chosen as the landscape scale for management purposes. Ice Lake was resurveyed to determine effectiveness of brook trout *Salvelinus fontinalis* suppression by introduced tiger muskellunge *Esox lucius* X *E. masquinongy*.

Fishery enhancements were conducted by stocking 5,196 fingerling size kokanee *Oncorhynchus nerka*, 111,216 fingerling size rainbow trout *O. mykiss*, 283,515 catchable size rainbow trout, and 2,870 catchable size channel catfish *Ictalurus punctatus* in regional lowland lakes and ponds. Clearwater Region fisheries management personnel conducted standard lake surveys of four lowland lakes. In addition, a smallmouth bass *Micropterus dolomieu* population study and creel survey was initiated on Dworshak Reservoir to provide information on population parameters, harvest, and angler effort in order to direct future management actions. A total of 914 smallmouth bass were collected through electrofishing and angling, of which 227 were tagged. Of these tagged fish, 36 were recaptured and 25 were harvested. The creel survey on Dworshak Reservoir was conducted from March 28-August 28. Angler effort was estimated at 273,351 hours. This effort resulted in the overall capture of 248,069 fish, of which 206,308 were harvested. This is a catch rate of 0.91 fish/hour and a harvest rate of 0.75 fish/hour. An estimated 10,011 smallmouth bass were harvested.

A fisheries enhancement of Tolo Lake was conducted by stocking 200 channel catfish. Additionally, 1,960 black crappie *Pomoxis nigromaculatus* were removed from Mann Lake as part of an annual exchange with the Washington Department of Fish and Wildlife (WDFW) for tiger muskellunge. The tiger muskellunge are used as an experimental method for brook trout removal in high mountain lakes, and to supplement existing populations in lowland lakes. However, due to hatchery disease problems, we were unable to obtain any tiger muskellunge this year.

Nine children's fishing clinics were held on Free Fishing Day June 5, 2004. An estimated 228 children and 171 adults attended the events. Several local businesses donated a variety of fishing tackle which was given away as prizes and in goodie bags at each event.

GRANT OBJECTIVES

1. To collect and maintain information for fishery management decisions on mountain lakes, lowland lakes and reservoirs, and rivers and streams including angler use and success, fish population characteristics, spawning potential, stocking success, limnology, morphology, genetics and notes on other aquatic life and develop appropriate management recommendations.

2. To manage wild populations of native and introduced fish to maintain desired sport fishing opportunities, to protect native fish populations and for the collection of broodstock for specific management programs.

3. To improve/restore habitat on degraded streams within Idaho with good potential to enhance wild trout recruitment.

4. To create and improve habitat in reservoirs for sport and forage fish species.

METHODS

Fish community surveys on lowland lakes and reservoirs were performed using Idaho Department of Fish and Game (IDFG) standard survey protocol. Results were reported in catch-per-unit-effort (CPUE). One "unit" of effort consists of: one hour of boat electrofishing, one floating and one sinking gill net, and one trap net. Boat mounted electrofishing was conducted using pulsed DC current from a portable generator and a Coffelt VVP-2E pulsator. Standard floating and sinking experimental gill nets were 46 meters (m) long by 1.8 m deep with six panels of different size mesh. Mesh sizes were 19 millimeters (mm), 25 mm, 25 mm, 32 mm, 51mm, and 64 mm square. Indiana style trap nets consisted of a front box maze of two 1.8 m wide by 1.8 m high steel frames with center braces and four 0.8 m diameter hoops with two 203 mm throats, and a 46 m long x 0.9 m high leader. Mesh size was 19 mm throughout. Fisheries management personnel also utilize these standard electrofishing, trapping, and netting techniques for trapping and transplanting fish.

The annual smallmouth bass survey of Dworshak Reservoir consists of electrofishing three shoreline sites in their entirety: Magnus Bay, Swamp Creek Bay, and the shoreline beginning directly across from the Dent Boat ramp up to the Dent Bridge. Electrofishing time is recorded for each section, and all fish are weighed in grams (g) and measured for total length (mm).

Backpack electrofishing was conducted with 2-3 person teams. One person operates a Smith Root Model 15D generator powered backpack electrofishing unit and nets fish. The other team member(s) net fish and/or carry a 5-gallon holding bucket. The electrofishing unit is typically operated at the I-5 and O-5 settings at 500-800 volts pulsed DC.

Fish community surveys on mountain lakes were performed utilizing gill nets, angling, and standard backpack electrofishing methods. A single 7-panel gill net (mesh sizes 10 mm-38 mm, 40 m long, Research Nets, Seattle, WA was set in the lake in early evening. The gill net was removed the next morning after 12 hours, and all fish collected were measured for length and weight. Fish collected by angling were measured for length and weight, and angling time was recorded in rod-hours.

Standard snorkeling techniques were used to monitor fish densities at established monitoring sites in regional rivers and streams. Snorkeling was conducted when stream flows are low, clear and accessible. Small streams were snorkeled upstream with one to five observers depending on stream width and visibility. Larger streams and river corridors were snorkeled either upstream or free-floating downstream with the number of observers dependent on corridor width, water depth, and visibility. Fish observed were recorded by species in mm groups, with the exception of salmon, which were recorded by age group. Population abundance was reported as fish per 100 m^2.

Job a. 2004 Clearwater Region Mountain Lake Investigations

Regional Objectives

1. Biological, physical, and chemical inventory of mountain lakes.

2. Long term monitoring.

3. Determine ecological effect of fish introductions.

4. Development of fish management guidelines for individual lakes.

Methods

Standard mountain lake survey methodology was utilized to collect brook trout from Ice Lake to determine the effectiveness of tiger muskellunge as a method for removing brook trout from mountain lakes. Backpack electrofishing was utilized to collect fish from the lake inlet and outlet.

Results and Discussion

In 2004, one 12-hour net set, two angler hours, and 658 seconds of electrofishing in the inlet and outlet resulted in the capture of no brook trout (Figure 1) or tiger muskellunge. No tiger muskellunge or brook trout were collected or observed in Ice Lake during sampling in either 2002 or 2004. This suggests that a stocking rate of 40 tiger muskellunge/ha, in conjunction with electrofishing, provided an effective method for removal of brook trout from the lake. The persistence of tiger muskellunge is then limited by prey availability.

Management Recommendations

1. Continue monitoring Ice Lake to determine long term effectiveness of tiger muskellunge introductions on controlling brook trout.

2. Expand the tiger muskellunge program to additional mountain lakes to gain further information regarding the effectiveness of this technique as a management tool.

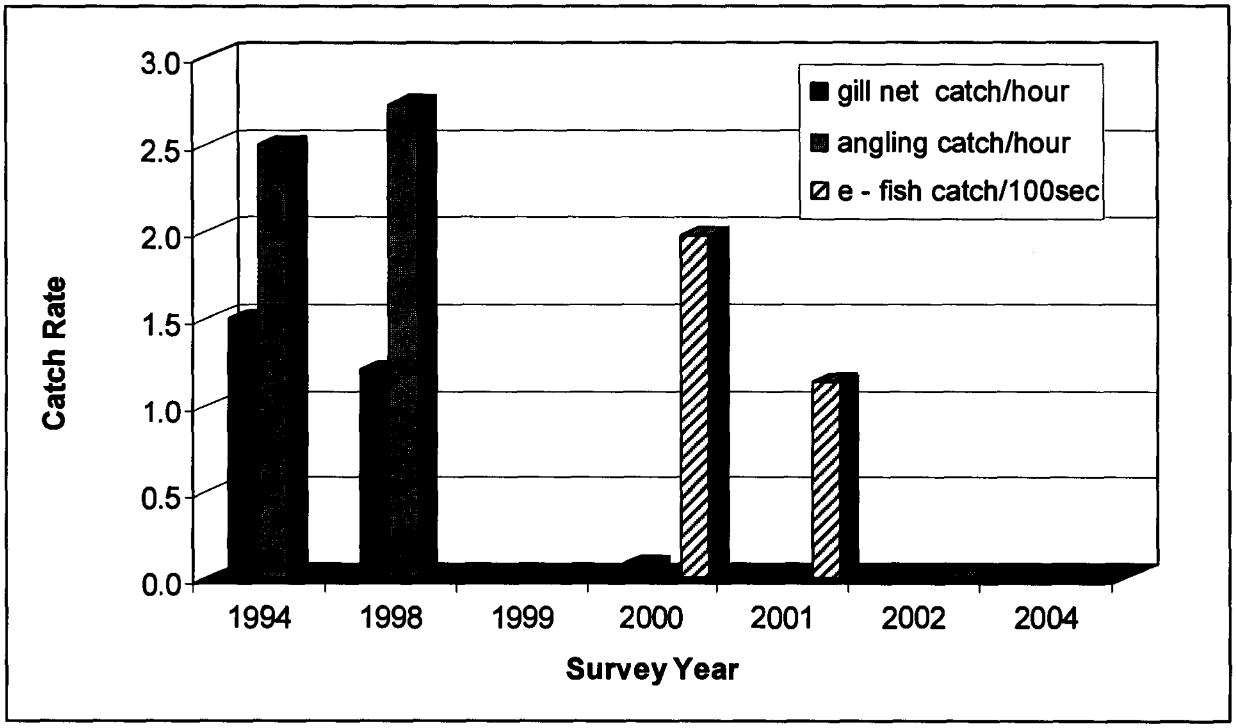


Figure 1. Estimated brook trout abundance in Ice Lake, 1994-2004, including lake inlet and outlet 2000-2004.

Job b. 2004 Clearwater Region Lowland Lake Investigations

Regional Objectives

1. Utilize hatchery raised fish to provide or enhance fish populations for sport fishing in waters that are limited by a lack of reproduction or excessive fishing pressure or both.

2. Move naturally produced fish from other waters to provide or enhance fish populations for sport fishing in waters that are limited by a lack of reproduction or excessive fishing pressure or both.

3. Control, eradicate, or remove undesirable fish from regional waters.

4. Conduct standard lake surveys and creel surveys on lowland lakes and reservoirs to track fisheries composition and catch rate.

Methods

A creel survey was conducted from March 28 to August 28, 2004 on Dworshak Reservoir. The survey utilized uniform sampling with two day types (weekday and weekend/holiday) and two week periods (Boydstun and McArthur 1993). The reservoir was divided into three sections: dam to Dent Bridge, Dent Bridge to Grandad Bridge, and Grandad Bridge to the end of flat water. Creel survey results were calculated using the IDFG Creel Survey Program.

Smallmouth bass were collected in Dworshak Reservoir for tagging using angling and electrofishing techniques. Fish were tagged using Floy anchor tags (model FD94) 64 mm length, yellow in color, with a tag number and the wording "IDFG 208-799-5010" printed on each tag. Mark III tagging guns were used to insert tags.

Results and Discussion

Fish Stocking and General Population Management

We enhanced resident fish populations and sport fishing in lowland lakes and reservoirs of the Clearwater Region in 2004 by stocking approximately 111,216 fingerling rainbow trout 5,196 fingerling kokanee, and 283,515 catchable size rainbow trout (Table 2). Additionally, 2,670 catchable size channel catfish were stocked into Winchester Lake, and 200 catchable size channel catfish were stocked into Tolo Lake.

Clearwater Region personnel collected black crappie from Mann Lake on April 27, 2004 using electrofishing gear. These fish were transferred to the WDFW. Usually these fish are traded for tiger muskellunge, but hatchery problems prevented us from obtaining any this year. The tiger muskellunge have been stocked in two mountain lakes (Ice Lake and Rainbow Lake) to determine their effectiveness as a method for removing brook trout from mountain lakes.

Nine children's fishing clinics were held on Free Fishing Day, June 12, 2004. An estimated 228 children and 171 adults attended the events.

Table 1. Fingerling (102 – 152 mm) westslope cutthroat trout, rainbow trout, and kokanee stocked in the lowland lakes and reservoirs of the Clearwater Region, 2004.

Water	Month	Cutthroat trout	Rainbow trout	Kokanee	Total
Deer Creek Reservoir	September	14,994			14,994
Mann Lake	April		29,472		29,472
Soldier's Meadow Reservoir	April		19,632		19,632
Spring Valley Reservoir	April		27,948		27,948
Waha Lake	June		4,992	5,196	10,188
Winchester Lake	April		29,172		29,172
Total			111,216	5,196	131,406

Table 2. Catchable-size (203 mm+) trout stocked in lakes, ponds, and reservoirs of the Clearwater Region, 2004.

Water	April	May	June	July	August	September	Total
Camp Grizzly Pond			500				500
Campbell's Pond	1,530	4,650	3,084			910	10,174
Deer Creek Res.	7,808	12,192					20,000
Dworshak Res.	41,520		6,480				48,000
Elk Creek Res.		7,513	7,518			6,500	21,531
Fenn Pond		540	554	1,040		1,430	3,564
Five Mile Pond		555	1,500	960			3,015
Henrys Gulch Pond		1,170	555				1,725
Hordeman Pond	255						255
Karolyn's Pond		555	554			455	1,564
Levee Pond	425	1,089	223			1,365	3,102
Mann Lake	16,500	10,150				7,920	34,570
Moose Creek Res.	7,200	15,016	2,500			9,960	34,676
Powell Pond		1,530	555	480		455	3,020
Robinson Pond		990					990
Soldier's Meadow Res.		15,350	4,989				20,339
Spring Valley Res.		9,600	15,380			7,590	32,570
Waha Lake	7,200						7,200
Wilkins Pond			500				500
Winchester Lake	9,200	7,280	7,200			12,540	36,220
Total	91,638	88,180	52,092	2,480	0	49,125	283,515

Dwdorshak Reservoir

An annual smallmouth bass monitoring survey was conducted on Dworshak Reservoir from May 27-29, 2004. A total of 55 smallmouth bass were collected in 18,539 seconds of electrofishing. This is the lowest number of smallmouth bass collected during the monitoring survey since 1994 (Figure 2). Poor weather and visibility, and consistent rain throughout the survey reduced sampling efficiency and were definite factors in the lower number of fish collected. The fish collected ranged in length from 110-450 mm (Figure 3). Smallmouth bass proportional stock density (PSD; Gablehouse, 1983) was 11.4 in 2004, continuing its upward trend from 6.7 in 2001 (Figure 4).

In addition to the annual monitoring survey, a smallmouth bass population survey was conducted on Dworshak Reservoir from April-September to determine vital population parameters and direct future management actions for the reservoir. This included a creel survey conducted from March 28-August 28, 2004. Angler effort was estimated at 273,531 hours, with a 95% confidence interval of 27,296 hours. This effort resulted in an estimated 248,069 fish caught (Table 3), with 206,308 of those harvested. This is an overall catch rate of 0.91 fish/hour, and a harvest rate of 0.75 fish/hour. An estimated 10,011 smallmouth bass were harvested (95% confidence interval of 5,142). During the creel survey, 164 bass were seen by creel clerks. A comparison of length frequency distributions of bass collected by sampling and harvested by anglers is shown in Figure 5. Additionally, 190,185 kokanee were harvested. An estimated 119,337 kokanee were harvested in section 1 (Dworshak Dam to Dent Bridge), 57,525 in section 2 (Dent Bridge to Grandad Bridge), and 13,283 in section 3 (Grandad Bridge to end of slack water) (Table 4). Estimated kokanee harvested by time intervals in the three sections is shown in Figure 6.

As part of the smallmouth bass population survey, a total of 914 smallmouth bass, ranging in length from 76-510 mm, were collected through electrofishing and IDFG angling (Figure 7). PSD values for fish collected through electrofishing and angling were 6.6 and 10.3. Mean relative weights (Anderson and Gutreuter, 1983) ranged from 73 for quality size fish, to 128 for trophy size fish (Table 5). During the study, we tagged 226 fish ranging in length from 240 - 450 mm. No fish under 240 mm were tagged due to data indicating that anglers do not harvest smallmouth bass in Dworshak Reservoir until they reach 254 mm in length. Thirty-six of the tagged fish were recaptured during the study period (either by anglers or during sampling), with 25 of those being harvested. If we assume a 100% angler reporting rate, this provides a recapture rate of 15.9% and a harvest rate of 11.1%. However, angler reporting rates generally range from 25-75%. This suggests recapture and harvest rates ranging from 21.2%-63.7% and 14.7%-44.2% respectively. A population estimate can be derived from these harvest rate estimates in conjunction with the harvest estimate of 10,011 fish generated from the creel survey. Utilizing these numbers, the population of smallmouth bass over 305 mm in Dworshak Reservoir is estimated to be from 22,649 - 68,102 fish. A comparison of the length frequency distributions of fish tagged and tagged fish harvested by anglers is shown in Figure 8. Even though a high percentage of bass are being harvested, most of these fish are 254-305 mm in length. Using scale samples, average length at age was calculated for 199 smallmouth bass between the lengths of 110-520 mm (Figure 9). The graph shows that it will take approximately seven years for a bass to reach 305 mm in length, and ten years to reach 381 mm in length in Dworshak Reservoir. This very slow growth is due primarily to cold water (short growing season) and a limited prey base.

Utilizing all of the population information collected for smallmouth bass, the fisheries modeling program FAST (Slipke and Maceina 2002) was used to calculate a variety of

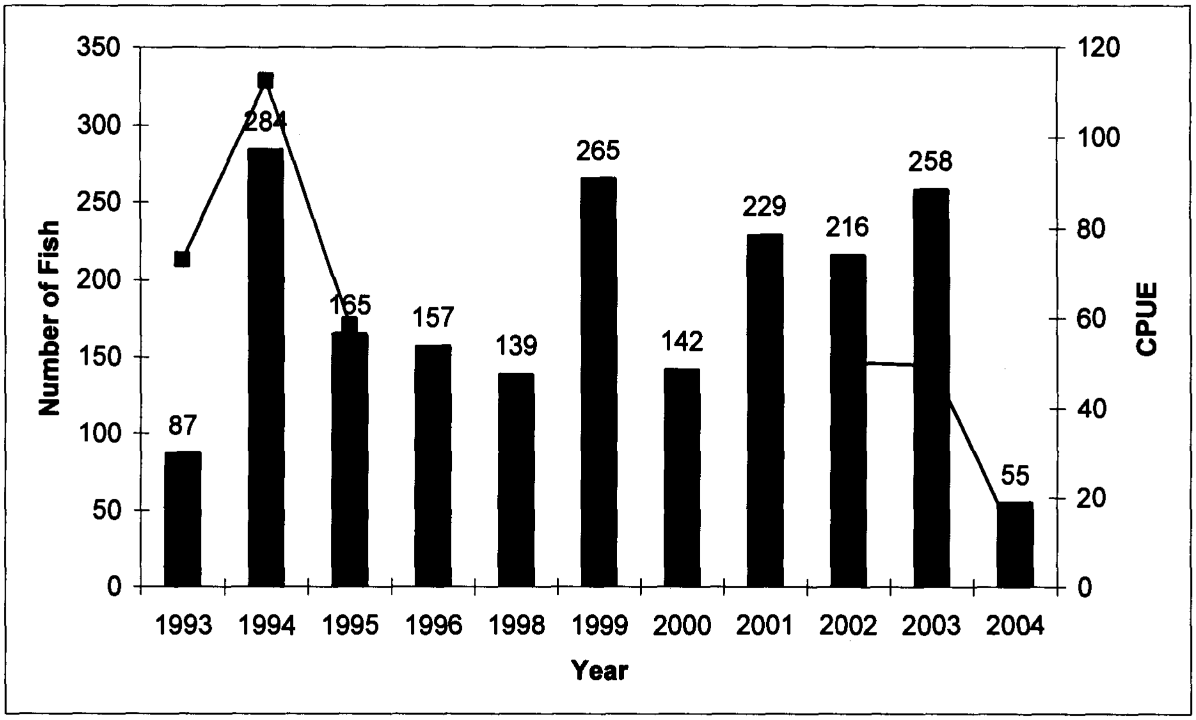
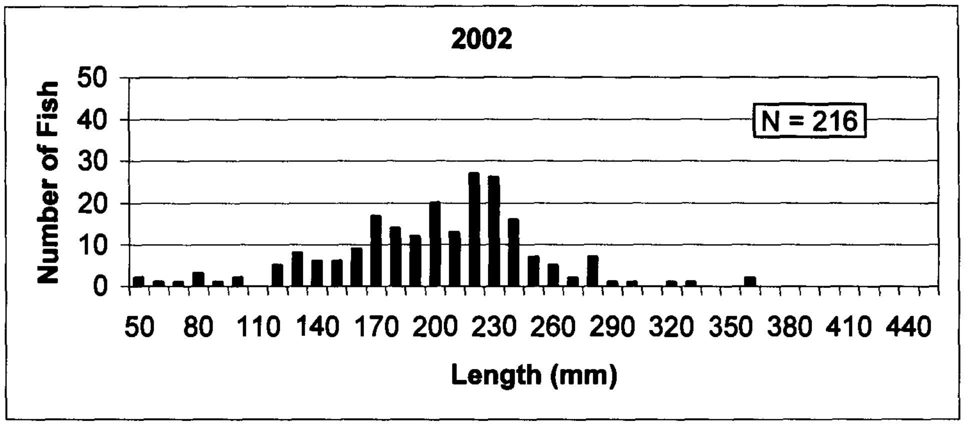
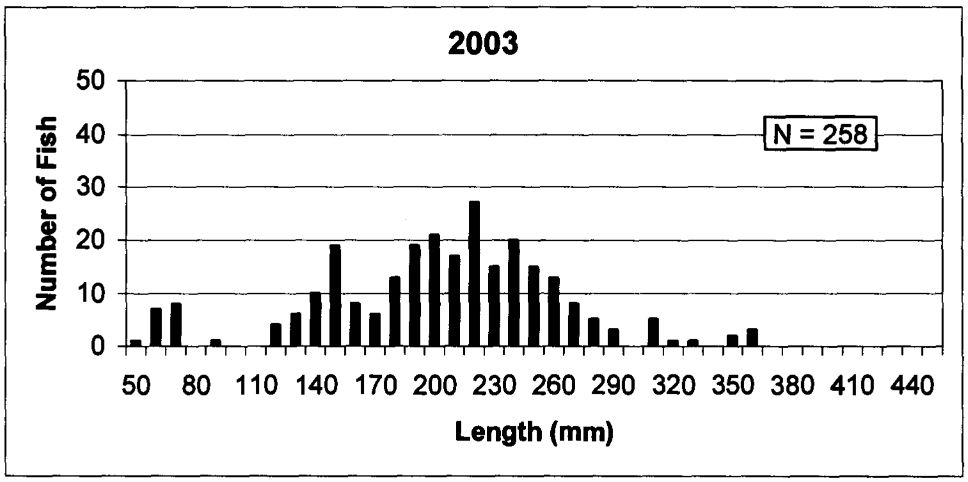


Figure 2. Number and CPUE of smallmouth bass collected during annual population surveys of Dworshak Reservoir, 1994-2004 (N values shown).





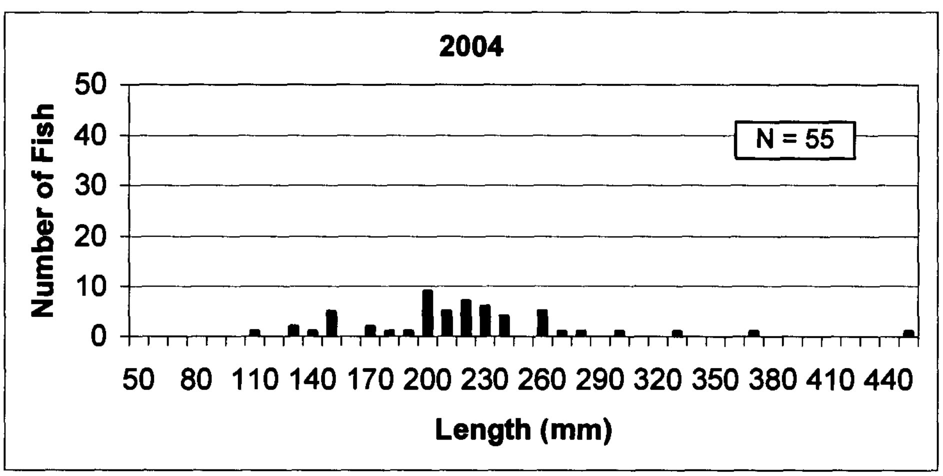


Figure 3. Length frequency distributions of smallmouth bass collected during annual population surveys of Dworshak Reservoir, 2002-2004.

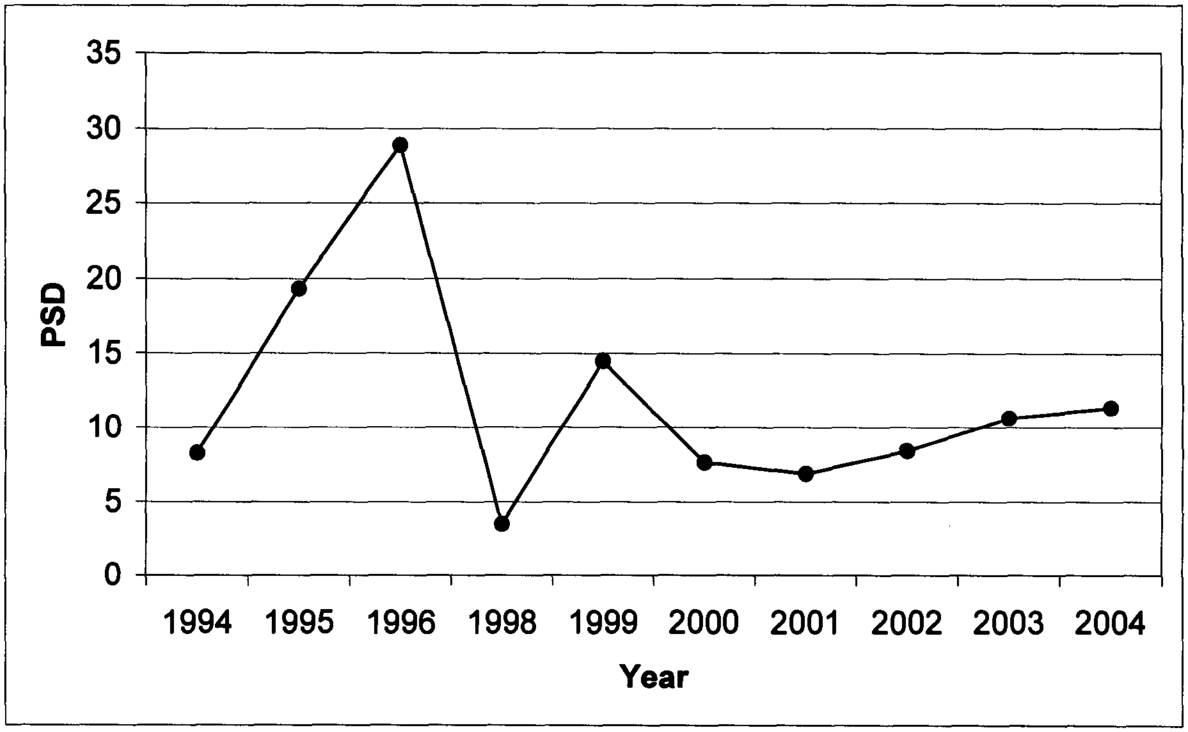


Figure 4. Proportional Stock Density values of smallmouth bass collected during annual population surveys of Dworshak Reservoir, 1994-2004.

Table 3. Harvest estimates calculated from a creel survey conducted on Dworshak Reservoir, 2004.

Species	Estimated Harvest	95 % C.I.
Kokanee	190,185	32,253
Rainbow trout	5,516	1,751
Cutthroat trout	239	386
Hybrid trout	236	508
Smallmouth bass	10,011	5,142
Total harvest	204,773	33,203

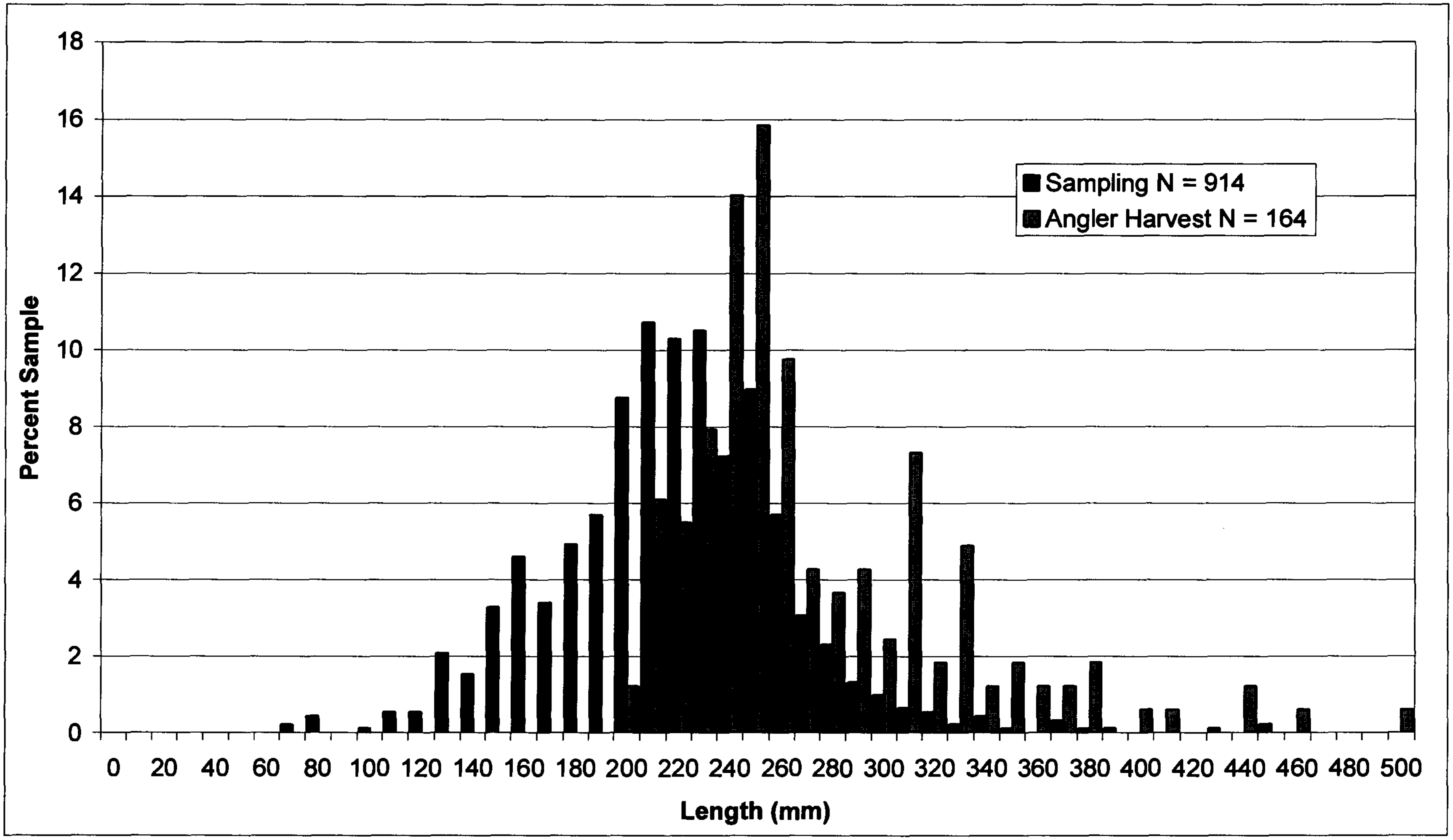
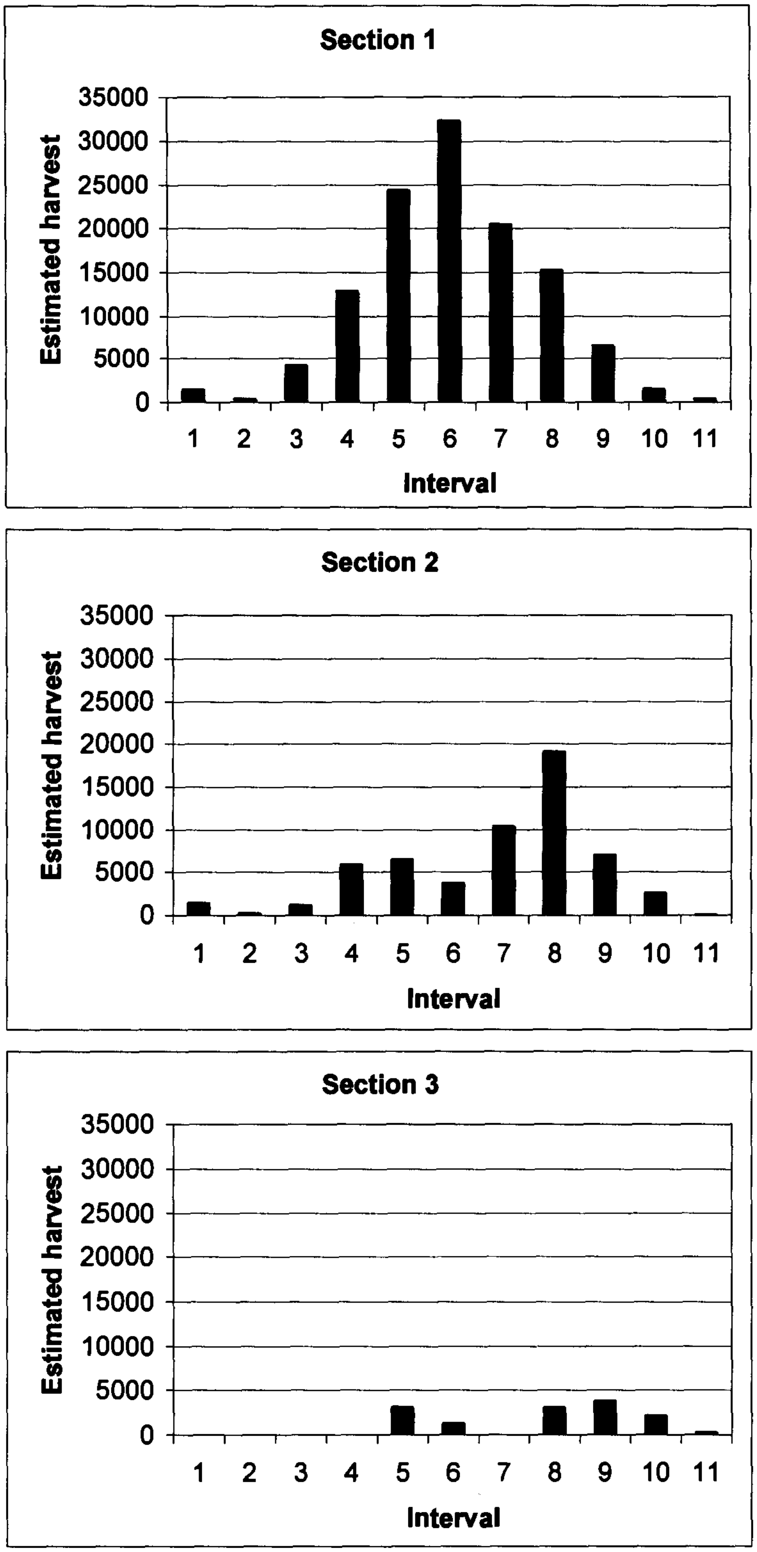


Figure 5. Comparison of length frequency distributions of smallmouth bass collected during sampling and harvested by anglers on Dworshak Reservoir, 2004.

Table 4. Estimated harvest of kokanee by section in Dworshak Reservoir based on 2004 creel survey.

Reservoir section	Estimated Harvest	95 % C.I.
Section 1		
Dworshak Dam to Dent Bridge	119,377	30,564
Section 2		
Dent Bridge to Grandad Bridge	57,525	9,052
Section 3		
Grandad Bridge to end of slack water	13,283	4,911
Total Harvest	190,5185	32,253

Figure 6. Estimated kokanee harvest by interval throughout three sections of Dworshak Reservoir based on 2004 creel survey.



Interval	Date
1	3/28 to 4/10
2	4/11 to 4/24
3	4/25 to 5/8
4	5/9 to 5/22
5	5/23 to 6/3
6	6/4 to 6/19
7	6/20 to 7/3
8	7/4 to 7/17
9	7/18 to 7/31
10	8/1 to 8/14
11	8/18 to 8/28

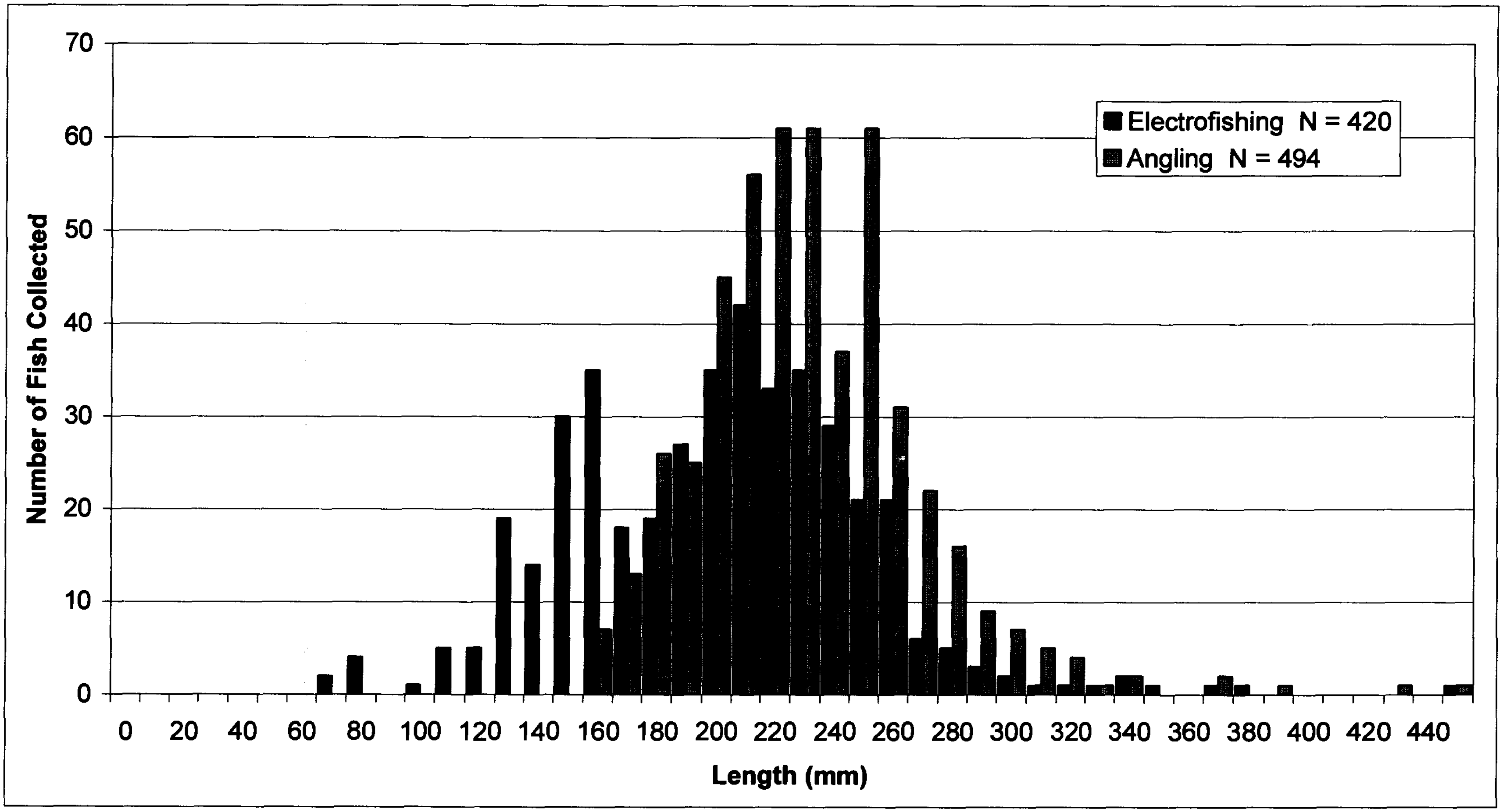


Figure 7. Length frequency distribution of smallmouth bass collected by electrofishing and IDFG angling during a population survey of Dworshak Reservoir, 2004.

Table 5. Mean relative weights of smallmouth bass collected during sampling of Dworshak Reservoir, 2004.

Sub-stock	Stock	Quality	Preferred	Memorable	Trophy
87	80	73	77	95	128

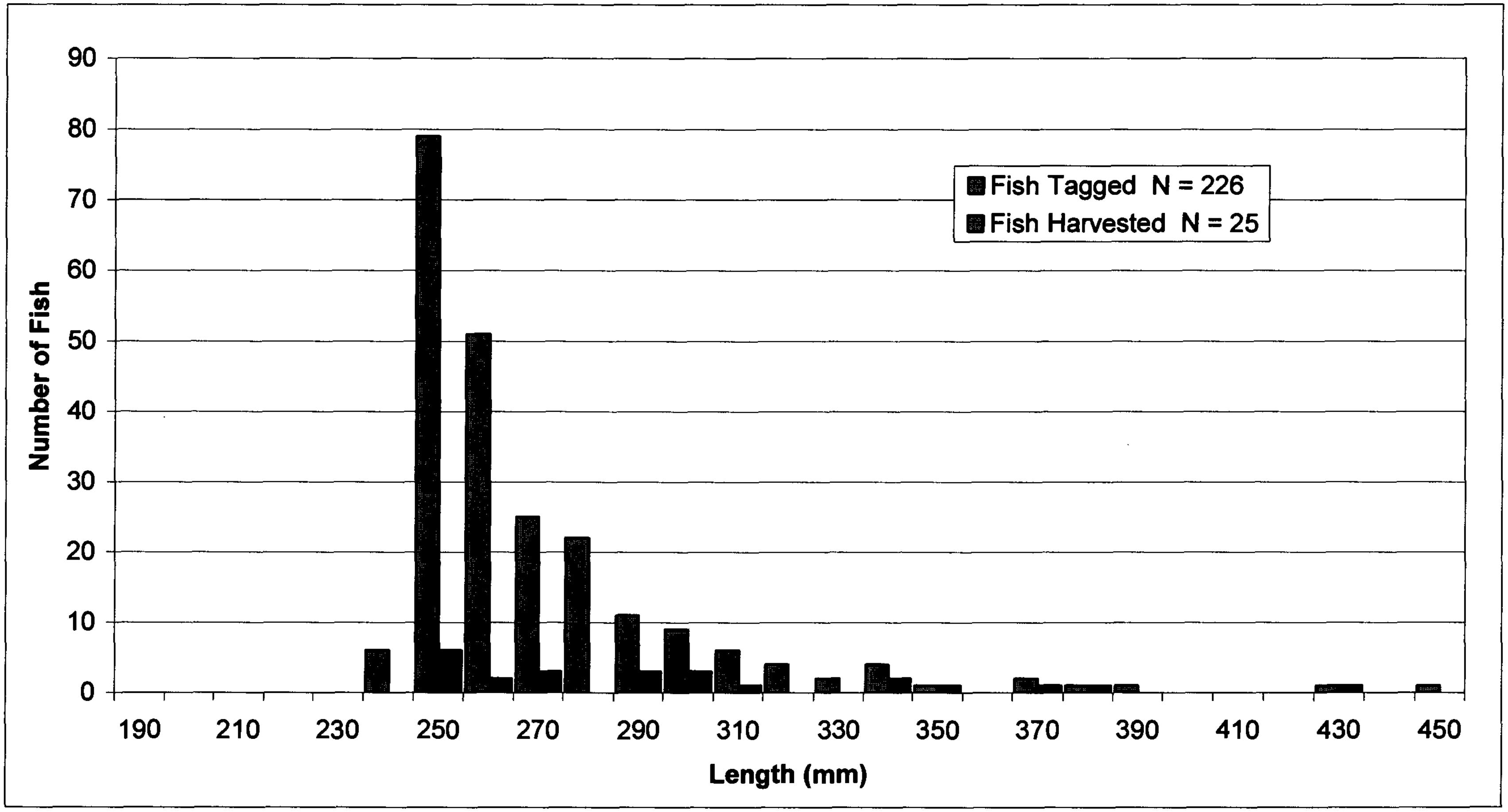


Figure 8. Comparison of length frequency distributions of smallmouth bass tagged, and tagged smallmouth bass that were harvested in Dworshak Reservoir, 2004.

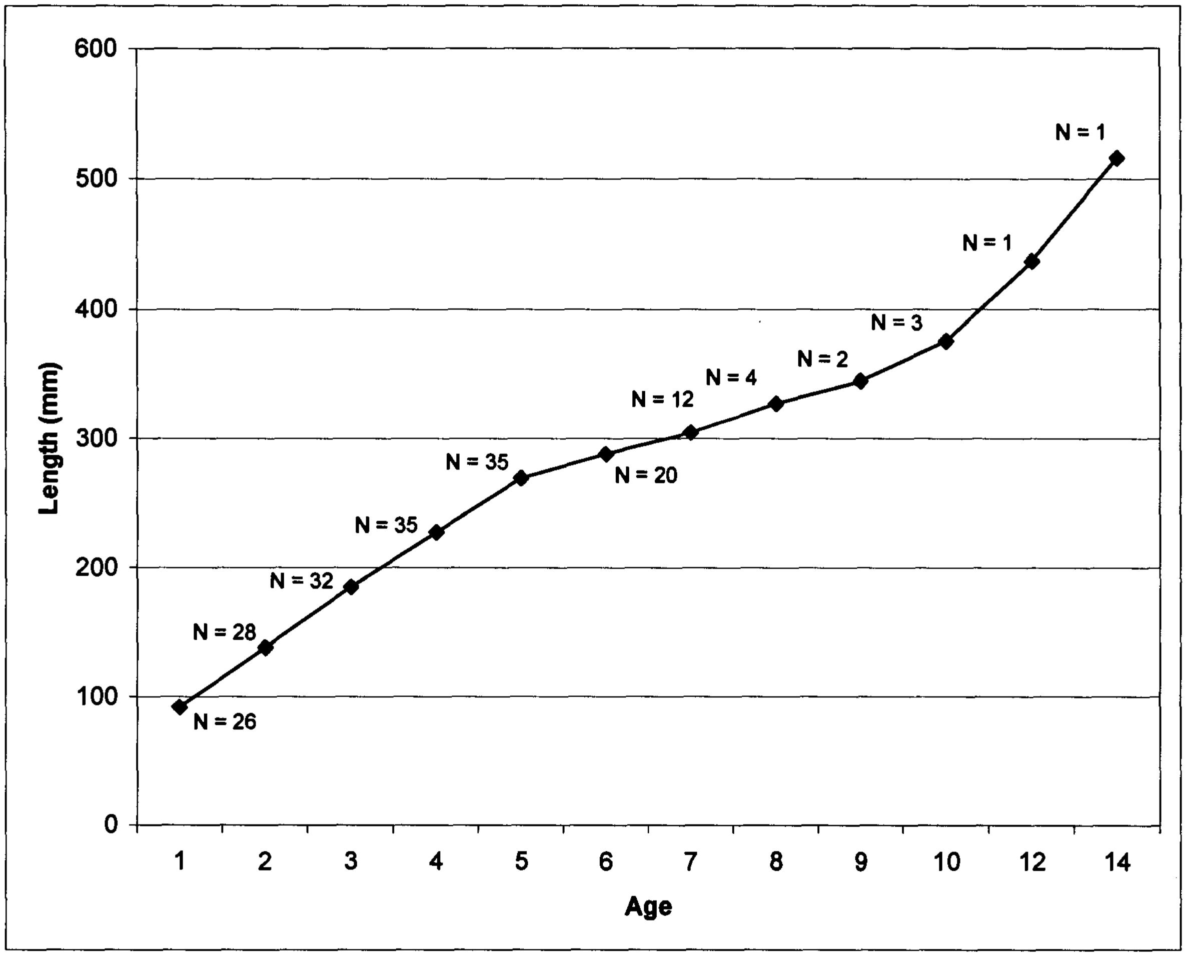


Figure 9. Back-calculated lengths at age for smallmouth bass collected in Dworshak Reservoir (N = number of fish aged), 2004.

population statistics, including a theoretical maximum length of 591.7 mm (from a Von Bertelanffy equation), theoretical maximum age of 14 years, and mortality statistics which are summarized in Table 6. The model was then used to determine the impact of several potential regulation changes on the smallmouth bass population. The first model estimated the number of fish over 305 mm in length in the reservoir under the current regulation of no minimum size limit compared to a minimum size limit of 305 mm. This model indicated that a minimum size limit of 305 mm would likely produce no change in the number of smallmouth bass over 305 mm in the reservoir (Figure 10), or in the number of smallmouth bass over 305 mm harvested from the reservoir (Figure 11). The second model estimated the number of fish over 381 mm in the reservoir under the current regulation of no minimum size limit compared to a potential 305-381 mm protective slot limit. The model indicated that a protective slot limit would likely produce no change in the number of smallmouth bass over 381 mm in the reservoir (Figure 12). However, it predicts a potential increase in the number of bass over 381 mm harvested with a protective slot limit (Figure 13). This is encouraging; but, due to the slow growth of bass in the reservoir, it would take several years to see any population response to a regulation change and based on the model could take up to 15 years to see the full benefits. Since it takes 10 years for a bass to reach 381 mm in length, it would be at least that long before any response to a slot limit could be scientifically measured. Given the very slow growth of smallmouth bass in the reservoir, and the long period of time before a response to regulation changes could be seen or accurately measured, it was determined that there was not enough evidence to warrant a regulation change at this time.

Moose Creek Reservoir

Clearwater Region fisheries management personnel conducted a standard lake survey of Moose Creek Reservoir on May 27, 2004. This survey resulted in the capture of 128 fish, including black crappie (N = 49), largemouth bass *M. salmoides* (N = 19), bluegill *Lepomis macrochirus* (N = 34), pumpkinseed *L. gibbosus* (N = 25), and brown bullhead *Ameiurus nebulosus* (N = 1). A comparison of CPUE and percent composition between samples collected in 2001 and 2004 are shown in Figures 14 and 15, respectively. These graphs show a large drop in largemouth bass numbers and biomass, while increases were seen in bluegill, pumpkinseed, and black crappie. Black bullhead *A. melas*, which were not collected in 2001, were present in small numbers in the 2004 sample. The length frequency distribution for largemouth bass shows fewer fish over 300 mm were collected in 2004 (Figure 16). Although more fish were collected in 2004 than in 2001, length frequency distributions of bluegill (Figure 17) and pumpkinseed (Figure 18) show little change between the two samples. Black crappie numbers also increased from the 2001 to 2004; however, the length frequency distribution (Figure 19) shows a shift towards larger fish in 2004.

Spring Valley Reservoir

Clearwater Region fisheries management personnel conducted a standard lake survey of Spring Valley Reservoir on May 28, 2004. This survey resulted in the capture of 297 fish, including largemouth bass (N = 127), bluegill (N = 120), and black crappie (N = 50). Due to the large number of fish collected during electrofishing, only 0.5 units of electrofishing effort were conducted. A comparison of CPUE and percent composition between samples collected in 1997, 2001, and 2004 are shown in Figures 20 and 21 respectively. When comparing CPUE, the number of largemouth bass collected in 2004 was similar to the number collected in 1997, but only half of the number collected in 2001. However, the 2004 sample had a substantially larger biomass than the 1997 and 2001 samples, indicating that the

Table 6. Mortality statistics calculated for smallmouth bass in Dworshak Reservoir, 2004 (F – fishing mortality; M – natural mortality; AM – total annual mortality; and S – total annual survival).

	F	M	AM	S
Age 2-4	0.19	0.15	0.29	0.71
Age 4-9	0.24	0.70	0.61	0.39
Age 9+	0.18	0.08	0.23	0.77
Overall	0.21	0.45	0.48	0.52

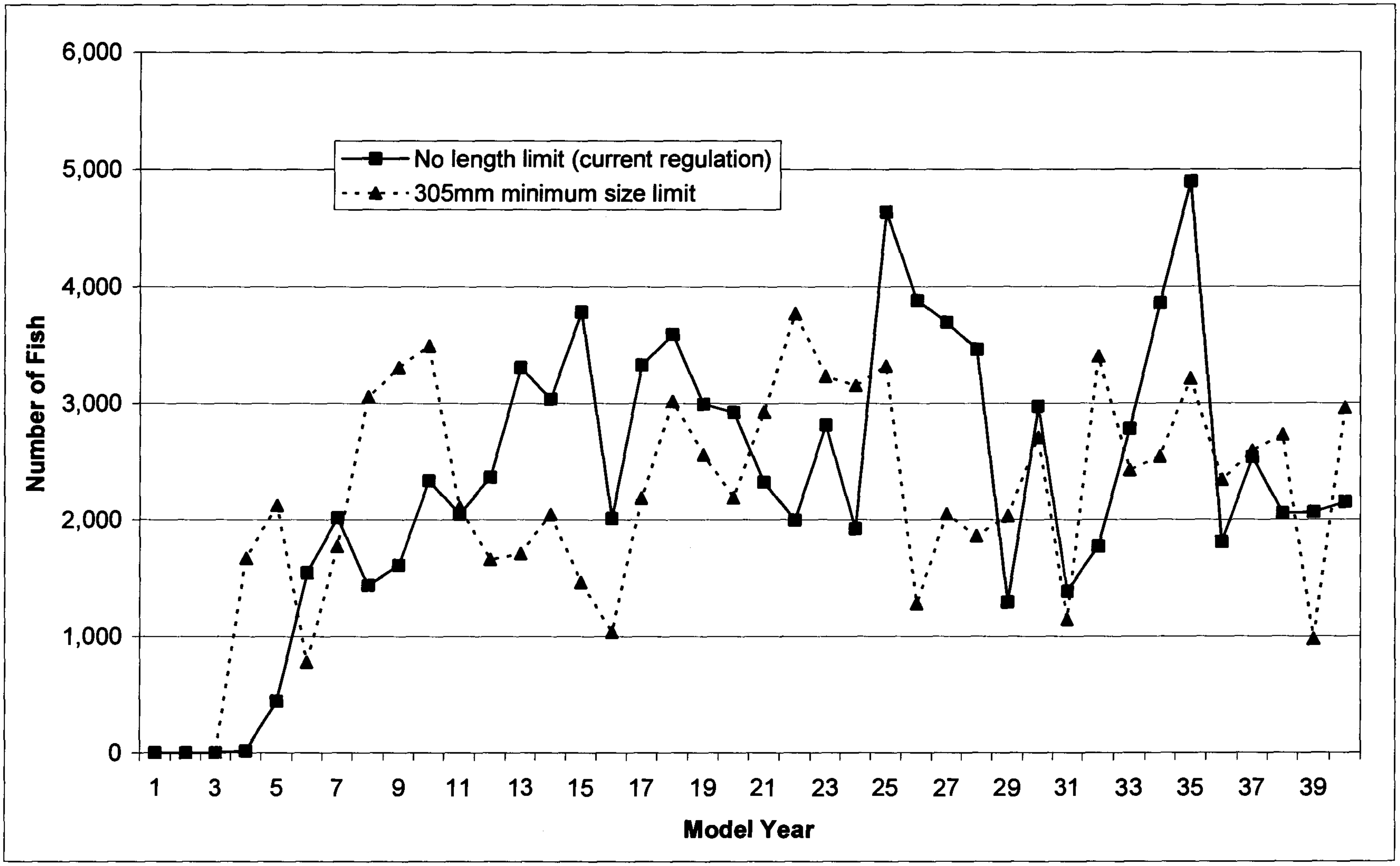


Figure 10. Model predicting the number of smallmouth bass over 305 mm in length in Dworshak Reservoir under the current regulation of no length limit versus a potential 305 mm minimum size limit.

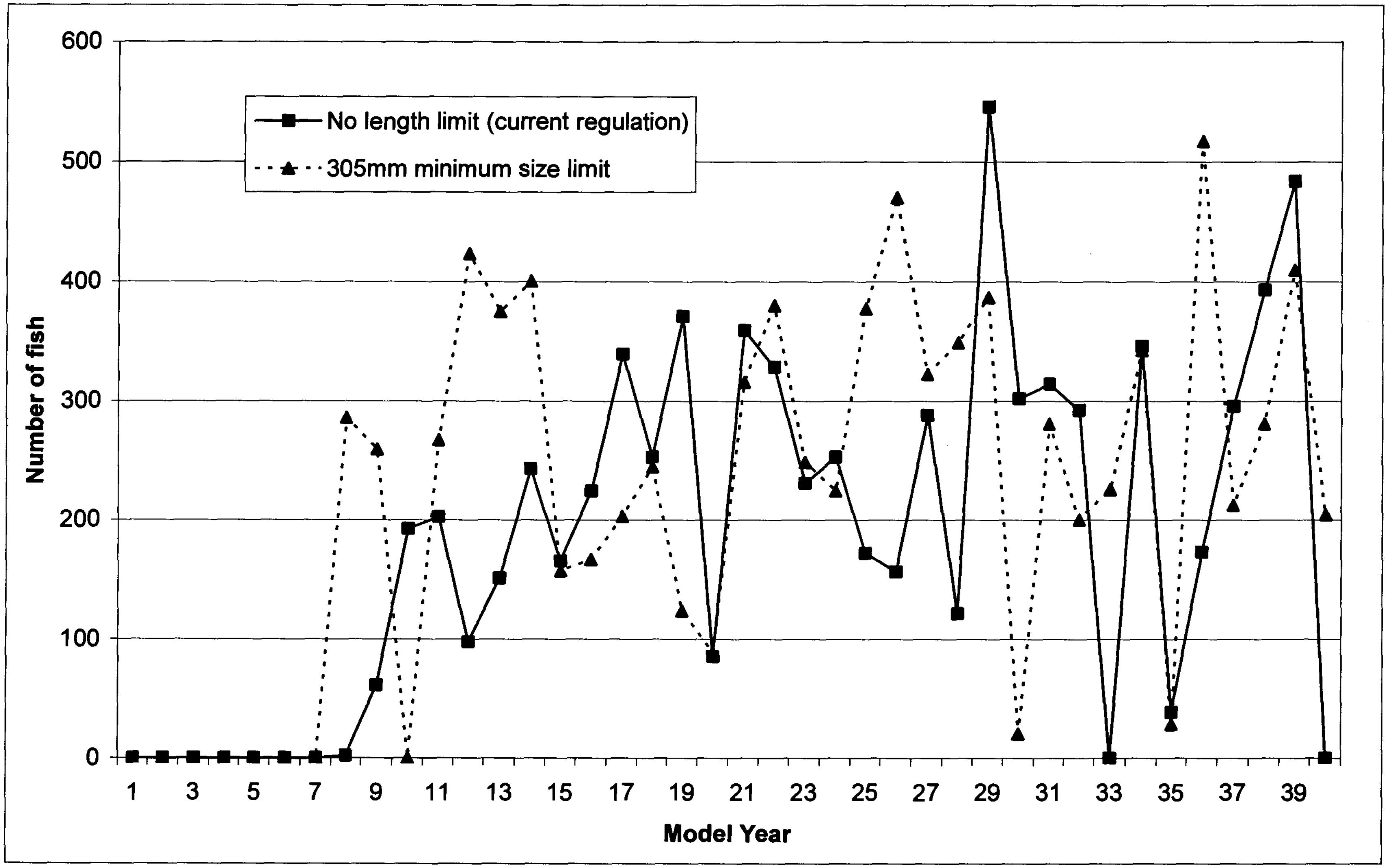


Figure 11. Model predicting the number of smallmouth bass over 305 mm in length harvested from Dworshak Reservoir under the current regulation of no length limit versus a potential 305 mm minimum size limit.

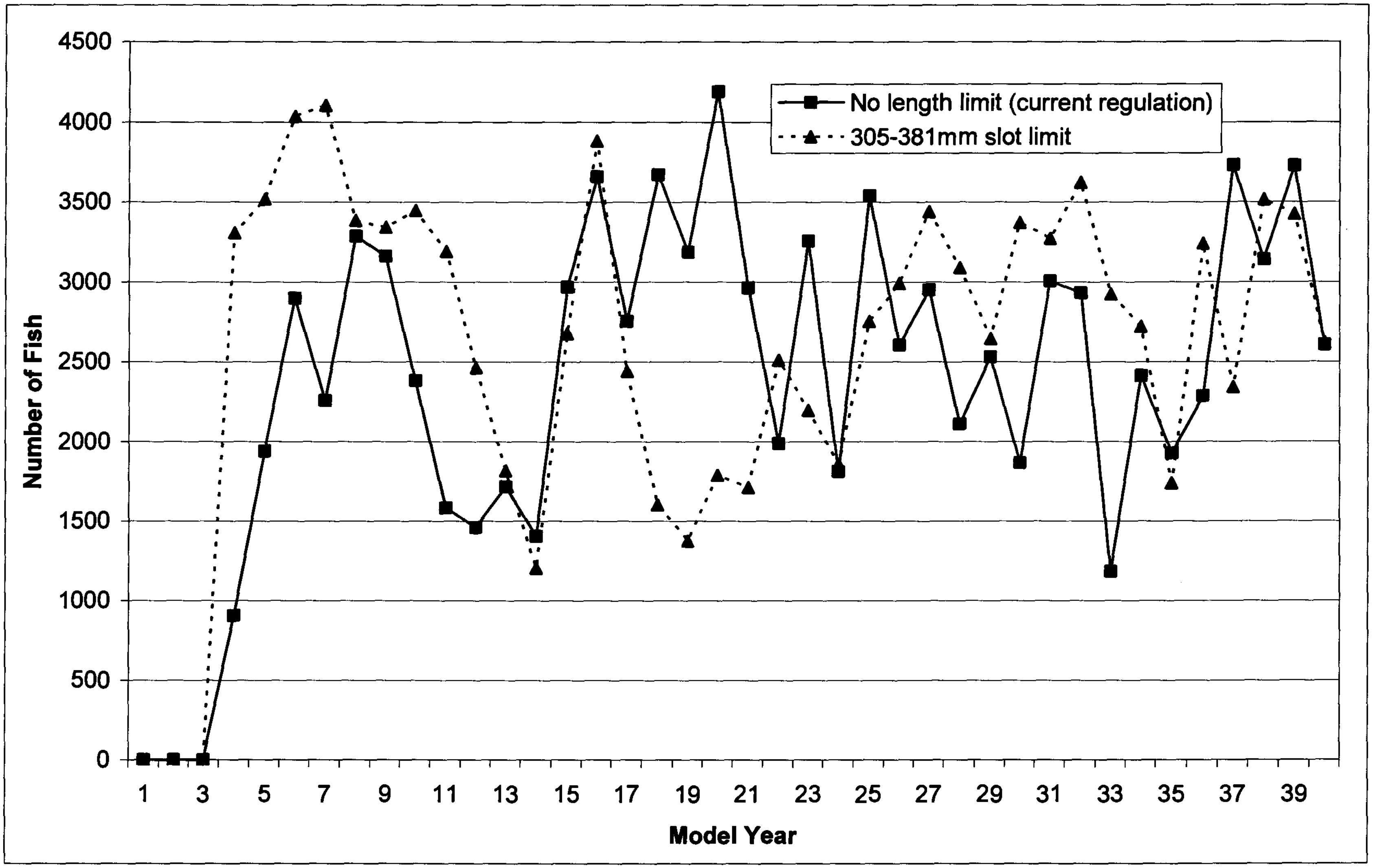


Figure 12. Model predicting the number of smallmouth bass over 381 mm in length in Dworshak Reservoir under the current regulation of no length limit versus a potential 305-381 mm protective slot limit.

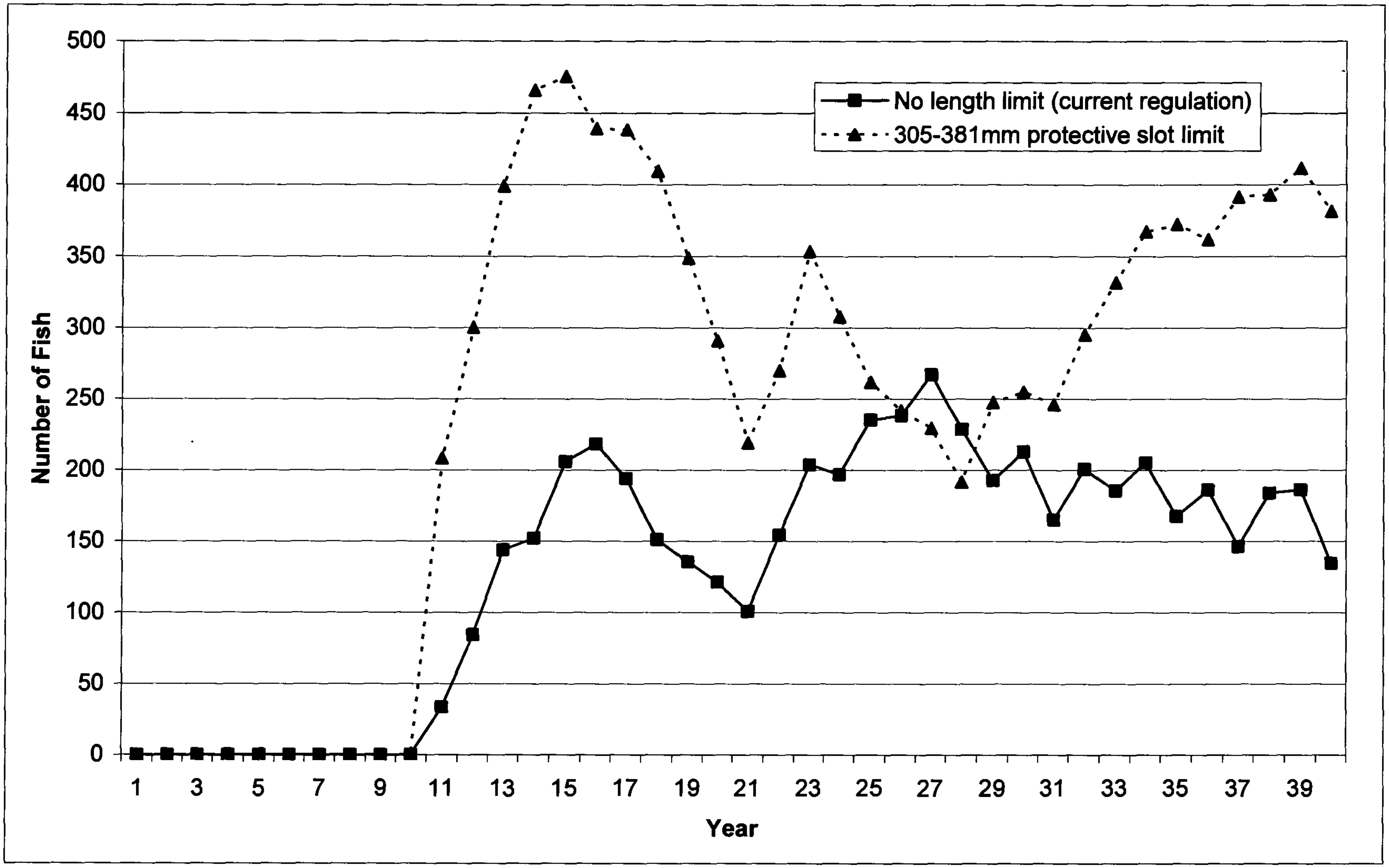


Figure 13. Model predicting the number of smallmouth bass over 381 mm in length harvested from Dworshak Reservoir under the current regulation of no length limit versus a potential 305-381 mm protective slot limit.

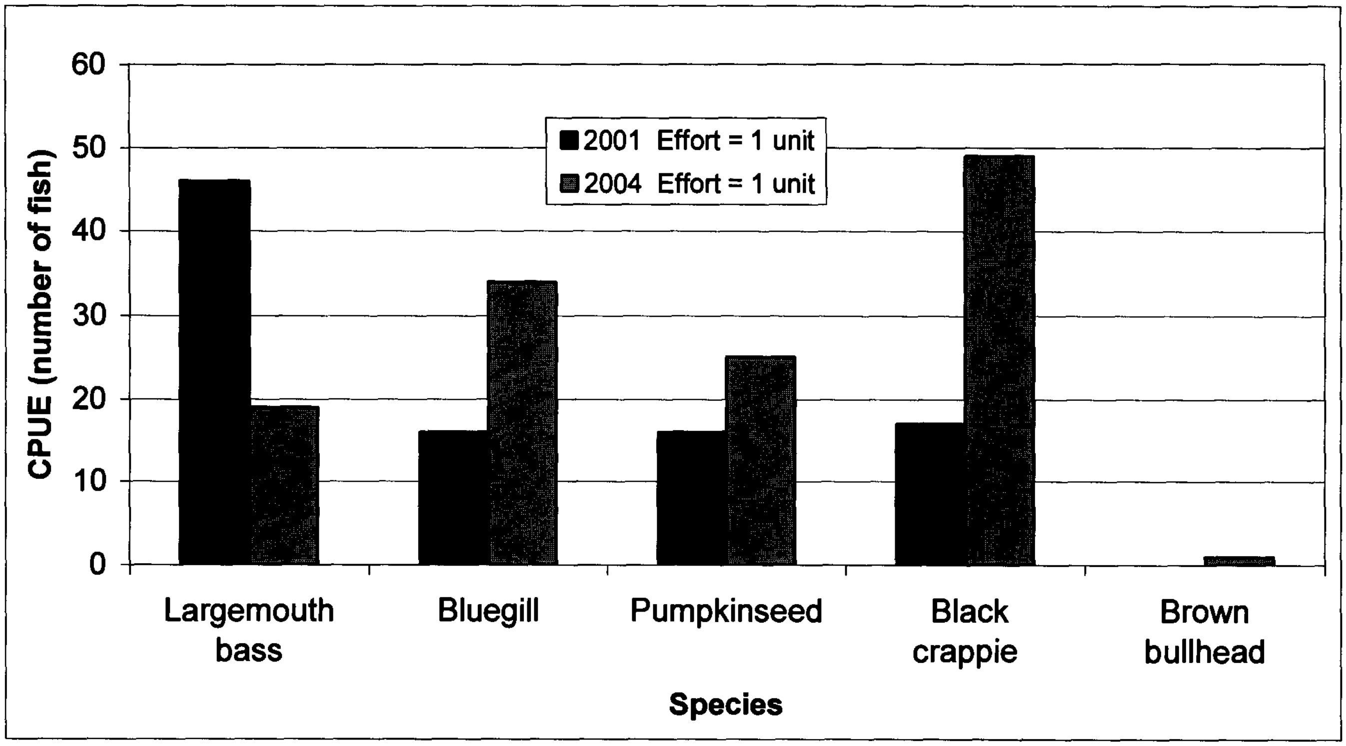


Figure 14. Catch-per-unit-effort of fish collected from standard lake surveys of Moose Creek Reservoir in 2001 and 2004.

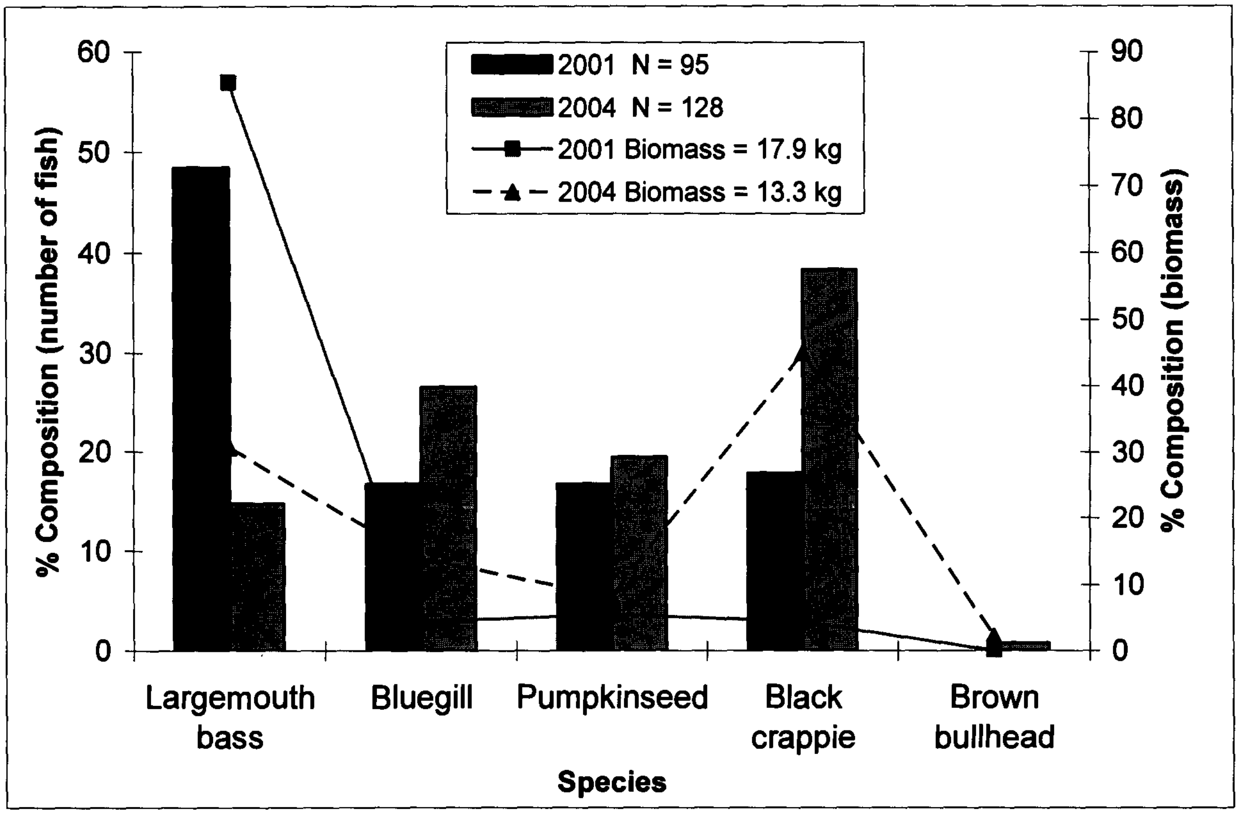
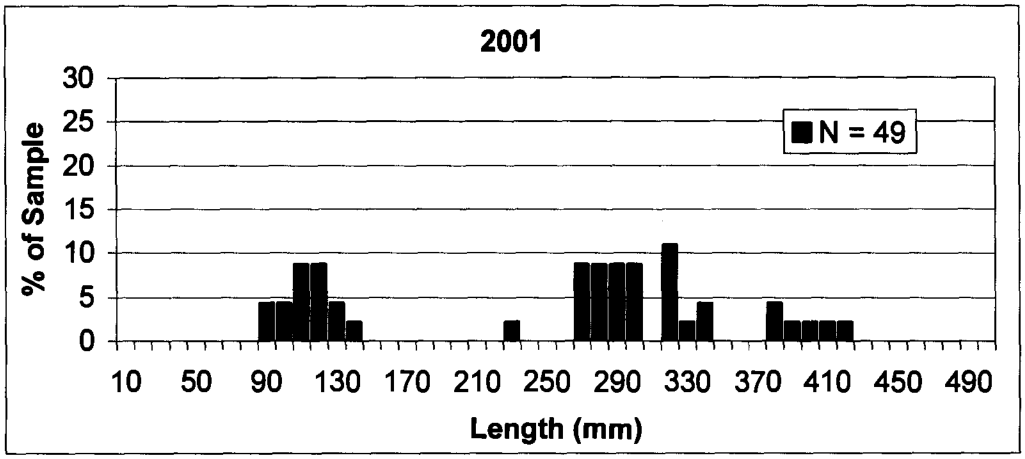


Figure 15. Catch composition of fish collected from standard lake surveys of Moose Creek Reservoir in 2001 and 2004.



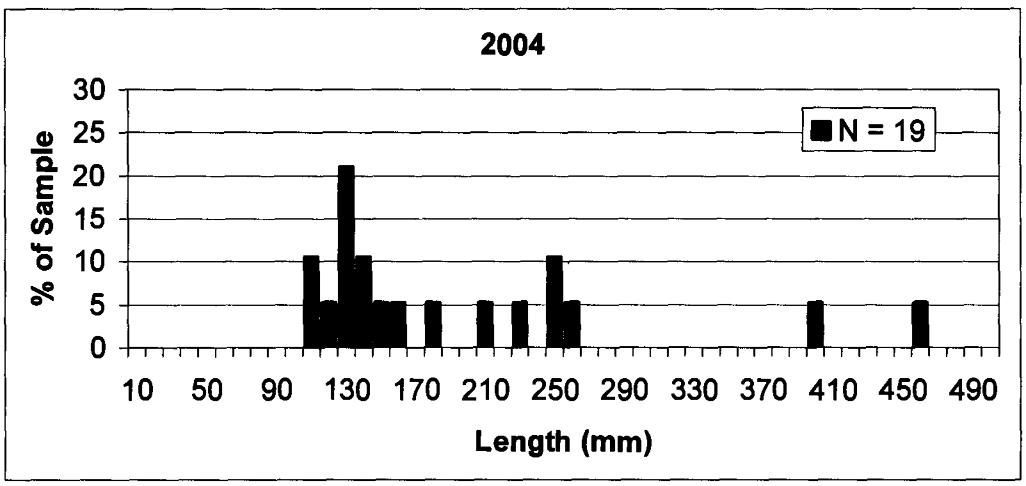


Figure 16. Length frequency distributions of largemouth bass collected from standard lake surveys of Moose Creek Reservoir in 2001 and 2004.

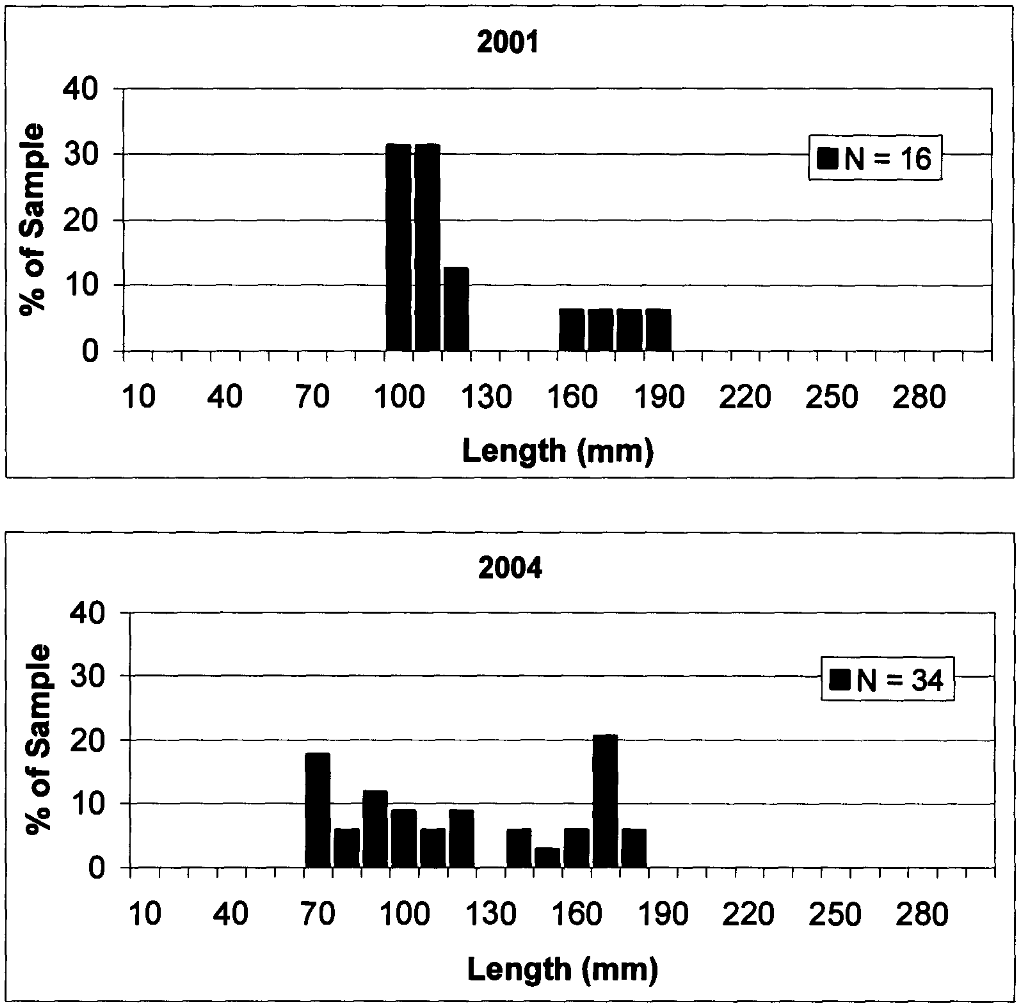
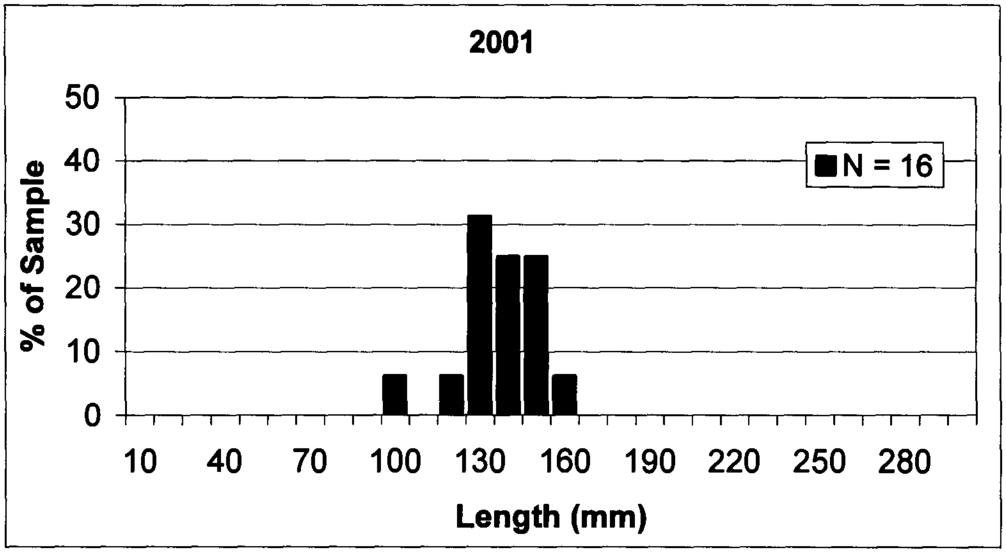


Figure 17. Length frequency distributions of bluegill collected from standard lake surveys of Moose Creek Reservoir in 2001 and 2004.



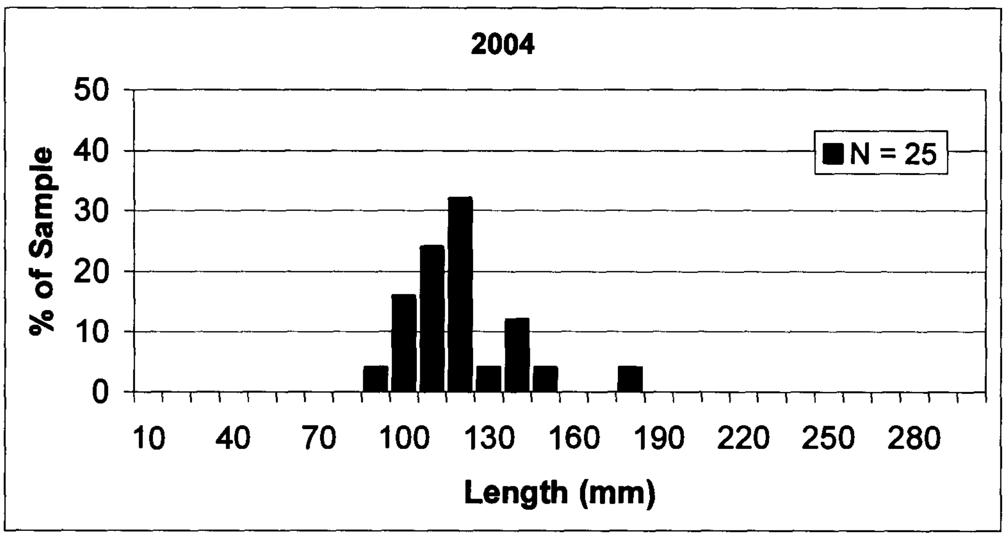


Figure 18. Length frequency distributions of pumpkinseed collected from standard lake surveys of Moose Creek Reservoir in 2001 and 2004.

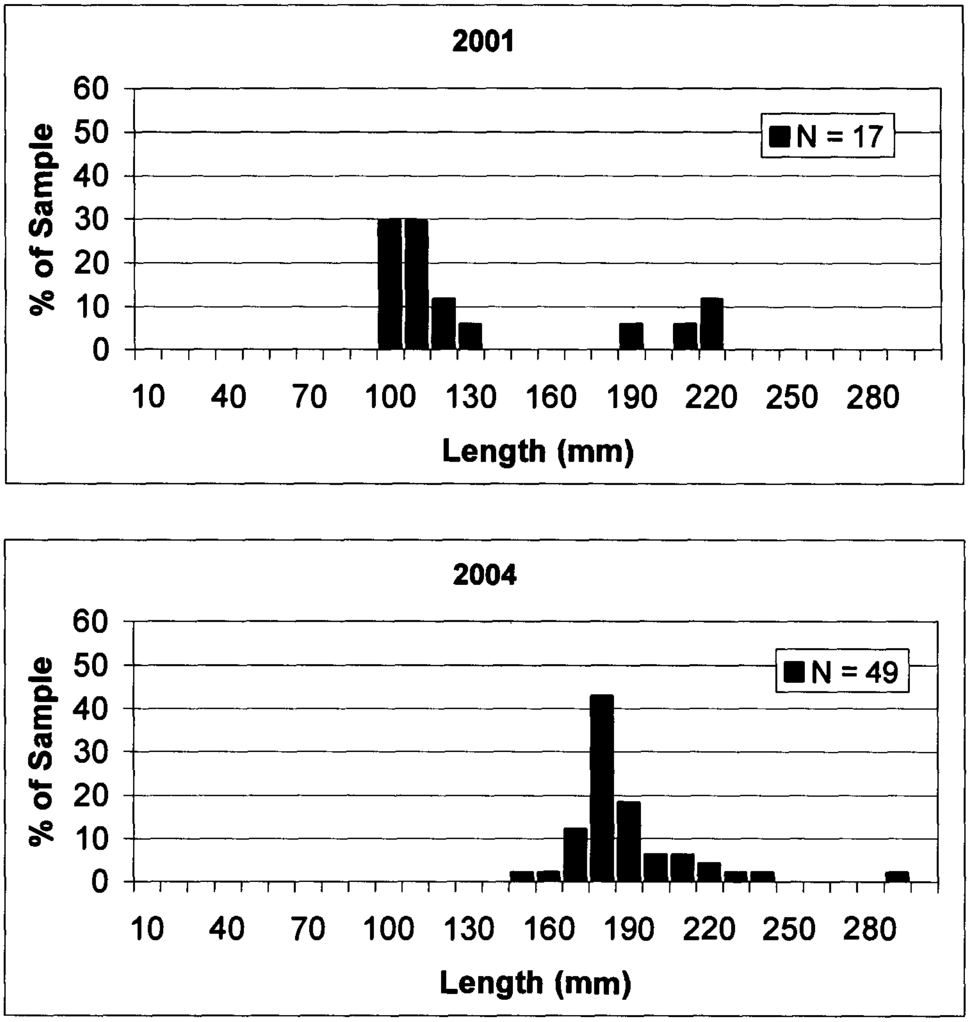


Figure 19. Length frequency distributions of black crappie collected from standard lake surveys of Moose Creek Reservoir in 2001 and 2004.

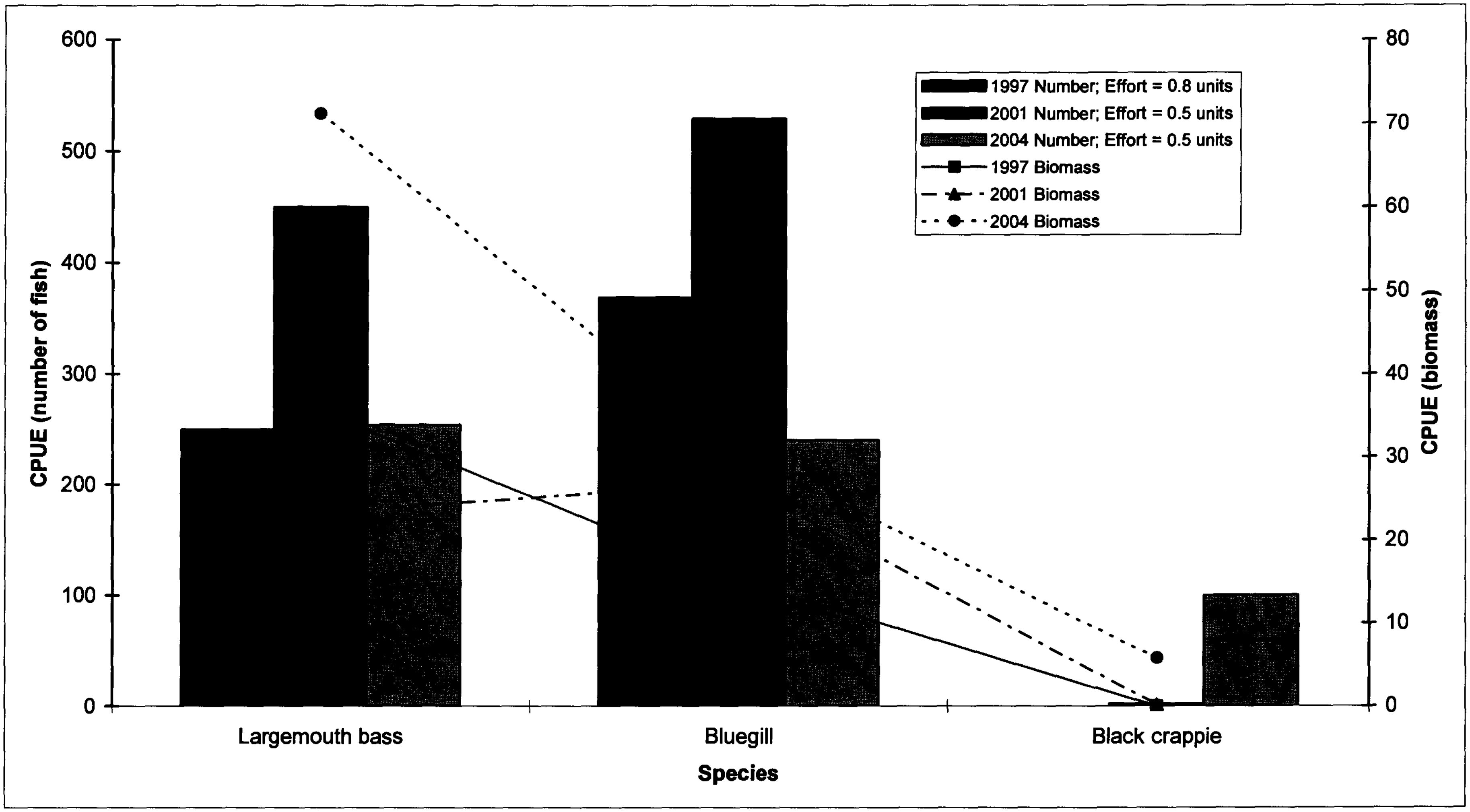


Figure 20. Catch-per-unit-effort of fish collected from standard lake surveys of Spring Valley Reservoir in 1997, 2001, and 2004.

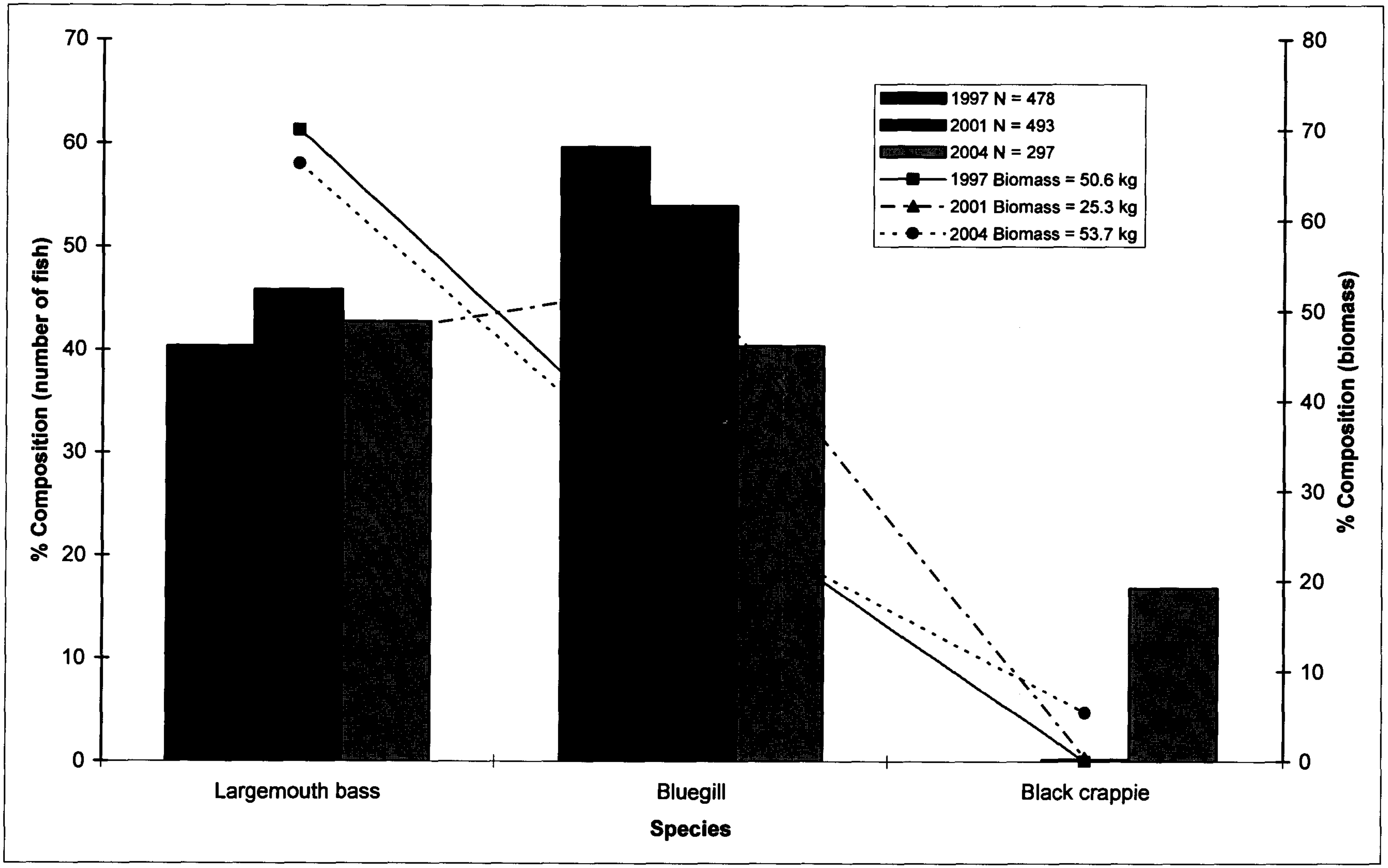


Figure 21. Catch composition of fish collected from standard lake surveys of Spring Valley Reservoir in 1997, 2001, and 2004.

fish collected in 2004 were larger than in previous years. This is confirmed by comparing length frequency distributions of the bass collected during these three years (Figure 22). The number of bluegill collected was lower in 2004 than in the previous two samples; however a comparison of length frequency distributions shows a shift towards larger fish in the 2004 sample (Figure 23). In 2004, the black crappie collected ranged in length from 110-210 mm (Figure 24), and accounted for 16.8% of the number of fish collected and 5.4% of the biomass. When compared to the zero and one black crappie collected in 1997 and 2001, respectively, it is apparent that these fish are becoming an important component of the fishery.

Waha Lake

Clearwater Region fisheries management personnel conducted a standard lake survey of Waha Lake on June 9, 2004. This survey resulted in the capture of 92 fish, including smallmouth bass (N = 15), yellow perch *Perca flavescens* (N = 65), splake *S. fontinalis X S. namaycush* (N = 4), and kokanee (N = 8). A comparison of CPUE and percent composition between samples collected in 1997, 2001, 2003, and 2004 are shown in Figures 25 and 26, respectively. The CPUE shows a steady decline in the total number of fish and biomass collected over the past four surveys. Smallmouth bass accounted for 16.3% of the number of fish and 10.9% of the biomass collected in 2004. The number of smallmouth bass collected dropped substantially from the 2001 and 2003 samples, and the biomass collected has declined since the 2001 survey. Length frequency distributions have remained fairly constant over the last three surveys (Figure 27). Yellow perch numbers and biomass increased slightly from the 2003 sample, but are still substantially lower than in 1997 and 2001. The length frequency distribution of yellow perch collected in 2004 is similar to the sample collected in 2003 (Figure 28). Splake and kokanee numbers remain low, however, more kokanee were collected in the 2004 sample than the three previous samples combined. The eight kokanee collected this year ranged in length from 210-249 mm in length (Figure 29). Black crappie accounted for 5.4% of the fish collected in 1997 and 0.9% in 2001, however no crappie were collected during the 2003 and 2004 samples.

Winchester Lake

Clearwater Region fisheries management personnel conducted a standard lake survey of Winchester Lake on June 10, 2004. This survey resulted in the capture of 456 fish, including largemouth bass (N = 201), bluegill (N = 168), yellow perch (N = 58), black crappie (N = 14), brown bullhead (N = 11), tiger muskellunge (N = 2), and channel catfish (N = 2). A comparison of CPUE and percent composition between samples collected in 2000, 2001, 2003, and 2004 are shown in Figures 30 and 31, respectively. Largemouth bass numbers and biomass were higher than any of the surveys conducted from 1997 to present. The fish collected in 2004 ranged in length from 100-370 mm in length. A comparison of length frequency distributions shows a steady shift towards larger fish over the last three samples (Figure 32). Largemouth bass PSD was 33.1 in 2004 (Figure 33). This is the highest PSD since the 1997 sample. Bluegill collected ranged in length from 60-220 mm. The length frequency distribution of bluegill shows an absence of smaller fish (<100 mm) in the 2004 sample (Figure 34). This is something not seen in previous samples, and may indicate a poor recruitment year. The yellow perch collected ranged in length from 80-230 mm. A comparison of length frequency distributions since 2001 shows little change in the population structure (Figure 35). Black crappie, brown bullhead, and tiger muskellunge were all present in low numbers. Channel catfish were present in the sample for the first time, although these fish were likely part of the 2,670 fish stocked in the lake this year.

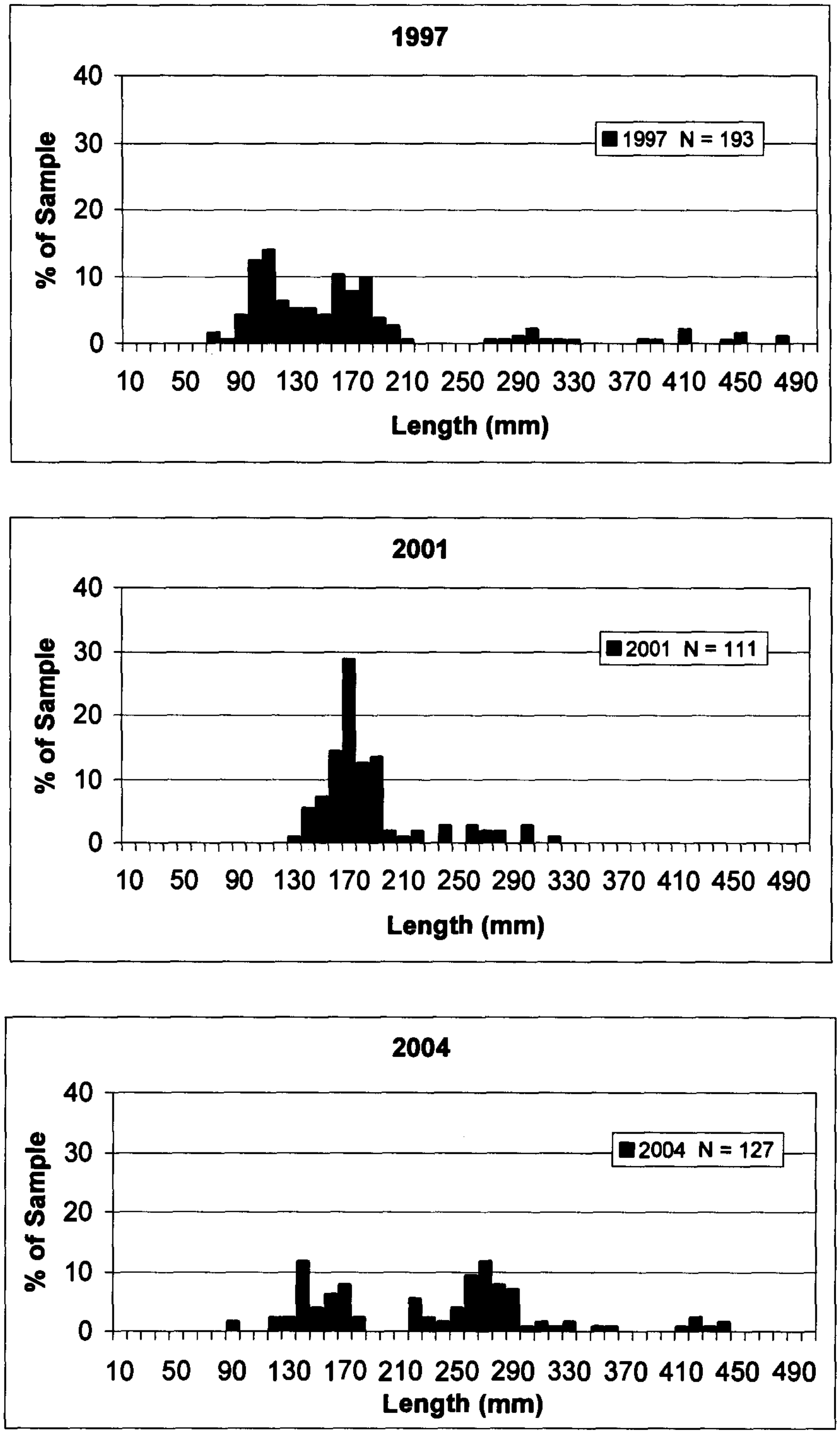


Figure 22. Length frequency distributions of largemouth bass collected from a standard lake survey of Spring Valley Reservoir in 1997, 2001, and 2004.

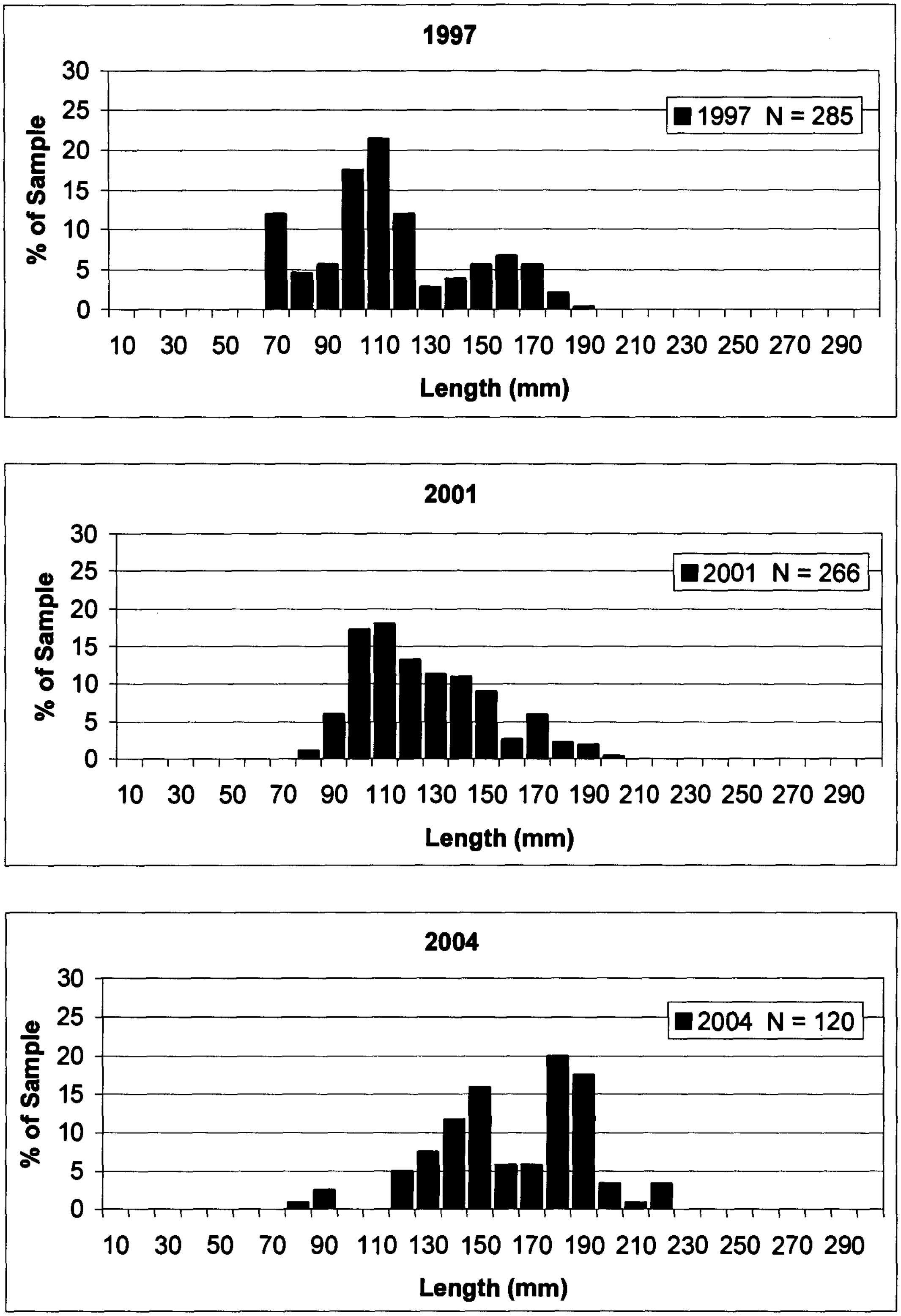


Figure 23. Length frequency distributions of bluegill collected from a standard lake survey of Spring Valley Reservoir in 2001 and 2004.

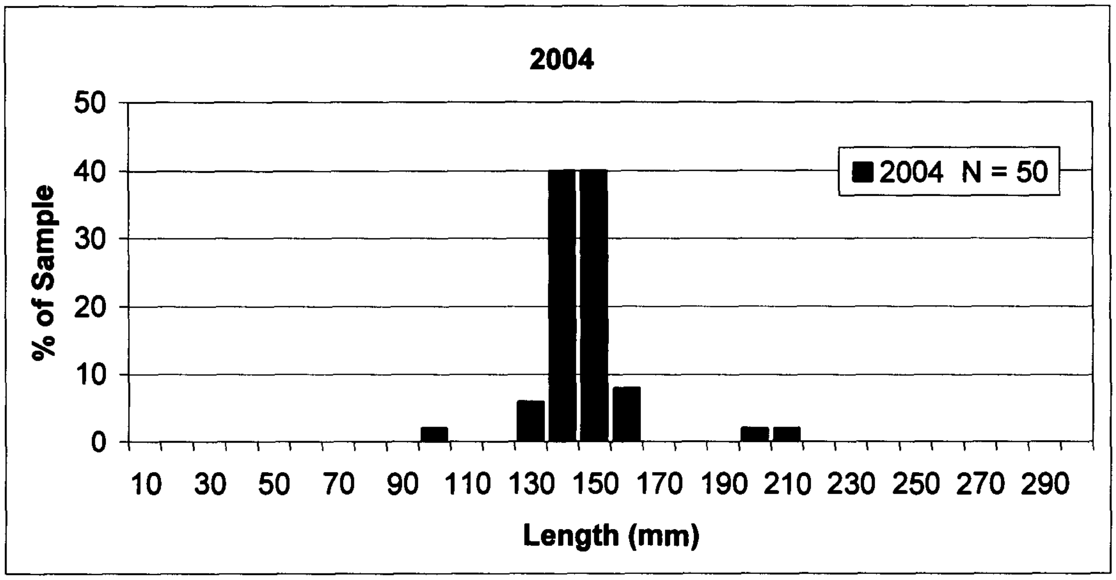


Figure 24. Length frequency distribution of black crappie collected from a standard lake survey of Spring Valley Reservoir in 2004.

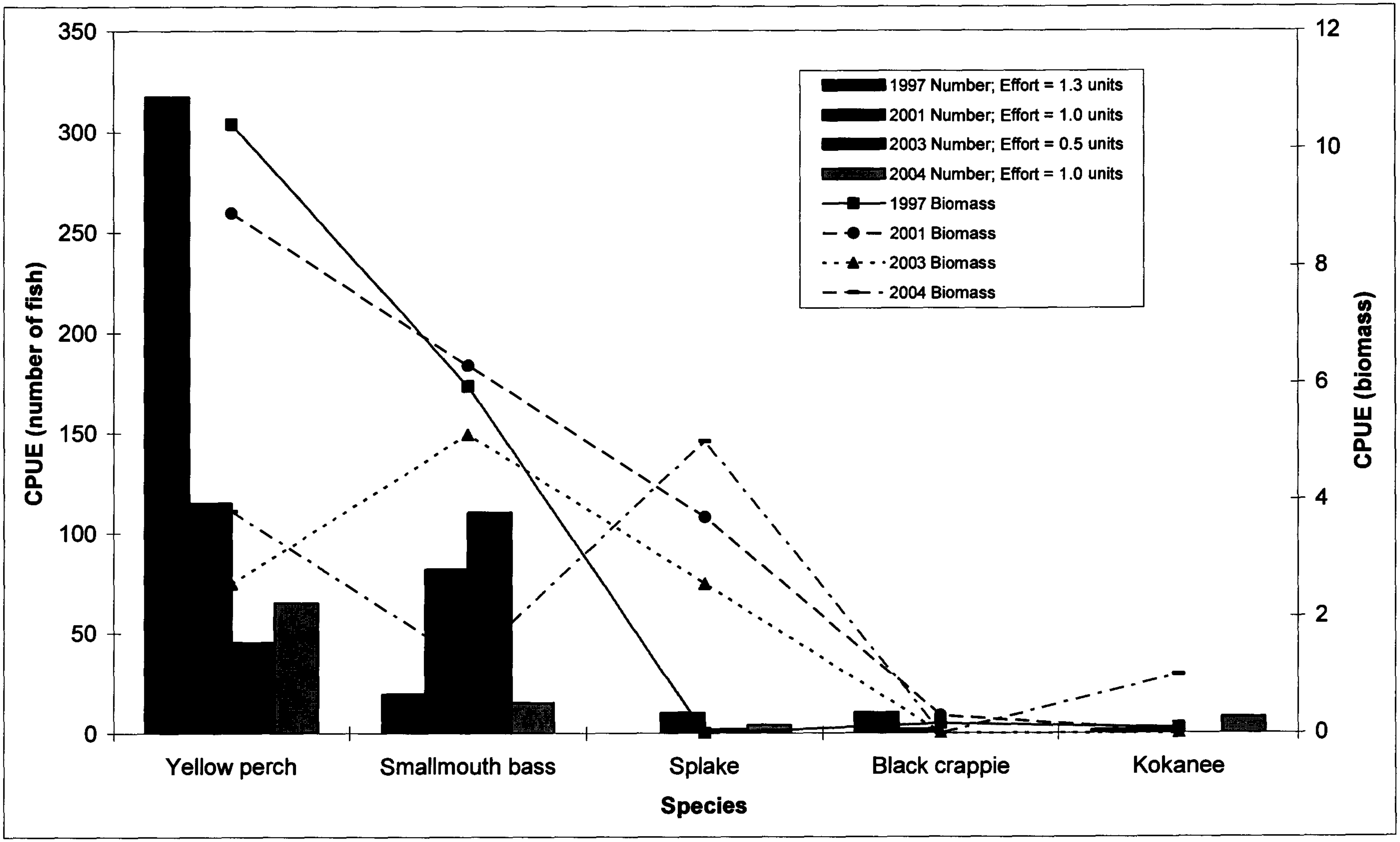


Figure 25. Catch-per-unit-effort of fish collected from standard lake surveys of Waha Lake in 1997, 2001, 2003, and 2004.

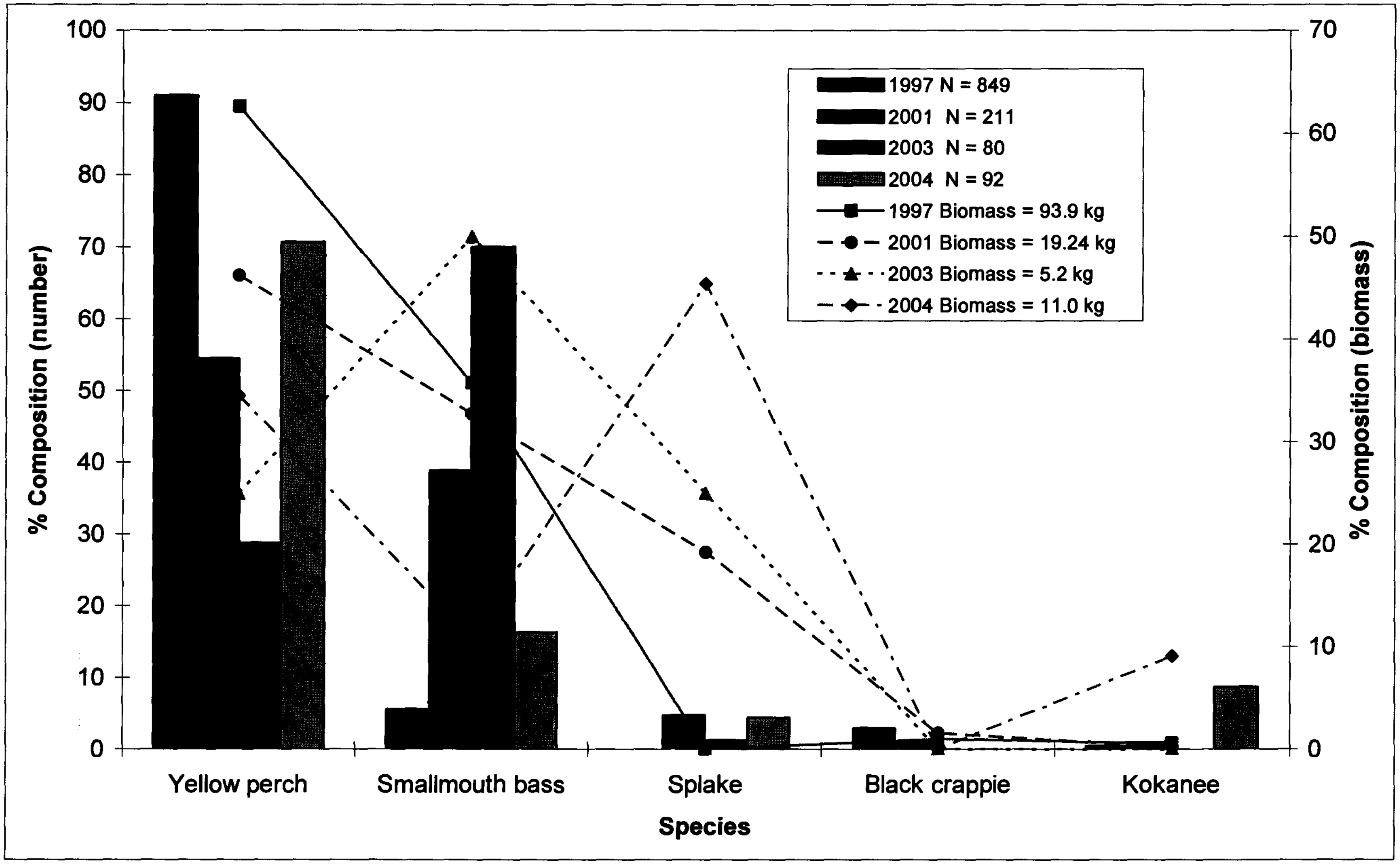


Figure 26. Catch composition of fish collected from standard lake surveys of Waha Lake in 1997, 2001, 2003, and 2004.

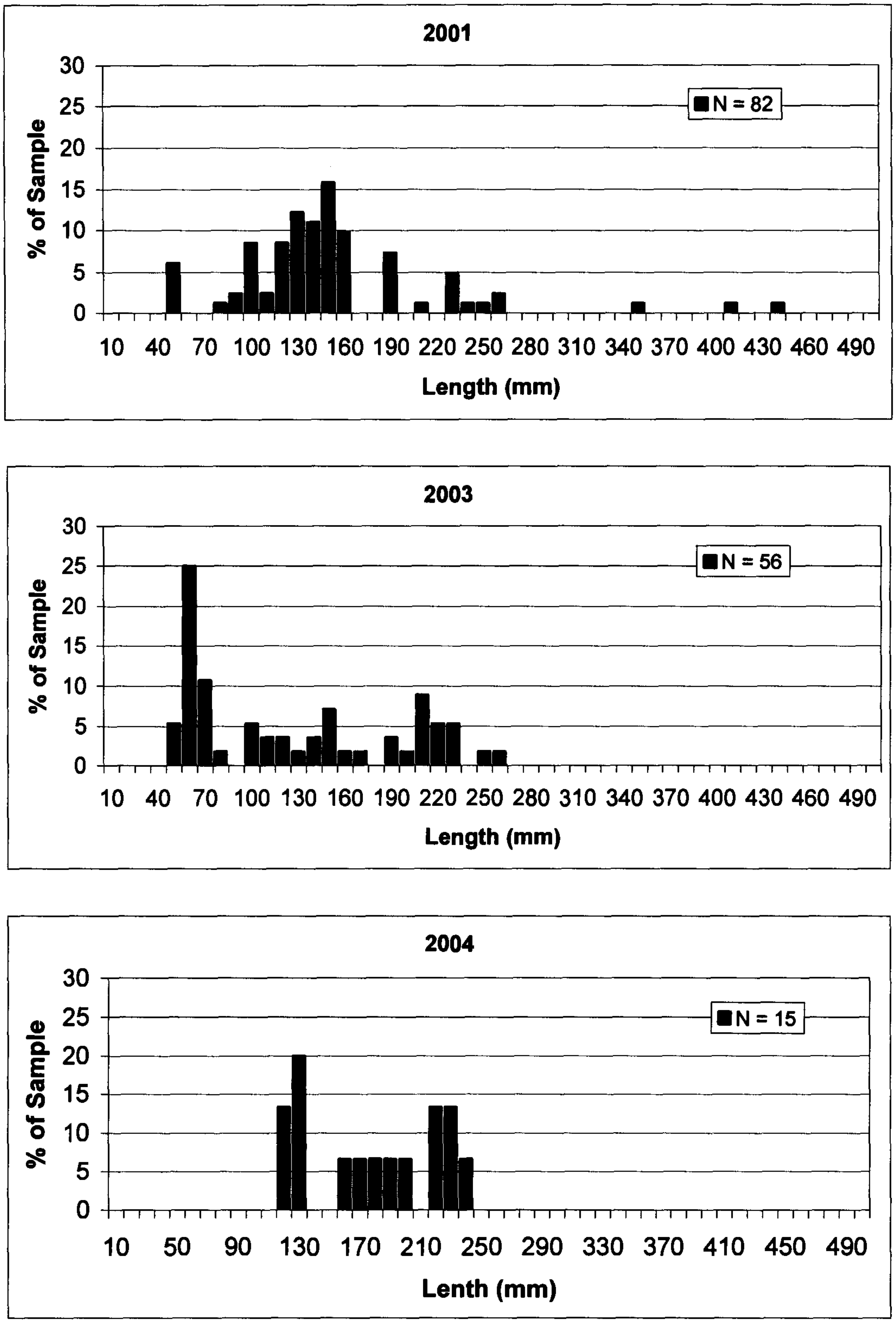


Figure 27. Length frequency distributions of smallmouth bass collected from standard lake surveys of Waha Lake in 2001, 2003, and 2004.

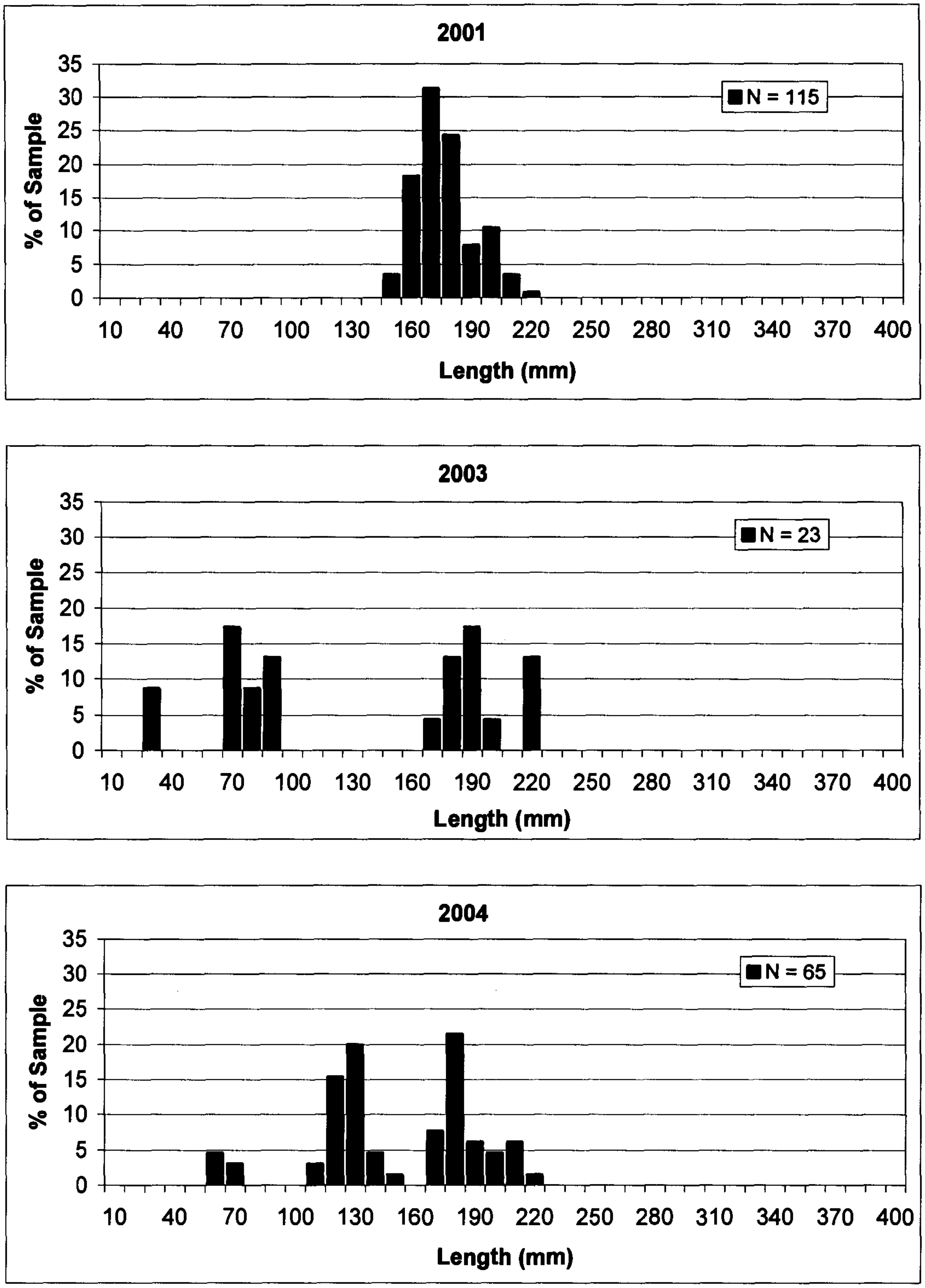
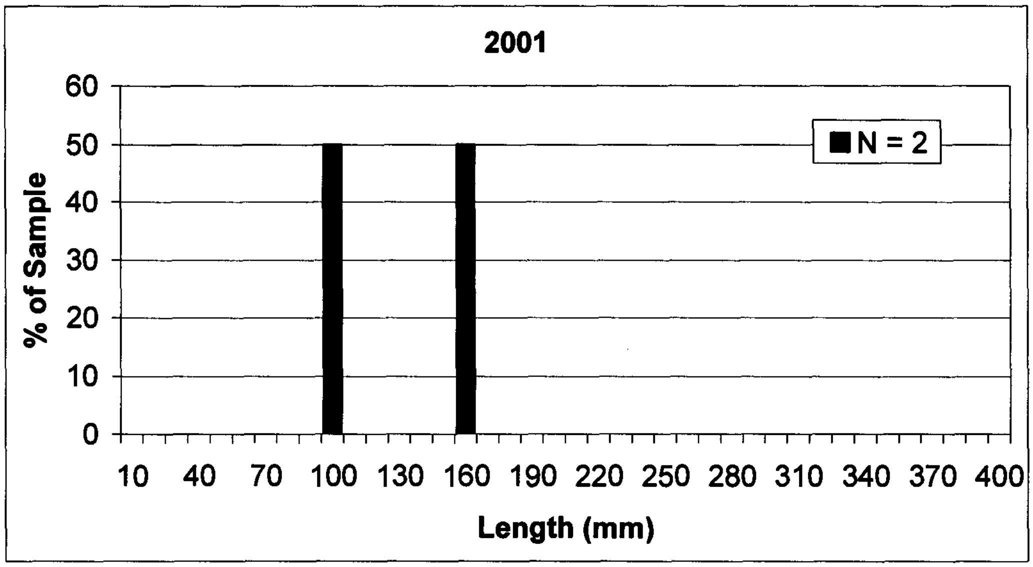


Figure 28. Length frequency distributions of yellow perch collected from standard lake surveys of Waha Lake in 2001, 2003, and 2004.



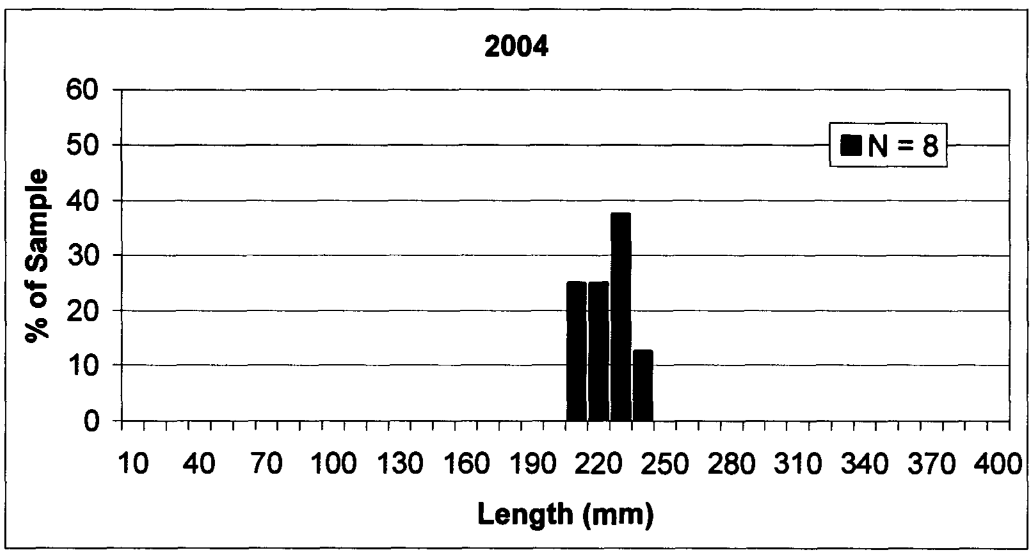


Figure 29. Length frequency distributions of kokanee collected from standard lake surveys of Waha Lake in 2001 and 2004 (no kokanee collected in 2003).

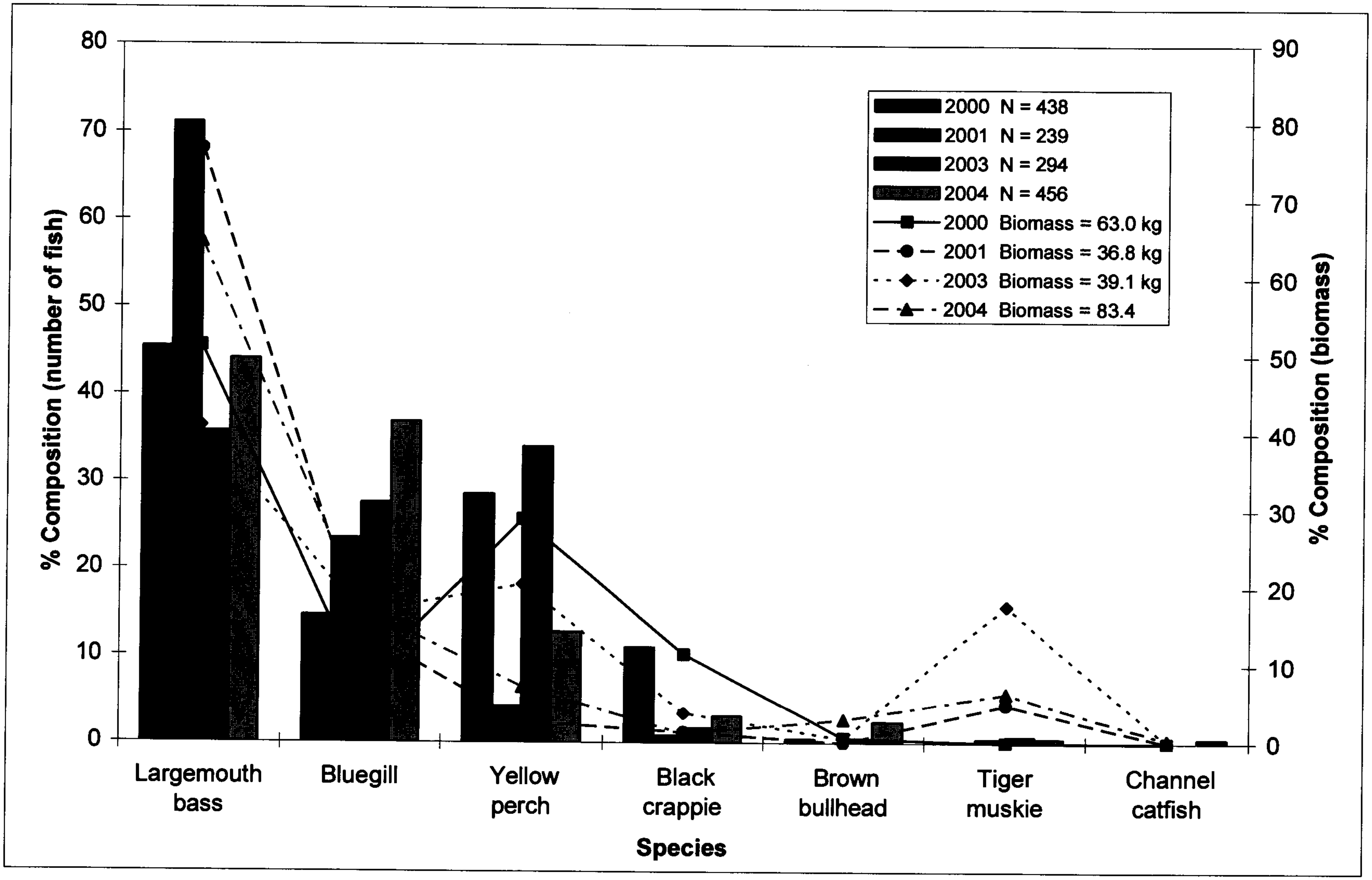


Figure 31. Catch composition of fish collected from standard lake surveys of Winchester Lake in 2000, 2001, 2003, and 2004.

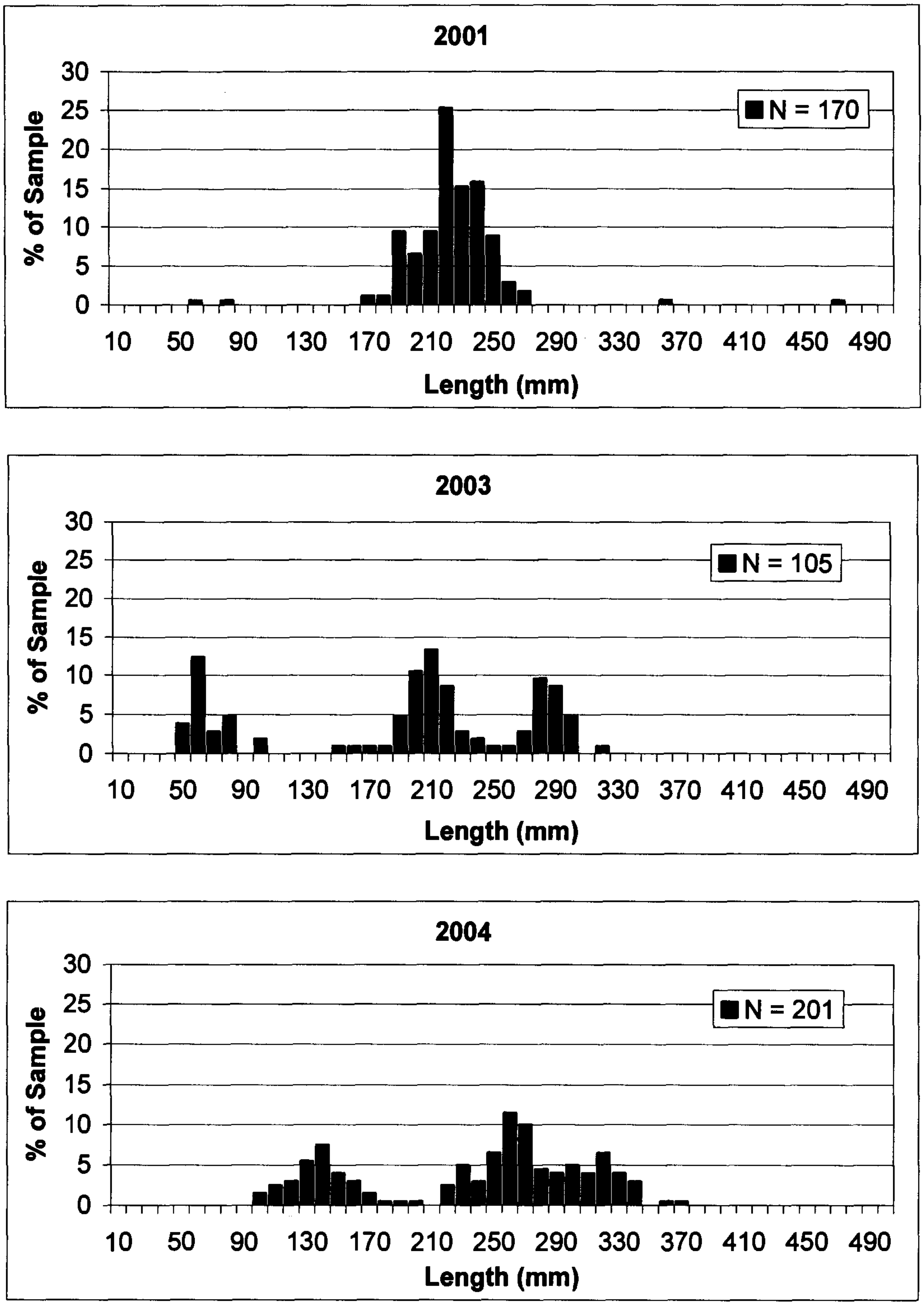


Figure 32. Length frequency distributions of largemouth bass collected from standard lake surveys of Winchester Lake in 2001, 2003, and 2004.

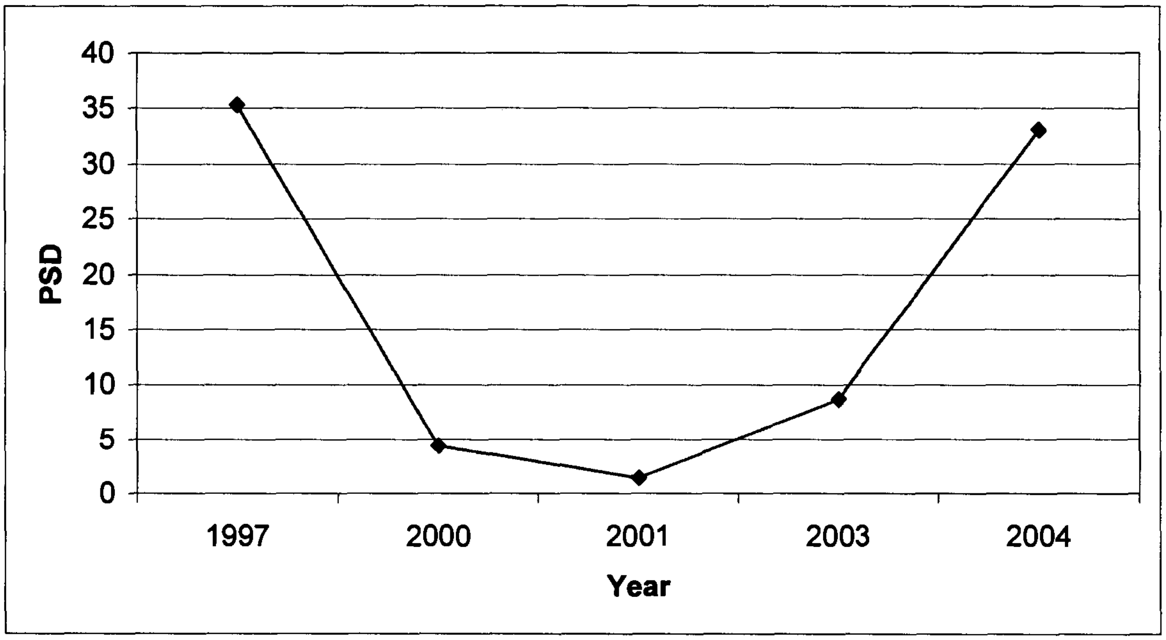


Figure 33. Proportional Stock Density values of largemouth bass collected in Winchester Lake 1997-2004.

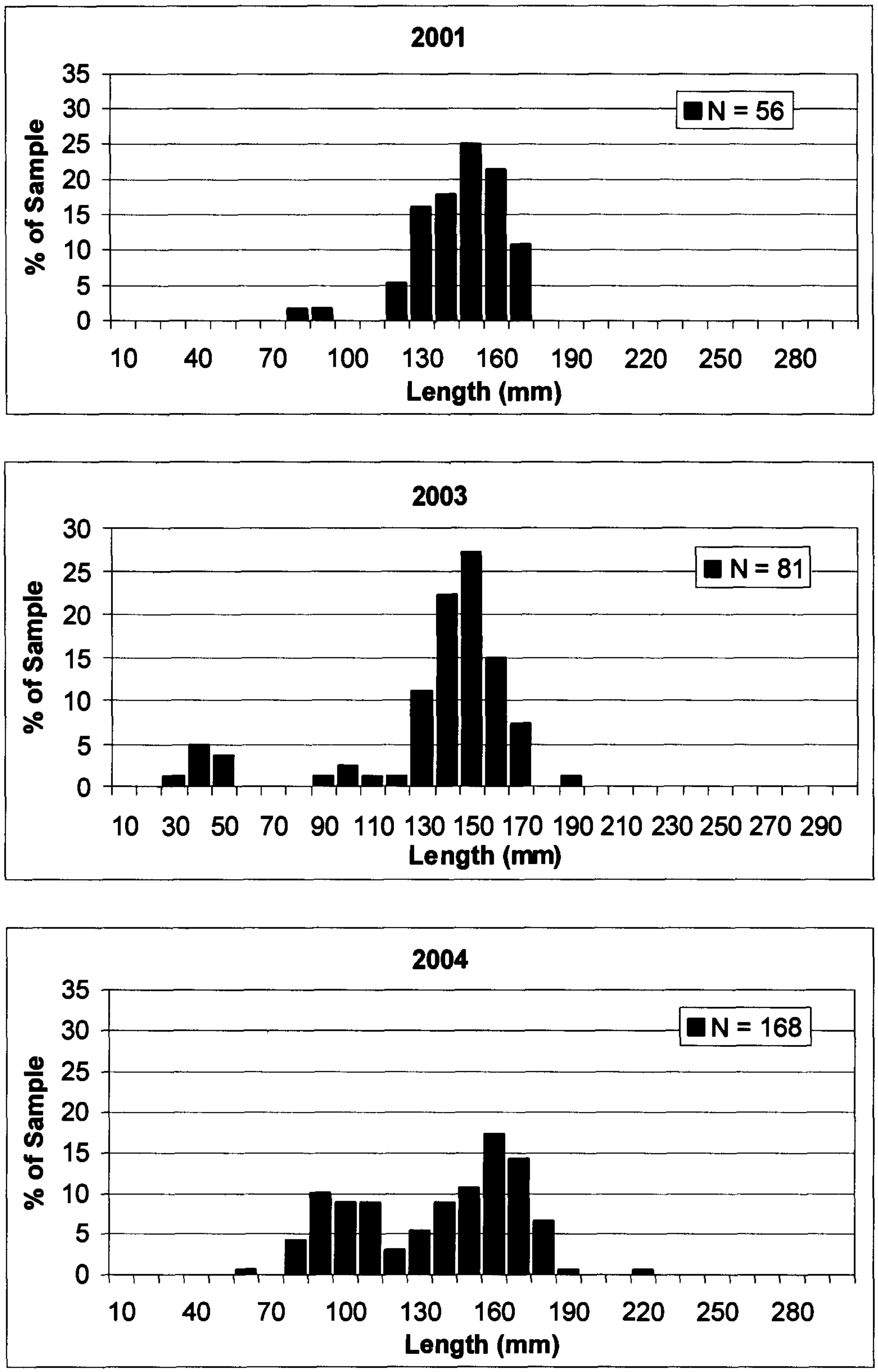


Figure 34. Length frequency distributions of bluegill collected from standard lake surveys of Winchester Lake in 2001, 2003, and 2004.

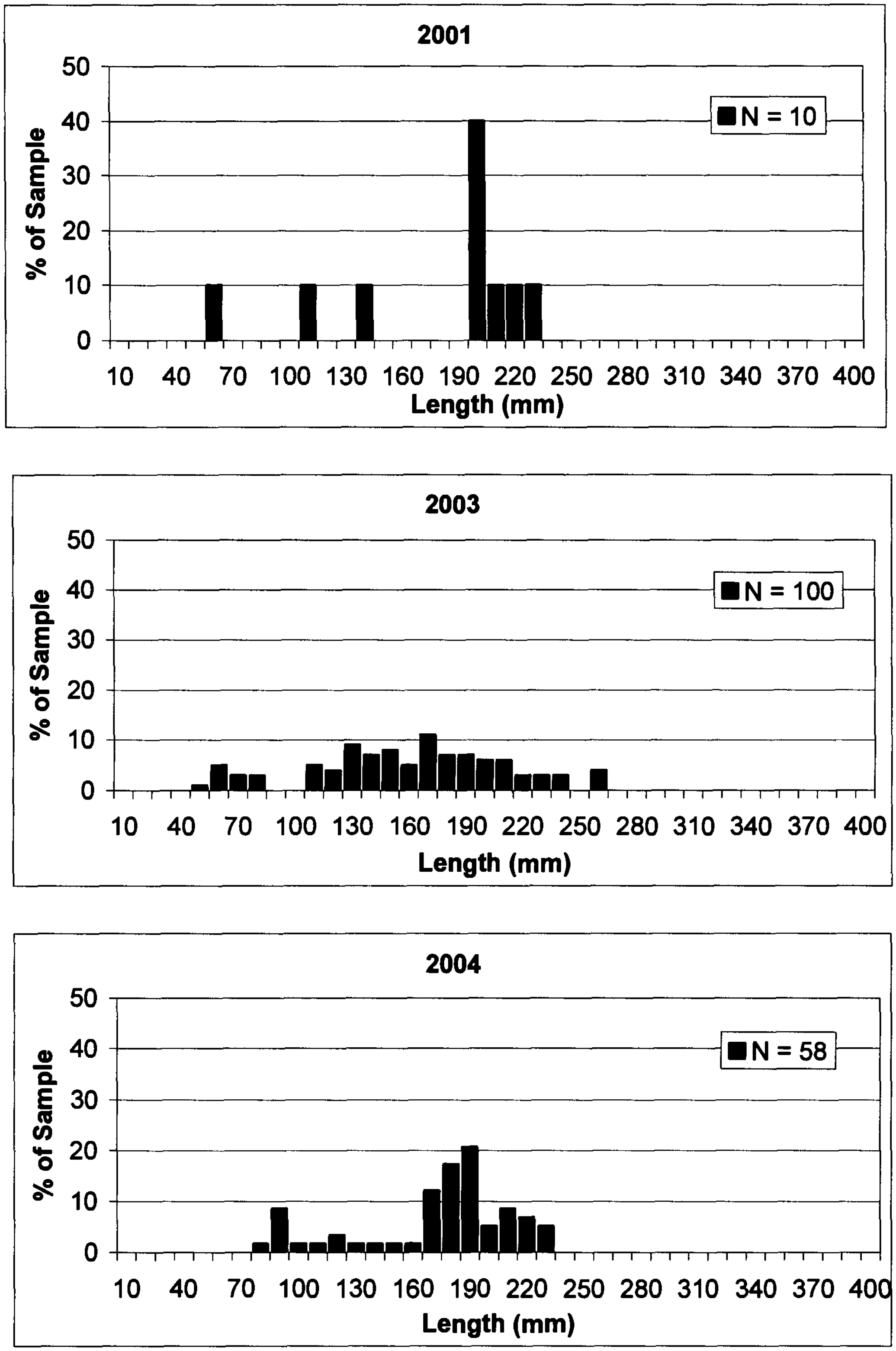


Figure 35. Length frequency distributions of yellow perch collected from standard lake surveys of Winchester Lake in 2001, 2003, and 2004.

Management Recommendations

1. Make no changes to smallmouth bass regulations on Dworshak Reservoir.

2. Continue three year rotation of lowland lake surveys.

3. Write management plan for lowland lake surveys to define goals and objectives of lowland lake program and allow development of an annual work plan for lowland lakes.

4. Conduct lowland lake creel survey in 2005 to provide angler harvest and effort information for lowland lake management plan.

5. Simplify regulations: add Deer Creek Reservoir and Winchester Lake to Family Fishing Waters; remove Soldier's Meadow and Tolo Lake from Family Fishing Waters; remove trophy and quality bass regulations from Moose Creek Reservoir and Elk Creek Reservoir.

Job c. 2004 Clearwater Region Rivers and Streams Investigations

Regional Objectives

1. Develop long-term fish population database on selected streams throughout the Clearwater Region.

2. Develop a population estimate for westslope cutthroat trout *O. clarkii lewisi* in the main stem North Fork Clearwater River.

Methods

Standard snorkeling techniques were used to develop a population estimate for westslope cutthroat trout in the main stem North Fork Clearwater River from Aquarius Creek to Long Creek (102 river km). The river was divided into three sections: Aquarius to Washington Creek (32.2 river km); Washington Creek to Kelly Creek (39.6 river km); and from Kelly Creek to Long Creek (30.2 river km). Within each section, 20 transects were randomly selected for sampling. Each transect consisted of one habitat type (riffle, run, pool, etc.). The number of transects sampled for each habitat type within a river section was determined by the proportion of each habitat type present in that river section. Each transect was measured for length and multiple widths to provide an area measurement. Total area calculations for the North Fork Clearwater River (by habitat type and river section) were obtained from a habitat survey conducted by the U.S. Forest Service (USFS) in 1994. The population estimates were calculated using the Area Density Method (Van Den Avyle 1993).

Results and Discussion

North Fork Clearwater River

Snorkel surveys were conducted from August 30-September 1, 2004 to develop population estimates for westslope cutthroat trout and mountain whitefish *Prosopium williamsoni* in the North Fork Clearwater River. A total of 439 westslope cutthroat trout were counted in 59 transects, of which 84 were 356 mm or greater in length (Figure 36). Additionally, 2,547 mountain whitefish were counted. Of these, 1,307 were 305 mm or greater in length. The population estimates for westslope cutthroat trout and mountain whitefish were calculated to be 7,603 and 36,371, respectively (Table 7).

Additionally, a creel survey was conducted on the North Fork Clearwater River from May 29-September 11, 2004 to provide data on effort, harvest, and the public response to changes in the regulations regarding the harvest of hybrid trout. The results of the creel survey estimated angler effort at 23,469 hours, with a 95% confidence interval of 2,480 hours. This effort resulted in an estimated 38,058 fish caught, with 721 of those harvested (Table 8). This is an overall catch rate of 1.62 fish/hour, and a harvest rate of 0.02 fish/hour. Of the fish harvested, 473 were westslope cutthroat trout, 100 were hybrid cutthroat x rainbow trout, and 49 were rainbow trout. The extremely low harvest rate suggests that while encouraging people to harvest hybrids may result in more of those fish being kept, there is too little harvest to have a significant impact on the population.

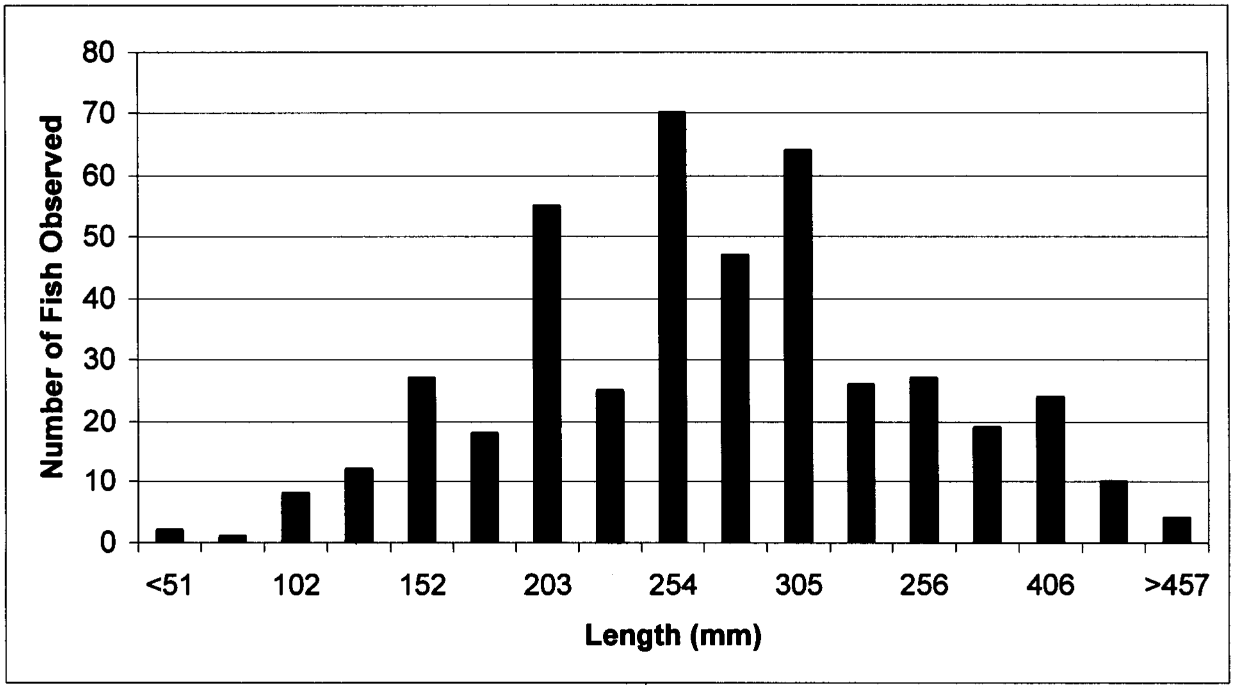


Figure 36. Length frequency distribution of westslope cutthroat trout observed in the North Fork Clearwater River during a snorkeling survey in August, 2004.

Table 7. Population estimates for westslope cutthroat trout and mountain whitefish in the North Fork Clearwater River, 2004.

	Estimate	95%CI	% Error
Westslope cutthroat trout			
Total population	7,603	1,998	26
Fish >=14"	1,668	722	43
Mountain whitefish			
Total population	36,371	21,439	59
Fish <12"	17,057	10,993	64
Fish >= 12"	19,313	11,068	57

Table 8. Harvest estimates calculated from a creel survey conducted on the North Fork Clearwater River, 2004.

Species	Estimated Harvest	95 % C.I.
Cutthroat trout	473	260
Rainbow trout	49	58
Hybrid trout	100	161
Smallmouth bass	87	119
Mountain whitefish	12	27
Total Harvest	721	403

Salmon River

From August 17-20, 2004, 36 smallmouth bass were collected in the lower Salmon River. These fish ranged in total length from 110-310 mm (Figure 37). A comparison of the length frequency distributions shows a lack of larger fish as compared to 2002-2003. Additionally, PSD values for smallmouth bass collected in the lower Salmon River have been declining over the last four years (Figure 38). Back calculated lengths at age are listed in Table 9.

Selway River

A hook-and-line survey of westslope cutthroat trout was conducted on the Selway River from August 1-7, 2004 in conjunction with an annual snorkel survey of the river and its tributaries. A total of 149 cutthroat trout were collected over six days of sampling. These fish ranged in length from 140 to 389 mm (Figure 39).

Management Recommendations

1. Continue to encourage anglers to harvest rainbow trout and hybrids in the North Fork Clearwater River.

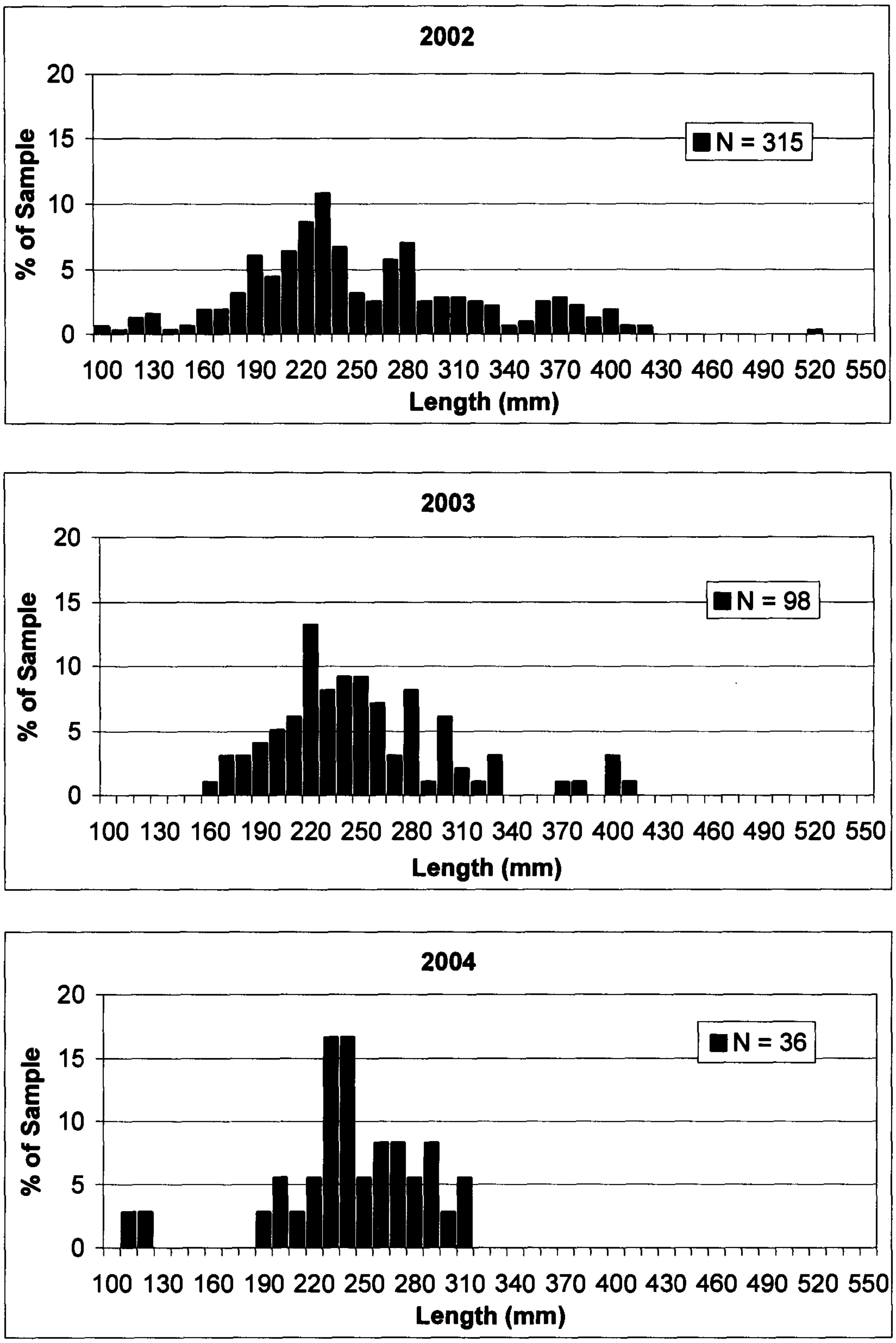


Figure 37. Length frequency distributions of smallmouth bass collected in the Lower Salmon River by hook and line sampling, 2002-2004.

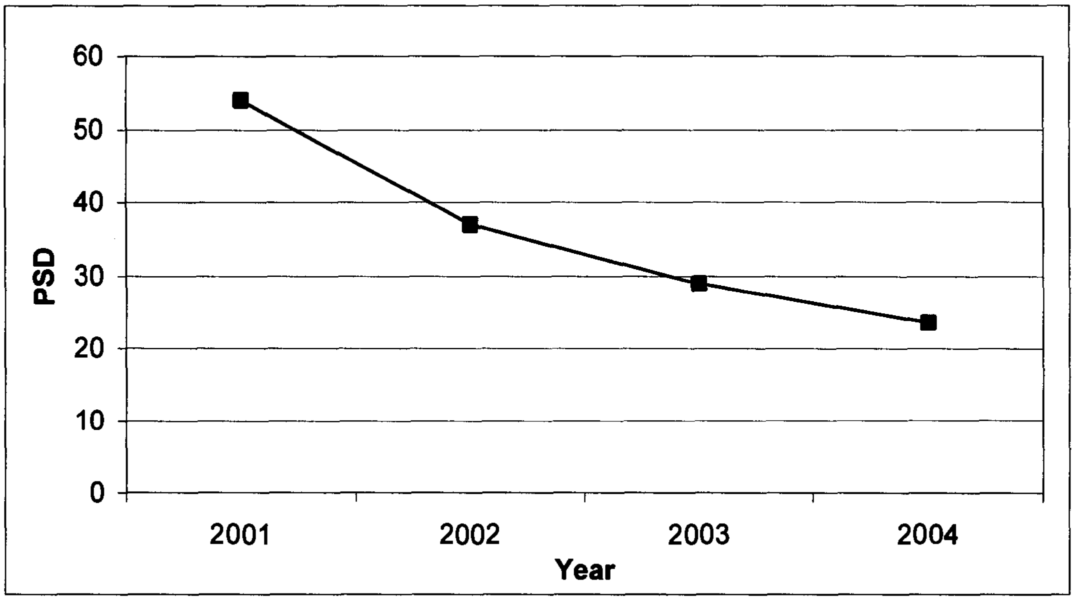


Figure 38. Proportional Stock Density values of smallmouth bass collected in the lower Salmon River by hook and line sampling, 2001-2004.

Table 9. Back-calculated lengths at age of smallmouth bass collected in the lower Salmon River, 2004.

Age Group	Number Aged	Back Calculated Length (mm) at each annulus 1	2	3	4	5
1	2	77				
2	0					
3	11	98	145	196		
4	15	96	149	196	239	
5	9	94	144	194	237	274
Avg. Length		95	138	195	238	274

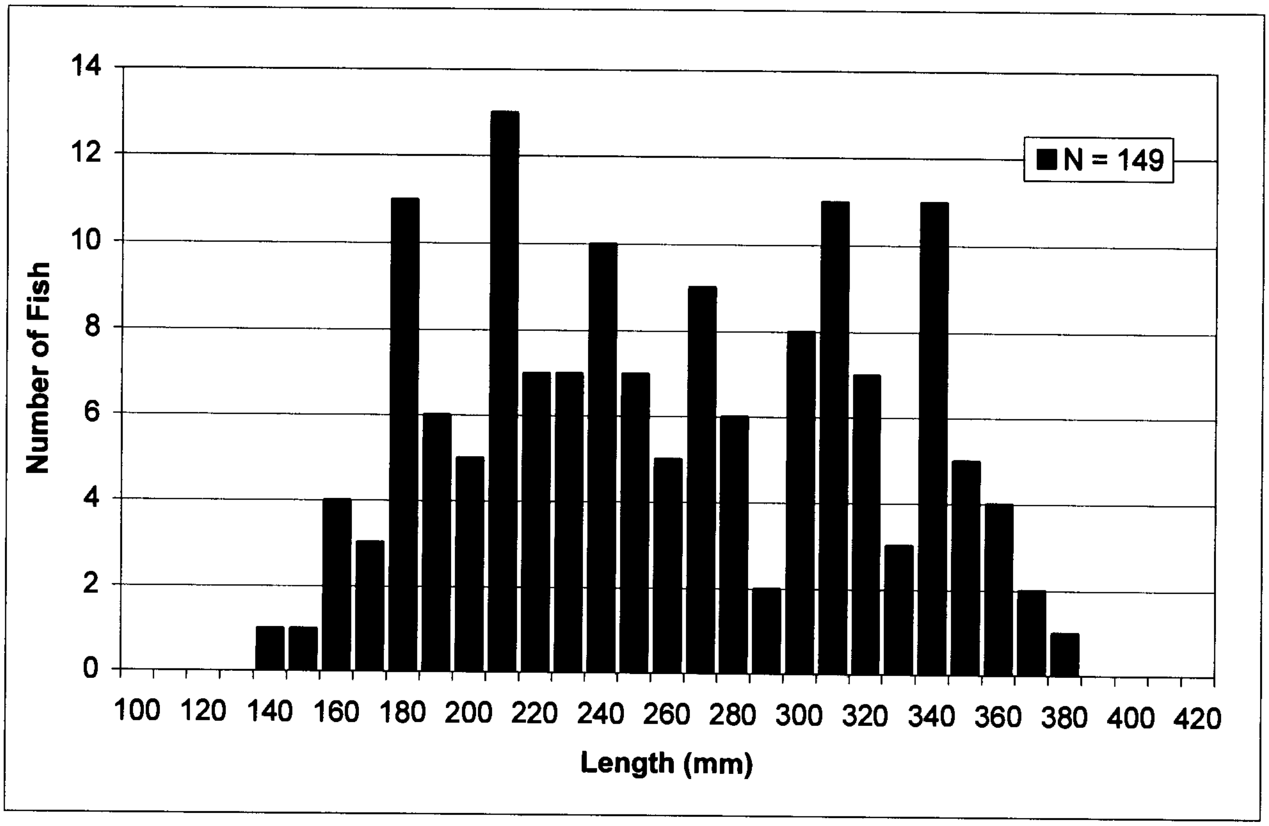


Figure 39. Length frequency distribution of westslope cutthroat trout caught by hook and line in the Selway River, 2004.

Project II. 2004 Clearwater Region Habitat Management

Regional Objectives

1. Develop new fishing waters in the Clearwater Region.
2. Address water quality and fish habitat problems in regional lowland lakes and reservoirs.

Results and Discussion

Deer Creek Reservoir

The construction of Deer Creek Reservoir was completed and the reservoir filled during the spring of 2004. This new reservoir, located near Headquarters, Idaho, is 50 hectares (ha) in surface area.

Elk Creek Reservoir

Water quality is also being addressed in Elk Creek Reservoir through the application of barley straw as an algaecide. In 2004, 65 bales of barley straw were placed in the upper end of Elk Creek Reservoir. As the straw decomposes, it inhibits algae growth, thus providing a natural way to control nuisance aquatic vegetation.

Waha Lake

A hypolimnetic aeration system with two units has also been installed into Waha Lake. This system will provide similar benefits to the Winchester Lake system. Monthly dissolved oxygen profiles illustrate the annual loss of oxygen in the hypolimnion of Waha Lake during the summer months (Figure 40).

Winchester Lake

Fish habitat and water quality issues continue to be addressed in Winchester Lake through the implementation of a hypolimnetic aeration system. Construction has been completed on eight aeration units, which draw water from the bottom of the lake, aerate it in a tub at the surface, and return the water to the bottom of the lake to prevent destratification. The increase in oxygen in the hypolimnion will increase habitat available for fish, and reduce the levels of phosphorous in the water by preventing it from being released from the lake substrate. The reduction in phosphorous will, in turn, reduces the levels of aquatic vegetation and algae that are a nuisance in the summer and fall months. Monthly dissolved oxygen profiles illustrate the annual loss of oxygen in the hypolimnion of Winchester Lake during the summer months (Figure 41).

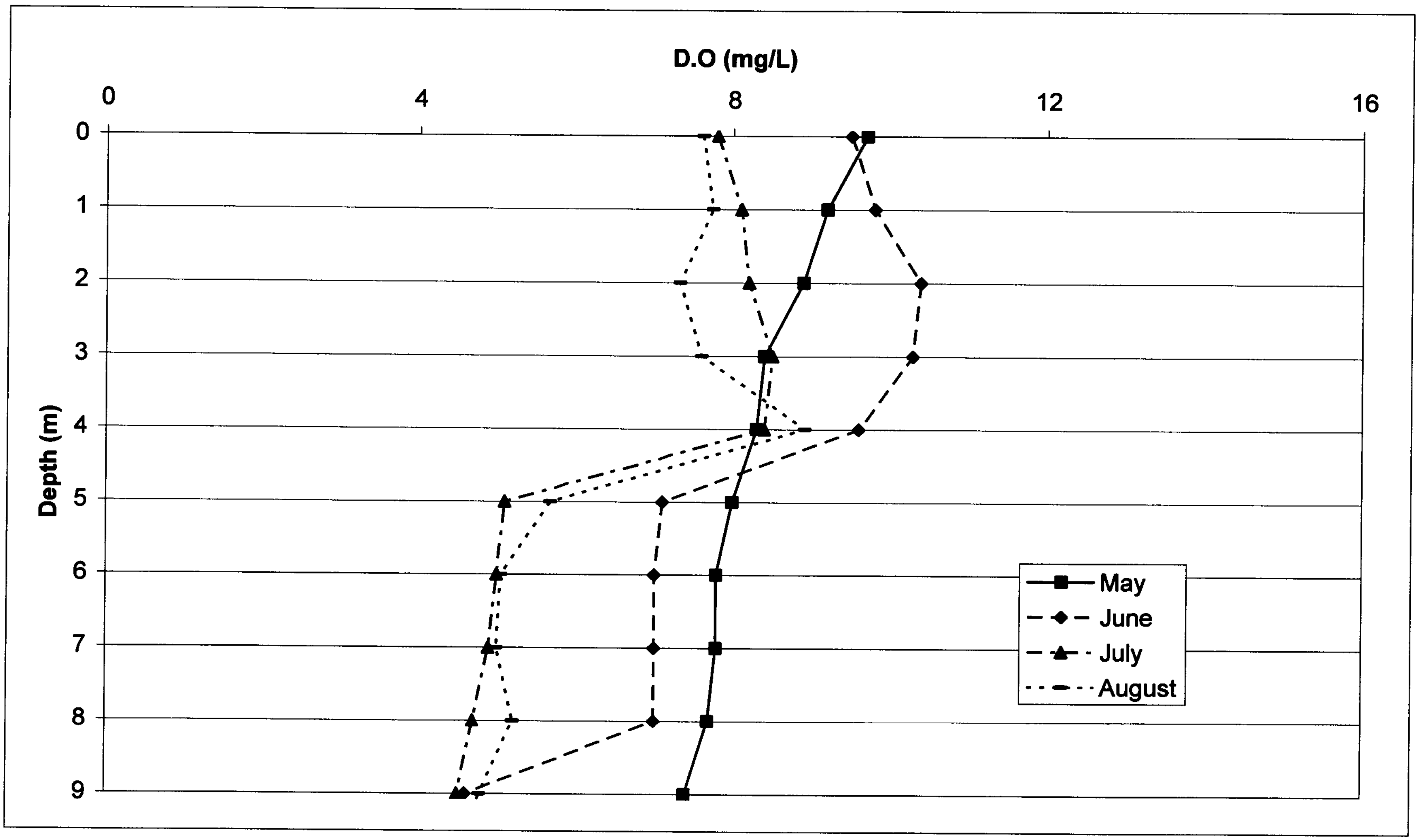


Figure 40. Monthly dissolved oxygen (D.O.) profiles of Waha Lake during 2004.

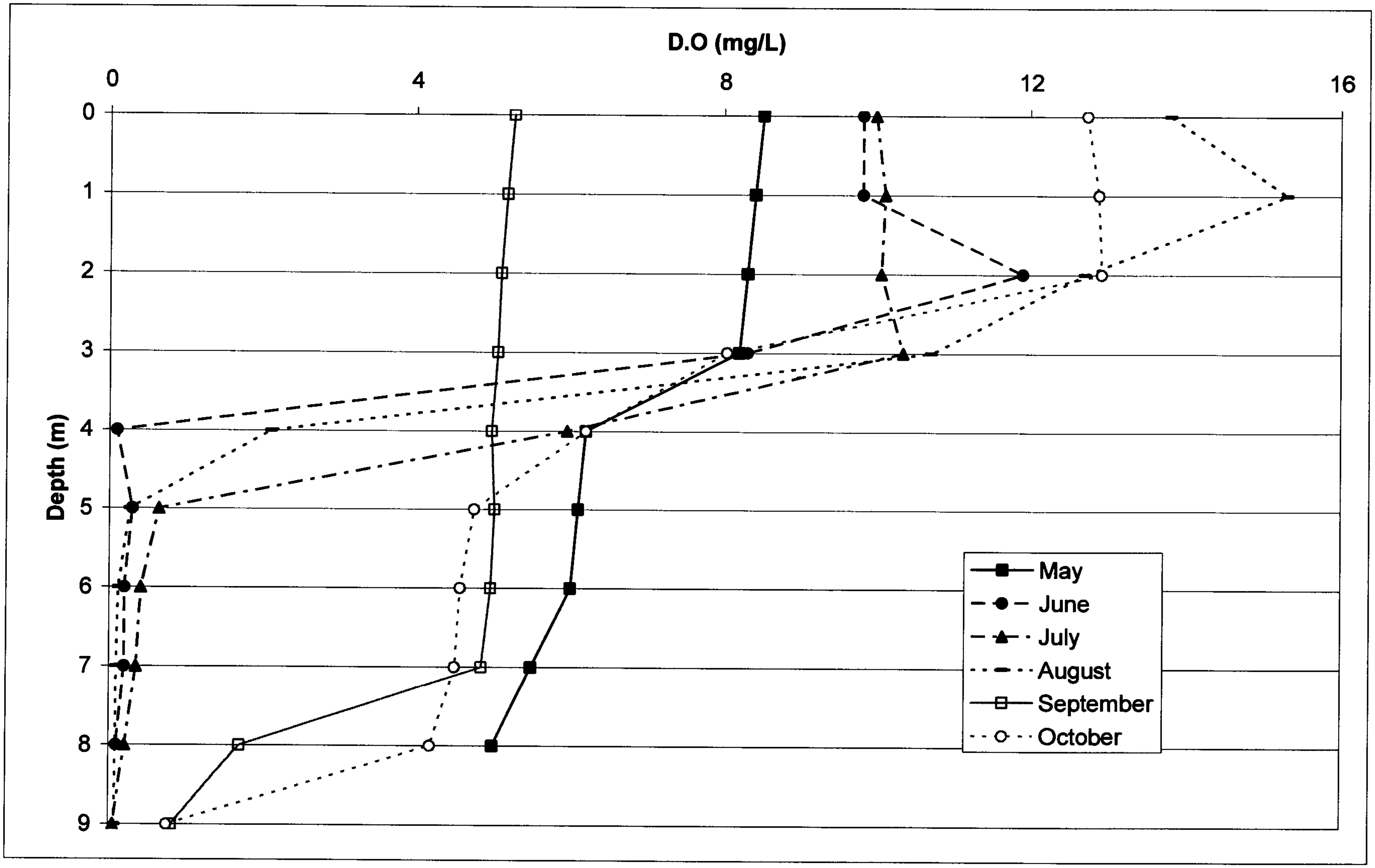


Figure 41. Monthly dissolved oxygen (D.O.) profiles of Winchester Lake during 2004.

Management Recommendations

1. Continue monitoring effectiveness of aeration systems.

2. Measure monthly dissolved oxygen and temperature profiles for each lowland lake.

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