WILSON RESERVOIR MANAGEMENT REPORT

2005

Prepared By

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Introduction

The reservoir management objective for Wilson Reservoir is to collect baseline biological data on the important sport fishes. From the data, length-at-age frequencies, growth, relative abundance, and relative weight will be obtained. This information will be analyzed and used to formulate management recommendations where needed to correct existing or potential problems concerning the reservoir fishery.

The biological data was obtained as a result of standardized fish population sampling as specified in the Fisheries Section Reservoir Management Program Manual. Physical and chemical characteristics for Wilson Reservoir were obtained from the Tennessee Valley Authority. Climatological data was provided by the Natural Resource Conservation Service (Table 1).

Methods

Wilson Reservoir was sampled in 2005 according to the guidelines of the Reservoir Management Program Manual. Fish were collected by electrofishing in the spring and gill netting in the fall. Electrofishing consisted of a 30-minute sample at ten randomly selected sites. Electrofishing target species included largemouth bass, bluegill, gizzard shad and threadfin shad. Target species were collected for the entire 30-minute sample period. Lengths, weights, and otoliths were taken from all largemouth bass greater than 150mm TL. Lengths and weights were taken from remaining largemouth bass, gizzard shad, threadfin shad and bluegill. Gill netting target species included striped bass, hybrid striped bass and white bass. Electrofishing and gill netting sites are shown on Figure 1. Data analysis was conducted with ADWFF Data Analysis and Report Utilities (Slipke, 2004).

Results

Largemouth bass had a total catch-per-unit-effort of 82 fish/hour of electrofishing. CPUE for stock to preferred size fish was 71.6 fish/hour (Table 2). Although catch rates have varied over the years, there has been no significant increase in the catch-per-unit-effort of stock to memorable size fish since the size limit was implemented in 1993.

A decrease in growth rates has been observed since the size limit was implemented. Prior to the size limit regulation in 1993, Wilson largemouth bass exhibited some of the fastest growth rates in the state. Since 1993, we have seen mean length-at-age decrease in most age classes. This is similar to what was observed in 2000, 2002 and 2003 (Floyd and Berry, 2004). For age 2 largemouth bass, we observed a mean length of 312 mm TL similar to that observed in 1993 (Table 3). Age 3 fish mean length decreased from 380 mm TL to 367 mm TL. Age 4 mean length decreased from 419 to 392 mm TL. Age 5 fish mean length decreased from 477 to 408 mm TL. Again, this is similar to that observed in 2003 (Floyd and Berry, 2004).

We have observed a decrease in the length-at-age for Wilson largemouth bass since the size limit was implemented in the fall of 1993. However, in the past several years we have seen a stabilization of length-at-age.

One disturbing observation in the spring sampling was the lack of largemouth bass 508 mm TL or larger (Figure 2 and Figure 3). TVA biologist noticed the same trend when they sampled Wilson in the spring of 2005. In twelve samples (6 hr of effort) they collected 1,065 largemouth bass of which only two (2) were 508 mm TL or larger (Kurt Lakin, Tennessee Valley Authority, personal communication). Simulation modeling for 1993 and 2003 data shows that 10 times more bass greater than 508mm were produced in 1993 than 2003 (Floyd and Berry, 2004). Annual survival rates in 2005 were 21%-29% lower than observed in 1993. These decreases in survival, in association with the decrease in growth rates, are major contributors to the decline in the number of memorable size fish.

Since 1993 we have observed an increase in the number of years it takes for largemouth bass to reach specific lengths (Table 4). The time that it takes for a largemouth bass to reach 381 mm TL has increased by eight to nine months. Time to reach 406 mm TL has increased by almost a year since 1993 (Table 4). The time to reach a specific length has varied over the years, but the most significant changes seemed to occur during the time between 1998 and 2005, especially for the time it takes for a largemouth bass to reach 508 mm TL (~5 pounds). Since the size limit was implemented in 1993 we have seen an increase in the time it takes to

reach 508 mm TL. In 2003, we saw a decrease in the time it takes to reach 508 mm but no decrease in the time it takes to reach 381 or 406 mm TL (Floyd and Berry, 2004). Although we have observed an overall decrease in growth rates since the length limit was implemented in 1993, the growth rates in 2005 were still above or just slightly below the statewide average for ages 1-5.

Relative weights have shown a significant decrease between the pre-length limit and post-length limit fish. For largemouth bass below the 381 mm size limit mean Wr values decreased from 100 to 94. For largemouth bass above 381 mm mean Wr values decreased from 109 to 98. These decreases in overall mean Wr values are also reflected in the mean Wr values for the different RSD categories (Table 2).

Length frequency indices vary between the sampling years. The RSD distribution is indicative of a moderate density bass population (Gablehouse 1984). Values for the RSD-Q and RSD-P were above or equal to statewide averages, whereas RSD-S were below state averages (Figure 3). Proportional Stock Density value was 59, also above the state average and within the range of 50-70% proposed by Anderson (1976).

Bluegill had a CPE of 106 fish/hour of electrofishing, above the statewide average (Table 2). PSD was 44%, higher than the range proposed by Anderson (1976). Average Wr values were similar to those observed in the past and equal to state wide averages for all categories. Length frequency distributions reflect the high PSD with several quality size fish collected (Figures 4 and 5). Wilson has always maintained a first class bream fishery, RSD values for quality and preferred bluegill is well above the state average.

The numbers of white bass collected in gill nets was less than what we have observed in the past. Catch rates have varied over the years and reflects the cyclic nature of this species. The catch of 0 and age -1 striped bass is interesting. Stripes have not been stocked in the Tennessee River since 1999. These fish represent recruitment from either stockings made in Tennessee waters or reproduction some where in the Tennessee River system. This would be similar to striped bass reproduction on the Coosa system.

The creel survey conducted in the spring showed that 54% of the anglers were fishing for bass (Appendix B). Anglers had a catch rate of 0.99 fish /hour and a harvest rate of 0.07 bass/hour. This indicates that the majority of bass anglers practice catch and release. Overall bass harvest rate is light in the spring with less than 7% of all bass caught being harvested. Due to working an access area below Wheeler Dam we interviewed more anglers that were fishing for other species than bass and crappie. These anglers were targeting catfish, white bass and striped bass, species that are normally caught below the dam in the spring.

Conclusions

The sampling conducted in 2005 confirms that observed in 2003. Growth and Wr have decreased and the numbers of bass greater than 15 inches has not improved. The removal of the minimum size limit should make more fish available to anglers. Hopefully, growth will improve and we will see an increase in the numbers of bass over 381 mm begin to enter the fishery. From the creel surveys anglers catch a high number of bass but harvest is light. Tournament anglers can begin using smaller fish and we should begin to see an increase in the number of bass caught reported in the B.A.I.T. reports.

Literature Cited

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APPENDIX A

TABLES AND FIGURES

TABLE 1. WILSON RESERVOIR MORPHOMETRIC, PHYSICAL AND CHEMICAL CHARACTERISTICS.

Surface area	15,500	surface acres
Drainage area	30,750	square miles
Full pool elevation	507.5	feet-msl
Mean annual fluxuation	3	feet
Shoreline distance	154	miles
Shoreline development index	10.3	
Mean depth	40.9	feet
Maximum depth	93	feet
Outlet depth	97.5	feet
Total dissolved solids	92	mg/l
Morphoedaphic index	2.3	
Growing season	220	frost free days (Jenkins 1967)
Date of Impoundment	1924	

TABLE 2. RELATIVE STOCK DENSITY, CATCH PER EFFORT, RELATIVE WEIGHT, AND PROPORTIONAL STOCK DENSITY OF TARGET SPECIES FROM WILSON RESERVOIR, 1992-2005.

Largemouth bass

		No. of	SUBSTOCK			RSD-S				RSD-Q				RSD-P				RSD-M				TOTAL		
Year	Gear	Samples	NO.	CPE	PCT.[1]	NO.	CPE	PCT	Wr	NO.	CPE	PCT	Wr	NO.	CPE	PCT	Wr	NO.	CPE	PCT	Wr	NO.	CPE	PSD
1992	Electro.	5	20	9.0	19	29	13.0	28	101	52	23.3	51	101	21	9.4	20	101	1	0.4	1.0	107	123	55.4	60
1993	Electro.	4	11	7.3	11	20	13.2	20	102	46	30.5	47	105	27	17.9	28	112	5	3	5.0	112	109	72.2	39
1995	Electro.	10	5	1.0	3	60	12.0	35	80	46	9.2	27	86	52	10.4	31	93	12	2.4	7.0	103	175	35.0	65
1996	Electro.	10	38	10.8	14	87	24.7	32	93	111	31.6	41	103	68	19.3	25	105	8	2.2	3.0	105	312	88.8	68
1998	Electro.	10	93	34.0	19	85	17.0	31	95	135	27.0	49	100	50	10.0	18	100	3	0.6	1.0	90	366	73.2	69
2000	Electro	10	19	3.8	5	99	19.8	28	88	183	36.6	52	93	72	14.4	20	92	1	0.2	0.3	85	374	74.8	72
2002	Electro.	10	75	15.0	34	72	14.4	33	94	98	19.6	45	95	49	9.8	22	94	1	0.2	0	120	295	59.0	67
2003	Electro.	10	87	17.4	28	129	25.8	41	93	117	23.4	37	102	66	13.2	21	105	2	0.4	1	103	401	80.2	59
2005	Electro.	10	54	10.8	15	116	23.2	32	87	144	28.8	40	94	98	19.6	27	97	0	0	0	0	412	82.4	68
	Lake Average		45	12.1	16.42	77	18.1	31.1	93	104	25.6	43.2	98	56	13.8	23.6	100	3.7	1.1	2	92		69	63

Bluegill

		No. of	SUBSTOCK			RSD-S				RSD-Q				RSD-P				RSD-M				TOTAL		
Year	Gear	Samples	NO.	CPE	PCT.[1]	NO.	CPE	PCT	Wr	NO.	CPE	PCT	Wr	NO.	CPE	PCT	Wr	NO.	CPE	PCT	Wr	NO.	CPE	PSD
1992	Electro.	4	9	7.1	9.0	64	50.4	64	82	35	27.5	35	81	1	0.7	1	92	--	--	--	--	109	85.8	36
1993	Electro.	4	8	4.4	7.3	68	37.0	67	82	33	17.9	32	86	1	0.5	1	84	--	--	--	--	110	60.1	33
1995	Electro.	5	3	1.8	3.0	47	29.4	47	82	50	31.3	50	86	3	2	3	88	--	--	--	--	103	64.6	53
1996	Electro.	4	3	3.2	3.0	41	44.8	41	84	59	64.5	58	84	1	1	1	88	--	--	--	--	104	113.7	59
1998	Electro.	5	1	0.4	1.0	49	23.9	43	87	62	30.3	54	90	4	2	3	90	--	--	--	--	116	50.7	57
2000	Electro.	3	2	1.0	1.3	65	43.3	43	89	86	57.3	57	88	--	--	--	--	--	--	--	--	153	102.0	57
2002	Electro.	3	1	0.8	1.0	57	45.7	43	104	74	59.3	56	80	1	0.8	1	85	--	--	--	--	133	110.8	57
2003	Electro.	4	--	--	--	59	49.6	56	85	45	37.8	43	80	2	1.7	2	76	--	--	--	--	106	89.1	44
2005	Electro.	4	1	0.8	1	57	44.5	52	84	46	35.9	42	79	7	5.5	6	87					111	86.7	48
	Lake Aaverage		3.1	2.17	2.956	56	41	50.6	87	54	40.2	47.4	84	2.2	1.54	1.99	77	0	0	0	0		84.8	49

TABLE 3 . AGE COMPOSITION AND MEAN LENGTH OF LARGEMOUTH BASS FROM WILSON RESERVOIR, SPRING 2005.

Age	Year Class	Number	Percent	CPE	Mean TL	SE
1	2004	156	37.9	31.2	207.3	2.1
2	2003	59	14.3	11.8	312.0	2.8
3	2002	102	24.8	20.4	367.3	2.0
4	2001	48	11.7	9.6	392.5	3.0
5	2000	26	6.3	5.2	408.2	7.2
6	1999	16	3.9	3.2	412.7	10.4
7	1998	2	0.5	0.4	477.5	3.5
8	1997	0	0.0	0.0	0.0	
9	1996	0	0.0	0.0	0.0	
10	1995	2	0.5	0.4	444.0	10.0
11	1994	1	0.2	0.2	481.0	
Total		412	100.0	82.4		

Table 4. Survival and growth rates of largemouth bass from Wilson Reservoir, spring 1992-2005. Annual survival (%) was estimated for age-3 and older fish using weighted and unweighted catch curve regressions. The time to reach 304, 381, 406, and 508 mm TL was estimated with von Bertalanffy equations using mean length at age data. NC= not computed.

	Survival			Growth			
				Time in years to reach TL(mm)			
Year	Age Range	Weighted	Unweighted	304	381	406	508
1992	2-6	NC	62	1.87	3.00	3.60	NC
1993	3-8	72	73	2.01	3.02	3.44	6.40
1995	3-9	60	61	2.48	3.30	3.66	7.04
1996	3-12	52	61	2.11	3.45	4.01	7.76
1998	3-10	62	62	2.60	4.12	4.76	9.46
2000	3-9	70	68	2.05	3.43	4.04	10.72
2002	3-9	47	48	2.45	3.81	4.43	12.50
2003	3-11	51	57	2.27	3.87	4.53	8.75
2005	3-7	43	41	2.04	3.54	4.35	NC

TABLE 5 . AGE COMPOSITION AND MEAN LENGTH OF WHITE BASS FROM WILSON RESERVOIR, FALL 2004.

Age	Year Class	Number	Percent	CPE	Mean TL	SE
0	2005	14	66.7	2.8	244.0	4.3
1	2004	2	9.5	0.4	345.0	2.0
2	2003	4	19.0	0.8	345.8	5.3
3	2002	0	0.0	0.0	0.0	
4	2001	1	4.8	0.2	369.0	
Total		21	100.0	4.2		

TABLE 6 . AGE COMPOSITION AND MEAN LENGTH OF STRIPED BASS FROM WILSON RESERVOIR, FALL 2004.

Age	Year Class	Number	Percent	CPE	Mean TL	SE
0	2005	1	4.8	0.2	257.0	
1	2004	19	90.5	3.8	439.6	4.9
2	2003	1	4.8	0.2	368.0	
Total		21	100.0	4.2		

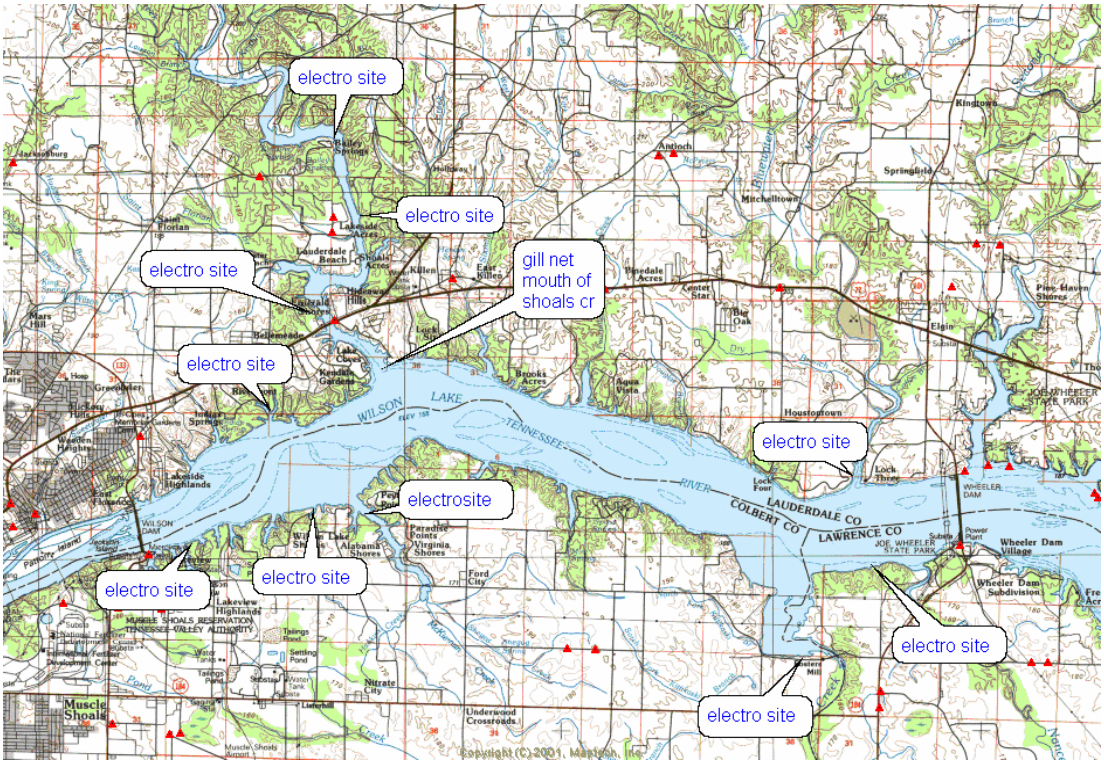

Figure 1. Gillnetting and Electrofishing sites for fall 2004 and spring 2005.

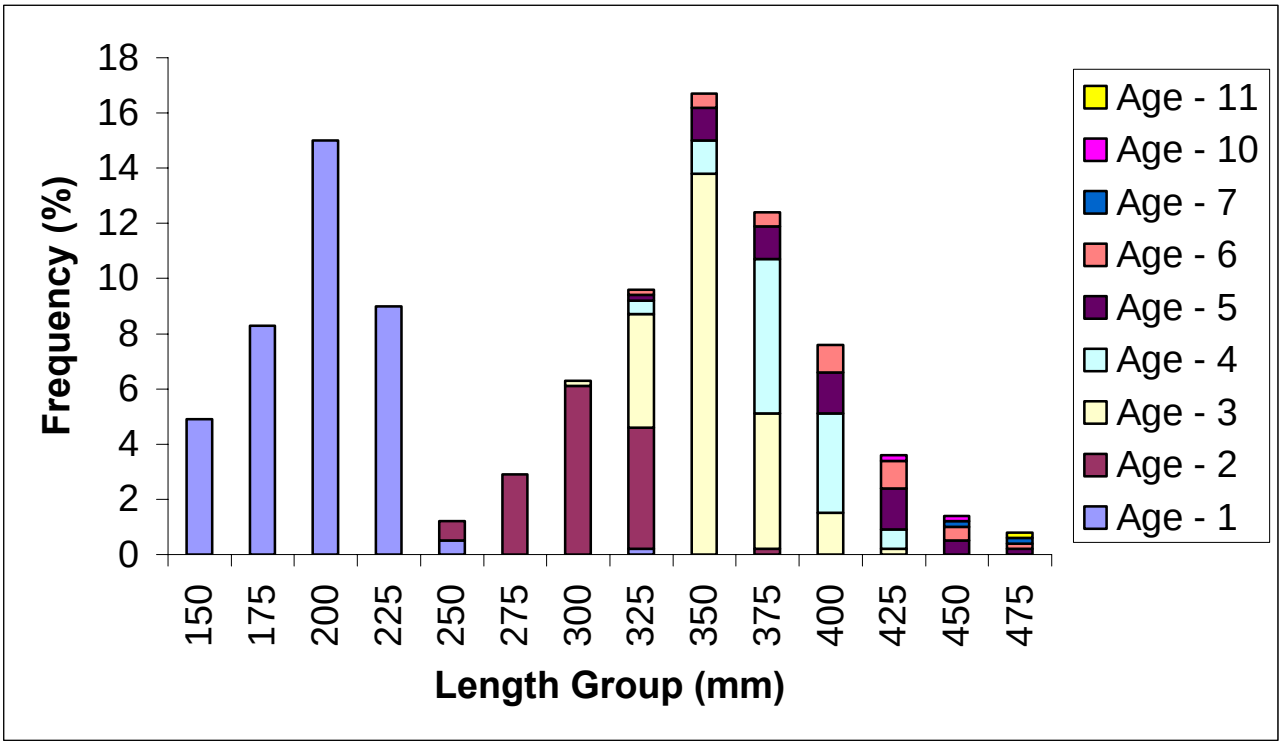

Figure 2. Length-at-Age frequency distribution for largemouth bass (N=412) from Wilson Reservoir, Spring 2005.

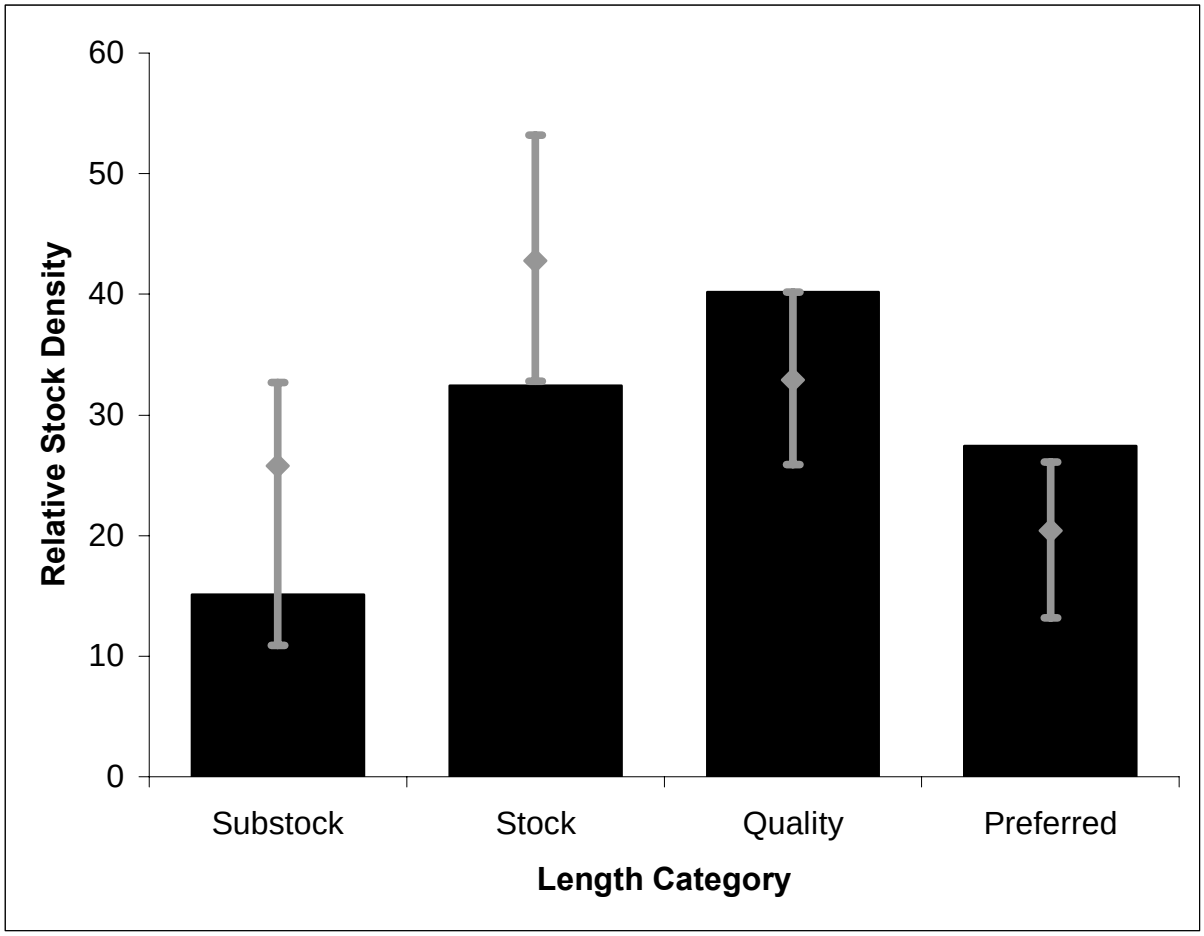

FIGURE 3. Relative Stock Density (RSD) of largemouth bass (N=412) from Wilson Reservoir,Spring 2005. The I-bars represent the statewide 75th and 25th percentile where as the ◊ represents the statewide mean.

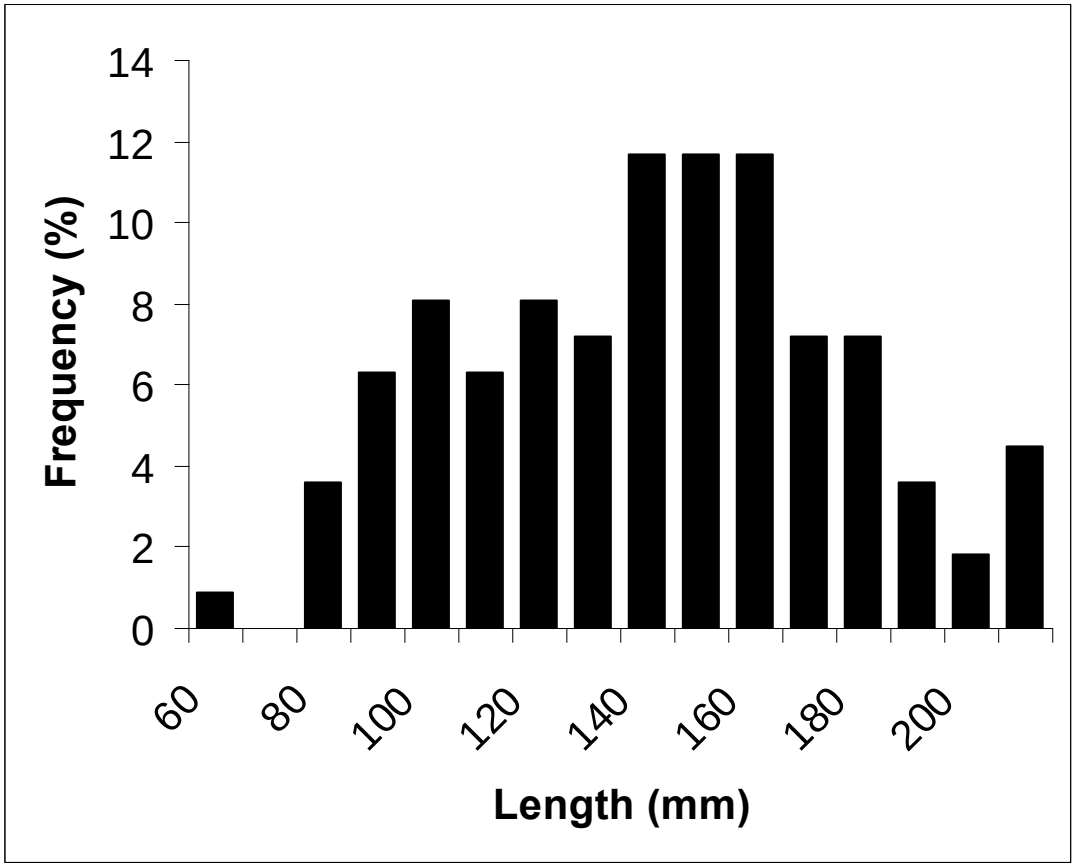

FIGURE 4. Length Frequency distribution of bluegill from Wilson Reservoir, Spring 2005.

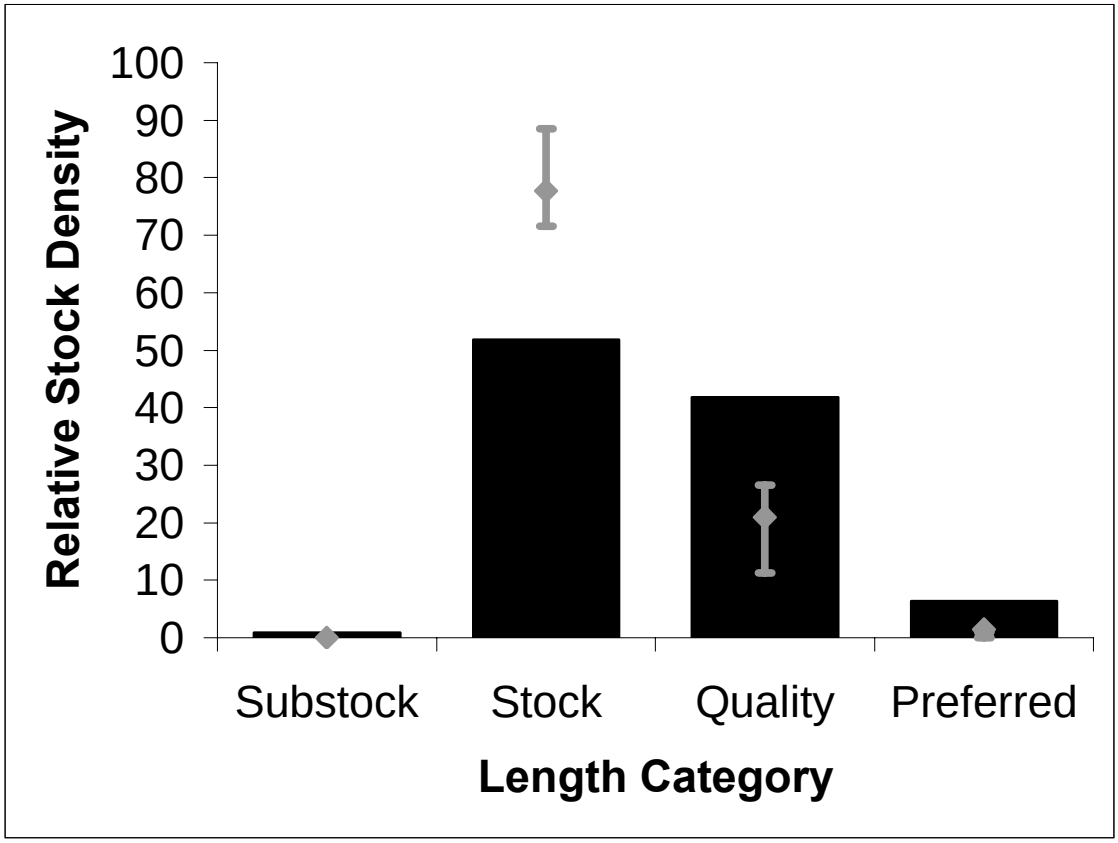

FIGURE 5. Releative Stock Density (RSD) distribution for bluegill from Wilson Reservoir, Spring 2005.

APPENDIX B

CREEL SURVEY RESULTS

WILSON RESERVOIR 2005 ANGLER SURVEY REPORT

1	Number of parties interviewed	=	413
2	Number of anglers interviewed	=	888
3	Total fishing effort (hours)	=	4879.10
4	Mean trip length (hours)	=	5.49
5	Number of parties fishing for bass	=	257
6	Percent of parties in survey fishing for bass	=	62.23
7	Number of bass anglers	=	488
8	Percent of anglers in survey fishing for bass	=	54.95
9	Fishing effort for bass (hours)	=	2922.43
10	Percent effort for bass	=	59.90
11	Mean trip length for bass anglers (hours)	=	5.99
12	Number of parties fishing for crappie	=	21
13	Percent of parties in survey fishing for crappie	=	5.08
14	Number of crappie anglers	=	41
15	Percent of anglers in survey fishing for crappie	=	4.62
16	Fishing effort for crappie (hours)	=	196.55
17	Percent effort for crappie	=	4.03
18	Mean trip length for crappie anglers (hours)	=	4.79
19	Number of parties fishing for anything	=	30
20	Percent of parties in survey fishing for anything	=	7.26
21	Number of anglers fishing for anything	=	72
22	Percent of anglers in survey fishing for anything	=	8.11
23	Fishing effort for anything (hours)	=	331.33
24	Percent effort for anything	=	6.79
25	Number of parties fishing for other species	=	102

26	Percent of parties in survey fishing for other species	=	24.70
27	Number of anglers fishing for other species	=	282
28	Percent of anglers in survey fishing for other species	=	31.76
29	Fishing effort for other species (hours)	=	1384.58
30	Percent effort for other species	=	28.38
31	Number of LMB <12" released by all anglers	=	1285
32	Number of LMB >12" released by all anglers	=	1348
33	Number of LMB <12" released by bass anglers	=	1141
34	Number of LMB >12" released by bass anglers	=	1315
35	Number of SMB <14" released by all anglers	=	234
36	Number of SMB >14" released by all anglers	=	40
37	Number of SMB <14" released by bass anglers	=	205
38	Number of SMB >14" released by bass anglers	=	38
39	Number of bass harvested by all anglers	=	215
40	Number of bass harvested by bass anglers	=	204
41	Bass harvest rate (bass/hr.) for all anglers	=	0.04
42	Bass catch rate (bass/hr.) for all anglers	=	0.64
43	Bass harvest rate (bass/hr.) for bass anglers	=	0.070
44	Bass catch rate (bass/hr.) for bass anglers	=	0.99
45	Modal length group (25mm) of black bass harvested	=	350, 375
46	Number of crappie < 9" released by all anglers	=	51
47	Number of crappie > 9" released by all anglers	=	26
48	Number of crappie < 9" released by crappie anglers	=	27

49	Number of crappie > 9" released by crappie anglers	=	7
50	Number of crappie harvested by all anglers	=	50
51	Number of crappie harvested by crappie anglers	=	33
52	Crappie harvest rate (crappie/hr.) for all anglers	=	0.01
53	Crappie catch rate (crappie/hr.) for all anglers	=	0.03
54	Crappie harvest rate (crappie/hr.) for crappie anglers	=	0.17
55	Crappie catch rate (crappie/hr.) for crappie anglers	=	1.20
56	Modal length group (10mm) of crappie harvested	=	300, 320

57 Effort by access area

Access area	No. of parties	Effort (hours)	Percent Effort
Fleet Harbor	163	1817.32	37.25
Safety Harbor	195	2309.85	47.34
Lock 6	55	751.93	15.41
Total	413	4879.10	100.00

The state and county of residence for Wilson Reservoir angler parties

State	County / City	Parties	Percent of All
AL	BIBB	1	0.23
AL	COLBERT	88	20.51
AL	CULLMAN	5	1.17
AL	FAYETTE	2	0.47
AL	FRANKLIN	5	1.17
AL	GILBERT	1	0.23
AL	JEFFERSON	5	1.17
AL	LAMAR	1	0.23
AL	LAUDERDALE	97	22.61
AL	LAWRENCE	24	5.59
AL	LIMESTONE	18	4.20
AL	MADISON	22	5.13
AL	MARION	8	1.86
AL	MARSHALL	2	0.47
AL	MAURY	1	0.23
AL	MORGAN	14	3.26
AL	TUSCALOOSA	4	0.93
AL	WALKER	3	0.70
AL	WINSTON	1	0.23
CO	LAUDERDALE	1	0.23
GA	MACON	1	0.23
IL	OGLE	1	0.23
IN	INDIANAPOLIS	2	0.47
IN	MORGAN	1	0.23
IA	IOWA	1	0.23
KY	LAUREL	1	0.23
MI	ALCORN	1	0.23
MN	CUMBERLAND	1	0.23
MO	ST. LOUIS	1	0.23
MS	NESHOBA	1	0.23
NC	HENDERSON	1	0.23
OH	DEFIANCE	1	0.23
TN	BEDFORD	1	0.23
TN	CARROLL	7	1.63
TN	COLUMBIA	1	0.23
TN	DAVIDSON	1	0.23
TN	COOKE	1	0.23
TN	GILES	11	2.56
TN	LAWRENCE	33	7.69
TN	LEWIS	2	0.47
TN	MADISON	1	0.23
TN	MARSHALL	8	1.86
TN	MAURY	18	4.20
TN	MOORE	1	0.23
TN	WAYNE	1	0.23
TX	DEWITT	1	0.23
AL	?	4	0.93
FL	?	3	0.70
GA	?	3	0.70
IL	?	3	0.70
IN	?	1	0.23
KY	?	5	1.17
MA	?	1	0.23
NC	?	2	0.47
OH	?	1	0.23
TN	?	1	0.23
WI	?	1	0.23
WV	?	1	0.23
Total		429 *	99.92

* In an interview, a party may include anglers from different counties; therefore, this total is higher than the total number of parties interviewed.