F-78-R 5 and 6
IV e
Region 7

Montana Department of Fish, Wildlife and Parks
Fisheries Division

Job Progress Report

STATE: Montana **PROJECT:** Statewide Fisheries Investigations

PROJECT NO. F-78-R-5 & 6 **STUDY TITLE:** Survey and Inventory of Warmwater Lakes

JOB NO: IV-E **JOB TITLE:** Tongue River Reservoir Investigations

PROJECT PERIOD: July 1, 1998 through June 30, 2000

ABSTRACT

A size goal for crappie was met in 1998 but not in 1999. Abundance goals for walleye greatly exceeded the desired level both years. Recruitment of young-of-the-year crappie appears to have been negatively affected during the 1996-1999 period due to reduced reservoir elevation associated with the reconstruction of the Tongue River Dam and spillway. The daily crappie limit instituted in 1996 appears to have sustained enough adult crappie to assist in increasing crappie populations once the reservoir construction is complete and water elevations restored. Smallmouth bass recruitment increased during the same period of lowered reservoir elevations.

INTRODUCTION

A size goal for crappie and an abundance index goal for walleye have been in place for a number of years. These goals, in mid-summer gillnet catches, are for 20% of crappie to exceed a total length of 250mm and for walleye catch rates to exceed an average of 2.0 fish per gillnet set.

A major construction project began at Tongue River Reservoir during 1995 and was completed during 1999. This project consisted of reconstructing the dam, spillway and low-level outlet works to meet safety standards. The post-construction dam increased the reservoirs capacity by 4 vertical feet (old spillway crest = 3242.4

ft, new spillway crest = 3248.4 ft.) resulting in an increased total storage of 10,320 acft. During the 1996-1999 construction period, the reservoir was held at a reduced elevation to facilitate construction. Reservoir elevations were approximately 700 surface acres (approximately 3,200 acres at the old spillway level) beginning in the fall of 1997 and remained low through 1998 and into the winter of 1999. Following the completion of the new dam and spillway in July, 1999, reservoir elevations were increased in order to test the new structure. Spring runoff in 1999 raised the reservoir's storage to near full capacity during the month of May. During June, 1999, the additional 4 feet of water stored behind the new dam began to leak into the East Decker Coal Mine near the mid-point of the reservoir's west side (Pearson Creek). The elevation of the reservoir was dropped to the old full-pool elevation. Reservoir levels remained at the old full-pool elevation through the crappie spawn.

METHODS

Fish populations were sampled with experimental gillnets and bag seines during August of 1998 and 1999. Gillnets were 125' experimental sinking nets with 25'panels of ¾, 1, 1 1/4, 1 ½, 2 inch bar mesh. Juvenile and forage fish were sampled using a 100 foot bag seine, 8 feet deep, with 1/4 inch mesh. The seine was set from a boat and hauled to shore in a quarter circle pattern to capture fish. Each sampling method consisted of a minimum of 10 net sets/seine hauls distributed across the upper, middle and lower sections of the reservoir. Captured fish were identified to species and total length and weight obtained from each fish Sub sampling of abundant catches consisted of collecting length and weight data from 25-50 randomly selected individuals and determining a total count of fish collected.

Pre-spawn smallmouth bass were sampled May 24, 1999 by night-time electrofishing. A boat mounted electofishing unit was used to fish 6, 10 minute transects in smallmouth bass habitat near the lower end of the reservoir. All captured fish were measured for total length and weight.

RESULTS AND DISCUSSION

Results of gill netting for both 1998 and 1999 are shown in Tables 1a and 1b, respectively.

Total catch rate of fish continued to increase in 1998 and remained high during 1999. A total catch of 1305 and 771 fish for 1998 and 1999, exceeded or was similar to, the 10 year average catch rate of 711 fish. Lower reservoir elevation may have influenced the high catch rate in 1998.

Rock bass, a species found in Montana only in the Tongue River drainage, continued to be present in gillnet catches in low numbers. Other species were collected in numbers and sizes similar to recent years. Northern pike remained absent from the gillnet catch but have been reported to be in the reservoir by anglers. The last northern pike sampled with gillnets was during the 1993 netting effort. The increased elevation of the reservoir and associated flooded vegetation is expected to provide spawning and rearing habitats for northern pike. Future sampling should determine if spawning or juvenile recruitment has been a limiting factor for northern pike in the Tongue River Reservoir system.

Catch rates of walleye have met or exceeded the catch-per-net goal of 2.0 fish since 1993 (Table 2). Walleye catch rates in 1998 and 1999 increased dramatically, compared with similar efforts during the mid-1990's. The abundant catch rate of 18 fish/net in 1998 may be attributed to the low reservoir elevations resulting in an increased opportunity to capture fish. Future sampling should focus on factors influencing walleye recruitment, such as, the impacts of reservoir levels, walleye spawning and recruitment, survival of stocked fry and fingerling walleye.

Adult crappie catch rates surpassed the management goal in 1998 with 25% of netted crappie exceeding 250 mm. in length (Table 2). The goal was not met in 1999 with a crappie catch rate of 13.5% over the desired length. Overall catch of adult crappie exceeded 20 fish/net in 1998 and declined to 16 fish/net in 1999. Long term trends show a reduced catch rate of adult crappie during the 1995-1999 period when compared to similar efforts from 1989-1994 (Figure 1). The 10 year mean catch rate for adult crappie is 20.1 fish/net.

Maintaining the current adult crappie management goal is dependant upon multiple factors with successful spawning and recruitment and limited angler harvest being important variables. The Dam construction project during the 1995-1999 period resulted in poor spawning and nursery habitat availability. Adult abundance during this time period remained relatively low (Figure 1). Lowering the bag limit on crappie to 15 fish/angler in 1996, reduced angler impacts during this time period. Previous reports on the Tongue River Reservoir fishery indicate that the crappie limit decreased angling pressure and harvest on adult crappie (Stewart 1997).

Spring electrofishing surveys resulted in 68 smallmouth bass and 98 crappie being captured in 6 transects located on the lower end of the reservoir near the dam. Smallmouth bass and crappie average lengths were 237 and 233 mm respectively (Table 5). Of the crappie sampled, 49% exceeded 250 mm in length.

Catch rate for young-of-the-year fish (YOY) in seine hauls was similar to historical levels (Tables 3, 4a and 4b). Smallmouth bass YOY experienced relatively good spawning years in both 1998 and 1999. Catch rates of 9.7 and 21.2 fish/seine respectively, exceed the 10 year average YOY smallmouth bass catch rate of 6.4 fish/seine. Smallmouth bass production has remained below the long term average since 1991.

Walleye YOY were poorly represented in the 1998 seining catch and were not sampled in seine hauls during 1999. Minimal catch rates for young walleye have been observed in past years. Since walleye planting began on an annual basis in the mid 1980's, walleye yearlings have always been observed in gill net samples. For that reason the absence of YOY in seine hauls does not indicate an absence in the reservoir.

Catch rate of crappie YOY in seine hauls in 1998 (155.5 fish/seine) increased slightly over similar efforts in 1996 and 1997 (75.9 and 121.8 respectively). The same effort in 1999 resulted in low numbers of young crappie with 22.3 fish caught per seine haul (Figure 2). Abundance of crappie YOY in seine hauls appears to be an accurate indicator of year class strength at Tongue River Reservoir. Data from previous year's surveys indicate that 1995 was the last strong year class of young crappie (Figure 2).

General observations of the Tongue River Reservoir fishery indicate that adult walleye are dependent upon YOY crappie as a primary forage source. Adult walleye numbers have exceeded management objectives the past two years increasing the predatory impact on forage populations. The increase in predators may have a detrimental impact on the fishery if walleye numbers continue to increase or if northern pike are able to utilize newly created habitats and return to the fishery in appreciable numbers.

Seining data indicates a strong year class of crappie occurred during the 1995 season. This cohort has provided adult crappie in recent years, which meet the management goal of 250 mm in length. Another strong year class is needed in order to maintain the existing fishery.

Recruitment of crappie in the Tongue River Reservoir seems to be marginal during most years with an occasional year of successful spawning. These successful cohorts continue to provide YOY fish as forage and sustain the crappie fishery. Improving crappie recruitment is vital to maintain the fishery in the reservoir. Adequate reservoir elevations timed with crappie spawning and juvenile rearing is imperative if successful spawning is to occur. Negotiations with the Montana Department of Natural Resources and Conservation and the Tongue River Water Users Association are

needed to ensure higher reservoir elevations and increased spawning habitats during the months of May and June.

Waters referred to: Tongue River Reservoir 7-21-9000
Key Words: Crappie, Crappie Reproduction, Walleye
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Date prepared: February 14, 2001

Literature Cited

Stewart, P. A. 1997. Survey and Inventory of Warm Water Lakes, Tongue River Reservoir Investigations. -R4, Job IV-E.

Table 1a.
Results of 10 overnight experimental gillnet sets at Tongue River Reservoir, August 1998.

Species	Number Caught	#/ Net set	Mean Length (mm)	Mean Weight (gm)	Length Range (mm)	Weight Range (gm)	% of Catch
Walleye	180	18.0	343	456	167-600	20-2000	13.8%
Yellow Perch	165	16.5	175	71	135-230	35-160	12.6%
Smallmouth Bass	32	3.2	255	284	190-411	105-1150	2.5%
White Crappie	124	12.4	246	221	200-328	90-460	9.5%
Black Crappie	105	10.5	235	227	195-280	120-390	8.0%
Pumpkinseed	3	0.3	170	130	157-193	90-200	0.2%
Rock Bass	1	0.1	212	220	xx	xx	0.1%
Channel Catfish	12	1.2	377	996	210-775	70-4990	0.9%
Yellow Bullhead	47	4.7	226	162	185-298	60-450	3.6%
Black Bullhead	346	34.6	226	181	198-302	95-310	26.5%
Short Head Red Horse	206	20.6	335	444	182-540	60-1145	15.8%
White Sucker	71	7.1	380	646	244-470	160-1130	5.4%
Carp	13	1.3	479	1310	401-547	890-1840	1.0%
Total	1305	130.5					100.0%

Table 1b.
Results of 10 overnight experimental gillnet sets at Tongue River Reservoir, August 1999

Species	# Caught	Mean #/ Net set	Mean Lgth (mm)	Mean Wght (gm)	Lgth Range (mm)	Wght Range (gm)	% of Catch
Walleye	85	8.5	411	700	181-602	50-2150	11.0%
Sauger	3	0.3	421	620	397-454	510-770	0.4%
Yellow Perch	79	7.9	201	108	140-245	20-190	10.2%
Smallmouth Bass	70	7.0	299	412	177-377	80-820	9.1%
Largemouth Bass	1	0.1	222	180	xx	xx	0.1%
White Crappie	133	13.3	167	68	115-318	20-430	17.3%
Black Crappie	33	3.3	193	153	107-270	15-310	4.3%
Pumpkinseed	1	0.1	145	70	xx	xx	0.1%
Rock Bass	5	0.5	188	150	184-195	140-160	0.6%
Channel Catfish	11	1.1	375	911	157-700	30-4500	1.4%
Yellow Bullhead	104	10.4	244	162	130-265	20-380	13.5%
Black Bullhead	74	7.4	189	124	122-276	20-340	9.6%
Stonecat	1	0.1	204	100	xx	xx	0.1%
Short Head Red Horse	120	12.0	322	405	135-656	30-1200	15.6%
White Sucker	39	3.9	368	600	220-445	110-950	5.1%
Longnose Sucker	0	0.0	xx	xx	xx	xx	0.0%
Carp	12	1.2	493	1465	295-629	390-2600	1.6%
Total	771	77.1					100.0%

Table 2.
Catch rates for walleye*, and percentage of crappie >250 mm total length in experimental gillnets, Tongue River Reservoir, 1980-1999

Year	Walleye Catch rate	Walleye Mean Total Length (mm)	Percentage of Crappie > 250 mm Total Length
1999	8.5	411	13.5
1998	18.0	343	25
1997	4.2	384	24.2
1996	5.0	395	20
1995	2.4	335	21.2
1994	5.3	349	2.2
1993	1.1	308	0.7
1992	8.4	325	0.8
1991	3.9	383	19.9
1990	4.1	349	2.9
1989	15.7	343	12.8
1988	19.4	332	18.9
1987	5.6	279	4.2
1986	1.6	273	0
1985	0.6	463	2.7
1984	0.4	417	1.2
1983	0.2	427	3.4
1982	2.0	397	1.7
1981	5.6	377	27.8
1980	4.3	319	11.4

*Mean #/net

Figure 1

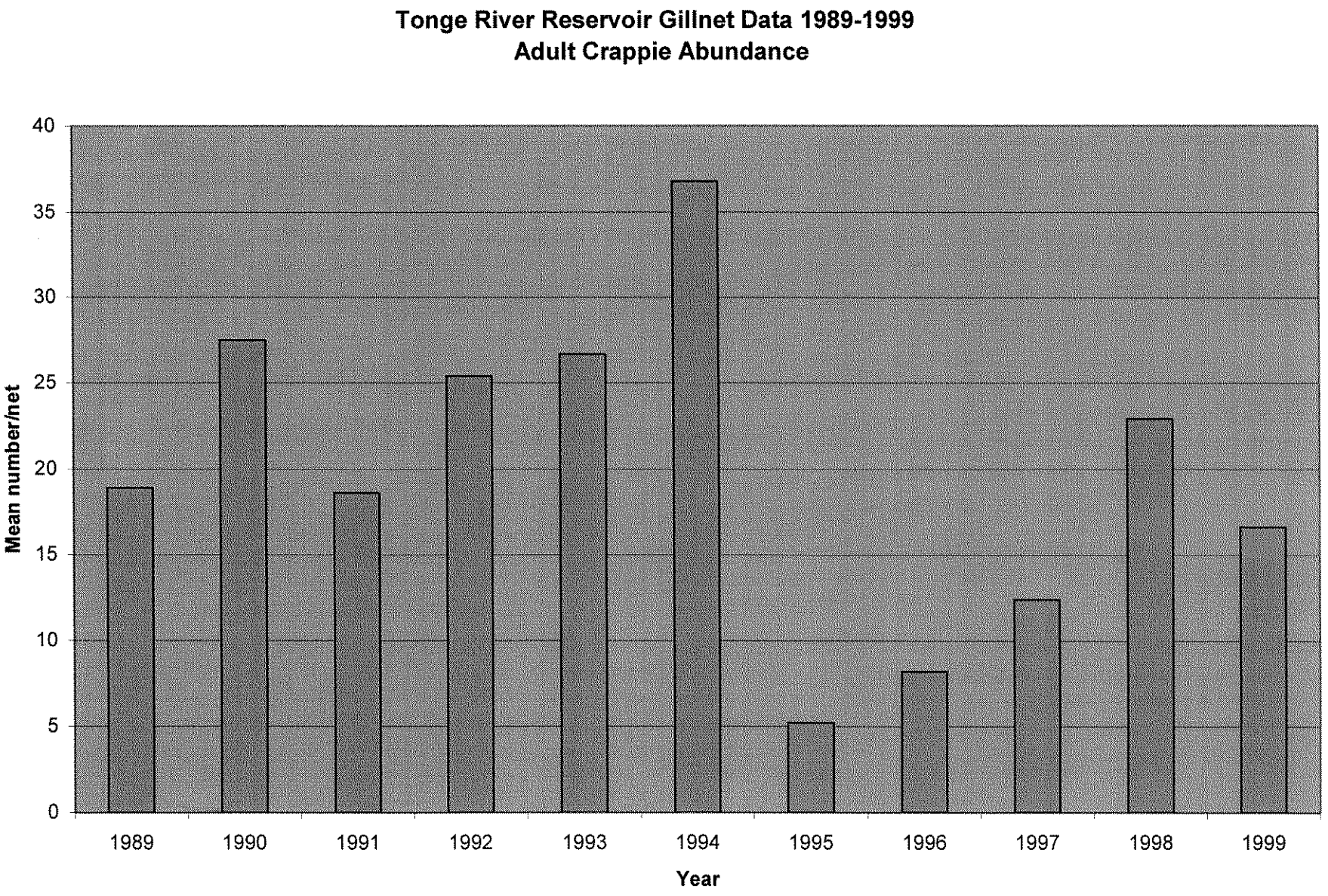
Tonge River Reservoir Gillnet Data 1989-1999
Adult Crappie Abundance
Mean number/net
40
35
30
25
20
15
10
5
0
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year

Table 3.
Mean number of young-of-the-year fish in Tongue River Reservoir seine hauls.

Year	Mean Number	Most Abundant spp	Second Most Abundant spp
1999	68	Bullheads	Crappie
1998	171	Crappie	Sunfish
1997	104	Crappie	Spottail shiner
1996	159	Crappie	Yellow perch
1995	682	Crappie	Smallmouth bass
1994	54	Yellow Perch	Crappie
1993	3	Crappie	Spottail Shiner
1992	17	Crappie	Sunfish
1991	464	Crappie	Carp
1990	569	Crappie	Bullhead
1989	5	Yellow Perch	Smallmouth Bass
1988	271	Crappie	Yellow Perch
1987	68	Yellow Perch	Smallmouth Bass
1986	127	Crappie	Carp
1985	46	Crappie	Yellow Perch
1984	585	Carp	Bullhead
1983	288	Crappie	Walleye

Table 4a.
Results of 11 seine hauls at Tongue River Reservoir, August 1998

Species	Number Caught	Mean No./Seine Haul	Mean Length (mm)	Mean Weight (gm)	Length Range (mm)	Weight Range (gm)
Smallmouth bass	7	0.7	234	207	171-304	80-460
Smallmouth bass YOY	107	10.7	59	xx	40-71	xx
Largemouth bass YOY	4	0.4	66	xx	55-76	xx
Yellow perch YOY	9	0.9	73	xx	66-78	xx
White crappie	5	0.5	203	119	164-235	60-195
Black crappie	3	0.3	188	129	136-222	30-210
Crappie YOY	1710	171.0	54	xx	46-64	xx
Bullhead YOY	23	2.3	52	xx	42-72	xx
Shorthead redhorse	1	0.1	119	25	xx	xx
Shorthead redhorse YOY	51	49.0	xx	38-65	xx	
Carp YOY	318	31.8	63	xx	27-94	xx
Spottailed shiner	17	1.7	54	xx	42-61	xx
Walleye	1	0.1	161	32	xx	xx
Channel Catfish YOY	1	0.1	36	xx	xx	xx
Sunfish YOY	515	51.5	29	xx	26-35	xx
Total	2772	321.1				

Table 4b.
Results of 11 seine hauls at Tongue River Reservoir, August 1999

Species	# Caught	Mean #./Seine Haul	Mean Lgth (mm)	Mean Wght (gm)	Lgth Range (mm)	Wght Range (gm)
Smallmouth bass	22	2.0	128	27	80-162	5-50
Smallmouth bass YOY	233	21.2	60	xx	41-82	xx
Largemouth bass	8	0.7	113	16	83-190	10-30
Yellow perch	8	0.7	141	23	120-180	5-30
Yellow perch YOY	19	1.7	68	xx	58-85	xx
White crappie	26	2.4	155	49	137-255	30-200
Black crappie	14	1.3	177	129	100-257	20-270
Crappie YOY	245	22.3	61	xx	47-78	xx
Pumpkinseed	42	3.8	102	20	84-182	5-110
Bullhead YOY	753	68.5	60	xx	10-103	xx
Shorthead redhorse	2	0.2	182	60	180-185	60-60
Carp YOY	378	34.4	62	xx	55-70	xx
Spottailed shiner	5	0.5	54	xx	51-62	xx
Total	1755	159.5				

Figure 2

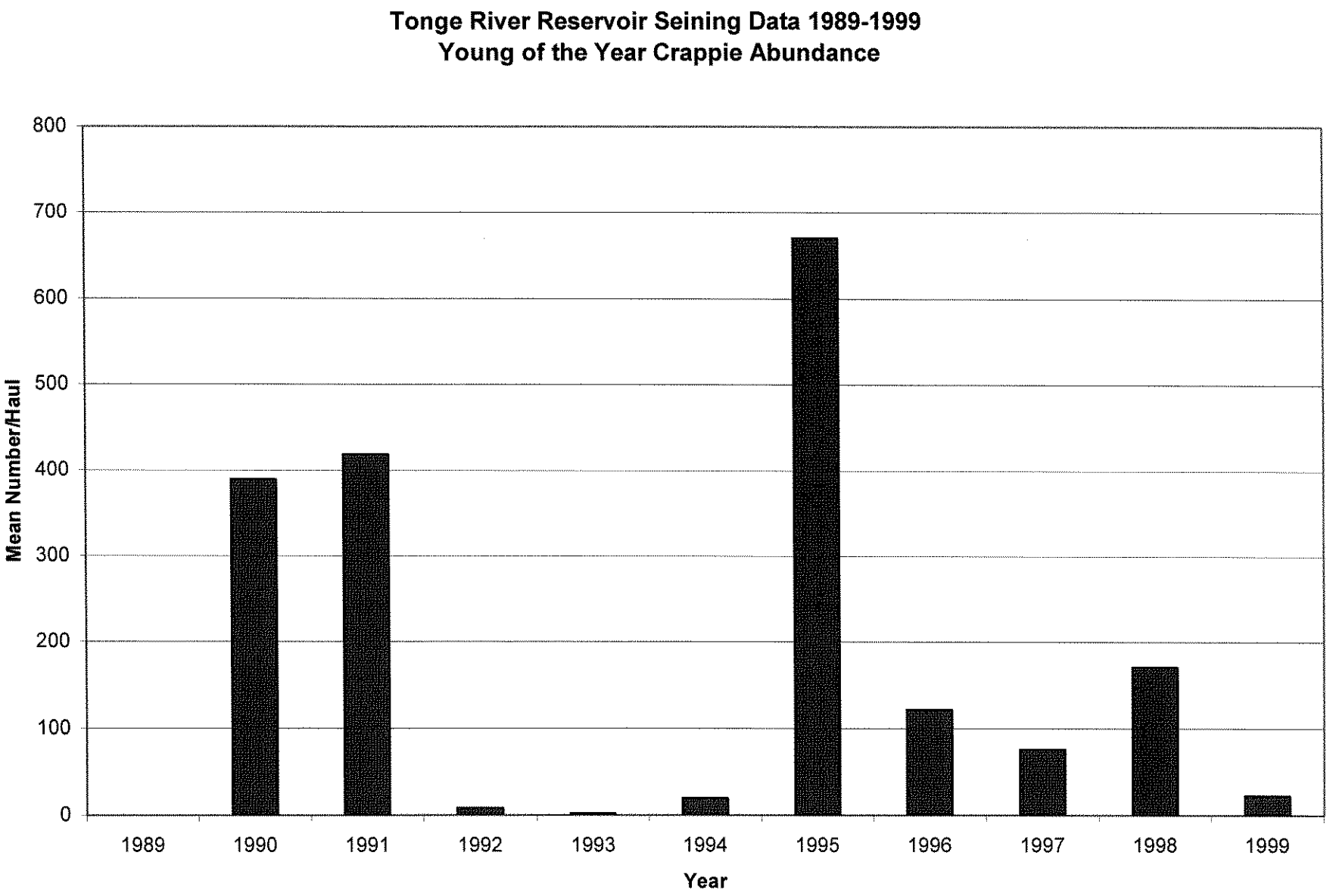
Tonge River Reservoir Seining Data 1989-1999
Young of the Year Crappie Abundance
Mean Number/Haul
800
700
600
500
400
300
200
100
0
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year

Table 5.
Results of 60 minutes of electrofishing (6 transects) at Tongue River Reservoir, May 24, 1999

Species	Number Caught	Mean Length (mm)	Mean Weight (gm)	Length Range (mm)	Weight Range (gm)
Crappie	98	233	205	75-295	2-320
Brown trout	1	175	60	xx	xx
Green sunfish	1	156	70	xx	xx
Rock bass	1	135	60	xx	xx
Shorthead red horse sucker	1	227	210	xx	xx
Smallmouth bass	68	237	199	87-306	10-460
Walleye	2	294	227	242-346	90-365
Total	172				

* 49% of sampled crappie >= 250 mm.