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SURVEY REPORT

OKLAHOMA FISHERIES MANAGEMENT PROGRAM

FISH MANAGEMENT SURVEY AND RECOMMENDATIONS

FOR

LAKE WAXHOMA

1994

Performance Report

State: Oklahoma Project No. F-44-D-9

Project Title: Oklahoma Fisheries Management Program

Study Title: Surveys and Recommendations - Waxhoma Lake

Period Covered: 1 January 1994 - 31 December 1994

LAKE WAXHOMA

ABSTRACT

Lake Waxhoma was sampled by spring electrofishing and fall gillnetting in 1994 to determine fish population trends. Largemouth bass were high in abundance with good numbers of quality size fish but the presence of too many bass 200 - 299 mm and no harvest restrictions increases the potential for future stockpiling. Crappie and channel catfish were low in abundance and did not represent quality fisheries. Bluegill and gizzard shad appeared to be providing an adequate forage base for the bass population.

Recommendations were to consider the implementation of a slot length limit on largemouth bass, to construct fish attractors, to stock channel catfish; and to improve the existing boating/fishing access area.

INTRODUCTION

Lake Waxhoma impounds an unnamed tributary of Dog Thresher Creek, 8.1 km east of Barnsdall in Osage County, Oklahoma (Figure 1). Waxhoma Lake covers 57 surface hectares and was constructed in 1955 by the City of Barnsdall for a water supply and recreation. Lake Waxhoma has a mean depth of 3.6 m, and a maximum depth of 12.5 m, a water exchange rate of < 1, and a secchi disc visibility of around 130 cm in the main pool in August; turbidity is primarily from plankton. Fish habitat is limited to steep rocky shorelines, rock rip-rap and small areas of aquatic vegetation on shallow flats.

A previous survey in 1979, indicated the largemouth bass population was low in abundance but well structured. Crappie were moderately abundant but comprised mainly of fish < 200 mm in length with slow growth rates. Channel catfish were low in abundance and had limited reproductive success. Bluegill and gizzard shad were the principal prey species present, but, only bluegill were consistently providing adequate forage.

Recent fish stockings are shown in Table 1.

Lake Waxhoma was sampled in 1994 by spring electrofishing and fall gill netting to up-date the status of the fish populations since the last survey in 1979.

RESULTS

Largemouth Bass

1. Largemouth bass abundance from 1994 spring electrofishing (C/f=175.4) was considerably above the minimum acceptable value for a quality fishery (C/f= 40). The total bass C/f has increased substantially since 1979 (Table 2).
2. In 1994 spring electrofishing, the abundance of bass < 200, > 300 and > 356 mm was satisfactory, while those 200 - 299 mm were well above acceptable values. The abundance of all bass size groups increased substantially since 1979.
3. Body condition values (W_r) were satisfactory for > 300 and > 356 mm but those 200 - 299 and < 200 mm were in fair and poor condition, respectively. Condition values for all size groups of bass have declined slightly since 1979.
4. The bass abundance > 300 mm was satisfactory but recent recruitment and overabundant fish 200 - 299 mm indicates a strong potential for stockpiling; a protected slot length limit may be needed to encourage harvest of smaller (< 300 mm) bass.

Crappie

1. Crappie abundance from 1994 gillnetting (C/f=0.06) was well below the minimum acceptable value for a quality fishery C/f=0.20). The total crappie C/f has declined since 1979 (Table 3).
2. The abundance of all crappie size groups were unsatisfactory. The abundance of crappie < 200 mm declined substantially,

while larger crappie size groups were fairly stable since 1979.

3. Body condition values (W_r) were satisfactory for all size groups. Condition values for all crappie size groups have declined slightly but remained satisfactory since 1979.

4. Age and growth was satisfactory for Age II and IV crappie. However, several year classes appeared to be either very weak or missing (Table 4).

5. Limited crappie recruitment appears to be the primary factor in their low abundance. Poor recruitment is probably related to either and/or a combination of competition for food at a specific trophic level and losses to predation from other fish species.

Channel Catfish

1. Channel catfish abundance for 1994 gill netting (C/f=0.08) was well below the minimum acceptable value for a quality fishery (C/f=0.20). The total channel catfish C/f has declined slightly since 1979 (Table 5).

2. The abundance of channel catfish > 400 mm was satisfactory, while smaller size groups were below acceptable values. The abundance of all channel catfish size groups has remained relatively stable since 1979.

3. Body condition values (W_r) were nearly satisfactory for all size groups.

4. As documented in the 1979 "SSP" survey, channel catfish continued to be low in abundance with limited reproductive success resulting in missing or weak year classes. Predation

on channel catfish < 130 mm by an abundant largemouth bass population is known to negatively affect channel catfish recruitment.

Flathead catfish

1. Only two (2) flathead catfish were collected in 1994 and none in 1979 (Table 6). These fish ranged from 561 to 860 mm in length and may have represented introduced specimens in recent years.

Bluegill

1. Bluegill abundance from 1994 spring electrofishing (C/f=180.4) was considerably above the minimum acceptable value for a quality forage supply (C/f=>45). The total bluegill C/f has increased several fold since 1979 (Table 7).
2. In 1994 spring electrofishing, the abundance of all bluegill size groups was satisfactory. The abundance of all bluegill size groups has increased since 1979.
3. Body condition values (W_r) were satisfactory or nearly so for all size groups. Condition values for all size groups have decreased slightly since 1979.
4. The abundance, size structure and condition values of the bluegill population indicates they were receiving adequate predation and providing an excellent forage base in 1994.

Redear

1. Redear sunfish were not collected by 1994 spring electrofishing and only three (3) were caught in gill netting.

2. Redear continued to be present in low numbers and did not represent a viable forage source or a quality fishery.

Gizzard Shad

1. Shad abundance form 1994 spring electrofishing (C/f=32.8) was slightly below the minimum acceptable value form a quality forage supply (C/f=>40). However, shad abundance form 1994 fall gill netting (C/f=0.55) was well above the minimum acceptable value for a quality forage supply (C/f=>0.20). The total shad C/f has increased since 1979.
2. In spring electrofishing, the abundance of shad < 200 mm was unsatisfactory, while those < 200 mm from spring electrofishing were well above the acceptable value. The abundance of shad < 200 mm has generally increased since 1979.
3. In both spring electrofishing and fall gill netting, body condition values (W_r) satisfactory for all size groups.
4. Shad abundance and size structures indicated they were providing an adequate forage supply in 1994.

RECOMMENDATIONS

Fish Attractors

1. Five attractors should be constructed in 1996 to aid both bank and boat anglers in improving their catch rates of sport fishes.

Fish Stockings

1. Channel catfish, 178 mm or longer, should be stocked at a rate of 138 fish per hectare in 1996 to supplement low recruitment to provide a viable fishery.
2. Forage fish abundance does not appear to be sufficient to support the introduction of additional predators such as walleye, saugeye and hybrid striped bass.

Fishing Regulations

1. The city of Barnsdall should consider the implementation of an ordinance placing a protective slot length limit of 305 to 406 mm on largemouth bass if quality bass fishing is a desired management objective. A quality bass fishery (> 300 mm) was present in the spring of 1994 but the presence of too many bass 200 - 299 mm increases the potential of stockpiling and stunting if overharvest of larger should occur.

Fish Survey

1. A spring electrofishing and fall gill netting survey should be conducted in 1997 or 1998 as a follow up to implementation of the above management recommendations.

Angler Access Improvements

1. Boating/fishing access at Waxhoma Lake is very limited. Improvements in the boat ramp and parking are needed along with a handicapped accessible boat/fishing dock. Wallop-Breau federal aide grants are available from the Oklahoma Department of Wildlife Conservation to assist with improvements.

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Table 1 . Age and mean back calculated length at each annulus on white crappie otoliths collected from Waxhoma Lake during October, 1994.

YEAR	AGE		Mean back calculated total length in mm. at end of year									
CLASS	GROUP	N	1	2	3	4	5	6	7	8	9	10
1994	0	0										
1993	I	0										
1992	II	5	105	175	(228)							
1991	III	0										
1990	IV	1	119	210	253	279	(308)					
1989	V	0										
1988	VI	0										
1987	VII	0										
1986	VIII	0										
1985	IX	1	99	139	173	203	234	258	292	319	340	
	X											
Number of Fish			7	7	2	2	1	1	1	1	1	
Weighted Ave.			106	175	213	241	234	258	292	319	340	
Growth Increment			106	69	38	28	-7	24	34	27	21	

( ) = Length at Capture

Table 2. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of largemouth bass collected by spring electrofishing and seining from Waxhoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total[1] (≥40)		<200 mm[1] (15-45)		200-299 mm[1] (15-30)		≥300 mm[1] (≥15)		≥356 mm[1] (≥10)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r
1979	56	24.8	2.7		8.9	87	13.3	101	8.4	103
1994	107	175.4	21.3	81	106.6	85	47.5	90	14.8	95

[1] Spring electrofishing

Table 3. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of crappie collected by gill netting from Waxhoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total (≥.20)		<200 mm (.05-.30)		≥200 mm (≥.08)		≥250 mm (≥.04)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1979	36	0.36	0.33	100	0.03	105	0.01	108
1994	7	0.06			0.06	92	0.03	91

Table 4. Mean length at age of crappie collected by gill netting from Lake . Numbers in parentheses represent values for acceptable growth rates.

Year	Age 1 (≥160 mm)	Age 2 (≥200 mm)	Age 3 (≥225 mm)	Age 4 (≥250 mm)
1994		228		308

Table 5. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of channel catfish collected by gill netting from Waxhoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total (≥.20)		<300 mm (≥.10)		≥300 mm (≥.10)		≥400 mm (≥.05)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1979	14	0.14	0.03		0.11		0.07	
1994	9	0.08			0.08	87	0.08	87

Table 6. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of flathead catfish collected by gill netting from Waxhoma Lake. Acceptable W_r values are ≥90.

	Total		<300 mm		≥300 mm		≥500 mm		≥600 mm		≥700 mm	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W^r
1979	0											
1994	2	0.02			0.02	88	0.02	88	0.01	86	0.01	86

Table 7. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of bluegill collected by spring electrofishing and seining from Waxhoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total[1] (≥45)		<75 mm[1] (≥10)		75-149 mm[1] (20-100)		≥150 mm[1] (≥15)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1979	103	45.8	14.2		28.4	95	3.1	104
1994	110	180.3	75.4		82.0	89	23.0	90

[1] Spring electrofishing

Table 8. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of redear collected by spring electrofishing and seining from Waxhoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

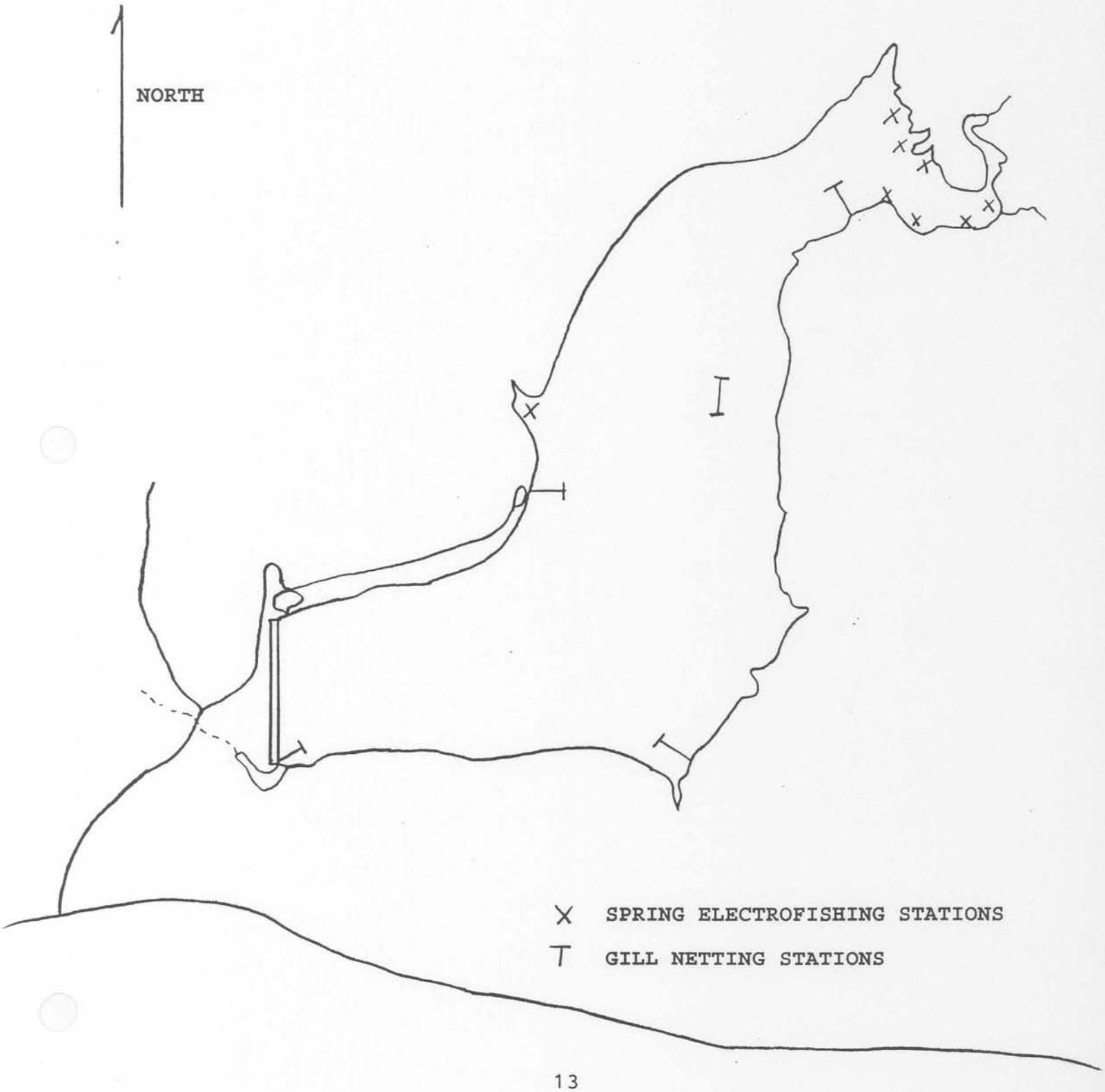
	Total[1] (≥35)		<150 mm[1] (≥20)		≥150 mm[1] (≥15)		<100 mm[2] -	
Year	No.	C/f	C/f	W_r	C/f	W_r	No.	C/f
1979	9	4.00	1.78		2.22			
1994								

[1] Spring electrofishing
[2] Seining

Table 9. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of gizzard shad collected by spring electrofishing, gill netting, and seining from Waxhoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total[1] (≥40)		<200 mm[1] (≥20)		Total[2] (≥.20)		<200 mm[2] (≥.10)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1979					0.35	107	0.34	103
1994	20	32.8	6.6	114	0.55	93	0.31	91

[1] Spring electrofishing
[2] Gill netting

Figure 1.

WAXOMA LAKE