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ANGLER USE AND HARVEST ON
FOX LAKE, WISCONSIN

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ABSTRACT

A creel survey of Fox Lake anglers was conducted in 1974 to measure angler use, angler harvest, and exploitation of game fish, and to determine preferences and characteristics of anglers using the lake. The study was done as part of a comprehensive survey to evaluate the fish populations in the lake.

Anglers made 172,360 fishing trips to the lake and exerted 268 hours/acre fishing pressure to catch 716,004 fish (1.03 fish/hour). Over half of the fishing pressure (58%) and 63% of the catch occurred during the open water season. Panfish made up 94% of the catch. The exploitation of walleye was 8.4-32% and exploitation of northern pike was 4%. These estimates were flawed due to tag loss and unreported tags. Of the walleye creeled, 68% were longer than 20 inches. Eighty-three percent of the northern pike caught were longer than 22 inches. Sixty percent of the bass caught were 11-15 inches long.

Wisconsin residents comprised 95% of the anglers; 68% of these resided outside Dodge County where the lake is located. Most nonresidents were from Illinois. The majority of anglers sought panfish (60%) and only 16% specifically sought game fish. Still fishing was the most common fishing method. Either live bait or a combination of artificial and live bait was used by 97% of the anglers.

Higher priority should be given to managing the lake for panfish and providing access facilities for bank anglers. Changes in fishing regulations, such as length limits, are not needed to protect the fishery at the present time. Rehabilitation of the Fox Lake fishery by chemical eradication has been an outstanding success. The use of this management alternative is encouraged in situations similar to Fox Lake.

CONTENTS

INTRODUCTION	3
STUDY AREA	3
METHODS.	5
RESULTS.	6
The Fishery	6
Fishing Pressure	6
Catch.	6
Catch Rates.	9
Angler Exploitation of Walleye and Northern Pike	10
Length Distribution of Catch	10
The Anglers	13
Angler Characteristics	13
Species Preference	13
Fishing Methods.	13
DISCUSSION	15
SUMMARY.	17
MANAGEMENT IMPLICATIONS.	18
LITERATURE CITED	19

INTRODUCTION

Fox Lake was the last and largest lake in Wisconsin to be chemically treated with the chlorinated hydrocarbon toxaphene to eradicate dominant rough fish populations. As is typical of fish populations following total eradication and restocking, fish growth and, consequently, anglers' satisfaction began to decline. Anglers expressed concern that the walleye, bluegill, and northern pike populations were declining and requested that the lake be stocked to maintain the populations.

A comprehensive fishery survey was undertaken in 1974 to determine the status of the fishery and the need for a management program. The survey included use of fyke netting and electrofishing to evaluate the fish populations, analyses of age and growth, mark and recapture estimates for walleye and northern pike, identification of walleye spawning habitat, and a creel survey of lake users.

This report concerns one phase of the comprehensive survey: a creel survey that was conducted to measure angler success during the 1974 fishing season. The objectives of the creel survey were three-fold: (1) measure angler use and harvest on a productive, intensively used lake; (2) determine the impact of exploitation of highly sought game fish in the lake; and (3) determine the attitudes, preferences, and characteristics of anglers using the lake.

STUDY AREA

Fox Lake is located in the northwest corner of Dodge County (Fig. 1). The shallow, natural, glacial lake bed was deepened by damming the outlet stream, creating a 19-ft deep, 2,625-acre lake (Fig. 2). Fox Lake has a 52-mile² watershed which is predominantly used for agriculture. Dense blue-green algal blooms are common in the summer. Fox Lake does not thermally stratify because of its shallowness and size. Water quality parameters are shown in Table 1.

Fox Lake suffered winterkills in 1959 and 1963. Following the kills, carp (Cyprinus carpio), bigmouth buffalo (Ictiobus cyprinellus), and black bullhead (Ictalurus melas) became the dominant fish species. The lake and its tributary streams were chemically treated with toxaphene in 1966 to remove the existing fish populations. Northern pike (Esox lucius), walleye (Stizostedion vitreum vitreum), hybrid musky (Esox masquinongy x Esox lucius), bluegill (Lepomis macrochirus), largemouth bass (Micropterus salmoides), pumpkinseed (Lepomis gibbosus), yellow perch (Perca flavescens), golden shiner (Notemigonus crysoleucas), and fathead minnow (Pimephales promelas) were stocked following the treatment. White crappie (Pomoxis annularis) became established later, probably as a result of stocking by anglers. Black bullhead (Ictalurus melas) are also present. Carp have been present in the lake in relatively small numbers but have increased noticeably since 1974. A helixor aeration system was installed in 1970 to protect the lake from winterkill.

Historically, Fox Lake has been an excellent fishing lake and a popular resort area. Because of its reputation for good fishing and close proximity to large population centers in southern Wisconsin, it is heavily used for fishing and water-based recreation. The shoreline is heavily developed by seasonal and permanent residences, except for the marshy areas which comprise approximately 35% of the shoreline.

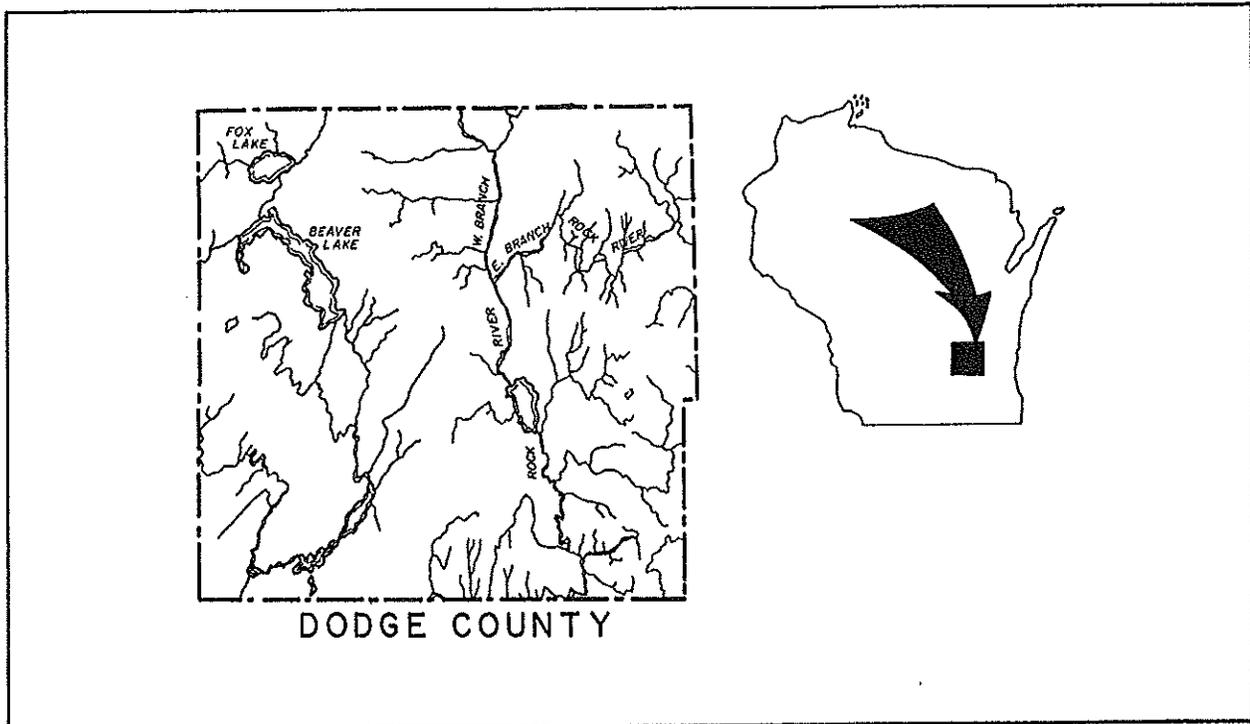


FIGURE 1. Location of Fox Lake, Dodge County, Wisconsin.

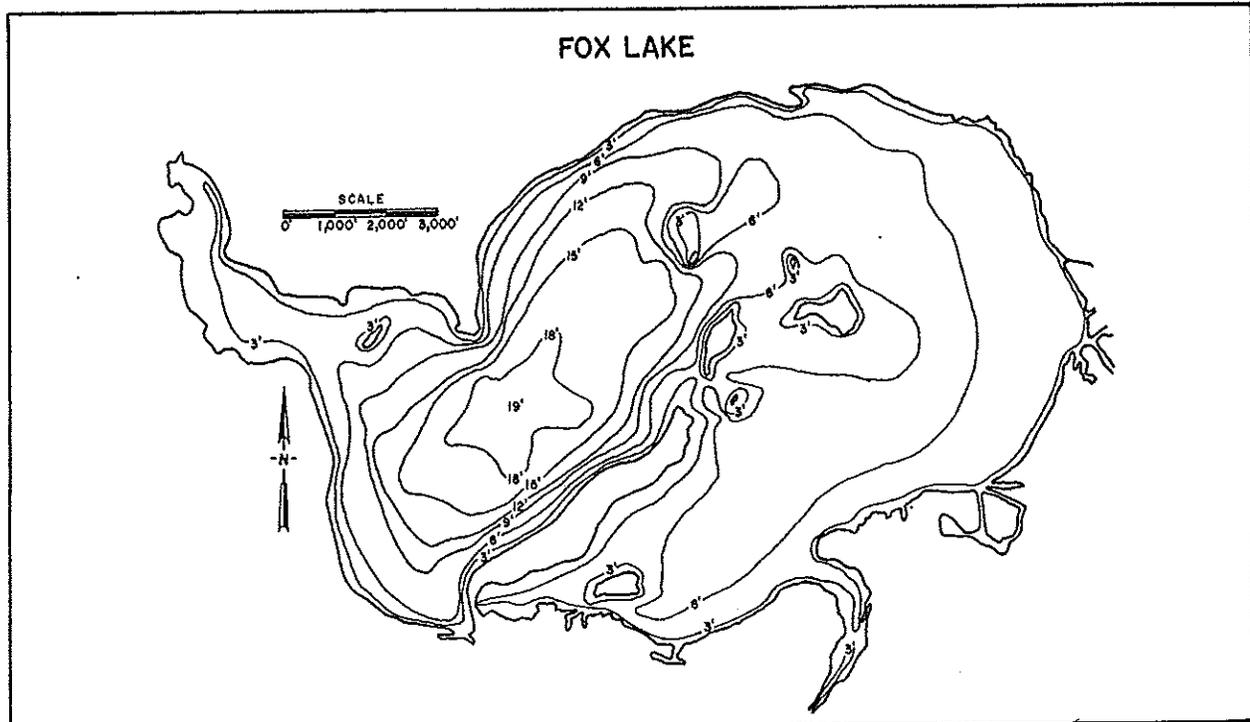


FIGURE 2. Hydrographic map of Fox Lake, Dodge County, Wisconsin.

TABLE 1. Water quality parameters from surface samples for Fox Lake, Wisconsin, December 1978.

Parameter	Level
Total nitrogen	3.17 mg/L
Total phosphorus	0.13 mg/L
Chlorides	22 mg/L
Alkalinity	151 mg/L CaCO ₃
pH	8.0
Conductivity	339 μ mhos/cm
Turbidity	24.0 JTU
Chlorophyll-a	101 μ g/L

METHODS

A creel survey was conducted from 4 May 1974 (opening of the season for game fish) through 31 March 1975, except for November and April. For purposes of this report, the term "game fish" includes northern pike, walleye, largemouth bass, and hybrid musky. Angler counts and interviews were not conducted during November and April. Due to adverse weather and unsafe ice, angler use was too low to warrant the cost. A random stratified sampling schedule was developed to sample Fox Lake anglers. Instantaneous angler counts and angler interviews were conducted on every Saturday and Sunday and 3 randomly chosen weekdays each week throughout the survey period.

The length of the fishing day surveyed was sunrise to sunset. On each survey day, the clerk spent 4 hours on the lake making the angler count and conducting interviews. The starting time for each day was randomly chosen (with replacement). If the assigned starting time was such that the work period extended past sunset, the clerk continued to work until the 4-hour time period was completed. The hours worked after sunset were spent at the boat landings interviewing anglers leaving the lake. The time for the instantaneous angler count was randomly selected (with replacement) from the possible times within the assigned 4-hour period. Only one instantaneous count was made during each 4-hour period. The survey clerk made the angler count at the assigned time by navigating around the lake in a boat, following a course that enabled him to see all parts of the lake and shoreline. The remaining time was used to interview anglers on the lake and at the landings as they left the lake. On days when the wind velocity was too great to safely use a boat, angler counts were made from various observation points around the shoreline.

The following information was collected during angler interviews: length of fishing trip; type of fishing (boat, bank, ice); method of fishing (cast, still, troll, drift, multiple); bait used; residence of angler; primary species sought; and fish caught. Northern pike, walleye, and largemouth bass were measured to the nearest 0.1 inch total length. Northern pike and walleye were examined for presence of a tag.

Angler hours were calculated for each time stratum (weekends and weekdays) in each month for each kind of fishing (boat, shore, and ice). Angler hours were calculated by multiplying the total possible fishing hours in the stratum (number of days times average daylight hours in a day) by the mean number of anglers per instantaneous count. All completed trip interviews were combined to calculate a mean trip length for the entire fishing season because too few trip interviews were completed to calculate a monthly mean. The number of fishing trips was estimated by dividing total fishing hours by the mean length of completed fishing trips.

Catch estimates were calculated by species for each time stratum in each month for each kind of fishing. Catch per hour information was obtained from angler interviews, and a monthly mean was determined for each species. The mean catch per hour was multiplied by the number of angler hours for that month to calculate monthly harvest estimates.

A tagging study was conducted in conjunction with the creel survey to obtain estimates of exploitation of walleye and northern pike by anglers. Walleye and northern pike were captured with fyke nets during the spring spawning runs and tagged just below the dorsal fin with Floy T-anchor spaghetti tags. The creel clerk examined all fish checked during angler interviews for the presence of tags. Pamphlets were distributed to anglers, resorts, bait shops, and the news media to publicize the tagging study. Anglers were asked to report tagged fish caught and respondents were mailed a questionnaire requesting information on time of capture, size at capture, and size and number of untagged fish caught. An estimate of the exploitation rate of northern pike and walleye was made from tagging and tag return data.

RESULTS

THE FISHERY

Fishing Pressure

Fox Lake anglers fished an estimated 704,332 hours (268 hours/acre) during the 1974 fishing season (Table 2). Of this total, 58% of these hours occurred during the open water season and 42% occurred during the winter. The heaviest fishing pressure occurred during June when anglers fished 103,091 hours (39 hours/acre, 15% of total fishing hours, and 25% of open water fishing). The second-heaviest fishing month was January, when anglers fished 97,252 hours (14% of total fishing hours and 33% of winter fishing hours). During the survey period, an average of 188 people per instantaneous count was recorded (Table 3). The most intense use occurred in January when the average number of anglers per count was 330. An instantaneous count on one Sunday in January recorded 3,400 anglers using the lake. The average length of completed fishing trips was 4.08 hours. An estimated 172,630 fishing trips were made to Fox Lake during the survey period (99,780 in the open water season and 72,850 in the winter season).

Catch

Panfish comprised 94% of the estimated 716,004 fish creeled during the survey period. Of the total harvest, 63% was taken by open water fishing and 37% by ice fishing (Table 4). During the open water season, bluegill was the most

TABLE 2. Estimated hours of fishing on Fox Lake, Wisconsin, May 1974-April 1975.

Method	Month												Total
	May	Jun	Jul	Aug	Sep	Oct	Dec	Jan	Feb	Mar			
Boat hours	69,166	80,400	65,652	50,420	34,407	9,024	*	*	*	*	*	*	309,069
% of month	79.3	78.0	70.3	73.1	81.1	77.6							43.9
Bank hours	18,022	22,691	27,799	18,552	8,018	2,611	*	*	*	*	*	*	87,693
% of month	20.7	22.0	29.7	26.9	19.9	22.4							13.9
Ice hours	*	*	*	*	*	*	65,676	97,252	78,895	54,747			297,570
% of month	*	*	*	*	*	*	100.0	100.0	100.0	100.0			42.2
Total hours fished	87,188	103,091	93,451	68,972	42,425	11,635	65,676	97,252	79,895	54,747			704,332
% of total	12.4	14.6	13.3	9.8	6.0	1.7	9.3	13.8	11.3	7.8			100.0
Hrs/acre	33.2	39.3	35.6	26.3	16.2	4.4	25.0	37.0	30.4	20.9			268.3

* No estimate.

TABLE 3. Mean number of anglers using Fox Lake at times of instantaneous counts.

Mean no./count	Avg. For Year											
	May	Jun	Jul	Aug	Sep	Oct	Dec	Jan	Feb	Mar		
201	215	188	153	153	108	30	232	330	272	153		188

TABLE 4. Estimated harvest from Fox Lake, May 1974-April 1975.

Month	Bullhead	Northern Pike	Yellow Perch	Walleye	Largemouth Bass	Pumpkinseed	Bluegill	White Crappie	Total	% of Seasonal Creel
May	1,545	726	5,826	2,414	3,362	2,173	33,102	7,483	56,631	12.5
June	4,147	472	26,280	919	1,456	5,347	91,037	16,233	145,891	32.3
July	9,468	295	44,771	223	772	3,101	59,541	12,477	130,648	28.9
August	6,449	187	37,794	55	91	1,222	16,011	5,664	67,473	14.9
September	4,249	170	21,267	41	96	664	13,692	4,684	44,863	9.9
October	272	38	2,213	7	14	14	3,945	163	6,666	1.5
Open water total	26,130	1,888	138,151	3,659	5,791	12,521	217,328	46,704	452,172	100.0
% of creel	5.8	0.4	30.6	0.8	1.3	2.8	48.1	10.3	63.2	
December	26	3,822	20,005	79	0	131	10,219	8,984	43,266	16.4
January	107	2,315	38,502	49	29	1,780	13,537	23,243	79,562	30.2
February	56	1,310	14,988	56	80	1,135	27,939	18,368	63,932	24.2
March	0	71	31,600	0	0	1,659	34,731	9,011	77,072	29.2
Ice fishing total	189	7,518	105,095	184	109	4,705	86,426	59,606	263,832	100.0
% of creel	0.1	2.8	39.8	0.1	0.0	1.8	32.8	22.6	36.8	100.0
Total harvest	26,319	9,406	243,246	3,843	5,900	17,226	303,754	106,310	716,004	
Harvest/acre	10.0	3.6	92.7	1.5	2.2	6.6	115.7	40.5	272.8	

abundant species in anglers' creels (48% of catch), followed by yellow perch (31%). In the winter, yellow perch was the most common fish in the creel (40%), followed by bluegill (33%). Northern pike was the most common game fish in the creel, followed by largemouth bass and walleye.

Open water anglers caught the most fish during June and July, when 38% of the total catch and 61% of the open water catch were creeled (Table 4). The game fish catch was greatest in May and June and then declined through the summer and fall months.

The ice fishing catch was more consistent throughout the 4-month period (Table 4). The panfish harvest, particularly bluegill, increased through the winter, while the walleye and northern pike harvest declined as the season progressed. Anglers seeking game fish had the best success during the winter.

Catch Rates

During the survey period, 4,750 anglers interviewed by the creel clerk fished 29,739 hours (4.2% of projected total fishing hours) and caught 30,555 fish (Table 5). The catch rate for all anglers interviewed was 1.03 fish/hour. Catch rates of boat, bank, and ice anglers were similar: 1.1 fish/hour for boat anglers, 1.0 fish/hour for bank anglers, and 0.9 fish/hour for ice anglers.

The best months for fishing were June and March (Fig. 3). The catch per hour in June was 1.3 fish/hour for boat anglers and 1.8 for bank anglers; the catch rate in March was 1.4 fish/hour for ice anglers.

Success was highest for open water fishing in June and July and then declined through the summer to a low in October. Ice fishing success was lowest in December, improved as the winter progressed, and was best just before ice-out.

TABLE 5. Fox Lake angler harvest rates (fish/hour), May 1974-April 1975.*

Month	Boat Anglers	Bank Anglers	Ice Anglers	Total
May	0.6	1.0	-	
June	1.3	1.8	-	
July	1.4	1.4	-	
August	1.1	0.6	-	
September	1.2	0.3	-	
October	0.7	0.3	-	
December	-**	-	0.7	
January	-	-	0.8	
February	-	-	0.8	
March	-	-	1.4	
Total fish caught	16,939	1,412	12,204	30,555
Total hours fished	15,126	1,412	13,201	29,739
Fish/hour	1.12	1.00	0.92	1.03

* Harvest rates were calculated from actual creel information obtained during angler interviews.

** No estimate.

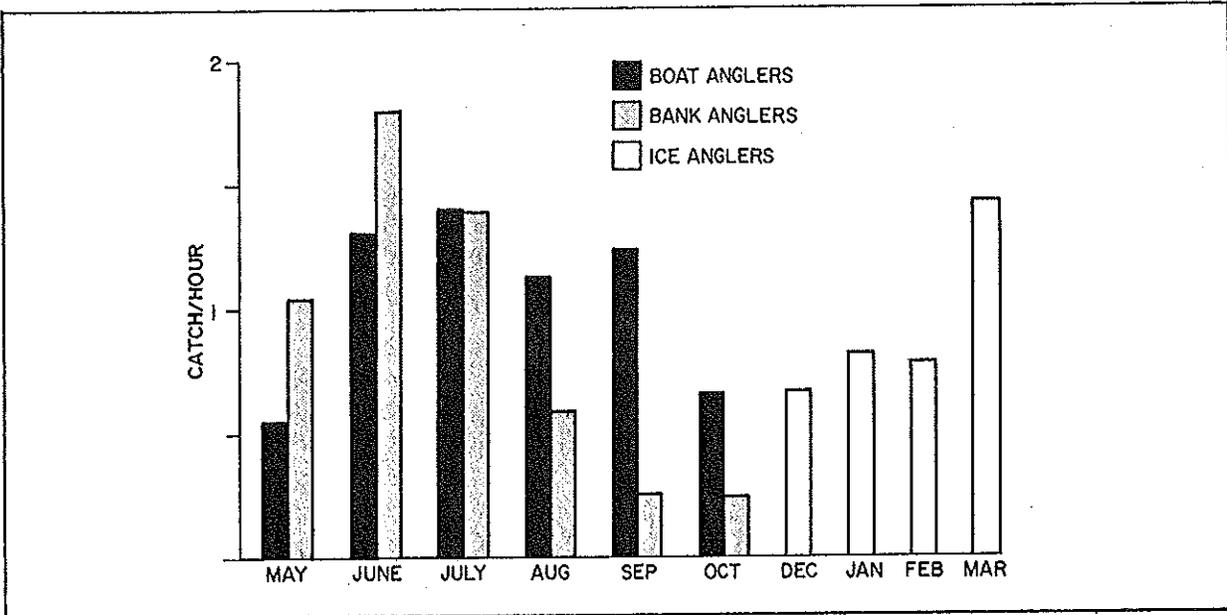


FIGURE 3. Angler harvest per hour from Fox Lake, Wisconsin.

Angler Exploitation of Walleye and Northern Pike

Based on tags returned by anglers, exploitation of walleye was estimated at 8.4%. Anglers returned 104 tags from 1,252 fish tagged during the spawning run. Female walleye appeared to be more susceptible to angling than males. Sixty-four percent of the walleyes tagged were female, yet 81% of the tags returned by anglers were from female fish.

Exploitation of walleye was estimated at 32% using the estimated harvest and population size. The walleye population was estimated at 11,977 (Congdon, unpubl.) and the angler harvest estimated by this creel survey was 3,843.

The angler exploitation of northern pike was estimated at 4% based on angler tag returns. During the spawning run, 682 fish were tagged. Of these, 26 tags were returned during the 1974 fishing season.

Length Distribution of Catch

Untagged walleye creeled by anglers were 8–28 inches in length. Sixty-eight percent of these fish were over 20 inches, and 11% were less than 15 inches (Fig. 4). The lengths of walleye tagged during the spawning run was 10–27 inches (Fig. 5). Tagged walleye creeled by anglers were 14–27 inches (Fig. 6). Anglers did not return tags from any males under 14 inches or females under 20 inches.

Northern pike creeled by anglers were 12–41 inches in length. Eighty-three percent of the northerns creeled were over 22 inches. The length distribution of northerns tagged during the spawning run (Fig. 7) was similar to that of angler-caught fish (Fig. 8). Only 26 tagged fish were reported caught by anglers.

Largemouth bass caught by anglers were 6–21 inches in length (Fig. 9). Sixty percent of the fish creeled were 11–15 inches.

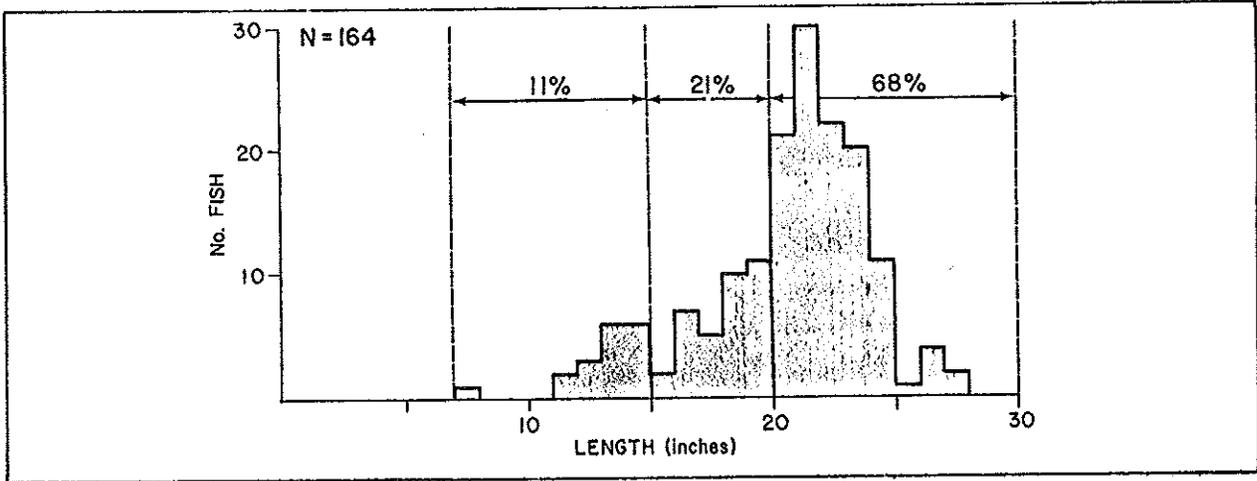


FIGURE 4. Length distribution of untagged walleye caught by anglers on Fox Lake, Wisconsin.

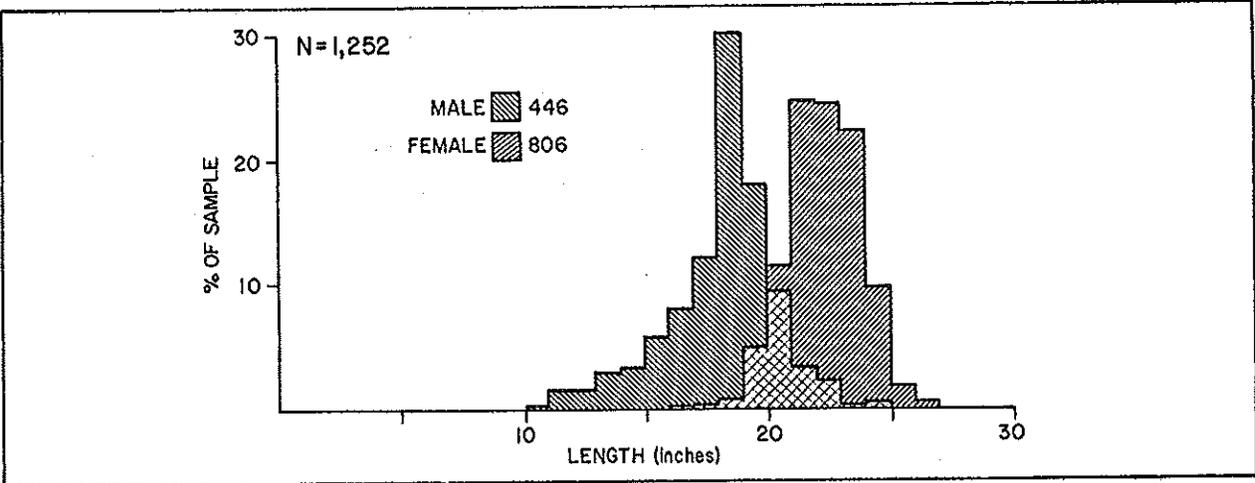


FIGURE 5. Length distribution of male and female walleye tagged during the 1974 spawning run on Fox Lake, Wisconsin.

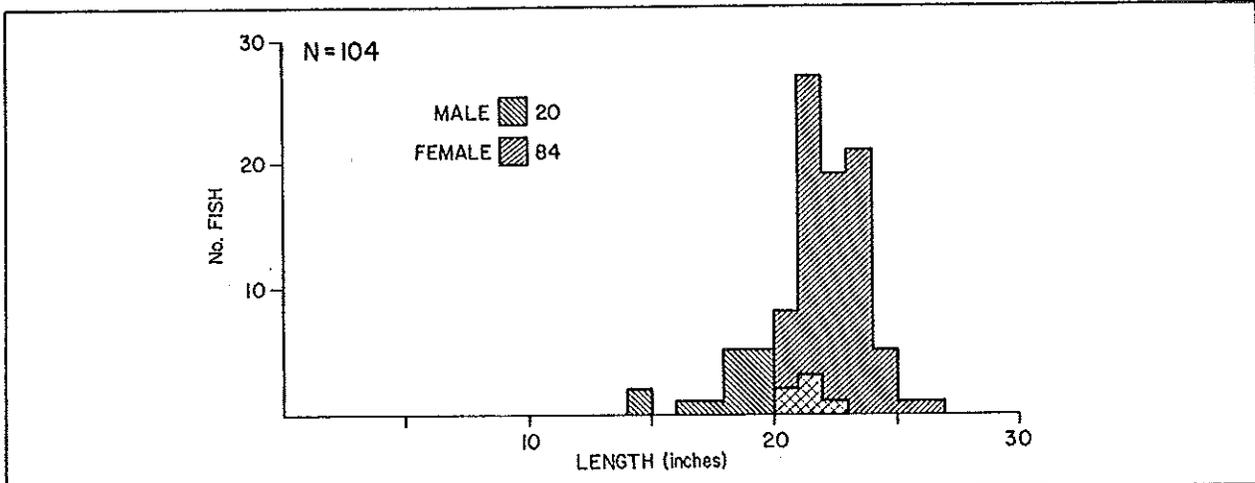


FIGURE 6. Length distribution of tagged male and female walleye caught by anglers on Fox Lake, Wisconsin.

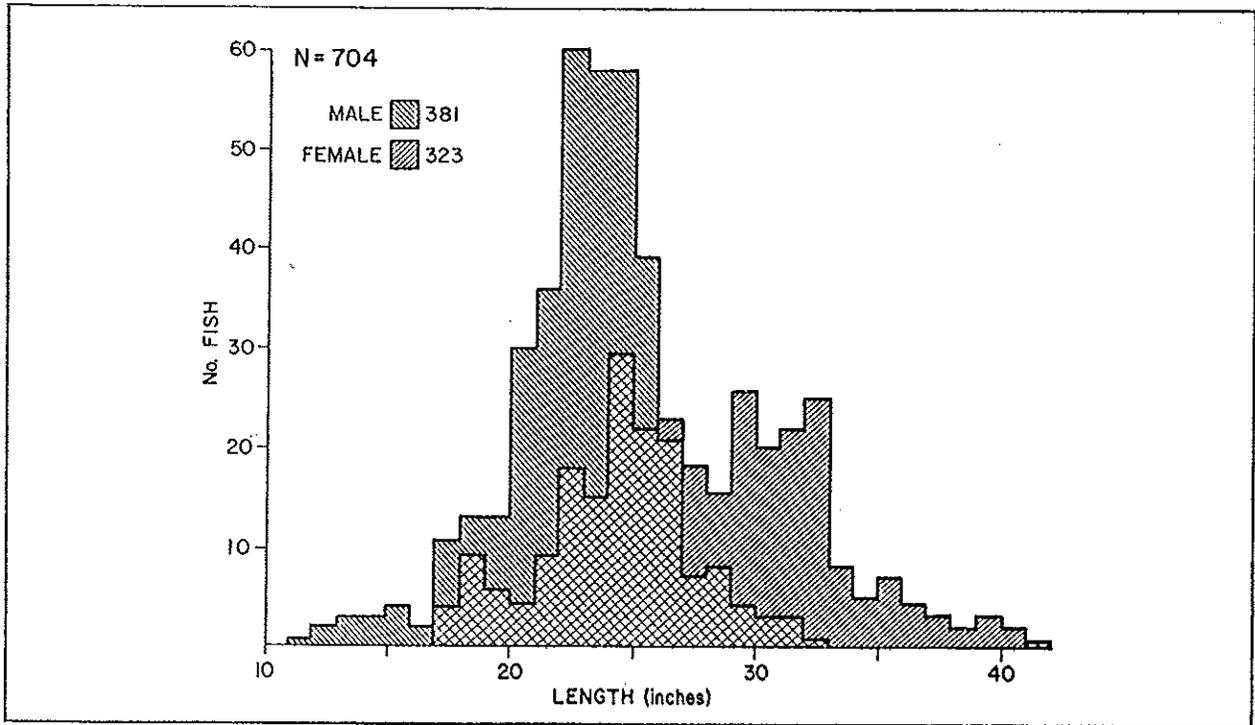


FIGURE 7. Length distribution of male and female northern pike tagged during the 1974 spring spawning run on Fox Lake, Wisconsin.

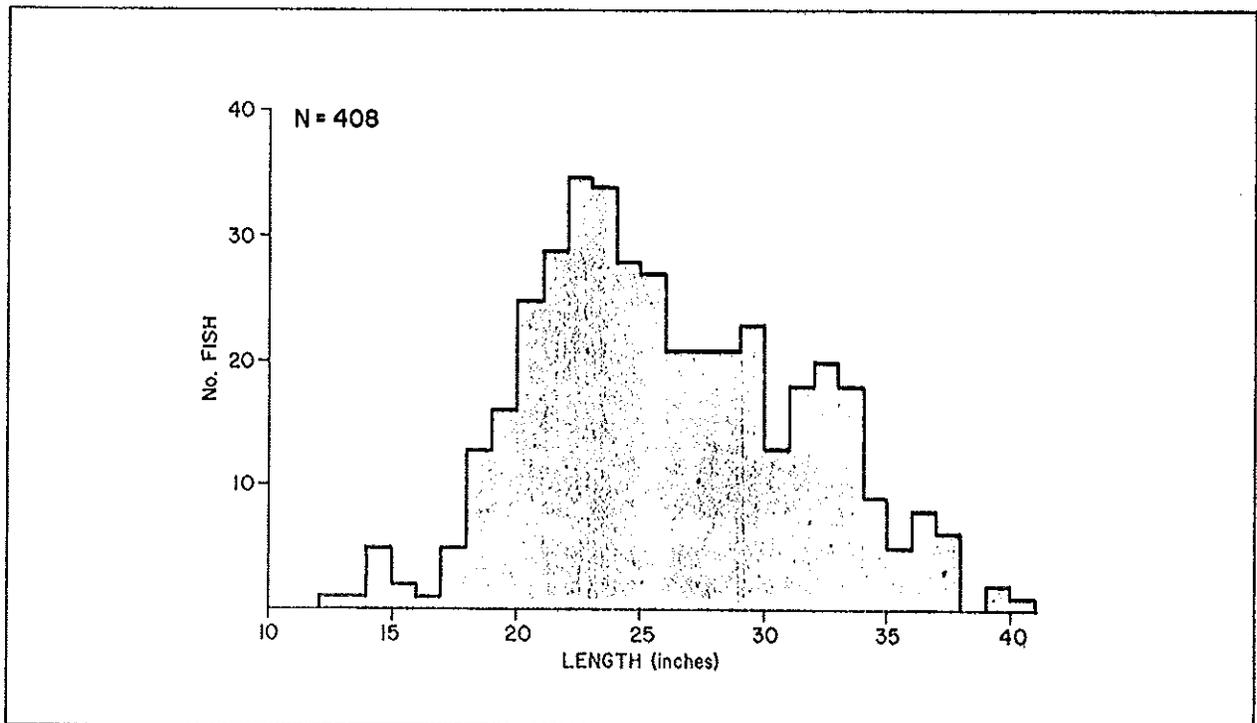


FIGURE 8. Length distribution of northern pike caught by anglers on Fox Lake, Wisconsin.

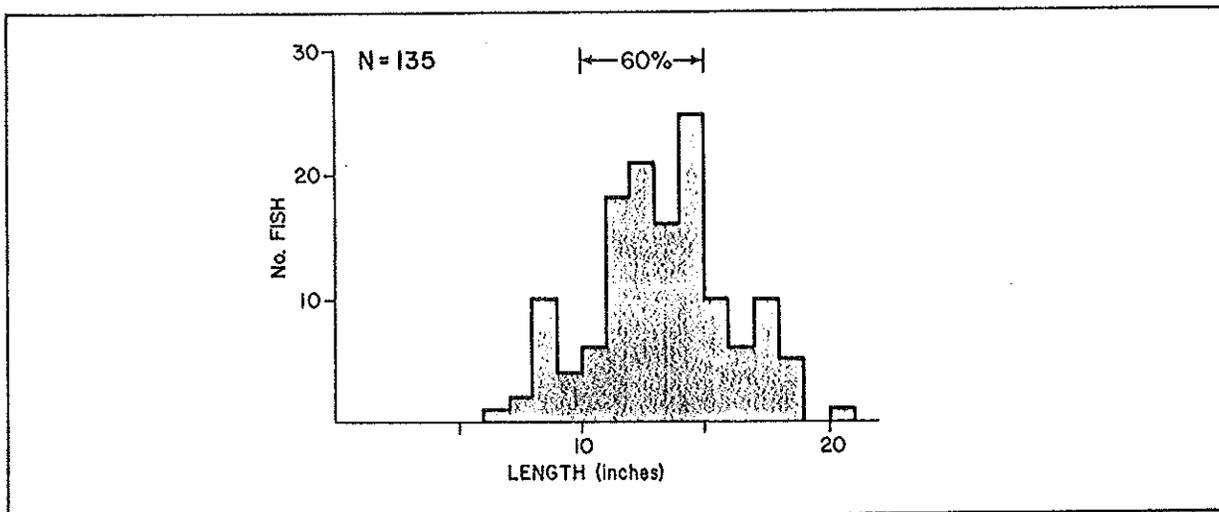


FIGURE 9. Length distribution of largemouth bass caught by anglers on Fox Lake, Wisconsin.

THE ANGLERS

Angler Characteristics

Wisconsin residents comprised 95% of the anglers fishing Fox Lake during the 1974 fishing season (Table 6). Ninety-two percent of open water anglers were Wisconsin residents compared to 99% during the ice fishing season.

Sixty percent of the anglers on Fox Lake were from Dodge (32%) and Milwaukee (28%) counties. Dodge County residents comprised 25% of the open water anglers and 43% of the ice anglers. Milwaukee County residents comprised 36% of the open water anglers. Illinois residents comprised 85% of the nonresidents using Fox Lake during the open water season and 79% of the nonresident ice anglers. People from at least 5 states other than Wisconsin fished Fox Lake.

Species Preference

The majority of anglers using Fox Lake sought panfish. Most anglers interviewed preferred panfish (61%) (Table 7). The number of anglers seeking panfish was lowest in the spring (17%), but increased to 63-73% throughout the summer and winter.

Anglers seeking walleye and northern pike each made up 14% of the total number of anglers. The number seeking walleye was highest in spring (44%), declined through the summer, and was lowest during the winter (5%). Those seeking only northern pike increased from a low of 1% during the spring to 31% during the winter.

Fishing Methods

Still fishing was the most common fishing method used by Fox Lake anglers (Table 8). Drifting and casting methods were used more frequently in the spring than during summer and fall, probably indicating the effort expended to catch walleye and largemouth bass during the early part of the season. The

high percentage of still fishing in summer and fall reflects the interest in panfish fishing during these seasons. Even though motor trolling is allowed on Fox Lake, only 0.7% of anglers used this method.

Most Fox Lake anglers used live bait (89%), a combination of live and artificial bait (7%), or artificial bait (3%) (Table 9). Nearly all ice anglers interviewed used live bait (99%).

TABLE 6. Residence of anglers fishing on Fox Lake.

Residence	Summer (%)	Winter (%)	Total (%)
In State	92	99	95
Dodge	25	43	32
Milwaukee	36	17	28
Fond du Lac	6	13	10
Washington	7	8	7
Jefferson	6	6	6
Waukesha	3	4	3
Other (25 counties)	9	8	9
Out of State	8	*	5
Illinois	7	*	5
Other (5 states)	1	*	*

* Denotes less than 1%.

TABLE 7. Primary species sought by anglers fishing Fox Lake.

Species	Spring (%)	Summer (%)	Fall (%)	Winter (%)	Overall (%)
Panfish	17	67	73	63	61
Largemouth bass	5	1	0	1	*
Northern pike	1	2	4	31	14
Walleye	44	15	12	5	14
Musky	0	*	0	*	*
Any fish	33	15	11	1	10

* Denotes less than 1%.

TABLE 8. Fishing methods used by anglers fishing Fox Lake.

Fishing Method	Spring (%)	Summer (%)	Fall (%)	Winter (%)	Overall (%)
Casting	10	2	2	0	2
Still	43	68	76	100	80
Trolling	1	1	2	0	1
Drifting	30	12	8	0	8
Multiple	16	17	12	0	9

TABLE 9. Bait used by anglers fishing Fox Lake.

Bait Used	Spring (%)	Summer (%)	Fall (%)	Winter (%)	Overall (%)
Live bait	72	83	86	99	89
Worms	51	49	47	21	38
Minnows	7	5	8	20	12
Other	14	28	31	58	39
Artificial	10	3	4	1	3
Combination	17	13	9	1	7
Unknown	1	1	1	1	1

DISCUSSION

Fishing pressure on Fox Lake was high (268 hrs/acre) when compared to other Wisconsin and midwestern lakes (Table 10) and was approximately on the middle of the range of creel survey data summarized by Snow (1978). Fishing pressure ranged from 567 hours/acre for Alabama lakes to 21 hours/acre for several Michigan lakes. The intensity of angler use found on Fox Lake has been reported elsewhere only on smaller bodies of water.

The intense fishing pressure on Fox Lake may be due to several factors. First, Fox Lake has earned a reputation for good fishing. The overall catch rate of 1.03 fish/hour (all anglers interviewed) ranks fairly high when compared to catch rates from other midwestern lakes as summarized by Thuemler (1981).

Second, the majority of anglers in Wisconsin fish for panfish and Fox Lake is a panfish lake. Panfish comprised 94% of the creel by numbers, and 60% of the anglers interviewed preferred panfish. When the panfish are biting on Fox Lake, the lake is so crowded it is difficult to find space to park at public accesses.

TABLE 10. Fishing pressure and harvest rates on several Wisconsin lakes.

Lake, County, and Survey Length	Acreage	Angler Hours/Acre	Fish Harvest/Hour	Reference
Fox, Dodge Co. (1 year)	2,625	268	1.03	Current study
Shawano, Shawano Co. (1 year)	6,178	73	1.09	Langhurst (1984)
Murphy Flowage, Rusk Co. (15 years avg.)	180	74	1.88	Snow (1978)
Escanaba, Vilas Co. (24 years avg.)	293	65	0.84	Kempinger et al. (1975)
Stormy, Black Oak, Laura, Vilas Co. (1 summer only)	522-599	16-20	0.58-0.74	McKnight and Serns (1974)
Flambeau Flowage, Iron Co. (1 year)	14,300	15	0.49	Lealos and Beaver (1982)
Noquebay, Marinette Co. (1 summer)	2,409	34	1.28	Thuemler (1981)
(1 winter)		13	0.65	Thuemler (1984)
Devils, Sauk Co. (2 years avg.)	373	117	0.8	Brynildson et al. (1970)
Browns, Racine Co. (2 years)	396	69	*	Mraz (1964)
Beaver Dam, Dodge Co. (1 year)	6,600	25	1.25	Congdon (unpubl.)
Wind, Racine Co. (1 summer)	936	66.2	0.84	Stuber (unpubl.)
Pewaukee, Waukesha Co. (1 summer)	2,359	95.1	0.85	Schumacher (1987)
Nagawicka, Waukesha Co. (1 summer)	957	155.7	1.14	Schumacher (1987)

* No comparable estimate available.

Finally, Fox Lake is within a one hour drive of major population centers such as Milwaukee, Madison, and the Fox River Valley. Fox Lake has excellent public access facilities, and local businesses and resorts cater to the non-local angler.

A heavily used fishery such as Fox Lake is a significant source of income to the local economy. The average angler in America spent \$20 on an angling trip in 1980 (U.S. Department of Interior 1982). Expanding this figure over the estimated 172,630 fishing trips to Fox Lake in 1974, more than 3 million dollars potentially enters the local economy annually as a result of the fishery on Fox Lake.

One of the objectives of this creel survey was to obtain data to assess the impact of angling on game fish populations. However, both estimates of exploitation obtained are felt to be unreliable.

Walleye exploitation was estimated by 2 methods which varied by a four-fold difference. The estimate obtained from voluntary tag returns (8.4%) represents only minimum exploitation because angler response was low during this study. For example, after the study we learned that one angler had 15 unreported tags in his possession, even though he had been interviewed by the creel clerk and was aware of the study.

A second factor which contributed to a low tag return was poor tag retention in the fish due to failure of the adhesive used to attach the colored vinyl streamer to the anchor. Almost 50% of the tagged walleye recaptured during the 1975 spring spawning run one year after tagging had lost the vinyl streamer. The anchors still remained in the fish but anglers may not have

noticed them or known what they were. It is not known how soon after tagging the adhesive failure began, so it is not possible to estimate the impact of tag loss on the return rate. Based on a possible 50% tag failure, angler tag return could have been 16%, had tag failure not occurred.

The exploitation rate, calculated from estimated harvest from the creel survey and population size data, is also felt to be unreliable due to the high rate of tag loss that occurred during the study. The population data used in the estimate was calculated by the Bailey modification of the Peterson method. Recapture data was obtained from creel survey interviews. Tag loss during the recapture period would tend to bias the population estimate upward, causing a possible underestimation of exploitation.

Anglers caught an estimated 9,406 northern pike (3.6/acre) during the 1974 fishing season. The estimated exploitation of northern was 4% based on angler tag returns. This estimate is probably low considering that anglers harvested 3.6 fish/acre. During the course of the study, we observed many northern pike which had lost tags, as evidenced by scars in the body area where the tags had been attached, and fish which had lost the colored streamer from the tag. The tags used on northern pike were from the same lot used on walleye. The estimated exploitation was probably much lower than the actual rate that occurred, due to a combination of tag loss and unreported tags.

SUMMARY

1. A creel survey conducted during the 1974 fishing season on Fox Lake, Dodge County, Wisconsin, estimated that 172,630 fishing trips (66 trips/acre) were made by anglers who spent 704,332 hours (268 hours/acre) fishing. Fifty-eight percent of fishing pressure occurred during the open water season. The heaviest fishing pressure occurred in June (39 hours/acre, 15% of total fishing hours) and January (37 hours/acre, 14% of total fishing hours).
2. Panfish comprised 94% of the estimated 716,004 fish creeled during the survey period. Sixty-three percent of the total harvest was taken by open water fishing. Bluegill was the most frequently caught species for open water fishing; yellow perch was most frequently caught during ice fishing. Northern pike was the most frequently caught game fish.
3. The 4,750 anglers interviewed caught fish at a rate of 1.03 fish/hour. Catch rates by boat, bank, and ice anglers were 1.1, 1.0, and 0.9 fish/hour, respectively. June and March were the best months for fishing. May and December were the best months to catch game fish.
4. The exploitation of walleye was estimated to be 8.4% based on tag returns and 32% based on estimated harvest and population size. The exploitation rate for northern pike was estimated to be 4% based on tag returns. These estimates were considered unreliable due to tag loss and unreported tags.
5. Sixty-eight percent of the walleye creeled were longer than 20 inches. Female walleye were caught at a greater rate than males. Northern pike longer than 22 inches comprised 83% of the creel. Sixty percent of the bass caught were 11-15 inches long.

6. Wisconsin residents comprised 95% of the anglers fishing Fox Lake. Sixty-eight percent of these people were from outside Dodge County. Most nonresident anglers were from Illinois.
7. The majority of anglers using Fox Lake sought panfish (60%). Those seeking only game fish comprised 16% of the anglers interviewed. Walleye was the preferred game fish in the summer; northern pike was preferred in the winter.
8. Still fishing was the most common fishing method used by anglers. Less than 1% fished by motor trolling. Live bait or a combination of artificial and live bait was used by 97% of the anglers.

MANAGEMENT IMPLICATIONS

1. The results of this creel survey indicate that most anglers seek and catch panfish even though the most vociferous requests for management services ask for more game fish. Most management dollars are now spent on game fish management. This study shows that there is a need to reprioritize our management effort to emphasize panfish, which are the fish primarily sought by the majority of the angling public.
2. Fox Lake provides quality angling for bank anglers as well as boat anglers. However, there is very limited access for bank fishing. Development of bank fishing access by acquisition of shoreline and installation of fishing piers would provide fishing opportunities for many more anglers who do not own boats. This service would provide fishing for a segment of the angling public that is mostly ignored at present.
3. Anglers are becoming increasingly aware of the impact harvest has on fish populations. There is a growing public demand for length limits to prevent harvest of small fish. The most popular trends in length limits (13 inches or 15 inches for walleye, and 22 inches for northern pike) would have little impact on the fish population or angler creel in Fox Lake, as most creeled fish of these species were greater than these lengths. A 15-inch length limit on largemouth bass would significantly alter the harvest. Because of rapid growth rates, high length limits would be necessary to protect a significant part of the population. The results of this survey did not indicate a need for length limits in Fox Lake at the time the survey was made.
4. Accurate data is required to make sound management decisions. The difficulty in obtaining accurate assessments of the fisheries in large lakes is demonstrated by the failure of this study to obtain reliable estimates of exploitation. It is essential to develop some method of encouraging anglers to return tags, such as greater public information efforts, rewards, or prizes for certain tag numbers. Unless anglers return the tags from harvested fish, the data obtained can be very misleading. Also, careful attention should be given to tag selection and application, as well as the handling of fish. This study required a large amount of labor to capture and tag fish. Faulty tags essentially negated any benefits from this investment of time and resources.

5. The outstanding success of the chemical rehabilitation of the Fox Lake fishery points out the significant value of this management tool. Fox Lake was converted from a "carp-ridden mud hole" to one of the most heavily fished lakes in the state with an excellent quality fishery that has lasted 20 years. Upon consideration of the available alternatives, if chemical eradication is chosen as the best tool, I encourage its use to re-establish a fishery.

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