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A CREEL CENSUS AND WATER USE STUDY OF WACONIA LAKE, CARVER COUNTY[1/]

January 1980

1/ Completion Report (Part I) - Study IX, Job 2-B DJ Project FW-1-R-2

A CREEL CENSUS AND WATER USE STUDY OF WACONIA LAKE, CARVER COUNTY [1/]

by

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INTRODUCTION

This creel census report is a part of the continuing effort to census all lakes in the Metro Region. The main purpose of any creel census is to determine fishing pressure and success. In addition, this study provides estimates of pressure for the non-fishing activities of speed-boating, waterskiing, sailboating, canoeing and house or pontoon boating. While a complete census may be desirable and very reliable, it is also expensive. Because of this, sampling type censuses which have good reliability have been developed. The statewide creel census is a modification of one developed by Daley and Skrypek, 1964. The estimates of fishing pressure and harvest found in this study can be compared to previous censuses in the metro area, as well as to creel census data on lakes outside the metro area, to determine how good fishing is and how much pressure occurs on metro lakes. The estimates of non-fishing pressure can be compared to previous Metro Region creel censuses.

CREEL CENSUS METHODS

Waconia Lake, Carver County, was selected for this study. The identification number, township, range, sections, and acreage is given below:

Lake	I.D. No.	Township	Range	Sections	Acreage
Waconia	10-48	116	24,25	6,7,18; 1,2,10-15	3,104

One creel census clerk was employed for this census. The clerk worked an eight hour day, forty hours per week, with two consecutive work days off. Each

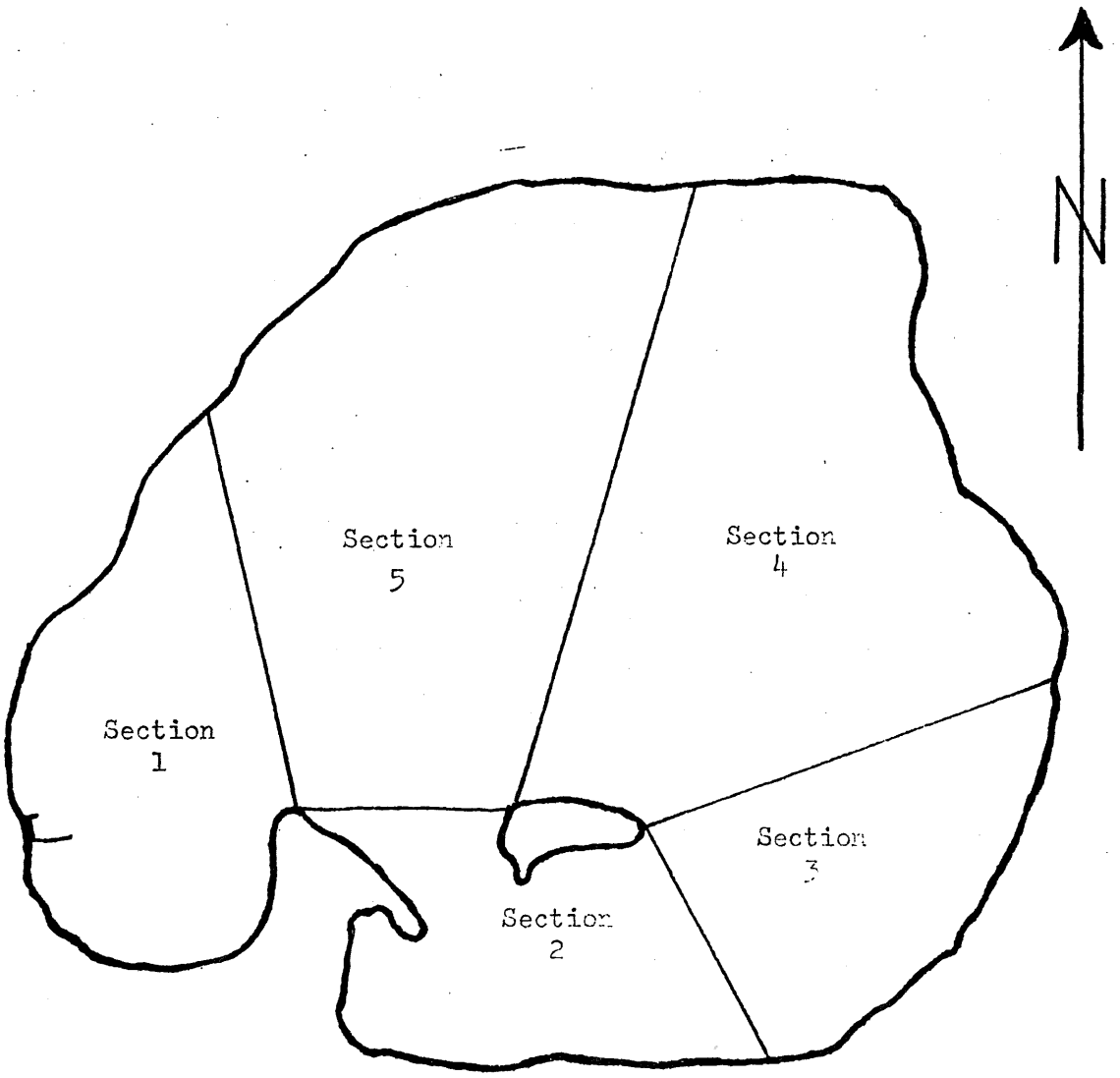

Figure 1. Outline of Waconia lake showing census sections.

weekend and holiday was censused and the days off were scheduled so that all days of the week were censused during each month. The clerk came into the office on a different weekday each month to fill out the necessary creel census forms. The time the clerk started working on any particular day was selected randomly and varied from 6:00 a.m. to 2:00 p.m. The lake which the clerk started working on was also selected randomly. Recreational pressure data was collected on seven lakes by the clerk. However, Waconia Lake was the only lake on which angler interviews were conducted.

Sampling Method

Waconia Lake was divided into five sections according to expected recreational pressure as well as for vantage point considerations. The clerk spent one hour per section, including boating and/or driving time to the next section. Figure 1 shows the lake divided into the appropriate sections.

At each visit to a section, the clerk would make instantaneous counts of all shore anglers, pier anglers, fishing boats and boat anglers, runabouts, waterskiers, sailboats, canoes, houseboats and pontoon boats which were present. This data was then recorded on the rough data sheet. Any person or craft that entered the area after the instantaneous count had been made was not counted, and any person or craft that had been counted, but left before the count was completed, was not subtracted. After the instantaneous count, the clerk would then interview as many anglers as possible and still have enough time to reach the next section at the appropriate time. The interviews were made as objective as possible so that clerks would not influence or bias the angler response. For each angler interviewed, the following information was obtained and recorded on the rough data sheet: whether the trip was complete or not, time of the interview, time the angler started fishing, which was an estimate based on the angler's memory, type of fishing, method

of fishing, fishing lure or bait, species sought, number and species of fish caught, weight of species caught, age, sex, and hometown. The information from the instantaneous counts was then transferred to an A form tabulation sheet and the information obtained from the interviews was transferred to computer Form B on the day the clerk was in the office. In addition to counting and interviewing anglers, the clerk also weighed as many creeled fish as possible to obtain average weights for each species which are used in calculating harvest, and took scale samples of creeled walleyes.

Calculations

The estimated number of man-hours spent fishing (fishing pressure), speedboating, waterskiing, sailboating, houseboating or pontoon boating, canoeing, or row-boating and the number of fish caught per man-hour (fishing success) are the parameters measured.

Fishing Pressure Estimates: The formula used is--

$$\frac{\text{Total number of anglers counted}}{\text{Number of counts}} \times \text{fishing hours in period} = \text{man-hours in the period}$$

The method of calculation assumes that conditions observed on a section at the time of an instantaneous count are representative of conditions on the section for one hour. Each fisherman counted then represents one man-hour and can be expressed as such. If counts are made at random times each day throughout the period, the average of those counts can be considered representative of conditions during any hour. Multiplying the average count by the number of available fishing hours in a period, gives an estimate of the number of man-hours during that period on that section. For the purposes of this study, it is assumed that all fishing and recreational craft activities took place during daylight hours. Use of the flexible starting times (between 6:00 a.m. and 2:00 p.m.) enables the clerks to sample all fishing hours without working more than eight

hours per day. (Hawkinson and Krosch, 1972).

In order to estimate the number of man-hours in any time period for a particular activity, one must count the actual number of people present during the instantaneous counts. This is extremely difficult to do for distant, fast-moving, non-fishing watercraft. To overcome this difficulty, the number of watercraft were counted during the instantaneous counts, and then a special effort was made during the entire census to count the number of people in the various watercraft. This information was then used to arrive at the mean number of people for each type of watercraft. The means are as follows:

TABLE 1. Mean Number of People Per Craft, Waconia Lake.

Lake		Runabouts	Sailboats	Canoes	Pontoon or Houseboat	Fishing Boats
	No. of Craft	340	361	32	86	1,839
WACONIA	No. of People	830	881	64	403	4,325
	Av. People Per Craft	2.44	2.44	2.00	4.69	2.36

With the exception of fishing boats, the formula used to estimate pressure for the types of watercraft listed above are:

1. $\frac{\text{Total Number of Watercraft}}{\text{Number of Counts}} \times \text{Recreational Activity Hours in the Period} = \text{Watercraft Hours in the Period}$

2. (Watercraft hrs. in period) X Average Number of People in Watercraft = Man-hours in the Period

Fishing Success

Fishing success is measured by the catch per unit of effort expended and can be described as the ratio of the number or pounds of fish caught over the number of hours spent fishing. There are two types of catch ratios which can be computed. The overall ratio is the number of all species caught divided by the total hours spent fishing. This catch rate was used in making estimates of harvest. A catch ratio of less than .005 fish per man-hour and equal to or greater than .001 fish per man-hour was recorded as a trace (tr.). Any catch ratio or harvest less than .001 was considered zero. The catch ratio for selected species was also calculated. It was computed by dividing the number of particular species caught by anglers seeking that species by the number of man-hours spent fishing for that particular species, as it eliminates the people who were fishing for other species and may have been using gear, methods, and lures or bait not suited for catching the species being considered (Hawkinson and Krosch, 1972).

Harvest

Harvest is defined as number or pounds of fish removed per time period from a particular fishery. It is calculated as follows:

1. (Estimated man-hours fishing)(overall catch rate) = estimated number of fish for period
2. (Estimated number of fish)(average weight) = estimated lbs. for the period
3. (Estimated lbs.) ÷ (lake acreage) = lbs. per acre per period

Harvest can be calculated for each species and all species combined for the whole census period and for smaller periods of time.

Fishing pressure, non-fishing pressure, fishing success and harvest were stratified by weekend days and holidays, and weekdays. Separate calculations were then made and the two estimates added together to provide the final estimate.

RESULTS

The creel census started on May 11, 1979, and continued through September 16, 1979.

Non-fishing Recreational Pressure

The most popular non-fishing recreational activity on Waconia Lake was speed or pleasure boating (4.62 man-hours/acre) followed closely by sail-boating (4.51 man-hours/acre). The next most popular activity was house or pontoon boating (2.35 man-hours/acre). Canoeing or rowboating (.35 man-hours/acre) and waterskiing (.45 man-hours/acre) were lower in popularity.

Idle craft were considered to be non-fishing watercraft which were not under power, either by motor, sail, or man-powered. Idle craft were not observed by the clerk during instantaneous counts on Waconia Lake. All non-fishing recreational hours listed in this report will therefore be moving man-hours.

Table 2 gives a summary of the non-fishing recreational pressure on Waconia Lake in man-hours.

TABLE 2. Summary of the Non-fishing Recreational Pressure on Waconia Lake, May 11 - September 16, 1979

Runabouts		Waterskiing		Sailboats		Canoes and/or Rowboats		House and/or Pontoon Boats	
Est. M-H	Est. M-H per acre	Est. M-H	Est. M-H per acre	Est. M-H	Est. M-H per acre	Est. M-H	Est. M-H per acre	Est. M-H	Est. M-H per acre
14,351	4.62	1,407	.45	13,995	4.51	1,073	.35	7,294	2.35

Total Recreational Pressure

Total recreational pressure (fishing and non-fishing) was 119,192 man-hours, or 38.40 man-hours/acre. Tables 1a. - 5a. provide a section-by-section breakdown for each of the non-fishing recreational activities on Waconia Lake.

Figure 2 shows non-fishing and fishing pressure distributed by month for Waconia Lake over the census period. The greatest fishing pressure occurred in the month of May with 23,493 man-hours or 7.57 man-hours per acre. Fishing pressure dropped steadily until the end of July when it began a relatively rapid drop, but always remaining higher than all other recreational activities on the lake combined. The following lists fishing as a percentage of all recreational activities by month:

May	-	83.98%
June	-	72.86%
July	-	60.67%
August	-	57.19%
September	-	53.94%

Of non-fishing recreational activities, all showed greatest pressure during July except canoeing which was only slightly below the level for June. Table 3 provides a month-by-month breakdown of the fishing and non-fishing recreational activities on Waconia Lake.

FIGURE 2.

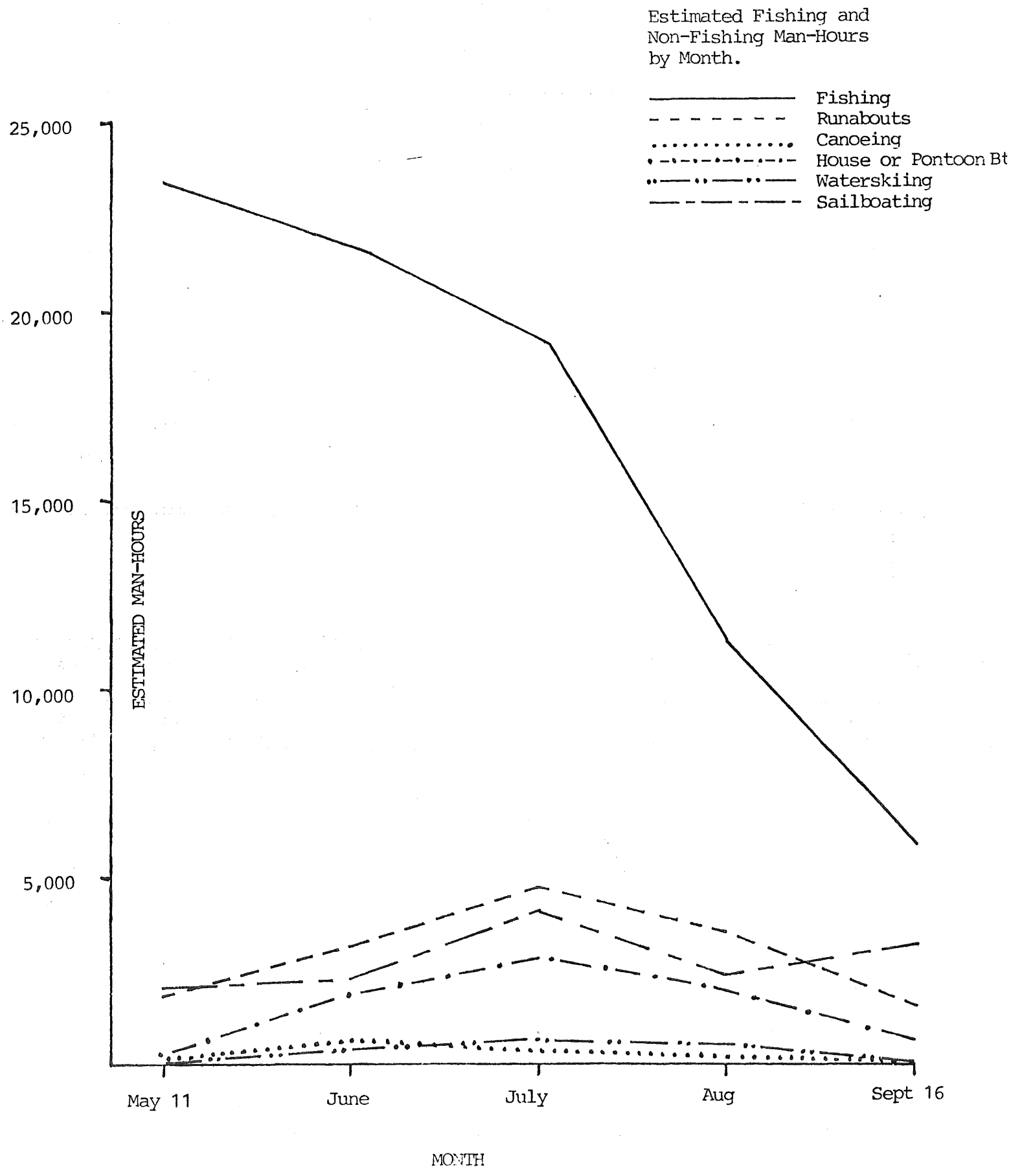
Estimated Fishing and
Non-Fishing Man-Hours
by Month.
Fishing
Runabouts
Canoeing
House or Pontoon Bt
Waterskiing
Sailboating
25,000
20,000
15,000
10,000
5,000
ESTIMATED MAN-HOURS
May 11
June
July
Aug
Sept 16
MONTH

TABLE 3. A Month-by-Month Summary of Fishing and Non-fishing Pressure on Waconia Lake, May 11 - September 16, 1979. All Sections Combined. Results for Non-fishing Activities Expressed in Moving Man-hours Only.

	May 11 - 31	June	July	August	September 1 - 16	TOTAL
Fishing	23,493	21,651	19,116	11,119	5,693	81,072
Runabouts	1,836	3,145	4,595	3,418	1,357	14,351
Waterskiing	80	350	542	409	26	1,407
Sailboats	2,141	2,311	4,184	2,331	3,028	13,995
Canoes and/or Rowboats	190	368	323	166	26	1,073
House and/or Pontoon Boats	236	1,889	2,746	1,998	425	7,294
TOTAL	27,976	29,714	31,506	19,441	10,555	119,192

TABLE 4. Number and Percent of Male and Female Anglers for Each Age Group for Waconia Lake, All Sections Combined, May 11 - September 16, 1979.

Age Group	Number Males	Percent Males	Number Females	Percent Females	Total Number in Age Group	Total Percent
0 - 12	298	10.08	99	3.35	397	13.43
13 - 15	129	4.37	28	.95	157	5.31
16 - 17	47	1.59	12	.41	59	2.00
18 - 24	211	7.14	55	1.86	266	9.00
25 - 34	408	13.81	103	3.49	511	17.29
35 - 44	347	11.74	83	2.81	430	14.55
45 - 64	631	21.35	129	4.37	760	25.72
65+	337	11.40	38	1.29	375	12.69
TOTAL	2,408	81.49	547	18.51	2,955	100.00

Characteristics of the People Fishing

A total of 2,955 anglers were interviewed on Waconia Lake. The age and sex of each angler interviewed was recorded. The results are shown in Table 4. Female angler participation was 18.51% of the total number of anglers interviewed.

Of anglers interviewed, 60.31 percent indicated that they had travelled a distance of less than 25 miles. Another 35.89 percent had travelled 26 to 50 miles to fish. The percentage of anglers from the 26 - 50 mile group is much higher than for any lakes previously studied in the Metro creel census. A small percentage (1.23%) travelled between 51 and 200 miles, while the remaining 2.57 percent travelled over 200 miles. Table 5 is a list of hometowns of anglers interviewed.

TABLE 5. List of Hometowns of Anglers Interviewed on Waconia Lake

Seven County Metro Area	Male	Female	Total	Seven County Metro Area	Male	Female	Total
Anoka	2	0	2	Eden Prairie	43	8	51
Apple Valley	22	5	27	Edina	32	9	41
Arden Hills	1	1	2	Excelsior	12	0	12
Belle Plaine	67	22	89	Farmington	4	0	4
Blaine	3	1	4	Fridley	7	3	10
Bloomington	134	32	166	Golden Valley	9	4	13
Brooklyn Center	9	4	13	Hamburg	8	1	9
Brooklyn Park	7	2	9	Hamel	3	0	3
Burnsville	52	20	72	Hopkins	21	6	27
Carver	7	1	8	Inver Grove Hts.	6	1	7
Champlin	2	0	2	Jordan	9	2	11
Chanhassen	6	2	8	Lakeville	2	0	2
Chaska	50	9	59	Long Lake	6	2	8
Circle Pines	1	3	4	Maple Grove	10	1	11
Cologne	26	3	29	Maple Plain	6	1	7
Coon Rapids	6	0	6	Mayer	11	3	14
Cottage Grove	9	0	9	Mendota Hts.	2	3	5
Crystal	7	4	11	Minneapolis	453	120	573
Deephaven	2	0	2	Minnetonka	35	6	41
Eagan	13	3	16	Mound	9	2	11
				New Brighton	1	0	1

Table 5 Continued

Seven County Metro Area	Male	Female	Total
New Germany	24	7	31
New Hope	3	1	4
New Market	1	0	1
New Prague	39	14	53
Norwood	42	6	48
Plymouth	4	0	4
Prior Lake	3	1	4
Richfield	59	17	76
Robbinsdale	2	0	2
Rosemount	4	3	7
St. Bonifacius	13	3	16
St. Louis Park	48	6	54
St. Paul	248	46	294
St. Paul Park	4	0	4
Savage	4	0	4
Shakopee	45	7	52
South St. Paul	3	0	3
Stillwater	3	0	3
Vermillion	2	0	2
Victoria	8	1	9
Waconia	358	75	433
Watertown	59	12	71
Wayzata	2	0	2
West St. Paul	6	0	6
White Bear Lake	2	1	3
Young America	52	13	65
Total	2,157	493	2,650

Other Minnesota Cities	Male	Female	Total
Aitkin	1	1	2
Arlington	29	7	36
Buffalo	2	0	2
Cambridge	2	0	2
Cannon Falls	1	0	1
Chisago City	1	0	1
Delano	5	1	6
Fairfax	1	0	1
Gaylord	4	1	5
Glencoe	21	10	31
Grantie Falls	1	0	1
Green Isle	3	0	3
Hector	1	0	1
Henderson	29	2	31
Hutchinson	2	1	3
Isanti	1	0	1
LeSuer	11	0	11
Lester Prairie	10	5	15
Little Falls	1	0	1
Luverne	4	1	5
Mankato	0	1	1
Marshall	1	0	1
Montgomery	2	1	3
Morgan	1	0	1
New Auburn	2	0	2
New Ulm	5	0	5
New Richland	7	1	8
Northfield	2	0	2
Olivia	1	0	1
Plato	7	0	7
Rockford	1	0	1
Roseau	3	1	4
Rush City	1	0	1
Stacy	1	0	1
St. Cloud	2	0	2
Stewart	5	1	6
Virginia	1	1	2
Zumbro Falls	1	0	1
Total	173	35	208

Table 5 Continued

Other States	Male	Female	Total
Alabama	1	0	1
California	11	5	16
Colorado	0	1	1
Florida	1	0	1
Idaho	4	0	4
Illinois	14	2	16
Indiana	2	0	2
Iowa	2	0	2
Kansas	1	0	1
Kentucky	2	0	2
Ohio	7	0	7
Oklahoma	2	0	2
Oregon	1	0	1
Louisiana	0	2	2
Missouri	3	0	3
Montana	2	0	2
Nebraska	5	0	5
New York	6	0	6
North Dakota	1	0	1
South Dakota	1	0	1
Texas	3	0	3
Washington	1	0	1
Wisconsin	9	3	12
Total	79	13	92

Other Countries	Male	Female	Total
Germany	2	1	3
Ireland	0	1	1
Mexico	1	0	1
Total	3	2	5

Grand Total - 2,955

The majority of anglers (89.71%) interviewed were from the seven county metropolitan area. Anglers from the seven county metro area were further broken down by county. For the 2,650 anglers from the metro area, the percentages are as follows:

Hennepin County	-	43.7%
Carver County	-	29.6%
Ramsey County	-	11.3%
Scott County	-	8.1%
Dakota County	-	5.7%
Anoka County	-	1.0%
Washington County	-	.6%

Anglers from the local community of Waconia made up 16.3 percent of the anglers from the seven county area.

Trip Data

A total of 18 completed fishing trips were tallied for Waconia Lake during the census period. The average length of a completed trip was 2.91 hours.

Fishing Pressure and Non-Fishing Pressure

Fishing Pressure: The estimated man-hours of fishing is shown in Table 6.

TABLE 6. Estimated Man-hours of Fishing on Waconia Lake, May 11 - September 16, 1979

Total Acres	Estimated Man-Hours Weekends	Estimated Man-Hours Weekdays	Total Estimated Man-Hours	Man-Hours Per Acre
3,104	49,688	31,384	81,072	26.12

Table 6a. provides a breakdown of fishing pressure by census sections.

Fishing Style

Boat fishing was the most popular type of fishing with 96.3 percent of the total estimated man-hours of fishing. Approximately 41 percent of the boat fishermen used locators. Bank and pier fishing accounted for 2.2% and 1.6% of the total estimated man-hours of fishing respectively. There were no public fishing piers as such on Waconia Lake, but private docks were considered as piers. Table 7 provides a summary of the fishing types.

TABLE 7. Summary of the Estimated Man-hours of Fishing Pressure for the Different Types of Fishing and Percent of the Total for Waconia Lake, May 11 - September 16, 1979

Type	Estimated Man-hours	Percent of Total
Boat	78,086	96.32
Bank	1,809	2.23
Pier	1,177	1.45
Total	81,072	100.00

Table 7a. provides a breakdown of fishing style of anglers interviewed by fishing type, fishing method and bait or lure.

Principal Species Sought

The largest percentage of anglers interviewed indicated they were fishing for more than one fish species. Combining all sections, 28.07% of the anglers were seeking a mixed bag. Table 8 shows angler preference by section.

Table 9 shows the species contribution to the sport catch by numbers and percent, for each section and all sections combined. Bluegills made up 50.71 percent of the total catch of anglers interviewed on all sections combined. Black crappie (24.37%) and white crappie (7.95%) were the next most abundant species in the catch.

TABLE 8. Breakdown of the Number of Anglers Seeking a Specific Species by Section and for All Sections Combined. Waconia Lake, May 11 - September 16, 1979.

	Section 1		Section 2		Section 3		Section 4		Section 5		Total	
Species	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Northern Pike	22	2.67	28	3.99	5	1.21	37	5.15	35	6.72	127	4.30
Walleye	12	2.00	4	.57	7	1.69	24	3.34	10	1.92	57	1.93
Crappies	95	15.83	95	13.55	98	23.73	122	16.99	99	18.81	509	17.20
Sunfish	164	27.33	161	22.83	107	25.92	141	19.64	148	28.41	721	24.38
L.M. Bass	61	10.17	32	4.56	2	.48	16	2.23	9	1.73	120	4.06
Bullheads	0	0	4	.57	0	0	0	0	0	0	4	.14
Mixed	131	21.83	235	33.53	89	21.55	218	30.36	156	29.94	829	28.07
Panfish	107	17.84	143	20.40	105	25.42	160	22.28	65	12.47	580	19.65
Perch	8	1.33	0	0	0	0	0	0	0	0	8	.27
Total	600	100.00	702	100.00	413	100.00	718	100.00	522	100.00	2,955	100.00

TABLE 9. Species Composition of the Sport Catch by Section and for all Sections Combined. May 11 - September 16, 1979.

	Section 1		Section 2		Section 3		Section 4		Section 5		Total	
Species	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Northern Pike	23	2.13	13	1.39	6	.64	11	1.12	16	1.22	69	1.32
Walleye	15	1.39	20	2.14	11	1.18	24	2.43	20	1.53	90	1.72
Bl. Crappie	356	32.90	184	19.70	276	29.61	169	17.14	293	22.37	1,278	24.37
W. Crappie	43	3.97	44	4.71	85	9.12	153	15.52	92	7.02	417	7.95
Bluegill	462	42.70	448	47.97	495	53.11	527	53.45	727	55.50	2,659	50.71
Pumpkinseed	2	.18	7	.75	--	--	4	.41	2	.15	15	.29
Gr. Sunfish	14	1.29	66	7.07	12	1.29	18	1.83	23	1.76	133	2.54
L.M. Bass	89	8.22	66	7.07	5	.54	16	1.62	20	1.53	196	3.74
Perch	30	2.77	39	4.18	15	1.61	12	1.22	65	4.76	161	3.07
Bl. Bullhead	1	.09	--	--	--	--	--	--	--	--	1	.02
Br. Bullhead	1	.09	5	.54	--	--	6	.61	14	1.07	26	.50
Y. Bullhead	--	--	1	.11	--	--	--	--	--	--	1	.02
Carp	--	--	1	.11	--	--	--	--	--	--	1	.02
Sheepshead	46	4.25	40	4.28	27	2.90	46	4.67	38	2.90	197	3.76
Total	1,082	100.00	934	100.00	932	100.00	986	100.00	1,310	100.00	5,244	100.00

Catch Per Unit Effort

This parameter is expressed in numbers of fish per man-hour of fishing for each species caught on each section and for the combined number of each species caught on each section. The combined rate (all types of fishing, methods, and lures) was .803 fish per man-hour. The bluegill showed the highest catch rate followed by black crappie. Table 8a. shows the overall catch rate for each species for each section.

Catch Per Man-hour by Fishing Type, Method and Lure

Table 9a. gives the catch rate of each species taken during the census period by section for each of the types of fishing censused. Pier fishermen were observed by the clerk but none were contacted. Boat fishermen using locators had the highest catch rate (.860 fish per man-hour) of the three types of fishing listed.

Of five methods of fishing censused, still fishing was the most popular method with 70.8% of the censused man-hours of fishing spent at that method. The catch rate was found to be highest for jigging (1.893 fish/man-hour) as a method, followed by still fishing with .930 fish per man-hour.

The most frequently used bait was a natural type and produced the highest catch per man-hour (.911 fish/man-hour).

Catch Rate for Selected Species

During the interview, the angler was asked what he or she was fishing for. The catch rates for selected species or classes of fish were calculated by

dividing the number of a particular fish caught, by anglers actually seeking that fish species or class, by the number of man-hours spent fishing for that species or class of fish. This parameter, as explained earlier, gives a truer catch rate for a species since it eliminates the people who were seeking other species and may have been using gear, methods, and baits not suited to catching that species. Table 10 shows the catch rate for selected species by different types of fishing.

TABLE 10. The Catch Rate of Anglers Fishing for a Specific Species or Class of Fish by Fishing Type on Waconia Lake, May 11 - September 16, 1979. Results are in Fish Per Man-hour

Type of Fishing	Northern Pike	Walleye	Crappies	Sunfish	L.M. Bass	Bull-heads	Mixed Panfish	Perch	Total
Boat	.040	.050	.760	1.210	.370	0	.400	.700	1.27	.678
Boat w/ Locator	.080	.090	.710	1.370	.220	-	.500	.880	0	.728
Bank	--	--	.320	.290	0	-	0	.050	-	2.09

Number and Percent Successful Anglers

A successful angler was one who caught and kept at least one fish of any species. Of the 2,955 anglers interviewed, 1,511 anglers or 51.13% were successful.

Harvest

This parameter is expressed in estimated numbers and pounds of each species caught during the period for each section. The total estimated harvest for Waconia Lake was 64,357 fish weighing 30,154 pounds, or 9.71 pounds per acre. The estimate of weight of fish is low due to lack of weight data for some

rough fish species in the catch. Two fish species, bluegill and black crappie contributed to 74.7% of the total estimated catch by numbers. Table 11a shows harvest data for Waconia Lake.

DISCUSSION

Publications such as Moyle and Franklin (1955), Scidmore (1961), Hawkinson and Krosch (1972), Tureson (1978), Gilbertson (1979), provide estimates of fishing pressure and harvest for many Minnesota lakes. The estimates of harvest and pressure for Waconia Lake were in the range of the above reports. Pressure on Waconia Lake was compared to metropolitan area lakes of over 1,000 acres. The comparisons were made with Minnetonka, White Bear, Bald Eagle, Forest, and Big Marine lakes. Fishing pressure on Waconia (26.12 man-hours/acre) was approximately the same as that found on Minnetonka (25.01 man-hours/acre) but lower than the other lakes listed.

Lake Waconia's combined non-fishing use (12.28 man-hours/acre) fell about mid way between the combined non-fishing recreation estimates for Big Marine (7.88 man-hours/acre) and Forest Lake (16.00 man-hours/acre), but was well below those found on Bald Eagle (30.7 man-hours/acre), White Bear (58.7 man-hours/acre) and Minnetonka (64.23 man-hours/acre).

SUPPLEMENT

Walleye and walleye fishing were of special interest to area management in addition to water surface use and pressure on Waconia Lake. Walleye fry have been stocked annually since 1975. Scale samples were taken from 69 of 90 fish checked by the clerk. The average length of walleyes taken was 12.2 inches (range 9.5" to 29.0") and an average weight of .64 pounds (range .19 to 7.25 pounds). Of these fish, 98.6% were three annulus fish or younger which places their origin within the fry stocking years. From Table 12a. it can be clearly seen that annulus I fish dominate in the catch.

ACKNOWLEDGEMENTS

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APPENDIX

TABLE 1a. Estimated Non-Fishing Recreational Pressure on Waconia Lake

May 11 - September 16, 1979

Runabouts, Results are in Moving Man-Hours

Lake and Section Number (Acreage)	Days in Period	Est. M-H on Weekends + (% Total)	Est. M-H on Weekdays + (% Total)	Total Est. Man-Hours	Est. Total Man-Hours Per Day	Est. Total M-H/Acre per Day	Est. Total Man-Hours per Acre
Waconia Lake Section 1 (481)	129	1,770 (71.11)	719 (28.89)	2,489	19.29	.04	5.17
Waconia Lake Section 2 (385)	129	3,373 (61.70)	2,094 (38.30)	5,467	42.38	.11	14.20
Waconia Lake Section 3 (365)	129	1,979 (81.57)	447 (18.43)	2,426	18.81	.05	6.65
Waconia Lake Section 4 (960)	129	1,686 (77.23)	497 (22.77)	2,183	16.92	.02	2.27
Waconia Lake Section 5 (913)	129	910 (50.95)	876 (49.05)	1,786	13.84	.02	1.96
Total (3,104)	129	9,718 (67.72)	4,633 (32.28)	14,351	111.25	.04	4.62

TABLE 2a. Estimated Non-Fishing Recreational Pressure on Waconia Lake

May 11 - September 16, 1979

Waterskiing, Results are in Moving Man-Hours

Lake and Section Number (Acreage)	Days in Period	Est. M-H on Weekends + (% Total)	Est. M-H on Weekdays + (% Total)	Total Est. Man-Hours	Est. Total Man-Hours per Day	Est. Total M-H/Acre per Day	Est. Total Man-Hours per Acre
Waconia Lake Section 1 (481)	129	209 (79.47)	54 (20.53)	263	2.04	<.01	.55
Waconia Lake Section 2 (385)	129	286 (46.81)	325 (53.19)	611	4.74	.01	1.59
Waconia Lake Section 3 (365)	129	74 (41.11)	106 (58.89)	180	1.40	<.01	.49
Waconia Lake Section 4 (960)	129	92 (63.01)	54 (36.99)	146	1.13	<.01	.15
Waconia Lake Section 5 (913)	129	101 (48.80)	106 (51.20)	207	1.60	<.01	.23
Total (3,104)	129	762 (54.16)	645 (45.84)	1,407	10.91	<.01	.45

TABLE 3a. Estimated Non-Fishing Recreational Pressure on Waconia Lake

May 11 - September 16, 1979

Sailboats, Results are in Moving Man-Hours

Lake and Section Number (Acreage)	Days in Period	Est. M-H on Weekends + (% Total)	Est. M-H on Weekdays + (% Total)	Total Est. Man-Hours	Est. Total Man-Hours Per Day	Est. Total M-H/Acre per Day	Est. Total Man-Hours per Acre
Waconia Lake Section 1 (481)	129	578 (81.41)	132 (18.59)	710	5.50	.01	1.48
Waconia Lake Section 2 (385)	129	3,329 (89.03)	410 (10.97)	3,739	28.98	.08	9.71
Waconia Lake Section 3 (365)	129	930 (93.84)	61 (6.16)	991	7.68	.02	2.72
Waconia Lake Section 4 (960)	129	5,851 (96.95)	184 (3.05)	6,035	46.78	.05	6.29
Waconia Lake Section 5 (913)	129	2,245 (89.08)	275 (10.92)	2,520	19.53	.02	2.76
Total (3,104)	129	12,933 (92.41)	1,062 (7.59)	13,995	108.49	.03	4.51

TABLE 4a. Estimated Non-Fishing Recreational Pressure on Waconia Lake

May 11 - September 16, 1979

Canoes and/or Rowboats, Results are in Moving Man-Hours

Lake and Section Number (Acreage)	Days in Period	Est. M-H on Weekends + (% Total)	Est. M-H on Weekdays + (% Total)	Total Est. Man-Hours	Est. Total Man-Hours Per Day	Est. Total M-H/Acre per Day	Est. Total Man-Hours per Acre
Waconia Lake Section 1 (481)	129	201 (46.85)	228 (53.15)	429	3.33	<.01	.89
Waconia Lake Section 2 (385)	129	304 (52.14)	279 (47.86)	583	4.52	.01	1.51
Waconia Lake Section 3 (365)	129	0	0	0	0	0	0
Waconia Lake Section 4 (960)	129	61 (100.00)	0	61	.47	<.01	.06
Waconia Lake Section 5 (913)	129	0	0	0	0	0	0
Total (3,104)	129	566 (52.75)	507 (47.25)	1,073	8.32	<.01	.35

TABLE 5a. Estimated Non-Fishing Recreational Pressure on Waconia Lake

May 11 - September 16, 1979

House and/or Pontoon Boats, Results are in Moving Man-Hours

Lake and Section Number (Acreage)	Days in Period	Est. M-H on Weekends + (% Total)	Est. M-H on Weekdays + (% Total)	Total Est. Man-Hours	Est. Total Man-Hours per Day	Est. Total M-H/Acre per Day	Est. Total Man-Hours per Acre
Waconia Lake Section 1 (481)	129	881 (51.88)	817 (48.12)	1,698	13.16	.03	3.53
Waconia Lake Section 2 (385)	129	1,457 (54.24)	1,229 (45.76)	2,686	20.82	.05	6.98
Waconia Lake Section 3 (365)	129	421 (100.00)	0	421	3.26	.01	1.15
Waconia Lake Section 4 (960)	129	1,123 (59.69)	760 (40.31)	1,883	14.60	.02	1.96
Waconia Lake Section 5 (913)	129	480 (79.21)	126 (20.79)	606	4.70	<.01	.66
Total (3,104)	129	4,362 (59.80)	2,932 (40.20)	7,294	56.54	.02	2.35

TABLE 6a. Estimated Fishing Pressure on Waconia Lake

May 11 - September 16, 1979

Lake and Section Number	Days in Period	Est. M-H on Weekends + (% Total)	Est. M-H on Weekdays + (% Total)	Total Est. Man-Hours	Est. Total Man-Hours per Day	Est. Total M-H/Acre per Day	Est. Total Man-Hours per Acre
Waconia Lake Section 1 (481)	129	9,707 (63.31)	5,625 (36.69)	15,332	118.85	.25	31.87
Waconia Lake Section 2 (385)	129	11,329 (59.70)	7,648 (40.30)	18,977	147.11	.38	49.29
Waconia Lake Section 3 (365)	129	5,597 (61.08)	3,567 (38.92)	9,164	71.04	.19	25.11
Waconia Lake Section 4 (960)	129	13,621 (61.85)	8,401 (38.15)	22,022	170.71	.18	22.94
Waconia Lake Section 5 (913)	129	9,434 (60.56)	6,143 (39.44)	15,577	120.75	.13	17.06
Total (3104)	129	49,688 (61.29)	31,384 (38.71)	81,072	628.47	.20	26.12

TABLE 7a. Fishing Style Expressed in Percent for Each Section

May 11 - September 16, 1979

Waconia Lake. Estimated Man-Hours in Parenthesis

	FISHING STYLE											
	Fishing Type			Fishing Method					Fishing Bait or Lure			
Section	Boat	Bank	Pier	Still	Troll	Cast	Jig	Mixed	Artificial	Natural	Mixed	Prepared
1	95.92 (14,706)	1.57 (241)	2.51 (385)	66.67	10.50	12.67	.66	9.50	18.67	67.17	14.17	-0-
2	89.83 (17,047)	6.00 (1,138)	4.17 (792)	74.89	6.85	8.56	.29	9.41	8.58	76.03	15.41	-0-
3	99.37 (9,106)	.63 (58)	-0-	85.23	4.36	1.94	.48	7.99	2.91	83.78	13.32	-0-
4	99.36 (21,880)	.64 (142)	-0-	73.26	11.00	4.18	.56	11.00	8.77	78.83	12.40	-0-
5	98.52 (15,347)	1.48 (230)	-0-	67.18	13.82	4.99	.77	13.24	8.25	73.90	17.85	-0-
Total	96.32 (78,086)	2.23 (1,809)	1.45 (1,177)	72.92	9.48	6.77	.54	10.29	9.82	75.62	14.56	-0-

TABLE 8a. Number of Fish Caught Per Man-Hour for All Types and Methods of Fishing, by Section

Waconia Lake, May 11 - September 16, 1979

Species	Section 1	Section 2	Section 3	Section 4	Section 5	Total Number of Fish Sampled	Total Catch Per Man-Hour
Northern Pike	.017	.009	.007	.007	.013	69	.011
Walleye	.011	.013	.012	.015	.017	90	.013
Black Crappie	.258	.125	.301	.107	.246	1,278	.196
White Crappie	.031	.030	.093	.097	.077	417	.064
Bluegill	.335	.305	.541	.334	.611	2,659	.407
Pumpkinseed	tr.	tr.	0	tr.	tr.	15	tr.
Green Sunfish	.010	.045	.013	.011	.019	133	.020
L.M. Bass	.064	.047	tr.	.010	.017	196	.028
Perch	.022	.027	.016	.008	.054	161	.024
Bl. Bullhead	tr.	0	0	0	0	1	0
Br. Bullhead	tr.	tr.	0	tr.	.012	26	tr.
Yl. Bullhead	0	tr.	0	0	0	1	0
Carp	0	tr.	0	0	0	1	0
Sheepshead	.033	.027	.029	.029	.032	197	.030
Number Caught	1,082	934	932	986	1,310	5,244	---
Hours Fished	1,380.9	1,470.2	915.8	1,576.1	1,190.2	6,533.2	---
Catch per Man-Hour	.784	.635	1.018	.626	1.101	---	.803

TABLE 9a. Number of Fish Caught Per Man-Hour for Waconia Lake, All Sections Combined Comparing Boat Fishing, Boat With Locator, and Bank Fishing

May 11 - September 16, 1979

Species	Boat Fishing	Boat with Locator	Bank Fishing	Total Number of Fish Sampled	Total Catch Per Man-Hour
Northern Pike	.008	.015	0	69	.011
Walleye	.009	.021	0	90	.013
Black Crappie	.191	.199	.391	1,278	.196
White Crappie	.059	.072	0	417	.064
Bluegill	.374	.458	.215	2,659	.407
Pumpkinseed	tr.	tr.	0	15	tr.
Green Sunfish	.025	.012	.078	133	.020
L.M. Bass	.025	.036	0	196	.028
Perch	.037	.008	0	161	.024
Bl. Bullhead	0	0	0	1	0
Br. Bullhead	tr.	tr.	0	26	tr.
Yl. Bullhead	0	0	0	1	0
Carp	0	0	0	1	0
Sheepshead	.027	.033	.078	197	.030
Number Caught	2,924	2,281	39	5,244	---
Hours Fished	3,829.3	2,652.7	51.2	6,533.2	---
Catch Per Man-Hour	.764	.860	.762	---	.803

TABLE 10a. Number of Fish Per Man-Hour for Specified Method or Lure for Waconia Lake

May 11 - September 16, 1979

	Method					Lure			
Species	Still	Troll	Cast	Jig	Mixed	Artificial	Natural	Prepared	Mixed
Northern Pike	tr.	.032	.017	0	.031	.034	tr.	0	.021
Walleye	.010	.044	.008	0	.017	.024	.013	0	.010
Bl. Crappie	.216	.161	.086	.507	.156	.111	.209	0	.185
White Crappie	.062	.052	.100	.747	.027	.058	.072	0	.029
Bluegill	.529	.099	.096	.080	.136	.133	.501	0	.136
Pumpkinseed	tr.	.015	tr.	0	tr.	tr.	tr.	0	tr.
Green Sunfish	.022	0	.010	.533	.006	.025	.021	0	.016
L.M. Bass	.016	tr.	.186	0	.026	.135	.020	0	.014
Perch	.080	tr.	.023	0	.014	tr.	.024	0	.012
Bl. Bullhead	0	0	0	0	0	.014	0	0	0
Br. Bullhead	tr.	tr.	tr.	0	tr.	0	tr.	0	tr.
Yl. Bullhead	0	0	0	0	0	0	0	0	0
Carp	0	0	0	0	0	0	0	0	0
Sheepshead	.032	.023	.029	.027	.026	.009	.034	0	.025
Number Caught	4,285	260	269	71	359	350	4,422	0	472
Hours Fished	4,608.2	596.0	478.3	37.5	813.2	638.1	4,854.8	0	1,040.3
Catch Per Man-Hour	.930	.436	.562	1.893	.441	.549	.911	0	.454

Table 11a. Estimates of Harvest on Waconia Lake, Expressed in Numbers of Fish Caught and Weight in Pounds in Parenthesis. May 11 - September 16, 1979

Species	Section 1	Section 2	Section 3	Section 4	Section 5	Total
Northern Pike	261 (846)	171 (554)	64 (207)	154 (499)	203 (658)	853 (2,764)
Walleye	169 (117)	247 (170)	110 (76)	330 (228)	265 (183)	1,121 (774)
Bl. Crappie	3,956 (1,859)	2,372 (1,115)	2,758 (1,296)	2,356 (1,107)	3,832 (1,801)	15,274 (7,178)
W. Crappie	475 (271)	569 (324)	852 (486)	2,136 (1,218)	1,199 (683)	5,231 (2,982)
Bluegill	5,136 (1,849)	5,788 (2,084)	4,958 (1,785)	7,355 (2,648)	9,518 (3,426)	32,755 (11,792)
Pumpkinseed	15 (4)	99 (25)	0	66 (16)	31 (8)	211 (53)
Green Sunfish	153 (38)	854 (214)	119 (30)	242 (60)	296 (74)	1,664 (416)
L.M. Bass	981 (1,609)	892 (1,463)	46 (75)	220 (361)	265 (435)	2,404 (3,943)
Perch	337 (42)	512 (64)	147 (18)	176 (22)	851 (106)	2,023 (252)
Bl. Bullhead	15 *	0	0	0	0	15 *
Br. Bullhead	15 *	57 *	0	88 *	187 *	347 *
Yl. Bullhead	0	19 *	0	0	0	19 *
Carp	0	19 *	0	0	0	19 *
Sheepshead	506 *	512 *	266 *	639 *	498 *	2,421 *
Total Est. No.	12,019	12,111	9,320	13,762	17,145	64,357
Total Est. Pounds	6,635	6,013	3,973	6,159	7,374	30,154
Total Pounds/Acre						9.71

*Weights not obtained for these species

Table 12a. Age-Frequency Distribution of Walleyes Sampled Waconia Lake, May 11 - September 16, 1979

Species	Sample Size	Sub-sample Size	AGE GROUPS I	II	III	IV	V	VI+
Walleye	90	69	60	4	4	--	--	1

TABLE 13a. Recreational Pressure for Selected Metropolitan Lakes. Pressure Listed in Man-hours Per Acre. Non-Fishing Pressure in Moving Man-hours/Acre

		May 11 - Sept. 16, 1979	May 17 - Oct. 19, 1975	May 7 - Sept. 30, 1977		May 12 - Sept. 24, 1978	
	Lake	Waconia	Minnetonka	White Bear	Bald Eagle	Forest	Big Marine
Activity							
Runabouts		4.62	40.73	10.60	12.50	7.90	4.61
Sailboats		4.51	13.24	15.60	10.70	3.32	.77
Canoes		.35	.91	.40	1.00	.78	.95
Pontoons		2.35	7.79	1.70	4.20	3.26	1.01
Waterskiing		.45	1.56	.90	2.30	.74	.54
Fishing		26.12	25.01	29.50	36.40	31.97	56.38
Total		38.40	89.24	88.20	67.10	47.97	64.26