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AN ANALYSIS OF THE MUSKELLUNGE FISHERY OF LITTLE GREEN LAKE  
GREEN LAKE COUNTY, WISCONSIN 1957-65

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ABSTRACT

Muskellunge were stocked in Little Green Lake, Green Lake County, Wisconsin after the existing fish population was removed by chemical treatment in 1956. Tagging studies and voluntary creel census returns indicate that muskellunge stocked usually reach the legal size of 30.0 inches at the age of 3-4 years. A voluntary creel census of anglers for the period 1963-65 recorded 471 muskellunge weighing 4,215.8 pounds. The harvest averaged 2.9 pounds per acre per year during the period. Known-age muskellunge from the September, 1960 plant comprised 298 or 63.3 percent of all fish caught during the voluntary creel census. Fishermen from 87 communities in five states recorded catching legal muskellunge in the voluntary creel census.

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## INTRODUCTION

In 1956, Little Green Lake, a 478 acre, eutrophic body of water in Green Lake County, Wisconsin, was chemically treated with 0.1 p.p.m. of toxaphene to completely eradicate all fish. This body of water is alkaline, hard, with a methyl purple alkalinity reading of 115.0 p.p.m., and extremely fertile. Maximum depth is 24 feet, the average depth is 11 feet, and during most summers the lake does not stratify.

Little Green Lake was restocked after detoxification with a variety of fish species including yellow perch (Perca flavescens), bluegill (Lepomis macrochirus), largemouth bass (Micropterus salmoides), smallmouth bass (M. dolomieu), walleye (Stizostedion vitreum vitreum) and muskellunge (Esox masquinongy). Muskellunge were first stocked in Little Green Lake on September 17, 1957, with additional plantings of this species occurring at staggered intervals up to 1964. Prior to chemical treatment, muskellunge were never reported present in this body of water.

Little Green Lake was the first lake in Wisconsin to be treated with toxaphene. For this reason, and because of the high degree of interest expressed by sportsmen, fyke net, seine and boom shockers surveys were made of the fish populations at regular intervals.

In addition, a voluntary creel census of the muskellunge caught by anglers during the open seasons was kept by seven boat livery operators in 1963 and 1964, and by eight boat livery operators in 1965. Signs posted at the two public access sites on the lake requesting fishermen launching boats from these areas to register their muskellunge at any of the boat liveries. Cooperation of fishermen in registering legal muskellunge was excellent.

It is the intent of this paper to report on the growth of muskellunge in Little Green Lake since this species was first stocked in 1957, to follow the growth and harvest to date of one plant of muskellunge stocked in September, 1960, and to report on the data volunteered by anglers catching legal muskellunge during the open seasons of 1963-1965.

### MUSKELLUNGE STOCKING

During the period from 1957 to the present, muskellunge have been stocked in Little Green Lake at irregular intervals. All muskellunge stocked on September 22, 1960, and thereafter were marked by removal of a fin, or a portion of maxillary bone. (Table 1)

Most plants of marked muskellunge in Little Green Lake were of large fingerlings in excess of 8.5 inches. The June 30, 1960, plant consisted of 11,600 fingerlings 1.5 to 2.0 inches long, and the August 12, 1958 and July 20, 1959, stocks ranged from 4.0 to 7.0 inches in length. Smaller numbers of muskellunge under 8.5 inches in total length were present in September 22, 1960, and September 18, 1964, plants.

Table 1 - Muskellunge stocked in Little Green Lake, Green Lake County, 1957-1964.

Date stocked	Number stocked	Mean length or range in total length in inches	Mark
9-17-57	300	8.7	None
8-12-58	1,100	6.0 - 7.0	None
7-20-59	1,000	4.0 - 6.0	None
6-30-60	11,600	1.5 - 2.0	None
9-22-60	1,500	8.4 - 13.3	RV
9-21-61	145	4.8 - 8.9	RP
9-21-61	239	9.0 - 12.5	LV
9-18-64	2,000	7.4 - 12.0	LMx

### RECAPTURE OF UNMARKED MUSKELLUNGE

Unfortunately, plants of muskellunge placed in Little Green Lake during the period from 1957 to June, 1960, were unmarked. For this reason, accurate and/or specific growth and survival information is not available for the early plants. However, comparison of unmarked muskellunge recaptured in the various netting and electro-fishing surveys (Table 2) to the records of muskellunge stocked (Table 1) shows that apparently only the initial plant in September, 1957, exhibited good survival. Growth of muskellunge in Little Green Lake was extremely rapid, thus a wide variance in length separated the various year classes. Small muskellunge were infrequently or never captured in succeeding years following the 1958, 1959 and June, 1960, plants of unmarked fish. This is in direct contradiction to the 1960 and 1961 plants of marked large fingerlings which were easily captured in the years following. None of the June 30, 1960, plant of 1.5 to 2.0 inch fingerlings were ever seen and they are presumed not to have survived.

### TAGGING STUDIES

During fyke netting, seining or electro-fishing operations from 1960-63, 285 muskellunge were captured and tagged at Little Green Lake. All fish were marked with a pair of Peterson tags held in place with a pure nickel pin, and at the same time were measured to the nearest tenth of an inch (total length) and weighed to the nearest .01 pound. Most of the fish were tagged with the pin pushed through the pterigiophores of the caudal fin where it merges with the caudal peduncle. Some of the smaller fish, in the 17.0 to 20.0 inch size range, were marked with placement of the tags in the musculature immediately below the dorsal fin, although this site proved not as satisfactory as the caudal placement because the plastic tags worked deeply into the flesh as the fish continued to grow. At the caudal peduncle, some tag embedding occurred, but not as deeply as at the dorsal site because the width of the body remains relatively constant at the caudal peduncle regardless of length or weight.

To date (March, 1966), 75 tagged fish have been reported caught by fishermen. This amount represents 26.3 percent of all tagged muskellunge. The exact location on the lake where their fish were caught was reported by 45 fishermen, with nine (20.0 percent) of the 45 fish being caught in the exact location where they had been previously tagged.

The maximum period of time to elapse between the dates of tagging and recapture was 44 months. Other fish were recaptured 41, 38, and 34 months after tagging. The average period of time elapsed between the tagging and recapture dates was 12.9 months. Fifteen of the 75 tagged fish were recaptured by fishermen 24 months or more after they were tagged.

Maximum growth of a tagged individual fish was exhibited by a muskellunge marked on October 5, 1961, which was 19.1 inches in total length and weighed 1.25 pounds. The fish was recaptured 44 months later on June 11, 1965, being 35.3 inches long and weighing 11.25 pounds, an increase of 16.2 inches and 10.0 pounds. This was closely followed by a fish tagged May 2, 1962, at 20.4 inches and 2.93 pounds, which was recaptured 41 months later on October 17, 1965 at 37.0 inches and 12.63 pounds, an increase of 16.6 inches and 9.70 pounds.

### LENGTH - WEIGHT RELATIONSHIP

All muskellunge recaptured and tagged were weighed and measured (Table 3). At the minimum legal size of 30 inches, the muskellunge averaged 7.56 pounds with a range of 5.75 - 8.56 pounds. The smallest muskellunge taken during tagging operations weighed 0.81 pounds and the largest 17.75 pounds.

### SEXUAL MATURITY

During tagging operations, observations were also made of the sexual maturity of muskellunge. The first ripe males noted were three-year old fish taken in fyke nets in the spring of 1960. Three-year old males from the marked planting of 1960 were also mature and ripe in April, 1963. The smallest mature male captured was 23.5 inches.

Table 2 - Length frequency (total length in inches) of unmarked muskellunge recaptured in surveys on Little Green Lake, Green Lake County, 1958 - 1964.

Length groups	Date of survey									
	2/58	10/59	5/60	10/60	1/61	10/61	4/52	4/63	5/63	1/64
18.0 - 18.9										
19.0 - 19.9		1								
20.0 - 20.9										
21.0 - 21.9	2									
22.0 - 22.9										
23.0 - 23.9										
24.0 - 24.9			1							
25.0 - 25.9		2								
26.0 - 26.9		1	1							
27.0 - 27.9		3	2							
28.0 - 28.9		1	2							
29.0 - 29.9		3	1	2	3	1				
30.0 - 30.9			3	1						
31.0 - 31.9			1	3		1	2			
32.0 - 32.9				1	3		2			
33.0 - 33.9								2	1	
34.0 - 34.9								2		
35.0 - 35.9									1	
36.0 - 36.9									1	
37.0 - 37.9									1	
38.0 - 38.9										
39.0 - 39.9										
40.0 - 40.9										1
TOTALS	2	11	11	7	8	12	16	4	4	1

The first mature ripe female was captured in a fyke net during April, 1961. This fish was 29.0 inches in length and four years of age. Similarly, known-age four-year old female muskellunge were found to be mature and ripe during the 1964 netting operation.

Despite the fact that early plants of muskellunge were not marked, ages were considered to be known because this species was not stocked in Little Green Lake until 1957. Therefore, mature fish taken in 1960 and 1961 could not possibly be more than 3 or 4 years of age respectively.

In Little Green Lake, male muskellunge mature at 3 years of age while female muskellunge mature one year later at an age of 4 years. This compares to the earliest reported age of maturity, both sexes included as reported by Oehmcke, Johnson, Klingbiel and Wistrom (1958).

#### SURVIVAL, GROWTH AND HARVEST OF SEPTEMBER, 1960 STOCKED MUSKELLUNGE

On September 22, 1960, 1,500 muskellunge fingerlings were stocked in Little Green Lake. These fish ranged in total length from 8.4 to 13.3 inches, weighed a total of 266.5 pounds and were marked with a right ventral finclip. From that time to the close of the 1965 open season, this group of fish has been closely observed to determine growth rates, survival and harvest.

On October 4-6, 1960, Little Green Lake was intensively electro-fished with 230 volt alternating current, 3 phase boom shockers. All right ventral marked muskellunge recaptured were additionally marked by removal of the left pectoral fin. The lake was again electro-fished on October 25 and 28, 1960, to complete a population estimate of the remaining numbers of right ventral finclipped muskellunge fingerlings. These fingerlings captured averaged 10.7 inches in length, with a range of 8.1 to 13.1 inches.

A total of 103 right ventral fingerlings was captured and marked in the October 4-6, 1960, operations. The October 25 and 28, 1960, electro-fishing surveys obtained 70 additional right ventral marked fingerlings without left pectoral marks and 20 right ventral-left pectoral combination finclipped fish.

Using the Peterson formula for population estimates:

$$PE = \frac{m(u+r)}{r}$$

when m = number of marked fish present

u = number of unmarked fish captured

r = number of marked fish recaptured

$$PE = \frac{103 (70+20)}{20}$$

PE = 464 (30.9 percent survival 36 days after stocking)

Table 3 - Weight (mean and range) in pounds of muskellunge in different total length increments taken during survey and tagging operations, Little Green Lake, Green Lake County, 1960 - 1963.

Length groups	Number sampled	Mean	Range
17.0 - 17.9	4	1.31	0.81 - 1.61
18.0 - 18.9	19	1.64	1.25 - 2.25
19.0 - 19.9	14	1.84	1.25 - 2.25
20.0 - 20.9	9	2.30	1.69 - 2.93
21.0 - 21.9	1	2.19	----
22.0 - 22.9	0	----	----
23.0 - 23.9	5	3.27	3.13 - 3.43
24.0 - 24.9	15	3.73	2.87 - 4.50
25.0 - 25.9	35	4.07	3.50 - 4.81
26.0 - 26.9	51	4.79	4.06 - 6.00
27.0 - 27.9	21	5.47	4.37 - 6.43
28.0 - 28.9	28	5.91	5.13 - 6.75
29.0 - 29.9	12	6.63	5.31 - 7.87
30.0 - 30.9	12	7.56	5.75 - 8.56
31.0 - 31.9	11	8.29	6.69 - 10.81
32.0 - 32.9	10	9.04	8.13 - 10.63
33.0 - 33.9	10	9.56	8.50 - 10.42
34.0 - 34.9	12	10.52	9.43 - 12.69
35.0 - 35.9	5	11.69	11.00 - 12.19
36.0 - 36.9	45	13.47	12.81 - 14.00
37.0 - 37.9	6	14.43	13.43 - 15.21
38.0 - 38.9	1	17.75	----
TOTAL	285		

On May 15-16, 1963, similar mark and recapture methods were employed to estimate the numbers of right ventral finclipped muskellunge remaining in Little Green Lake. A total of 78 muskellunge were recaptured and marked by excising a small portion of the caudal fin on May 15, 1963.

On May 16, 1963, 68 unmarked right ventral finclipped muskellunge were captured with 9 right ventral - caudal marked fish. The Peterson method of population estimation then suggests:

$$PE = \frac{78(68+9)}{9}$$

$$PE = 667 \text{ (44.5 percent survival 32 months after stocking)}$$

At the time of the May, 1963, survey, the right ventral marked muskellunge averaged 26.4 inches with a range of 21.5 to 28.4 inches.

#### Growth of Known-Age Fish

At various times during the period after stocking of right ventral marked muskellunge in September, 1960 to April, 1964, length samples were obtained of all fish of this group taken during tagging operations (Table 4). The data suggests that the first muskellunge of this group reached the legal size of 30.0 inches at an age of 37-38 months shortly after the May, 1963, sample was taken. The voluntary creel census of 1963-65 shows that the first legal muskellunge of this group was caught by a fisherman on May 31, 1963. Growth is also indicated between October and April when mean lengths of the fish sampled in October, 1960 and April, 1961 are compared, and again in October, 1961 and April, 1962. Growth in length during April to May is also shown by comparing the mean lengths of April and May, 1963 samples.

#### Harvest by Anglers

During 1963, a voluntary creel census was initiated at Little Green Lake. Signs were erected at both public access sites, requesting fishermen to register all muskellunge caught at any boat livery on the lake. Cooperation by fishermen and boat livery operators was excellent. Seven boat livery operators registered muskellunge in 1963 and 1964, and in 1965 a new boat livery agreed to assist for a total of eight cooperators.

The creel census sheet showed specifically the finclips to look for and the boat livery operators became quite proficient at recognizing the markings. Total lengths and weights were recorded on the creel census sheets, plus the date, the name and address of each successful fisherman, the location where the fish was caught on Little Green Lake, the method of fishing, the bait used, the finclip and/or tag, and several livery operators recorded the actual time of day each fish was caught.

Table 4 - Growth in length of known-age muskellunge during various sampling periods after stocking in Little Green Lake, Green Lake County in September, 1960.

Length groups	Frequency							
	SAMPLING PERIOD							
	October 1960	April 1961	October 1961	April 1962	April 1963	May 1963	April 1964	
8.0 - 8.9	8							
9.0 - 9.9	40							
10.0 - 10.9	52	1						
11.0 - 11.9	44	1						
12.0 - 12.9	27	3	1					
13.0 - 13.9	2	2						
14.0 - 14.9			1					
15.0 - 15.9								
16.0 - 16.9								
17.0 - 17.9			6	1				
18.0 - 18.9			22	1				
19.0 - 19.9			12	4				
20.0 - 20.9			5	12				
21.0 - 21.9						1		
22.0 - 22.9					1			
23.0 - 23.9					3	2		

Table 4 - continued

Length groups	Frequency							
	SAMPLING PERIOD							
	October 1960	April 1961	October 1961	April 1962	April 1963	May 1963	April 1964	
24.0 - 24.9					9	10		
25.0 - 25.9					27	12	1	
26.0 - 26.9					35	17	1	
27.0 - 27.9					6	19	5	
28.0 - 28.9					1	11	24	
29.0 - 29.9							19	
30.0 - 30.9							18	
31.0 - 31.9							9	
32.0 - 32.9							2	
33.0 - 33.9							1	
TOTALS	173	7	47	18	82	72	80	
Mean length	10.7"	12.4"	18.5"	19.9"	25.8"	26.4"	29.5"	
Range in length	8.1-13.1"	10.5-13.9"	12.8-20.3"	17.5-20.8"	22.2-28.5"	21.5-28.4"	25.0-33.2"	
Actual age								
in months*	5	11	17	23	35	46	47	
Months since stocking	1	7	13	19	31	32	43	

\* Assuming May hatching date

Data pertaining to 1,500 right ventral marked muskellunge stocked in September, 1960, were obtained from the creel census sheets (Table 5).

A total of 298 right ventral marked muskellunge weighing 2,574.2 pounds have been registered to the close of the 1965 fishing season. When the 1,500 fish from this group were stocked, they weighed a total of 266.5 pounds. The harvest of 2,574.2 pounds to date represents a 966 percent increase in weight in the five-year period since stocking. This amount must be considered a minimum harvest because one 1963 creel census sheet was lost which contained data for 27 muskellunge registered by fishermen. Most of the information on the lost sheet was duplicated except finclip markings before it was lost. Data are available regarding finclip markings for 107 of the 136 muskellunge registered during 1963. Using the ratio of 75 right ventral marked muskellunge out of 107, the probable 1963 harvest of right ventral finclipped muskellunge out of the total 1963 catch of 134 fish, is estimated at 94 fish weighing 723.8 pounds, an increase of 19 fish and 149.6 pounds over the data shown in Table 5. In addition, all angler caught muskellunge were not registered and it is possible that some of the marked fish were not identified. These circumstances emphasize a point, the numbers of fish caught and total annual weights are minimum harvest figures only.

The table also shows that mean annual lengths and weights increased each year of the voluntary creel census, although the mean lengths and weights for the three-year period most nearly approximated the 1964 averages during the second year after these fish reached legal length.

The total number of muskellunge registered annually by sportsmen during the three-year period, 1963-65, was 136, 179 and 156 respectively, totalling 471 fish. Muskellunge of the September, 1960, plant represented 55.1 percent of all muskellunge caught during 1963 (69.1 percent using the corrected estimate), 72.1 percent of the 1964 total catch, and 60.3 percent of the 1965 catch. Table 5 shows that a total of 298 September, 1960, stocked muskellunge were caught during the three-year period representing 63.3 percent (67.3 percent using the corrected number for 1963) of all muskellunge caught.

#### COMPLETE VOLUNTARY CREEL CENSUS DATA

In addition to the information obtained regarding the marked September, 1960, plant of muskellunge, the voluntary creel census supplied additional data regarding the total catch during the period, 1963-65. The 1963 catch totalled 136 muskellunge weighing 1,186.3 pounds, while the 1964 catch of 179 muskellunge weighed 1,583.8 pounds, and the 1965 catch of 156 fish weighed 1,445.7 pounds. The grand totals for the three-year period were 471 muskellunge weighing 4,215.8 pounds, with an average of 1,405 pounds per year.

The average weight of the muskellunge caught by fishermen in the three-year period, 1963-65, was 8.8, 8.9 and 9.3 pounds, respectively, with a 9.0 pound average during the three-year period.

Angler harvest of registered fish, measured in pounds per acre, was 2.5, 5.3, and 3.0 respectively, from 1963-65 with a 3-year average of 2.9 pounds per acre.

Table 5 - Recapture data of 1,500 right ventral marked muskellunge stocked in Little Green Lake, Green Lake County during September, 1960.

Range in length	Number captured by anglers			Totals	Range in weight (lbs.)	Number captured by anglers			Totals
	1963	1964	1965			1963	1964	1965	
30.0-30.4	14	10	3	27	5.5-5.9			2	2
30.5-30.9	20	9	8	37	6.0-6.4	5	5	3	13
31.0-31.4	14	12	12	38	6.5-6.9	9	2	1	12
31.5-31.9	9	13	7	29	7.0-7.4	18	14	17	49
32.0-32.4	10	26	7	43	7.5-7.9	16	17	6	39
32.5-32.9	5	13	10	28	8.0-8.4	17	23	11	51
33.0-33.4	1	9	12	22	8.5-8.9	5	20	10	35
33.5-33.9		12	4	16	9.0-9.4	3	9	6	18
34.0-34.4		11	2	13	9.5-9.9		15	9	24
34.5-34.9	2	4	2	8	10.0-10.4	1	6	6	13
35.0-35.4		6	6	12	10.5-10.9		10	2	12
35.5-35.9		2	4	6	11.0-11.4		3	5	8
36.0-36.4		1	4	5	11.5-11.9		3	2	5
36.5-36.9			2	2	12.0-12.4		1	2	3
37.0-37.4		2	4	6	12.5-12.9			3	3
37.5-37.9			2	2	13.0-13.4		1	3	4
38.0-38.4			2	2	13.5-13.9				

Table 5 - continued

Range in length	Number captured by anglers			Totals	Range in weight (lbs.)	Number captured by anglers			Totals
	1963	1964	1965			1963	1964	1965	
38.5-38.9			1	1	14.0-14.4			2	2
39.0-39.4			1	1	14.5-14.9	1			1
39.5-39.9					15.0-15.4			2	2
40.0-40.4					15.5-15.9				
40.5-40.9					16.0-16.4			1	1
					16.5-16.9				
					17.0-17.4				
					17.5-17.9				
					18.0-18.4				
					18.5-18.9			1	1
TOTALS	75*	129	94	298	TOTALS	75*	129	94	298
Mean length	31.3	32.9	33.5	32.7	Annual weight (lbs.)	574.2	1,121.7	878.3	2,574.2
Range in length	30.0-34.5	30.0-37.1	30.0-40.5	30.0-40.5	Mean weight	7.7	8.7	9.3	8.6
					Range in weight	6.0-14.7'	6.0-13.25	5.75-18.75	5.75-18.75

\*Shows minimum number. One creel census card with records on 27 muskellunge was lost. Using a ratio of 75 right ventral muskellunge to 107 total on which figures are presently available, the probable 1963 catch of right ventral muskellunge was 94 fish weighing 723.8 pounds. There were 134 muskellunge registered in 1963.

Analysis of the creel census forms shows that August was the most productive month throughout the three-year period, supplying a total of 107 legal muskellunge (Table 6). The next most productive month was June when 101 legal fish were caught, followed by May when 80 fish were taken. These three months supplied 61.1 percent of all muskellunge caught during the period from 1963-65. May, 1963, November in 1964, and October and November, 1965, were the lowest producing months during the three-year interval. The muskellunge season closes on November 15 annually. As a result, in November only one-half as many days are available for fishing for this species, compared to other months of the open season.

A comparison of days of the week on which anglers caught muskellunge during the period from 1963-65 as reported in the voluntary creel census (Table 7), shows the marked influence of the weekend fishermen. Of the total of 471 muskellunge caught during the period of study, 269 or 57.1 percent were caught on weekends. The lowest number of 31 was registered on Mondays during the period.

Several of the boat livery operators assisting in the voluntary creel census also recorded the exact time each registered fish was caught by the angler (Table 8). The most productive time of the day was from 7:00 to 5:59 p.m. during the three-year period, followed by 8:00 to 8:59 p.m. The hours from 6:00 to 8:59 p.m. were the most productive consecutive three-hour period, with 105, or 30.0 percent of the muskellunge captured reported being taken during that time. The hours before 5:00 a.m. and after 10:00 p.m. were the least productive to fishermen.

Analysis of the creel census cards shows that 68 distinctly different artificial baits and 6 different live baits were used to catch the muskellunge registered during the three-year period. One medium sized surface lure was the most effective, being recorded as the bait used to catch 141 muskellunge. The next nearest competitor was the bucktail which caught 37. Imported spinners and bucktails caught 20 muskellunge, while a large surface bait caught 18.

Some catches of muskellunge were made incidental to fishing for other species. Three muskellunge were caught on live bluegills and 3 on redworms, while 10 were caught on live minnows and 5 on nightcrawlers, which were used as walleye baits. Five muskellunge were caught on live suckers and one on a live chub, with both baits being used specifically as bait for muskellunge.

#### Success of Fishermen

During the three-year period of the voluntary creel census, some fishermen were unusually successful. One fisherman caught 22 legal muskellunge weighing 206.8 pounds, and another caught 14 fish weighing 131.4 pounds.

The most successful fisherman for a short period of time was a Michigan resident who caught 5 muskellunge weighing 47.1 pounds in eleven days. The creel census sheets also show four fishermen fishing in the same boat on the same day caught four legal muskellunge weighing 35.4 pounds. The largest muskellunge caught to date in Little Green Lake was taken in 1965. This fish was 45.25 inches in length and weighed 27.0 pounds. This fish was not finclipped and in all probability was a survivor of the initial September, 1957, plant. If it originated from that stocking, the fish could be no more than 8.5 years of age at the time of capture.

Table 6 - Month of capture of muskellunge caught by anglers at Little Green Lake, Green Lake County, 1963 - 1965.

Year	Month of capture by anglers							Totals
	May	June	July	August	September	October	November	
1963	10	11	14	36	30	17	18	136
1964	30	36	27	46	18	16	6	179
1965	40	54	15	25	10	6	6	156
Totals	80	101	56	107	58	39	30	471

Table 7 - Capture of muskellunge by anglers on various days of the week, Little Green Lake, Green Lake County, 1963 - 1965.

Year	Day of week - number captured							Totals
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
1963	10	8	10	14	20	45	29	136
1964	11	16	14	7	22	67	42	179
1965	11	17	14	15	13	53	33	156
Totals	32	41	38	36	55	165	104	471

Table 8 - Hour of capture for muskellunge caught by anglers, Little Green Lake, Green Lake County, 1963 - 1965.

Hour of capture	Year			Totals
	1963	1964	1965	
4:00- 4:59 a.m.			2	2
5:00- 5:59	1	2	2	5
6:00- 6:59	4	14	3	21
7:00- 7:59	6	12	6	24
8:00- 8:59	5	20	3	28
9:00- 9:59	3	13	5	21
10:00-10:59	8	12	7	27
11:00-11:59	6	9	4	19
12:00-12:59 p.m.	6	9	5	20
1:00- 1:59	7	2	3	12
2:00- 2:59	1	3	4	8
3:00- 3:59	8	2	5	15
4:00- 4:59	8	11	5	24
5:00- 5:59	3	9	3	15
6:00- 6:59	3	12	13	28
7:00- 7:59	6	21	19	46
8:00- 8:59	6	15	10	31
9:00- 9:59		3	2	5
10:00-10:59		1		1
TOTALS	81	170	101	352

### Origin of Fishermen

The voluntary creel census also made it possible to determine the home town of all fishermen catching muskellunge during the three-year period from 1963-65.

Successful fishermen originated from 60 Wisconsin communities, 22 cities in Illinois, 2 from Michigan, and 1 each from Utah, New Jersey and Arizona.

Residents of eight cities caught more than 11 muskellunge during 1963-65. Residents of Milwaukee or its suburbs caught 119, followed by Waupun (64), Markesan or Little Green Lake (35), West Bend (26), Fond du Lac (14), Rockford, Illinois (13), Beaver Dam (11) and Whitewater (11). Residents of all other communities caught 8 muskellunge or less.

### NATURAL REPRODUCTION OF MUSKELLUNGE

During the period from 1963 to 1965, we have received a number of written and oral communications from fishermen reporting the capture of small unmarked muskellunge in the 6.0 to 12.0 inch size range. The reports were particularly significant because northern pike are not present in the lake, and because the reports were received during periods when small muskellunge were not being stocked. Unfortunately, water conditions during the fall of 1965 prevented boom shocker surveys which could have authenticated the reports.

During late June of 1965, a small 2.0 inch naturally reproduced muskellunge was found dead along the south shore of Little Green Lake. Muskellunge of this size were not stocked in the lake during that period and the discovery of this fish substantiates that some natural reproduction is occurring. The extent of natural reproduction will be evaluated during boom shocker surveys in October, 1966.

On August 22, 1962, 900 feet of shoreline containing the prime muskellunge spawning marshes were purchased by the Wisconsin Conservation Department. The marshes are located in Kearley's Bay and the Middle Bay on the west shore. Ripe adult muskellunge and walleyes are consistently found in this location.

### STOMACH CONTENTS OF ANGLER CAUGHT MUSKELLUNGE

During the voluntary creel census and from tag return results obtained from cooperating sportsmen, information was obtained on the stomach contents of 48 muskellunge at the time they were captured. Thirty-one contained bluegills, 2 contained minnows, 1 contained a minnow and a bluegill, and 2 contained largemouth bass. One 34.7 inch muskellunge had a 12.5 inch largemouth bass in its stomach when found dead after being struck by an outboard motor.

## DISCUSSION

Since Little Green Lake was chemically treated in 1956, followed by the stocking of muskellunge in 1957, fishermen have harvested large numbers of this species. The interest of fishermen in the muskellunge is typified by the outstanding cooperation received from successful anglers who reported in detail the results of their catch, and particularly by the boat livery operators who often went to a great deal of trouble to obtain and record the information.

The widespread interest in muskellunge is further substantiated by the fact that successful fishermen during 1963-65 originated from 87 different communities in five states. Most fishermen catching muskellunge fished specifically for that species, and traveled long distances to reach Little Green Lake. The economic benefit to the local community should not be underestimated.

Growth of muskellunge in Little Green Lake has been very rapid, with many legal 30.0 inch long fish being caught shortly after they reach three years of age.

The voluntary creel census points out that August is generally the most successful month to catch muskellunge in Little Green Lake, with the most successful hours being from 6:00 to 9:00 p.m. Because Little Green Lake is extremely fertile, August is annually the "dog days" period when algae is most abundant. Because muskellunge are "sight feeders", the success of muskellunge fishermen in August must be considered an anachronism.

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