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GUN LAKE

Allegan and Barry counties
T02N, R11W, Section 1; T03N, R11W, Section 36 in Allegan County T02N, R10W, Sections 4, 5, 6, 8, 9; T03N, R10W, Sections 19, 28, 29, 30, 31, 32, 33 in Barry County
Survey 1989

Joan Duffy

Environment

Gun Lake is located in Yankee Springs and Orangeville Township in Barry County, and in Wayland and Martin townships in Allegan County. It is 2,680 acres in size, covering more than four sections of area. The lake is approximately 11 miles west of Hastings, 27 miles southeast of Grand Rapids, and 32 miles northeast of Kalamazoo.

The soils adjacent to the lake to the west are primarily sandy loams and loamy sands, which tend to be poorly drained, and have slow surface runoff. On the east side of the lake, the adjacent soils are sands or loamy sands, with some areas where cutting and filling have altered natural soils. To the west, the balance of the watershed is primarily fine sand and sand complexes. The land is nearly level or slightly undulating, and well to excessively drained. Runoff varies with the degree of slope, which can reach 40% or more. To the east, the topography is more varied, with sands, loamy sands, and muck soils scattered throughout the watershed. Drainage varies from poor in the Houghton and Adrian muck soils to well to excessively drained in the Coloma, Boyer, and Spinks loamy sand complexes.

The Gun Lake watershed encompasses 30 square miles and is in the Kalamazoo River Basin, draining into Lake Michigan. It has 17.8 miles of shoreline, with 1.4 miles more shoreline in islands. The lake has eight inlets, including those from Payne, Long Hall, and Fawn lakes. The Hall Lake inlet feeds three walleye rearing ponds on the east shore of the lake. The outlet of Gun Lake is the Gun River, a designated trout stream for most of its length. The lake level is controlled by a dam in the outlet just above Patterson Road, which was built in 1905. Land use in the watershed is predominantly agriculture, though a large percentage of the land is included in the Barry State Game Area and Yankee Springs Recreation Area and remains in its natural wooded state.

The lake is separated into an east and west basin which differ significantly in depth and structure. The west basin is almost uniformly shallow and has a maximum depth of 5 feet, with the exception of Robbin's Bay and Pickerel Cove, which have maximum depths of 34 and 25 feet, respectively (Figure 1). The bottom is marl with sandy shorelines. The two deeper bays have muck and marl bottoms and limited areas of gravel in the shallows. The shoreline of this basin was historically wooded, with several segments of encroaching shoreline, numerous deadheads, and large areas of submerged and emergent vegetation. Development on the lakeshore has altered much of this shoreline.

The east basin has a marl bottom with a few small areas of peat. Depths vary greatly, to a maximum of 68 feet. More gravel is found in the east basin, and the shoreline is steeper in many

areas. Historically both emergent and submergent vegetation were more limited, and fewer deadheads were present. Numerous submerged and emergent islands are surrounded by gravel bars and boulders. This basin was developed earlier and has many bulkheads and seawalls along the shoreline. Several peninsulas project into the east basin, with steep banks. There are some shallower bays in this basin, with maximum depths of 7 to 8 feet, with sand and gravel along their shorelines. The northeast section of the basin has an encroaching shoreline. There is an area of steep shoreline with numerous springs on the east shore, formerly known as the Cascades. Brush shelters were installed to provide additional habitat in this basin in the early 1950s.

In general, water quality in the lake is good. There is a sewage treatment plant serving all the residences and businesses around the lake, the Gun Lake Sewer Authority, that was built in 1980. The most recent water chemistry of the lake was completed in the deepest part of the east basin in August of 1989. Dissolved oxygen levels were 5 ppm or better to a depth of 24 feet. Water temperatures ranged from 73° at the surface to 49° near the bottom. A 1968 water chemistry survey showed dissolved oxygen levels above 5 ppm at least 25-30 feet in three major bays of the lake, with water temperatures between 17-20°C. In 1989 total alkalinity ranged form 110-147 ppm, indicating fair buffering capacity. In 1968 average total alkalinity ranged from 120-135 ppm. The pH ranged from 8.2 to 8.8 in 1985, and in 1968 it ranged from 6.5 to 8.0 ppm. Additional parameters measured in the 1968 survey included ammonia, phosphorus, iron, chlorine, sulfates, sodium, and conductivity.

Most of the lakeshore is developed, with the exception of the marshy northeast shore in the east basin and the state land included in Yankee Springs Recreation Area. Parks Division controls about 4 miles of the shoreline of the lake, and maintains a camping area, two boat launch sites, and a day use area located on the peninsula dividing the two basins of Gun Lake. There is another public launch site operated by Allegan County on the west shore of the west basin. Several private resorts with boat rentals are operated in the summer.

Fishery Resource

Early records indicate there were native populations of both muskellunge and walleye in Gun Lake. The lake mapping crew in 1945 noted they had seen pictures of record catches of walleyes, pike, bass, and muskellunge. Species they reported seeing in anglers' creels were perch, bluegills, pike, muskies, largemouth and smallmouth bass, and sunfish. Walleyes (yellow pike-perch) were first reported in gill-net and seine surveys in 1950 and were stocked in the lake as early as 1921 (see Appendix 1).

The composition of the fish population is essentially the same today as it has been since the 1940s (Table 1). Earlier seine surveys took a variety of forage species including blacknose, mimic, sand, spottail, emerald, spotfin, and golden shiners, bluntnose minnow, central mudminnow, banded killifish, logperch, johnny darter, brook silversides, and northern creek chub. The abundance of several game species has fluctuated over past decades and has dictated the management practices on the lake. According to angler reports, northern pike were apparently abundant in the 1930s and 1940s, then declined for some unknown reason. A 1950 survey showed modest numbers of pike, but low numbers were seen in subsequent years until the most recent surveys in the 1980s. Musky numbers were historically sufficient to support a winter spear fishery, but no summer fishery ever developed. Few muskies were collected in surveys until plants for broodstock were initiated in the mid-1970s. Existing walleye populations were augmented by fry plants in the 1920s, but apparently sufficient numbers were already present to create at least a modest fishery. Fair numbers of walleyes were collected in surveys since the 1950s, even in years when no walleyes were stocked.

Currently a good fishery exists for walleyes, and the northern pike fishery has improved in the last few years. Only a remnant musky population exists, and the fishery has declined significantly in

recent years. The lake is very popular with bass anglers, with good success for both largemouth and smallmouth bass. Panfish fishing is considered average. Anglers report the perch fishery has improved over the past few years, but that fewer big perch are caught now than before musky stocking was initiated. These reports must be tempered with the known opposition to musky stocking among some local anglers and riparians, and their claim that muskies ruined the perch fishery that existed in past years.

Fish growth in Gun Lake is average for most species, with a few notable exceptions (Table 2). Smallmouth bass are growing slowly at all ages. Walleyes are growing very well; many are reaching legal sizes by their second year of growth. Other species are growing slightly above or below state average rates, but are within what is considered an acceptable range.

Gun Lake is heavily developed and receives substantial boating pressure from riparians and boaters using the State Park and County access sites. Much of the pressure is from recreational boating, especially in the summer months, and anglers are restricted to early morning and late evening or night fishing. Boating pressure has reduced the wild rice beds in the west basin to a fraction of their former size. There is also a fair amount of duck hunting on the lake each fall. Residents often claim that they "lose their lake" between Memorial Day and Labor Day each year.

Gun Lake now supports a good fishable population of walleyes. Annual fingerling stockings have averaged over 20,000 fish in the last decade and is regulated by the success at the ponds operated by the Gun Lake Protection Association (GLPA), with plants occasionally augmented from the District rearing ponds. This rate of only seven to eight fingerlings per acre is much below the recommended rate for Region III (25-50 per acre for fingerlings 2 inches or smaller), but a successful fishery is still supported. It is not known if natural reproduction contributes to the population of walleyes in Gun Lake.

Walleyes have been the target in surveys more than any other species in Gun Lake. The average size of fish in collections since 1961 ranged from 8.3 to 20.8 inches, and individuals up to 27 inches and 7 pounds have been taken. Despite the frequency of surveys, walleye growth was not evaluated regularly, but the few analyses done show growth to be much above average in Gun Lake.

The northern musky population in the lake has been reduced to a fraction of what existed prior to cessation of stocking in 1983. While Great Lakes muskies were native to the lake, it is doubtful that natural reproduction could maintain a musky population today, given the extensive development of the lake. Cultural development is cited as a primary reason for the decline of native musky populations in many northern states (Dombeck et al. 1986). Competition with northern pike is another crucial factor in the success of muskies when the two coexist in a lake. Pike are known to utilize similar forage to the musky, and are predators on young-of-the-year muskies (Dombeck et al. 1986; Inskip 1986). Walleye would also compete with muskies for forage at some sizes, and could prey on young-of-the-year muskies.

Surveys since the initiation of musky stocking show the average size of fish ranging from 12.7 to 37.0 inches, and reached 41.0 inches in size. Because of the difficulty of accurately aging esocids from scales, only two surveys included analysis of growth. In 1983 growth was much above average, and in 1989 the few muskies collected were growing below state average rates.

Northern pike numbers have increased in the lake in recent years, and a good fishery exists for them today. Small areas of suitable habitat still exist on the lake for the population to maintain itself, and a large marshy area at the Payne Lake inlet is available for spawning. Anglers interested in large sports fish have apparently turned to pike and walleyes following the decline in the musky population. Conservation Officer reports and local fishing reports support this change, but no creel census data exists from recent years. The average size of pike collected in surveys ranged from

16.6 to 24.8 inches, and individuals up to 41 inches were collected. Growth in pike aged in 1989 was slow, with fish growing 0.7 inches below state average rates.

The yellow perch population does not appear to have changed significantly from the populations surveyed in the early 1950s and 1960s. Maximum size of perch in survey collections was between 10 and 12 inches, with the exception of a subsample collected during musky broodstock netting in 1985, when the largest perch sampled was 8.4 inches. The average size of perch ranged from 4.7 to 8.3 inches. These averages are of course greatly influenced by gear type; the two surveys with the lowest average size of perch (1989 and 1983) were those where 2 to 5 inch perch collected while electroshocking made up the majority of the perch sampled. The catch-per-unit-effort (CPUE) in surveys has fluctuated from year to year, and was higher in 1989 than in previous years. Many local anglers are convinced that the average size of perch declined after musky stocking for broodstock was initiated in 1977, and that fewer large perch have been caught in recent years. We have no census data to verify these claims. There is no evidence of a significant change in the average or maximum size of perch collected in surveys, either before or after the initiation of stocking either muskies or walleyes. Growth has been above average in all surveys with available growth data, except the 1984 sample, where the -0.5 growth index is still considered "normal". This was also a smaller sample of perch than in all other surveys.

Bluegills have averaged between 4.8 and 6.9 inches in surveys, and individuals up to 10 inches have been collected. In 1989, over 56% of the bluegills were 6 inches or larger. Growth is slightly below average in all but the oldest surveys. Black crappies averaged between 5.6 and 10.1 inches, and individuals up to 13 inches have been collected. Over 92% of the sample collected in 1989 were over 7 inches. Growth has been at state average rates in recent years. These species, along with rock bass and pumpkinseed sunfish, should produce a good panfish fishery in the lake.
However, Gun Lake is not noted as one of the better panfish lakes in the District, since several nearby lakes are capable of producing 8 and 9 inch bluegills rather consistently.

Smallmouth and largemouth bass are a very popular sport fish in Gun Lake, and generate many hours of fishing by both individual anglers and organized clubs. The average largemouth in surveys has been between 7.3 and 11.8 inches and individuals up to 19 inches have been collected. Growth is somewhat slow, but generally has been within acceptable ranges in all surveys. In 1989, 17% of the largemouth collected were legal size or larger, and individuals up to 4.6 pounds were collected. Smallmouth bass have averaged between 5.9 and 10.8 inches in surveys, and individuals up to 20 inches have been taken. Growth is slow in smallmouths; in all surveys where growth was evaluated, the fish averaged at least 1.0 inches below state average rates. Despite slow growth rates, many smallmouths reach sizes acceptable to anglers. Thirty percent of the smallmouths taken in 1989 were 12 inches or larger, and individuals up to 5.0 pounds were collected.

Brown, black, and yellow bullheads are found in Gun Lake. Individuals up to 15 inches were collected in 1989, and over 98% of the sample of bullheads were of a size acceptable to anglers. It is not known if any significant fishery exists for these species.

In addition to the game species mentioned above, other predator fish that are found in Gun Lake and that contribute to the balance of the fish population include bowfin, longnose gar, and spotted gar.

Management Direction

Presently, Gun Lake is stocked annually with walleye fingerlings. Musky stocking was suspended in 1984, and has not resumed. The broodstock designation for the lake was lifted in 1985, and spearing is again allowed on the lake. The last collection of broodstock for muskies was in 1985. At that time, 115 pike and 47 muskies were taken, as well as 39 walleyes. Good habitat exists for walleye growth and reproduction, and the addition of additional spawning habitat has been

considered. Good water quality should be assured by the continued operation of the Gun Lake Sewer Authority.

The existing sport fishery in Gun Lake should be expected to continue, and could be enhanced. The following recommendations can accomplish this goal.

1. A full fisheries survey should be conducted at Gun Lake at least every 10 years, to monitor the entire fish population, and make changes in the management direction of the lake as necessary. In addition, a full creel survey should be conducted within the next 2 years to determine present harvest rates of walleyes and other game fish in Gun Lake. This information will be invaluable in guiding the management direction of the lake, and in evaluating the success of the walleye plants in sustaining or expanding the fishery.

2. Musky stocking should not be resumed at the present time. The growing pike and walleye populations will negatively impact on any chance of successfully reestablishing a significant musky population. The existing musky population will be reduced further by continued angling pressure, and cannot be expected to sustain itself through natural reproduction. Renewal of muskellunge stocking in Gun Lake will be dependent on population changes which would again favor muskellunge survival and growth. The desire of musky anglers to have a quality fishery can be met at another lake in the District, such as Thornapple Lake in Barry County.

Several of the lakes currently managed for tiger muskies could also be switched to northern musky plants if fish were available, or stocking of other lakes could be investigated. Despite the support from some local and visiting anglers, the musky is too highly regarded as a sport fish, and too expensive to raise, to continue stocking in a lake where many of the riparians and anglers using the lake do not welcome them.

3. The cooperative rearing agreement for walleyes with the GLPA should be continued. Further, a minimum stocking rate should be established to maintain or try to improve the fishery that now exists. This will necessitate augmenting the rearing pond production if it is not adequate, whenever District rearing pond production allows it. Alternatively, the GLPA should consider purchasing additional fingerlings if the rearing pond production is below the minimum number recommended. The GLPA could also look for additional ponds for cooperative rearing facilities.

4. An evaluation of possible natural reproduction of walleyes needs to be conducted, by alternate year stocking for a minimum of 4 years. If natural reproduction is found to be adequate enough to contribute significantly to the fishery, the established stocking schedule should be adjusted appropriately. If natural reproduction is shown to be insufficient to support the walleye fishery, reasons for the deficiency should be investigated.

5. The GLPA should pursue boating regulations for the lake, such as a slow, no-wake period from early evening to early morning. This would enhance fishing opportunities on the lake and allow the best utilization of the walleyes being stocked in the lake.

References

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Inskip, P. D. 1986. Negative associations between abundances of muskellunge and northern pike: evidence and possible explanations. American Fishery Society Special Publication 15:135-150.

Approved by:

D. C. Johnson, District Fisheries Biologist

D. E. Reynolds, Regional Fisheries Biologist
J. M. Robertson, Fisheries Division Chief

Distribution List

Fisheries Division, Lansing and Region III
Gun Lake Protective Association Michigan Chapter, Muskies, Inc.

Table 1.-Species and relative abundance of fishes collected by number and weight in Gun Lake, 1989 (all gear).

Species found	Total number	Percent	Length range (inches)	Total weight (pounds)	Percent
Bluegill	2194	38.2	1-9	389.4	14.8
Yellow perch	437	7.6	2-11	47.2	1.8
Black crappie	1261	21.9	2-13	504.7	19.2
Longear sunfish	3	0.1	2-3 0.1	<0.1	
Green sunfish	21	0.4	2-5	1.8	0.1
Largemouth bass	3125.4	2-19	182.3	7.0	
Smallmouth bass	98	1.7	2-19	71.8	2.7
Walleye	65	1.1	8-27	225.8	8.6
Northern musky	3	0.1	36-38	41.0	1.6
Northern pike	23	0.4	9-31	74.5	2.8
Pumpkinseed sunfish	113	2.0	2-9	28.8	1.1
Rock bass	608	10.6	2-10	197.7	7.5
Bullheads	449	7.8	5-15	492.9	18.8
Warmouth bass	48	0.8	3-8	13.3	0.5
Longnose gar	32	0.6	21-38	63.8	2.4
Spotted gar	5	0.1	17-28	11.4	0.4
Bowfin	50	0.9	7-27	234.8	9.0
Golden redhorse	1	<0.1	17	2.5	0.1
White sucker	3	0.1	13-20	7.2	0.3
Carp	4	0.1	18-32	29.3	1.1
Golden shiner	3	0.1	7-8	0.8	<0.1
Mud pickerel	8	0.1	3-12	0.9	<0.1
Lake chubsucker	5	0.1	3-7	0.6	<0.1
Total	5746			2622.6	

Table 2. Mean length and age at capture, and mean growth index of game species in Gun Lake, 1989.

Gear type, Species	Age										Mean Growth index*
	0	I	II	III	IV	V	VI	VII	VIII	IX	
Trap nets											
Yellow perch	—	—	—	5.8	8.5	9.4	10.8	11.8	11.2	—	+1.1
Bluegill	—	—	—	4.9	5.3	6.6	7.3	8.0	8.0	—	-0.1
Black crappie	—	—	6.0	6.9	8.6	10.1	11.1	11.6	12.1	12.7	+0.3
Smallmouth bass	—	—	7.6	9.8	11.6	13.4	—	—	—	—	-0.7
Largemouth bass	—	—	7.5	9.8	11.6	13.0	13.9	—	—	—	-0.04
Walleye	—	—	—	17.6	20.3	21.8	24.2	26.2	27.3	—	+4.4
Muskellunge	—	—	—	—	—	—	36.2	—	—	—	—
Northern pike	—	14.1	—	20.4	22.0	26.7	30.3	—	31.3	—	-0.4
Electrofishing											
Yellow perch	3.0	4.1	6.0	6.8	—	—	—	—	—	—	-0.4
Bluegill	1.6	2.9	3.8	—	—	—	—	—	—	—	-0.8
Black crappie	2.8	5.0	—	—	—	—	—	—	—	—	+1.2
Smallmouth bass	3.2	5.8	8.8	10.1	13.2	—	—	—	—	—	-2.2
Largemouth bass	3.6	6.3	8.1	—	—	14.7	—	—	—	—	-0.9
Walleye	8.2	—	—	19.9	—	—	25.8	23.4	—	—	—
Gill nets											
Yellow perch	—	—	6.7	7.4	7.6	—	11.4	—	—	—	+0.3
Black crappie	—	5.1	—	—	—	—	—	—	—	—	-0.5
Smallmouth bass	—	8.1	9.0	12.3	12.8	—	—	—	—	—	+0.3
Largemouth bass	—	7.7	—	—	—	—	—	—	—	—	—
Walleye	—	—	14.6	17.9	19.5	—	—	—	—	—	—
Northern pike	9.8	19.0	21.2	22.1	24.3	—	—	—	36.4		—

*Mean growth index is the average across all ages of the differences between mean fish length and state average length for that age. It includes only those age classes where five or more fish were collected.

Appendix 1.--Gun Lake stocking summary, 1921 to present.

Year	Walleye	Northern Muskellunge	Largemouth bass	Smallmouth bass	Bluegill	Yellow Perch	Other
1989	11797	—	—	—	—	—	—
1988	48392	—	—	—	—	—	—
1987	33875	—	—	—	—	—	—
1986	20153	—	—	—	—	—	—
1985	17181	—	—	—	—	—	—
1984	19368	—	—	—	—	—	—
1983	17618	4839	—	—	—	—	—
1982	15636	1742	—	—	—	—	—
1981	9037	4002	—	—	—	—	—
1980	9933	2010	—	—	—	—	—
1979	13318	1677	—	—	—	—	—
1978	917	—	—	—	—	—	—
1977	19143	3000	—	—	—	—	—
1976	20699	—	—	—	—	—	—
	600000**a**	—	—	—	—	—	—
1975	31468	—	—	—	—	—	—
	3000000**a**	—	—	—	—	—	—
1974	4323	—	—	—	—	—	—
	1950000**a**	—	—	—	—	—	—
1973	164	—	—	—	—	—	—
1972	—	—	—	—	—	—	—
1971	—	—	—	—	—	—	—
1970	—	—	—	—	—	—	—
1969	—	—	—	—	—	—	—
1968	—	—	—	—	—	—	—
1967	—	—	—	—	—	—	—
1966	—	—	—	—	—	—	—
1965	—	—	—	—	—	—	—
1964	—	—	—	—	—	—	—
1963	—	197	—	—	—	—	—
1962	—	9200	—	—	—	—	—
1961	—	800**b**	—	—	—	—	—
1960	—	—	—	—	—	—	—
1959	—	—	—	—	—	—	—
1958	—	—	—	—	—	—	—
1957	—	2800	—	—	—	—	—
1956	—	—	—	—	—	—	—
1955	—	—	—	—	—	—	—
1954	—	—	2000	—	6320	—	—
1953	—	—	10000	—	20000	—	—
1952	—	—	—	—	23000	—	—
1951	—	—	8976	—	—	—	2000**d**
1950	—	—	6655	—	14800	—	1550**d**
1949	—	—	5196	—	23000	—	—
1948	—	—	1960	950	26000	—	—
1947	—	—	4245	2158	—	—	—
1946	—	—	—	—	—	—	56000**e**
1945	—	—	14000	—	72000	—	—

Appendix 1 cont.

Year	Walleye	Northern Muskellunge	Largemouth bass	Smallmouth bass	Bluegill	Yellow Perch	Other
1944	—	—	10500	17500	29000**c**	—	—
1943	—	—	5000	2900	116000	—	—
1942	—	—	6150	600	76600	—	—
1941	—	—	11800	16000	57000	—	—
1940	—	—	4800	1000	43000	—	—
1939	—	—	7100	10450	77000	29000	90000**f**
1938	—	—	4500	1100	15750	8000	—
1937	—	—	9600	5500	25000	—	—
1936	—	—	10900	24200	59500	5850	70500**f**
1935	—	—	7000	10000	63000	5000	—
1934	—	—	10340	—	6500	1600	—
1933	—	—	5800	3000	3300	3600	—
1932	—	—	2700	4100	14000	—	—
1931	—	—	7700	5500	34800	39500	—
1930	—	—	7160	4800	14000	4500	—
1929	—	—	4500	4000	5170	—	—
1928	—	—	4500	5300	2900	—	—
1927	—	—	5000	6000	50000	—	—
1926	—	—	14000	13750	130000	800000**a**	—
1925	150000**a**	—	—	7950	3500	32000	—
	—	—	—	—	—	300000**a**	—
1924	—	—	2000	2750	3750	600000**a**	—
1923	150000**a**	—	8000	15000	15000	40250	7500**g**
				20000**a**	—	1050000**a**	—
1922	160000**a**	—	—	11500	5000	13500	10500**g**
	—	—	—	—	—	6000**c**	—
	—	—	—	—	—	360000**a**	—
1921	324000**a**	—	—	—	3750	40500	—
	—	—	—	—	—	368000**a**	—

a=Fry.
b=Sublegal.
c=Yearling.
d=Rainbowtrout.
e=Fatheadminnow.
f=Emeraldshiner.
g=Sunfish.

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Web Author: *Tina M. Tincher, Librarian*

Questions, comments and suggestions are always welcome! Send them to tinchert@michigan.gov