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Abstract.–This report summarizes management efforts, data collections, and analyses for walleye *Stizostedion vitreum* from Lake Gogebic between 1986 and 1996. In an effort to improve the growth of walleye by increasing forage, the Baraga District Fisheries unit attempted to establish spottail shiner *Notropis hudsonius* and emerald shiner *Notropis atherinoides* in Lake Gogebic. One thousand pounds of shiners were introduced in 1988, but it was concluded that much larger plants would be necessary to have any effect. Riparian owners are attempting to establish fathead minnow *Pimephales promelas* as forage fish. They stocked 1.2 million fathead minnow in both 1995 and 1996 and plan to continue the program. Length at age and mortality of walleye were calculated from netting survey data, and population size was estimated from a tagging program. Length at age has been consistent over all sampling years, and is below state average. The 1996 total annual mortality of Lake Gogebic walleye was estimated to be about 37%. This estimate is likely biased because two strong year classes of walleye occurred in 1991 and 1988. In 1993, 1,025 walleye were tagged and a population estimate was made in 1994 based on tag returns. The estimate of 62,497 walleye was nearly identical to an estimate made in 1984. These estimates were mainly for males on the east shore of the lake during spawning but are useful indices of the population size. A population model was used to determine if different regulations could provide better walleye fishing. No size limit, a 15-in minimum size limit and a 10- to 15-in slot limit were compared to the current 13-in size limit. The 15-in size limit appeared to produce the best fishery, so the minimum size for walleye in Lake Gogebic was changed to 15 inches in 1996. Spring assessment sampling for walleye is recommended to continue at 3-5 year intervals. Summer assessments of the fathead minnow plants are recommended for the same years as walleye assessments.

Introduction

Norcross (1986) summarized data collected on the walleye *Stizostedion vitreum* population of Lake Gogebic between 1928 and 1986. He described the population in the mid-1980s as being abundant though slow growing. The fishery had been dominated by small walleye for many years. Although the statewide size limit for walleye changed in 1976 to 15 in, the size limit in Lake Gogebic remained at 13 in. Norcross recommended that the Lake Gogebic size limit be further reduced to 12 in because population modeling indicated that the pounds of walleye harvested would remain the same while the numbers of legal fish caught would increase and numbers of sublegal fish caught and released would decrease. Modeling also indicated that reproductive potential of the population would drop by some 20% under a 12-in minimum size limit, but that decrease was not expected to harm the population because

recruitment in Lake Gogebic had always been exceptionally high and dependable.

Yellow perch *Perca flavescens* is the main forage for walleye in Lake Gogebic. Norcross advocated introducing another forage species into Lake Gogebic in an attempt to improve the chronically slow growth rate of walleye. Other recommendations were to continue monitoring the spawning population and to undertake additional fall sampling to determine year-class strength of sublegal fish.

This report is intended to be an update of events that have occurred since 1986 and includes current management recommendations. Although the 12-in minimum size limit was never put in place, an attempt to introduce additional forage was made and spring sampling continues to be undertaken annually.

Methods

In spring 1988, the Baraga District Office of the Michigan Department of Natural Resources (MDNR) contracted with a commercial fisherman from Ashland, Wisconsin to catch spottail shiner *Notropis hudsonius* and emerald shiner *Notropis atherinoides* for introduction into Lake Gogebic. A total of 1,000 pounds of shiners were captured and transferred to the lake in District hatchery trucks. In August 1988, an attempt was made to capture some of those fish to determine their abundance. Fifteen mini-fyke nets (26 in high by 39 in wide front opening, 1/4-in bar mesh) were set and lifted in three different locations near planting sites.

Spring sampling has continued annually since 1986. Routine assessment entails tending of 10-15 fyke nets (4 ft high by 6 ft wide front opening, 3/4-in bar mesh) set off the east shore from Porcupine Point south for approximately five miles. The nets are set within a few days of ice-out and are generally fished for about a week. Each day during this period, walleye are counted by sex, measured, weighed, and examined for tags.

Until 1989, walleye scale samples were taken for aging purposes. Beginning in 1989 and continuing through 1996, sectioned dorsal spine rays were used to determine ages. In 1996, spines and scales were taken from a sample of fish, and three people read both. The objective of this exercise was to determine what level of agreement could be reached among readers and between aging methods. A scale and a spine were accepted for assignment of an age when at least two out of the three readers agreed on an age. Scale and spine samples not matching those aging criteria were not used.

Length frequencies of tagged walleye were compared with those from tag returns reported by anglers. Average length-at-age was computed to compare with state averages. Catch curves were used to calculate mortality (Lackey and Hubert 1978).

A population estimate was made in 1994 from 1,025 walleye that were tagged with floy tags during spring data collection in 1993. Most tagged fish were males, but an unknown number were immature females. After accounting for natural mortality and the number of tagged fish caught by anglers, the ratio of tagged to untagged fish in the 1994 spring sample was used to obtain a population estimate. The method used for the estimate was the Bailey modification of the Peterson estimate (Merna et al. 1981).

Walleye population data for 1994 were modeled to determine if changes in size limit were warranted. The model used was Trout Dynamics, which was developed originally to model trout populations in the Au Sable River (Clark et al. 1979). It has been used to model several fish populations (various species) throughout the state.

Walleye population modeling inputs included estimates of catch rates, hooking mortality rates of released fish, mean lengths of the various age groups, instantaneous natural mortality, and size-specific vulnerability to angling. Other factors that were taken into account were relative weekly estimates of walleye growth and fishing effort. Model inputs for the Lake Gogebic walleye fishery are listed in Appendix 1. Inputs came from various sources. The instantaneous catch rate, instantaneous natural mortality rate of age 0 fish and percent of annual growth each week were taken from a model developed for Little Bay De Noc when coolwater fishing regulations in the State of Michigan were being modeled (MDNR, unpublished data). Hooking mortality for fish

caught and released, percent of legal fish harvested, percent of sublegal fish kept and vulnerability coefficients by inch group were estimated by the author. Instantaneous natural mortality rates for walleye aged 1-14 were taken from a catch curve of the 1993 Lake Gogebic sample. Mean length at age was taken from a von Bertalanffy curve of mean length at age for the 1990 Lake Gogebic walleye sample. Percent of annual fishing effort by week was taken from tag return data in 1994. The initial population to be modeled was set at 1,000 age-0 walleye (250 3-in fish, 500 4-in fish, and 250 5-in fish) and constant recruitment was assumed.

The model simulated what would occur if 1,000 age-0 fish were produced each year for 15 years and the population was subjected to fishing under regulations with no size limit, a 13-in minimum size limit, a 15-in minimum size limit and, a slot limit regulation that would allow the harvest of walleye between 10.0 and 15.9 in. The objective was to determine which regulation would provide the best fishery. The use of 1,000 fish in the model was arbitrarily chosen to have an equal beginning point on which to base comparisons. Fifteen years was selected as the length of time to model so that several cohorts would be represented in the analysis.

Results and Discussion

Forage Fish Introduction

Netting produced few fish resulting from the 1,000 pounds of shiners stocked in spring 1988. Six spottail and no emerald shiner were captured during the mini-fyke net survey in August 1988. A variety of other fish were taken, however, including 8,700 young-of-the-year yellow perch. Much larger plants may be necessary to establish shiners in Lake Gogebic. It is not know whether the planted fish dispersed or were eaten. Further attempts to stock additional fish were not undertaken by the Baraga Fisheries staff primarily because the district was not equipped to handle the cost and transport of such large numbers of fish.

Many riparian landowners around Lake Gogebic felt that the addition of a good forage species was desirable. They began collecting donations from interested parties and in 1995 had sufficient funds to purchase 1,200,000 fathead minnow *Pimephales promelas* from a commercial fish producer in Wisconsin. It appears that this program may be ongoing for some time. In 1996, local donations provided the money to plant another 1,200,000 minnows. If this can be done over several years, fathead minnow may become sufficiently established to provide an additional food source for walleye in Lake Gogebic.

Comparison of Aging Techniques

The comparison of scale aging to spine aging methods for walleye proved enlightening (Table 1). The three scales readers agreed completely only 19.8% of the time. At least two of three scale readers agreed 84.7% of the time, however. All readers agreed on spine ages 57.9% of the time, and at least two out of three readers agreed 94.2% of the time. Aging walleye by spines appears to be much more consistent than aging by scales.

When comparing spine ages to scale ages, there was only 27.9% agreement. In 64.4% of the cases, spine ages were greater than scale ages. Both young and old walleye were assigned younger ages when scales were used for age determination. Generally, scale ages were only one year younger on young fish but could be two or more years younger on older fish. It was interesting to note that the largest fish aged, a 26.0-in female, was determined to be age 14 by all three spine readers (there were no scales).

Tag Return Data

Anglers reported catching 215 of the 1,025 tagged walleye. This represents an exploitation rate of 21%. Proportionately, lengths of tagged walleye caught by anglers were almost identical to overall length frequencies of tagged fish (Figure 1). This indicates that tagged fish were representative of the walleye vulnerable to anglers. Most returns were made within two months of tagging (Figure 2), so length

frequency comparisons were minimally affected by growth.

Length at Age

Length at age records for walleye have been kept for many years (Table 2). These records have been maintained to keep track of growth trends. From 1947 through 1986, scale samples were used to age fish, but 1989-96 walleye were aged from dorsal spine sections. Surprisingly little variation in length at age was apparent (Figure 3). Samples were normally collected during walleye spawning (after ice-out) when males were more abundant than females. Growth has not changed appreciably over time.

Similar growth over the years is again strongly suggested when confidence limits are placed on the mean lengths of male walleye at ages 4 through 7 in the 1996 sample. Mean lengths of 4- to 7-year-old walleye in the 1947-1986 samples remained within confidence limits of the 1996 sample. Therefore, any difference in growth among years can most likely be explained by sampling variation.

Estimates of Mortality

Mortality rates for walleye in Lake Gogebic have been estimated at various times (MDNR, Baraga, unpublished data) using age distributions determined from spring sampling. Estimates were based on relatively small samples of primarily male fish on the spawning shoals, but they provide some indication of what is occurring in the lake. In 1977, total annual mortality of male walleye was calculated to be 27.7%. It rose to 38.2% in 1985. An attempt was made to calculate a mortality rate from samples taken in 1996, but it was obvious that two strong year classes, 1991 and 1988 (Tables 3 and 4), skewed the shape of the catch curve (Figure 4). A total annual mortality rate of 37% was calculated from male walleye aged 5-12 in 1996.

1994 Population Estimate

After the 1994 spring sampling, a population of 62,497 ± 10,799 walleye was estimated to be present in Lake Gogebic. This was nearly identical to the 1984 estimate of 63,000 fish (Table 5). These numbers do not represent the entire walleye population of the lake but primarily reflect the numbers of males on the spawning shoals of the east shore of the lake. An estimate of the numbers of those fish is easiest to make because of their abundance and it should serve as an indicator of population strength.

1994 Walleye Population Model

The size structure of the walleye population after 15 years of simulation with the Trout Dynamics model is presented in Table 6 and Figure 5. Fisheries under four different regulations were simulated. The 13-in size limit was modeled because it is the current size limit for Lake Gogebic walleye. A 15-in size limit was simulated because that is the current state regulation. Local anglers were interested in knowing what would occur if there were no size limit at all and what would occur with a slot limit for 10- to 15-in walleye, so model runs under those regulations were also simulated.

After 15 years under a no size limit regulation, 1,302 walleye were estimated present and 236 of those fish would be 10 in or greater (the estimated length that anglers would begin to keep walleye). The average size of walleye 10 in or larger would be 13.2 in and 0.79 lb (based on state average length-weight relationships). Total pounds of walleye available for harvest was estimated to be 186. Comparable data for other regulations are presented in Table 6.

A strict slot limit would not be acceptable to anglers, in part because they felt that they should be able to keep one fish over 15 in. Also, there is an annual fishing contest on Lake Gogebic where large walleye are tagged for prizes, and there was concern that it would not be possible to keep any trophy fish. The Trout Dynamics model has no way to adjust for modified slot regulations, but because very large

walleye are uncommon in Lake Gogebic and only a few walleye are tagged for the fishing contest, results from the slot limit modeling run should be very close to what would occur with a modified slot limit which allowed the retention of one large fish.

The fishery under a no size limit option offered fewer harvestable pounds of walleye than with the 13-in regulation. The slot limit would provide more fish to the creel than would either the 13- or 15-in size limit, but the fishery would be almost entirely for small fish. Compared to the 13-in size regulation, the fishery produced under a 15-in size limit was have a slight reduction in the number of legal walleye available (-11.9%), but there would be a greater increase of total pounds of harvestable fish (+26.8%).

Considering all model outputs, the 15-in size regulation would produce the best fishery. Results of this simulation were explained to area residents at public meetings, and a majority concurred with this conclusion. Therefore, a 15-in size limit regulation was put on walleye in Lake Gogebic in 1996. It is understood by residents that it may take several years under the new regulation before greater numbers of larger walleye are realized.

Management Recommendations

Effects of change in the size limit from 13 to 15 in and the introduction of fathead minnow will need to be evaluated in the future. Annual surveys should not be necessary, however. Annual surveys between 1971 and 1996 have shown that fish abundance or growth changed very little over that time. It will take some time before either the new size limit or the introduction of a new forage species has a noticeable effect on the walleye population. Collection of data from spring net-run samples of walleye every 3 to 5 years should be sufficient to determine whether these techniques have succeeded in producing a better fishery. At least 200 adult males and 100 adult females should be sampled for biological data each sampling year. Dorsal spine samples of 10 fish of each sex per inch group should be taken for aging. Historic catch and population data are presented in Appendices 2-5 to provide a baseline to allow comparison for future evaluations.

Summer surveys of forage fish with an electrofishing boat or small mesh fyke nets should be conducted during the same years spring assessments are conducted. If fathead minnow are successful in establishing a viable population, some index of abundance would be useful in monitoring them.

The MDNR should continue to maintain close contact with the riparian landowners of Lake Gogebic so that any potential problems can be dealt with in a timely fashion.

Acknowledgments

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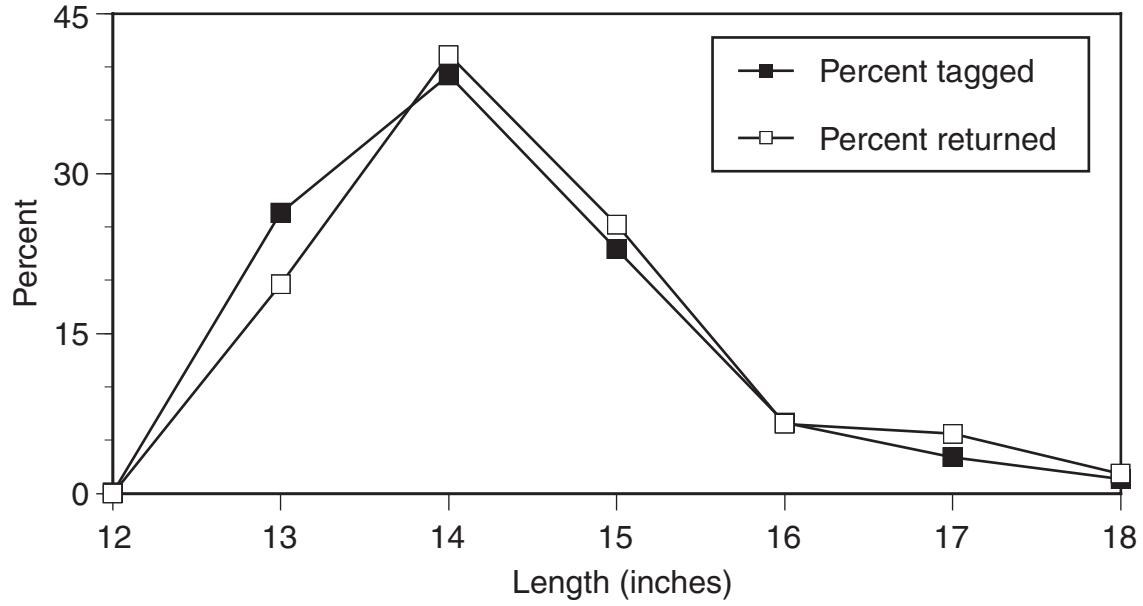

Figure 1.–Length frequency of walleye tagged in Lake Gogebic, as well as length frequency of fish recaptured by anglers.

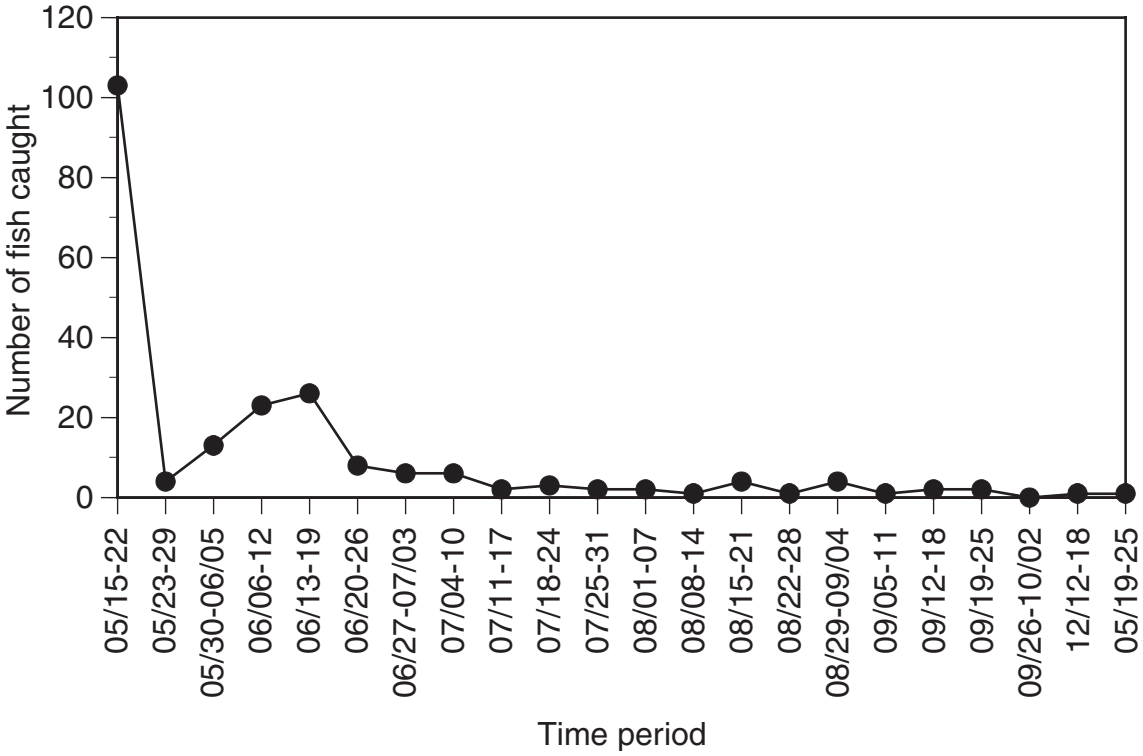

Figure 2.–Number of tagged walleye caught at various times in the 1993 season at Lake Gogebic.

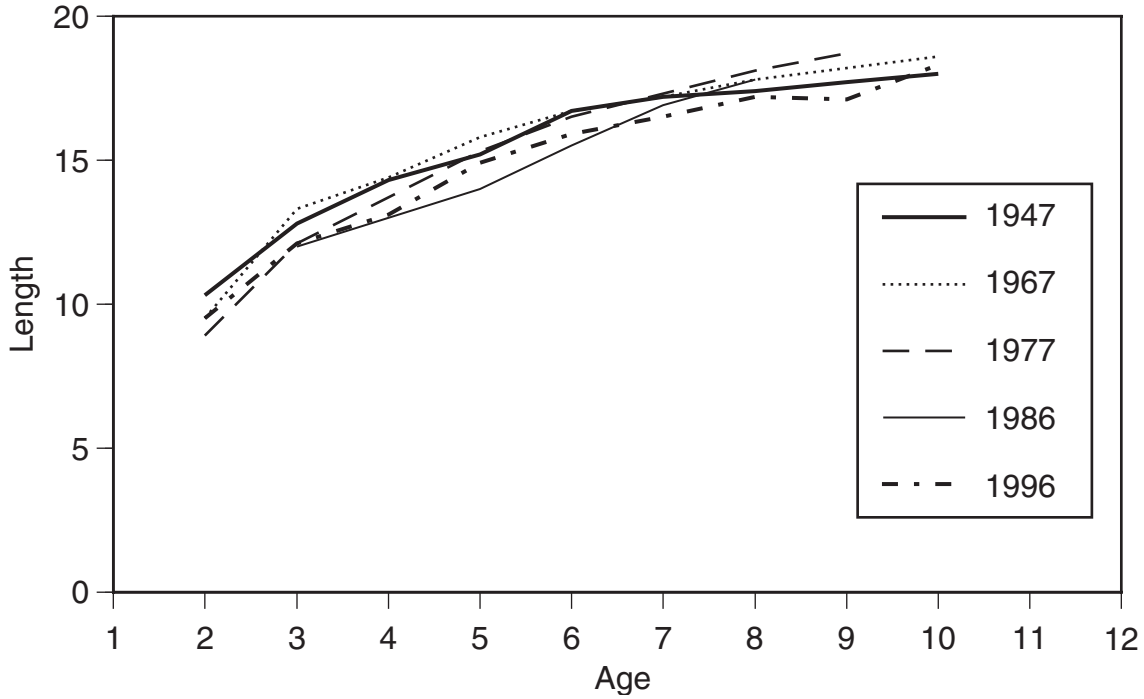

Figure 3.–Length-at-age for Lake Gogebic walleye in selected years. The 1967 plot represents males and females combined; plots for all other years are males only.

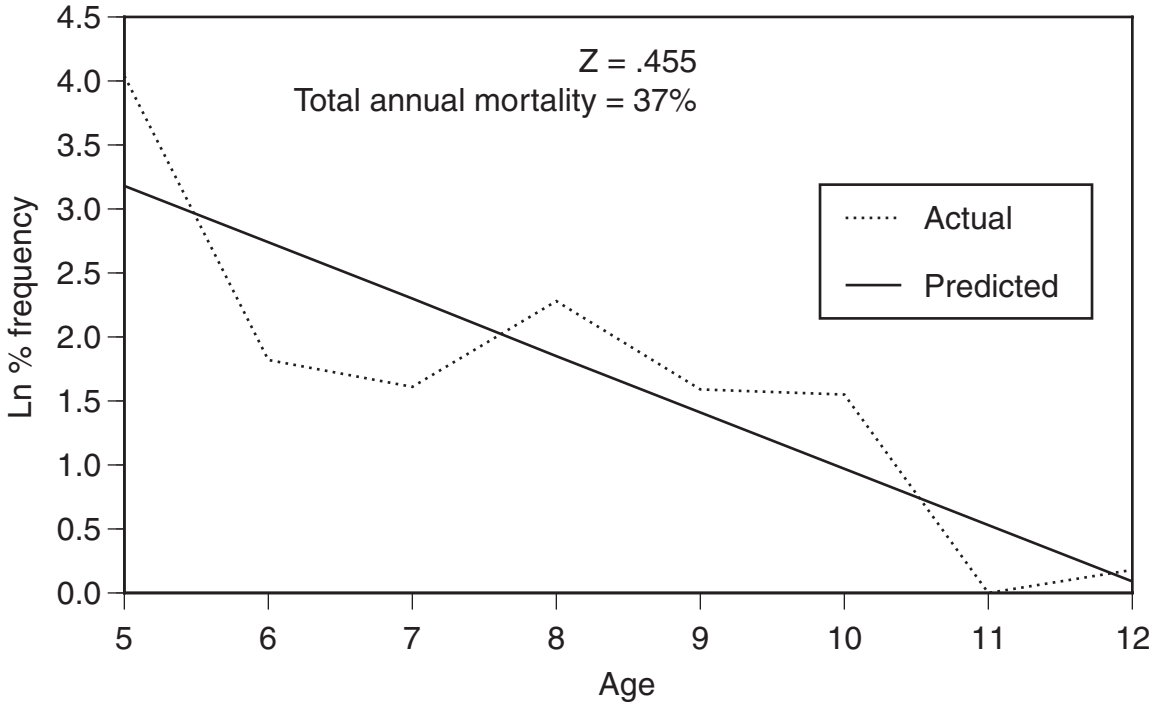

Figure 4.–Catch curve of the 1996 male walleye sample from Lake Gogebic.

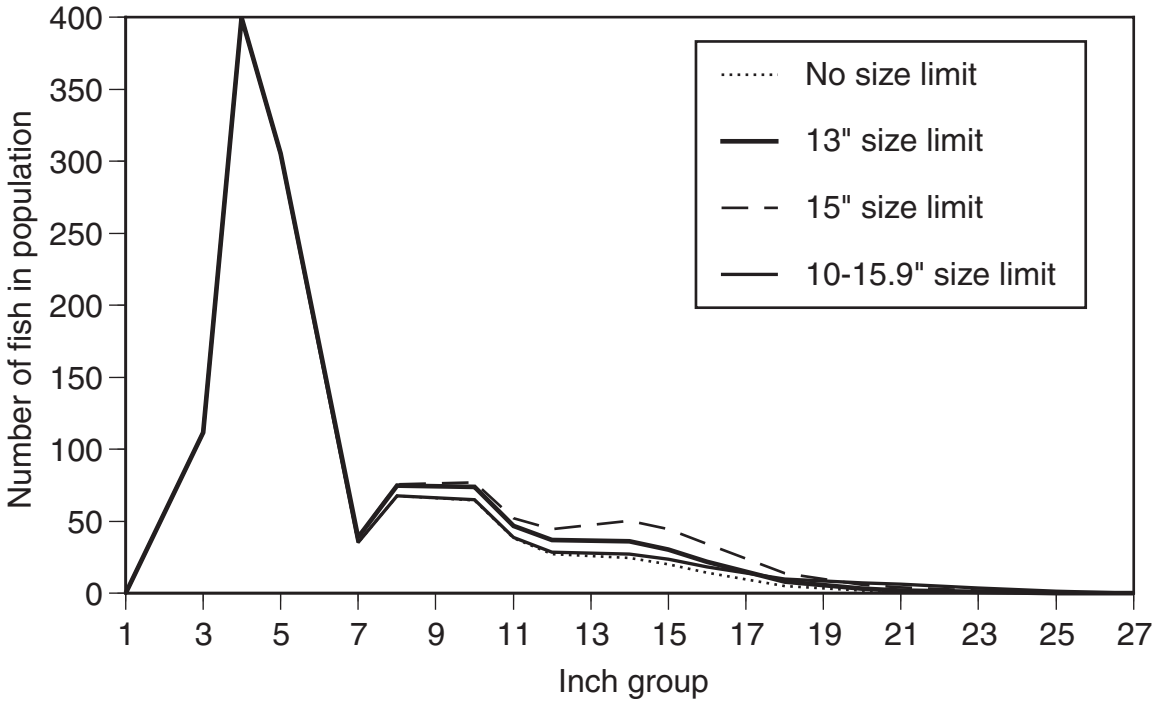

Figure 5.–Predicted effect of various size regulations on Lake Gogebic walleye.

Table 1.–Agreement (%) between three readers (R1, R2, R3) aging walleye spines and scales from Lake Gogebic, 1996. N = 73 males, 42 females, 6 immature.

	Scales			Spines		
	R1	R2	R3	R1	R2	R3
Scales						
R1	–	27.3	37.2	67.8	62.8	66.1
R2	27.3	–	57.0	14.8	38.0	18.2
R3	37.2	57.0	–	22.3	24.0	33.1
Spines						
R1	67.8	14.8	22.3	–	79.3	65.3
R2	62.8	38.0	24.0	79.3	–	65.3
R3	66.1	18.2	33.1	65.3	65.3	–

Table 2.–Average length at age of walleye from Lake Gogebic during spawning, 1947-96[a] (state average length at age shown for comparison).

		Age group										
Year	Sex	2	3	4	5	6	7	8	9	10	11	12
1947	Male	10.3	12.8	14.3	15.2	16.7	17.2	17.4	17.7	18.0		
	Female	9.6	13.3	14.8	16.4	18.1	19.2	20.4	20.6	21.0		
1967	Both	9.5	13.3	14.4	15.8	16.7	17.2	17.8	18.2	18.6		
1976	Male	10.9	11.0	13.0	14.3	15.7	16.6	17.7	18.4	18.8	19.5	
	Female						19.0	20.0	19.2	20.4	21.2	22.1
1977	Male	8.9	12.1	13.7	15.3	16.5	17.3	18.1	18.7			
	Female					15.7	16.8	17.4	18.1	19.5	20.0	21.3
1985	Male	9.0	11.4	12.9	14.0	15.9	17.6	18.2	20.0			
	Female				15.0	16.9	17.9	19.3	19.9	22.1	22.8	
1986	Male		12.0	13.0	14.0	15.5	16.9	17.8				
1989	Male	10.8	11.8	13.6	15.0	18.4	18.5	17.5	19.3	19.1	19.4	19.5
	Female				17.3	17.8	17.3	20.0	20.7	22.8	25.7	26.0
1990	Male		11.3	13.5	15.1	15.7	16.8	17.2	17.3	19.3	18.2	
	Female			15.7	17.3	18.2	19.0	18.9	20.4	20.7	20.9	25.2
1996	Male	9.5	12.1	13.1	14.9	15.9	16.5	17.2	17.1	18.3	19.1	17.5
	Female				15.8	16.9	18.3	18.5	18.5			
State average (both sexes)		10.4	13.9	15.8	17.6	19.2	20.6	21.6	22.4			

[a] 1947-1986 lengths at ages from scale reading; 1989-1996 from spines.

Table 3.–Age distribution of male walleye collected from Lake Gogebic in 1996 (ages imposed on length frequency using an age-at-length key).

Age	Year Class	Number	Percent
3	1993	17	8.5
4	1992	3	1.7
5	1991	114	57.1
6	1990	12	6.2
7	1989	10	5.0
8	1988	20	9.8
9	1987	10	4.9
10	1986	9	4.7
11	1985	2	1.0
12	1984	2	1.2
Totals		199	100.1

Table 4.–Age distribution of female walleye collected from Lake Gogebic in 1996 (ages imposed on a length frequency using an age-at-length key).

Age	Year Class	Number	Percent
5	1991	27	49.9
6	1990	7	12.6
7	1989	2	4.1
8	1988	14	26.5
9	1987	4	6.8
Totals		54	99.9

Table 5.–Estimates of population size, exploitation rates and annual mortality rates for walleye, 1947-94.

Year	Population estimate	Exploitation rates[a] (%)	Natural mortality (%)	Total mortality (%)
1947	–	4.0	20.0	24.0
1976	56,000	5.7	22.0	26.7
1977	38,000	7.2	19.5	26.7
1984	63,000	20.0	18.2	38.2
1994	62,497[b]	20.9		

[a] Minimum estimates based on tag returns by anglers.
[b] Estimated number of male walleye greater than 13 in.

Table 6.–Predicted effect of various catch regulations on the structure of the Lake Gogebic walleye population.

	All walleye	Legal walleye			
Size limit	Total number	Total number	Average length (in)	Average weight (lb)	Total weight (lb)
None[a]	1,302	236	13.2	0.79	186.4
13 in	1,405	160	15.7	1.21	193.0
15 in	1,503	141	17.3	1.74	244.8
10-15.9 in slot	1,354	210	12.4	0.62	130.3

[a] Calculated statistics are for walleye 10 in or longer.

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James S. Diana, Editor
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Alan D. Sutton, Graphics
Barbara A. Diana, Word Processor
Ellen S. Grove, Desktop Publisher

Appendix 1.–List of input values used to simulate Lake Gogebic walleye fishery.

1. Number of years to simulate	15
2. Maximum age to consider	12
3. Recruitment method	Constant
4. Instantaneous catch rate	1
5. Hooking mortality for fish caught and released	10%
6. Percent of sublegals kept	5

Instantaneous natural mortality rates

Age 0	1.2
Age 1-12	0.27

Mean lengths at age

Age	Length
0	0.0
1	6.3
2	10.7
3	13.8
4	16.0
5	17.6
6	18.6
7	19.4
8	19.9
9	20.3
10	20.6
11	20.8

Vulnerability coefficients by inch group

Inch group	Value
1 – 9	0.0
10	0.6
11	0.7
12	0.8
13 – 15	1.0
16 – 17	0.8
18 – 19	0.7
20 – 21	0.5
22 – 29	0.2
30+	0.0

Appendix 1.–Continued.

Percent of annual growth by week of year

Week	Value
1 – 17	0
18 – 20	1
21 – 23	2
24 – 27	3
28 – 30	4
31 – 34	6
35 – 39	5
40 – 41	4
42 – 43	3
44 – 45	2
46 – 52	0

Percent of fishing effort by week of year

Week	Value
1 – 9	3
10 – 11	1
12 – 18	0
19	15
20	8
21	7
22 – 23	5
24	4
25 – 26	3
27 – 33	2
34 – 40	1
41 – 52	0

Initial Population for simulation (Age 0)

Inch group	Number
3	250
4	500
5	250

Appendix 2.–Catch statistics for Lake Gogebic spring walleye netting (1971-96) including total catch by sex, sex ratio, effort and catch per unit effort CPUE for males and spawned females.

	Total		Females	Sex ratio	Effort		CPUE	
Year	Males	Females	spawned	(M:F)	Total[a]	Spawn[b]	Males	Spawned females
1971	1,514	148	58	10:1	83	36	18.2	1.6
1972	1,395	737	340	2:1	36	36	38.7	9.4
1973								
1974	15,104	466	260	32:1	175	95	86.3	2.7
1975	2,299	340	208	7:1	64	64	35.9	3.3
1976	4,273	259	162	16:1	109	58	39.2	2.8
1977	5,727	336	117	17:1	58	51	98.7	2.3
1978	9,362	447	349	21:1	76	76	123.2	4.6
1979	5,600	504	196	11:1	67	67	83.6	2.9
1980	7,953	260	138	31:1	109	34	73.0	4.1
1981	5,112	285	169	18:1	83	69	61.6	2.5
1982	7,083	572	282	12:1	36	36	196.8	7.8
1983	6,479	514	316	13:1	77	62	84.1	5.1
1984	7,130	283	162	25:1	83	75	85.9	2.2
1985	6,117	270	93	23:1	80	30	76.5	3.1
1986	11,047	283		39:1	87		127.0	3.3
1987	8,785	275	154	32:1	70	42	125.5	3.4
1988	5,387	150	72	36:1	45	35	119.7	2.1
1989	3,078	318		10:1	30		102.6	
1990	3,880	299		13:1	17		228.2	
1991	8,220	72		114:1	30		274.0	
1992	2,351	53		44:1	9		261.0	
1993	5,376	283		19:1	24		224.0	
1994	10,275	502		20:1	80		128.0	
1995	3,508	88		40:1	30		117.0	
1996	2343	55		43:1	27		87	
	5,976	312	192	26:1	63	54	115.8	

[a] Total effort is the total net nights expended to catch total males and total females; it was used to compute CPUE for males.

[b] Spawn effort is the total net nights accumulated from time females first spawned to termination of spring netting; it was used to compute CPUE for spawned females.

Note: In 1971 and 1972, trap nets were used to collect the fish. During the remaining years, fyke nets were used. In 1971-74, the nets were fished on the north shore. Beginning in 1975, all nets were fished on the east shore south of Porcupine Point.

Appendix 3.–Size frequency (%) of male walleye from net catches in Lake Gogebic, 1947 and 1976-96.

	Inch Group							
Year	<13	13	14	15	16	17	18	>18
1947[a]	0.1	1.6	8.9	19.5	17.8	24.1	20.0	8.0
1976	24.4	12.4	12.8	11.6	7.4	9.9	11.1	10.3
1977	1.2	1.4	14.6	20.4	25.7	22.6	9.6	4.6
1981	19.8	5.5	15.1	20.6	18.3	11.1	6.3	3.2
1985	25.6	17.6	21.3	11.6	9.6	9.1	4.2	1.1
1986	32.6	23.7	15.8	13.2	6.8	5.3	2.6	
1988	11.0	18.0	30.0	22.0	10.0	8.0	1.0	
1989	30.5	8.8	7.3	17.5	16.8	10.2	4.4	4.3
1990	29.6	22.4	12.6	11.2	12.8	7.4	3.2	1.0
1991	24.0	20.0	26.0	15.0	8.0	6.0	1.0	
1992	11.1	29.6	29.6	13.9	7.4	4.2	2.3	1.9
1993	0.1	26.3	39.2	22.9	6.6	3.4	1.4	
1994	19.3	24.2	30.9	16.6	6.7	1.3	0.9	
1995	45.0	10.0	18.0	18.0	6.5	1.0	0.5	1.0
1996	4	6.5	23	34	19.5	11	0.5	1.5
Mean	18.6	15.2	20.3	17.9	12.0	9.0	4.6	3.7

[a] Includes walleye collected outside of the spawning period.

Appendix 4.–Size frequency (%) of female walleye from net catches in Lake Gogebic, 1947 and 1976-96.

	Inch Group									
Year	<16	16	17	18	19	20	21	22	23	>23
1947[a]	1.4	11.2	20.1	26.2	17.5	11.5	7.9	2.6	0.7	0.7
1976				0.8	5.1	22.9	18.6	18.6	16.9	16.9
1977	1.4	13.0	20.3	17.4	13.0	5.8	4.3	11.6	7.2	5.8
1985	2.3	10.0	22.3	23.5	14.2	8.1	3.5	3.5	3.8	8.8
1988	4.0	11.0	13.0	30.0	25.0	8.0	1.0	1.0	2.0	5.0
1989	2.5	15.4	26.4	25.5	13.5	3.8	2.5	2.5	1.9	7.9
1990	0.9	4.7	15.1	28.3	25.5	11.3	2.8		2.8	8.5
1991	13.9	8.3	13.9	6.9	15.3	8.3	8.3	6.9	9.7	8.4
1992	18.9	18.9	24.5	11.3	11.3	3.7	5.7	1.9	1.9	1.9
1993	34.2	26.8	17.7	9.2	1.8	1.8	4.2	1.1	3.2	1.4
1994	30.0	31.3	10.7	7.2	4.7	0.9	2.1	3.9	1.7	7.3
1995	19.3	34.0	21.5	7.9	6.8		2.2		1.1	5.6
1996	32.7	23.6	14.5	18.2	9.1	1.8				1.8
Mean	13.5	17.4	18.3	16.3	12.5	7.3	5.3	5.4	4.4	6.2

[a] Includes walleye collected outside of the spawning period.

Appendix 5.–Age frequency (%) of female walleye from net catches in Lake Gogebic for selected years.

	Age Group															
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1947[a]	21.0	1.9	5.2	20.2	18.7	14.6	6.0	5.6	4.5	7.0						
1976						0.8	0.8	3.4	5.1	26.3	35.6	14.4	8.4	2.5	0.8	1.7
1977					2.0	14.0	20.0	22.0	16.0	12.0	2.0	6.0	4.0	1.0		
1985					4.4	15.5	46.7	13.3	8.9	4.4	6.7					
1989					8.4	23.2	5.3	14.7	13.7	13.7	1.0	8.4	5.3	1.0	3.2	1.0
1990				0.9	0.9	24.3	37.4	6.9	13.0	5.2	4.3		0.9	3.5	1.7	0.9
1995						15.0	27.5	25.0	12.5	2.5	7.5	7.5		2.5		
1996					43.9	12.2	4.9	29.3	7.3					2.4		

[a]Includes walleye collected outside spawning season.

Appendix 6.–Age frequency (%) of male walleye from net catches in Lake Gogebic for selected years.

	Age Group															
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1947[a]	29.0	3.9	3.9	16.3	25.4	7.1	5.1	5.5	2.4	1.2						
1976	0.8	10.4	24.9	18.3	9.5	8.3	8.7	7.9	4.1	4.1	2.5					
1977		1.8	28.2	19.5	28.2	14.1	4.5	2.3	1.4							
1981		6.3	11.1	17.5	27.8	20.6	24.5	8.7	4.5	0.4						
1985		0.3	11.4	25.9	24.3	24.5	8.7	4.5	0.4							
1986			20.8	20.3	29.4	20.8	4.1	3.5	1.0							
1989		3.3	30.4	9.8	9.8	16.3	2.2	9.8	4.3	7.6	1.1	2.2	1.1	2.2		
1990			23.5	23.5	5.9	9.8	7.8	4.9	6.9	2.0	4.9	2.0	1.0	2.0	2.9	1.0
1995				31.8	18.2	13.6	13.6	11.4	6.8	4.5						
1996			8.5	1.7	57.1	6.2	5.0	9.8	4.9	4.7	1.0	1.2				

[a] Includes walleye collected outside spawning season.