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STATUS OF THE WALLEYE IN MICHIGAN WATERS OF LAKE ERIE AND CONNECTING WATERS, 1980-1983[1]

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Abstract

The 1980-1981 on-site creel census of the Michigan waters of Lake Erie and the Detroit River provided the first accurate assessment of sportfishing harvest and effort in these waters.

In 1980, total shore and boat angler harvest in Lake Erie was an estimated 1,037,000 fish; in 1981 harvest was only 485,100 fish; however combined with the winter catch it totaled 1,168,900 fish. Six times more fish were caught by boat than by shore anglers during the 2-year census. Yellow perch comprised 82% of the total harvest in 1981. Ice fishing in 1981 on Lake Erie yielded more yellow perch in 2 months than the catch of all species combined for the remainder of the year. Two and 3-year-olds were the most numerous in the walleye catch in 1980 and 1981. Age IV walleyes were the next most numerous in the 1981 catch, due to persistence of a very strong 1977 cohort. The catch of white bass consisted mainly of age II and III fish in 1980, and age I fish in 1981.

In 1980, total shore and boat angler harvest in Detroit River was an estimated 697,000 fish; in 1981 harvest was only 489,000 fish. Several species comprised the bulk of the Detroit River harvest, contrasting to the dominance of yellow perch in the Lake Erie catch. White bass were the most numerous in the 1980 and 1981 catch, followed by yellow perch, freshwater drum and walleye. The boat angler catch rate of white bass was 9 times and walleyes 10 times the catch rate of shore anglers. The 1977 year class of walleyes was the most numerous in both 1980 and 1981. Survey netting indicated walleye stock density in Lake St. Clair increased greatly in recent years due to the occurrence of several strong cohorts. The 1977 year class, which contributed heavily to the Detroit River and Lake Erie angler harvest, was numerically dominant in the net catches. The white bass fishery, concentrating on spawning

fish in the lower half of the river, consisted mainly of age II, III, and IV fish in 1980 and age III and IV fish in 1981.

Nearly 18,000 walleye were tagged between 1974 and 1982 at sites located in west and east Anchor Bay of Lake St. Clair, west Lake Erie and south Lake Huron. Nearly all of the 1,491 tags returned came from anglers. Tag returns indicated substantial movement of walleyes into the Detroit River from western Lake Erie and from Anchor Bay into the St. Clair River. Most springtime returns came from the Thames River of Lake St. Clair and the Maumee River of western Lake Erie, confirming the importance of these streams for spawning.

Using maximum likelihood procedures with tag recovery data, the mean survival rate for Anchor Bay walleyes was estimated to be 51.2% and for western Lake Erie walleyes 57.7%.

A program of monetary rewards for tag returns started in Anchor Bay in 1981 for the purpose of measuring discrepancies between the number of tags reported and the number actually recovered. Recapture data showed that significant numbers of non-reward tags were not being reported. Apparent exploitation rate increased from the mean annual tag reporting rate of 4.9% to 9.7%. Estimates of instantaneous fishing and natural mortality were 0.13 and 0.54, respectively.

Introduction

The walleye (Stizostedion vitreum) has a long history of both commercial and sportfishing utilization in the western basin of Lake Erie. Commercial harvest of walleye increased steadily after stocks of lake whitefish (Coregonus clupeaformis), sauger (Stizostedion canadense), and lake herring (Coregonus artedii) were reduced by 1920 to commercial insignificance. Walleye landings peaked in the 1950's with a maximum 15.5 million pounds recorded for United States and Ontario waters combined in 1956. The population began to collapse at this level of harvest, and by 1960, harvest was only 1.8 million pounds. The discovery of mercury contamination of fish and the resulting 1970 ban on fishing stopped commercial harvest and prevented further deterioration of the population. The walleye has been protected since then from commercial harvest by being added to the list of Michigan sport fish species. Similar protection has been afforded walleyes in the Ohio waters of the western basin.

Concern for walleye in the western basin resulted in an international plan, adopted by the Great Lakes Fishery Commission (GLFC) in 1973, to protect and enhance this population. A Standing Technical Committee (STC) was charged with the responsibility of allocating the harvestable portion of production through agency quotas. Success of the management plan required accurate estimates of the annual walleye harvest. Since no on-site creel census had ever been conducted on the Michigan waters of Lake Erie or the Detroit River before 1980, there was no accurate estimates of the anglers' catch.

The primary objective of this study was to accurately estimate the sportfishing harvest of walleyes in Michigan waters of Lake Erie and the Detroit River. The secondary objective was to tag walleyes to assess their movements into and away from these waters.

Methods

Creel census

Estimates of the shore angler harvest and effort were obtained from extrapolation of instantaneous angler counts and angler interviews. The mean number of anglers ($\bar{X}$) was computed for each day. Week days and weekend days (and holidays) were calculated separately. The number of available fishing hours (F) for the month equaled length of the fishing day times the number of week days or weekend days. Then (F) ($\bar{X}$) equaled total angling hours for the month.

Total estimated catch for each time strata for the month equaled angler hours times mean catch per hour for that period. The variance (V) for the total estimate of the catch for the month equaled [angler hours^2 x catch V/ hour] + [(catch/hour)^2 x angler hour V]. The square root of the variance is the standard error and two standard errors approximates the 95% confidence limits for the total estimated catch.

Instantaneous shore fishermen counts were not made during the March through July period of 1981 Lake Erie census. A ratio estimate of shore angling hours to boat angling hours, based on the 1980 creel census, was used to make fishing pressure estimates for this period. If this ratio is not consistent from year to year, the shore angler hours and trips estimated would be invalid, however, the catch rates are valid because angler interviews were conducted. During August and September, estimates for both catch rates and fishing pressure were made in the usual manner.

Tagging

Walleyes were initially captured in experimental trap nets with pots 6 feet high and leads 300 feet long and 6 feet deep. All healthy, legal-sized walleyes (330 mm

minimum length) were tagged with size 10 or 12 serially numbered monel strap tags attached to the lower jaw. Fish over 635 mm were tagged with a monel self-piercing size 3 tag attached to the operculum.

The primary tagging sites were located in western Anchor Bay of Lake St. Clair (1974-1982) and in Lake Erie near the city of Monroe (1978-1982). Tagging occurred between April 15 and May 10 in Lake Erie, and May 15 and June 15 in Anchor Bay, prior to significant angler harvest. Tagging in eastern Anchor Bay took place during late fall of 1974-1977 and in southern Lake Huron near Lexington during mid-summer in 1975, 1977, and 1980.

Results

Lake Erie creel census

The 1980 on-site Lake Erie creel census estimate of catch and effort is summarized in Table 1 for boat anglers and Table 2 for shore anglers and the 1981 estimate for boat anglers is summarized in Table 3 and for shore anglers in Table 4.

Yellow perch (Perca flavescens) dominated the Lake Erie boat angler harvest as indicated below:

Species	Percent of total catch	
	1980	1981
Walleye	20.3	24.0
White bass	1.0	3.6
Yellow perch	73.4	65.4

The boat angler total catch was 55% lower in 1981 than 1980, due to reduced effort and a 60% reduction in the yellow perch harvest. White bass (Morone chrysops) was the only species showing a gain in catch in 1981. Decreased catches of four of the five major species probably indicated changes in distribution and fishing effort rather than

decreased abundance. Angling effort from both boat and shore was down significantly in 1981 compared to 1980. This decline may have been reflective of the deepening economic recession.

The on-site creel census estimate of fish caught and total effort (with two standard errors) by ice anglers in Michigan waters of Lake Erie, January - February 1981, were as follows:

	January	February	Total	Catch per angler hour
Carp	0	375	375± 928	0.002
Smelt	136	53	189± 291	0.001
Yellow perch	435,764	247,429	683,193±130,335	3.96
Total catch	435,900	247,855	683,757±130,338	3.96
Angler hours	115,054	57,412	172,466± 26,425	---
Angler trips	39,821	19,158	55,979± 9,280	---

Ice conditions permitting, the Lake Erie winter yellow perch fishery is highly productive. More yellow perch were caught in the 2-month winter season than the total catch of all species during the remainder of 1981.

In 1980, total shore and boat angler harvest was an estimated 1,037,000 fish. In 1981 shore and boat angler harvest was 485,100 fish; however, combined with the winter catch it totalled 1,168,900 fish. Almost one million or 82% of this total was yellow perch. Six times more fish were caught by boat than shore anglers during the 2 years of creel census.

An estimate of walleye age composition for 1980 and 1981 of the sport harvest was derived from creel census samples. Two- and 3-year olds comprised the bulk of the catch in 1980 and 2-, 3-, and 4-year olds in 1981 as the following tabulation by percent indicates:

Year	II	III	IV	V	VI	VII	VIII	IX-X	Number of fish aged
1980	26.5	60.0	4.6	6.5	1.4	0.4	0.5	0.2	1,301
1981	41.0	29.6	25.3	0.9	2.0	0.9	0.2	0.0	537

White bass in the census samples were mainly age II and III in 1980, but age I in 1981 as shown below in percent composition.

Year	0	I	II	III	IV	V	VI	VII	VIII	Number of fish aged
1980	0.0	2.9	21.9	46.7	1.9	2.9	1.9	1.0	1.0	105
1981	2.6	78.1	7.3	3.6	7.8	0.0	0.0	0.0	0.1	192

Spring index trap net surveys of major species were begun at the Monroe station in 1978. The 1978-1982 catch per net lift (CPE) of walleyes, by year class, is presented in Table 5. The exceptionally strong 1977 year class at ages II and III, completely dominated the net catches. Its abundance was substantiated in the creel census where it comprised an estimated 60% of the total walleye angler harvest in 1980 and 25% in 1981.

Detroit River creel census

The 1980 creel census estimates of fish harvest and effort by boat anglers in the Detroit River are presented in Table 6. The shore catch and effort are presented in Table 7. The 1981 catch and effort estimates are given in Table 8 for boat anglers and in Table 9 for shore anglers.

White bass was the most numerous fish in the Detroit River catch, ranking first in both the 1980 and 1981 boat

angler harvest. Yellow perch ranked second, followed by freshwater drum (Aplodinotus grunniens) and walleye.

Boat fishing total catch efficiency, measured as catch per hour, was twice that of shore angling. Boat angling was particularly more effective than shore fishing for walleyes and white bass. For the 2-year census period, ten times more walleye and nine times more white bass were caught by boat than shore anglers.

The estimated total shore and boat catch was 697,000 in 1980 and 489,000 in 1981. The reduction was mainly due to a steep decline in the 1981 harvest of white bass and yellow perch. The 1980 and 1981 Detroit River estimated total angler catch for the Detroit River in 1980 and 1981 of 1.2 million fish was slightly less than the Lake Erie (winter fishing excluded) total of 1.5 million fish. The Detroit River shore and boat angler catch per hour was moderately less than for Lake Erie.

The white perch (Morone americana), recently established in western Lake Erie, has expanded into the Detroit River. An estimated 400 were caught in the Detroit River in 1981 and similar numbers were taken in Lake Erie during 1980 and 1981.

The estimated age composition in percent for 1980 and 1981 of the walleye harvested by anglers in the Detroit River is presented below:

Year	I	II	III	IV	V	VI	VII	VIII	IX	Number of fish aged
1980	0.0	17.4	72.5	3.9	3.9	1.1	0.6	0.4	0.2	661
1981	1.8	25.6	32.4	34.8	2.4	2.1	0.9	0.0	0.0	571

The 1980 samples consisted mainly of the 1977 year class. This strong year class, though less abundant, was still the most numerous in 1981 samples.

The estimated age composition in percent of the white bass harvested by anglers in the Detroit River for 1980 and 1981 is given below:

Year	I	II	III	IV	V	VI	VII	VIII	Number of fish aged
1980	5.6	28.1	24.7	36.0	3.4	0.0	2.2	0.0	126
1981	0.0	13.5	77.0	6.4	0.8	0.8	0.0	1.6	89

Age II-IV fish comprised the bulk of the Detroit River creel samples. It appears that spawning concentrations of white bass in the lower half of the river were being effectively harvested by anglers.

The walleye catch per trap net lift (CPE) by year class for walleyes caught during 1972-1981 in the spring trap net surveys in Anchor Bay of Lake St. Clair is summarized in Table 10. These data are appropriately included since tagging has documented an exchange of walleyes between Lake Erie and Lake St. Clair. The much increased CPE's since 1977 indicate there has been a substantial rise in walleye stock density in recent years. A number of strong year classes, particularly the 1977 cohort, contributed to this increased abundance. The 1965 year class was the strongest produced in the 1960's. Its large contribution to stock abundance was evident by it being the numerically dominant cohort in net catches in 1972 at age VIII. At age VIII and IX, it was second in abundance only to the 1970 year class.

Tag returns

The vast majority of tag recoveries came from anglers who voluntarily reported their catch. The relative number of tags recovered from various geographical areas reflects both fish distribution and the pattern of sportfishing effort. Sportfishing effort throughout the study area was

extensive so that it was unlikely that tagged fish moved out of areas where they would be vulnerable. The distribution patterns and estimates of annual survival derived from tag recoveries are considered representative of the population. However, the reward tag study has revealed that exploitation rate values are seriously underestimated due to incomplete angler reporting of non-reward tags.

The total number of walleyes tagged in the study area from 1974 through 1982 is summarized below:

Tagging site	Total number tagged	Total number of tag returns	Percent return
Monroe Lake Erie	6,573	411	6.25
West Anchor Bay Lake St. Clair	7,565	704	9.31
East Anchor Bay Lake St. Clair	2,253	281	12.47
Lexington South Lake Huron	1,528	95	6.22
Total	17,919	1,491	8.32

Distribution of angler recaptures of walleye from the Monroe tagging site in Lake Erie is summarized in Table 11. More than half of the walleye recaptured came from the western basin. Very few returns have come from the central or eastern basin of Lake Erie. Ten percent of the returns came from the Maumee River area, 13% from the Detroit River, and the remaining 14% from scattered sites northward as far as southern Lake Huron. Only one return came from the Thames River.

Distribution of walleyes tagged in western and eastern Anchor Bay of Lake St. Clair is summarized in Table 12. The largest proportion of recaptured west Anchor Bay-tagged walleyes (42%) came from within Anchor Bay. The St. Clair

River ranked second in returns (28%). Only 2% of the returns came from Lake Erie.

Three times more east Anchor Bay-tagged walleyes were recovered in the Thames River than west Anchor Bay-tagged fish. Otherwise, the distribution of returns from the two sites was similar.

More than half of the returns of south Lake Huron-tagged walleyes (Table 13) came from the St. Clair River and only 10% from Lake Huron. Small numbers of recaptures came from scattered sites throughout Lake St. Clair with the largest number coming from the Thames River. Only 2% of the returns came from Lake Erie.

Tag return data revealed a significant level of movement of walleyes northward out of Lake Erie into the Detroit River. The few returns indicated no significant walleye movement eastward from the west basin to the central basin in Lake Erie.

The Thames River flowing into Lake St. Clair and the Maumee River flowing into the western basin of Lake Erie are both considered to be major walleye river spawning sites. Most springtime returns of tagged walleyes came from these two streams which verified their importance for spawning.

Tag returns confirmed a substantial northward movement of walleyes out of Anchor Bay into the St. Clair River and southern Lake Huron. A counter movement of walleyes from southern Lake Huron back into the St. Clair River was also evident. An observed summer movement from Lake Erie and Lake St. Clair into river environments was probably due to an attraction to these cooler waters draining Lake Huron.

Tag reward program

A program of monetary rewards for tag returns was started at the west Anchor Bay tagging site in 1981. The purpose was to measure the discrepancy between the number of tags actually recovered and the number reported. Every third walleye was tagged with a reward tag. Equal numbers

of four different monetary denominations were used to determine whether increased value would stimulate greater cooperation. This was an essential step to developing an estimate of actual exploitation rate instead of apparent exploitation (non-reward tag reporting rate).

The 1981-1983 summary of walleye reward tags and recoveries is presented below:

	Number tagged	Total recoveries	Percent recoveries
$2 tags	231	21	9.09
$4 tags	234	27	11.54
$6 tags	237	42	17.72
$8 tags	237	34	14.35
Non-reward tags	2,028	157	7.74
Total	2,967	281	9.47

The differences between reward tag denomination reporting rates were within the levels of chance variation. A chi-square (X^2) test of first-year reporting rates for the 1981-1983 period supported, at the 5% probability level, the hypothesis that each reward tag denomination reporting rate was identical. A chi-square test of first-year reporting rates under the hypothesis that reward and non-reward rates were not different, showed, at the 0.05 level, that reward tag recovery rates were significantly higher than non-reward rates in the 1981-1983 period. The percent returns of reward and non-reward tags for 1981-1983 are given below:

	1981	1982	1983
Reward tags	7.2%	10.1%	11.6%
Non-reward tags	3.4%	5.8%	7.5%

Three years of reward tag recapture data showed that significant numbers of non-reward tags have not been reported by successful anglers. The $6 reward tag return rate was 2 1/3 times the non-reward rate.

Tag recovery data were also used to estimate survival and exploitation. Seber (1970); Robson and Youngs (1971); and Brownie et al. (1978); following Ricker (1975); have developed a mark-recapture method based on a probability model consisting of products of multinomial distributions. Estimates of survival and recovery rates (apparent exploitation) and their variances are derived using maximum likelihood procedures which represent a major advance over the older life table methods. It is possible with this method to use all years' recaptures to better estimate each year's specific survival and exploitation rate. This method generates survival estimates independent of tag reporting rate. Anchor Bay and western Lake Erie estimates of walleye annual survival rates (S) derived from maximum likelihood procedures for all non-reward tag reporting data for 1975-1983 are given below. The 95% confidence intervals are shown in parentheses.

Mean annual tag reporting rate		Mean survival rate from tag returns	
Anchor Bay	W. Lake Erie	Anchor Bay	W. Lake Erie
4.9%	2.9%	51.2%	57.7%
(4.3-5.4%)	(2.4-3.5%)	(46.9-55.6%)	(34.9-7.53%)

There are few estimates of survival rates for Great Lakes walleye populations, but Ryder (1968) estimated the 1955-1957 weighted S for Nipigon Bay, Lake Superior, walleyes to be 45%.

By using the $6 tag return rate for Anchor Bay walleyes, apparent exploitation rate was increased from 4.9%

to 9.7%. With the survival rate, S, of 0.51, instantaneous fishing mortality rate, F, was calculated to be 0.13, and instantaneous natural mortality rate, M, = 0.54. Ryder (1968) estimated M for Nipigon Bay walleyes to be 0.70, 0.61, and 0.31, respectively for years 1955-1957.

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Table 1. Estimates of total numbers of fish caught and total effort by boat anglers in Michigan waters of Lake Erie, May-November 1980.

Species	Month				
	May	Jun	Jul	Aug	Sep
Walleye	12,438	73,954	89,925	6,823	265
Yellow perch	5,418	85,973	61,530	117,825	271,832
White bass	1,151	3,815	996	1,168	1,020
Freshwater drum	553	5,839	2,825	3,470	1,247
Channel catfish	524	6,950	7,477	5,456	4,568
Total catch[1]	20,216	176,870	163,126	135,264	283,777
Angler hours	33,540	268,001	244,821	77,944	58,547
Angler trips	7,620	61,418	46,235	14,709	23,690

Species	Month		Total catch	Two standard errors	Catch per angler hour
	Oct	Nov			
Walleye	0	6	183,411	34,391	0.26
Yellow perch	88,432	29,671	660,681	166,365	0.93
White bass	1,543	0	9,693	4,450	0.01
Freshwater drum	410	0	14,344	4,544	0.02
Channel catfish	613	2	25,590	9,268	0.04
Total catch[1]	91,279	29,733	900,265	170,492	1.27
Angler hours	18,524	7,873	709,250	98,018	---
Angler trips	6,547	2,778	162,997	22,739	---

[1] Total catch includes 15 other species that were taken infrequently.

Table 2. Estimates of total numbers of fish caught and total effort by shore anglers in Michigan waters of Lake Erie, May-August 1980.

Species	Month			
	May	Jun	Jul	Aug
Walleye	158	3,481	5,961	183
Yellow perch	546	15,841	11,391	37,337
White bass	1,912	1,021	6,923	5,838
Freshwater drum	905	2,983	3,565	7,980
Channel catfish	1,918	6,689	4,774	2,639
Total catch[1]	7,868	33,838	34,532	60,443
Angler hours	19,122	80,503	56,664	50,443
Angler trips	3,871	19,582	11,983	12,654

Species	Total catch	Two standard errors	Catch per angler hour
Walleye	9,783	16,252	0.05
Yellow perch	65,115	26,575	0.32
White bass	15,694	5,453	0.08
Freshwater drum	15,433	3,564	0.07
Channel catfish	16,020	4,833	0.08
Total catch[1]	136,679	32,488	0.66
Angler hours	206,732	30,282	---
Angler trips	48,090	7,534	---

[1] Total catch includes 17 other species that were taken infrequently.

Table 3. On-site creel census estimates of total number of fish caught and total effort by boat anglers in Michigan waters of Lake Erie, March-September 1981.

Species	Month				
	Mar	Apr	May	Jun	Jul
Walleye	0	5	24,826	44,595	25,678
Yellow perch	203	7,017	33,387	22,517	17,951
White bass	0	128	5,078	1,848	165
Freshwater drum	0	0	401	6,738	1,611
Channel catfish	0	0	490	4,464	2,791
Total catch[1]	216	7,150	64,597	82,513	49,371
Angler hours	903	7,541	87,629	172,172	127,872
Angler trips	163	1,363	14,518	30,148	22,502

Species	Month		Total catch	Two standard errors	Catch per angler hour
	Aug	Sep			
Walleye	3,018	22	98,144	19,307	0.18
Yellow perch	47,695	138,067	266,837	104,694	0.49
White bass	6,202	1,199	14,620	9,496	0.03
Freshwater drum	1,313	358	10,421	7,932	0.02
Channel catfish	4,566	932	13,243	5,126	0.02
Total catch[1]	63,548	140,707	408,102	107,370	0.75
Angler hours	59,285	87,011	542,413	67,959	---
Angler trips	11,788	13,513	93,995	12,411	---

[1] Total catch includes 11 other species that were taken infrequently.

Table 4. On-site creel census estimates of total number of fish caught and total effort by shore anglers in Michigan waters of Lake Erie, March-September 1981.

Species	Month				
	Mar	Apr	May	Jun	Jul
Walleye	1	0	12	2	8
Yellow perch	18	66	0	157	7,690
White bass	4	43	1,371	196	15,890
Freshwater drum	1	12	105	351	3,275
Channel catfish	13	24	871	2,277	8,027
Total catch[1]	246	522	3,084	3,556	36,657
Angler hours	390	904	4,881	7,304	63,586
Angler trips	83	182	988	1,776	13,446

Species	Month		Total catch	Two standard errors	Catch per angler hour
	Aug	Sep			
Walleye	9	0	32	29	trace
Yellow perch	1,663	4,019	13,613	4,396	0.11
White bass	7,438	3,047	27,989	10,922	0.23
Freshwater drum	4,491	3,409	11,644	3,447	0.09
Channel catfish	1,444	474	13,130	5,701	0.11
Total catch[1]	17,743	15,231	77,039	13,996	0.62
Angler hours	25,262	21,120	123,447	22,659	---
Angler trips	10,885	7,431	34,791	8,658	---

[1] Total catch includes 15 other species that were taken infrequently.

Table 5. Walleye catch per trap net lift by year class from spring survey trap netting in western Lake Erie near Monroe, 1978-1982.

Year class	Sample year				
	1978	1979	1980	1981	1982
1971	---	0.04	---	---	---
1972	0.52	0.04	0.02	---	---
1973	0.40	0.05	0.03	0.08	0.03
1974	6.90	1.24	0.33	0.23	0.25
1975	16.64	6.96	1.05	0.86	0.57
1976	1.94	0.99	0.44	0.32	0.52
1977	1.42	39.47	8.40	5.47	4.23
1978	---	---	7.69	4.79	2.94
1979	---	---	0.06	8.75	3.79
1980	---	---	---	0.19	26.51
1981	---	---	---	---	0.05
Total	27.82	48.79	18.02	20.69	38.89

Table 6. Estimates of total numbers of fish caught and total effort by boat anglers in Michigan waters of Detroit River, May-November 1980.

Species	Month				
	May	Jun	Jul	Aug	Sep
Walleye	17,284	22,277	35,160	11,425	3,766
Yellow perch	769	43,268	13,679	29,096	2,373
White bass	157,250	104,838	5,422	5,312	389
Freshwater drum	1,926	7,621	6,097	4,881	1,088
Total catch[1]	178,507	182,765	63,939	56,728	8,344
Angler hours	74,298	132,509	100,364	78,724	43,638
Angler trips	17,021	27,330	21,116	16,729	8,262

Species	Month		Total catch	Two standard errors	Catch per angler hour
	Oct	Nov			
Walleye	197	0	90,109	18,030	0.20
Yellow perch	8,402	112	97,699	44,445	0.21
White bass	0	0	273,211	116,313	0.59
Freshwater drum	0	0	21,613	6,695	0.04
Total catch[1]	8,673	112	499,068	126,083	1.08
Angler hours	24,127	6,232	459,892	65,452	---
Angler trips	5,480	1,307	97,245	13,649	---

[1] Total catch includes 18 other species that were taken infrequently.

Table 7. On-site creel census estimates of total numbers of fish caught and total effort by shore anglers in Michigan waters of the Detroit River, June-November 1980.

Species	Month			
	Jun	Jul	Aug	Sep
Walleye	872	3,188	2,970	5,653
Yellow perch	22,818	26,583	21,134	15,431
White bass	12,396	776	598	403
Freshwater drum	16,710	19,643	19,519	6,982
Rock bass	6,103	5,124	2,741	2,242
Total catch[1]	59,934	58,588	60,632	40,201
Angler hours	201,633	116,787	112,122	81,996
Angler trips	32,989	24,167	23,882	16,865

Species	Month		Total catch	Two standard errors	Catch per angler hour
	Oct	Nov			
Walleye	0	0	12,683	7,324	0.02
Yellow perch	13,432	4,022	103,420	29,780	0.19
White bass	0	0	14,173	5,982	0.03
Freshwater drum	0	0	62,854	10,481	0.12
Rock bass	452	0	16,662	4,273	0.03
Total catch[1]	13,900	4,026	237,281	36,508	0.44
Angler hours	25,736	6,752	545,026	41,963	---
Angler trips	7,498	1,438	106,839	7,805	---

[1] Total catch includes 18 other species that were taken infrequently.

Table 8. On-site creel census estimates of total number of fish caught and total effort by boat angler in Michigan waters of the Detroit River, May-September 1981.

Species	Month			
	May	Jun	Jul	Aug
Walleye	107	58,619	25,166	4,713
Yellow perch	367	11,261	10,697	1,401
White bass	1,429	63,847	5,073	0
Freshwater drum	36	6,019	11,691	6,906
Rock bass	64	6,860	5,680	2,075
Total catch[1]	2,003	147,006	59,312	19,095
Angler hours	17,545	171,320	120,895	54,838
Angler trips	3,661	34,603	23,015	15,367

Species	Month	Total catch	Two standard errors	Catch per angler hour
	Sep			
Walleye	848	89,453	31,873	0.23
Yellow perch	2,656	26,382	13,127	0.07
White bass	122	70,471	94,311	0.18
Freshwater drum	806	25,458	12,817	0.06
Rock bass	679	15,358	8,864	0.04
Total catch[1]	5,940	233,356	101,691	0.60
Angler hours	26,693	391,291	51,578	---
Angler trips	5,700	82,346	12,656	---

[1] Total catch includes 11 other species that were taken infrequently.

Table 9. On-site creel census estimates of total numbers of fish caught and total effort by shore anglers in Michigan waters of the Detroit River, May-September 1981.

Species	Month			
	May	Jun	Jul	Aug
Walleye	13	1,023	2,698	610
Yellow perch	0	43,262	13,526	2,748
White bass	16	25,337	1,319	596
Freshwater drum	0	41,630	33,561	16,193
Rock bass	8	14,284	14,886	3,201
Total catch[1]	37	129,457	72,934	28,757
Angler hours	11,567	194,268	136,236	157,943
Angler trips	1,998	37,796	34,432	37,571

Species	Month	Total catch	Two standard errors	Catch per angler hour
	Sep			
Walleye	702	5,046	3,616	0.01
Yellow perch	3,086	62,622	16,804	0.10
White bass	522	27,790	13,471	0.05
Freshwater drum	7,322	98,706	23,371	0.16
Rock bass	3,258	35,637	10,972	0.06
Total catch[1]	24,205	255,390	35,393	0.43
Angler hours	98,197	598,211	36,308	---
Angler trips	22,073	133,870	12,862	---

[1] Total catch includes 14 other species that were taken infrequently.

Table 10. Walleye catch per trap net lift by year class from spring survey trap netting in Anchor Bay of Lake St. Clair 1972-1981.

Year class	Sample year									
	1972	1973	1974	1975	1976[a]	1977	1978	1979	1980	1981
1959	---	0.02	---	---	---	---	---	---	---	---
1960	0.09	0.02	---	---	---	---	---	---	---	---
1961	0.13	0.02	0.03	---	---	---	---	---	---	---
1962	0.00	0.11	0.20	---	---	---	---	---	---	---
1963	0.41	0.11	0.08	0.06	---	---	---	---	---	---
1964	0.56	0.18	0.14	0.04	---	---	---	---	---	---
1965	4.53	1.14	1.58	0.92	0.02	---	0.06	---	---	---
1966	1.11	0.34	0.45	0.22	0.04	0.10	0.0	0.03	---	---
1967	0.56	0.36	0.56	0.49	0.19	0.00	0.24	0.00	---	---
1968	3.20	0.77	0.76	0.83	0.38	0.13	0.49	0.10	---	---
1969	1.13	0.95	0.60	0.85	0.34	0.20	0.46	0.03	---	---
1970	4.50	7.72	4.77	3.79	3.00	3.59	3.83	0.30	0.11	0.07
1971	---	0.37	0.76	1.80	1.11	0.90	4.03	1.83	0.47	0.13
1972	---	---	0.88	3.06	2.03	2.15	9.16	0.73	0.57	0.28
1973	---	---	---	0.05	0.43	0.30	1.08	1.00	0.91	0.39
1974	---	---	---	---	2.23	5.53	4.37	1,74	0.77	0.49
1975	---	---	---	---	---	1.58	4.75	1.57	1.82	0.51
1976	---	---	---	---	---	---	0.44	0.31	1.08	0.73
1977	---	---	---	---	---	---	---	11.47	27.24	20.05
1978	---	---	---	---	---	---	---	---	0.18	2.71
1979	---	---	---	---	---	---	---	---	---	6.83
Total	16.22	12.11	10.81	12.13	9.78	14.48	28.91	19.11	33.15	32.20
Mean age	4.75	4.12	5.32	5.16	4.62	4.56	5.68	3.62	3.51	3.72

[a] The 1976 survey was conducted in the summer, which is the most probable reason for the decreased catch per trap net lift.

Table 11. Geographical distribution of walleye tags recovered by anglers, 1978 through 1982, from the Lake Erie tagging site near Monroe.

Recovery location	Number of returns	Percent of total
Southern Lake Huron	8	2.0
Upper St. Clair River	17	4.1
Lower St. Clair River	12	2.9
East Anchor Bay	4	1.0
West Anchor Bay	3	0.7
West Lake St. Clair	6	1.5
North Lake St. Clair	1	0.2
East Lake St. Clair	2	0.5
Thames River	1	0.2
South Lake St. Clair	5	1.2
Upper Detroit River	17	4.1
Lower Detroit River	38	9.3
Detroit River mouth	18	4.4
Lake Erie near Monroe	60	14.6
Maumee River and mouth	42	10.2
Southwestern Lake Erie	70	17.0
Bass Islands	52	12.7
Pelee Island	24	5.8
Northwestern Lake Erie	15	3.7
Southern Lake Erie	9	2.2
Eastern Ontario waters	1	0.2
Unknown	6	1.5
Total	411	---

Table 12. Geographical distribution of walleye tags recovered by anglers 1974 through 1982, from Anchor Bay tagging sites in Lake St. Clair.

Recovery location	West Anchor Bay		East Anchor Bay		Combined	
	Number of returns	Percent of total	Number of returns	Percent of total	Number of returns	Percent of total
Southern Lake Huron	36	5.1	8	2.8	44	4.5
Upper St. Clair River	111	15.8	32	11.4	143	14.5
Lower St. Clair River	89	12.6	41	14.6	130	13.2
E. Anchor Bay	139	19.7	54	19.2	193	19.6
W. Anchor Bay	157	22.3	19	6.8	176	17.9
W. Lake St. Clair	30	4.3	24	8.5	54	5.5
N. Lake St. Clair	24	3.4	14	5.0	38	3.9
St. Clair River Delta	11	1.6	10	3.6	21	2.1
E. Lake St. Clair	12	1.7	9	3.2	21	2.1
Thames River	32	4.6	37	13.2	69	7.0
S. Lake St. Clair	15	2.1	8	2.8	23	2.3
Clinton River	2	0.3	2	0.7	4	0.4
Upper Detroit River	19	2.7	11	3.9	30	3.1
Lower Detroit River	11	1.6	7	2.5	18	1.8
Detroit River mouth	2	0.3	---	---	2	0.2
Lake Erie near Monroe	2	0.3	---	---	2	0.2
Maumee River and mouth	3	0.4	---	---	3	0.3
S.W. Lake Erie	2	0.3	1	0.4	3	0.3
Bass Islands	2	0.3	2	0.7	4	0.4
Pelee Island	2	0.3	---	---	2	0.2
N.W. Lake Erie	1	0.1	---	---	1	0.1
S. Lake Erie	0	0	---	---	---	---
E. Ontario waters	1	0.1	---	---	1	0.1
Unknown	1	0.1	2	0.7	3	0.3
Total	704	---	281	---	985	---

Table 13. Geographical distribution of walleye tags recovered by anglers, 1975 through 1982, from the Lexington tagging site in southern Lake Huron.

Recovery location	Number of returns	Percent of total
Southern Lake Huron	10	10.5
Upper St. Clair River	33	34.7
Lower St. Clair River	18	19.0
East Anchor Bay	3	3.2
West Anchor Bay	6	6.3
West Lake St. Clair	2	2.1
North Lake St. Clair	2	2.1
Thames River	11	11.6
South Lake St. Clair	3	3.2
Upper Detroit River	4	4.2
Lower Detroit River	1	1.1
Southwestern Lake Erie	1	1.1
Pelee Island	1	1.1
Total	95	---

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