

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
FISHERIES DIVISION

**STATUS OF THE FISHERIES AND SELECTED FISH SPECIES
IN MICHIGAN WATERS OF
LAKE ERIE AND LAKE ST. CLAIR**

1994



by

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Sport fisheries

An on-site creel survey conducted by the Michigan Department of Natural Resources (MDNR), produced a total harvest estimate for Michigan's 1994 Lake Erie sport fishery (non-charter) of 529,577 fish (Table 1). Walleye (35%) and yellow perch (44%) accounted for 79% of the total catch. The only other considerable contributions to the harvest were from white bass (9%) and channel catfish (6%). Angler effort continued on an increasing trend since 1992 (Table 2), but remained 78% lower than the effort spent on the fishery in 1988. Catch rates for both walleye and yellow perch declined from 1993 (Table 2).

Biological samples were collected from walleye and yellow perch during the 1994 on-site creel survey (Tables 3 and 4). Age 3 fish (1991 year class) dominated the walleye harvest, accounting for 52% of the catch. Harvested age 3 walleye averaged 403 mm (15.9 in.) total length. The 1990 year class contributed 18% of the total walleye harvest. Harvested age 4 walleye averaged 475 mm (18.7 in.) total length. Yellow perch harvest was dominated by age 2 fish, which accounted for 40% of the total. Other important year classes in the yellow perch harvest were 1991 (18%) and 1990 (25%). The average lengths of harvested age 2, 3, and 4 yellow perch were 200 mm (7.9 in), 223 mm (8.8 in), 231 mm (9.1 in) respectively. The observed mean length at age for yellow perch taken in the Michigan sport fishery has increased quite dramatically since 1989 (Table 5). This suggests that yellow perch growth in the Michigan waters of Lake Erie has improved substantially during the last five years.

Since 1989, Michigan charter boat operators have been required to report their charter fishing catch and effort to the MDNR. In 1994, Michigan charter boat anglers harvested 44,577 fish from Lake Erie (Table 6). Walleye (69%) and yellow perch (28%) were the major species in the charter boat harvest, accounting for 97% of the catch. While charter boat catch rates for walleye were over 3 times higher than those estimated for non-charter anglers, yellow perch catch rates were about the same for charter and non-charter anglers.

On Lake St. Clair and the St. Clair River, charter boat anglers harvested 10,366 fish (Table 7). Yellow perch (70%) and "other" species (20%) made up the bulk of the catch, accounting for about 90% of the total harvest. The "other" species category is thought to consist mainly of smallmouth bass and muskellunge. Walleye accounted for about 10% of the 1994 charter boat harvest on Lake St. Clair.

During the period since 1989, walleye catch rates have remained relatively stable for Lake Erie charters, but declined markedly after 1990 for Lake St. Clair charters (Table 8). The 1994 Lake St. Clair charter catch rate for walleye, 0.1231 fish/angler hour, is the lowest recorded since the charter boat reporting system was implemented in 1989. Since 1990, the walleye catch rate has declined about 60%. Concurrently, the number of charter excursions reported for Lake St. Clair has also declined by about 60%. We suspect that the decline in walleye catch rates for charter fishing on Lake St. Clair is a major factor in the decline in charter excursions on the lake.

The Lake St. Clair charter boat catch rate for yellow perch in 1994 (0.8547 fish/angler hour) is the highest observed during the 1989-1994 period. In fact, yellow perch catch rates for Lake St. Clair charter boats have increased about 5-fold since 1989. 1994 is the first time the reported charter boat catch rate for yellow perch on Lake St. Clair was higher than that for Lake Erie charter boats.

The 1994 charter boat catch rate for "other" fish species on Lake St. Clair, primarily smallmouth bass and muskellunge, recovered from the low observed in 1993, to a level comparable with those of 1989 - 1991. However, since these catch rates are not based on targeted effort, it is possible that shifts in fishing effort

from other species to yellow perch have affected the catch rates for the “other” species. Anecdotal fishing reports from Lake St. Clair anglers suggest that yellow perch, smallmouth bass, and muskellunge fishing remained excellent, while walleye fishing remained rather poor for the 1994 fishing season.

Despite the lack of creel survey data for Lake St. Clair, it is apparent that the muskellunge fishery is likely better now than during any other period in modern history. Angler reports indicate that catch rates in the 1990's have reached almost unheard of levels. We believe that the quality of the Lake St. Clair muskellunge fishery is also reflected in the MDNR's Master Angler Program. The number of muskellunge from Lake St. Clair entered for Master Angler Awards in 1994 was higher than for any other year for which records are available (Table 9). The number of fish over 30 pounds in weight that were entered was also the highest on record.

Commercial fishery

In 1994, three licensed commercial seine operations in the shallow embayments along Michigan's Lake Erie shoreline harvested nine species for a total of 136,382 pounds (Table 10). In combination, common carp (85%), quillback (7%), and channel catfish (4%) accounted for 96% of the total harvest by weight. The total value of the 1994 Lake Erie commercial harvest from Michigan waters was estimated at \$27,953.

Netting surveys

The Michigan waters of the western basin of Lake Erie have been monitored with spring trap net surveys since 1978. In 1994, total catch per net lift (CPUE) for all species combined was the second lowest recorded since 1978 (Table 11). Only walleye, smallmouth bass, redhorse, goldfish, and quillback exhibited CPUE values above the 17 year means. Yellow perch CPUE was the lowest recorded since 1988. Comparison of mean yellow perch CPUE for the 1978-88 period (254.8/lift) with the 1989-94 period (82.7/lift) clearly illustrates the dramatic change in yellow perch catches at the spring trap net sites. This change is likely a result of a substantial decline in yellow perch abundance. We also suspect that net avoidance due to improved water clarity has contributed to low total CPUE since 1990.

Age 3 walleye made up 29% of the trap net walleye catch (Table 12), reflecting the strength of the 1991 year class. The 1990, 1987, and 1986 year classes were also well represented, accounting for 22%, 14%, and 11%, respectively. Based on mean length at age, no trend in walleye growth rates for Lake Erie is evident. A total of 2,006 walleye captured in the trap nets were tagged and released as part of the ongoing interagency tagging project. In addition, 540 walleye were captured with electrofishing gear on the Huron River, tagged and released.

Based on mean length at age from trap net samples, growth of Lake Erie yellow perch has improved over the past six years (Table 13). This improvement is most notable for males age 3 to age 6, and females age 4 to age 7. In fact, the appearance of age 2 males in the trap nets in recent years may be a reflection of the improved growth and subsequent earlier recruitment to our index trap nets.

In 1994, a total of 7,200 walleye were tagged by Ontario, Ohio, New York, and Michigan at 12 different Lake Erie sites. A total of 242 of those tags were recovered by fishermen for a single season reporting rate of 3.4%. The 1994 site-specific reporting rate varied from a low of 0.0% for the Buffalo River tag site, to a high of 6.8% for the Lackawanna tag site in New York. Other sites with reporting rates over 4.0% were

Maumee River (5.1%) and Sugar Rock (4.3%) in Ohio, and Shorehaven (4.5%) in New York. The Huron River (2.9%) and Monroe (3.7%) tag sites in Michigan waters experienced lower reporting rates.

There has been considerable concern among fishermen and resource managers over the apparent decline in walleye fishing success in Lake St. Clair and the St. Clair River. Geographical mapping of walleye tag recoveries (Figures 1) for 1994 illustrates the movement of walleyes from Michigan's Lake Erie tag sites into those waters. There is little evidence that walleye fishing has declined for the Lake Erie stocks.

Since 1978, the MDNR has fished variable mesh multi-filament gill nets at two locations in western Lake Erie each fall, as part of the interagency yearling walleye assessment program. From 1990 to 1994, variable mesh mono-filament gill nets were also fished in an effort to compare catches between the two gear types. During 1994, a total of 979 walleye were caught in eight net lifts. The yearling catch per net lift of 73.3 in multi-filament gill nets suggests that the 1993 year class is strong (Table 14). The 1991 year classes contribution of 61.5 fish per net lift is the third highest on record for age 3 fish. Only the extremely large 1982 and 1986 year classes exhibited higher CPUE's in the multi-filament gill nets as age 3 fish. In combination, the 1991 and 1993 year classes should support good walleye fishing in Michigan's waters of Lake Erie for the next several years. No trend in walleye growth is obvious from the mean length at age data for fish taken in the fall index gill net survey (Table 15).

Sport fishing regulations

As a result of a recent review of Michigan's Great Lakes fishing regulations, several changes in the sport fishing regulations have been implemented for the Michigan waters of Lake St. Clair and Lake Erie in 1995. Minimum size limits (MSLs) for largemouth and smallmouth bass have been increased from 12 inches to 14 inches. The MSL for northern pike has increased from 20 inches to 24 inches. The MSL for muskellunge has increased from 40 inches to 42 inches. The bag limit for yellow perch has declined from 100 fish to 50 fish.

In light of the concerns of the Ontario Ministry of Natural Resources over the status of the Thames River walleye stock, we have recommended that the Michigan sport fishing regulations for walleye in Lake St. Clair and the St. Clair River be modified. We are proposing an increase in the MSL from 13 inches to 15 inches for walleye from these waters, beginning in 1996. Of course, this change could be reversed at a later date if the OMNR believes that the Thames River stock has recovered.

Table 1. Estimated sport harvest, catch rate, and effort for Michigan's 1994 Lake Erie non-charter boat fishery. Two standard errors in parentheses.

| Species | Total C/H | April | May | June | July | August | Sept. | October | Total |
|-----------------|--------------------|--------------------|---------------------|---------------------|---------------------|--------------------|---------------------|--------------------|----------------------|
| Rainbow trout | 0.0001 (0.0001) | 0 (---) | 31 (53) | 19 (40) | 28 (58) | 0 (---) | 0 (---) | 0 (---) | 78 (88) |
| Northern pike | 0.0000 (---) | 0 (---) | 0 (---) | 0 (---) | 21 (43) | 0 (---) | 0 (---) | 0 (---) | 21 (43) |
| White sucker | 0.0000 (---) | 0 (---) | 0 (---) | 28 (57) | 0 (---) | 0 (---) | 0 (---) | 0 (---) | 28 (57) |
| Redhorse (spp) | 0.0000 (---) | 0 (---) | 30 (61) | 0 (---) | 0 (---) | 0 (---) | 15 (32) | 0 (---) | 45 (69) |
| Channel catfish | 0.0303 (0.0097) | 1,057 (1,141) | 4,054 (3,326) | 7,489 (4,605) | 5,201 (2,765) | 5,880 (4,010) | 4,046 (3,368) | 1,648 (1,417) | 29,375 (8,405) |
| White perch | 0.0142 (0.0049) | 0 (---) | 1,424 (860) | 1,010 (516) | 6,044 (2,562) | 2,335 (2,453) | 1,865 (2,017) | 1,065 (1,013) | 13,743 (4,322) |
| White bass | 0.0477 (0.0184) | 825 (1,145) | 31,399 (15,293) | 7,071 (4,303) | 969 (1,238) | 94 (135) | 2,726 (3,253) | 3,142 (3,021) | 46,226 (16,582) |
| Rock bass | 0.0013 (0.0006) | 0 (---) | 17 (23) | 40 (70) | 519 (423) | 120 (124) | 455 (342) | 62 (58) | 1,213 (566) |
| Pumpkin-seed | 0.0000 (---) | 0 (---) | 0 (---) | 0 (---) | 0 (---) | 0 (---) | 0 (---) | 39 (87) | 39 (87) |
| Bluegill | 0.0016 (0.0017) | 0 (---) | 30 (61) | 0 (---) | 165 (194) | 175 (302) | 811 (1,424) | 370 (666) | 1,551 (1,614) |
| Smallmouth bass | 0.0012 (0.0007) | 0 (---) | 89 (96) | 36 (47) | 376 (270) | 152 (179) | 426 (516) | 110 (110) | 1,189 (628) |
| Largemouth bass | 0.0003 (0.0003) | 0 (---) | 0 (---) | 0 (---) | 0 (---) | 0 (---) | 29 (64) | 277 (333) | 306 (339) |
| Black crappie | 0.0001 (0.0002) | 56 (121) | 0 (---) | 0 (---) | 0 (---) | 0 (---) | 15 (32) | 0 (---) | 71 (125) |
| Yellow perch | 0.2412 (0.0748) | 12 (26) | 5,694 (2,727) | 7,730 (2,626) | 15,417 (7,110) | 36,848 (19,722) | 131,916 (58,830) | 35,968 (14,158) | 233,585 (64,150) |
| Walleye | 0.1912 (0.0468) | 2,379 (1,488) | 63,206 (28,021) | 59,436 (17,410) | 55,356 (15,674) | 3,989 (2,759) | 754 (817) | 40 (60) | 185,160 (36,667) |
| Freshwater drum | 0.0168 (0.0062) | 677 (800) | 4,678 (3,562) | 5,850 (3,638) | 4,064 (1,907) | 360 (286) | 385 (376) | 263 (243) | 16,277 (5,521) |
| Other | 0.0007 (0.0004) | 42 (91) | 228 (192) | 211 (318) | 46 (93) | 33 (48) | 25 (54) | 85 (93) | 670 (411) |
| Total | 0.5469 (0.1117) | 5,048 (2,343) | 110,880 (32,420) | 88,920 (19,061) | 88,206 (17,774) | 49,986 (20,467) | 143,468 (59,078) | 43,069 (14,603) | 529,577 (76,538) |
| Angler hours | | 28,586 (13,383) | 204,849 (80,455) | 288,385 (75,045) | 255,951 (60,971) | 67,036 (36,710) | 95,501 (44,911) | 27,946 (11,344) | 968,254 (139,623) |
| Angler trips | | 7,472 (3,643) | 37,030 (14,320) | 50,537 (12,912) | 42,776 (10,179) | 12,795 (6,923) | 18,580 (8,807) | 5,575 (2,412) | 174,765 (24,899) |
| Angler days | | 7,354 (3,591) | 36,859 (14,307) | 50,235 (12,890) | 42,664 (10,166) | 12,622 (6,770) | 18,501 (8,762) | 5,564 (2,408) | 173,799 (24,809) |

Table 2.—Estimated sport harvest, catch rate (fish per hour), and angler effort for walleye and yellow perch from Michigan's Lake Erie sport fishery (non-charter), April 15 - October 31, 1986-1994. Two standard errors in parentheses.

| | 1986 | 1987 | 1988 ¹ | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|-------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|----------------------|----------------------|----------------------|----------------------|
| Walleye harvest | 605,666 (110,365) | 902,378 (151,024) | 1,996,824 (419,055) | 1,092,289 (205,068) | 780,239 (145,900) | 132,427 (22,873) | 215,599 (44,354) | 230,074 (47,319) | 185,160 (36,667) |
| Walleye catch rate | .291 (.064) | .367 (.077) | .458 (.121) | .288 (.068) | .314 (.071) | .164 (.037) | .272 (.069) | .260 (.066) | .191 (.047) |
| Yellow perch harvest | 844,294 (220,555) | 619,112 (385,740) | 318,786 (205,749) | 1,466,372 (242,822) | 769,736 (368,162) | 378,654 (80,078) | 236,908 (72,114) | 451,826 (126,436) | 233,585 (64,150) |
| Yellow perch catch rate | .406 (.117) | .252 (.160) | .073 (.049) | .386 (.084) | .310 (.156) | .470 (.129) | .299 (.102) | .510 (.162) | .241 (.075) |
| Angler hours | 2,079,668 (252,852) | 2,455,903 (308,709) | 4,362,452 (702,522) | 3,799,139 (545,688) | 2,481,670 (298,193) | 805,387 (120,402) | 792,737 (120,008) | 885,704 (134,495) | 968,254 (139,623) |

¹Sample period, May through September.

Table 3.—Mean length (mm), weight (g), and age distribution of walleye sampled from Michigan angler catch during 1994.

| Year class | Age | Number | Percent | Mean length | Mean weight (kg) |
|------------|-----|--------|---------|-------------|------------------|
| 1992 | 2 | 14 | 3.7 | 364 | 0.42 |
| 1991 | 3 | 199 | 52.2 | 403 | 0.58 |
| 1990 | 4 | 70 | 18.4 | 475 | 0.98 |
| 1989 | 5 | 9 | 2.4 | 504 | 1.13 |
| 1988 | 6 | 16 | 4.2 | 520 | 1.26 |
| 1987 | 7 | 27 | 7.1 | 544 | 1.40 |
| 1986 | 8 | 22 | 5.8 | 584 | 1.85 |
| 1985 | 9 | 10 | 2.6 | 565 | 1.68 |
| 1984 | 10 | 10 | 2.6 | 634 | 2.54 |
| 1983 | 11 | 3 | 0.8 | 667 | 2.77 |
| 1982 | 12 | 1 | 0.3 | 686 | 2.86 |
| All fish | | 381 | | 456 | 0.92 |

Table 4.—Mean length (mm), weight (g), and age distribution of yellow perch sampled from Michigan angler catch during 1994.

| Year class | Age | Number | Percent | Mean length | Mean weight (g) |
|------------|-----|--------|---------|-------------|-----------------|
| 1993 | 1 | 21 | 4.2 | 159 | 47 |
| 1992 | 2 | 202 | 40.4 | 200 | 90 |
| 1991 | 3 | 88 | 17.6 | 223 | 137 |
| 1990 | 4 | 125 | 25.2 | 231 | 156 |
| 1989 | 5 | 40 | 8.0 | 242 | 184 |
| 1988 | 6 | 7 | 4.6 | 251 | 201 |
| 1987 | 7 | 9 | 1.8 | 248 | 202 |
| 1986 | 8 | 5 | 1.0 | 269 | 272 |
| 1985 | 9 | 1 | 0.2 | 302 | 318 |
| 1984 | 10 | 1 | 0.2 | 287 | 318 |
| All fish | | 499 | | 216 | 127 |

Table 5.—Mean length (mm) of yellow perch sampled from Michigan's Lake Erie sport fishery. Sample size in parentheses.

| Age | Survey Year | | | | | | | | | |
|------|-------------|-------|------|---------|------|-------|------|-------|------|-------|
| | 1989 | | 1991 | | 1992 | | 1993 | | 1994 | |
| 1 | — | — | 157 | (2) | 181 | (3) | 166 | (7) | 159 | (21) |
| 2 | 165 | (2) | 180 | (74) | 190 | (310) | 194 | (120) | 200 | (202) |
| 3 | 191 | (124) | 185 | (285) | 199 | (246) | 205 | (369) | 224 | (88) |
| 4 | 208 | (168) | 198 | (223) | 209 | (74) | 214 | (113) | 231 | (125) |
| 5 | 216 | (88) | 216 | (189) | 225 | (29) | 226 | (32) | 242 | (40) |
| 6 | 234 | (15) | 229 | (162) | 232 | (47) | 230 | (3) | 251 | (7) |
| 7 | 236 | (8) | 241 | (67) | 255 | (17) | 244 | (5) | 248 | (9) |
| 8 | 262 | (1) | 264 | (22) | 250 | (15) | 267 | (2) | 269 | (5) |
| 9 | — | — | 300 | (6) | 281 | (3) | 246 | (1) | 302 | (1) |
| 10 | — | — | — | — | 318 | (1) | 323 | (1) | 287 | (1) |
| Mean | 206 | (407) | 206 | (1,030) | 202 | (745) | 206 | (653) | 216 | (499) |

Table 6.—Total catch per hour, catch per excursion, number caught, and fishing effort (angler hours, trips, and charter excursions) for charter boats on Lake Erie, 1994.

| Species | Total catch per hour | Total catch per excursion | Month | | | | | | | Season Total |
|--------------------|----------------------|---------------------------|-------|--------|--------|-------|-------|-------|-------|--------------|
| | | | Apr | May | Jun | Jul | Aug | Sep | Oct | |
| Rainbow trout | 0.0002 | 0.0042 | 0 | 2 | 4 | 0 | 0 | 1 | 0 | 7 |
| Lake trout | 0.0009 | 0.0253 | 0 | 0 | 42 | 0 | 0 | 0 | 0 | 42 |
| Yellow perch | 0.2874 | 7.6713 | 0 | 316 | 380 | 402 | 2,487 | 6,788 | 2,369 | 12,742 |
| Walleye | 0.6964 | 18.5912 | 79 | 8,628 | 15,202 | 6,639 | 284 | 4 | 44 | 30,880 |
| Other | 0.0204 | 0.5455 | 0 | 234 | 464 | 191 | 16 | 1 | 0 | 906 |
| Angler hours | | | 173 | 10,753 | 20,813 | 8,731 | 1,184 | 1,734 | 953 | 44,341 |
| Angler trips | | | 33 | 1,964 | 3,857 | 1,674 | 214 | 346 | 183 | 8,271 |
| Anglers | | | | | | | | | | |
| Resident | | | 33 | 1,726 | 3,158 | 1,476 | 199 | 327 | 171 | 7,090 |
| Nonresident | | | 0 | 238 | 699 | 198 | 15 | 19 | 12 | 1,181 |
| Charter excursions | | | 7 | 394 | 768 | 337 | 49 | 71 | 35 | 1,661 |

Table 7.—Total catch per hour, catch per excursion, number caught, and fishing effort (angler hours, trips, and charter excursions) for charter boats on Lake St. Clair and the St. Clair River, 1994.

| Species | Total catch per hour | Total catch per excursion | Month | | | | | | | Season Total |
|--------------------|----------------------|---------------------------|-------|-----|-------|-------|-------|-------|-------|--------------|
| | | | Apr | May | Jun | Jul | Aug | Sep | Oct | |
| Coho salmon | 0.0008 | 0.0234 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 7 |
| Rainbow trout | 0.0001 | 0.0033 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Yellow perch | 0.8547 | 24.3512 | 0 | 686 | 252 | 1,015 | 1,313 | 2,309 | 1,706 | 7,281 |
| Walleye | 0.1231 | 3.5084 | 138 | 41 | 267 | 519 | 77 | 7 | 0 | 1,049 |
| Other | 0.2381 | 6.7826 | 0 | 0 | 562 | 887 | 349 | 217 | 13 | 2,028 |
| Angler hours | | | 81 | 480 | 1,533 | 2,766 | 1,746 | 1,472 | 441 | 8,519 |
| Angler trips | | | 23 | 81 | 245 | 396 | 239 | 201 | 63 | 1,248 |
| Anglers | | | | | | | | | | |
| Resident | | | 23 | 78 | 235 | 376 | 225 | 190 | 60 | 1,187 |
| Nonresident | | | 0 | 3 | 10 | 20 | 14 | 11 | 3 | 61 |
| Charter excursions | | | 9 | 20 | 58 | 91 | 56 | 48 | 17 | 299 |

Table 8.—Michigan charter boat catch and effort for Lake Erie and Lake St. Clair, 1989 - 1994.

| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|------------------------------|--------|--------|--------|--------|--------|--------|
| <u>Lake Erie</u> | | | | | | |
| Walleye Catch/hr | 0.7561 | 0.7449 | 0.6276 | 0.7882 | 0.8135 | 0.6964 |
| Total Walleye Catch | 14,868 | 33,379 | 24,640 | 34,017 | 40,302 | 30,880 |
| Y.perch Catch/hr | 1.3105 | 0.2941 | 0.3410 | 0.4148 | 0.4391 | 0.2874 |
| Total Y.perch Catch | 25,769 | 13,177 | 13,389 | 17,901 | 21,764 | 12,742 |
| Charter Excursions | 818 | 1,684 | 1,445 | 1,666 | 1,881 | 1,661 |
| <u>Lake St. Clair</u> | | | | | | |
| Walleye Catch/hr | 0.3446 | 0.3242 | 0.2040 | 0.1369 | 0.1992 | 0.1231 |
| Total Walleye Catch | 3,892 | 6,881 | 3,607 | 1,550 | 1,786 | 2,028 |
| Yellow perch Catch/hr | 0.1427 | 0.1375 | 0.1678 | 0.1410 | 0.4326 | 0.8547 |
| Total Y.perch Catch | 1,612 | 2,919 | 2,968 | 1,597 | 3,880 | 7,281 |
| Other species Catch/hr | 0.2103 | 0.2043 | 0.2577 | 0.4155 | 0.1598 | 0.2381 |
| Total "other" catch | 2,375 | 4,336 | 4,558 | 4,705 | 1,433 | 2,028 |
| Charter Excursions | 412 | 779 | 643 | 448 | 319 | 299 |

Table 9.—Summary of Lake St. Clair Great Lakes Muskellunge entered in the Michigan Department of Natural Resources Master Angler Program, 1986 - 1994.

| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|-----------------------|------|------|------|------|------|------|------|------|------|
| Entries | 8 | 18 | 19 | 16 | 14 | 13 | 25 | 15 | 34 |
| Max. wt. | 30.8 | 29.5 | 33.5 | 31.3 | 34.1 | 37.5 | 36.4 | 36.1 | 38.9 |
| Number over 30 pounds | 1 | 0 | 3 | 4 | 5 | 3 | 11 | 4 | 12 |

Table 10.—Commercial harvest (expressed as weight in pounds) from Michigan waters of Lake Erie in 1994.

| | Carp | Quillback | Channel catfish | Gizzard shad | White bass | Bullheads | Other ¹ | Total |
|-------------------|----------|-----------|--------------------|-----------------|---------------|-----------|--------------------|----------|
| Harvest | 116,212 | 9,353 | 5,946 | 2,103 | 1,819 | 659 | 290 | 136,382 |
| % of total | 85.2 | 6.9 | 4.4 | 1.5 | 1.3 | 0.5 | 0.2 | |
| Economic value | \$17,432 | \$4,676 | \$3,568 | \$252 | \$1,819 | \$165 | \$31 | \$27,953 |

¹ Others category includes gar, freshwater drum, and goldfish

Table 11.—Mean catch per trap net lift for all species commonly taken during spring trap net surveys in Michigan waters of Lake Erie, 1978-1994.

| Species | Survey year | | | | | | | | | | |
|----------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
| Walleye | 28.1 | 49.0 | 18.1 | 20.6 | 38.8 | 26.1 | 36.6 | 75.5 | 61.7 | 33.9 | 83.1 |
| Smallmouth bass | 0.1 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 |
| Yellow perch | 377.0 | 320.0 | 669.0 | 512.0 | 146.0 | 257.0 | 129.0 | 156.0 | 40.3 | 174.0 | 22.9 |
| Rock bass | 1.2 | 0.8 | 1.9 | 0.9 | 1.5 | 1.3 | 1.0 | 1.5 | 0.7 | 1.5 | 0.9 |
| White bass | 1.5 | 1.5 | 3.7 | 1.4 | 10.5 | 4.9 | 2.5 | 2.8 | 7.6 | 0.4 | 5.3 |
| White perch | 0.0 | 0.1 | 0.3 | 0.5 | 24.6 | 35.0 | 10.9 | 38.9 | 30.3 | 43.5 | 63.1 |
| Pumpkinseed | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 |
| Bluegill | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| Black crappie | 0.2 | 0.0 | 0.2 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 |
| Channel catfish | 3.5 | 9.7 | 5.4 | 5.8 | 4.9 | 10.6 | 4.6 | 5.5 | 5.4 | 2.7 | 3.5 |
| Brown bullhead | 0.2 | 1.1 | 1.6 | 1.9 | 1.7 | 4.2 | 2.5 | 1.5 | 4.1 | 0.9 | 9.2 |
| White sucker | 7.8 | 8.3 | 7.9 | 12.2 | 8.7 | 6.7 | 10.2 | 33.0 | 10.2 | 7.0 | 6.7 |
| Redhorse sp. | 2.4 | 1.2 | 0.6 | 1.0 | 0.8 | 1.5 | 1.7 | 1.4 | 1.3 | 1.7 | 1.8 |
| Freshwater drum | 37.4 | 66.8 | 14.0 | 42.9 | 13.4 | 23.5 | 25.1 | 30.6 | 25.3 | 9.1 | 15.6 |
| Common carp | 5.1 | 26.1 | 4.7 | 8.2 | 6.9 | 14.9 | 3.5 | 2.0 | 1.9 | 0.6 | 6.0 |
| Goldfish | 4.8 | 2.4 | 0.3 | 0.4 | 0.4 | 2.5 | 0.6 | 0.2 | 0.1 | 0.0 | 0.2 |
| Gizzard shad | 4.4 | 4.7 | 2.3 | 3.9 | 17.8 | 28.4 | 18.1 | 17.4 | 2.7 | 2.3 | 15.9 |
| Longnose gar | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bowfin | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Quillback | 4.0 | 18.6 | 1.8 | 2.0 | 2.4 | 5.6 | 2.0 | 1.9 | 1.7 | 1.8 | 1.5 |
| Stonecat | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 477.9 | 510.3 | 731.8 | 613.9 | 278.8 | 422.4 | 248.7 | 368.5 | 193.6 | 279.7 | 236.4 |
| Percent yellow perch | 78.9 | 62.7 | 91.4 | 83.4 | 52.4 | 60.8 | 51.9 | 42.3 | 20.8 | 62.2 | 9.7 |
| Percent white perch | 0.0 | 0.0 | 0.0 | 0.1 | 8.8 | 8.3 | 4.4 | 10.6 | 15.7 | 15.6 | 26.7 |
| Net lifts | 50 | 46 | 48 | 36 | 37 | 53 | 57 | 51 | 49 | 55 | 51 |

Table 11 contd.—Mean catch per trap net lift for all species commonly taken during spring trap net surveys in Michigan waters of Lake Erie, 1978-1994.

| Species | | | | | | | 1978-88 | 1989-94 | Overall |
|----------------------|-------|-------|-------|-------|-------|-------|---------|---------|---------|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | mean | mean | mean |
| Walleye | 35.9 | 23.8 | 95.9 | 37.7 | 39.2 | 53.0 | 42.9 | 47.6 | 44.5 |
| Smallmouth bass | 0.3 | 0.1 | 0.2 | 0.1 | 0.2 | 0.8 | 0.1 | 0.3 | 0.2 |
| Yellow perch | 251.5 | 41.7 | 94.6 | 35.0 | 50.2 | 23.2 | 254.8 | 82.7 | 194.1 |
| Rock bass | 0.8 | 0.3 | 0.8 | 0.5 | 1.2 | 1.0 | 1.2 | 0.8 | 1.0 |
| White bass | 4.7 | 0.9 | 1.6 | 0.5 | 0.1 | 1.1 | 3.8 | 1.5 | 3.0 |
| White perch | 233.0 | 40.5 | 56.8 | 5.1 | 0.0 | 14.7 | 22.5 | 58.4 | 35.1 |
| Pumpkinseed | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| Bluegill | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Black crappie | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 |
| Channel catfish | 4.1 | 9.0 | 6.0 | 4.6 | 4.6 | 5.4 | 5.6 | 5.6 | 5.6 |
| Brown bullhead | 3.9 | 13.1 | 4.3 | 4.0 | 1.6 | 1.1 | 2.6 | 4.7 | 3.3 |
| White sucker | 2.8 | 4.3 | 13.5 | 14.6 | 9.0 | 5.8 | 10.8 | 8.3 | 9.9 |
| Redhorse sp. | 0.6 | 0.4 | 0.6 | 3.1 | 3.6 | 1.8 | 1.4 | 1.7 | 1.5 |
| Freshwater drum | 6.4 | 5.1 | 25.6 | 8.9 | 20.7 | 8.8 | 27.6 | 12.6 | 22.3 |
| Common carp | 0.6 | 2.3 | 2.3 | 1.3 | 1.4 | 3.7 | 7.3 | 1.9 | 5.4 |
| Goldfish | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 4.4 | 1.1 | 0.8 | 1.0 |
| Gizzard shad | 0.3 | 2.3 | 0.0 | 0.6 | 0.3 | 0.3 | 10.7 | 0.6 | 7.2 |
| Longnose gar | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bowfin | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Quillback | 0.7 | 1.9 | 2.9 | 4.4 | 3.2 | 4.6 | 3.9 | 2.9 | 3.6 |
| Stonecat | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 546.2 | 145.8 | 305.5 | 120.5 | 135.2 | 129.6 | 396.5 | 230.5 | 337.9 |
| Percent yellow perch | 46.0 | 28.6 | 31.0 | 29.0 | 37.1 | 17.9 | 56.0 | 31.6 | 47.4 |
| Percent white perch | 42.7 | 27.8 | 18.6 | 4.2 | 0.0 | 11.3 | 8.2 | 17.4 | 11.5 |
| Net lifts | 55 | 82 | 29 | 55 | 40 | 45 | 48 | 51 | 49 |

Table 12. —Mean length (mm) of walleye caught in trap nets during spring surveys. Sample size in parentheses.

| Age | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | |
|-----|----------------|------|--------------|------|--------------|------|--------------|------|--------------|------|--------------|------|
| | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE |
| | Males | | | | | | | | | | | |
| 2 | 339 (48) | 3.0 | 346 (45) | 2.4 | 358 (145) | 1.5 | 365 (207) | 1.2 | 334 (31) | 4.5 | 353 (6) | 6.7 |
| 3 | 401 (831) | 0.7 | 400 (117) | 2.2 | 413 (379) | 1.0 | 433 (135) | 2.0 | 418 (460) | 1.0 | 409 (621) | 0.9 |
| 4 | 451 (246) | 1.5 | 442 (674) | 0.9 | 448 (280) | 1.6 | 462 (200) | 1.7 | 468 (57) | 3.4 | 464 (365) | 1.5 |
| 5 | 487 (147) | 2.3 | 478 (214) | 1.9 | 480 (933) | 0.9 | 493 (215) | 1.9 | 495 (127) | 2.8 | 494 (80) | 3.1 |
| 6 | 513 (73) | 4.0 | 521 (263) | 1.9 | 520 (183) | 2.4 | 514 (614) | 1.2 | 517 (151) | 2.5 | 520 (127) | 2.5 |
| 7 | 522 (269) | 1.8 | 531 (49) | 5.6 | 541 (254) | 1.8 | 546 (184) | 2.2 | 532 (270) | 2.0 | 536 (291) | 1.8 |
| 8 | 561 (25) | 7.2 | 540 (215) | 2.1 | 566 (84) | 3.2 | 563 (190) | 2.3 | 564 (89) | 3.5 | 551 (212) | 2.3 |
| 9 | 577 (5) | 20.4 | 570 (14) | 12.9 | 561 (43) | 5.2 | 579 (37) | 4.8 | 578 (34) | 5.5 | 569 (85) | 3.9 |
| 10 | 607 (8) | 12.5 | 589 (6) | 10.5 | — | — | 588 (35) | 5.1 | 586 (13) | 7.5 | 584 (27) | 6.4 |
| 11 | — | — | — | — | — | — | — | — | 579 (16) | 6.6 | 597 (14) | 8.2 |
| | Females | | | | | | | | | | | |
| 2 | — | — | — | — | — | — | — | — | 317 (3) | 5.3 | 349 (6) | 9.8 |
| 3 | 439 (19) | 4.8 | 435 (6) | 12.7 | 421 (6) | 7.8 | — | — | 430 (3) | 30.2 | 416 (66) | 3.6 |
| 4 | 479 (15) | 6.8 | 494 (103) | 2.8 | 496 (32) | 4.4 | 501 (23) | 5.6 | 515 (4) | 11.6 | 511 (172) | 2.2 |
| 5 | 531 (32) | 5.5 | 520 (27) | 21.6 | 534 (160) | 1.9 | 536 (21) | 6.5 | 550 (12) | 11.2 | 537 (19) | 7.8 |
| 6 | 585 (6) | 24.1 | 577 (25) | 8.0 | 584 (28) | 4.9 | 577 (57) | 4.7 | 569 (14) | 9.6 | 578 (24) | 7.4 |
| 7 | 599 (47) | 6.6 | — | — | 600 (36) | 6.1 | 607 (17) | 6.3 | 598 (67) | 3.9 | 613 (34) | 7.1 |
| 8 | 636 (8) | 9.2 | 620 (48) | 7.1 | 647 (12) | 13.4 | 654 (19) | 8.5 | 639 (25) | 10.4 | 611 (56) | 6.8 |
| 9 | 671 (3) | 14.8 | 651 (4) | 26.0 | 654 (28) | 5.8 | 671 (7) | 12.3 | 660 (23) | 6.7 | 646 (35) | 7.5 |
| 10 | 610 (3) | 23.2 | 672 (5) | 15.2 | 672 (3) | 40.2 | 681 (16) | 8.5 | 667 (12) | 10.7 | 672 (24) | 9.3 |
| 11 | 694 (3) | 53.2 | 707 (3) | 23.5 | — | — | — | — | 702 (14) | 7.7 | 644 (6) | 21.6 |
| 12 | — | — | 700 (3) | 23.8 | — | — | — | — | — | — | 683 (8) | 14.1 |

Table 13.—Mean length and standard error (SE) in mm for yellow perch caught in trap nets during spring surveys. Sample size in parentheses.

| Age | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | | 1994 | |
|----------------|------|-----|------|------|------|------|------|------|------|------|------|------|
| | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE | Mean | SE |
| Males | | | | | | | | | | | | |
| 2 | — | — | — | — | — | — | 159 | 9.7 | 177 | 2.5 | 168 | 3.5 |
| | | | | | | | (7) | | (4) | | (11) | |
| 3 | 169 | 2.9 | 175 | 6.7 | 189 | 4.7 | 181 | 2.3 | 185 | 2.1 | 189 | 3.9 |
| | (29) | | (3) | | (12) | | (31) | | (48) | | (24) | |
| 4 | 190 | 3.3 | 185 | 3.4 | 196 | 6.6 | 208 | 7.0 | 212 | 3.6 | 207 | 2.8 |
| | (24) | | (38) | | (11) | | (16) | | (25) | | (45) | |
| 5 | 215 | 3.4 | 205 | 3.3 | 210 | 4.7 | 221 | 6.7 | 233 | 7.2 | 217 | 5.7 |
| | (21) | | (29) | | (31) | | (8) | | (10) | | (26) | |
| 6 | 221 | 4.4 | 230 | 4.9 | 229 | 4.8 | 243 | 4.1 | 238 | 3.9 | 239 | 6.2 |
| | (20) | | (25) | | (21) | | (34) | | (8) | | (8) | |
| 7 | 251 | 7.3 | 233 | 5.7 | 244 | 5.0 | 238 | 4.2 | 250 | 5.4 | 252 | 3.4 |
| | (14) | | (10) | | (21) | | (25) | | (23) | | (8) | |
| 8 | 248 | 5.2 | 252 | 2.7 | 258 | 5.5 | 247 | 7.2 | 258 | 7.5 | 277 | — |
| | (4) | | (22) | | (8) | | (13) | | (6) | | (1) | |
| 9 | — | — | 266 | 9.8 | 255 | 4.4 | 278 | 12.9 | 260 | 4.2 | 257 | 4.1 |
| | | | (4) | | (6) | | (4) | | (10) | | (3) | |
| 10 | — | — | — | — | — | — | — | — | 248 | 14.4 | 250 | — |
| | | | | | | | | | (3) | | (1) | |
| Females | | | | | | | | | | | | |
| 3 | 189 | 4.5 | — | — | 237 | 13.0 | 233 | 6.8 | 224 | 4.4 | 216 | 3.7 |
| | (10) | | | | (4) | | (13) | | (31) | | (25) | |
| 4 | 207 | 2.1 | 213 | 7.1 | 255 | 10.2 | 243 | 6.7 | 239 | 3.8 | 239 | 3.4 |
| | (28) | | (17) | | (3) | | (22) | | (32) | | (47) | |
| 5 | 236 | 4.5 | 233 | 3.3 | 250 | 5.8 | 254 | 6.8 | 267 | 5.7 | 248 | 5.6 |
| | (39) | | (36) | | (21) | | (14) | | (24) | | (19) | |
| 6 | 272 | 5.2 | 252 | 5.5 | 253 | 5.5 | 276 | 4.3 | 281 | 5.0 | 286 | 5.8 |
| | (32) | | (28) | | (18) | | (23) | | (14) | | (16) | |
| 7 | 279 | 4.8 | 278 | 6.7 | 272 | 4.4 | 283 | 5.8 | 290 | 6.8 | 297 | 8.0 |
| | (15) | | (22) | | (24) | | (23) | | (12) | | (3) | |
| 8 | 284 | 4.3 | 290 | 3.9 | 279 | 13.4 | 296 | 6.0 | 311 | 6.6 | 306 | 8.0 |
| | (15) | | (17) | | (7) | | (21) | | (13) | | (4) | |
| 9 | — | — | 292 | 6.2 | 300 | 8.8 | 294 | 8.1 | 307 | 5.8 | 308 | 20.0 |
| | | | (15) | | (6) | | (3) | | (10) | | (3) | |
| 10 | — | — | 279 | 28.1 | — | — | — | — | 305 | 4.8 | — | — |
| | | | (3) | | | | | | (5) | | | |

Table 15. —Mean total length (mm) at age for walleye caught during fall in survey multi- and mono-filament gill nets (sample size in parentheses).

| Age | Survey year | | | | |
|-----------------------|-------------|-----------|-----------|-----------|-----------|
| | 1990 | 1991 | 1992 | 1993 | 1994 |
| Sexes combined | | | | | |
| 1 | 351 (64) | 345 (218) | 309 (252) | 331 (13) | 328 (415) |
| 2 | 418 (143) | 434 (68) | 414 (192) | 389 (246) | 407 (32) |
| 3 | 461 (107) | 463 (37) | 459 (40) | 445 (62) | 440 (340) |
| 4 | 487 (174) | 489 (40) | 487 (29) | 462 (11) | 476 (83) |
| 5 | 509 (34) | 500 (78) | 504 (55) | 501 (23) | 505 (17) |
| 6 | 532 (33) | 520 (6) | 530 (44) | 510 (13) | 523 (31) |
| 7 | 530 (7) | 544 (8) | 542 (5) | 548 (22) | 545 (20) |
| 8 | 568 (14) | 570 (8) | 627 (2) | 539 (3) | 556 (15) |
| 9 | — — | — — | — — | 541 (2) | 548 (4) |
| 10 | 637 (1) | — — | — — | — — | 578 (2) |
| Mean | 457 (577) | 415 (463) | 395 (619) | 418 (399) | 402 (959) |
| Males | | | | | |
| 1 | 354 (33) | 342 (97) | 305 (153) | 337 (5) | 324 (220) |
| 2 | 411 (95) | 418 (26) | 408 (139) | 385 (161) | 402 (24) |
| 3 | 452 (68) | 444 (17) | 449 (27) | 429 (39) | 434 (277) |
| 4 | 472 (117) | 472 (27) | 477 (22) | 447 (9) | 469 (72) |
| 5 | 500 (29) | 489 (63) | 492 (46) | 487 (18) | 498 (15) |
| 6 | 519 (28) | 504 (4) | 511 (26) | 510 (13) | 523 (31) |
| 7 | 530 (7) | 542 (7) | 542 (5) | 529 (16) | 536 (18) |
| 8 | 558 (11) | 550 (6) | 556 (1) | 539 (3) | 553 (14) |
| 9 | — — | — — | — — | 541 (2) | 548 (4) |
| Mean | 452 (388) | 422 (247) | 394 (419) | 416 (268) | 413 (677) |
| Females | | | | | |
| 1 | 348 (31) | 348 (121) | 316 (98) | 328 (8) | 333 (194) |
| 2 | 432 (48) | 444 (42) | 430 (52) | 398 (85) | 421 (8) |
| 3 | 477 (39) | 479 (20) | 478 (12) | 472 (23) | 468 (63) |
| 4 | 519 (57) | 525 (13) | 518 (5) | 532 (2) | 517 (11) |
| 5 | 563 (5) | 550 (15) | 577 (7) | 550 (5) | 564 (2) |
| 6 | 602 (5) | 552 (2) | 558 (18) | — — | — — |
| 7 | 604 (3) | 560 (1) | — — | 599 (6) | 629 (2) |
| 8 | 637 (1) | 629 (2) | 698 (1) | — — | 610 (1) |
| 10 | — — | — — | — — | — — | — — |
| Mean | 465 (189) | 408 (216) | 396 (193) | 422 (129) | 378 (281) |

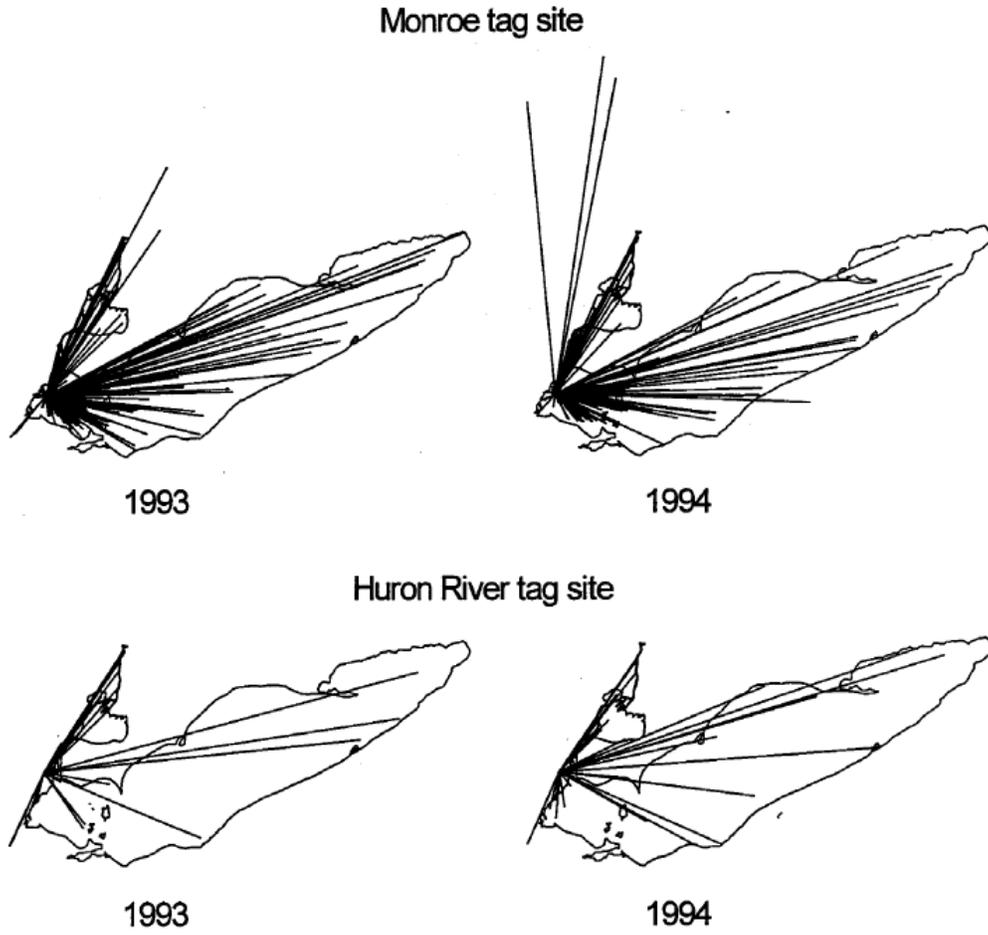


Figure 1. —Geographical distribution of walleye tag recoveries during 1993 and 1994 from fish tagged at the Monroe tag site (top graphs) and the Huron River (bottom graphs) on Lake Erie.