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MICHIGAN DEPARTMENT OF NATURAL RESOURCES

Fisheries Division

Technical Report: 73-31

December, 1973

MUSKELLUNGE MANAGEMENT
IN MICHIGAN

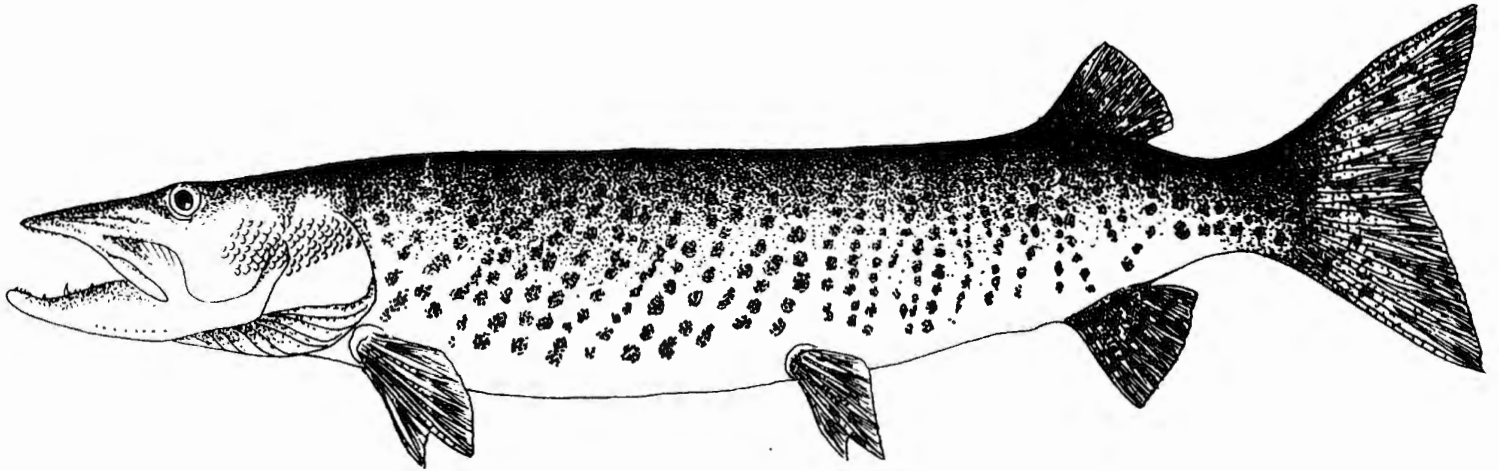
John D. Schrouder
Inland Fisheries Sepcialist

SUMMARY

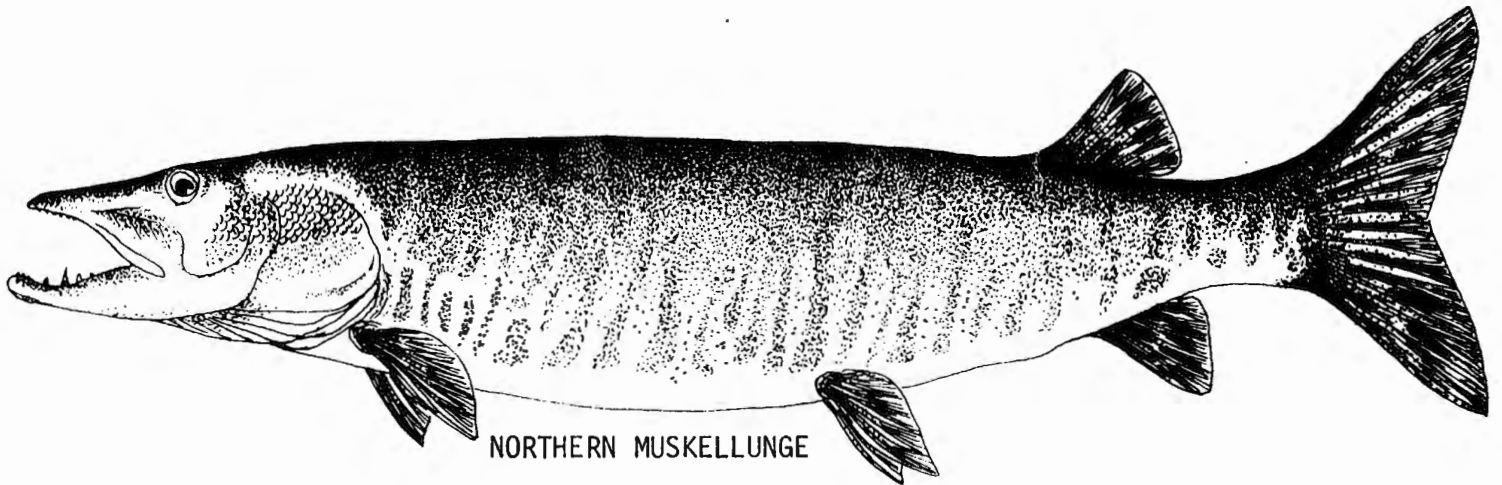
Muskellunge catch and effort data for 1971 and 1972 was reviewed to evaluate program costs and effectiveness. On a statewide basis, approximately one-half of the state's total harvest (15,000-20,000) were Great Lakes muskellunge from Lake St. Clair. Harvest rates for inland waters having Great Lakes musky were relatively low. Most of the inland harvest, and 40 percent of the statewide annual harvest of muskellunge, was comprised of tiger or hybrid muskies.

The identification, life histories, food habits, growth, reproduction, distribution and management of the three types of muskellunge found in Michigan (Great Lakes, northern and tiger) are also discussed. Growth rates for Great Lakes and northern muskellunge appear to be comparable in similar latitudes. Tiger growth seems to be faster than the purebred muskellunge through Age IV.

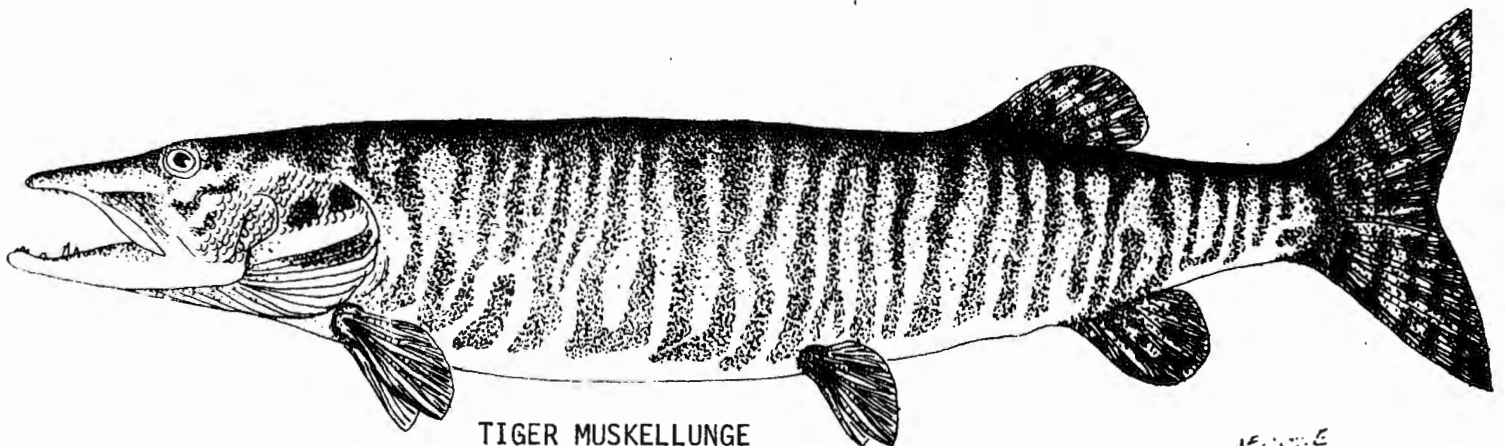
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GREAT LAKES MUSKELLUNGE



NORTHERN MUSKELLUNGE



TIGER MUSKELLUNGE

NEAL E
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MUSKELLUNGE MANAGEMENT IN MICHIGAN

John D. Schrouder, Inland Fisheries Specialist

Introduction

Great Lakes Muskellunge (Esox masquinongy) were once abundant enough in Michigan to support a limited commercial fishery. The seventh Biennial Report of the State Board of Fish Commissioners (1884-1886) reported that: "the muskellunge is known to fishermen of the entire coast. It is very large and not plentiful in any locality...it commands the highest price of any of the lake fishes."

In the mid 1950's there were about 15 lakes and streams where muskies provided a fishery (Williams, 1959). Since 1960, this number has been increased to 58 through increased hatchery production.

Rearing is accomplished by feeding the fish a diet of live minnows; a practice which is both extremely expensive and space consuming. One major breakthrough which may result in increased production has been the development of a new intensive culture technique. With this technique, muskellunge can be reared on artificial diets under intensive culture similar to trout and salmon.

Identification

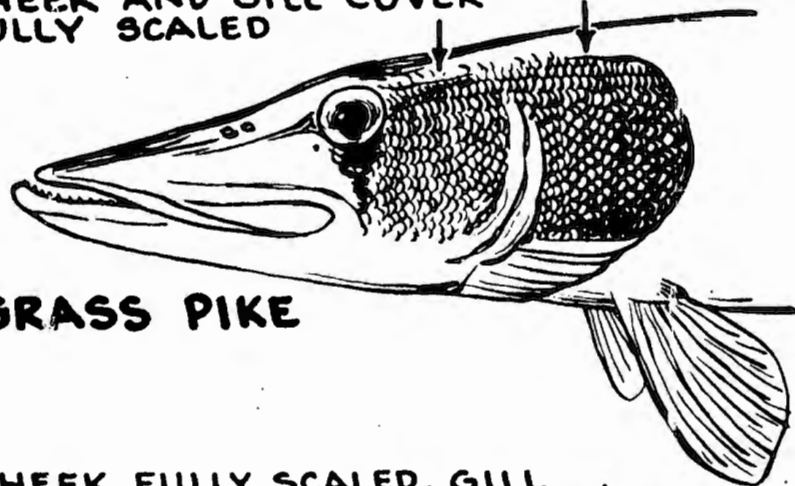
The muskellunge is the largest of the pike family (Esocidae) in Michigan, and can be distinguished from the northern pike by the scale pattern on its cheek and gill cover, (Figure 1). Only the upper one-half of both the cheek and gill cover is scaled on the muskellunge, whereas pike have the cheek fully scaled. Sensory pores on the lower jaws of the musky number six to nine while northern pike generally have five or less pores. Tiger muskellunge identification is more difficult since they possess characteristics similar to both parents. Tigers have the head scale pattern typical of the pike, cheek fully scaled and gill cover naked below (Figure 1). The number of sensory pores is variable, five to eight, which is more typical of muskies. The tiger's color pattern is also similar to that of the northern musky; both have longitudinal bars on their sides over a light background. The tiger's bars, however, tend to be darker and extend further ventrally than the northern's. The Great Lakes variety has a color pattern of dark spots over a light background and is relatively easy to differentiate from the pike (light spots on dark background) and other muskellunge. (See cover page.)

Food

Johnson (1958) indicated that immediately after yolk sac absorption, muskellunge fry feed on small zooplankton such as Daphnia sp., Cladocerans, and Ostracods. Zooplankton is utilized for 4-10 days, then young muskies begin feeding on other small fish. If other species are limited by the time muskies reach one inch, cannibalism often occurs (Williams, 1953).

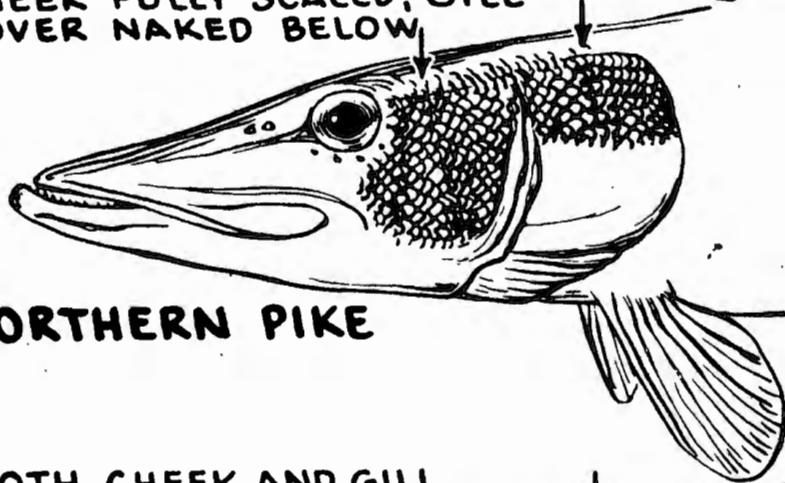
FIGURE 1 Muskellunge Identification

CHEEK AND GILL COVER
FULLY SCALED



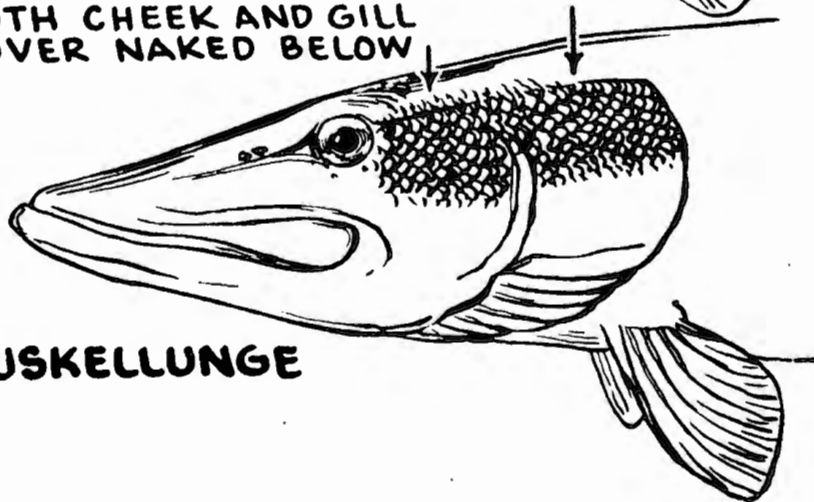
GRASS PIKE

CHEEK FULLY SCALED, GILL
COVER NAKED BELOW



NORTHERN PIKE

BOTH CHEEK AND GILL
COVER NAKED BELOW



MUSKELLUNGE

Once muskellunge begin to feed on fish, it remains their principal food item throughout life; although adults have been known to eat muskrats, ducks, and shrews. Soft rayed species are preferred. Turbid water may adversely affect feeding as muskellunge are sight feeders (Johnson, 1954a; Oehmcke, et al, 1958).

Habits

Muskellunge are generally sedentary fish of solitary habit; preferring to lie concealed among vegetation near channels, drop-offs, or shoals. They prefer water temperatures cooler than 78° F, but they may tolerate up to 90° F for short periods. Muskies normally inhabit water depths of less than 20 feet, but during the hottest months, have been found in depths to 40 feet (Oehmcke, et al). Relatively large, shallow, fertile lakes and reservoirs are generally the preferred habitat.

Fishing

Hook and line fishing for purebred muskellunge is not as productive as other types of fishing. Even among experienced fishermen, it may take 80 hours or more to boat a legal fish. Creel surveys conducted during 1955 and 1956 on Lake St. Clair revealed that for anglers unfamiliar with the lake and musky fishing techniques, 226 hours were needed to catch a fish (Williams, 1959).

Spear fishing during the open season (January through February) is even less productive. Williams reported in 1959 that between 209-378 hours were required per fish, depending on the lake and the year.

Tiger muskellunge, however, are voracious feeders and can be taken more readily than their purebred musky counterparts. Estimates from Michigan's 1970 creel census indicate that on the average only about 20 hours are required to catch a hybrid musky. Both purebreds and hybrids can be caught by trolling or casting with large lures (bucktail-spinners, spoons and floating or sinking plugs). Many fish are also taken on large suckers and chubs by still fishing or drifting.

In fishing, a common thrill is the sight of a 30 or 40 inch fish cruising in behind the lure. An unnerving characteristic of the musky is that of making long "follows" of the lure. Sometimes these "follows" are capped by a heart-stopping strike just as the lure is to be lifted from the water, but more often the angler is left open mouthed and shaken as the fish glides out of sight under the boat or back to his lair.

Distribution

Currently there are approximately 140,000 (90,000 Great Lakes and 50,000 inland) acres of water in Michigan which support muskellunge populations. Approximately 75 percent of the total inland musky acreage is occupied by the Great Lakes variety, while the northern muskellunge is found in only 6 percent (4,925 acres) of the inland water.

The northern variety was indigenous to only a few lakes in the western portion of the Upper Peninsula. Their distribution has been increased recently through introductory plants into a few selected Lower Peninsula waters--primarily for the creation of additional brood stock lakes for egg taking purposes (Figure 2). More than 17 percent (13,764 acres) of the state's inland musky water is now under tiger management. A listing of musky waters and their stocking histories is contained in Table 1.

Natural Reproduction

Muskellunge reproduce in relatively few waters, (Figure 3). The most notable area of successful natural reproduction of Great Lakes muskellunge is in Lake St. Clair. A few lakes in the western Upper Peninsula support northern musky reproduction. Hybrid tiger muskellunge are, for practical purposes, infertile.

Great Lakes muskellunge spawn in the spring when water temperatures reach 55-65° F, whereas northern muskies spawn at lower temperatures (48-58° F). The spawning habitat of the two varieties also differs. Great Lakes muskies spawn at the edges of river channels among logs and detritus and do not use shallow bays without current as does the northern variety. Both broadcast their eggs over a large area, a few at a time, and do not guard the eggs after spawning (Williams, 1959).

The Great Lakes muskellunge generally matures slowly. Although some females reach sexual maturity at 32 inches, numerous 37 inch immature females have been recorded. Males normally mature at a small size, between 26 and 30 inches (Williams, 1959).

Northern muskellunge reach sexual maturity at a smaller size. Females mature at the length of 32 inches (Age IV-VI). MacGregor, Scott, and Dean (1960) reported finding one mature female northern muskellunge 22.6 inches long. Males are generally sexually mature when they reach 26 inches in length.

Growth

Data from hundreds of fish samples throughout the state over the last 25 years demonstrate similar growth patterns for Great Lakes and northern muskellunge in similar latitudes. The state average for both is about four growing seasons to reach legal size, 30 inches. Females generally grow faster and larger than males. In southern Michigan where the growing season is longer, purebred musky have reached 30 inches in three years. In more northern latitudes (Bass Lake, Gogebic County) it has taken from five to seven years for known age fish to reach 30 inches.

Tiger musky growth data, although limited, indicates that the hybrid grows faster than either of the purebreds (Figure 4). Hybrids have reached 32 inches in just two growing seasons (Age I +) in the southern portion of the state (personal communication--James Copeland, 1972). Very little data is available for tigers over Age IV. The largest tiger caught to date weighed 28 pounds and 3 ounces.

FIGURE 2.

MICHIGAN MUSKELLUNGE WATERS MANAGED WITH AN ACTIVE STOCKING PROGRAM



TABLE 1. MUSKELLUNGE STOCKING
HISTORY
1966-1973

LOCATION COUNTY - WATER	VARIETY	YEAR AND NUMBER OF FINGERLINGS PLANTED								
		1966	1967	1968	1969	1970	1971	1972	1973	
Allegan -										
	Dumont Lake.....T.....							.92.....	.900.....	
	Ely Lake.....T.....								15,000 Fry.....	
	Osterhout Lake....T.....		3,000.....	151.....					.690.....	
Barry -										
	Clear Lake.....T.....		2,567.....						.580 (Art.Diet).....	
	Long Lake.....GL.....								17,000 Fry.....	
	Thornapple Lake...N.....		4,138.....		2,256.....	2,500.....	2,200.....			799.....
Branch -										
	Marble Lake.....T.....					3,900.....			1,500.....	
	Rose Lake.....T.....						1,602.....			
Cheboygan -										
	Indian R. Spreads..GL.....			180.....		.52A.....	.160.....		1,453 & 38,000 Fry.....	
						501.....				
Chippewa -										
	Caribou Lake.....T.....		3,746.....	2,000.....	3,500.....		2,000.....			
	Shelldrake									
	Flowage.....N.....		2,000.....							
Clare -										
	Budd Lake.....N&T.....	2,000.....	2,000.....		1,750.....	2,000.....	1,723.....	1,375.....		
	Lake George.....T.....	2,000.....								
	Muskegon River....T.....							1,375.....		
	Muskegon River....T.....							103,000 Fry.....		

Table 1 continued on next page.

TABLE 1. (Continued)

LOCATION COUNTY - WATER	VARIETY	YEAR AND NUMBER OF FINGERLINGS PLANTED							
		1966	1967	1968	1969	1970	1971	1972	1973
Delta -									
	Gooseneck Lake.....T.....					1,200		1,747	
	Big Bay De Noc.....T.....							4,095	
Dickinson -									
	Felch Mt.....T.....					50,000 Fry			
	Hancock Flowage.....T.....					100,000 Fry			
Gogebic -									
	Bass Lake.....T&N.....							1,000	800
	Dawn Lake.....T.....							8,000	
	Eel Lake.....T&N.....		250					100	
	Elbow Lake.....T.....					200			
	Marion Lake.....T.....			1,500	1,500				
	Moosehead Lake.....T&N.....	1,392	801					1,000	600
	Moraine Lake.....T&N.....	1,392	750					1,000	
	Plymouth Lake.....T.....					200 and			
						10,000 Fry			
Grand Traverse -									
	Rennie Lake.....T.....							1,000	1,500
Houghton -									
	Rice Lake.....T.....							3,000	2,866
	Boston Pond.....T.....					40,000 Fry			
Ingham -									
	Lake Lansing.....T.....					3,850		1,000	1,000

Table 1 continued on next page.

TABLE 1. (Continued)

LOCATION COUNTY	WATER	VARIETY	YEAR AND NUMBER OF FINGERLINGS PLANTED							
			1966	1967	1968	1969	1970	1971	1972	1973
Iron -	Emily Lake.....	N.....							963.....	
	Iron Lake.....	N.....	1,833.....	3,000.....		214.....		1,985.....	1,600.....	1,240.....
	Robinson.....	T.....					390.....			
	Runkle Lake.....	T.....					2,000.....	375.....		
	Stanley Lake.....	T.....				1,000.....		1,000.....		
Jackson -	Center Lake.....	T.....		2,832.....		7,600.....		3,044.....		1,355.....
	Norvell Lake.....	T.....							36,000 Fry.....	
Kent -	Big Pine Island...T.....								100.....	
	Campeau Lake.....	T.....	1,775.....			2,000.....	2,000.....	1,500.....		500.....
∞	Dean Lake.....	T.....				950.....	266.....		400.....	
	Lincoln Lake.....	T.....					3,000.....	1,529.....	1,300.....	
	Murray Lake.....	T.....					3,200.....	1,631.....	1,324.....	913.....
Keweenaw -	Bailey Lake.....	T.....							955.....	
Lapeer -	Lake Nepessingi...T.....		15,000.....	2,000.....	1,528.....	2,000.....		1,790.....	1,600.....	
			(Fry)							
Livingston -	Woodland Lake.....	T.....		1,500.....		2,900.....		1,250.....		1,200.....
	Whitmore Lake.....	T.....				1,697.....	4,274.....	818.....		
Luce -	Kak's Lake.....	T.....				1,500.....				152.....
	Stuart Lake.....	T.....		500.....						

Table 1 continued on next page.

TABLE 1. (Continued)

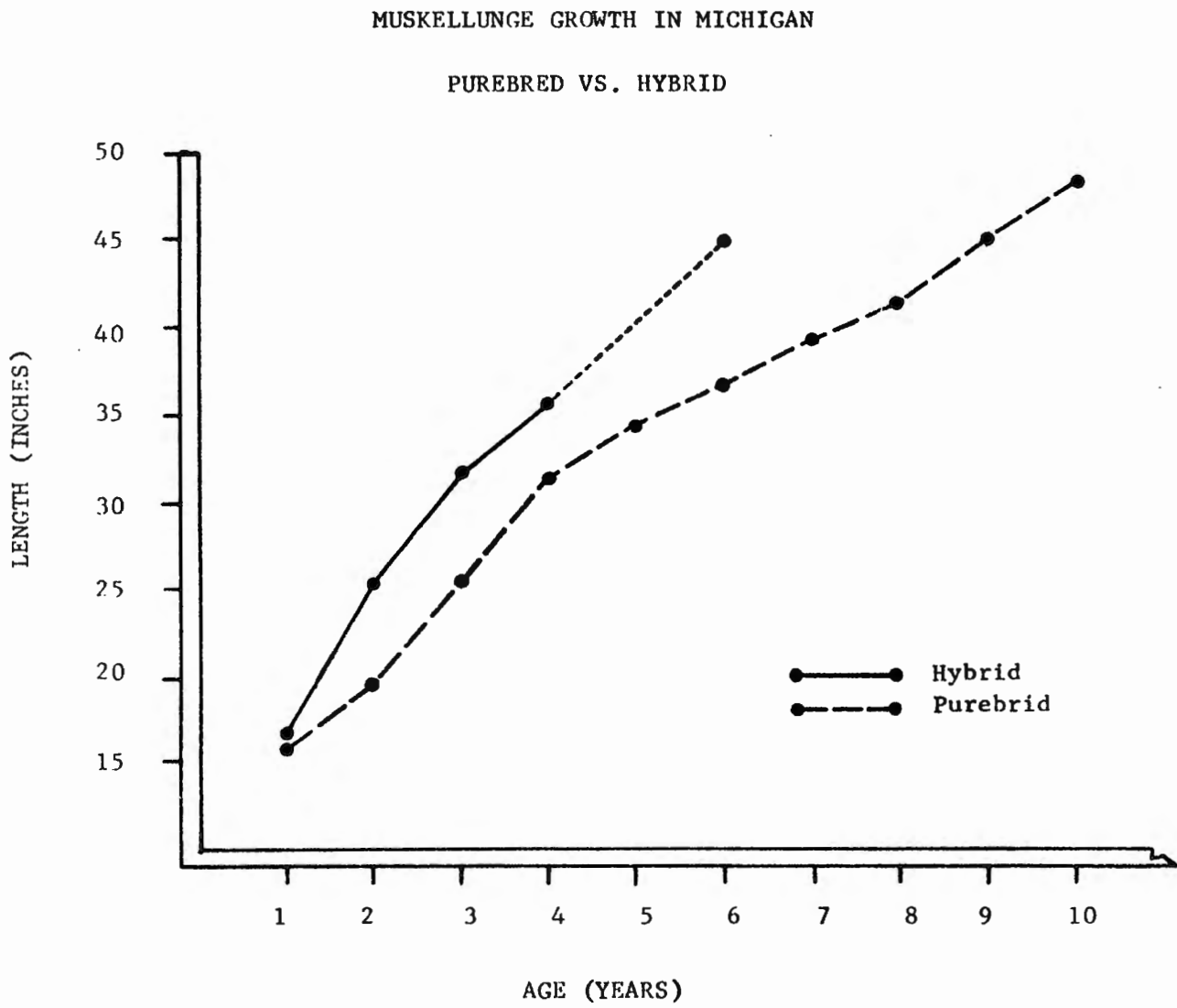
LOCATION COUNTY - WATER	VARIETY	YEAR AND NUMBER OF FINGERLINGS PLANTED							
		1966	1967	1968	1969	1970	1971	1972	1973
Mackinac -									
	Whitefish Lake....T.....							963.....	
Macomb -									
	Lake St. Clair...GL.....			987.....				30,000 Fry.....	
Marquette -									
	Lake Angeline....T.....				3,000.....	1,500.....	2,011.....		
Mason -									
	Bass Lake.....T.....				3,000.....		530.....	750.....	
	Hamlin Lake.....T.....				216.....	9,920.....	6,000.....	4,352.....	
Midland -									
	Sandford Lake....T.....					100,000 Fry.....			
Missaukee -									
	Long Lake.....T.....		1,000.....						
Oakland -									
	Haven Hill Lake...N.....				690.....				300.....
	Pontiac Lake.....T.....				1,799.....	2,500.....	1,000.....		
	Tipsico Lake.....T.....					1,000.....	600.....		
	Long Lake.....T.....		50,000 Fry.....						
	Heron Lake.....N.....				23,000 Fry.....		300.....		
Otsego -									
	Big Bear Lake....T.....				6,000.....		17,768 &.....		
	Round Lake.....T.....						100,000 Fry.....		
					5,000 Fry.....				

Table 1 continued on next page.

FIGURE 3. DISTRIBUTION OF MUSKELLUNGE NATURAL PRODUCTION IN MICHIGAN



FIGURE 4.



The largest officially recognized purebred muskellunge caught in Michigan was taken from Lake St. Clair. It was a Great Lakes musky and weighed 62 pounds and 8 ounces. Larger Great Lakes muskies have been reported, but were not officially authenticated. One fish reportedly caught in a pond net off the Sleeping Bear Dunes in Lake Michigan in the 1880's was said to have weighed 162 pounds and measured more than seven feet long. The skull of that fish, which was retained by Alvin Wescott of Glen Arbor, measured about 13 inches long and 20 inches in circumference more than seventy years later. If this fish could be substantiated it would easily break the current world's record--a 69 pound fish caught in New York in 1957. This world record fish was over 30 years old, as determined from vertebrae and scales. The average age of most musky creeled, however, ranges from three to six years, (Oehmcke, et al).

Harvest

Creel census data collected during the 1971 statewide post card survey (Jansen, 1972) is listed in Tables 2 and 3. Michigan's total muskellunge harvest from this survey was estimated to be 15,140 fish in 1971. Census data for 1972 indicates the total catch has increased by about 33 percent to 20,000. Using an average weight per fish of 10 pounds, the catch represents about 100 tons of musky.

Harvest rates for inland waters of Regions I and II having Great Lakes muskellunge, were consistently low (.06 and .05 muskies per acre per year). These waters receive very little stocking and natural reproduction sustains the fishery.

Approximately one-half (7,520) of the state's total harvest came from Lake St. Clair. The remainder of the catch was comprised of about 80 percent hybrids and 20 percent northern muskellunge. These figures point out two important points in Michigan's muskellunge program. First, the muskellunge spawning area in Lake St. Clair and the St. Clair River is critically important to the entire program. Second, the hybrid musky is contributing about 40 percent of the statewide annual harvest of muskellunge. This is significant in light of the fact that legal-size tiger muskies have only been available to fishermen in Michigan since 1969.

Data in Table 3 indicate a rather heavy harvest of tigers from Region III lakes, ~~7.57~~ fish/acre/year. In Lake St. Clair the harvest is only about 0.25 fish/acre/year.

1.03 -

Management Policy

Michigan's current program involves the stocking of a few highly suitable and strategically located lakes on the premise that these spectacular fish will add excitement, variety, and quality to the state's overall fishing opportunities. This species cannot be produced in a large enough quantity to be considered for general panfish control, but its presence in most lakes will be beneficial in this regard.

TABLE 2. Michigan's 1971 Muskellunge
Catch Totals

ALL MICHIGAN INLAND WATERS WITH ACTIVE
MANAGEMENT FOR WHICH HARVEST DATA WAS AVAILABLE FOR 1971

District	Harvest - 1971	Water	Acreage
2	200 est.	Iron ^N (est. standing crop - 400 Legals) Chicagon ^N	396 1,100
8	520	Budd ^T George ^T	175 134
9	320	Dean ^T Campeau ^T Tamarack ^T	35 190 323
10	880	Woodland ^T	290
11	2,380	Nepissing ^T Murphy ^N	414 209
12	200 est.	Dumont ^N Osterhout ^N Thornapple ^N	215 168 409
13	1,960 1,060	Center ^T Lk. Chain Marble ^T Whitmore ^T	1,404 780 667
TOTALS	Harvest	6,460 Muskellunge 5,560	6,909 acres

Musky harvest all managed waters = $\frac{0.80}{0.94}$ fish/ac./yr.
Tiger harvest all managed waters = $\frac{0.70}{0.92}$ fish/ac./yr.

^TTiger muskellunge (northern pike x northern muskellunge)
^NNorthern muskellunge
^{GL's} Great Lakes muskellunge

TABLE 3. MUSKELLUNGE HARVEST IN 1971 FROM ALL STATE WATERS

Region I: Musky Waters (Upper Peninsula)

District	Catch-Period		Water	Acreage
	1/1-6/30	7/1-12/30		
1	300	480	Bass ^{T&N}	187
			Eel ^T	44
			Moosehead ^T	43
			Moraine ^T	73
			Craig ^N	321
			LacVieu Desert ^N	1,530
2	100 est.	100 est.	Iron ^N	396
			Chicagon ^N	1,100
3	0	0	(Less than 5 harvested from Big Bay De Noc in 1971)	
4	0	160	Stuart ^T	77
			Tahquamenon R. ^N	350 ac.(70 mi.)
			Gulliver ^T	837
			Crooked ^T	168
			Indian ^T	8,659
			Caribou ^T	825
Brevort Lk. ^{GL's}	4,230			
subtotal	<u>400</u>	<u>740</u>		<u>18,836</u>
TOTALS	1,140		TOTAL ACREAGE	18,836

Table 3 continued on next page.

HARVEST = .06 muskies/ac./1971

^TTiger muskellunge (northern pike x northern muskellunge)

^NNorthern muskellunge

^{GL's}Great Lakes muskellunge

TABLE 3. (Continued)

Region II: Musky Waters (Northern Lower Michigan)

District	Catch-Period		Water	Acreage
	1-1/6-30	7-1/12-30		
5	100	320	Indian R. Spreads ^{GL's}	500
			Tomahawk Flowage ^N	40.5
			Black Lake ^{GL's}	10,130
			Intermediate Lakes ^{GL's}	1,515
7	200	0	Elk ^{GL's}	7,732
			Round ^{GL's}	2,561
			Long ^I	60.5
8	200	320	Budd ^T	175
			George ^T	134
sub totals				27,837
Total Harvest = 1,140			TOTAL ACREAGE	27,837 acres

Table 3 continued on next page.

Musky harvest/ac./1971 = 0.05

^NNorthern muskellunge

^{GL's}Great Lakes muskellunge

^TTiger muskellunge (northern pike x northern muskellunge-hybrid)

TABLE 3. (Continued)

Region III: Musky Waters (Southern Lower Peninsula)

<u>District</u>	<u>Catch-Period</u>		<u>Water</u>	<u>Acreage</u>
	<u>1-1/6-30</u>	<u>7-1/12-30</u>		
9	0	320	Dean ^T Campeau ^T Tamarack ^T	35 190 323
10	800	480	Woodland ^T	290
11	1,100	1,280	Murphy ^N Nepissing ^T	209 414
12	0(100 est)	0(100 est)	Dumont ^N Osterhout ^N Thornapple ^N	215 168 409
13	100	960	Center ^T (Big Wolf, Moon, Price, Mud) Whitmore ^T	850 1,404 667
14	0	0	Marble ^T	780
TOTALS	2,100	3,140		3,103 acres 5,104

Total Harvest - 5,240 or $\frac{1.03}{1.65}$ muskies/ac./yr.

^TTiger muskellunge (northern pike x northern muskellunge hybrid)

^NNorthern muskellunge

Musky lakes are currently managed to provide a trophy fishery. The open season runs from May 15 through February 29 on most waters. Although a winter spearing ban has been imposed on most lakes where muskellunge are stocked, the fish are still available to the tip-up fishermen. A minimum legal size limit of 30 inches is imposed on most lakes, but a special 36 inch size limit and artificial lure restriction applies on brood stock lakes. The creel limit for all waters is one fish per day except for a few waters which have catch and release regulations.

Stocking

Most waters are stocked annually or biennially with six to nine inch fingerlings at the rate of 2-4 per acre. This rate is based on an average expected survival rate of 20 percent (Figure 5) to age four or legal size. Fry (3/4 inch) or two inch fingerlings may be stocked after chemical renovation or in waters with low predator populations. Muskellunge angling success is generally good to excellent when there are from 0.5 to 1.0 legal size fish present per surface acre.

Northern muskellunge fingerlings are stocked primarily in lakes designated as brood stock lakes to establish assured sources of eggs for future production. As this priority is met, northern muskellunge will be planted in other suitable lakes.

Difficulties in rearing Great Lakes muskellunge have delayed program development for this variety. Once these difficulties are overcome, management efforts will be directed to a few choice sites selected because of their history of supporting this variety. Habitat protection and sound regulations, hopefully, will preclude the need to stock muskellunge in Lake St. Clair.

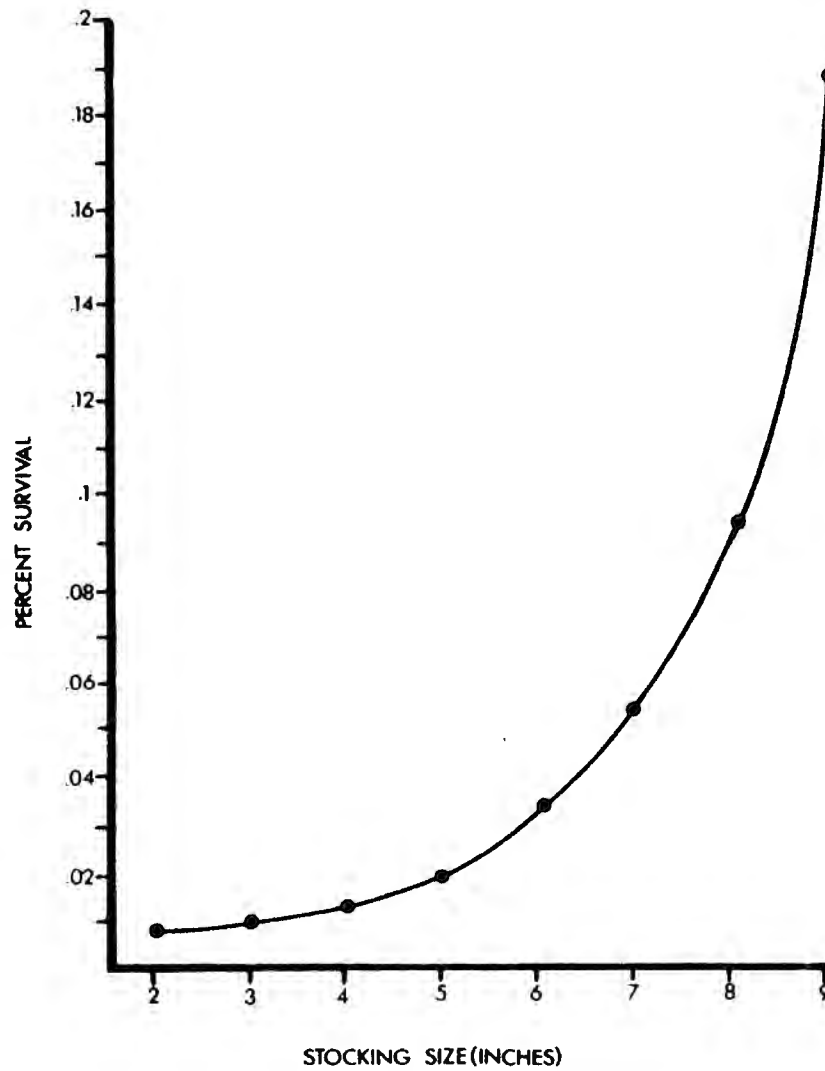
A new warmwater hatchery, scheduled for completion in 1976, will greatly improve current musky stocking capability. This facility is programmed to produce 500,000 fry, 100,000 three inch and 100,000 nine inch fingerlings annually.

Cost and Benefits

Hatchery costs for producing a legal-sized (Age IV) purebred or tiger musky are essentially equal, if reared by the same cultural technique and on similar diets. Currently, most muskellunge are reared extensively, in earthen ponds with standing water on a diet of zooplankton and minnows. With intensive culture in circular troughs supplied with flowing water and artificial diets (pelletized food), a substantial savings in rearing costs can be realized. Present rearing costs per survivor to Age IV with nine inch fingerlings produced by extensive culture is \$4.15. This cost could be reduced to \$2.78 with intensive culture, the technique to be employed in the state's planned new warmwater hatchery. Hatchery

FIGURE 5.

SURVIVAL OF HATCHERY
PRODUCED MUSKELLUNGE
TO AGE FOUR ¹



¹ Provided by the Penn. Fish Commission,
1989

costs and survival estimates for fingerlings reared under the various cultural techniques are as follows:

Fing. Size	%Surv. (Age IV) ¹	No. Stocked/Acre ²	Cost per Fing. ³			Cost per Survivor		
			Intensive 1	Extensive 2	Extensive 2	Intensive 1	Extensive 2	Extensive 2
3"	1.2%	83	\$0.019	\$0.026	\$0.028	\$1.54	\$2.14	\$2.30
6"	3.4	29	0.089	0.124	0.230	4.55	6.32	6.80
9"	19.0	5	0.526	0.732	0.787	2.78	3.86	4.15

In order to estimate the total cost per survivor, survey and evaluation costs must also be added. These are approximately \$2.50 per acre (one pre and post stocking evaluation survey). Therefore, when evaluation costs are added, the cost per survivor is \$5.28 and \$6.65 with nine inch fingerlings reared intensively and extensively respectively.

Unlike production costs, catch per unit of effort for the purebred and tiger are not similar. On the average, approximately 16 and 4 days are required to catch a legal purebred and tiger respectively. Considering only the days spent by fishermen to catch a legal fish, the purebred program would seem to provide the best angler day/cost ratio.

The fact that tigers generate fewer angler days per creel fish is probably related to their relatively high vulnerability to fishing, a favorable characteristic from the fisherman's standpoint. They are also suited to a wider range of waters than purebreds, including the more productive waters for growth in Michigan's Lower Peninsula. Because of these factors, Michigan will continue to stress hatchery propagation of tiger muskellunge for production stocking in selected waters.

¹Survival rates adopted by John Robertson from Union City Reservoir Study, Pennsylvania, 1969.

²Based on a goal of 1 adult (Age IV) per acre.

³Production costs prepared by John Robertson (1972). 1 = Artificial diet. 2 = Natural diet.

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MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

January 16, 1974

TO: Regional, District, Hatchery, Research and Great Lakes Biologists

FROM: John D. Schrouder, Inland Fisheries Specialist, Fisheries
Division

SUBJECT: Errata to Technical Report #73-31, "Muskellunge Management
In Michigan"

Attached please find a corrected Table 1 (Muskellunge Stocking History, 1966-1973), pages 5-10, which should be inserted in your copy of subject report.

Table 3 (Muskellunge Catch Totals) was also found in error. Please make the following corrections on your copies of Table 3:

1. Page 14 - The harvest total for District #13 should be changed from 1,960 to 1,060 which decreases the total harvest figure from 6,460 to 5,560. Therefore, musky harvest all managed waters and tiger harvest all managed waters should read 0.80 fish/acre/year and 0.70 fish/acre/year respectively.
2. Page 17 - The acreages for Whitmore and Marble Lakes, both in District #13, 667 and 780 acres were left off which changes the total acreage figure (3,103) to 5,104 acres. The harvest per acre (1.65) then should be corrected to read 1.03 muskies per acre per year.
3. Page 13 - The change in #2 above then, results in a correction in the reference in the fourth paragraph under Harvest. The first sentence in that paragraph should be amended to read as follows: "Data in Table 3 indicate a rather heavy harvest of tigers from Region III lakes, 1.03 fish/acre/year."

JDS:bjw
Attachment

cc: Fish. Div. Staff



FIGURE 2.

MICHIGAN MUSKELLUNGE WATERS MANAGED WITH AN ACTIVE STOCKING PROGRAM



TABLE 1. MUSKELLUNGE STOCKING
HISTORY
1966-1973

LOCATION COUNTY - WATER	VARIETY	YEAR AND NUMBER OF FINGERLINGS PLANTED							
		1966	1967	1968	1969	1970	1971	1972	1973
Allegan -									
	Dumont Lake.....T.....							92.....	900.....
	Ely Lake.....T.....								15,000 Fry.....
	Osterhout Lake....T.....		3,000.....	151.....					690.....
Barry -									
	Clear Lake.....T.....		2,567.....						580 (Art.Diet).....
	Long Lake.....GL.....								17,000 Fry.....
	Thornapple Lake...N.....		4,138.....		2,256.....	2,500.....	2,200.....		799.....
Branch -									
	Marble Lake.....T.....					3,900.....			1,500.....
	Rose Lake.....T.....						1,602.....		
Cheboygan -									
	Indian R. Spreads..GL.....			180.....		52A.....	160.....		1,453 & 38,000 Fry.....
						501.....			
Chippewa -									
	Caribou Lake.....T.....		3,746.....	2,000.....	3,500.....		2,000.....		
	Shelldrake Flowage.....N.....		2,000.....						
Clare -									
	Budd Lake.....N&T.....	2,000.....	2,000.....		1,750.....	2,000.....	1,723.....	1,375.....	
	Lake George.....T.....	2,000.....							
	Muskegon River....T.....								1,375.....
	Muskegon River....T.....								103,000 Fry.....

Table 1 continued on next page.

TABLE 1. (Continued)

LOCATION COUNTY - WATER	VARIETY	YEAR AND NUMBER OF FINGERLINGS PLANTED								
		1966	1967	1968	1969	1970	1971	1972	1973	
Delta -										
	Gooseneck Lake.....T.....					1,200		1,747		
	Big Bay De Noc.....T.....							4,095		
Dickinson -										
	Felch Mt.....T.....					50,000 Fry				
	Hancock Flowage.....T.....					100,000 Fry				
Gogebic -										
	Bass Lake.....T&N.....							1,000	800	
	Dawn Lake.....T.....							8,000		
	Eel Lake.....T&N.....		250					100		
	Elbow Lake.....T.....				200					
	Marion Lake.....T.....			1,500	1,500					
	Moosehead Lake.....T&N.....	1,392	801					1,000	600	
	Moraine Lake.....T&N.....	1,392	750					1,000		
	Plymouth Lake.....T.....				200 and					
					10,000 Fry					
Grand Traverse -										
	Rennie Lake.....T.....							1,000		1,500
Houghton -										
	Rice Lake.....T.....							3,000	2,866	
	Boston Pond.....T.....				40,000 Fry					
Ingham -										
	Lake Lansing.....T.....					3,850		1,000	1,000	

Table 1 continued on next page.

TABLE 1. (Continued)

LOCATION COUNTY	WATER	VARIETY	YEAR AND NUMBER OF FINGERLINGS PLANTED							
			1966	1967	1968	1969	1970	1971	1972	1973
Iron -	Emily Lake.....	N.....							963.....	
	Iron Lake.....	N.....	1,833.....	3,000.....		214.....		1,985.....	1,600.....	1,240.....
	Robinson.....	T.....					390.....			
	Runkle Lake.....	T.....					2,000.....	375.....		
	Stanley Lake.....	T.....				1,000.....		1,000.....		
Jackson -	Center Lake.....	T.....		2,832.....		7,600.....		3,044.....		1,355.....
	Norvell Lake.....	T.....							36,000 Fry.....	
Kent -	Big Pine Island.....	T.....							100.....	
	Campeau Lake.....	T.....	1,775.....			2,000.....	2,000.....	1,500.....		500.....
∞	Dean Lake.....	T.....				950.....	266.....		400.....	
	Lincoln Lake.....	T.....					3,000.....	1,529.....	1,300.....	
	Murray Lake.....	T.....					3,200.....	1,631.....	1,324.....	913.....
Keweenaw -	Bailey Lake.....	T.....							955.....	
Lapeer -	Lake Nepessingi.....	T.....	15,000.....	2,000.....	1,528.....	2,000.....		1,790.....	1,600.....	
			(Fry)							
Livingston -	Woodland Lake.....	T.....		1,500.....		2,900.....		1,250.....		1,200.....
	Whitmore Lake.....	T.....				1,697.....	4,274.....	818.....		
Luce -	Kak's Lake.....	T.....				1,500.....				152.....
	Stuart Lake.....	T.....		500.....						

Table 1 continued on next page.

TABLE 1. (Continued)

LOCATION COUNTY - WATER	VARIETY	YEAR AND NUMBER OF FINGERLINGS PLANTED								
		1966	1967	1968	1969	1970	1971	1972	1973	
Mackinac -										
	Whitefish Lake....T.....								963.....	
Macomb -										
	Lake St. Clair...GL.....			987.....					30,000 Fry.....	
Marquette -										
	Lake Angeline....T.....					3,000.....	1,500.....		2,011.....	
Mason -										
	Bass Lake.....T.....					3,000.....			530.....	750.....
	Hamlin Lake.....T.....					216.....	9,920.....	6,000.....	4,352.....	
Midland -										
	Sandford Lake....T.....						100,000 Fry.....			
Missaukee -										
	Long Lake.....T.....		1,000.....							
Oakland -										
	Haven Hill Lake...N.....					690.....				300.....
	Pontiac Lake.....T.....					1,799.....	2,500.....		1,000.....	
	Tipsico Lake.....T.....							1,000.....	600.....	
	Long Lake.....T.....		50,000 Fry.....							
	Heron Lake.....N.....					23,000 Fry.....			300.....	
Otsego -										
	Big Bear Lake....T.....					6,000.....			17,768 &.....	
	Round Lake.....T.....					5,000 Fry.....			100,000 Fry.....	

Table 1 continued on next page.

