

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-53-R-14

Study No.: 488

Title: Status of the Lake St. Clair fish community and sport fishery

Period Covered: April 1, 1997 to March 31, 1998

Study Objective: The objectives of this study are (1) to measure the abundance of yellow perch and other forage species in Lake St. Clair, (2) to monitor yellow perch diet and growth and compare with yellow perch populations of Saginaw Bay and Lake Erie, (3) to monitor the abundance and distribution of newly introduced exotic fish species in Lake St. Clair, (4) document the abundance and distribution of species of special concern, and (5) to monitor trends in sport fish catch rates for the Lake St. Clair fishery.

Summary: Fish populations were sampled with 10 m and 4.8 m headrope bottom trawls during 1997. Data entry for all trawl catch data in 1997 was completed. Trout-perch, spottail shiner, and mimic shiners dominated the trawl catches. Round goby trawl catch rates increased substantially in June, but declined in September. Special concern species sampled with trawls included channel darter and lake sturgeon. Sport fishing catch and effort information was collected with a voluntary angler diary program. Catch rates for walleye, yellow perch, smallmouth bass, and muskellunge increased in 1997. Yellow perch foraged extensively on invertebrates such as chironomids, ephemeroptera, amphipods, and isopods during June. Decapods, fish, and zooplankton became more common in the yellow perch diet in September. Lake St. Clair yellow perch have been found to prey on round gobies.

Job 1. Title: Sample yellow perch and forage with index trawls.

Findings: During 1997, fish were collected with a 10 m headrope bottom trawl in 12 tows in June and 18 tows in September from the Anchor Bay index site. In June, rainbow smelt, yellow perch, and trout-perch had the highest catch rates (CPUE expressed as catch per 10 minute tow). During September, mimic shiner, spottail shiner, trout-perch, and rock bass had the highest CPUE's. Comparison of spring and fall trawl CPUE's for Anchor Bay since 1993 reveals some interesting seasonal patterns (Table 1). Rainbow smelt are very abundant in June, but decrease to very low abundance in September, probably a result of the warmer water conditions found in Lake St. Clair during July and August. Similarly, yellow perch CPUE is consistently higher during June than during the fall sampling period. We suspect that yellow perch CPUE is low in September due to yellow perch distribution in macrophyte beds which are quite abundant by September. We are unable to effectively trawl in heavily vegetated areas of the lake. Mimic shiners are rather rare in the June trawls, but are one of the most abundant species in the fall trawl catch. No trends in catch rates across the time period from 1993-97 are evident. Samples of yellow perch were frozen for later analysis of age, growth, condition, and diet.

Job 2. Title: Sample exotic and other fish species with trawls.

Findings: In addition to trawls included under Job 1, exotic species and special concern species were sampled from June through October with a total of 236 trawl tows made lakewide. Lake St. Clair was divided into a 5 minute grid system. The 5 minute grids were grouped for the three main areas of the lake, the northwest portion or Anchor Bay, the southwest area, and the southeast area. Trawl locations were randomly selected from shoreline grids and offshore grids. Shoreline grids were sampled with the 4.8 m headrope trawls pulled by 18 foot work boats. Offshore grids were sampled with 10 m headrope trawls pulled by the RV Channel Cat.

Over 82,000 fish comprising 43 species were collected (Table 2) from a total of 236 trawl tows. Trout-perch (38.8%), spottail shiner (18.1%), mimic shiner (11.9%), and yellow perch (6.7%) were the most abundant species combining for over 78% of the total catch. The recently introduced exotic round goby ranked sixth in abundance (2.0%) with 1,654 collected lakewide. Round gobies were collected from all three areas of the lake and from both nearshore and offshore grids. In contrast, only 17 of the exotic tubenose goby were collected. Special concern species including channel darter (4), and lake sturgeon (90) were also collected.

Job 3. Title: Collect catch and effort data for sport fishery with angler diaries.

Findings: The Ontario Ministry of Natural Resources (OMNR) initiated an angler diary program in 1985 to monitor trends in the muskellunge catch rate for Lake St. Clair. Five years later the program was expanded to include other species. The Michigan Department of Natural Resources became involved in the program in 1993. Since that time, the program has been a cooperative effort between the OMNR and MDNR. In 1997, the MDNR distributed 87 angler diaries to Michigan resident sport anglers interested in participating in the diary program. A total of 53 diaries were returned by cooperating anglers during the fall and early winter.

The Lake St. Clair Angler Diary Program provides annual estimates of catch rates for the major sport fish species in the lake. Ontario and Michigan angler diary data were pooled to produced the 1997 estimates (Table 3). The walleye catch rate in 1997 was about 35% higher than in 1995 and the second highest for the five year period. Similarly, the yellow perch catch rate increased by over 36% and was the highest observed during the period. Smallmouth bass catch rates recovered from the low rate in 1996 to the highest rate observed since 1992. The 1997 muskellunge catch rate for Lake St. Clair was the highest for the five year period and the highest observed since the OMNR began the muskie diary program on Lake St. Clair in 1985 (personal communication, Don MacLennan, OMNR, Wheatley, ONT).

Job 4. Title: Identify and quantify perch stomach contents.

Findings: Lab processing of 589 yellow perch collected in June and September of 1996 has been completed. Chironomid pupae and larvae, ephemeroptera, amphipods, and isopods were all found in high percentages of the non-empty June stomach samples (Table 4). While chironimid larvae and ephemeroptera remained common in the September samples, decapods, fish, and zooplankton also became quite common as well. Yellow perch in Lake St. Clair have begun to forage on round gobies - two September stomachs were found to contain round gobies. Lab processing of yellow perch collected for diet analysis in 1997 is underway.

Job 5. Title: Analyze data and estimate growth rates for yellow perch.

Findings: Processing of yellow perch scale samples and diet samples collected in 1997 is underway. While no trend in yellow perch growth is apparent, based on mean length at age (Table 5), a couple of interesting points should be noted. Consistent with most yellow perch populations, Lake St. Clair female yellow perch grow considerably faster than males. Overall, Lake St. Clair yellow perch are growing near or at state average.

Evaluation of catch rate by age indicates the presence of strong and weak year classes in the population (Table 6). The 1992 and 1995 year classes appear weak, while the 1991, 1993, and 1994 year classes are comparatively strong. Variable recruitment is characteristic of yellow perch populations throughout the Great Lakes.

Job 6. Title: Prepare annual performance reports.

Findings: In addition to this study performance report, findings of work conducted under this study were summarized in an annual fisheries status report.

Table 1.—Mean catch per 10 minute tow for all species caught during spring (June) and fall (September or October) 10 m headrope index trawls in Anchor Bay, Lake St. Clair.

Species	Spring					Fall				
	1993	1994	1995	1996	1997	1993	1994	1995	1996	1997
Alewife	23.4	1.5	1.9	12.9	4.7	31.3	11.0	13.6	12.5	13.6
Banded killifish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Black crappie	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.1
Blackchin shiner	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Blackside darter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Bluegill	0.0	0.0	0.0	0.0	0.0	0.2	0.0	13.1	0.0	0.0
Bluntnose minnow	5.5	27.6	8.3	0.3	0.0	36.5	564.0	13.3	0.0	14.8
Brook silversides	0.0	0.0	0.0	0.0	0.0	0.2	1.6	0.5	0.0	0.1
Brook stickleback	5.1	27.8	1.0	0.0	0.0	0.2	0.7	0.1	0.5	0.0
Brown bullhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Channel darter	0.0	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1
Common carp	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.4
Common white sucker	0.2	0.5	0.0	2.4	1.6	0.3	0.7	0.1	0.2	1.0
Eastern sand darter	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Emerald shiner	0.2	0.0	0.1	0.3	0.1	0.7	0.0	1.9	1.7	0.5
Freshwater drum	0.3	0.7	0.1	2.9	5.5	1.9	0.4	2.0	0.5	0.3
Gizzard shad	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	4.9	0.0
Golden redhorse	0.0	0.0	0.0	0.1	0.2	0.9	0.0	0.0	0.1	0.1
Iowa darter	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Johnny darter	7.3	27.1	7.9	9.6	1.3	0.8	0.0	1.9	7.8	1.8
Lake sturgeon	0.2	0.0	0.0	1.0	0.2	0.1	0.0	0.0	0.8	0.0
Largemouth bass	0.0	0.0	0.0	0.0	0.0	0.3	24.3	8.2	0.0	0.0
Logperch	1.6	4.3	33.4	3.9	33.4	22.9	6.3	12.3	14.3	17.7
Longnose gar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mimic shiner	0.6	0.6	0.6	7.6	11.6	627.0	755.9	704.3	118.2	483.6
Muskellunge	0.0	0.1	0.0	0.0	0.1	0.0	1.4	0.3	0.1	0.1
Northern pike	0.1	0.3	0.0	0.0	0.2	0.0	0.2	0.6	0.0	0.2
Northern shorthead redhorse	0.3	1.5	0.4	3.4	3.0	0.6	0.0	0.5	0.1	0.2
Pumpkinseed	0.0	0.0	0.0	0.0	0.3	0.0	1.0	34.0	0.1	1.8
Quillback	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.4	0.1
Rainbow smelt	426.1	626.1	435.6	261.9	289.8	0.0	0.1	1.6	0.4	7.3
Rock bass	2.9	11.7	16.3	19.0	7.7	36.1	29.4	41.8	8.1	36.0
Round goby	0.0	0.0	0.1	2.1	6.3	0.6	0.2	8.9	29.0	4.3
Silver lamprey	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0
Silver redhorse	0.1	0.0	0.0	0.3	1.0	0.0	0.0	0.1	2.0	0.4
Slimy sculpin	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Smallmouth bass	0.0	0.1	0.1	0.1	1.4	6.7	1.6	1.3	6.0	4.7
Spottail shiner	3.9	10.1	10.9	78.7	54.1	23.2	3.2	32.0	7.5	215.2
Threespine stickleback	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trout-perch	21.9	4.9	23.0	102.1	152.8	27.3	8.5	67.6	342.6	40.8
Tubenose goby	0.0	0.1	0.3	0.1	0.0	0.0	0.3	0.6	0.0	0.0
Unid. redhorse	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.0
Walleye	0.6	0.7	0.7	2.0	4.6	0.2	0.3	1.9	3.2	0.6
White bass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
White perch	0.2	0.0	0.0	0.6	0.3	0.6	0.0	1.8	7.1	5.2
Yellow perch	62.4	117.1	346.9	523.0	247.5	14.9	17.0	33.8	15.1	11.8

Table 2.–Catch summary for 202 trawl tows on Lake St. Clair in 1997.

Species	Total catch	Percent of total	Species	Total catch	Percent of total
Trout-perch	32,095	38.8	Pumpkinseed	75	0.1
Spottail shiner	14,965	18.1	Silver redhorse	67	0.1
Mimic shiner	9,842	11.9	White bass	48	0.1
Yellow perch	7,982	6.7	Black crappie	47	0.1
Smelt	6,994	8.4	Banded killifish	43	0.1
Round goby	1,654	2.0	Common carp	36	<0.1
Logperch	1,372	1.7	Tube-nose goby	17	<0.1
Rockbass	1,265	1.5	Channel catfish	12	<0.1
White perch	1,106	1.3	Great lakes muskellunge	11	<0.1
Alewife	948	1.2	Quillback carpsucker	9	<0.1
Bluntnose minnow	910	1.1	Northern pike	7	<0.1
Smallmouth bass	693	0.8	Slimy sculpin	5	<0.1
Johnny darter	631	0.8	Silver lamprey	4	<0.1
Freshwater drum	341	0.4	Channel darter	4	<0.1
Emerald shiner	330	0.4	Brook stickleback	3	<0.1
Gizzard shad	326	0.4	Stonecat	2	<0.1
Largemouth bass	230	0.3	Longnose gar	1	<0.1
Walleye	149	0.2	Brown bullhead	1	<0.1
White sucker	134	0.2	Lake whitefish	1	<0.1
Bluegill	110	0.1	Greenside darter	1	<0.1
Lake sturgeon	90	0.1	Blackside darter	1	<0.1
Northern redhorse	86	0.1			

Table 3.—Angler effort, catch and catch rates for Lake St. Clair sport fishing diary program.

Year	Effort (rod-hours)	Number caught	Number kept	Catch per rod-hour
Walleye				
1992	5,558	1,331	1,223	0.24
1993	8,159	2,901	2,616	0.36
1994	7,808	1,983	1,878	0.25
1995	6,296	1,458	1,220	0.23
1996	6,102	1,906	1,685	0.31
1997	4,681	1,479	1,311	0.32
Yellow perch				
1992	3,148	6,017	4,297	1.91
1993	5,212	12,076	8,715	2.32
1994	5,548	12,331	8,508	2.22
1995	4,509	10,139	5,969	2.25
1996	3,462	10,654	5,846	3.08
1997	2,701	9,661	5,773	3.58
Smallmouth bass				
1992	2,326	1,512	608	0.65
1993	3,284	1,376	584	0.42
1994	2,484	995	352	0.40
1995	2,069	1,008	269	0.49
1996	1,537	545	190	0.35
1997	1,375	687	148	0.50
Muskellunge				
1992	9,799	742	16	0.076
1993	13,859	1,096	19	0.080
1994	19,069	1,628	22	0.090
1995	19,587	1,434	13	0.073
1996	15,629	1,458	12	0.093
1997	15,199	1,573	11	0.103

Table 4.—Frequency of occurrence (expressed as percent of non-empty stomachs containing each taxa) for yellow perch diet in Lake St. Clair, 1996.

Taxa	June	September
Amphipod	47.0	5.3
Chironomid larvae	84.1	33.6
Chironomid pupae	38.5	3.3
Decapod	1.9	7.2
Ephemeroptera	79.9	49.3
Gastropod	6.6	8.6
Hydracarina	1.1	0.7
Isopod	29.1	2.0
Pelecepod	0.3	0.0
All fish species	0.8	20.4
All zooplanton	0.3	19.1
Tricoptera	13.5	23.0
<i>Dressiena polymorpha</i>	1.9	0.7
Non-empty stomachs	364	152

Table 5.—Mean length at age (mm) for yellow perch from June Lake St. Clair trawls. Sample size in parentheses.

Age	Year				State
	1993	1994	1995	1996	Average
Males					
1	87.3 (6)	100.9 (38)	99.8 (44)	92.3 (10)	
2	129.8 (124)	138.6 (21)	148.4 (55)	127.7 (43)	
3	164.0 (22)	163.2 (187)	185.9 (9)	169.4 (46)	
4	179.0 (35)	190.8 (19)	207.9 (52)	204.0 (5)	
5	194.5 (13)	202.1 (34)	228.0 (8)	216.4 (38)	
6	— —	216.6 (17)	225.1 (12)	229.5 (10)	
7	210.3 (3)	227.0 (6)	243.0 (3)	236.8 (5)	
Females					
1	94.3 (7)	101.8 (10)	100.2 (46)	107.0 (3)	
2	134.2 (157)	146.5 (12)	146.9 (53)	129.4 (43)	
3	163.6 (17)	180.4 (155)	180.3 (3)	179.8 (59)	
4	193.1 (8)	196.3 (23)	220.5 (14)	198.8 (8)	
5	235.0 (13)	225.9 (34)	228.4 (8)	236.2 (38)	
6	— —	249.8 (4)	— —	248.6 (15)	
7	— —	267.0 (2)	281.5 (2)	— —	
Sexes combined					
1	89.9 (14)	96.7 (77)	100.0 (90)	95.7 (13)	102
2	132.2 (282)	142.0 (36)	147.7 (108)	128.6 (86)	145
3	163.9 (39)	170.7 (357)	184.5 (12)	175.2 (105)	173
4	181.6 (43)	194.0 (43)	210.6 (66)	200.8 (13)	198
5	199.9 (15)	207.5 (44)	228.1 (13)	223.0 (57)	221
6	— —	222.9 (21)	225.1 (12)	241.0 (25)	239
7	210.3 (3)	237.0 (8)	258.4 (5)	238.2 (6)	267

Table 6.—Catch rate by age for yellow perch in June index trawl tows on Lake St. Clair.

Year Class	1993	1994	1995	1996
1984	0.06	0.08	0.27	—
1985	0.00	0.23	0.00	—
1986	0.18	0.08	0.00	—
1987	0.00	0.62	0.27	0.13
1988	0.90	1.63	0.94	0.27
1989	2.80	3.68	2.15	1.24
1990	6.12	4.12	13.41	5.18
1991	51.3	47.01	32.09	18.69
1992	1.00	3.39	5.81	11.49
1993	—	56.28	125.80	171.41
1994	—	—	166.16	293.17
1995	—	—	—	21.42
1996	—	—	—	—

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