

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-53-R-13

Study No.: 488

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

Period Covered: April 1, 1996 to March 31, 1997

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 1996. Data entry for all trawl catch data in 1996 was completed. Yellow perch, trout-perch, and mimic shiners dominated the trawl catches. Round goby trawl catch rates increased substantially in 1996. Special concern species sampled with trawls included eastern sand darter, channel darter, and lake sturgeon. Lab processing of yellow perch diet samples collected in 1996 is completed and data entry in computer files is underway. Sport fishing catch and effort information was collected with a voluntary angler diary program. Catch rates for walleye, yellow perch, and muskellunge increased in 1996, while smallmouth bass catch rates declined.

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

Findings: During 1996, fish were collected with a 10 m headrope bottom trawl in 16 tows in June and 18 tows in September from the Anchor Bay index site. In June, yellow perch, rainbow smelt, and trout-perch had the highest catch rates (CPUE expressed as catch per 10 minute tow). During September, trout-perch, mimic shiner, and round goby 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 annually to very low abundance in September. Similarly, yellow perch abundance is consistently higher during June than during the fall sampling period. Mimic shiners are rather rare in the June trawls, but are one of the most abundant species in the fall trawl catch. Some trends in catch rates across the time period from 1993-96 are also evident. Spring yellow perch CPUE increased steadily over the 4 year period. Round goby CPUE increased greatly in 1995 and 1996. 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 168 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 72,000 fish comprising 49 species were collected (Table 2) from a total of 202 trawl tows. Yellow perch (31.8%), trout-perch (25.0%), and mimic shiner (10.9%) were the most abundant species combining for over 67% of the total catch. The recently introduced exotic round goby ranked eighth in abundance (2.1%) with 1,549 collected lakewide. Round gobies were collected from all three areas of the lake and from both nearshore and offshore grids. In fact, round gobies were found in 35 of the 38 grids sampled in 1996, illustrating their complete colonization of the lake. In contrast, only 29 of the exotic tubenose goby were collected. Special concern species including eastern sand darter (18), channel darter (2), and lake sturgeon (75) 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 1996, the MDNR distributed 104 angler diaries to Michigan resident sport anglers interested in participating in the diary program. A total of 63 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 1996 estimates (Table 3). The walleye catch rate in 1996 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 declined in 1996, continuing a general downward trend. In fact, the 1996 smallmouth bass catch rate was the lowest for the time period. The 1996 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: A total of 591 yellow perch from 24 trawl tows were processed for diet information. These fish were frozen in liquid nitrogen immediately upon capture to stop digestion. Stomach samples, and length and wet weight data were collected from each fish in the lab. Stomach contents were identified and enumerated with the aid of a stereoscopic microscope. Individual yellow perch and their stomach contents were oven dried and weighed. These data are in the process of being entered into computer files so that statistical analyses of growth and diet can be made.

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

Findings: While no trend in yellow perch growth is apparent, based on mean length at age (Table 4), 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. Age composition suggests that the 1992 year class (age 2 in 1994, age 3 in 1995, age 4 in 1996) was comparatively low in abundance, probably a result of poor recruitment in 1992.

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

Table 2.—Catch summary for 202 trawl tows on Lake St. Clair in 1996.

Species	Total catch	Percent of total	Species	Total catch	Percent of total
Yellow perch	23,123	31.8	White bass	47	0.1
Trout-perch	18,142	25.0	Banded killifish	43	0.1
Mimic shiner	7,928	10.9	Brook stickleback	32	<0.1
Spottail shiner	5,501	7.6	Tube-nose goby	29	<0.1
Smelt	3,884	5.3	Common carp	19	<0.1
Alewife	2,729	3.8	Brindled madtom	18	<0.1
White perch	2,599	3.6	Black crappie	18	<0.1
Round goby	1,549	2.1	Eastern sand darter	18	<0.1
Logperch	1,466	2.0	Tadpole madtom	16	<0.1
Rock bass	1,101	1.5	Quillback carpsucker	13	<0.1
Gizzard shad	962	1.3	Brown bullhead	9	<0.1
Bluegill	926	1.3	Silver lamprey	8	<0.1
Smallmouth bass	452	0.6	Great lakes muskellunge	3	<0.1
Johnny darter	364	0.5	Golden redhorse	3	<0.1
Bluntnose minnow	348	0.5	Sand shiner	3	<0.1
Pumpkinseed	270	0.4	Brook silversides	3	<0.1
Largemouth bass	226	0.3	Grass pickerel	2	<0.1
Walleye	151	0.2	Northern pike	2	<0.1
Emerald shiner	147	0.2	Channel catfish	2	<0.1
Freshwater drum	134	0.2	Unid. redhorse	2	<0.1
White sucker	96	0.1	Channel darter	2	<0.1
Lake sturgeon	75	0.1	Spotfin shiner	1	<0.1
Northern redhorse	64	0.1	Unid. minnow	1	<0.1
Creek chub	61	0.1	Hornyhead chub	1	<0.1
Silver redhorse	49	0.1	Greenside darter	1	<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
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
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
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

Table 4.—Mean length at age (mm) for yellow perch from June Lake St. Clair trawls. Sample size in parentheses.

Age	Year				State Average
	1993	1994	1995	1996	
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

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