

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-7

Study No.: 230436

Title: Vital Statistics of walleyes in Saginaw Bay.

Period Covered: October 1, 2005 to September 30, 2006

Study Objective: To determine exploitation, abundance, growth, mortality, movement, and recruitment for the walleye population in Saginaw Bay.

Summary: A total of 2,998 walleyes *Sander vitreus* were tagged in 2006 in the Tittabawassee River. The sex composition of walleyes collected for tagging in 2006 was 2.9 males for each female. A total of 310 tags were reported by anglers in 2005, representing 11 year classes. The tag recovery software, ESTIMATE was used to analyze tag returns. The tag recovery rate was 3.71% for 2005, yielding a corresponding corrected exploitation rate of 8.6%. Total annual survival for 2004 (the most recent year estimated) was 61.7%. The angler fishery for walleye in Saginaw Bay continues to only lightly exploit the walleye population and overall survival is high. This suggests that progress in walleye recovery is probably not being limited by the sport fishery and further harvest restrictions are not presently necessary. Age and growth analysis of 2006 samples are pending scale aging.

Findings: Jobs 1, 2, 3, and 4 were scheduled for 2005-06, and progress is reported below.

Job 1. Title: Tag walleyes.—In 2006, a total of 2,998 serially-numbered monel tags were applied to the jaws of walleyes below Dow Dam on the Tittabawassee River, a tributary to the Saginaw River and Saginaw Bay. Walleyes were collected with 230-volt DC electrofishing gear. We used a single boat and two tagging crews. About 700 walleyes were typically tagged per day. Tagging spanned about five days of work in early April. The collection effort also doubled as a spawn collection opportunity for the Michigan state hatchery system. The 2006 tagging effort brings the study total to 86,082 walleyes tagged since 1981. In 2006, about half or 1,500 of the jaw tagged walleye were also tagged with a passive integrated transponder (PIT) tag. This is part of a separate interagency companion study funded by the Great Lakes Restoration Act to assess jaw tag loss rate.

Biological data were collected from all walleyes handled as part of the tagging program. Fish were measured for total length to the nearest mm. Tagging was limited to fish meeting or exceeding the 381-mm minimum length limit in the sport fishery. Fish sex and maturity was determined from secondary sexual characteristics. Mature males were ripe and easily identified but fish identified as females could have included some immature individuals of both sexes. Scales were taken from all walleyes tagged. A subsample of these scales from the height of the run is being aged. A single day of scale collection was selected for aging when the sex ratio most closely approximated 1:1.

Job 2. Title: Process tag returns and analyze data.—The sex composition of walleyes collected for tagging in 2006 was 2.9 males for each female. Analysis of age structure and the corresponding growth rate of walleyes in the spawning migration has not yet been performed for 2006. The age structure of walleyes from the 2005 migration indicates little change from 2004 (Table 1). Strong year classes produced since 2003 had not yet matured sufficiently to recruit to the spawning run

as of 2005. In all, 12 year classes were represented in the 2005 spawning migration. Other biological analyses completed for the 2005 walleye spawning run included trends in growth rate.

In 2005, a total of 310 tags, spanning 11 year classes, were reported by anglers. Using the tag-recovery program, ESTIMATE–Model 1 (for year-specific survival, fishing, and reporting rates) (Brownie et al. 1985), for tag returns since 1990, the following values were estimated.

2005 recovery rate (percent)	3.71
95% confidence interval	3.05 – 4.38
2004 survival rate (percent)	61.68
95% confidence interval	45.75 – 77.61
Mean adult life span after tagging (years)	2.30
95% confidence interval	2.19 – 2.43

Recovery rates reported here are year-specific rates from the ESTIMATE analysis and are the most up-to-date values. The mean recovery rate for all years since 1990 was 3.32. Total annual mortality rate for walleyes from the estimated survival rate was 38.32% in 2005. Exploitation rate was estimated by expanding the year-specific recovery rate by a correction factor (for non-reporting) of 2.33, previously determined for Saginaw Bay, and was 8.6% for 2005. Overall, this suggests that progress in walleye recovery is probably not being limited by the sport fishery and further harvest restrictions are not presently necessary.

More background and the history of this study can be found in Keller et al. (1987) and Mrozinski et al. (1991) who summarized results through 1988. Fielder et al. (2000) summarized results from 1989 through 1997 and related the findings to other work on Saginaw Bay including movement based on tag returns. Results from 1998 – 2004 are summarized and reported in Fielder and Thomas (In Press).

Analysis and reporting of the 2006 fishing season tag returns will take place in 2007.

Job 3. Title: Prepare annual, final, and other reports.–The performance report was prepared. A seven year summary report spanning the findings from 1998 – 2004 is in press and will be coupled with the findings of Study 466 for the same time period. Although these studies were renewed in 2005, the in-depth summary report takes the place of a final report.

Job 4. Title: Publish manuscript.–Publication of the 1998–2004 summary report as a research report is complete and provided.

Fielder, D. G., and M. V. Thomas. 2006. Fish Population Dynamics of Saginaw Bay, Lake Huron 1998–2004. Michigan Department of Natural Resources, Fisheries Research Report 2083, Ann Arbor.

Literature Cited:

- Brownie, C., D. R. Anderson, K. P. Burnham, and D. S. Robson. 1985. Statistical inference from band recovery data: a handbook. U.S. Fish and Wildlife Service, Resource Publication No. 156.
- Fielder, D. G., J. E. Johnson, J. R. Weber, M. V. Thomas, and R. C. Haas. 2000. Fish population survey of Saginaw Bay, Lake Huron, 1989 - 1997. Michigan Department of Natural Resources, Fisheries Research Report 2052, Ann Arbor.
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- Keller, M., J. C. Schneider, L. E. Mrozinski, R. C. Haas, and J. R. Weber. 1987. History, status, and management of fishes in Saginaw Bay, Lake Huron, 1891-1986. Michigan Department of Natural Resources, Fisheries Technical Report 87-2, Ann Arbor.
- Mrozinski, L. E., J. C. Schneider, R. C. Haas, and R. E. Shepherd. 1991. Rehabilitation of walleye in Saginaw Bay, Lake Huron. Pages 63-84 *in* P. J. Colby, C. A. Lewis, and R. L. Eshenroder, editors. Status of walleye in the Great Lakes: case studies prepared for the 1989 workshop. Great Lakes Fishery Commission, Special Publication 91-1, Ann Arbor.

Table 1.—Age composition (percent) of walleyes sampled from Tittabawassee River (Dow Dam) during spring electrofishing, 1992-2005.

	Age														Mean age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14+	
1993															
Female	—	—	1.6	13.7	31.8	11.7	18.6	14.6	6.5	1.2	0.3	—	—	—	6.1
Male	—	—	33.3	25.6	14.2	12.6	9.0	2.9	1.1	1.3	—	—	—	—	4.6
1994															
Female	—	—	1.3	17.3	32.7	16.0	7.7	12.2	7.7	1.9	1.3	0.6	—	—	6.0
Male	—	—	4.9	18.9	12.8	10.4	13.4	17.1	12.8	4.9	1.2	—	—	—	6.5
1995															
Female	—	—	—	9.4	53.1	13.4	9.1	7.1	3.9	2.4	1.2	0.4	—	—	5.8
Male	—	—	1.3	9.0	20.5	21.0	12.7	14.0	12.5	7.6	0.7	0.4	0.2	—	6.7
1996															
Female	—	—	—	0.2	9.1	18.4	22.6	13.1	12.6	15.9	6.9	1.3	—	—	7.8
Male	—	—	0.6	0.8	6.3	16.1	18.9	21.9	18.4	13.0	3.1	0.9	—	—	7.8
1997															
Female	—	—	0.4	4.1	1.3	11.8	26.8	22.9	12.4	8.4	7.1	4.9	—	—	7.9
Male	—	—	—	1.5	0.3	15.2	23.6	27.3	16.1	9.2	4.0	2.0	—	0.6	7.9
1998															
Female	—	—	1.7	22.8	11.0	6.6	11.3	19.6	12.8	7.3	4.0	2.7	0.3	—	7.0
Male	—	—	6.8	9.3	3.4	4.8	16.4	22.7	17.7	10.3	6.2	1.5	0.9	—	7.6
1999															
Female	—	—	0.4	8.0	13.3	4.9	4.5	11.4	21.2	18.6	9.8	6.8	0.4	0.4	8.3
Male	—	0.6	1.7	13.2	8.5	5.2	7.4	23.5	19.8	12.4	4.5	1.2	0.8	—	7.6
2000															
Female	—	—	—	0.6	11.2	14.9	10.6	4.3	13.0	20.5	13.7	8.1	2.5	—	8.7
Male	—	4.4	11.7	2.2	9.0	11.4	5.8	8.2	21.8	14.1	8.3	2.5	0.6	—	7.4
2001															
Female	—	—	2.7	7.5	5.8	8.4	13.3	8.0	9.7	15.5	14.6	11.5	2.2	0.9	8.6
Male	—	—	25.4	9.5	3.0	9.1	10.5	11.0	14.2	9.5	5.4	1.9	0.5	—	6.6
2002															
Female	—	—	—	16.5	38.0	15.2	9.5	3.8	4.4	3.8	3.8	2.5	1.9	0.6	6.3
Male	—	—	0.8	31.4	28.9	7.1	7.9	7.5	2.9	7.1	4.2	0.8	1.3	—	6.0
2003															
Female	—	—	—	4.5	25.9	17.7	9.1	10.7	9.1	6.6	8.2	5.8	1.6	0.8	7.4
Male	—	1.2	5.5	13.1	26.2	17.7	12.8	11.9	4.9	4.0	2.0	0.6	—	—	6.1
2004															
Female	—	—	0.3	10.5	28.0	28.6	11.0	3.7	5.1	5.4	3.7	2.5	0.8	0.4	6.5
Male	—	—	9.7	6.3	16.2	25.2	13.3	11.7	4.5	6.5	3.8	1.8	0.7	0.4	6.6
2005															
Female	—	—	—	14.2	18.1	30.3	13.6	6.2	5.7	3.7	1.7	3.1	2.3	1.1	6.6
Male	—	—	6.1	6.1	13.3	26.1	11.2	7.9	8.5	8.1	3.8	1.6	1.1	—	6.6