

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-16

Study No.: 230763

Title: Investigation of stocking methods for expanding the steelhead fishery in Lake Huron

Period Covered: October 1, 2014 to September 30, 2015

Study Objectives:

- (1) Evaluate the effects of pen acclimation on returns to creel of spawning-phase steelhead (*Oncorhynchus mykiss*) at each of three ports.
- (2) Evaluate effect of size at stocking on returns to creel of spawning-phase steelhead at each of three ports.
- (3) Compare and describe recreational fisheries for spawning-phase steelhead produced by stocking in rivers with those produced by stocking in harbors lacking tributaries.
- (4) Assess diets and other life history parameters of steelhead so as to better understand the trophic niche occupied by the species and potential opportunities and limitations of this species in Lake Huron.

Summary: The final year of the stocking and marking phase of this study was completed in 2013 with direct plant and acclimation pens efforts at Van Etten Creek (Au Sable River), Harrisville, and Harbor Beach. A Great Lakes creel survey (Study 230499), covering 12 Lake Huron ports included in this evaluation, was conducted as planned during 2015 and snouts from AD-clipped steelhead (Rainbow Trout) were collected by creel clerks as well as “head hunters” from a multi-agency Great Lakes mass marking project. Since the first two years of returns documented a substantial steelhead fishery in the lower Au Sable River, an additional grant was secured to conduct a year-round creel survey of at this site from October 2012 through September 2014. By the end of the 2014 fishing season, 221 marked (coded-wire tag and adipose fin-clipped) steelhead from the direct plant and acclimation pen study groups stocked in 2011 and 166 marked steelhead from the study groups stocked in 2012 were collected from all 13 creel survey sites. Only 24 steelhead from the 2013 cohort were collected because they have not fully recruited to the fishery. Slightly more than half of all fish collected from all ports and cohorts have been from the direct plant groups (227 fish) compared to the imprinting net pen groups (184 fish). The ratios of direct plant to imprinting net pen returns vary between the three sites with ratios being approximately 1:1 for Van Etten Creek (Au Sable River) and Harbor Beach and 1.8:1 at Harrisville. The study design included stocking large yearling steelhead (210 mm) at one site each year with the other two sites receiving small yearling steelhead (180 mm); the site receiving the large fish would rotate each year of the study. The large yearlings were stocked in direct plants and acclimation pens in Van Etten Creek in 2011, Harrisville in 2012 and Harbor Beach in 2013. Since the 2013 cohort stocking at Harbor Beach had not fully recruited to the fishery at the end of the 2014 fishing season, comparisons of returns of small versus large yearlings will be deferred until 2015 results are known. Evaluation of coded-wire tag returns will continue until at least 2016. Electrofishing in the spring at stocking sites for spawning phase adults was largely discontinued in 2015 due to low capture numbers in 2012-2014. Field crews electrofished one night in April 2015 at Harbor Beach and collected and released one fin-clipped steelhead. The final report for this study was initially planned for preparation in 2017, but due to the nature of the preliminary returns of marked fish, we will assess in 2016 whether the study can be concluded a year early.

Findings: Jobs 3, 4, and 5 were scheduled for 2014-15, and progress is reported below.

Job 3. Measure return to creel.—A year-round creel survey of the lower Au Sable River was conducted, including the Van Etten Creek study site, from October 2012 through September of 2014. The creel data for 2014 at this location and 12 Lake Huron Great Lakes ports (Study 230499) were summarized and showed a drop in targeted salmonid effort and an increase in steelhead harvest relative to 2013 (Figure 1). Similarly, targeted salmonid effort was below the seven year average from 2008 to 2014 while steelhead harvest was above the average for the same time period. The top five ports ranked by targeted salmonid effort are Oscoda, Au Sable River, Alpena, Harbor Beach and Rogers City while the top five ports ranked by steelhead harvest are Port Sanilac, Alpena, Rogers City, Au Sable River and Harbor Beach (Figure 2).

Throughout the duration of this study, creel census clerks (Study 230499) collected snouts from adipose-clipped steelhead whenever possible. The U.S. Fish and Wildlife Service and Michigan Department of Natural Resources (MDNR) also funded “head hunter” positions from 2013–2015 to collect snouts of adipose-clipped salmonids from the Lake Huron and Lake Michigan recreational harvest through a collaborative mass marking project. Comparisons of relative return rates for direct-planted and imprinting net penned fish from the 2011, 2012 and 2013 cohorts (tables 1–3, Figure 3) stocked in Lake Huron show return rates for the 2013 cohort remain low and comparisons between ports and treatments may not be meaningful until those fish are fully recruited to the fishery. Creel surveys of the 12 major recreational fishing ports on Lake Huron were conducted as planned in 2015 under Study 230499. A detailed analysis of how the coded-wire tagged fish from this study contribute to the fishery during 2015 will be made in the final report after tag extractions and data analysis are completed.

Job 4. Collect life history data.—The Northern Lake Huron Management Unit electrofished the stocking sites at Van Etten Creek (Au Sable River) and Harrisville in the spring of 2012, 2013, and 2014 to determine if there was a significant return of adult steelhead to the northern study sites. During 2014, 42 adipose-clipped fish originating from this study were collected in 4.3 hours of electrofishing. No electrofishing was attempted at the northern study sites in 2015. The Southern Lake Huron Management Unit electrofished Harbor Beach for one hour in April 2015 and collected one adipose-clipped steelhead.

Although it is likely too soon to draw any conclusions regarding survival of all the test groups, the spring electrofishing demonstrated that most of the test groups were present and that a sufficient number of steelhead had returned as two- and three-year old fish to the Harrisville and Au Sable River study sites to produce a recreational fishery in those areas. Of the 2011 to 2013 stockings, only the 2011 and 2012 cohorts have fully recruited to the recreational sport fishery; thus coded wire tag returns should increase substantially in 2015 and 2016.

We collaborated with the U.S. Geological Survey - Great Lakes Science Center on a diet analysis of recreationally-caught fish from Lake Huron. A total of 97, 253, and 138 steelhead stomachs were collected in 2009, 2010, and 2011 (Roseman et.al 2014). We will use these data to describe the diet and food web niche of steelhead in Lake Huron in the context of the food habits of other Lake Huron predators.

Job 5. Write annual, final, and other reports.—This performance report was prepared. In addition, a project summary was completed (Attachment 1).

Table 1.—Number of coded-wire tagged steelhead returned from 2011 cohort by capture year, age, location, and treatment, 2011–2014.

Capture year	Age	Location and treatment					
		Van Etten Creek		Harrisville		Harbor Beach	
		Direct	Pen	Direct	Pen	Direct	Pen
2011	1	2	2	0	0	0	0
2012	2	20	20	10	2	1	2
2013	3	16	15	6	6	8	10
2014	4	31	26	11	7	12	14
	Total	69	63	27	15	21	26

Table 2.—Number of coded-wire tagged steelhead returned from 2012 cohort by capture year, age, location, and treatment, 2011–2014.

Capture year	Age	Location and treatment					
		Van Etten Creek		Harrisville		Harbor Beach	
		Direct	Pen	Direct	Pen	Direct	Pen
2012	1	1	2	1	0	0	0
2013	2	12	7	22	11	4	4
2014	3	16	19	29	16	14	8
	Total	29	28	52	27	18	12

Table 3.—Number of coded-wire tagged steelhead returned from 2013 cohort by capture year, age, location, and treatment, 2011–2014.

Capture year	Age	Location and treatment					
		Van Etten Creek		Harrisville		Harbor Beach	
		Direct	Pen	Direct	Pen	Direct	Pen
2013	1	0	0	1	0	0	1
2014	2	2	3	2	3	6	6
	Total	2	3	3	3	6	7

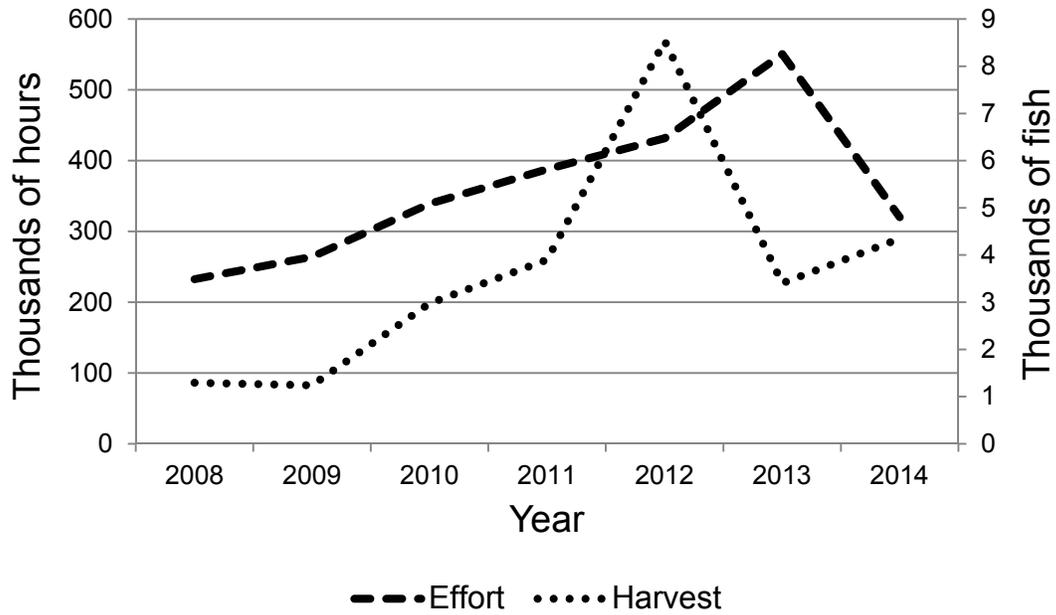


Figure 1.—Estimated lake-wide targeted salmonid fishing effort (left y-axis) and steelhead harvest (right y-axis) for 13 Lake Huron ports, 2008-2014.

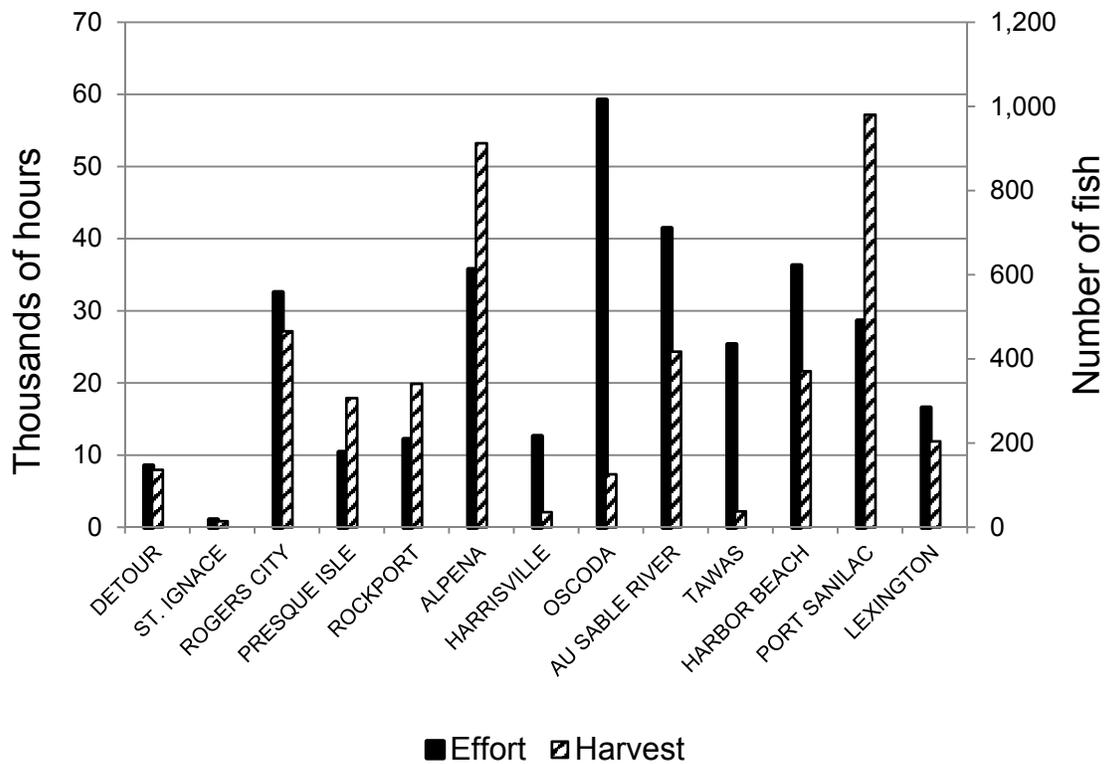


Figure 2.—Estimated targeted salmonid fishing effort (left y-axis) and steelhead harvest (right y-axis) by Lake Huron port, 2014.

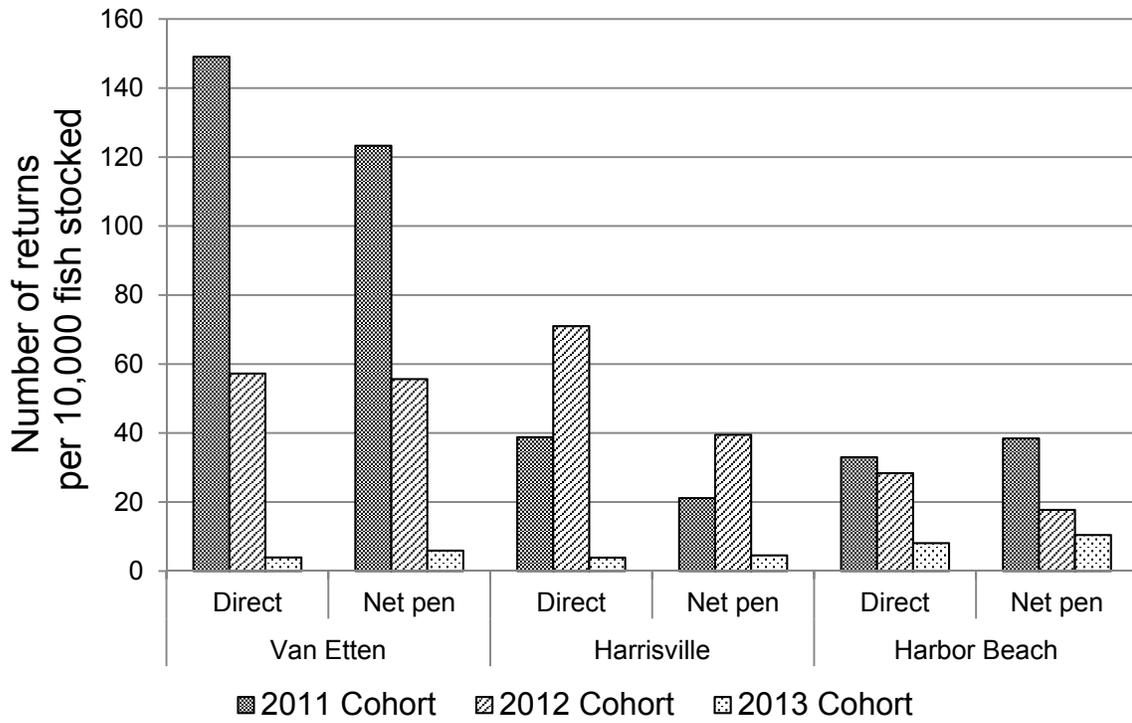


Figure 3.—Relative return rates for direct-plant and imprinting net pen steelhead, by stocking site, from the 2011, 2012, and 2013 cohorts.

References

Roseman, E. F., J. S. Schaeffer, E. Bright, and D. G. Fielder. 2014. Angler-caught piscivore diets reflect fish community changes in Lake Huron, Transactions of the American Fisheries Society, 143:6.