

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-1

Study No.: 487

Title: Performance, survival and production of steelhead strains in tributaries of Lake Michigan and Lake Huron.

Period Covered: October 1, 1999 to September 30, 2000

Study Objectives: To evaluate strain performance of winter (Michigan) and summer (Skamania) strains of steelhead. To evaluate the performance of steelhead planted in six rivers, Lake Michigan and Lake Huron. To evaluate returns of steelhead from upstream and downstream plants in rivers. To describe year-to-year variation in growth and survival of steelhead populations in Michigan. To define the quality, condition, and health of different strains and batches of hatchery-produced fish.

Summary: We completed the stocking of steelhead with coded-wire tags (CWTs) for this study in 1999. Study fish are returning to the fishery and are being recovered through volunteer angler returns, Great Lakes and river creel clerks, headhunters hired to look for study fish, and by Department of Natural Resources (DNR) personnel conducting assessment work for other studies. Some CWTs were collected from the river fisheries in 1998; and from 1999 until the present, we have conducted full river creel surveys on the Muskegon, Manistee, and Au Sable rivers. In 1996 and 1997, we collected 216 heads from fish marked for our study and in 1998, we recovered 895 fish. The number of fish collected in 1999 is nearly four times that amount, 3,491 steelhead (2,937 of which had tags). We are still collecting and analyzing heads returned from the 2000 fishery. Early results indicated that the upstream plants are returning better than downstream plants, and that both strains are returning at similar rates to the Lake Michigan fishery.

Job 2. Title: Mark, stock and release steelhead smolts in selected lake tributaries.

Findings: A total of 306,049 steelhead were tagged and released in 1996; 400,546 in 1997; 392,172 in 1998; and 378,864 in 1999. The last year of stocking for the study was 1999. Table 1 summarizes the allocation of coded-wire-tagged steelhead at each stocking site from 1996-1999.

Job 4. Title: Evaluate performance of upstream and downstream plants.

Findings: It is still premature to fully quantify the differences between upstream, midstream, and mouth plants. Adult fish of both strains have returned to Great Lakes and river creel collections. Michigan strain steelhead have been returning to river systems for several years while Skamania returned for the first time to study river systems to spawn in the fall 1998 and spring 1999 seasons.

As of 1999, midstream and upstream plants from the Muskegon River were returned at a greater rate to the lake fisheries (Lake Michigan and Lake Huron) than mouth plants were (Table 2).

Both Michigan and Skamania strain steelhead in the Manistee River also produced higher returns to the lake fisheries when stocked at the upstream site compared to the midstream (both strains) and mouth (Michigan strain) stocking locations (Table 2). In the Sturgeon River, Skamania strain steelhead returned in similar numbers from both upstream and mouth sites and the Michigan strain returned best to lake fisheries when planted at the mouth site (Table 2). Initial results for the St. Joseph River were less clear. We stocked steelhead at six sites on the St. Joseph River, the mouth, three midstream, and two upstream locations. Returns of Michigan strain steelhead to lake fisheries were similar for fish stocked at the mouth and midstream sites, but the highest returns were from the furthest upstream site (nearly 60 miles upstream). Skamania strain steelhead on the St. Joseph River returned best to the Lake Michigan fishery from a mid-stream site, Arden Pond, an extensive rearing facility. We again observed relatively high returns from upstream planting sites and the lowest returns from fish planted at the mouth. We continue to collect and compile data from 2000 collection efforts.

Results from the Au Sable River, based on Lake Huron returns through 1999, indicated a similar pattern to that observed for most of the Lake Michigan rivers. The upstream plants of Michigan strain steelhead have returned to the Lake Huron fishery at a greater rate than mouth plants (Table 2).

Job 5. Title: Estimate growth and survival of marked steelhead to lake and river fisheries.

Findings: Marked Skamania strain steelhead first returned to river fisheries in 1998. Full creel surveys commenced in 1999 and continued in 2000. We have collected a significant amount of data from river creel surveys in 1999 (Table 3); these data have been entered into standard database formats but have not been analyzed. The numbers collected in 2000 are projected to be greater than from 1999 based on early estimates of creel-returned fish heads. To evaluate the contribution of steelhead planted in a given river system to the Lake Michigan sport fishery, we summarized the returns of marked steelhead by river of origin (Table 4). The St. Joseph River seems to be providing the best input to the lake fisheries, followed by the Muskegon, and Manistee rivers. The river creel surveys on the Muskegon, Manistee, and Au Sable rivers initiated in 1999 have greatly enhanced our ability to obtain data from systems other than Lake Michigan and the St. Joseph River.

It is still early to define the implications behind the return rates of strains or stocking locations in the river fisheries. Only a single year of data is available for analysis (1999) and 2000 data are being collected and compiled. We have not yet evaluated variation in the growth of steelhead among lake and river systems. At this point in the project, the relative return rates of treatment groups of steelhead in the open lake fisheries of Lakes Huron and Michigan are used as measures of survival.

Job 6. Title: Evaluate performance characteristics of steelhead strains.

Findings: As of October 2000, we have evaluated over 4,500 steelhead snouts at the Charlevoix Fisheries Research Station. Heads from a total of 1,073 fish were returned by Lake Michigan anglers from fish that were stocked in study river systems (Manistee, St. Joseph, and Sturgeon) with paired plantings of the two strains (Michigan and Skamania). The Michigan strain appeared to be returning at a slightly better rate to the Lake Michigan fishery when evaluated for systems with paired plantings. The Michigan strain was represented by 2,918 (adjusted per 100,000 stocked) fish, while the Skamania strain was represented by 1,699 (adjusted per 100,000 stocked);

Tables 1 and 2). The second year of river creel is being collected; it is still too early to evaluate the implication of strain in river returns.

Job 9. Title: Define condition of hatchery fish.

Findings: All fish have been dried and weighed and we will provide the final analysis in the 2000-2001 annual report.

Prepared by: Jory Jonas.

Date: September 30, 2000

Table 1.--Stocking locations and number of marked (coded-wire tag and adipose fin clip) steelhead (by strain) stocked into study rivers during 1996-99. Number in parenthesis represent fish marked for additional study by the State of Indiana comparing size-at-stocking rearing strategies.

River	Stocking Location	1996		1997		1998		1999	
		Skamania	Michigan	Skamania	Michigan	Skamania	Michigan	Skamania	Michigan
St. Joseph	Pier 33	0	9,961	15,811	15,076	10,608	9,982	11,054	15,030
	Sportsman's Club-Arden	10,723	10,921	15,440	11,652	11,615	11,697	10,265	10,577
	Shamrock Park-Berrien	0	9,847	15,666	14,923	10,667	10,173	11,108	10,049
	Buchanan City Launch	10,697	9,801	15,672	14,780	10,556	10,107	10,823	9,987
	St. Patrick's Park			15,535		16,135		15,989	
	Mishawaka-Lincoln Park			31,755 (31,209)	19,819	32,013 (32,237)	20,317	31,726 (32,009)	20,054
	Indiana-Merrifield Park S. Bend	0	20,931						
Manistee	Manistee		14,795		15,102		16,727		15,080
	High Bridge	15,357	15,787	16,494	14,787	17,071	15,044	12,555	15,444
	Tippy Dam	21,340	15,950	16,000	15,005	17,105	15,110	12,961	15,010
Manistiquee	Manistique Public Access Site		8,161		8,549		8,134		8,008
Muskegon	Muskegon Lake Outlet		10,163		10,056		10,180		10,095
	Henning Park		21,489		19,965		20,218		20,022
	Pine Street		22,072		20,198		20,180		20,058
Sturgeon	Big Bay DeNoc-499 Bridge	5,397	5,430	5,021	5,116	3,682	5,128		5,216
	Sturgeon River	6,284	5,345	4,998	4,983	5,103	5,222		5,145
Au Sable	Harbor		28,426		21,095		22,134		25,050
	Rea Road		27,172		24,812		25,027		25,426
TOTAL		69,798	236,251	183,601	235,918	166,792	225,380	148,490	230,451

Table 2.—Steelhead coded-wire tag returns from lake-caught (lakes Michigan and Huron) fish in 1996-1999 (all years combined). The number per 100,000 stocked indicates the number caught adjusted to a stocking rate of 100,000 fish per river.

River	Stocking Location	Classification	Skamania Strain		Michigan Strain	
			Number	Number per 100,000 stocked	Number	Number per 100,000 stocked
St. Joseph River	Pier 33	Mouth	32	338	75	703
	Sportsmans Club-Arden Pond	Mid-17P	97	1,089	76	941
	Shamrock Park-Berrien Springs	Mid-23	49	521	65	619
	Buchanan City Launch-Smittys	Mid-32	52	545	67	606
	Mishawaka-Lincoln Park	Up-55	204	775	109	1151
	Indiana-Merrifield Park S. Bend	Up-60	-- ¹	-- ¹	40	450
Manistee River	Manistee	Mouth	--	--	48	341
	High Bridge	Mid	58	404	47	346
	Tippy Dam	Up	85	726	95	679
Manistique River	City of Manistique	Mouth	--	--	19	242
Muskegon River	Muskegon Lake Outlet	Mouth	--	--	66	715
	Henning Park	Mid	--	--	129	1,817
	Pine Street	Up	--	--	168	1,738
Sturgeon River	Big Bay DeNoc-499 Bridge	Mouth	4	70	8	161
	Sturgeon River	Up	4	83	4	78
Au Sable River	Harbor	Mouth	--	--	87	634
	Rea Road	Up	--	--	107	817

¹ No Skamania were stocked in 1996 by the State of Indiana

Table 3.—Number of marked steelhead returned in 1999 from river creel surveys.

RIVER	CLASSIFICATION	CREEL AREA	NUMBER
AU SABLE RIVER	MOUTH	Detroit Mackinaw Railroad Bridge to US23	22
	UP	Foote Dam to Detroit Mackinaw Railroad Bridge	66
BIG MANISTEE RIVER	MOUTH	Bear Creek to Manistee Lake	34
	MID	High Bridge to Bear Creek	41
	UP	Tippy Dam to High Bridge	112
MUSKEGON RIVER	MID1	Newaygo to Maple Island	117
	MID2	Thornapple Street to Newaygo	33
	UP	Croton Dam to Thornapple Street	83
ST. JOSEPH RIVER	MID 1	Jasper Dairy Access to Corrunde	101
	MID 2	Berrien dam to Jasper Dairy access	226
	MID 3	Buchanan dam to Berrien dam	9
	MID 4	Niles dam to Buchanan dam	7
	MID 5	State Line to South Bend dam	6
	UP	South bend dam to mishawaka dam	95

Table 4.—Planting site of marked steelhead caught in lakes Michigan and Huron (Michigan and Skamania strains). The number caught indicates the actual number of heads returned in 1996-1998. The adjusted number indicates the number caught adjusted to a stocking rate of 100,000 fish per river.

River of origin	Number caught	Number per 100,000 stocked
Manistee River	332	2,489
St. Joseph River	899	7,968
Muskegon River	362	4,259
Au Sable River	15	120
Sturgeon River	20	393
Manistique River	19	242