

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-8

Study No.: 230692

Title: Influence of total length and condition at stocking on Chinook salmon survival and time at large.

Period Covered: October 1, 2006 to September 30, 2007

Study Objectives: There are six main objectives identified for this project. 1) To evaluate the influence of the total length of stocked Chinook salmon on post-stocking survival. 2) To evaluate the influence of total length of Chinook salmon at stocking on the age and size of fish returning to spawn. 3) To evaluate the cost per return of small versus large stocked Chinook salmon. 4) To evaluate the influence of condition on survival of Chinook salmon stocked at the same size. 5) To evaluate the influences of high and low condition on the return size and age of Chinook salmon stocked at similar sizes. 6) To determine the cost per return of Chinook salmon at two condition levels.

Summary: Fish for this study have been stocked for six years, 2001-2006. Funding to mark fish in 2007 was unavailable so that planting will not be evaluated. The portion of the study evaluating the condition of Chinook salmon at stocking has not yet been initiated due to delays in hatchery renovations at the Thompson hatchery and the need to work out appropriate rearing techniques to complete this objective. Returns of tagged fish from the size-at-stocking evaluation are increasing; four year-classes have fully entered the fishery. At the time of completion of this report, 4,564 fish have been returned from the recreational fishery.

Findings: Jobs 1 through 4 were scheduled for 2006-07, and progress is reported below.

Job 1. Title: Stock Fish.—Study fish have been stocked into Lake Michigan and Lake Huron tributaries for six years, 2001 through 2006 (Table 1). Funding to mark fish stocked in 2007 was not available so I will be unable to evaluate returns from that planting. Fish quality assessments have been conducted on each treatment prior to stocking, and data are being compiled for evaluation.

Job 2. Title: Recover tags.—A total of 4,564 tagged study fish have been returned from the recreational fishery during 2001 through 2007 (Table 2). In 2002, over 76 percent of these were larger fish planted from the Wolf Lake hatchery. A similar yet less pronounced pattern was observed in 2003, when 63 percent of the fish returned were from Wolf Lake hatchery. In 2004, the pattern changed to nearly equal returns from each hatchery and the pattern began to reverse in 2005, with only 45 percent of returns from Wolf Lake hatchery fish (Table 2). In 2006 and 2007, returns of Platte River fish appear to be increasing relative to Wolf Lake fish. By 2007, Platte River fish comprised 63 percent of returns. The majority of the fish returned were stocked at Medusa Creek and returns from this site were nearly 3.5 times higher than other stocking locations. The greatest number of salmon heads were returned from the Charlevoix, Manistee, Grand Haven, Ludington, Rogers City, Frankfort and South Haven fisheries in Lake Michigan (N=854, 564, 447, 414, 310, 305 and 235 fish).

Job 3. Title: Analyze data on length.—The lengths of 40–60 randomly sampled fish were obtained within 7 d prior to stocking. Lengths were to be obtained from each hatchery at each stocking

location. Samples were not collected at all facilities and sites (Table 3). Fish from Wolf Lake on average tended to be longer than fish from the Platte River Hatchery, and pen-reared fish were longer than direct-plant fish.

Job 4. Title: Analyze data on condition.—Dry weights were obtained from a random sample of 40–60 fish collected within 7 d prior to stocking from each hatchery at each stocking location. Percent water provides an indication of the fat content and therefore condition of fish. The higher the water content, the lower the condition. The water content of fish from the two facilities was more similar than total length. When differences did occur, larger fish from Wolf Lake and those raised in net pens had lower water content (i.e., were in better condition; Table 4).

Table 1.—Number of Chinook salmon stocked (recoverable tags) by location (river/tributary) from Wolf Lake and Platte hatcheries (treatment), 2001 to 2006.

Year	Swan River		Medusa Creek		Little Manistee River		St. Joseph River	
	Wolf Lake	Platte	Wolf Lake	Platte	Wolf Lake	Platte	Wolf Lake	Platte
2001	102,749	84,703	94,462	75,348	98,978	79,719	71,029	67,085
2002	84,027	95,473	96,524	100,424	96,424	91,137	73,562	68,496
2003	100,698	94,038	98,471	98,768	98,057	94,284	70,943	71,201
2004	86,606	88,705	84,849 ^a	97,326	86,790	93,879	68,513	74,009
2005	89,314	95,703	88,414	97,420	80,814	97,330	64,231	73,118
2006	99,040	101,107	99,822	102,661	100,296	100,579	60,178	61,467

^a The Medusa Creek plant of fish from the Wolf Lake Hatchery was negatively affected by a pump shut-down at the cement plant shortly after being stocked.

Table 2.—Number of Chinook salmon heads returned and tags recovered annually, 2001 to 2007.

Year	Total heads returned	Number of heads with tags	Number and hatchery origin of tags	
			Platte	Wolf Lake
2001	416	306	0	2
2002	894	671	46	142
2003	1,793	1,433	325	551
2004	1,885	1,530	593	584
2005	1,129	909	481	386
2006	1,158	904	521	376
2007	701	558	349	208
Total	7,976	6,311	2,315	2,249

Table 3.—Average length (mm) ± standard deviation of Chinook salmon stocked annually by location (river/tributary) from Wolf Lake and Platte hatcheries, 2001 to 2006. ND indicates “no data.”

Year	Swan River		Medusa Creek (net pen)		Little Manistee River		St. Joseph River (net pen)	
	Wolf Lake	Platte	Wolf Lake	Platte	Wolf Lake	Platte	Wolf Lake	Platte
2001	96±9	78±5	111±10	105±8	96±9	74±6	ND	78±6
2002	ND	ND	ND	ND	ND	ND	ND	ND
2003	84±6	ND	108±10	102±7	92±8	ND	111±9	98±7
2004	90±9	79±4	ND	ND	92±9	77±4	93±8	73±4
2005	91±8	78±5	110±12	100±7	92±7	78±5	112±7	84±5
2006	100±9	80±7	104±11	93±8	94±9	80±9	100±9	79±7
Average	93±10	79±5	108±11	96±9	93±8	77±6	105±11	83±10

Table 4.—Average percent water of Chinook salmon stocked annually by location (river/tributary) from Wolf Lake and Platte hatcheries, 2001 to 2006. ND indicates “no data.”

Year	Swan River		Medusa Creek		Little Manistee River		St. Joseph River	
	Wolf Lake	Platte	Wolf Lake	Platte	Wolf Lake	Platte	Wolf Lake	Platte
2001	77.0	77.1	77.6	76.5	76.6	80.3	ND	79.6
2002	ND	ND	ND	ND	ND	ND	ND	ND
2003	79.6	ND	76.0	77.1	76.9	ND	74.5	74.0
2004	77.9	79.4	ND	ND	79.8	79.6	76.5	78.6
2005	77.6	78.4	77.6	79.1	77.4	78.2	77.0	80.1
2006	76.6	78.8	77.5	77.8	76.9	79.4	77.6	78.4
Average	77.7	78.4	77.0	77.4	77.4	79.4	75.9	77.9