STUDY FINAL REPORT

State: Michigan **Project No.:** F-80-R-16

Study No.: 230692 **Title:** Influence of total length and condition at stocking on Chinook salmon survival and time at large

Period Covered: October 1, 2000 to September 30, 2015

Study Objectives: There are six main objectives identified for this project: 1) To evaluate the influence of the total length of stocked Chinook Salmon *Oncorhynchus tshawytscha* 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; and 6) To determine the cost per return of Chinook Salmon at two condition levels.

Findings: Job 6 was scheduled for 2014-15, and progress is reported below.

Job 6. Title: Publish final report.–Findings for all six objectives are in the following Fisheries Division internal report and are summarized below:

Jonas, J. L., R. M. Claramunt, D. F. Clapp, and M. Kornis. 2015. Influence of Chinook salmon size and condition at stocking on returns to angling and harvest weirs in Lakes Michigan and Huron. Michigan Department of Natural Resources, Fisheries Division Internal Report, Lansing.

1) Evaluate the influence of the total length of stocked Chinook Salmon *Oncorhynchus tshawytscha* on post-stocking survival:

Fish reared at the Wolf Lake Hatchery (WL) were generally larger than those at the Platte River Hatchery (PR). One of the most surprising outcomes of our investigation was that the larger fish from WL did not survive better. We had hypothesized that because WL fish were larger they would mature and spawn earlier and that survival and returns to spawning weirs would be higher, but this was not the case. In fact, WL fish were less likely to return to anglers or spawning weirs despite their earlier maturation schedules.

2) Evaluate the influence of total length of Chinook Salmon at stocking on the age and size of fish returning to spawn:

Age composition and maturation rates were different for fish raised at the two hatchery facilities. PR fish were older when returning to anglers and at weirs compared to fish from WL. The smaller PR fish tended to remain in the lake longer, delaying maturation to older ages, and therefore returned to the lake fishery in greater proportions. It is an important consideration that the smaller PR reared fish would be available to the fishery for a longer amount of time and therefore return at higher rates. Larger fish from WL matured earlier and returned to spawn, they were therefore less vulnerable to angling pressures. There are clear implications that need to be considered in stocking practices, harvest and egg take operations.

3) Evaluate the cost per return of small versus large stocked Chinook Salmon:

   In 2015, it cost the State of Michigan an average of $0.40 to stock a Chinook Salmon from Platte River Hatchery and $0.94 to stock a Chinook Salmon from Wolf Lake. It is 2.35 times more expensive to stock larger fish from Wolf Lake Hatchery. WL fish did not return as well to fisheries or weirs. They did however, return to weirs at a younger ages which could be of value if there was a need to build stock for egg take within a shorter-time frame.

4) Evaluate the influence of condition on survival of Chinook Salmon stocked at the same size:

   PR fish tended to have higher water content and therefore lower condition levels than those from WL. However, differences in condition among groups were rarely statistically significant and were much less evident than differences in length. We were not able to completely separate the influences of condition and length in our analysis. Despite this, we were able to conclude with some certainty that length was the primary driving factor behind difference in maturation rates and return to fisheries.

5) Evaluate the influences of high and low condition on the return size and age of Chinook Salmon stocked at similar sizes:

   There was not enough consistent contrast in condition level to effectively complete this analysis. At levels observed in our study condition had little bearing on return size or age when compared to the influences of length.

6) Determine the cost per return of Chinook Salmon at two condition levels:

   This objective was predicated on completion of the previous two objectives. Because there were no clear distinctions among groups the association of condition level with outcomes in our investigation was week. We were unable to effectively assess the cost or benefits of stocking fish at different condition levels.

Prepared by: Jory Jonas
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