STUDY PERFORMANCE REPORT

State: Michigan

Study No.: 230464

Project No.: F-80-R-6

Title: Coded-wire tag and oxytetracycline marking of salmonines in the Great Lakes and tributary streams and data base management for tagged fish returns and weir and survey data

Period Covered: October 1, 2004 to September 30, 2005

Study Objective: To coded-wire tag and adipose fin clip, or mark with oxytetracycline, experimental lots of fish at state fish hatcheries. To design, develop, and manage databases for research studies which utilize coded-wire tags (CWT) or oxytetracycline (OTC), harvest weir data, and survey data from Charlevoix Fisheries Research Station research studies. To convert all past Charlevoix Fisheries Research Station main frame and personal computer data files into a common personal computer-based format.

Summary: Approximately 760,000 Chinook salmon were marked with a coded-wire tag and adipose fin clip in 2005. Tag retention for Chinook salmon ranged from 90-94% and averaged 92%. Marked and unmarked Atlantic salmon, brown trout, Chinook salmon, coho salmon, lake trout, and rainbow trout were sampled from index surveys, sport fisheries, tribal fisheries, weirs, and fish ladders. Approximately 4,700 salmonines with CWTs were processed from the 2004 collections. Chinook salmon (N=3,655), lake trout (N=911), and rainbow trout (N=93 fish) accounted for the majority of fish collected in 2004 for CWT processing.

Findings: Jobs 1 through 5 were scheduled for 2004-05, and progress is reported below.

Job 1. Title: Mark fish and conduct quality control. – Approximately 759,959 Chinook salmon received a coded-wire tag and adipose fin clip in 2005. Tag retention was good, averaging 92.0% and ranging from 90-94% across stocking sites (Table 1). The total number of fish marked in 2005 was similar to 2004 (Table 2).

Job 2. Title: Sample marked and unmarked fish. – Marked and unmarked Atlantic salmon, brown trout, Chinook salmon, coho salmon, lake trout, and rainbow trout were collected in 2004 from assessment samples, sport fisheries, tribal fisheries, and harvest weirs (Table 3). These collections resulted in proportional samples of marked and unmarked fish. Additional, non-proportional samples of marked fish were obtained from the sport fisheries through creel census, fishing tournaments, and anglers and charter boat operators who observed an adipose-fin clipped fish and voluntarily returned the head to a designated drop-off site (Table 3). Some non-proportional samples of CWT fish were also collected at fish ladders (Study 487). Collection of marked and unmarked fish is ongoing during 2005, from the same sources utilized in 2004.

Job 3. Title: Read CWT and OTC marked fish. – All adipose-clipped fish collected during the 2004 field season (see Job 2) were examined for presence of a CWT; tags were removed, read, and recorded in a database. Data were provided to other researchers and managers (both within and outside the MDNR) as requested. A significant portion of work in this job involves data sharing and exchange with other state and federal agencies.
A total of 4,702 CWT fish collected in 2004 have been processed at the Charlevoix Fisheries Research Station (Table 3). This number likely represents most of the fish collected in 2004 with CWTs that will be turned in for analysis, although volunteer anglers may continue to return some fish. Chinook salmon (N=3,655) were the species with the highest number of CWTs recovered and processed, followed by lake trout (911) and rainbow trout (93). The majority (59%) of tag collections were from sport fisheries, through volunteer, creel census program (Study 427), and headhunter returns. The total number of fish processed in 2004 was slightly lower than the average for the period 1990-2003 (Table 4).

Job 4. Title: **Prepare annual report.**—This Performance Report was completed as scheduled. In addition, project personnel organized a fish marking symposium at the May 2005 meeting of the International Association for Great Lakes Research. Presentations of coded-wire tag results were made to various sport-fishing groups. Project personnel also collaborated with other researchers in the preparation of annual Performance Reports (Studies 230482, 230487, 230692) and peer-reviewed publications (Adlerstein et al. in review).

Job 5. Title: **Develop database structures and do data entry.**—Database maintenance and improvement work is ongoing. Databases have been corrected to standardize data codes and fields, allowing users to link and work with multiple databases. In addition to the databases maintained at Charlevoix Fisheries Research Station (surveys, creel census, coded-wire tag), compatibility with databases maintained by other Michigan Department of Natural Resources (MDNR) units has been ensured.

Data entry has been completed for all CWTs collected during 2004 using the standard entry format that was developed previously. The entry form utilized simplifies the entry process and greatly reduces errors. Visual basic programming allows for automatic searches of the extensive volunteer and CWT databases.

Information on stocking and capture locations is entered in formats that are compatible with GIS (geographic information systems) mapping programs. Recording locations in decimal degree formats and standardizing entries allows for more efficient use of information obtained from within the coded-wire tag database when conducting spatial/movement analyses.

**References:**


**Prepared by:** David Clapp, John Clevenger, and Pat O’Neill

**Date:** September 30, 2005
Table 1.–Number of spring fingerling Chinook salmon marked with coded-wire tags and stocked in 2005, by stocking location. Number tagged is not corrected for tag retention or fin clip rates. Overall values are total fish for number tagged and average percentage for tag retention.

<table>
<thead>
<tr>
<th>Study number</th>
<th>Stocking site</th>
<th>Number tagged</th>
<th>Tag retention (%)</th>
<th>Stocking date</th>
<th>Net pen (Y/N)</th>
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<tbody>
<tr>
<td>513/692</td>
<td>Medusa Creek, Charlevoix</td>
<td>201,924</td>
<td>93.9</td>
<td>06-01-05</td>
<td>Yes</td>
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<td>692</td>
<td>St. Joseph River</td>
<td>153,556</td>
<td>91.0</td>
<td>05-17-05</td>
<td>Yes</td>
</tr>
<tr>
<td>513/692</td>
<td>Swan River, Rogers City</td>
<td>202,238</td>
<td>93.7</td>
<td>05-11-05</td>
<td>No</td>
</tr>
<tr>
<td>513/692</td>
<td>Little Manistee River</td>
<td>202,241</td>
<td>89.6</td>
<td>05-10-05</td>
<td>No</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>759,959</td>
<td>92.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.–Number of fish marked with coded wire tags, 1990-2005. Number tagged is not corrected for tag retention or fin clip rates.

<table>
<thead>
<tr>
<th>Year</th>
<th>Atlantic salmon</th>
<th>Chinook salmon</th>
<th>Lake trout</th>
<th>Rainbow trout</th>
<th>Other</th>
<th>All species</th>
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<td>98,361</td>
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<td>100,303</td>
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<td>59,200</td>
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<td>759,959</td>
<td>0</td>
<td>0</td>
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<td>759,959</td>
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</table>

Total: 433,976 14,366,659 725,341 1,802,922 40,378 17,369,276
Average (1990-2004): 28,932 907,113 48,356 120,195 2,692 1,107,288
Table 3.—Number of fish collected in 2004 from various sources and examined for the presence of coded wire tags. Tags were removed and read at the Charlevoix Fisheries Research Station. Percentage of total fish from each source and species is shown in parentheses.

<table>
<thead>
<tr>
<th>Source Gear type</th>
<th>Atlantic salmon</th>
<th>Brown trout</th>
<th>Chinook salmon</th>
<th>Coho salmon</th>
<th>Lake trout</th>
<th>Rainbow trout</th>
<th>Other</th>
<th>All species (% of total)</th>
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<tbody>
<tr>
<td>Assessment/Index Samples</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Gill net</td>
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<td>0</td>
<td>1</td>
<td>0</td>
<td>33</td>
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<td>0</td>
<td>34 (0.7)</td>
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<td>0</td>
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<td>0</td>
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<td>0 (0.0)</td>
</tr>
<tr>
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<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0 (0.0)</td>
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<td>Charter boat</td>
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<td>0</td>
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<td>145 (3.1)</td>
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<td>5</td>
<td>78</td>
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<td>0</td>
<td>440 (9.4)</td>
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<td>10</td>
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<td>0</td>
<td>586 (12.5)</td>
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<tr>
<td>Gill net</td>
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<td>0</td>
<td>87</td>
<td>0</td>
<td>0</td>
<td>88 (1.9)</td>
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<td>0</td>
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<td>Weir Samples</td>
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<td>Other</td>
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<td>0</td>
<td>6</td>
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<td>10 (0.2)</td>
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<tr>
<td>All Sources (% of total)</td>
<td>0 (0.0)</td>
<td>14 (0.3)</td>
<td>3,655 (77.7)</td>
<td>29 (0.6)</td>
<td>911 (19.4)</td>
<td>93 (2.0)</td>
<td>0 (0.0)</td>
<td>4,702 (100.0)</td>
</tr>
</tbody>
</table>
Table 4.—Number of fish collected from various sources and examined for the presence of coded wire tags, 1990-2004. Tags were removed and read at the Charlevoix Fisheries Research Station.

<table>
<thead>
<tr>
<th>Year</th>
<th>Atlantic salmon</th>
<th>Chinook salmon</th>
<th>Coho salmon</th>
<th>Lake trout</th>
<th>Rainbow trout</th>
<th>Other</th>
<th>All species</th>
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<tr>
<td>1990</td>
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<td>276</td>
<td>66</td>
<td>343</td>
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<td>30</td>
<td>717</td>
<td>1,362</td>
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<td>3,462</td>
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<td>2,146</td>
<td>8</td>
<td>5,300</td>
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<td>85</td>
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<td>1,039</td>
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<td>268</td>
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<td>3,812</td>
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<td>911</td>
<td>93</td>
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<td>4,702</td>
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<td>28,226</td>
<td>20,795</td>
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<td>Average (1990-2003)</td>
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<td>32</td>
<td>1,951</td>
<td>1,479</td>
<td>17</td>
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