

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-6

Study No.: 230464

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 data base 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:

Adlerstein, S.A., E.S. Rutherford, J.A. Clevenger, A.P. Woldt, J. Johnson, and D.F. Clapp. In review. Lake trout movement in US waters of Lake Huron interpreted from coded wire tag recoveries in recreational fisheries. *Journal of Great Lakes Research*.

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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.

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

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

Year	Atlantic salmon	Chinook salmon	Lake trout	Rainbow trout	Other	All species
1990	0	1,140,491	98,361	142,618	0	1,381,470
1991	50,315	1,464,558	97,344	0	0	1,612,217
1992	51,498	1,328,518	111,000	0	0	1,491,016
1993	78,580	1,420,863	0	32,597	0	1,532,040
1994	35,259	1,423,681	100,303	35,476	0	1,594,719
1995	70,853	515,240	107,957	36,320	0	730,370
1996	48,101	515,282	0	349,727	0	913,110
1997	45,211	512,938	0	435,148	0	993,297
1998	54,159	485,634	59,200	392,172	0	991,165
1999	0	270,280	0	378,864	3,195	652,339
2000	0	800,294	0	0	10,744	811,038
2001	0	1,115,262	151,176	0	4,370	1,270,808
2002	0	1,090,252	0	0	9,456	1,099,708
2003	0	763,238	0	0	5,291	768,619
2004	0	760,079	0	0	7,322	767,401
2005	0	759,959	0	0	0	759,959
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.

Source Gear type	Atlantic salmon	Brown trout	Chinook salmon	Coho salmon	Lake trout	Rainbow trout	Other	All species (% of total)
Assessment/Index Samples								
Gill net	0	0	1	0	33	0	0	34 (0.7)
Electrofishing	0	0	0	0	0	0	0	0 (0.0)
Other	0	0	0	0	0	0	0	0 (0.0)
Sport-Caught								
Charter boat	0	0	85	0	58	2	0	145 (3.1)
Creel clerk	0	2	325	5	78	30	0	440 (9.4)
Headhunter	0	0	321	10	254	1	0	586 (12.5)
Tournaments	0	10	236	6	219	12	0	483 (10.3)
Volunteer	0	2	884	8	176	46	0	1,116 (23.7)
Tribal Samples								
Gill net	0	0	1	0	87	0	0	88 (1.9)
Other	0	0	0	0	0	0	0	0 (0.0)
Weir Samples								
Harvest Weirs	0	0	1,798	0	0	1	0	1,799 (38.3)
Fish Ladders	0	0	0	0	0	1	0	1 (0.0)
Other								
Unknown	0	0	4	0	6	0	0	10 (0.2)
All Sources (% of total)	0 (0.0)	14 (0.3)	3,655 (77.7)	29 (0.6)	911 (19.4)	93 (2.0)	0 (0.0)	4,702 (100.0)

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.

Year	Atlantic salmon	Chinook salmon	Coho salmon	Lake trout	Rainbow trout	Other	All species
1990	0	276	66	343	857	3	1,545
1991	0	1,347	30	717	1,362	6	3,462
1992	2	2,193	22	929	2,146	8	5,300
1993	85	2,975	33	1,039	737	14	4,883
1994	268	4,141	18	1,771	386	21	6,605
1995	104	4,916	14	2,918	252	6	8,210
1996	81	3,638	55	3,493	440	29	7,736
1997	212	2,355	52	3,476	546	31	6,672
1998	166	1,447	59	3,115	2,110	22	6,919
1999	98	1,301	11	2,491	3,733	48	7,682
2000	84	749	18	2,511	3,812	27	7,201
2001	16	769	7	1,833	2,617	17	5,259
2002	1	1,793	48	1,430	1,401	10	4,683
2003	1	3,266	21	1,249	303	1	4,841
2004	0	3,655	29	911	93	14	4,702
Total	1,118	34,821	483	28,226	20,795	257	80,998
Average (1990-2003)	80	2,226	32	1,951	1,479	17	5,786