

**Atlantic Herring Stock Discreteness and Migration: A Coded Microwire
Tagging Pilot Project in the Gulf of Maine**

**Completion Report Submitted to the Northeast Consortium
for the Period of October 2001-June 2003***

By

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* Two extensions were made to the original grant, awarded in the 2001 funding cycle.

Project Introduction and Background:

The Maine Department of Marine Resources and industry partners requested project development funds from the Northeast Consortium in 2001. The proposal was entitled “Atlantic herring stock discreteness and migration: A coded microwire tagging pilot project in the Gulf of Maine”. The total monetary request of \$24,926 was awarded to DMR in January 2002.

The project need was based on the lack of migration and spawning site data for Atlantic herring in the inshore Gulf of Maine. The last tagging effort in US waters occurred during the late 1970s and early 1980s. Since then, mobile gear fishing pressure on the inshore stock component increased, herring moved further from coastal waters and the Georges Bank stock component recovered from its collapse of the 1960s. The pilot project funded by NEC was designed to complement an existing tagging effort by using coded microwire tags to mark pre-spawning aggregations of herring on Jeffrey’s Ledge in the Gulf of Maine. Microwire tags were selected as the best option for tagging herring, because they are less invasive, result in high retention rates and automated tag detection is possible.

The project was not implemented as outlined in the original proposal due to unforeseen delays in the transfer of funds from NEC to DMR and availability problems with herring in the Gulf of Maine. In February of 2002 an extension to the grant was requested allowing fieldwork to occur in the 2002 fishing season instead of the proposed 2001 season (see Appendix 1). Despite this extension, the proposed work was unable to be accomplished in 2002 due to a lack of available herring in the Gulf of Maine. Another agreement was made between NEC and DMR for the project development funds to be used in the winter of 2003 to trial an aquarium codend (see Appendix 2). The vessel contract funds (\$15,000) were successfully used over 5 contracted days in April 2003 to capture and tag live herring with the aquarium codend. The equipment portion of the budget was spent as originally specified in the grant proposal.

Assessment of Meeting the Proposed Objectives:

Objective 1: Continue to develop and evaluate catch methods for obtaining live, high quality herring from a commercial fishing vessel platform.

This objective was successfully met through the final implementation of this grant. The original intent of the project was to tag herring from purse seine vessels using an early capture method that reduces handling and scale loss. However, herring were largely unavailable to purse seine vessels during the fall of 2002. This was a result of herring schools remaining deep in the water column out of the reach of most purse seine nets (average 35 fathoms deep). This unusual behavior prompted DMR to explore other methods of obtaining live herring suggested by herring industry members. An aquarium codend was borrowed from the National



Figure 1: Aquarium Codend



Figure 2: Live Herring in the Aquarium Codend

Marine Fisheries Service Atlantic salmon program in the fall of 2002 and tested for its ability to capture live herring. The aquarium codend proved capable of consistently catching live, high quality herring, therefore DMR commissioned a custom unit for the tagging project. The herring codend was finished in the spring of 2003 and the NEC project development funds were used to test it and tag herring on winter-feeding grounds off Rhode Island. Over the course of five days of contract vessel time, ten sets were made resulting in 4,553 tagged fish.

Objective 2: Become versed in microwire field tagging methods, technology and equipment.

This objective was successfully met through the development of field tagging methods using coded microwire tags. Equipment to facilitate microwire tagging was developed and used on both purse seine and mid-water trawl platforms. Four microwire tagging machines on loan from NMFS were overhauled and repaired at the beginning of the project. After every tagging event each machine was stripped, cleaned with isopropyl alcohol and dried. On occasions when DMR personnel could not repair the machines, technicians at Northwest Marine technologies were consulted. Field methodology for microwire tagging herring proved extremely successful with hourly tagging rates between 600 and 800 fish.

Objective 3: Continue lab studies to determine tag retention and handling mortality rates.

This objective was not met through implementation of the NEC project development grant. Although several attempts were made between June and August of 2001 and 2002 to get live herring back to the DMR lab, all efforts failed. The most promising technique tried was flooding a fish hold on a herring vessel and transporting the herring to the dock. Once the vessel was in port the herring were transferred into modified xactix tanks with circulators and oxygen. The herring were then driven to the lab and put into large circular tanks. Initial mortality was 25% and reached 99% after the first 24-hour period.

Objective 4: Install and evaluate a recovery system at the Stinson's 2001 Inc. processing plant in Bath, ME.



This objective was met, however final evaluation of the recovery process caused DMR to abandon the microwire tagging project.

An automated detection unit was purchased in 2001 and transported to the Connor's Brothers Ltd. processing facility in Blacks Harbour, New Brunswick. The engineers at Connor's Brothers designed and constructed a conveyor system that incorporated the detection unit

Figure 3: Installed Recovery Unit

into the processing lines at a point where tags could be retrieved. After the modified conveyor line was installed at the Bath plant, several repairs and modifications were made. As soon as the unit was operating reliably, testing was conducted showing that tag recovery within the plant ranged between 80-100%.

Unfortunately, the microwire tagging project experienced a significant setback when the detection unit was damaged during the course of normal plant operations. Several attempts were made to repair the unit at the plant, however after the unit was reinstalled test trials revealed electronic problems caused by moisture in the detector. The unit was sent back to Northwest Marine Technologies (NMT) for evaluation and repair if possible.

Results and Conclusions:

DMR began a major review of the microwire tagging project after the difficulty experienced with the recovery process. The conclusion of a full evaluation of the program by DMR, Stinsons 2001 Ltd. and various industry members was to abandon the microwire tagging project and initiate a more conventional anchor tagging program for Atlantic herring. The anchor tagging project began in the spring of 2003 through support of the NEC project development funds and incorporated most of the equipment and expertise gathered from the work conducted in 2001-2002. To date, of the 4,553 fish tagged during the spring 2003 field season, 4 have been recovered. All of the returns were from Canadian waters including German Bank, Moores Ledge and Scots Bay. The recaptures were made as soon as 26 days after the initial tagging and as long as 122 days after tagging (see Table 1).

With the initial success of the anchor tagging effort DMR has committed to the continuation of the program. Future work will center around tagging herring on summer feeding/spawning grounds in the Gulf of Maine and on winter feeding grounds off Rhode Island. The program will target a goal of 30,000 fish annually, distributed evenly between the two tagging strata.

Appendix 1



STATE OF MAINE
DEPARTMENT OF
MARINE RESOURCES
P.O. BOX 8, MCKOWN POINT
W. BOOTHBAY HARBOR, MAINE 04575

GEORGE D. LAPOINTE
COMMISSIONER

February 4, 2002

Troy Hartley
Northeast Consortium
Morse Hall, Room 155
University of New Hampshire
Durham, NH 03824

Dear Mr. Hartley,

I am writing to follow up on our phone conversation of 1/28/02. In our discussion I explained that I was unable to use the project development funds awarded to Maine DMR (Atlantic Herring Stock Discreetness and Migration) during the 2001 field season. This was largely due to an unanticipated delay in the transfer of funds between NEC and DMR. I expect to utilize the funds during the 2002 field season (September-October) to accomplish the objectives outlined in the initial proposal. The following is a summary of the budget:

Vessel Time	\$15,000
Coded Micro-Wire Tags	\$2,500
Equipment Repairs and Modifications	\$1,600
Indirect	\$5,826
Total	\$24,926

If you have any questions please contact me at 207-633-9535.

Sincerely,

Kohl Kanwit
Maine Department of Marine Resources
PO Box 8
West Boothbay Harbor, ME 04575

Appendix 2

-----Original Message-----

From: Kanwit, Kohl [mailto:Kohl.Kanwit@maine.gov]
Sent: Thursday, March 06, 2003 12:33 PM
To: 'troy.hartley@unh.edu'
Subject: Project update

Hi Troy,

I wanted to touch base and tell you where we stood on the "Atlantic herring stock discreteness and migration" project. As you may remember, we were required to get an extension from NEC because the money was not available for the scheduled fieldwork as outlined in the proposal. Low and behold we have hit another snag....herring were so incredibly scarce this summer/fall that we were not able to tag many fish (a grand total of 6,000, and we were aiming for 30,000). The result of all this is that we have spent the grant money dedicated to supplies etc, but have not used the vessel contract funds. We still have \$15,000 available (5 days) and would like to use it to develop a new method of catching live herring with an aquarium codend. We trailed a unit NMFS had last summer in desperation and it worked. I just had one built for DMR and need to test it and hopefully tag herring before they make their migration northward. We should be starting fieldwork the first part of April and be done before the end of the month. The only other change would be using a mid-water trawl vessel instead of the purse seine vessel identified in the contract. This arrangement is agreeable to all parties involved.

Please let me know what you think of these changes and if I need to do anything more formal.

-Kohl

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Response from NEC

Hi Kohl,

To follow-up on my phone message earlier today, this proposed change is fine and I hope you find that the results are helpful in developing future cooperative research projects. As a project development award, the Northeast Consortium's 75%/25% split policy does not apply -- 75% of resources to the fishing industry and 25% to the research organization. However FYI, as a general policy, it is practically impossible for me to approve any budget and work plan change that reduces the fishing industry budget and increases the research budget.

Take care, Troy

Troy W. Hartley
Executive Director, Northeast Consortium

Table 1: Tag return summary

Return No	Capture Date	Recovery Location	Days at Large	Tagging Location	Tagging Date	Length (mm)	Sex	Weight (g)	Gonad Wt. (g)
1	5/21/03	German Bank	26	Long island	4/28/03				
2	7/8/03	Grand Manan	21	11 Mile Ridge	6/18/03				
3	7/17/03	Moore's Ledge	80	Long Island	4/28/03				
4	7/30/03	Scots Bay	96	Long Island	4/25/03	286	F		
5	8/25/03	German Bank	122	Long Island	4/25/03	267	M	153	28