

Environmental Monitors on Lobster Traps Annual Report 2007

NOAA Northeast Fisheries Science Center, Woods Hole
Jim Manning, 508-495-2211, james.manning@noaa.gov

Gulf of Maine Lobster Foundation
Erin Pelletier, 207-985-8088, eringomlf@zwi.net

Atlantic Offshore Lobstermen
Association Representative:
Bonnie Spinazzola, 603-483-3030, bonnie@offshorelobster.org

Massachusetts Lobstermen
Association Representative:
Dave Casoni, 508-224-3038, lobsterteacher@hotmail.com

Maine Lobstermen
Association Representative
Patrice McCarron, 207-985-4544, patrice@mainelobstermen.org

Downeast Lobstermen
Association Representative
Jeremy Cates, 207-259-3647, admissions@washingtonacademy.org

Project objectives:

The objective of eMOLT Phase V is to demonstrate that New England lobstermen can contribute to the region's integrated ocean observing systems by deploying "realtime" temperature probes on their traps. The goal is to telemeter bottom-temperature readings via satellite communication each time the trap is hauled on deck. Given a previous grant from NOAA's Small Business Initiative Research Program (SBIR), a probe has been under development for a few years that wirelessly sends data to a base station in the wheelhouse where it is immediately relayed to a satellite. Ultimately, the data is then transmitted to a NOAA server and posted on the web within minutes.

Methods and work plan:

Since the technology is still under development, much of the work involves testing the functionality of the probe. While the probe undergoes extensive tests in the laboratory, exposing it to the marine environment in deep waters often results in failure. To this end, a number of local lobstermen have been involved with test deployments. With each new prototype, test are required in the real ocean.



Figure 1. Lobstermen Lamborghini, Oehme, Weeks, and Casoni on the Sandwich docks after the first successful deployment and recovery of the realtime temperature probe.

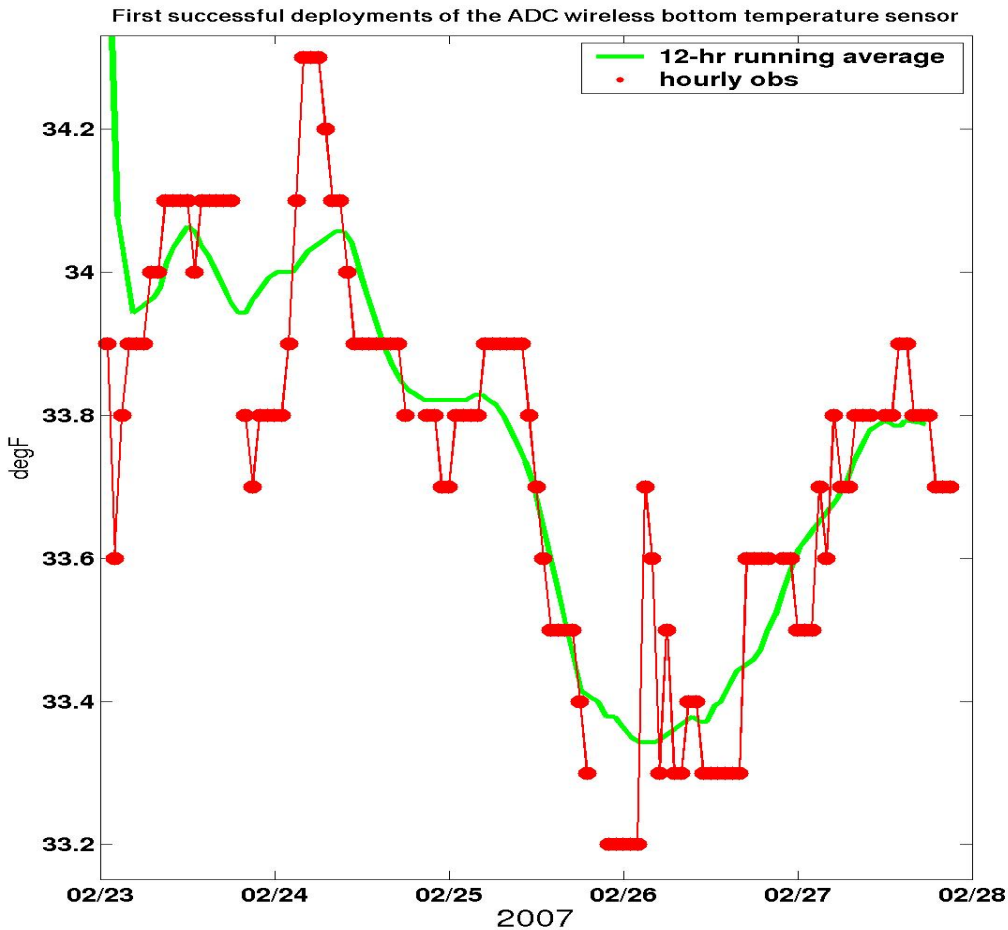
Work completed to date:

The real-time probe development has progressed on two fronts. The first is in collaboration with the Advanced Design Consulting Inc. from Lansing, NY, the company originally awarded the SBIR grant in 2004. They have generated and delivered at least three different prototypes that have each been tested both in their lab and at sea with the help of lobstermen. ADC has produced their own progress report fully documenting this development. In short, the first prototype were deployed by lobstermen John Carver and Phil Mason in Mass Bay in 2006. Both of their probes evidently failed due to leaky housing seal. Even after an attempt to completely seal a subsequent prototype, the instrument leaked again (this time deployed off the dock in Woods Hole) evidently due to a hair-line fracture in the plastic sealing material. Finally, in February of 2006, the first successful deployment was conducted in 70+ feet of water in Mass Bay (Figure 1).

Concurrent with the ADC development, Jim Valdes (an independent Woods Hole ocean engineer) has been devising an alternative solution where both the temperature sensor and the satellite transmitter are sealed together in a housing to be submerged as a package. The advantage of this strategy is that the entire system is contained in a single unit and does not need a shipboard base station. The disadvantages of this strategy over the ADC's are that the lobstermen does not get immediate access to the readings and the expense of the satellite transmitter will prohibit lobstermen from deploying multiple units.

Results to date:

The result of the first successful deployment is presented in Figure 2. While the instrument did not function exactly as programmed and reported very little pressure/depth readings, it did transmit the hourly record of temperature and displayed the values on the handheld unit in the wheelhouse. The biggest hurdle of transmitting data by a triggered response to low pressure failed due to bad pressure records. Approximately 10% of the temperature readings were also bad. So, while the deployment was generally successful, there is obviously more work to be conducted. The unit has been returned to the lab for further development.



In September 2007, another prototype was tested on land that successfully transmitted data to a satellite and automatically emailed the result to the NOAA server. While the transmission was successful this one time, subsequent attempts have failed. So, at the time of this writing, we are still working with the engineers at ADC to make the system reliable enough to pass on to fisherman. Much of our time now is spent in learning the ORBCOMM satellite system which is different from the GLOBALSTAR system used in our drifter work to date.

Data:

Data from future deployments of both the ADC and Valdes units will obviously become part of the eMOLT server and accessible. The big difference in these cases, however, is the near-realtime postings. When the system is fully operational we expect the data to be available on the web within minutes of the lobstermen's haul. The data will be relayed through the ORBCOMM and GLOBALSTAR satellite network in the case of ADC and Valdes, respectively, processed on the NOAA server at Woods Hole, and, after some automated filtering/QC operations, posted for the general public. The data will be served through OPeNDAP system and documented through the Gulf of Maine Ocean Data Partnership and NASA's Global Change Master Directory. The data user interface for eMOLT data is at emolt.org under "Data Access".

Impacts and applications:

Lobstermen have been asking for more immediate (realtime) information since the eMOLT project began several years ago. Well before the eMOLT project began, in fact, many New England lobstermen have attempted to deploy thermometers of various kinds on the seafloor to obtain some indication of the thermal environment at depth. While some of these may have worked to some extent, the accuracy of the results were difficult to quantify. Now finally, in 2007, there is some hope that they may have a reliable means of determining temperature changes that may be important to the activity and movement of their prey (Drinkwater et al, 2006). A statistical relationship between catch and bottom-temperature is difficult to quantify however and has eluded some researchers to date (Worden, et al, 2007). Only with sustained record keeping of quality data in the years to come will it be possible to prove a significant relationship.

Related Projects:

A variety of related projects have sprung up in the last few years that are closely related to the goals and applications of eMOLT. In addition to the obvious relation to the Gulf of Maine Ocean Observing System, eMOLT has been collaborating with multiple "ventless trap" projects around the region. Since these projects are deploying traps at specific sites and depth zones and the intention is to continue monitoring the juvenile populations of lobster for multiple years, an effort has been made to equip these traps with temperature probes. The newly formed "ASFMC Regional Ventless Trap" project seems most promising as a funded mechanism to get lobster catch data concurrent with temperature records.

In addition to the ventless trap projects in both US and Canada, we are working with the lobster settlement studies of both Wahle (Bigelow Lab) and Cowan (Lobster Conservancy). Each of these projects now have a temperature probe component.

Partnerships:

As noted in the related projects section above, eMOLT is connected with a variety of projects around the gulf. A short list of them is provided in Table 1.

Project	Contact
GoMOOS/GoMODP	Tom Shyka
DMF Ventless	Bob Glenn
GoMLF VentTS	Erin Pelletier
FSRS monitoring	Carl McDonald
Lobster Conservancy	Diane Cowan
S Maine Comm. College	Brian Tarbox
ASFMC Ventless Trap	Carl Wilson
RIDEM	Tom Angel

Presentations:

eMOLT presentations this past year are posted in Table 2.

Table 2. eMOLT Presentations in 2007

Group	Location	Date
eMOLT participants	Best Western Portsmouth, NH	26 Jan 2007
Mass Lobstermen Weekend	Sheraton Hyannis, Ma	3 Feb 2007
Maine Fishermen Forum	Samoset Rockport, Me	3 Mar 2007

Student Participation:

As of this writing, there is no student participation specifically associated with phase V. However, we continue to involve students in the previous phase IV through our collaboration with local marine science departments at, for example, SMCC, Bowdoin, and Univ. of New England. Students continue to design, construct, and deploy drifters. Projects are now underway where students are actually involved with deployments and tracking themselves. In the Fall of 2006, a total of 19 drifter deployments were made by students in Casco Bay and reports were submitted on their experiences. In the spring and fall semesters of 2007, several more student-deployed drifters were made not to mention 42 others by research institutions.

Published Reports and Papers (available on request):

Bowdoin College reports
ADC progress reports
U. Virginia manuscripts in progress
ICES newsletter on eMOLT

Images:

A collection of images are stored on the emolt.org website including an archive of maps, plots, and photographs. A gallery of images describing the development of technology, for example, is posted at:

http://www.nefsc.noaa.gov/epd/ocean/MainPage/lob/pic_links.html

The most up-to-date images of recent findings are posted under the “What’s New” page.

References:

Drinkwater, K.F., G.C. Harding, K.H. Mann, and N. Tanner, 1996, Temperature as a possible factor in the increased abundance of American lobster, *Homarus americanus*, during the 1980s and early 1990s., *Fisheries Oceanography*, 5:3/4, 176-193.

Worden, M.K., J. Bahr, and J. Manning. 2007, Catch rate of the American lobster in the US fisheries is independent of water temperature. In Prep.