

GULF OF MAINE LOBSTER FOUNDATION



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Annual Report

Project Title: Determining Effect of Eastern Maine Bottom Currents On Groundlines

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## Project Objectives and Scientific Hypotheses

In this 6-month field project, GOMLF sought to examine the effect of bottom currents on specific lobster gear in nearshore eastern Maine waters. Our objective was to establish whether bottom currents in Downeast Maine are so strong that they significantly reduce the profile of floating rope used as groundline, and therefore reduce the risk of whale entanglements. The methodology we used and the manageable scale of the objectives in this development phase of the research allowed us to stay true to the goals of this project. There was no significant change to the objectives, goals or rationale of the project.

## Methods and Work Plan

The experimental design of our project (and the NEC program staff) was flexible enough to allow us to make beneficial adjustments in the methodology as we moved forward with the project. For example, early on we determined that we would not require the services of a professional diver to check the mooring system for the Sensor Data current meter as was budgeted for, because Bill Look (participating lobsterman) was able to check on the gear's successful deployment by hauling it up, verifying the lack of rope snarls in the line, and re-setting it. (Resultant data shows the equipment was, indeed, deployed successfully.) The budget for the diver was instead used to purchase additional mooring anchors for the equipment.

Also, a hand-held GPS unit was not needed after all, as the boat's electronics included a plotter that could be read in degrees latitude and longitude. Look typically uses Loran-C on his plotter, but switched the signal to Lat-Long in order to record locations of the equipment.

Another minor change to the design was the incorporation of donated acoustic Doppler current profilers, or ADCP, at both the beginning and end of the project, a real boon to the dataset of current direction and velocity. During June and July, the first two months of deployment, an ADCP was donated to the project by the National Marine Fisheries Service Northeast Regional Office (NMFS NERO) in a dual-purpose contribution: NMFS NERO was eager to have the unit tested and ground-truthed for data collection; and GOMLF was pleased to add another layer of corroborating data for eventual inclusion in the modeling work.

For the last month of field work, GoMOOS Director Neal Pettigrew, lead scientist on this project, contributed an ADCP unit to the cause, with the idea that the data will benefit not only this examination and modeling of bottom currents and their effect on lobster gear, but as a test of the GoMOOS mission to reflect real-time current information as well.

Another change to the experimental design involved the length of time the equipment -- data loggers and current meters -- was in the water. Originally planned to be deployed over three weeks each of the six months, it was discovered prior to the first deployment,

during pre-meetings with all participants, that a sufficient if not ample amount of data could be collected on a two-week set of the equipment. Two weeks allowed for the measuring of a full lunar tide, and allowed the requisite time for GOMLF to retrieve the equipment, download the data, re-program all the equipment, and return to Jonesport for the next deployment.

### Work Completed to Date

Five discrete datasets were collected during the field-work portion of the project. Originally slated to result in six months' of data, one full month was missed due to fishery conflict and the threat of losing gear and equipment. During the month of October, the mid-water and purse seine herring fleet descended upon Jonesport and worked the area hard, causing a great loss of fixed lobster gear in the process. In order to avoid the risk of losing expensive scientific equipment, GOMLF opted to wait until the herring fleet moved on or the fishery closed (which happened on October 25<sup>th</sup>) before setting the measuring equipment out again. As a result, there are only five months' worth of data; but this is still seen as ample for this effort by Pettigrew.

Data from the Star-Oddi pressure sensors (data loggers) was successfully downloaded after each of the five deployments by Laura Ludwig, Principal Investigator. She attended every deployment in order to accurately record the placement of the sensors on the lobster gear in the logbook. She provided for the retrieval of equipment and re-programmed the sensors each month.

Chris Heinig, MER, provided ready and able assistance throughout the entire project, helping first with the deployment design for the Sensor Data 6000 current meter, then on-site with the first day of deployment, and every month thereafter with speedy data retrieval from the unit and subsequent conveyance of the data to GOMLF.

Weather created a few challenges, particularly during the last deployment. We were prevented from deploying gear three consecutive times by late-October and early-November storms; the last deployment was made finally on November 20.

Sara Ellis, Data Manager for GOMLF, has done some preliminary data extraction from the pressure sensors and the data is good (see Figure 1). All the data will be sent to Pettigrew in January after it has been extracted by Ellis. The Sensor Data 6000 dataset is graphed and submitted to Pettigrew already (see Figure 2). Data from the two ADCPs is also in GoMOOS' possession. The three datasets, in conjunction with data from the nearest GoMOOS buoy arrays, will be used to model bottom current patterns in the area where the gear was deployed, and should be ready for preliminary presentation at the Maine Fishermen's Forum in early March, 2008.

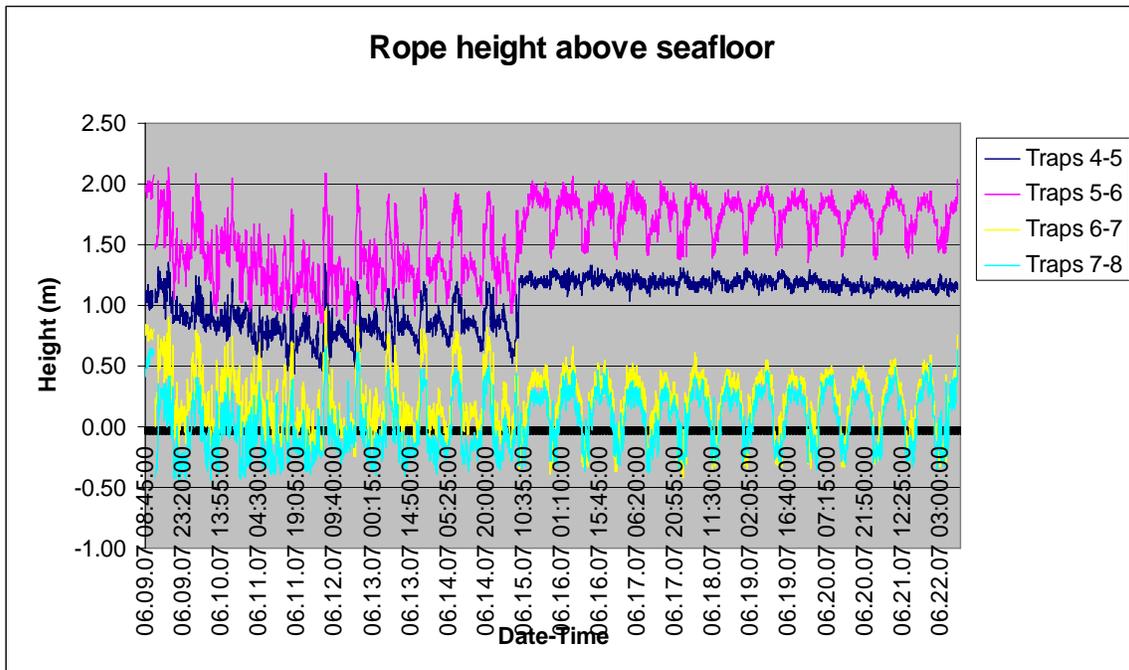


Figure 1: Representation of one month's data from Star-Oddi pressure sensors.

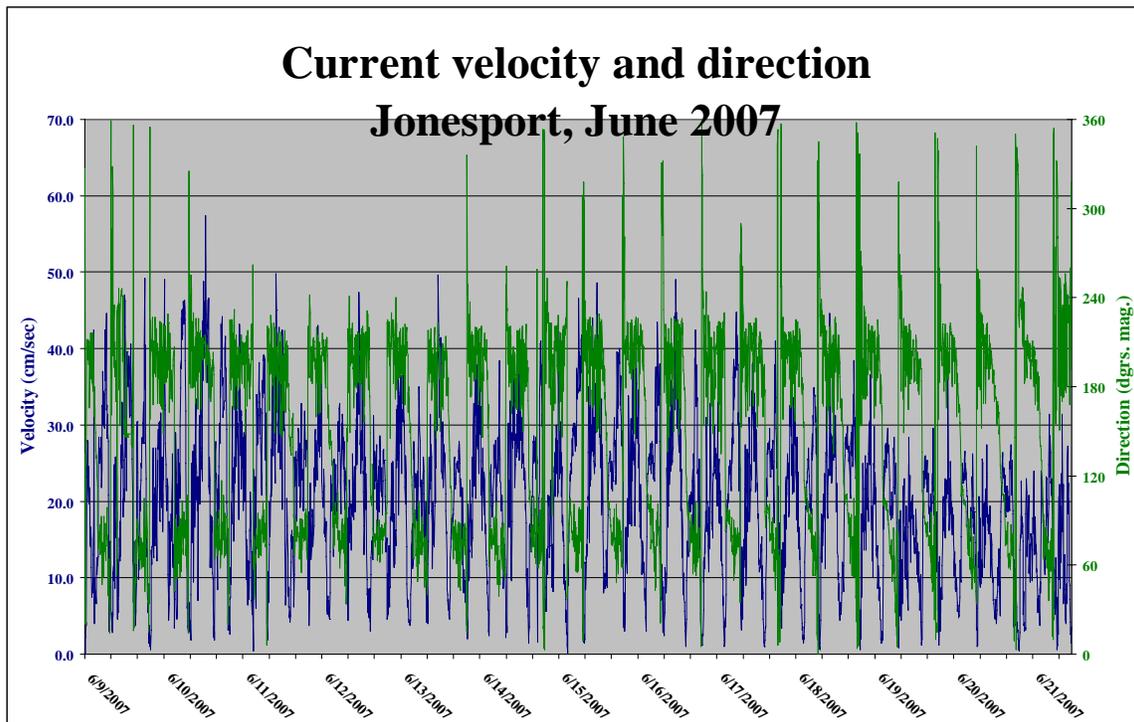


Figure 2: One month's data retrieved from the SensorData 6000 current meter.

## Results to Date

All told, there are five months' worth of data from 19 pressure sensors which were deployed on Look's trawl each month, as well as from the Sensor Data 6000 current meter deployed next to his trawl. There are three months of accompanying data from two different ADCPs, both rigged in a customized 3' lobster trap directly into the trawl, which give a richer look at the velocity and direction of current over the groundlines.

While the pressure sensors and ADCPs can be deployed at great depths, the current meter was at its depth limit each month (300' maximum depth). This could be a limiting factor for future bottom-current work, but for this development project the readings were consistently clear from all equipment.

Preliminary assessment of the current meter data indicates that the current off Jonesport, Maine, measured at the bottom of the ocean level with the traps (1-2m off bottom), is often over 30 cm/sec and has little to no "slack" period between tides. While the full dataset from the pressure sensors still needs analysis, early readings of the data shows the floating groundlines at or below six feet (one fathom) of arc height over a 20 fathom length.

## Data

All datasets will be submitted to the Northeast Consortium Fisheries & Ocean Database once it has been extracted and made presentable to the general public. This should be done by May 2008 and will include a model of the bottom currents for consideration.

## Impacts and Applications

GOMLF was hopeful that the work conducted during this pilot project would be informative for the regulatory process issuing the Final Whale Rule, however, it comes too late to factor into that process. The information will be extremely useful for future litigations or research applications regarding federal whale rulings, insofar as the data has been unavailable until now and therefore was not part of the consideration of a lobsterman's situation in complying with the Final Whale Rule.

Downeast lobstermen are interested in seeing this scientific examination of the bottom currents Downeast, as they have known from experience that their gear is subject to rigorous action by tide, current, and rough ocean bottom. GOMLF will present preliminary results of the project at the Maine Fishermen's Forum.

## Partnerships

Bill Look, collaborating lobsterman, was eager to take part of this project from the get-go, and remains invested in the program by being included in a Full Proposal submitted by GOMLF to NEC (*Measuring the Effect of Eastern Maine Currents on Lobster Gear*, November 8, 2007). His considerable experience as a fisherman, his earlier classroom teaching, and

his thoughtful approach to solutions make him an ideal participant in this effort to determine where floating groundlines are laid so low by tide and current that they do not pose an entanglement risk to whales.

He is also an excellent partner in lobster research because of his natural leadership role among his peers. He communicates well with the fleet in Jonesport and as a result there has been a great deal of interest in the project by other lobstermen in the area. His involvement keeps them involved on the periphery, and they are eager to see the results of the field work.

Look's early suggestions regarding rigging, mooring and deployment of the current meter and ADCP were instrumental in their safe retrieval each month. His and his crew's care in tending the gear were critical elements in the success of data collection throughout the project. His maintenance of the logbook was consistent and provides the necessary information for each month's deployment.

Chris Heinig, MER, played a large role in the development phase of this project by virtue of being a very willing and able partner, ready with suggestions and advice at every turn. He greatly appreciated the careful approach taken by Look and crew toward the use of expensive scientific equipment, and had full faith in the lobstermen regarding the safe disposition of MER's current meter.

#### Presentations

Chris Heinig, Principal, MER, International Aquaculture Meeting, St. Andrews, NB, October 2007; presented the June SensorData 6000 current meter data in the context of discussions regarding the mooring of aquaculture equipment in areas of great tide and/or current.

#### Published Reports & Papers

No publications or reports have been made to date, apart from reference to the project in GOMLF's full proposal to NEC.

#### Images

Please see attached photos which depict how the equipment was rigged on and in the lobster gear, how it was deployed, and the vessel it was deployed from.