

1. Project title and contract number

Title: Evaluation of closed areas: Cashes Ledge as juvenile cod habitat

Prime Award No. NA05NMF4721057

Subaward No. PZ06119

2. PI contact information

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4. Major accomplishments and milestones

We are nearing completion of this project. In the fall, we provided a completion report for the first year of this study. We also continue to make significant progress on all three project goals:

Objective 1: we have reviewed the historic data of cod on Cashes Ledge collected by Bob Steneck (U. Maine-Orono) and Jon Witman in the 1980's and 1990's and compared these data with our cod video data collected in 2006 and 2007. Our results suggest that cod densities are lower than historical levels 2 decades ago, and are currently working with Bob and Jon to resolve the magnitude of difference between then and now.

Objective 2: in June of 2006, Dr. Tom Weber (UNH) conducted multibeam sampling from the F/V Seacup captained by Matthew Weber of our field sites around the peaks and sides of Cashes Ledge in order to create detailed habitat maps including the spatial extent of kelp habitat on the ledge. Tom collected half a terabyte of multibeam data. The Gulf of Maine Mapping Initiative sponsored a graduate student of Dr. Craig Brown from the University of Ulster, Chris McGonigle to come to the US and produce predictive habitat maps by analyzing these data. Chris was stationed at GMRI in the summer of 2007 and has completed predictive habitat maps by analyzing the backscatter data of the seafloor. In the fall of 2009, we conducted trips to collect video and bottom grab samples in the 9 habitat classes that were designated by these analyses in order to groundtruth the maps that Chris has created. Dr. Weber has also created a map of the kelp habitat on the top of Cashes Ledge. Both of these maps will be utilized to determine the effect of habitat on the distribution, abundance, and feeding ecology, and growth rates of cod.

Objective 3: in order to determine the juvenile cod use of Cashes Ledge, we conducted gillnet, hook-and-line, and video surveys in 2006 and 2007. Gill net sampling was conducted in the summer and fall of 2006 and the spring, summer, and fall of 2007. Hook-and-line and video work were conducted in the summer of 2006 and spring, summer, and fall of 2007. All three

methods were successful in measuring cod abundance at Cashes Ledge, and all lab samples (i.e., otolith aging, stomach contents, etc.) from hook and line and gillnet surveys have been processed. Preliminary analyses have been conducted on the effects of depth and season on cod abundance, and we are waiting until the habitat classification map is completed to finish the analyses. We anticipate completing these analyses in the spring.

5. Unexpected difficulties and project alterations

In the past year no major difficulties have been incurred. Thus we have not had to alter the project scope. See previous project reports for alterations that were made in the first year of the project.

6. Next steps, tasks for the final six months

- 1) Finish groundtruthing the habitat maps.
- 2) Overlay cod abundance, diet, condition data, etc. on habitat maps to assess the role of habitat in cod population dynamics and production.
- 3) Compare historic cod abundance data with current levels.
- 4) Finalize report and submit manuscripts.

7. Impacts of the project to fishermen/fishing community, and scientist/science community

Results from this study have been presented at the following conferences and meetings:

Grabowski, J. H., C. McGonigle, G. Sherwood, J. Gaudette, T. Weber, C. Brown, R. Steneck, and J. Witman. 2009. Developing cod habitat maps to evaluate the Cashes Ledge Closure Area Gulf of Maine Science Symposium, St. Andrews, Canada, October 4-9.

Grabowski, J. H. 2009. A review of recent juvenile cod research: closed areas & habitat associations. NE Regional Cod Tagging Program - A workshop to identify future research priorities for cod tagging in the Gulf of Maine. Portland, Maine, February 12.

Grabowski, J. H., G. Sherwood, J. Gaudette, T. Weber, C. McGonigle, R. Steneck, and R. Grizzle. 2008. Evaluation of closed areas: Cashes Ledge as juvenile cod habitat? American Fisheries Society Meeting. Ottawa, Canada, August 17-21.

Grabowski, J. H., G. Sherwood, J. Gaudette, T. Weber, C. McGonigle, R. Steneck, R. Grizzle. 2008. Evaluation of closed areas: Cashes Ledge as juvenile cod habitat? State of Marine Ecology Symposium, Brunswick, ME, May 2-3.

We anticipate two to three peer-reviewed manuscripts resulting from this work.

8. Signature and date



Jonathan Grabowski

January 15, 2009