

1. Project title and contract number

Evaluation of closed areas: Cashes Ledge as juvenile cod habitat

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2. PI contact information

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4. Major accomplishments and milestones

After receiving the NOAA-NEPA review in the late spring of 2006, we immediately began preparing for the field season by purchasing gear, obtaining a Letter of Acknowledgement from NOAA, and setting up subcontracts with project partners. We also have begun reviewing the historic data of cod on Cashes Ledge (Objective 1) collected by Bob Steneck (U. Maine-Orono) in the 1980's and 1990's. In June of 2006, we initiated our field sampling efforts. Specifically, 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 (Objective 2). The Cashes Ledge multibeam data was collected using a Reson 7125 multibeam sonar and a Coda Octopus F180 inertial navigation system. These data will be utilized along with existing bottom topography maps created from multibeam data in combination with video data collected on Cashes Ledge last summer to create extensive habitat maps of the area. We will be partnering with Craig Jackson (U. Ulster), his Ph.D. student (Chris McGonigle), and The Gulf of Maine Mapping Initiative to produce these maps in 2007. Chris will be at GMRI in the summer of 2007 to work with Tom Weber and my benthic ecology lab at GMRI on these data to create habitat maps that will then be used to examine cod use of habitats at Cashes and to compare with historical cod data from this region.

In order to determine the juvenile cod use of Cashes Ledge (Objective 3), we conducted the first gillnet sampling trip via the F/V Alice Rose captained by Matthew Thompson in August of 2006. Gillnet sampling for four consecutive evenings at sites on the edges vs. just off the reef resulted in the capture of just under 100 cod, which were enumerated and sampled for length, weight, gut contents, and otoliths. Later in August we returned to Cashes Ledge aboard the F/V Robert Michael captained by Curt Rice and conducted video surveys of cod use of each habitat, hook and line sampling, cod trapping, and habitat video surveys. Although hook and line

sampling was effective at catching cod, very few cod were captured in traps. Individuals and schools of cod, haddock, and pollock were observed on the fish video surveys. Finally, we returned to Cashes in October to resample our field sites with gillnets and caught primarily dogfish.

5. Unexpected difficulties and project alterations

The major issues that have arisen to date are as follows:

i) The crab pots were ineffective at catching cod, so that we decided to switch to long-line sampling in 2007. After consulting with industry participants in this project, we are currently constructing the gear necessary to conduct long-line sampling for cod on the bottom of Cashes Ledge at our shallow sites. We will also conduct tethering work of live prey in order to compare survival rates currently with those of lobsters, crabs and urchins 2 decades ago.

ii) we didn't conduct sampling efforts on the F/V Robert Michael in the fall of 2006 because a) we captured primarily dogfish in gillnets in October on the F/V Alice Rose and b) weather prohibited us from sampling during our scheduled dates in November. We intend to sample cod use of Cashes Ledge on both boats in the spring, summer and early fall of 2007 in order to compare with historic values from previous work over a decade ago.

iii) Although we initially proposed to sample 3 depths at Cashes, we added an additional depth after recognizing that Ammen rock is much shallower (~5-10 m) than other pinnacles on Cashes Ledge. Thus we sampled the following depths & habitats:

- | | |
|---|---------------------------------------|
| ○ Shallow (~5-10 fathoms or 10-20 meters) | <i>Laminaria</i> spp. (kelp) |
| ○ mid (~15-20 fathoms or 30-40 meters) | <i>Agarum cribosum</i> (shotgun kelp) |
| ○ deep (~25-30 fathoms or 50-60 meters) | rocky bottom |
| ○ extra deep (~35-50 fathoms or 70-100 m) | mud/sand bottom |

We also proposed to sample 4 replicate sites during each sampling events, but were able to add in two to four addition sites depending on the sampling method.

iv). In between submitting our proposal and receiving the funding, we learned that multibeam efforts were conducted at Cashes Ledge in 2005 to describe the bottom topography. We were able to use existing information on the bottom topography to select our field sites. In order to avoid creating redundant maps of the bottom, we focused our multibeam efforts towards collecting high resolution water column data to describe the extent of kelp habitat on Cashes Ledge. Groundtruthing these two multibeam datasets with our video data will permit us to construct much more accurate habitat maps of Cashes Ledge (Objective 2) in order to examine the historic and current distribution of cod within this closed area (Objective 3).

6. Next steps, tasks for next 6 months

Over the next six months the primary tasks include processing all laboratory samples collected thus far (stomach contents & stable isotopes for diet composition, otolith age analysis, video surveys of cod visitation rates, etc.) collected to date, entering data, preparing long line gear, preparing for the 2007 field season, and beginning to construct multibeam habitat maps that are groundtruthed with video data.

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

This project is still in the incipient stages of its development, so that it is difficult to predict its impacts on fishermen and the fishing community.

8. Signature and date

- Attachments: while attachments are not required or expected, we welcome vivid images or graphic demonstrations of project activities.

December 1, 2006

Jonathan Grabowski



Image 1: cod sampled by hook and line at Cashes Ledge, Gulf of Maine



Image 2: cod trap sampling on Cashes Ledge.