ANNUAL REPORT FY11
Habitat Assessment Funded Research

Project Title: Incorporating measures of habitat area into stock assessments: a case study with winter flounder and summer flounder

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Goals: Our goals are i) to test whether thermal habitat area is related to recruitment and ii) to incorporate thermal habitat area into stock assessment models. Our two focal species will be winter flounder and summer flounder. We have chosen these species because there is evidence that thermal habitat is an important regulator and because these species are important to regional fisheries and the fisheries management councils.

Approach:
Goal 1 – First, we will reexamine the relationship between recruitment and temperature. Then based on this reexamination and on a review of the literature, we will determine temperature thresholds and develop spatially explicit maps of thermal habitat during the important seasons for juvenile survival (winter for summer flounder and spring for winter flounder). From these maps and using GIS we will estimate the amount of thermally appropriate habitat in each year.

Goal 2 – We will incorporate our measures of habitat area into population models following the approach of Hare et al. (2010). Once the population model is constructed, we will run scenarios of the effect of increasing and decreasing habitat area. We will also work to incorporate the habitat volume measures into stock assessment models including AGEPRO and ASAP. We will work with the developers of these models to ensure that our implementations are correct.

Work Completed: This project is on track, on schedule. Based on assessment schedules, we have started working with winter flounder first. The first step of goal 1 was completed. Environmentally-explicit stock recruitment relationships were developed for the three stocks of winter flounder. These basic models explained a significant amount of variability in the southern stock but not in the northern stock. This result fits with the hypothesis that a species will experience more thermal stress at the edges of their range. After review by the assessment committee these models were not included on the assessment, but this interaction allowed us to raise thermal habitat in an assessment. Our next step is to refine our measures of habitat volume for winter flounder and examine some of the questions coming out of the assessment. We also need to perform the preliminary and more in depth analyses for summer flounder.

Recently, three post-doctoral applications were reviewed as part of the National Research Council Research Associateship Program. A decision should be made early in 2012 with the person starting in the spring. This will allow focused effort on the project. The post-doc will have two years of funding from the time they start.

Applications: This project will improve the stock assessments of winter flounder and summer flounder using existing habitat information and will continue the development of methods to

incorporate habitat-specific data into assessments. We will work closely with the stock assessment scientists and the fishery management councils throughout this project and our results and models will be presented to these groups. Both PIs have presented research to stock assessment committees and fishery management council. Our effort is designed to make habitat information available to the assessment process in the context of rebuilding plans and there is keen interest in these plans among many stakeholders in the region. We will also support an NRC post-doc and thus contribute to the training of a scientist who is versed in habitat science as applied to stock assessments.

Publications/Presentations/Webpages:

Hare, JA. 2011. Development of environmentally-explicit stock-recruitment models for three stocks of winter flounder (*Pseudopleuronectes americanus*) along the northeast coast of the United States. Working Paper 13 SARC 52 Southern Demersal Working Group, Winter Flounder Assessments (summarized in http://www.nefsc.noaa.gov/publications/crd/crd1117/atext.pdf, page 51-55).