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EVS 618 Internship  
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## Marine Fish Trophodynamic Modeling

### Host Institution

The Northeast Fisheries Science Center (NEFSC) in Woods Hole, MA.

### Description of Work:

#### *Manuscript Preparation*

My time at the NEFSC was primarily spent preparing a manuscript on the diet composition of four commercial benthic predators on the Northwest Atlantic continental shelf: black sea bass (*Centropristis striata*), scup (*Stenotomus chrysops*), northern searobin (*Prionotus carolinus*), striped searobin (*Prionotus evolans*). These temperate species are all part of the same species assemblage based on geography and depth distribution. Black sea bass and scup, despite being commercially important and subject to overfishing, have been identified as data-poor species. Searobins have a small commercial and recreational fishery and are often unintentionally caught as bycatch. The management of all four species could be dramatically improved with further understanding of their predatory behavior and prey selection.

The diet of these species has been generally characterized in previous studies but not across varying temporal or spatial scales. This study advances from previous diet studies because we examine variation in diet composition at two different temporal scales (season and 5-year time blocks), geographic region along the Northwest Atlantic continental shelf, and predator size guild. The NEFSC has a database of 35 years of data on fish and their stomach contents from four regions in the Atlantic spanning from Cape Hatteras to Nova Scotia. A statistical ordination technique was used to determine the importance of each of these factors on the diet composition of each predator.

#### *Bottom Trawl Cruise*

I volunteered to work on a 10-day bottom trawl cruise in the Gulf of Maine. This cruise was one of five legs of sampling in the Atlantic region for the spring 2009 season. The NEFSC conducts these surveys twice a year (spring and autumn) to monitor recruitment, abundance and survival of harvestable sizes, the geographic distribution of species, ecosystem changes, and the biological rates of the stocks ([www.nefsc.noaa.gov/femad/ecosurvey/mainpage/](http://www.nefsc.noaa.gov/femad/ecosurvey/mainpage/)). While on board, I worked twelve-hour shifts sorting and measuring fish. All the data is entered into FSCS, an automated software program specially designed for these NMFS surveys. The data collected on these surveys and entered into FSCS generates the database I used for the manuscript preparation described above.

#### *Other opportunities*

There were several opportunities for me to engage with other National Marine Fisheries Service (NMFS) employees outside of my internship requirements. They are described below.

#### *Management Procedures Discussion Group*

I attended a bi-weekly discussion group on management procedures, or management strategies evaluation (MSE). There are several different approaches and techniques to manage fisheries all of which have different trade-offs. MSE provides a framework for assessing these trade-offs and determining the best approach for a given situation. Attending these discussion

groups is informative for me in two ways. First, I am learning about a new topic and specific techniques of fisheries management and the evaluation of that management. Second, I gain insight into how our government is approaching and utilizing such strategies. Mike Fogarty and Chris Legault started these discussion groups with the expectation that the NEFSC staff may learn more about MSE and brainstorm on possible ways to incorporate MSE into existing fisheries science and management.

### *Seminars*

I attended noon seminars when the opportunity was available. Some of the seminars I attended include:

- “An overview of the NEFSC Ecosystem Assessment Program” given by Mike Fogarty of NEFSC.
- “End-to-end estimates of fisheries yield on Georges Bank” given by John Steele of the Marine Policy Center, Woods Hole Oceanographic Institution (WHOI) and former director of WHOI.
- “Gentle reminder of marine zoology and prey ID” given by Brian Smith of the Food Web Dynamics Program at NEFSC.

### *Maturity Workshops*

I attended two fish maturity workshops in preparation for the bottom trawl cruise. The sex and maturity of most fish can only be determined after dissection. Several specimens of various species and maturity levels were dissected and presented with instruction of identifiable characteristics for each.

### *Dissertation and Future Research*

While at NEFSC, I have been privileged to utilize their database for the purpose of research outside of my immediate IGERT internship obligations. I am using data collected by NEFSC and the expert advice of my host, Jason Link, for my dissertation research on ecosystem modeling. Additionally, Jason and I have briefly outlined another unrelated manuscript on scaling that I intend to write at a later date.

### **Target Publication**

I intend to submit a manuscript on the feeding ecology of four benthic predators, Black Sea Bass (*Centropristis striata*), Scup (*Stenotomus chrysops*), Northern Searobin (*Prionotus carolinus*), and Striped Searobin (*Prionotus evolans*), to a peer-reviewed journal. I will most likely submit to the Journal of Fisheries Biology or Environmental Biology of Fishes.

### **Conclusion Date**

My time at the Woods Hole office will continue as needed through the summer. I intend to continue my work with Jason Link at NMFS until the manuscript is accepted for publication in a peer-reviewed journal.