

Evaluating the Ecological Effects of Cephalopod Fisheries

Sea Grant researchers have shown that squid play an important role in the food web of the Atlantic continental shelf-- sometimes the predator, sometimes the prey. This multi-species approach has stimulated discussion among fisheries managers and researchers and helped in the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act.

A trend beyond single species management

Management of coastal marine fisheries has traditionally been single species focused. With tremendous fishing pressure and declines in many fishery stocks there is a need for the most accurate information about the species managed by fisheries management councils. One aspect to consider is the impacts of the interactions between the species that are managed and how they affect the fish populations of interest. Clearly there is a need for research that adds to our knowledge of the many fisheries species of the Atlantic continental shelf.

Evaluating squid within its ecological context

In 2002 Dr. Timothy Essington, then at the Marine Sciences Research Center at Stony Brook University, embarked on a study to look at the role of squid in the Atlantic coastal food web. The study sought to understand the relationships between squid and what they eat as well as those between squid and the animals for which *they* are food.

The project results did provide a better understanding of the food web linkages between squid and finfish on the U.S. mid-Atlantic continental shelf ecosystem. An important finding was evidence for the importance of relative body size in mediating predator-prey interactions.



Longfin inshore squid, *Loligo pealeii* from the mid-Atlantic continental shelf
Photo courtesy of Timothy Essington

Squid mostly prey on juvenile fish after reaching a certain size. There is more squid predation on fish in winter and spring when there is an abundance of small fish. But in summer into fall there is much fish predation on squid when fish reach adult size. The research also found that most of the fish that are eaten by squid are eaten by squid smaller than those captured in the squid fishery. Another result was that squid comprise a major part of the diet of large bluefish and large whiting, and are important for all sizes of summer flounder. These results indicate that squid fishing might reduce the productivity of other fisheries by removing the food needed for those species to grow.

The project clearly shows that squid play an important role in the food web, acting as both predators and prey. These complex interactions have implications for management of both squid and finfish fisheries. Fisheries managers and researchers are beginning to discuss the implications of this work. It is contributing, along with other NYSG research done by David O. Conover, to fundamental rethinking of the ways in which we manage harvested marine resources.

This work has served as a reference in the process leading to Magnuson-Stevens Fishery Conservation and Management Act Reauthorization. Both Drs. Conover and

Essington participated in an informational presentation to Congress that was organized by SeaWeb's COMPASS (Communication Partnership for Science and the Sea) to educate legislators about the implications of the research results on fisheries management. Results from this research are influencing work by the North East Fisheries Science Center to assess silver hake. Dr. Essington is collaborating on multi-species modeling efforts involving silver hake and squid.

Students

Two Sea Grant Scholars were part of this project. Michelle Staudinger received a Master's degree in 2004 and went on to pursue a doctorate at the University of Massachusetts Intercampus Graduate School of Marine Sciences and Technology (IGS).

Mary Hunsicker received her Master's in 2004 and is now a Ph.D. student at the University of Washington.

Publications

Hunsicker, M.E., and T.E. Essington. 2006. Size-structured patterns of piscivory of the longfin inshore squid (*Loligo pealeii*) in the mid-Atlantic continental shelf ecosystem. *Canadian Journal of Fisheries and Aquatic Sciences* 63(4):754-765.

Smith, L. 2002. Shifting fisheries management toward a multi-species approach. *Coastlines* 31(1):10-11.

Staudinger, M.D. 2004. The Importance of Squid to the Diets of Bluefish, Goosefish, Silver Hake, and Summer Flounder in the Southern New England Region. Master's Thesis. Stony Brook University, Stony Brook, NY. 84 pp.