Capstone Project Proposal

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The U.S. shrimp fishery targets penaeid shrimp across a large portion of the continental shelf in the northern Gulf of Mexico. The fishery is one of the largest and most valuable in the United States with approximately 188 million pounds of shrimp caught in the Gulf of Mexico in 2008 with a dockside value of over $366 million (National Marine Fisheries Service 2010). The shrimp fishery uses bottom trawls to catch the bottom dwelling shrimp. These bottom trawls are indiscriminate in their capture of demersal organisms and approximately 4.5 kg of bycatch are caught for every 1 kg of shrimp (Harrington et al. 2005). Bycatch are the unintended fish, invertebrates, and other organisms that are caught along with the targeted shrimp. Any bycatch caught in the shrimp fishery is usually returned to the water dead. Several studies have shown that fishing alters the structure and diversity of the benthic community (Haedrich and Barnes 1997; Bianchi et al. 2000; Kaiser and de Groot 2000; Schratzberger et al. 2002). Diamond et al. (2000) found that the shrimp fishery was negatively impacting populations of Atlantic croaker (*Micropogonias undulatus*) as well as other groundfish species in the Gulf of Mexico.

Over the past few years, a concerted effort has been made to move marine fisheries management in the U.S. away from single species management towards ecosystem-based management where management actions consider the relationships between all ecosystem components, including humans, nonhuman species, and the environments in which they live (U.S. Commission on Ocean Policy 2004). In ecosystem-based management, managers need to have a better understanding of how rules and regulations impact managed as well as non-managed species.

Atlantic croaker, spot (*Leiostomus xanthurus*), sand seatrout (*Cynoscion arenarius*), and silver seatrout (*C. nothus*) compose approximately 75% of the shrimp trawl bycatch. These groundfish species were also targeted as part of a directed fishery from the early 1950s to the early 1980s. In 1998, regulations required that shrimp vessels operating in federal waters of the Gulf of Mexico must use bycatch reduction devices (BRDs) in their nets to reduce the amount of finfish bycatch that they capture while trawling. While the efficiency of BRDs in releasing finfish from the net is less than 40%, a significant number of fish are still released that would have died before BRDs. Also, effort within the shrimp fishery has decreased approximately 60% since 2002 due to the increase of imported shrimp, increased fuel costs, and the number of major hurricanes in 2004, 2005, and 2008 that destroyed shrimp vessels. The cessation of the directed groundfish fishery in the 1980s, the implementation of BRDs in 1998, and the reduction in shrimping effort since 2002 have had some type of impact on groundfish populations in the Gulf of Mexico, but the impact is presently unknown.

My capstone project proposal is to examine the spatial distribution and abundance of these groundfish species from the early 1980s and compare that to the spatial distribution and abundance from the 2000s. I will use catch data from the Southeast Area Monitoring and Assessment Program’s (SEAMAP) Summer Shrimp/Groundfish Survey (Survey) to examine spatial distribution and abundance. The Survey is a standardized fishery independent data collection survey that has taken place annually since 1982. The sampling involves day/night sampling at sites chosen randomly in areas stratified by depth and area. A 13.1 m trawl net is used to sample shrimp and demersal finfish. All species of fish and invertebrates caught in the trawl are identified to species, enumerated, and weighed. Lengths of up to 25 individuals of every species are also measured. Approximately 300 to 400 trawl samples are conducted annually in waters from 10 to 100 m from Mobile Bay, Alabama to Brownsville, Texas. To avoid potential sources of uncertainty, the survey is conducted during June and July each year using standardized survey design, techniques, gear, and vessels.

Broad geographic shrimping effort data is available from 1960 to 2008 with more refined data available from 2007 to present. This data will provide information on current and past shrimping levels and distribution to see if changes in shrimping effort within areas has affected species distribution and abundance.

Anecdotal evidence from fishermen and researchers suggest that the groundfish species are making a very large comeback. Researchers participating in recent SEAMAP surveys have stated that they have not seen Atlantic croaker this large and in these large numbers since the late 1960s and early 1970s. I propose to analyze the fishery independent data to determine if groundfish populations are recovering.

References

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