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November 14, 2011

### ***Northeast Cooperative Research Program Feature*** **Monfish 2011 Research Set Aside Projects Awarded**

The goosefish, better known locally as “monkfish,” experienced a rapid rise in popularity as a food fish during the 1980s, and catch off the Northeastern U.S. increased to meet demand for this species. The monkfish was little-studied until it became commercially important. Although more is known now than in the 1980s, there is still much to be learned about this fish and its natural history. For more on monkfish, visit FishWatch:  
<http://www.nmfs.noaa.gov/fishwatch/species/monkfish.htm>

Two projects approved in late 2011 for Research Set-Aside support will attempt to build better understanding of where monkfish go during a year, what triggers their movements, how fast they grow, how to determine their ages, how temperature influences where they occur and catch rates for monkfish in the commercial fishery, and how rising ocean temperatures could affect monkfish distribution—all information important for a species that is managed by geographic area under rules intended to prevent overfishing and harmful stock declines.

#### **Using Archival Tagging and Age Validation Efforts to Assess Monkfish Movement, Age Structure, and Growth**

Jonathan H. Grabowski and Graham D. Sherwood of the Gulf of Maine Research Institute have tagged nearly 300 monkfish with tags that collect and store data. The tags can record for up to five years, and continuously record the depths and temperatures that the fish experiences over time and allow the fish’s movements to be estimated.

Researchers will now be able to tag and release more fish, increasing the chance that tagged fish and the data collected by the tags will be recovered. Each recovered tag is packed with information that is hard to directly observe in the wild for this deep-water species, and recovered fish help document how quickly animals grow, something that may vary with sex and geographic area. Nine fishing businesses are assisting with tagging.

In separate laboratory work with Crista Bank at the University of Massachusetts School of Marine Science and Technology, the researchers are hoping to improve methods and results for determining the age of monkfish.

In earlier work, monkfish were held in the laboratory and injected with oxytetracycline, an antibiotic that is incorporated into newly forming bone and cartilage and that fluoresces under ultraviolet light, providing a marker for the date when it was applied. Researchers can then use this marker to determine how much and how fast an animal has grown since the marker was introduced.

While this technique is not new, oxytetracycline is just one kind of chemical marker. The kind of chemical marker, dosage, and injection sites that obtain the best results for aging varies by species and much more needs to be known about these factors for monkfish. Researchers will be conducting laboratory trials to find the best way to introduce a chemical marker in monkfish that provides a readable mark without compromise the animal's health.

In one other bit of laboratory work, researchers will take a closer look at the ratio of strontium to magnesium in monkfish earbones. This ratio is a natural indicator of ambient temperatures experienced by some fish, and may also prove to be one for monkfish.

### **Influence of temperature on the distribution and catch rates of monkfish, *Lophius americanus***

Andrea Johnson at the University of Maine Eastern Shore is heading an effort to better understand how water temperature affects monkfish movements. This topic has become more interesting to researcher and fishermen as many shifts in species distribution have been documented as ocean waters off the Northeast have warmed in recent years.

The results of this study will help improve the population assessment of monkfish and modeling efforts in support of monkfish management. Further, this project will add to knowledge about how water temperature influences monkfish distribution and may eventually provide a basis for assessing the effects of climate change on monkfish behavior.

Johnson is working with colleagues at the Northeast Fisheries Science Center and with several commercial fishing vessels. Fishermen will conduct the fieldwork, targeting monkfish using gillnets fitted with devices that record depth and water temperature while fishing. They will also record a variety of other information such as when and where hauls occurred, how long the nets were in the water, number and total weight of fish caught, and information on currents, as well as collecting a subsample of fish for laboratory examination.

Johnson and her colleagues will comb through the data collected, compare it with other data about monkfish distribution, and look for patterns in monkfish catch, size, and reproductive status in relation to the temperatures and depths at which they were caught. By relating catch rates to the lunar cycle, researcher may also find out more about the effect of currents on catch.