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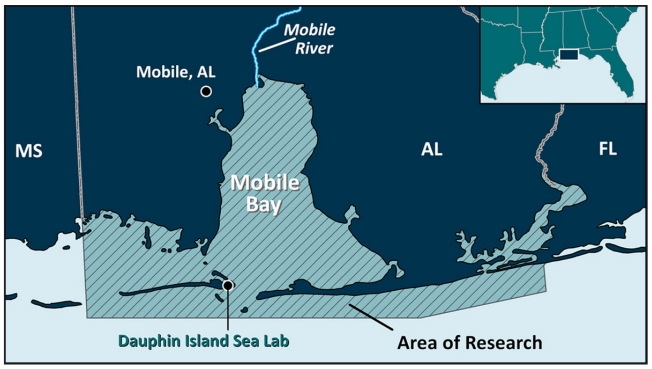
Discovery Porthole

Sharing Research with Educators and the Public

Monitoring Gulf Coast Fisheries

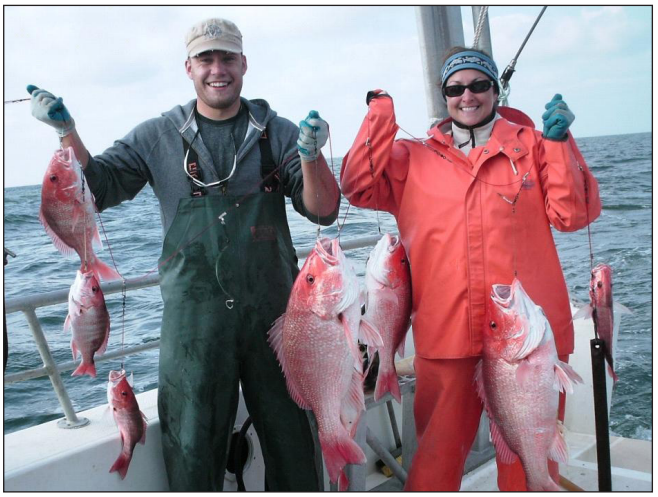
Following the Deepwater Horizon oil spill disaster, NGI funded researchers increased the frequency and expanded the coverage of monthly sampling programs across the northern Gulf of Mexico. Data collected by Dauphin Island Sea Lab scientists after the oil spill, is being compared to historical baseline data, allowing for the potential identification of changes in the structure of these critical populations.



Fisheries managers have had the difficult task of incorporating new ***ecosystem-based fisheries*** approaches into traditional fisheries management techniques. Traditional practices often examine a single species in a "vacuum" where ecosystem-based strategies, like those used by fisheries ecologists at the Dauphin Island Sea Lab (DISL), take a more holistic approach, looking at a system and all its' potential influences, both man-made and natural. Statistical models are popular tools used to describe ***ecosystem dynamics***; however, these models rely on detailed food web and distribution data, which is historically difficult to obtain. In order to document the impacts of the oil spill on both reef and bottom-associated fishes of Alabama, the Fisheries Ecology Lab at DISL is conducting ***fisheries-independent*** longline surveys. Vertical longline surveys, targeting reef fish like red snapper and bottom longline surveys, which target larger fishes such as sharks, grouper and red drum, have established baseline population trends for these communities. The information collected from these fishing methods helps researchers determine distribution patterns and map food webs in coastal ecosystems.

Sharks, like this hammerhead, are caught to monitor population trends and assess oil spill impacts in Alabama. Photo credit: DISL

Scientists measure the health of the ocean by evaluating the health and population size of the fish and other animals that live there. They often do this with the ***mark and recapture*** method. After scientists have recorded information, including the size and health of collected animals, they mark them with a unique tag and release them back into the environment. After a period of time, another sample is taken. If the same individual is recaptured, scientists record their observations and take note of any changes since the last time the animal was caught. DISL scientists are examining the population size and structure of red snapper and several shark species because of their role as top predators in the ocean. Changes in population size and structure of top predators can have trickle-down effects on the rest of the food web. Tissue samples are also being collected to monitor effects of the oil spill.



Researchers conduct longline surveys, sampling red snapper and other fish, to monitor oil spill impacts. Photo credit: DISL

Education Extension

Key Terms: *fishery, species, population, ecosystem, community, food web, random, estimate*

Classroom Activity: Mark and Recapture

Mark and recapture is a sampling technique scientists use to estimate population size. A simplified version of the mark and recapture method used in fisheries research can be done as a classroom activity.

Supplies: *plastic fish, aquarium or large bowl, water, marker, calculator*

Directions: 1) Place fish in a water filled aquarium and mix. 2) Scoop up a random sample of fish. 3) Place a mark on the captured fish and note how many were captured. 4) Return the fish and mix well. 5) Take a second random sample and take note of how many fish were captured and how many were recaptures (previously marked). 6) Use the data collected to estimate the total fish population size with this proportion formula:

$$\frac{\text{Number marked}}{\text{Total population}} = \frac{\text{Number marked in subsequent sample}}{\text{Number captured in subsequent sample}}$$

Ocean Literacy Principles:
1. The Earth has one big ocean with many features, 5. The ocean supports a great diversity of life and ecosystems, 6. The ocean and humans are inextricably interconnected, 7. The ocean is largely unexplored

National Science Standards:
A. Science as Inquiry: Abilities necessary to do scientific inquiry; C. Life Science: Populations and ecosystems; G. History and Nature of Science: Science as a human endeavor

Visit **http://dhp.disl.org/resources.html** for lesson plans and additional marine-related activities.

****Use the key terms above to search for additional lesson plans on the web!***

Did You Know...

Ecosystem-based fisheries management is an integrated approach, allowing scientists and decision makers to study and manage the resources of an entire ecosystem instead of a single organism.

Ecosystem dynamics refers to the interconnectedness of all living and non-living components of an environment. A small change in just one element can have dramatic effects on the others.

Fisheries-independent data is information collected by scientists through random, unbiased sampling and is unrelated to data collected from the commercial fishing industry (fisheries-dependent).

The ***mark and recapture*** technique involves collecting and tagging animals in a given area with a unique marker. This allows researchers to monitor the health and habits of an individual while also gaining information about the entire population.

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Funding

This project was funded through a grant from the BP Gulf of Mexico Research Initiative. NGI received a grant from BP's Independent University Research funds to address regional impacts from the Deepwater Horizon oil spill.

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The Northern Gulf Institute (NGI) is a National Oceanic and Atmospheric Administration (NOAA) Cooperative Institute addressing the research needs of the northern Gulf of Mexico. Mississippi State University leads this collaboration of the University of Southern Mississippi, Louisiana State University, Florida State University, Alabama's Dauphin Island Sea Lab, and NOAA scientists at laboratories and operational centers.

This document was prepared under award NA06OAR4320264 06111039 to the Northern Gulf Institute by the NOAA Office of Ocean and Atmospheric Research, U.S. Department of Commerce.