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# The Stressful Life of Fish

Fish get stressed! Obviously fish don't perceive stress the same way we do, but there are many factors that can stress fish populations. For example, two of the most common ways we think about fish populations being stressed are from overfishing and habitat loss. In reality, there are a multitude of ways that fish can be stressed. In this issue of the *Gulf Coast Fisherman*, we'll review two additional disturbances that lead to stress in fish: harmful algal blooms (HABs) and oil spills.

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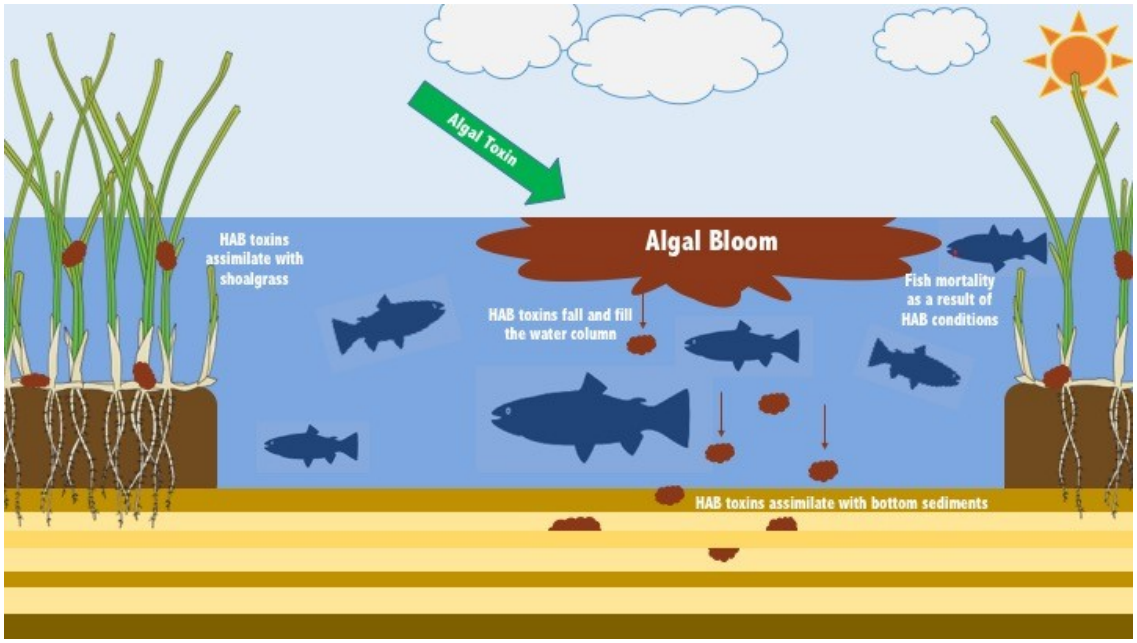
# What’s HAB-ening in the Eastern Gulf?

You’ve probably heard about the “red tide” affecting Florida’s coastline, but did you know that these events are increasing in prevalence and severity worldwide? Below, we’ll answer some frequently asked questions about Harmful Algal Blooms.




***What are Harmful Algal Blooms (HABs)?***

- Harmful algal blooms (HABs) are a natural phenomenon indicating environmental change in the water and/or on nearby land.
- Although HABs occur naturally, human activities can exacerbate HAB intensity and frequency.
- Less than one percent of algal blooms produce toxins, so not all algal blooms are harmful.

***When do HABs occur?***

- HABs occur when certain species of algae (phytoplankton, which are tiny microscopic plants) grow out of control and produce toxins.
- Algal growth is fueled by many factors, including sunlight, warm water temperatures, excess nutrients (nitrogen and phosphorus) from runoff, pollution, water flow modifications, and climate change.

***Where do HABs occur?***

- HABs occur in both freshwater and saltwater environments.
- HABs occur worldwide and have been documented in nearly every U.S. state.

***Which algal species are typically responsible for Gulf of Mexico***

***HABs?***

- *Karenia brevis* is a dinoflagellate, which is a type of plankton. This species produces a toxin (brevetoxin) and causes “red tide”. *K. brevis* is the most common harmful algal species in the Gulf of Mexico.
- *Pseudo-nitzchia* is a diatom, another type of plankton. This species produces domoic acid, which bioaccumulates (is passed up the food web) and can lead to amnesic shellfish poisoning (one of the symptoms is short-term memory loss!).

***What are the potential effects of HABs?***

| Environmental Effects | Economic Effects | Human Health Effects |
|---|---|---|
| • Discolored surface waters<br>• Depletion of oxygen in water (“dead zones”)<br>• Seagrass die-off<br>• Mass mortality of shellfish and finfish<br>• Changes in food webs<br>• Airborne toxins | • Losses resulting from decreased recreation and tourism<br>• Clean up costs to remove dead fish from beaches | • Fish/shellfish poisoning<br>• Respiratory irritation |

***What does the future hold for HABs?***

- Climate change and increasing nutrient levels (partly due to urbanization of coastlines) are causing increases in HAB intensity and frequency.
- Scientists can forecast HABs, and this will become increasingly important in the future.

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# The Impact of the Deepwater

# Horizon Incident on Gulf of Mexico Fish Populations

Separating the impacts of overfishing and habitat loss from the effects of an environmental disruption like the Deepwater Horizon (DWH) incident is a challenge, primarily because we lack adequate baseline (in this case, pre-spill) data. In the aftermath of the DWH, scientists are increasingly realizing the importance of routine fishery-independent surveys as a way to characterize marine ecosystems. Below is a summary of an article from 2018 detailing the most comprehensive fishery-independent survey of the Gulf of Mexico's continental shelf. A link to the full article (Murawski et al. 2018 from *Marine and Coastal Fisheries*) is included below.

***What did they do?*** Over a six-year period from 2011-2017, Murawski and colleagues deployed 343 bottom longlines off the USA, Mexico and Cuba to collect baseline data, monitor fish health and sample tissues for contaminant analyses.

***What did they find?*** Murawski and colleagues deployed over 150,000 baited hooks and captured nearly 15,000 fish, resulting in an average catch rate of 1 fish per ten hooks. They encountered 166 unique species, representing 11 percent of the known fish species from the Gulf of Mexico. The most common species were the Atlantic sharpnose shark, red snapper, and king snake eel. Predictable depth-related patterns were seen. Warm-water species like red grouper, atlantic sharpnose shark, and red snapper were often caught in shallower waters, whereas cool-water species like hake, dogfish, and tilefish were caught in deeper waters.

Atlantic sharpnose shark, the most commonly encountered fish in the Gulf-wide bottom longline study by Dr. Steve Murawski from the

University of South Florida.

***What does it mean?*** Data from this study provide a valuable baseline for evaluating the impacts from natural and man-made disturbances. Comparing the data from this study to bottom longline data from 2006-2009 (described in Scott-Denton et al. 2011) indicates that the species composition between the two periods is similar, suggesting that the northern Gulf of Mexico is resilient to impacts from events like the Deepwater Horizon disaster.

*Click here to access the free online version of this work (Murawski SA, Peebles EB, Gracia A, Tunnell JW Jr., Armenteros M. 2018. Comparative abundance, species composition, and demographics of continental shelf fish assemblages throughout the Gulf of Mexico. Marine and Coastal Fisheries 10:325-346).*

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I'm Marcus Drymon, an Assistant Extension Professor at Mississippi State University and a Marine Fisheries Specialist at Mississippi-Alabama Sea Grant. I'd like to hear from you - please send any comments or questions to marcus.drymon@msstate.edu, and click on the links below for more information on my website and Facebook page.


Contributing authors shown with their favorite fishes: Extension Associate Amanda Jefferson (triggerfish, left) and Extension Program Associate Emily Seubert (sharpnose shark).

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