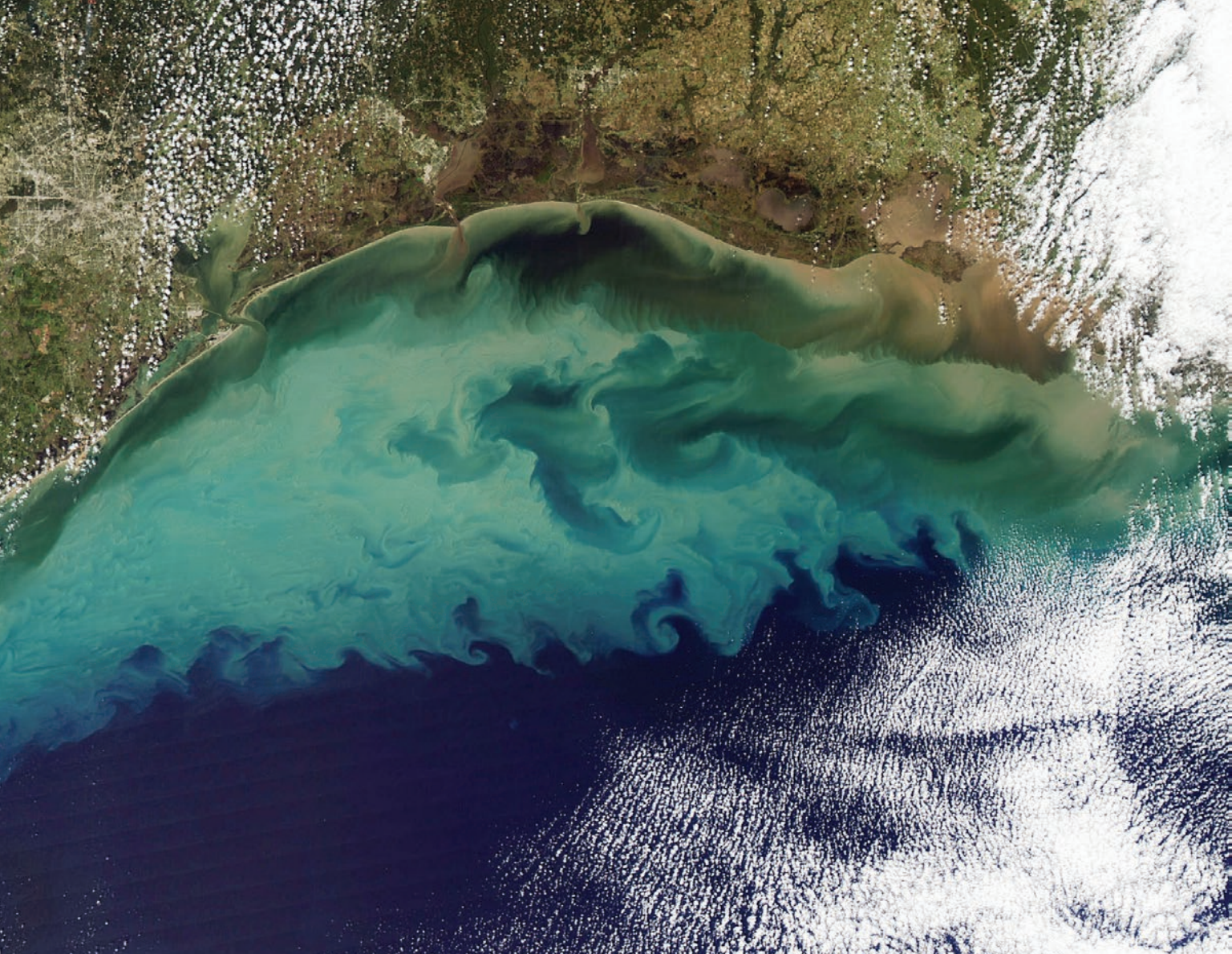


Restoring the Gulf

Beyond the Shore



Ocean
Conservancy



LEGEND

Icons indicate the different goals that projects listed in this booklet achieve.



Restore and conserve habitat



Restore water quality



Replenish and protect living coastal & marine resources



Enhance community resilience



Restore and revitalize the Gulf economy

The Gulf of Mexico is special to each of us in different ways. For some, the Gulf is a swimming pool, a favored fishing hole or a boating paradise. For others, the Gulf generates food and energy for the country and supports a vibrant tourism industry. The Gulf provides all of these benefits and more, and regardless of your favorite thing about it, what happens beneath the surface affects our collective future.

Picture, for a moment, a diverse and awe-inspiring ecosystem like the Amazon rainforest. Submerged beneath the surface of the Gulf of Mexico is an underwater ecosystem every bit as impressive and important as the Amazon. These rich waters touch our shores and our lives, oftentimes in ways we don't fully recognize. Unlike the Amazon, however, we can't see much of the undersea beauty of the Gulf. With much of that activity in the Gulf underwater and out of sight, we must imagine what we cannot directly see and estimate what we cannot directly count.

Unfortunately, this underwater ecosystem is far from idyllic. A dramatic story is unfolding in the Gulf from the damage caused by the BP Deepwater Horizon oil disaster. There are more than 15,000 species that call these waters home. Many of these species and their habitats were impacted by the BP oil disaster. Dozens of migratory wildlife species traveled through the oiled area en route to distant feeding and breeding grounds, inadvertently expanding the oil and dispersant footprint far beyond the disaster zone. The effects of the BP oil disaster are further

compounded by decades of natural and man-made stress on the Gulf.

Restoration funds resulting from this disaster offer an unprecedented opportunity to repair what was damaged, fix chronic problems and enhance what remains. Never before has this level of funding been dedicated specifically to restore the Gulf. As a region, it is our responsibility to invest these funds in the successful restoration of the Gulf.

Success means that restoration must be comprehensive, from the rivers that feed the estuaries, to the deepest expanses of the seafloor, where the BP oil disaster began, to the communities that call the Gulf Coast home. We need to make smart and immediate investments in projects that address pressing needs in the Gulf, as well as projects that support ongoing and future restoration efforts. If we are truly going to use this once-in-a-lifetime opportunity to protect and enhance the Gulf and its unique culture, we must ensure that restoration of the marine environment is an integral part of our approach.

The decisions we make now will impact the region for decades to come. Let's make them count.

THE OCEAN ECONOMY

The Gulf of Mexico is an economic engine for the country, providing jobs for millions of people. Living resources, tourism and recreation in coastal counties – including fishing, seafood, restaurants, lodging, recreational facilities, shipbuilding and more – are essential components of the Gulf’s ocean economy, totaling nearly \$22 billion.

Economic Value of the Gulf’s Ocean Economy

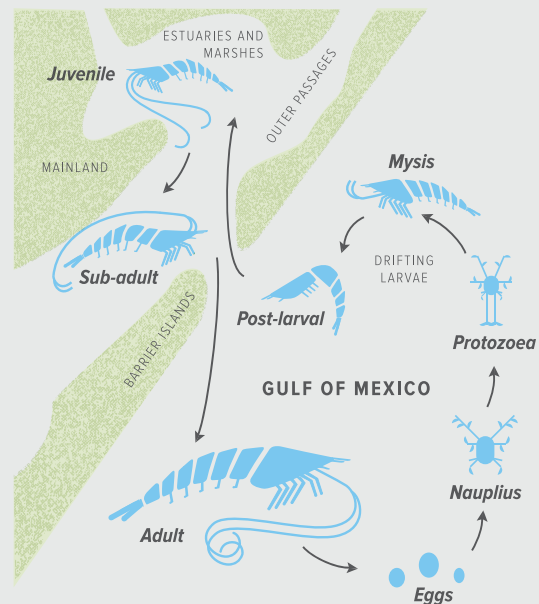



National Ocean Economics Program. (2014, March). *State of the U.S. Ocean and Coastal Economies 2014: Coastal and Ocean Economic Summaries of the Coastal States*. Retrieved from <http://www.oceaneconomics.org/download/>

ACHIEVING COMPLETE RESTORATION

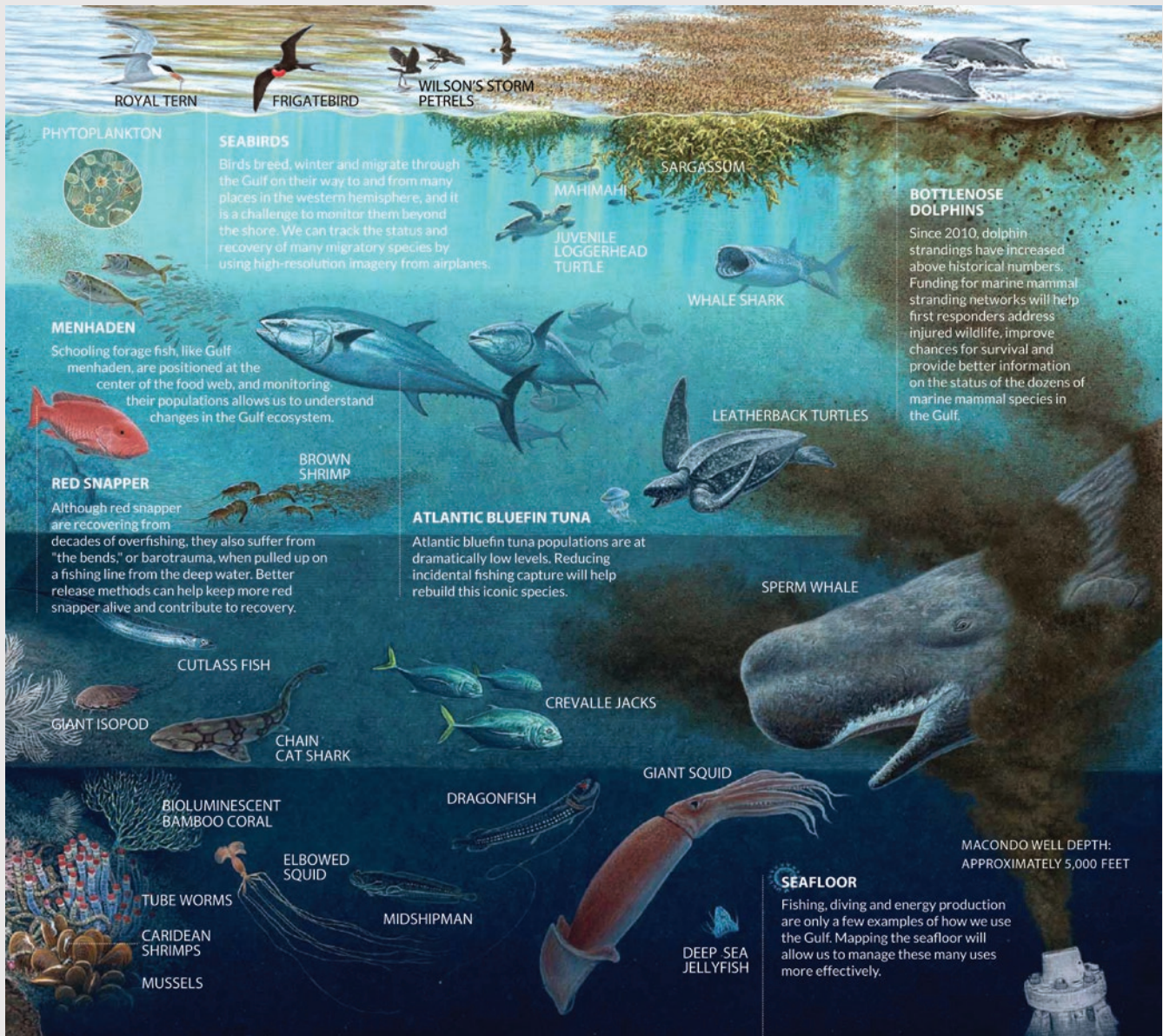
Brown shrimp are lifelong travelers. Newly hatched shrimp make their way from the deep offshore waters into the protected shallows of estuaries, only to return to the Gulf as adults to spawn. Shrimp are an important part of the Gulf’s food web, providing income for the Gulf’s most valuable commercial fishery, bait for recreational fishermen, a favorite seafood choice of consumers, and thus a fitting symbol for the interconnectedness of the Gulf of Mexico.

Like the people who catch them, shrimp need healthy, functioning coastal and marine ecosystems in order to thrive. Shrimp are but one example of the how the links between land and sea habitats are crucial to the health of our wildlife, our communities and our economy.



An underwater photograph showing a school of fish swimming in the upper right quadrant against a deep blue background. In the lower half, there is a vibrant coral reef with various types of coral, including branching and brain coral, in shades of green and brown. The text is overlaid on the upper left and center of the image.

The coastal and marine environments are two halves of a single whole, and restoration of one will be incomplete without the other.



ROYAL TERN

FRIGATEBIRD

WILSON'S STORM PETRELS

PHYTOPLANKTON

SEABIRDS

Birds breed, winter and migrate through the Gulf on their way to and from many places in the western hemisphere, and it is a challenge to monitor them beyond the shore. We can track the status and recovery of many migratory species by using high-resolution imagery from airplanes.

SARGASSOM

MAHIMAH

JUVENILE LOGGERHEAD TURTLE

WHALE SHARK

BOTTLENOSE DOLPHINS

Since 2010, dolphin strandings have increased above historical numbers. Funding for marine mammal stranding networks will help first responders address injured wildlife, improve chances for survival and provide better information on the status of the dozens of marine mammal species in the Gulf.

MENHADEN

Schooling forage fish, like Gulf menhaden, are positioned at the center of the food web, and monitoring their populations allows us to understand changes in the Gulf ecosystem.

RED SNAPPER

Although red snapper are recovering from decades of overfishing, they also suffer from "the bends," or barotrauma, when pulled up on a fishing line from the deep water. Better release methods can help keep more red snapper alive and contribute to recovery.

BROWN SHRIMP

ATLANTIC BLUEFIN TUNA

Atlantic bluefin tuna populations are at dramatically low levels. Reducing incidental fishing capture will help rebuild this iconic species.

LEATHERBACK TURTLES

SPERM WHALE

CUTLASS FISH

CREVALLE JACKS

GIANT ISOPOD

CHAIN CAT SHARK

GIANT SQUID

BIOLUMINESCENT BAMBOO CORAL

DRAGONFISH

MACONDO WELL DEPTH: APPROXIMATELY 5,000 FEET

ELBOWED SQUID

MIDSHIPMAN

SEAFLOOR

Fishing, diving and energy production are only a few examples of how we use the Gulf. Mapping the seafloor will allow us to manage these many uses more effectively.

TUBE WORMS

CARIDEAN SHRIMPS

MUSSELS

DEEP SEA JELLYFISH

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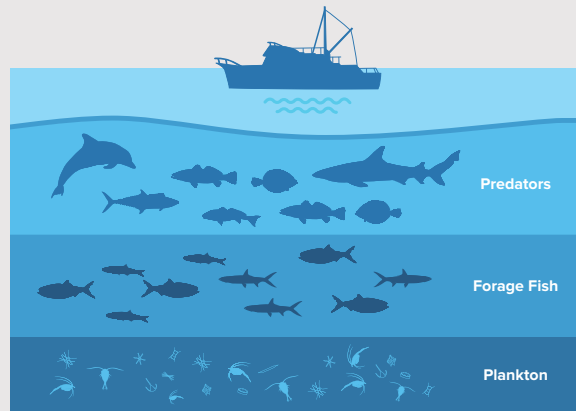


USING SMALL FISH TO UNDERSTAND BIG PROBLEMS



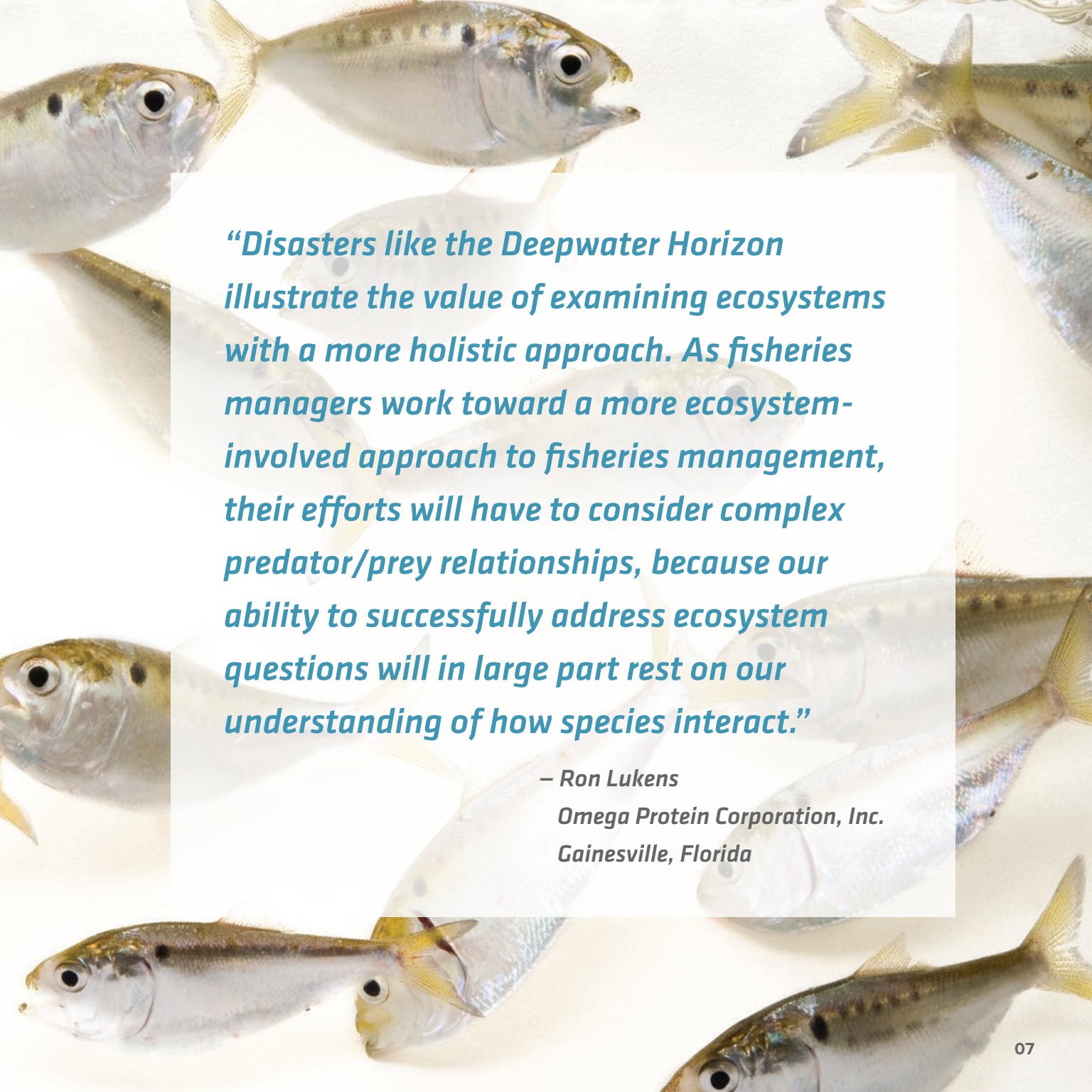
The Gulf is an interconnected ecosystem, driven by many environmental factors, such as freshwater flows, ocean currents and relationships between predators and prey. The animals that live here are part of a complex web of who eats whom, and as environmental conditions change, populations of some species may go down while others may go up. When this happens, predators will choose to eat something else or move to new areas in search of other food.

Small schooling fish commonly known as forage fish—menhaden and bay anchovies, for example—are major prey species and serve as important food sources for many predators, such as birds, mammals and other fishes. In turn, forage fish feed on organisms at the very base of the food web—tiny plants and animals called phytoplankton and zooplankton—thereby providing a key link in the ecosystem. Understanding the fluctuations in populations of Gulf forage fish, what causes their populations to change, as well as how this affects the recovery of different species that rely on them, is critical to restoring the Gulf.



Forage fish support a valuable commercial fishery and play a critical role in sustaining a vibrant Gulf of Mexico. These species eat tiny plants and animals, are consumed by bigger fish, sea-birds and marine mammals, and form an essential connection between the top and bottom of the food web.

It is imperative that we improve our understanding of the “pushes and pulls” that govern recovering species and the Gulf ecosystem as a whole. In many ways, restoration projects act like levers in a complex machine and, as we pull one lever, we need to track how it impacts other species or changes environmental conditions. With additional research, modeling and analysis, we can examine the unique and essential position that forage fish hold in the middle of the food web. In doing so, we will increase our understanding of how these small fish affect the recovery of species impacted by oil and dispersants, and restoration efforts can be more effective.



“Disasters like the Deepwater Horizon illustrate the value of examining ecosystems with a more holistic approach. As fisheries managers work toward a more ecosystem-involved approach to fisheries management, their efforts will have to consider complex predator/prey relationships, because our ability to successfully address ecosystem questions will in large part rest on our understanding of how species interact.”

*– Ron Lukens
Omega Protein Corporation, Inc.
Gainesville, Florida*

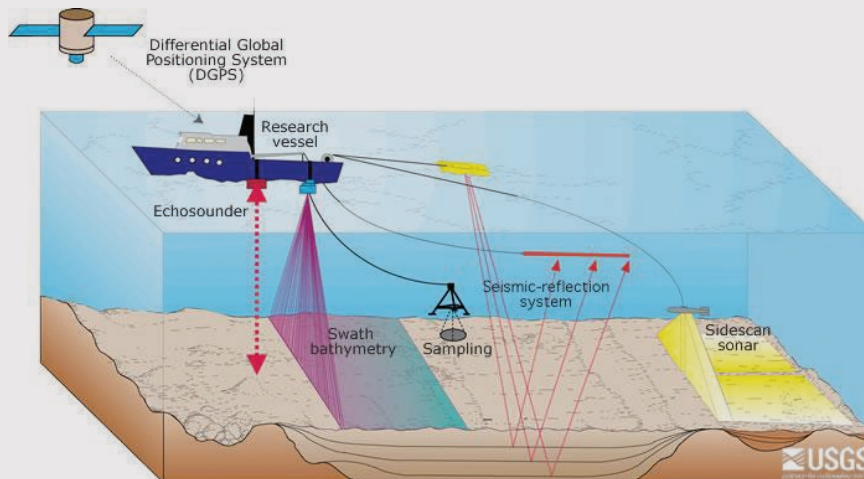
WHAT YOU NEVER KNEW YOU NEEDED TO KNOW ABOUT THE SEAFLOOR



Before tackling any big project, such as building a house or planning a neighborhood, the first order of business is to survey and catalogue the site. Restoring the Gulf of Mexico is no different.

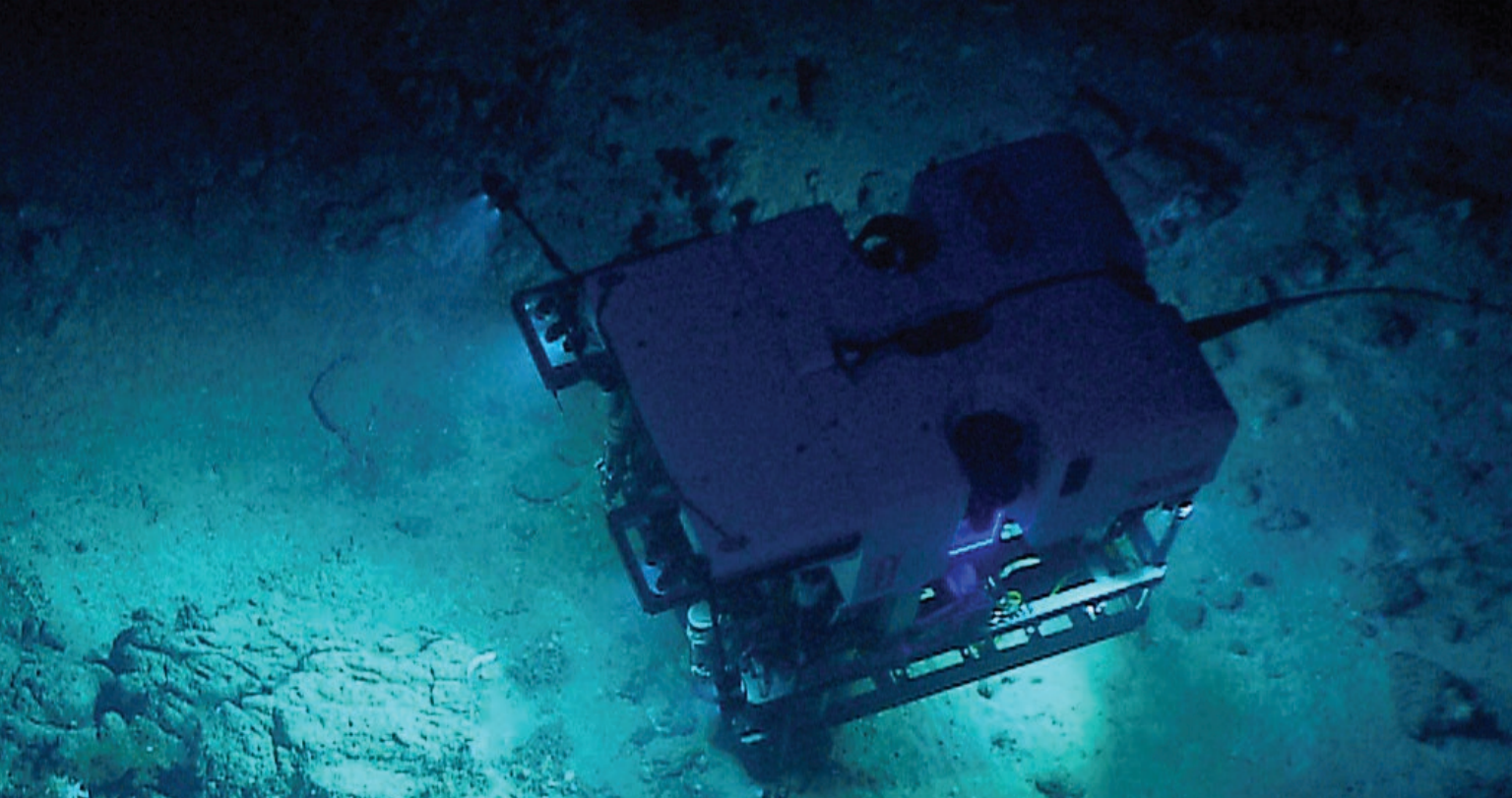
The Gulf is home to an amazing and diverse suite of plants, animals and seafloor types. Detailed maps of how these elements work together are critical to understanding the complexities of their interactions. Together, the flora, fauna and topographies form a vibrant and diverse Gulf comprised of unique neighborhoods—neighborhoods we have not yet charted or catalogued.

Understanding the Gulf's seafloor, as well as the plant and animal habitats that are drawn to its features, helps us more clearly assess and more effectively manage the Gulf's natural capital. From recreational and commercial fishing, to energy production, to wildlife-watching, managing all of these activities to avoid conflicting uses of natural resources depends on our knowledge of the Gulf's seafloor communities.



Habitat mapping uses the latest technology, including research vessels, sonar and global positioning systems (GPS) to build a more complete picture of the Gulf seafloor. By collecting multibeam sonar data, along with video, photography and sediment samples, we can determine what the seafloor contains and how we can best manage the Gulf in order to support its recovery.

Mapping the Gulf of Mexico advances our understanding of its assets and their limitations, helping us optimize our use of the Gulf now and into the future, while allowing us to manage the Gulf in the most responsible and effective ways possible.



“Fishermen understand certain species are attracted to different bottoms, structures and conditions. Mapping the Gulf’s various habitats will allow users to approach the Gulf responsibly and with understanding.”

*– John T. Marquez, Jr.
Coastal Conservation Association Mississippi
Gulfport, Mississippi*

CONSERVING FISH WITH THE POWER OF FISHERMEN



Each spring, Atlantic bluefin tuna travel thousands of miles across the Atlantic Ocean to spawn in the Gulf. Powering through warm Gulf waters with the size and speed of a small car, bluefin tuna must negotiate a labyrinth of baited hooks on fishing lines miles in length (known as longlines), which target other commercial species like yellowfin tuna and swordfish. In the process, bluefin can be accidentally caught on the commercial fleet's unmanned lines.

Surface Longlines



Every year, an estimated 423 Atlantic bluefin tuna are thrown back dead as accidental catch from pelagic long-line fishery boats in the Gulf.

Greenstick Gear



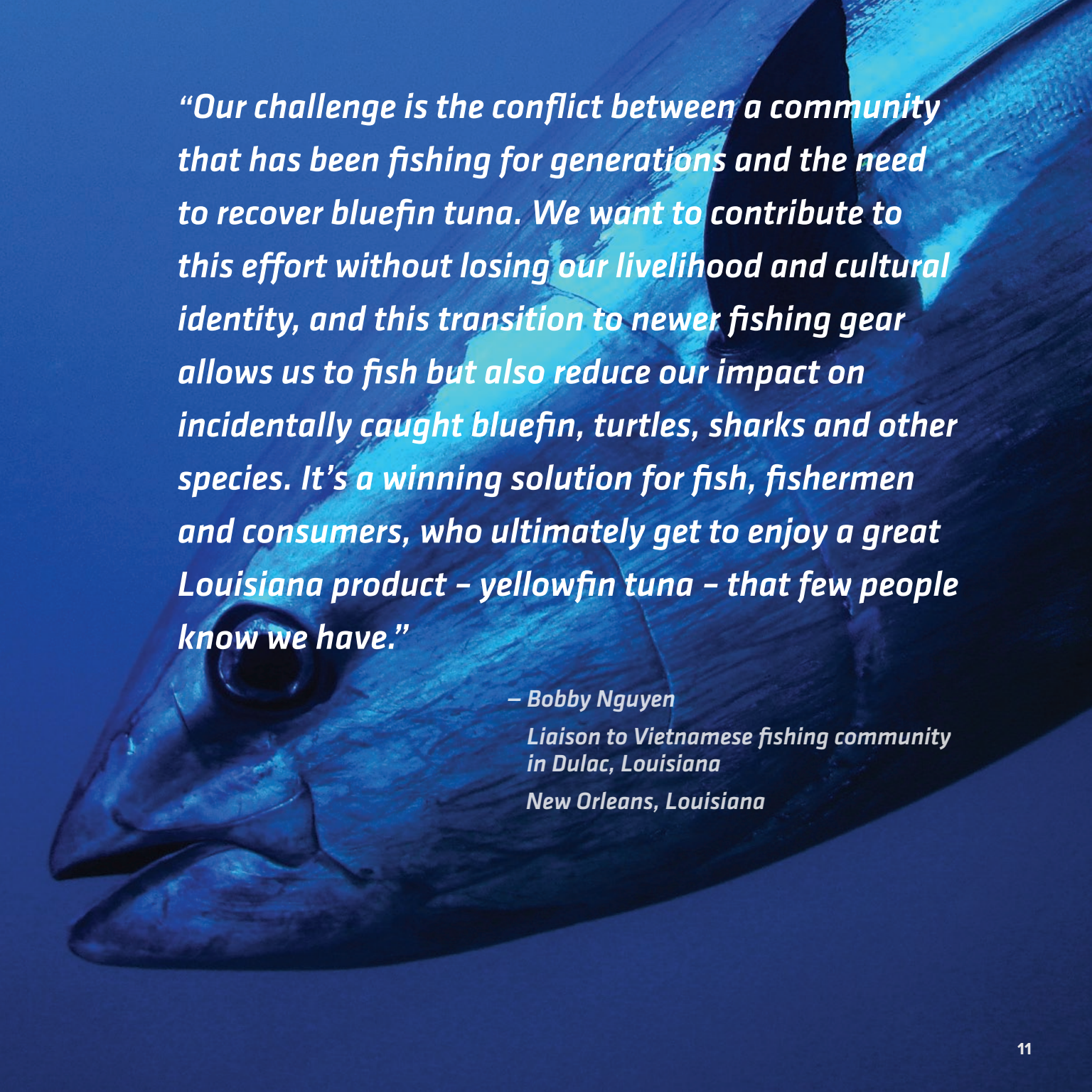
Zero Atlantic bluefin tuna killed with new experimental fishing gear.

Incidental bluefin catches contribute to a population decline for a species already severely depleted. Studies in the small fishing community of Dulac, Louisiana, may have a solution for bluefin tuna. Instead of using conventional, unmanned longlines, these fishermen tested new gear that allows them to continue to target other fish and reduce their impact

on bluefin tuna—a win-win for fish and fisherman. Converting the fleet to this new gear would usher in a new era of fishing that promotes and supports bluefin tuna recovery while protecting the area's rich fishing history and culture.

National Oceanic and Atmospheric Administration. (2013, August). *Draft Amendment 7 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan*. Silver Spring, MD: Author.

Pew Charitable Trusts. (2012, July 12). *Letter to National Marine Fisheries Service, RE: HMS Amendment 7 Scoping - Bluefin Tuna Management Recommendations*, citing personal communication with NOAA. Retrieved from http://www.pewenvironment.org/uploadedFiles/Bluefin%20Comment%20Letter_July2012.pdf



“Our challenge is the conflict between a community that has been fishing for generations and the need to recover bluefin tuna. We want to contribute to this effort without losing our livelihood and cultural identity, and this transition to newer fishing gear allows us to fish but also reduce our impact on incidentally caught bluefin, turtles, sharks and other species. It’s a winning solution for fish, fishermen and consumers, who ultimately get to enjoy a great Louisiana product – yellowfin tuna – that few people know we have.”

– Bobby Nguyen

*Liaison to Vietnamese fishing community
in Dulac, Louisiana*

New Orleans, Louisiana

HOW A MILK CRATE MIGHT IMPROVE FISHING IN THE GULF



Offshore anglers who release fish commonly see their efforts go to waste. Released fish, bloated with expanding gases resulting from being pulled up from deep waters, often float on the ocean's surface and struggle to return to the Gulf's seafloor, subjecting these fish to predation and lethal physical stress. Some popular Gulf bottom-dwelling fish, such as snappers and groupers, commonly experience dramatic physical effects, known scientifically as barotrauma, when they are reeled up from the deep. These effects—bulging eyes and stomachs protruding from the mouth—are often fatal. But this lethal harm does not have to happen.

Research reveals that most barotrauma symptoms are reversible and nonlethal if the fish is rapidly returned to its original depth. Allowing released fish a higher chance of survival could provide additional recreational fishing opportunities and supports the Gulf's deep-rooted cultural fishing institutions, extending both economic and social opportunities for future generations.

Barotrauma research on Gulf fishes is in its infancy, but there are promising signs that rapid descent of the Gulf's bottom-dwelling species in something as simple as a weighted milk crate can increase the fish's chances for survival upon release. Understanding the science of what happens to released fish and the best release practices that minimize and reverse injury could help more fish survive and, ultimately, lead to healthier populations, increased catches and possibly more days on the water for fishermen.



Jarvis, E. T., & Lowe, C. G. (2008). The effects of barotrauma on the catch-and-release survival of southern California nearshore and shelf rockfish (*Scorpaenidae*, *Sebastes* spp.). *Canadian Journal of Fisheries and Aquatic Science*, 65(7), 1286-1296.

Studies on the Pacific Coast indicate that when rockfish are caught and released with specialized devices, 83 percent of the fish survive the effects of barotrauma when returned to depth within two minutes. Rockfish are similar to snappers and groupers in the Gulf of Mexico. More information will help us understand how best release practices used in the Pacific could apply here to help fish survive and recover.

200 feet



350 feet

83%

**OF ROCKFISH
SURVIVED AFTER
RETURNED TO
DEPTH WITHIN 2
MINUTES.**

“The effects of barotrauma on fish are similar to the bends experienced by SCUBA divers if they do not ascend slowly enough and can cause high mortality. We’ve seen amazing survival of red snapper when using rapid recompression devices. Descending released fish to depth shows great potential to maximize fishing opportunities.”

– Greg Stunz, Ph.D.

***Harte Research Institute,
Texas A&M University – Corpus Christi
Corpus Christi, Texas***

FIGHTING FIRE WITH FUNDING



In any crisis, timing and training are key. If a four-alarm blaze engulfed your house, crews of well-orchestrated first responders would come from the surrounding



communities to fight the fire, treat the injured and determine the cause. Response time is critical to survival, and the advanced training and equipment available to first responders can make all the difference in an emergency. If, on the other hand, you are a sick or injured pilot whale beached in the shallows of the Everglades, the Marine Mammal Stranding Network is your crew of first responders. Unfortunately, there is only one trained response organization for every 1,200 miles of Gulf shoreline, and essential sources of funding for equipment, training and forensics are being eliminated.

Sadly, as the Gulf is experiencing unprecedented escalations in the numbers of stranded and dead marine mammals found on its shores, capacity to assist injured wildlife is shrinking. These unusual mortality events remind us how valuable stranding and response efforts are to provide better information on the status of the dozens of marine mammal species in the Gulf.

With these emergencies on the rise, increased support for the response effort is needed to increase the chances of survival for many of the dolphins and whales in the Gulf.



“With unexplained mass mammal strandings and deaths affecting some of the hardest hit waters of the Gulf of Mexico, funding for first responder teams that assist sick and injured marine mammals is critical.”

– Ron Hardy
 Gulf World Marine Park
 Panama City Beach, Florida

PUTTING DIGITAL TECHNOLOGY TO WORK FOR NATURE



The Gulf's warm waters are home to one of the most diverse ecosystems on earth, hosting both year-round and seasonal animals along its shores and in its waters. Marine mammals, sea turtles and seabirds travel great distances from around the globe to spend part of the year in the Gulf of Mexico. Highly migratory animals are particularly difficult to study and many are listed as threatened or endangered species, making assessments of their health and recovery all the more urgent. Fortunately, advances in computing and high-resolution digital imagery provide new tools for measuring the health and abundance of the Gulf's migratory populations.




Using aircraft flying high over the Gulf, surveys can capture and store high-resolution imagery of migratory wildlife. Where binoculars and boats were previously used, these methods had high frequencies of human error and were slow and costly. High-resolution imagery allows researchers to zoom in, identify animals and track their behavior. When analyzed, the imagery provides more accurate identification and population counts of birds, mammals and turtles, and can even capture images of seagrass beds, sargassum and schools of fish.

High-resolution digital imagery therefore provides critical information for assessing threatened, endangered and highly migratory species populations. Image-based abundance surveys also provide instructive baselines that give scientists a reference point for measuring future changes in populations. With these baselines established, scientists can track the effects of Gulf restoration, recovery and other efforts aimed at improving the health of migratory wildlife populations.



Northern gannets are the largest seabirds that breed in the North Atlantic, nesting in only six colonies in North America, all located in eastern Canada. Gannets migrate 6,000 miles across the continent and back, with many wintering in the Gulf of Mexico and returning to their Canadian nest site the following spring to breed and lay one single egg. While impacts on the next generation are still unknown, researcher Dr. Bill Montevecchi states, "At the outset of the 2010 breeding season, immediately after the BP disaster, there were multiple independent observations of gannets with oiled plumage at the colony at Cape St. Mary's, Newfoundland."



“Birds matter because their presence keeps ecosystems in balance and they remind us of our interconnected world. New technology like high-resolution satellite imagery is an essential tool for calculating population abundance and tracking migration patterns.”



*...and their amazing migrations
...-resolution video surveys offers
...ing recovery over time.”*

– John L. Borom

*President, Mobile Bay Audubon Society
Fairhope, Alabama*

IT'S TIME

Ocean Conservancy is committed to working with Gulf leaders, scientists, conservationists, natural resource managers and local residents to achieve comprehensive coastal and marine restoration for the Gulf of Mexico and the communities that depend on it.

If the Gulf is to recover fully from the BP oil disaster and decades-old problems, we must view restoration as a single package comprised of integrated activities that restore the ecosystem as a whole. Without restoring all, we risk recovery efforts that are incomplete and, ultimately, unsuccessful. The marine environment is an integral part of comprehensive restoration.

Now is the time to invest beyond the shore.




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Ocean Conservancy educates and empowers citizens to take action on behalf of the ocean. From the Arctic to the Gulf of Mexico to the halls of Congress, Ocean Conservancy brings people together to find solutions for our water planet. Informed by science, our work guides policy and engages people in protecting the ocean and its wildlife for future generations. With staff and offices in St. Petersburg, Florida; Mobile, Alabama; Baton Rouge and New Orleans, Louisiana; and Austin, Texas, Ocean Conservancy has been deeply engaged in Gulf of Mexico fisheries work for more than two decades and intensively on restoration of the Gulf ecosystem since the BP Deepwater Horizon oil disaster began.





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