INTRODUCING ACER
ALABAMA CENTER FOR ECOLOGICAL RESILIENCE

▶▶▶ What is ACER?

The Alabama Center for Ecological Resilience (ACER) Consortium was created to better understand the role that diversity played in how nearshore coastal ecosystems responded to the Deepwater Horizon oil spill.

ACER is one of 12 consortia funded by the Gulf of Mexico Research Initiative (GoMRI) and led by the Dauphin Island Sea Lab under the direction of Dr. John Valentine. ACER is comprised of 17 research scientists from 9 universities that include the University of South Alabama, University of South Florida, University of Alabama, Siena College, Northeastern University, Louisiana State University, Florida Gulf Coast University and Rutgers University. The consortium is divided into 7 integrated research groups focusing on the coastal ecosystems of the northern Gulf of Mexico extending from the mid-continental shelf to inshore oyster reefs and coastal wetlands. These groups are studying nitrogen cycling, the microbial community, microplankton, infauna, oyster reefs, wetlands and predators. The ACER Consortium also includes an education and outreach team and data management personnel.

ACER scientists are examining the relationship between genetic, taxonomic and functional diversity and ecosystem resilience at several scales and in many different groups of organisms to oil exposure. Using both field investigations and large-scale controlled laboratory experiments (mesocosms), several ecological processes (primary productivity, nitrogen cycling, predation) as well as aspects of ecosystem structure (density, biomass, biodiversity) are being measured. *continued on back*

ACER's 2016 All-Hands Meeting (*Photo/ACER*)

DISTURBANCE (Deepwater Horizon Oil Spill)

dispersant
oil slick
oil plume
dispersed subsurface oil plume
dispersed oil/hydrate plume
well head
asphaltines
accumulating oil on sediments

BIODIVERSITY

Taxonomic
Functional
Genetic

ECOSYSTEM SERVICES

Seafood Production

O_2
NO_3^-

Water Quality

Ecosystem Resilience

Tourism and Recreation

ECOSYSTEM STRUCTURE & FUNCTION

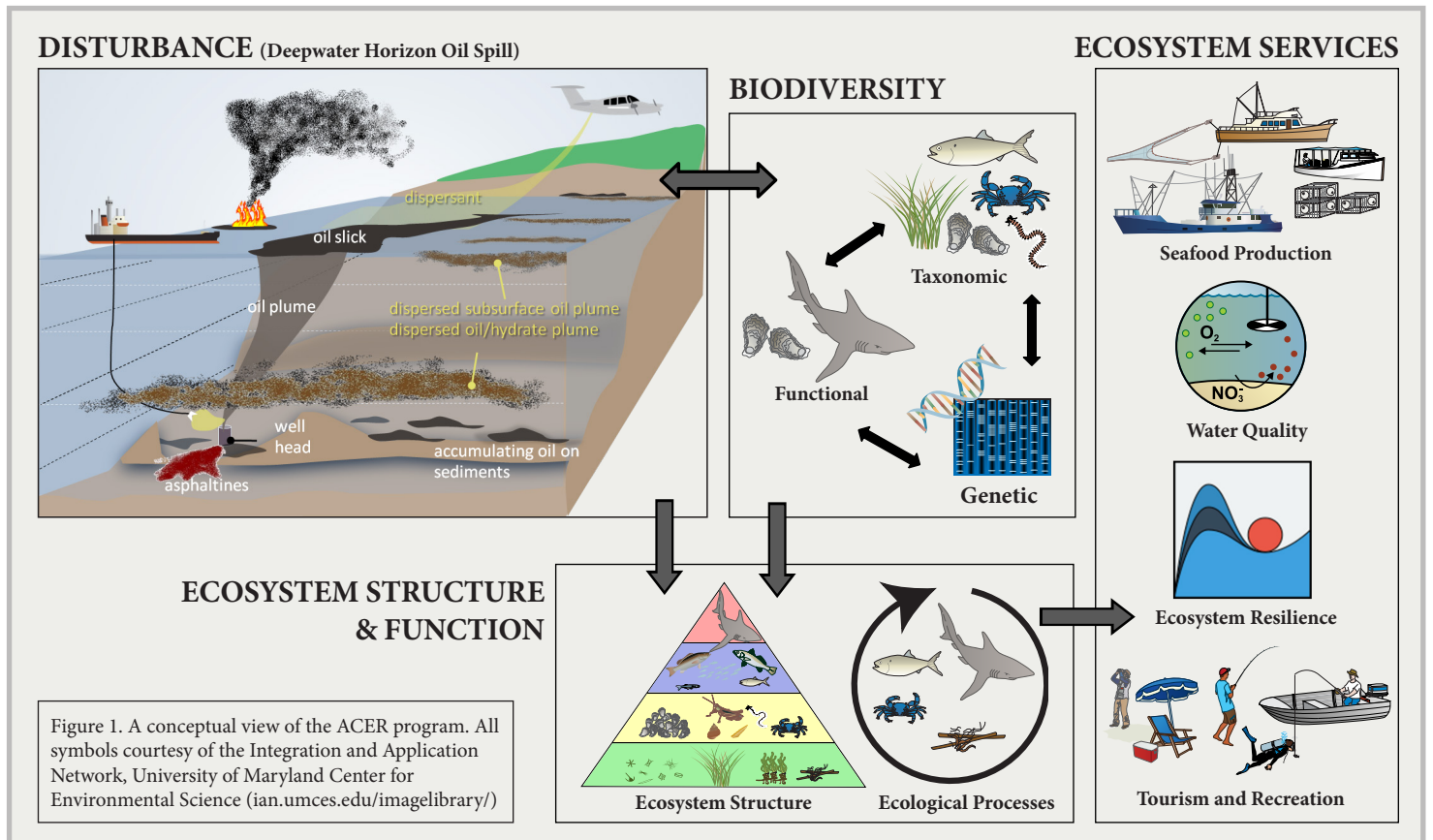Ecosystem Structure
Ecological Processes

Figure 1. A conceptual view of the ACER program. All symbols courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/imagelibrary/)

▶▶▶ ACER & Diversity

The primary goal of the ACER scientific research program is to investigate the role biological diversity plays in determining the resilience of nearshore northern Gulf of Mexico ecosystems to impacts from the 2010 Deepwater Horizon oil spill. More generally, ACER scientists anticipate their research providing insight into how diversity affects the way ecosystems respond to any type of disturbance, such as hurricanes, hypoxia, or human impacts.

What is *diversity*? Diversity and the term biodiversity, often used synonymously, usually refer to the number of different kinds of living organisms (species) in a habitat or area. For some animals such as crabs or fish which appear different (morphologically distinct), it is relatively easy to separate and count the number of different species present. However, for other organisms, such as bacteria, it is difficult to recognize distinct species and special techniques are required. In addition to species diversity, ACER scientists are also investigating the roles of genetic and functional diversity.

Scientists have often found that biodiversity provides resistance to the negative effects of environmental disturbances. The term for this ability to resist, recover or bounce back from impacts is resilience. Thus, **one of the key ideas or hypotheses that ACER scientists are investigating is that more diverse ecosystems are more resilient**. It is thought that increased diversity allows the continuation of important processes such as photosynthesis and nutrient cycling, and less disruption to food webs when a few species are reduced in number or eliminated by the disturbance. In a diverse ecosystem, other species would be available to take their place and the functioning of the ecosystem would be relatively unchanged. ACER scientists are testing this idea by sampling a variety of organismal groups (from bacteria to sharks) in multiple habitats with oiled and non-oiled sites.

ACER External Advisory Board

- Dr. Gary King, Professor, Louisiana State University
- Dr. Charles Peterson, Professor, University of North Carolina at Chapel Hill
- Dr. Joseph Suflita, Professor at Oklahoma University and MAPCO Professor of Environmental Quality
- Dr. Susan Williams, Professor, Bodega Marine Laboratory with the University of California, Davis
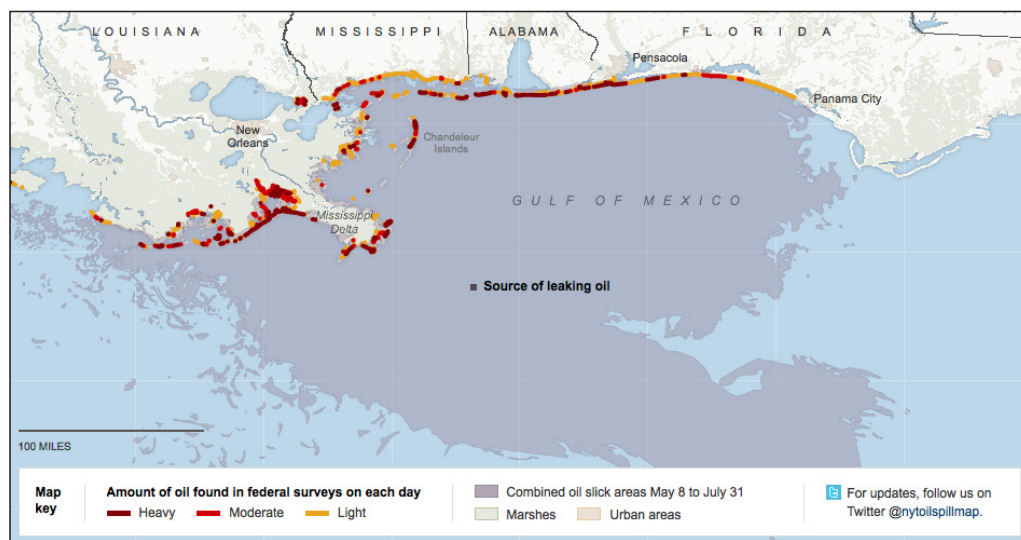
A look back at the Deepwater Horizon oil spill

The Deepwater Horizon oil spill is a disaster most people of the Gulf coast will never forget. On April 2010, the Deepwater Horizon oil rig exploded releasing an estimated total of 4.9 million barrels of Louisiana sweet crude oil over 87 days. Attempts to recover and reduce the impact of oil resulted in the controversial use of the chemical dispersant, which was applied at depth and sprayed at the surface. The long-term effects of oil and dispersant reaching benthic, pelagic and coastal habitats are still being studied. Scientists, including ACER's, continue to study the affected habitats and conduct experiments to better understand the short- and long-term effects of oil and dispersant on coastal habitats.

Figure 2. Deepwater Horizon Oil Spill Impact on coastlines and overall footprint as of July 31, 2010. Credit: New York Times

ABOUT US

The Alabama Center for Ecological Resilience (ACER) Consortium investigates how biodiversity influences an ecosystem's ability to resist and recover from disturbance, focusing on impacts of the 2010 Deepwater Horizon oil spill on coastal ecosystems in the northern Gulf of Mexico.

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