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An Ecosystem Services Approach to Assessing the Impacts of the *DWH* Oil Spill in the Gulf Of Mexico

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The National Academies of Sciences, Engineering, and Medicine

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Hundreds of scientific and technical professionals donate their time and energy to studies every year

Background

The 2010 Supplemental federal budget legislation included language supporting a study by the National Academy of Sciences on the impacts to ecosystem services of the *DWH* MC-252 spill:

"ECOSYSTEM SERVICES IMPACTS STUDY. For an additional amount, in addition to other amounts provided for the Department of Commerce, $1,000,000 to be available for the National Academy of Sciences to conduct a study of the long term ecosystem service impacts of the *Deepwater Horizon* oil discharge. Such study shall assess long-term costs to the public of lost water filtration, hunting, and fishing (commercial and recreational), and other ecosystem services associated with the Gulf of Mexico."

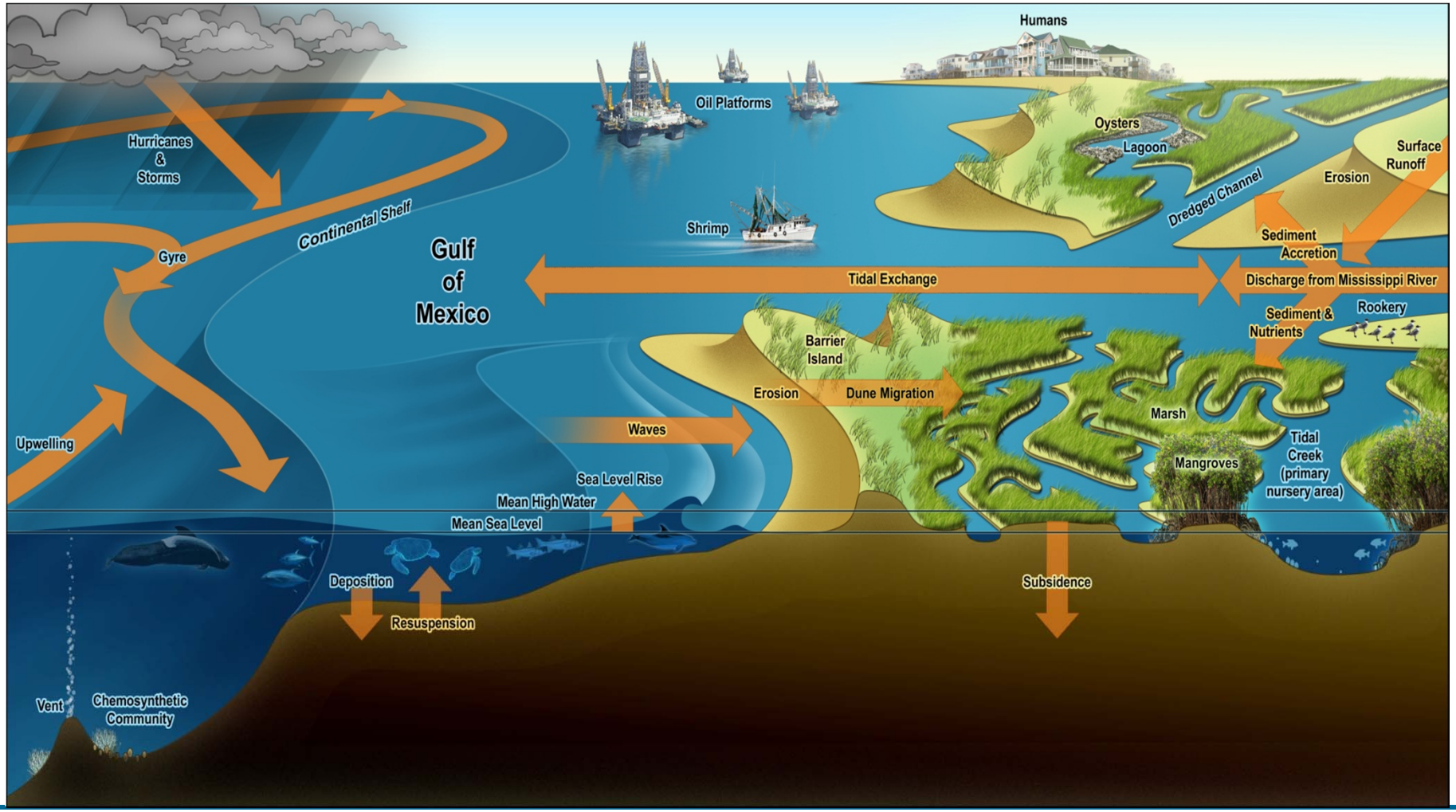
Statement of Task

1. Can we identify and quantify ecosystem services?
2. Are the tools available to measure the recovery of ecosystem services?
3. Do we have enough baseline information available to actually measure the impact from this oil spill impacts?
4. What are the services in the Gulf of Mexico?
5. Can we distinguish between the impacts from the spill from other stressors and their impacts?
6. What were the impacts of the spill response technologies used?
7. What can be done to restore and increase the resiliency of ecosystem services to future disturbances

Committee

Economics	Stephen Polasky, University of Minnesota,
	David W. Yoskowitz, Texas A&M University,
Engineering	**Michel C. Boufadel**, NJIT
Pathology	Joseph R. Geraci, University of Maryland
Toxicology	Ralph G. Stahl, Jr., DuPont Company,
Human Dimensions	Barbara A. Knuth, Cornell University,
Environmental Law	Josh Eagle, University of South Carolina
Marine Science	Larry A. Mayer, University of New Hampshire, **Chair**
	Jorge Brenner, The Nature Conservancy
	Robert S. Carney, Louisiana State University
	Cortis K. Cooper, Chevron Energy Technology Co.
	Jody W. Deming, University of Washington
	David J. Die, University of Miami
	James T. Morris, University of South Carolina
	Nancy N. Rabalais, LUMCON
Spill Responses	Kenneth Lee, Fisheries and Oceans Canada

Ecosystem Components and Processes



What are ecosystem services?

Benefits to humans that are derived from normal and possibly complex, integrated functioning of ecosystems

- **Provisioning Services**
  Material goods including fish and fuel
- **Cultural Services**
  Including recreational, aesthetic & existence
- Regulating Services
  Including climate, storm effects & water quality
- Supporting Services
  Including nutrient cycling & primary productivity

Why an Ecosystem Services Approach?

An ecosystem services approach has the potential to expand the array of possible projects for restoration through alternatives that restore an ecosystem service independently of identification of an equivalent habitat or resource.

Evaluation of the impacts on ecosystem services as part of the damage assessment process would expand the range of mitigation options.

Why an Ecosystem Services Approach?

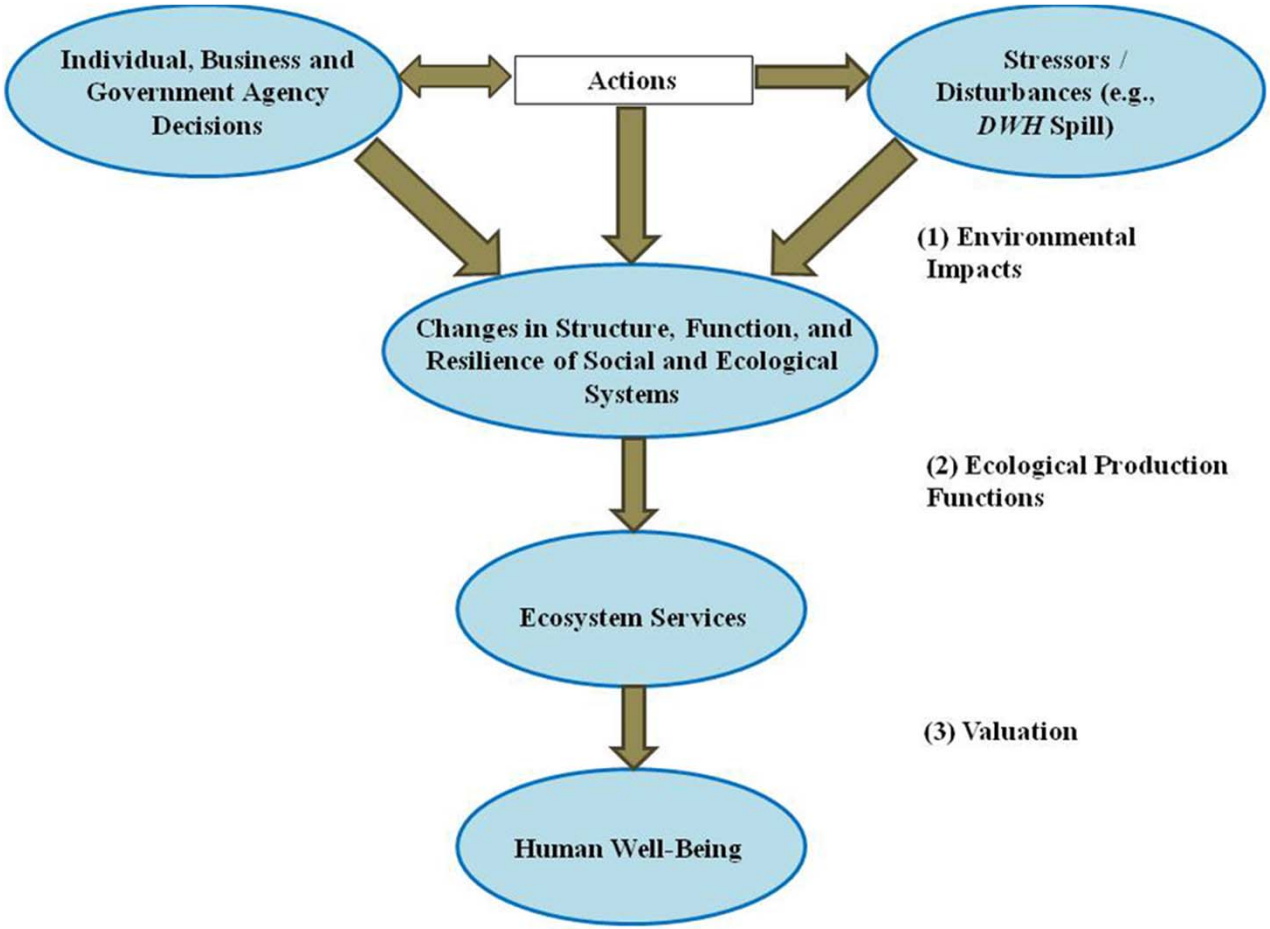
By framing damage assessment and restoration as an ecosystem services issue, an ecosystem service approach can:

1) Broaden the public's perception of natural resources and the ways agencies manage for healthy ecosystems.

2) Highlight the ways that healthy ecosystems support healthy economies.

Ecosystem Services Approach

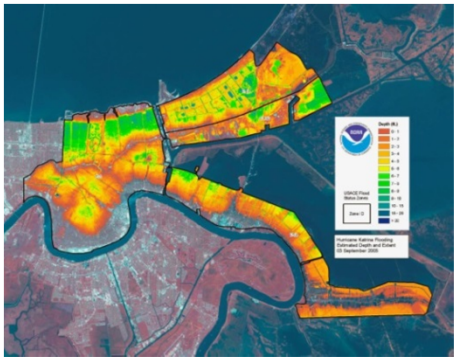
The links from human actions to human well-being: environmental impacts, ecological production functions and valuation.



Four case studies highlight the range and complexity of ecosystem services found in the Gulf.

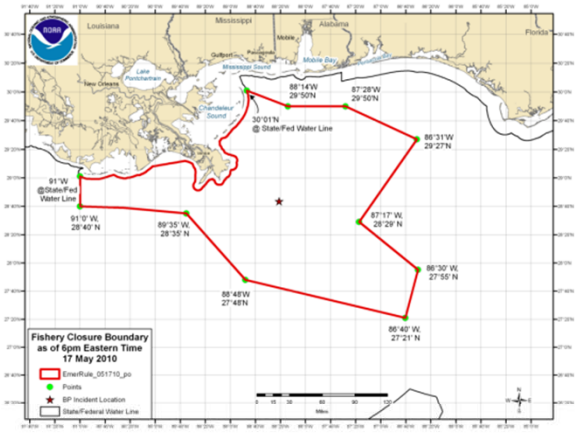
- **Wetlands**

Hazard Moderation



- **Fisheries**

Provisioning

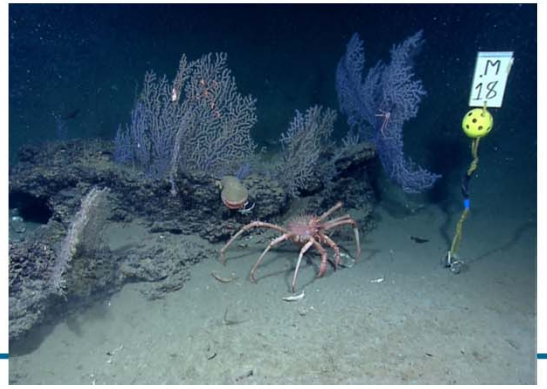


- **Marine Mammals**

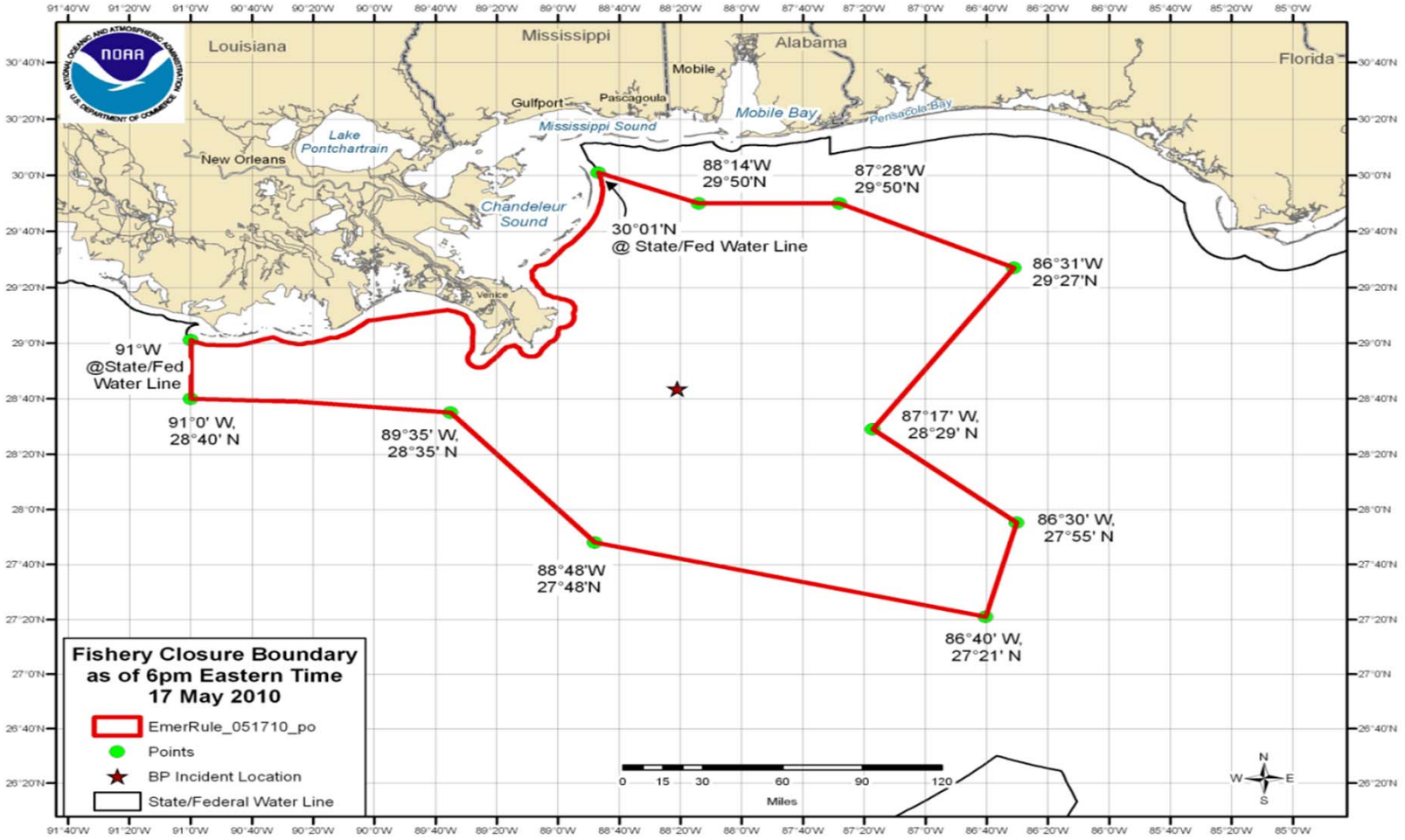
Existence & Spiritual

- **Deep Gulf of Mexico**

Pollutant Attenuation



Gulf Fisheries



- Houma Nation relies on commercial fishing “economic foundation” for the communities.
- Cultural and spiritual resources are linked to natural resources of marshes.
- DWH spill was just one of the major challenges facing Tribe; wetland loss is forcing relocation of families and villages

Vietnamese Shrimpers in coastal Louisiana

- Commercial fishermen but also active in subsistence fishing and bartering
- DWH spill and fishery closures impacted their ability to provide fresh protein to families.
- Subsistence Loss Claims filed by Vietnamese required proof of subsistence use, and language barriers

Looking Forward

We have an unprecedented opportunity to establish a comprehensive baseline and fundamental understanding of the Gulf of Mexico (GOM), a critical component of an ecosystem services approach.

1. There is a critical need for an overarching infrastructure for organizing and integrating the wealth of data that has been and will be collected in the GOM.
2. Considering the impact on human well-being of the *DWH* oil spill is of great importance, but our ability to analyze these impacts is still incomplete.
3. A comprehensive model that incorporates biophysical, social, and economic data for the GOM should be developed in the long term, while models for subcomponents of the GOM and its services are necessary in the short term.

Takeaways

Past actions to enhance a particular ecosystem service (e.g., energy development, fisheries, or tourism) have often resulted in tradeoffs that diminished other ecosystem services.

Current and pending funding will help further our scientific understanding
of the Gulf of Mexico ecosystem and the services they provide.
Policymakers and the public should consider potential tradeoffs as they set priorities and goals for restoring and strengthening their communities and the natural resources of the Gulf of Mexico.

Questions?