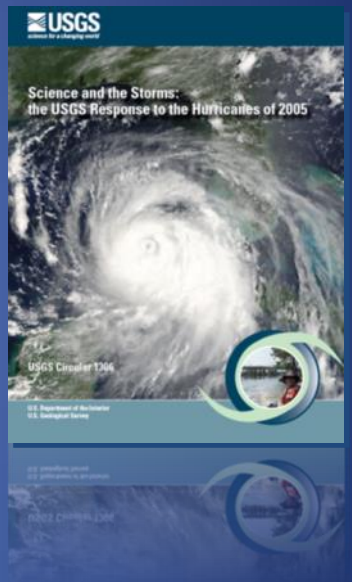
The U.S. Geological Survey's National Perspective on Restoration



Strategies, Priorities, Accomplishments, and Challenges

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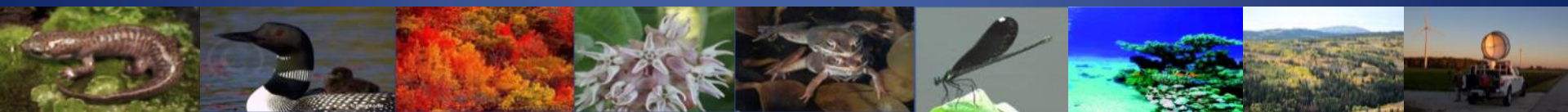
Ecosystems: Sustaining Livelihoods, Health and Well-being

Fundamental Human Needs	Ecosystems provide	Related Ecosystems Mission Area Programs	Research Topics
Subsistence	Food, water, atmosphere, raw materials	Fisheries Wildlife Invasive Species CRU	Energy and wildlife interactions; population, species & habitat assessments; pollinators; fish and aquatic systems; Biofuels; carbon sequestration; new tools and techniques
Protection	Protect us from the elements, fiber, shelter, social security, health systems	Environments Invasive Species	Coastal processes, restoration, fire, early detection, priority ecosystems new tools and techniques, disease emergence and spread
Affection & Understanding	Connections-Understanding our life within the planet	Fisheries, Wildlife Environments, Status and trends Invasive Species CRU	New tools and techniques; data collection, monitoring, modeling, analysis; basic biology
Participation	We participate in it, being "in" the landscape	Fisheries Wildlife Environments CRU	Population assessments; adaptive management; fire ecology; water quality; landscape conservation
Leisure & Creativity	Provide opportunity	Fisheries, Wildlife Environments CRU	Population assessment; adaptive management; landscape conservation
Identity & Freedom	Part of our identity, sense of place, laced w/culture	Fisheries, Wildlife Environments, Invasive Species	Endangered species; priority ecosystems

Ecosystems Strategic Science Plan Priorities

- Understand how drivers influence ecosystem change
- Understand the services that ecosystems provide to society



USGS Science Priorities

Recovery and Management

- T&E Species

Detection and Control

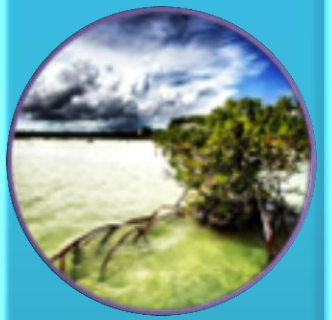
- Invasive Species
- Pathogens
- Wildlife Disease

Decision Support

- Ecological and Economic Uses of Land and Water

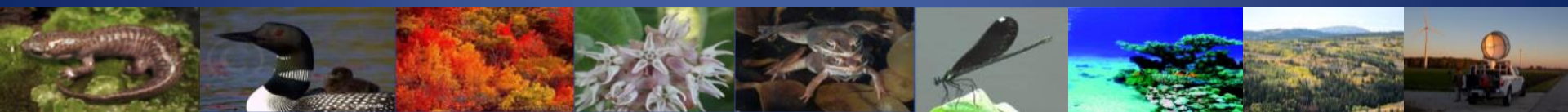
Ecological Adaptation and Mitigation

- Climate Change
- Sea-Level Rise
- Nitrogen Deposition
- Acidification



Strategies for Resilience

- Sustaining and Restoring Ecosystem Function and Services



USGS Integrated Research Areas

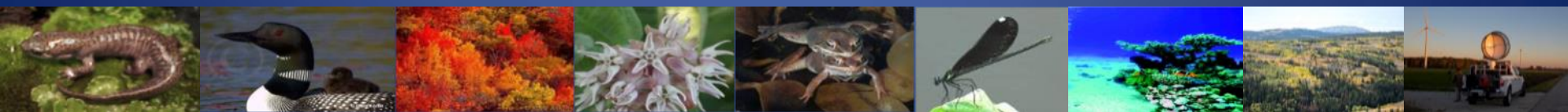
Integrated Assessment of Coastal Risk and Resiliency

Combined Environmental and Socioeconomic Impacts of Natural Hazards

Environmental Impacts of Alternative Energy Development

Documenting and Assessing Environmental Flows

Innovative Technologies for Environmental Assessment



Deepwater Horizon

Volume and extent of release

Extent of Release	Volume	Date
4.9 M barrels	Oil slick: 68,000 mi^2 = 180,000 km^2	April 20-July 15, 2010

- 184.8 M gallons = 699.6 M ℓ = 700,000 m^3

  (1 barrel of oil = 42 gallons)
- 25% captured, 25% dissolved, 24% dispersed, 26% in environment (National Incident Command 2010)
- 1.84 M gallons Corexit dispersant

  (= 6.966 M ℓ = 7,000 m^3)
- Approx. 500 km of shoreline oiled, 100 km heavily

Multi-disciplinary emergency response to *Deepwater Horizon* (*DWH*)

Federal flow estimation: helps determine impacts and penalties

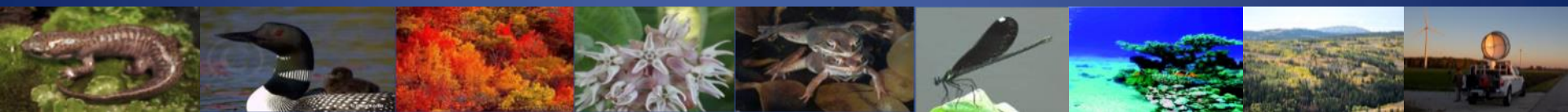
Oil provenance: *DWH* origin confirmed

Water monitoring: freshwater releases into GOM

Wetland monitoring: on site and remote

Microbial and chemical monitoring

Coastal Marine Geology: sand berm monitoring



More impacts on *Spartina* than *Phragmites*

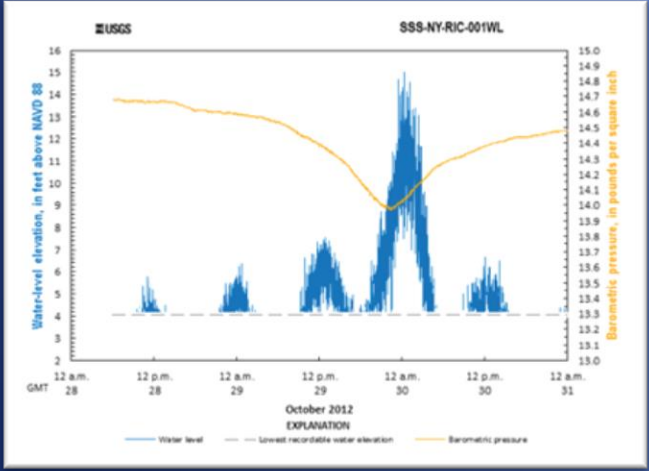
Kokaly et al., 2011

*Photos: Oct, 2010 by Harmon Brown
LA Dept. of Natural Resources

Compare: June 17, 2009 and June 23, 2010

Ramsey et al. 2011

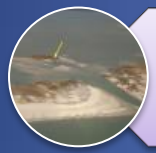
Hurricane Sandy



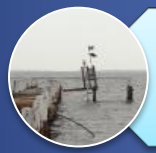
Multi-disciplinary emergency response to Sandy

Developed a Sandy Response Science Plan

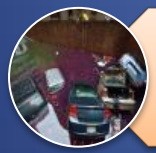
Measure changes in elevation in the near shore and on shore



Measure changes in sand: how did beaches, dunes, and berms respond?

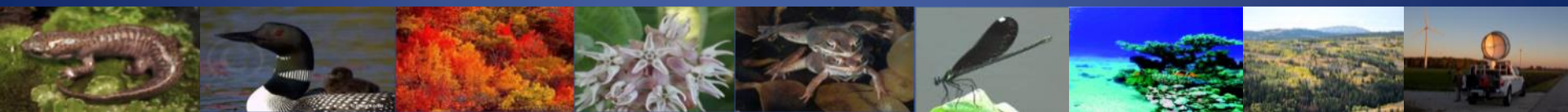


How did storm hydrology change flows? Where do we need gages for next storm?



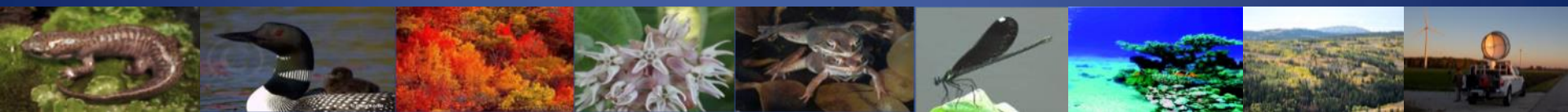
What toxic materials remain?

How were natural environments and species affected?

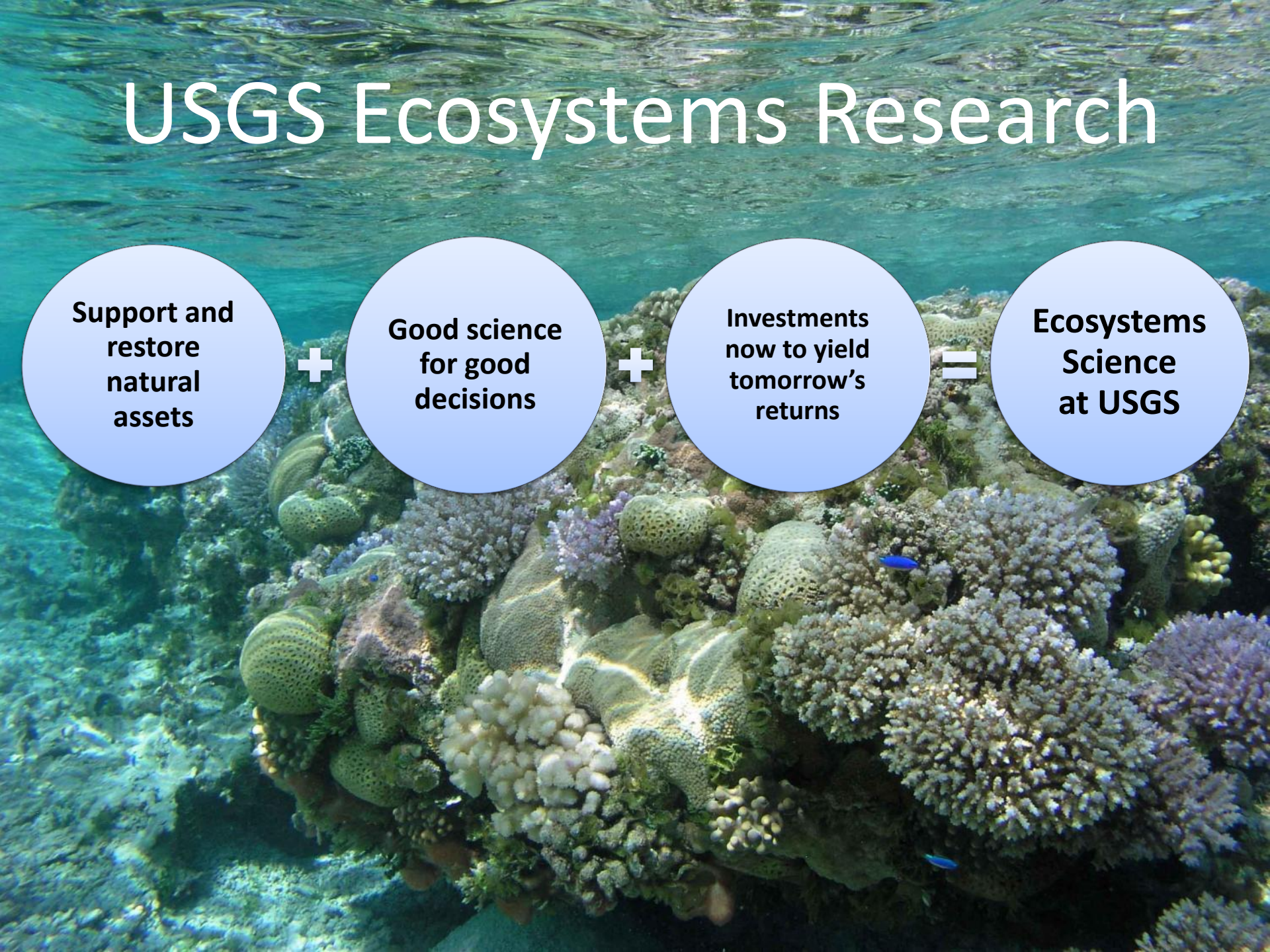


Challenges

- Shared definitions of
  - Landscapes and Hydroscapes
  - Ecosystem Services
    - Monetary
    - Non-monetary



USGS Ecosystems Research



Partnering for Science

U.S. Department of the Interior
U.S. Geological Survey