

**NOAA
FISHERIES**

SEFSC's Participation: Deepwater Horizon Natural Resource Damage Assessment

SEFSC Protected Species Program Review
Aug. 27, 2015

DWH NRDA Collaborators



- NOAA National Marine Fisheries Service (NMFS) - SEFSC, SERO, OPR
- NOAA National Ocean Service (NOS) – NCCOS, OR&R/ARD
- National Institute of Standards and Technology
- US Fish and Wildlife Service
- National Park Service
- State trustees
- Non-federal investigators including: National Marine Mammal Foundation, Chicago Zoological Society, University of Illinois, private veterinarians, & contract statisticians
- Northern Gulf Marine Mammal and Sea Turtle Stranding Networks - Louisiana Department of Wildlife and Fisheries, Audubon Aquarium of the Americas, Institute for Marine Mammal Studies, Dauphin Island Sea Lab, Emerald Coast Wildlife Refuge, & Gulf World Marine Park, and Florida FWCC
- The Northern Gulf Unusual Mortality Event Investigative Team
- The Working Group on Marine Mammal Unusual Mortality Events

What is the Natural Resource Damage Assessment (NRDA) ?

NRDA established through the Oil Pollution Act of 1990 (OPA)

NRDA is a Cooperative Process

- Coordination with the Co-Trustees & the public
- Moves faster if Responsible Party shares the same vision & works cooperatively with the Trustees

NRDA is a Legal Process

- Trustees are required to demonstrate causality between the release & resource injury/lost use



DWH NRDA Assessment Activities

OIL IN THE OPEN WATER

Oil in the open water may affect the health of microscopic plants and animals that form the basis of the oceanic food web. The eggs and larvae of shrimp, fish, and other commercially and recreationally important species are at risk, as are adult fish, sea turtles, marine mammals, and ocean-going birds. Far beneath the surface, corals and other deepwater communities also may be affected.

WATER COLUMN AND SEDIMENTS

- Water quality surveys
- Transect surveys to detect submerged oil
- Oil plume modeling
- Sediment sampling

TURTLES AND MARINE MAMMALS

- Aerial surveys
- Tissue sampling
- Acoustic monitoring
- Satellite tagging

FISHERIES

- Plankton surveys
- Invertebrate surveys
- Adult fish surveys
- Larval fish surveys

OIL IN NEARSHORE HABITATS

Sensitive nearshore communities such as oyster beds and shallow-water corals may lie directly in the path of underwater oil and surface mousse riding the waves to shore. When the oil does hit land, it can severely impact coastal habitats including marshes, mudflats, mangrove stands, and sandy beaches. Organisms that use these habitats, such as birds, crabs, turtles, crocodiles and other aquatic and terrestrial species also are at risk.

SHORELINES

- Aerial surveys
- Ground surveys
- Observations of the quality of habitat
- Measurements of subsurface oil near the shore

TERRESTRIAL AND AQUATIC SPECIES

- Ground surveys
- Observations of the quality of habitat

AQUATIC VEGETATION

- Aerial surveys
- Field surveys in large beds of aquatic vegetation

BIRDS

- Aerial surveys
- Ground surveys
- Nearshore boat surveys
- Offshore boat surveys
- Radio telemetry

SHELLFISH

- Oyster surveys
- Tissue and sediment sampling
- Mussel collection
- Shrimp collection

OIL AND HUMAN USE

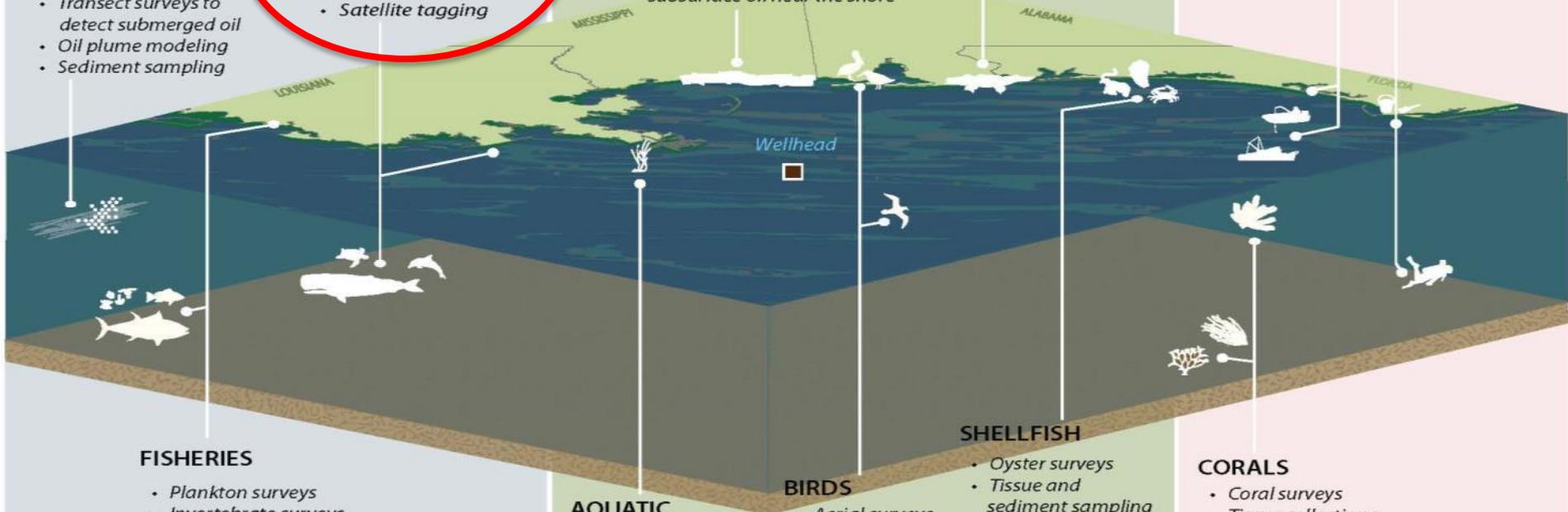
Humans, like wildlife, also rely on the ocean and coasts. From fishing to water sports and sunbathing to birdwatching, humans enjoy and rely on Gulf Coast waters and nearshore environments in many ways.

HUMAN USE

- Aerial surveys
- Ground surveys

CORALS

- Coral surveys
- Tissue collections
- Contaminant surveys



How DWH Changed Protected Species Science at SEFSC

- Unprecedented opportunity to pool resources and expertise from multiple agencies to advance marine mammal & sea turtle science in the Gulf of Mexico
- Added to existing workload for 5+ years & potentially many years to come
- SEFSC PR staff on Injury Assessment
 - 5 FTEs working primarily on DWH
 - 10 FTEs diverted part-time to DWH work
 - 6 existing contractors had part-time duties diverted
 - 3 new contractors hired through NRDA money, now trained & a valuable part of our program

General Approach and Metrics for Injury Assessment

Quantify Abundance and Spatial Distribution of Species within Impacted Areas



- Vessel Surveys, Passive Acoustic Monitoring
- Aerial Surveys
- Photo-ID Mark/Recapture Surveys

Assess Pathways of Exposure to DWH Oil



- Quantify spatial overlap of animal distribution and oil location (models and direct observation)
- Prey sampling
- Collection of biopsy and tissue samples

Evaluate Effects on Populations (Injury)



- Quantify changes in mortality rates for exposed populations
- Quantify changes in health and assess relationships to oil exposure
- Evaluate underlying causes of elevated stranding rates

Field techniques by habitat

Oceanic species

- Research cruises
- Biopsy sample collection
- Tag telemetry of sperm whales
- Passive Acoustic Monitoring

Coastal species

- Aerial surveys
- Studies of stranded animals

Bay/Sound/Estuary

- Photo ID/boat surveys
- Biopsy sample collection
- Prey sampling
- Capture-release for health assessment & satellite tagging
- Studies of stranded animals

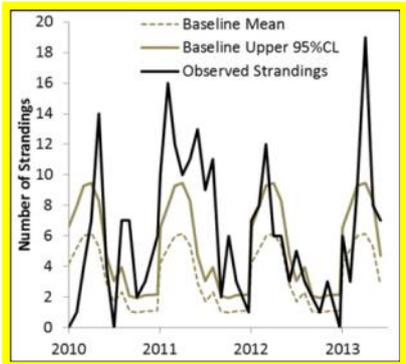


Timeline of Investigation: SEFSC Participation

DWH oil spill Apr-Jul 2010

Boat-based surveys
May 2010 – July 2015

Data analyses & injury assessment
report preparation - 2012 - present



Aerial surveys
May 2010 – Jan 2012

Large vessel survey
June 2010 – Nov. 2010

Stranding investigations
2010 – 2015

Laboratory analyses
July 2010 – 2014

The beginning

- April 20, 2010 – DWH explosion
- SEFSC immediately began the response & damage assessment
- Staff & contractors dispatched to field
(includes vessels, aerial teams, stranding response, command center staffing)
- Began data management plans & implemented evidence handling procedures



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DWH oil spill Apr-Jul 2010



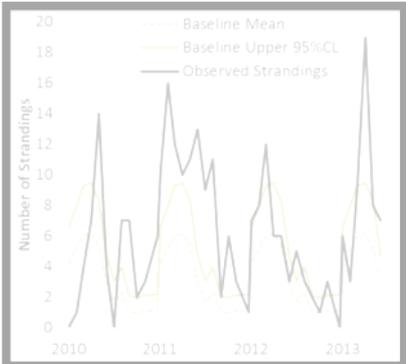
2010 2011

Boat-based surveys
May 2010 – July 2015

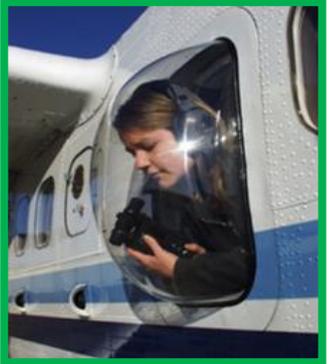


2012 2013

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report preparation - 2012 - present



2014 2015



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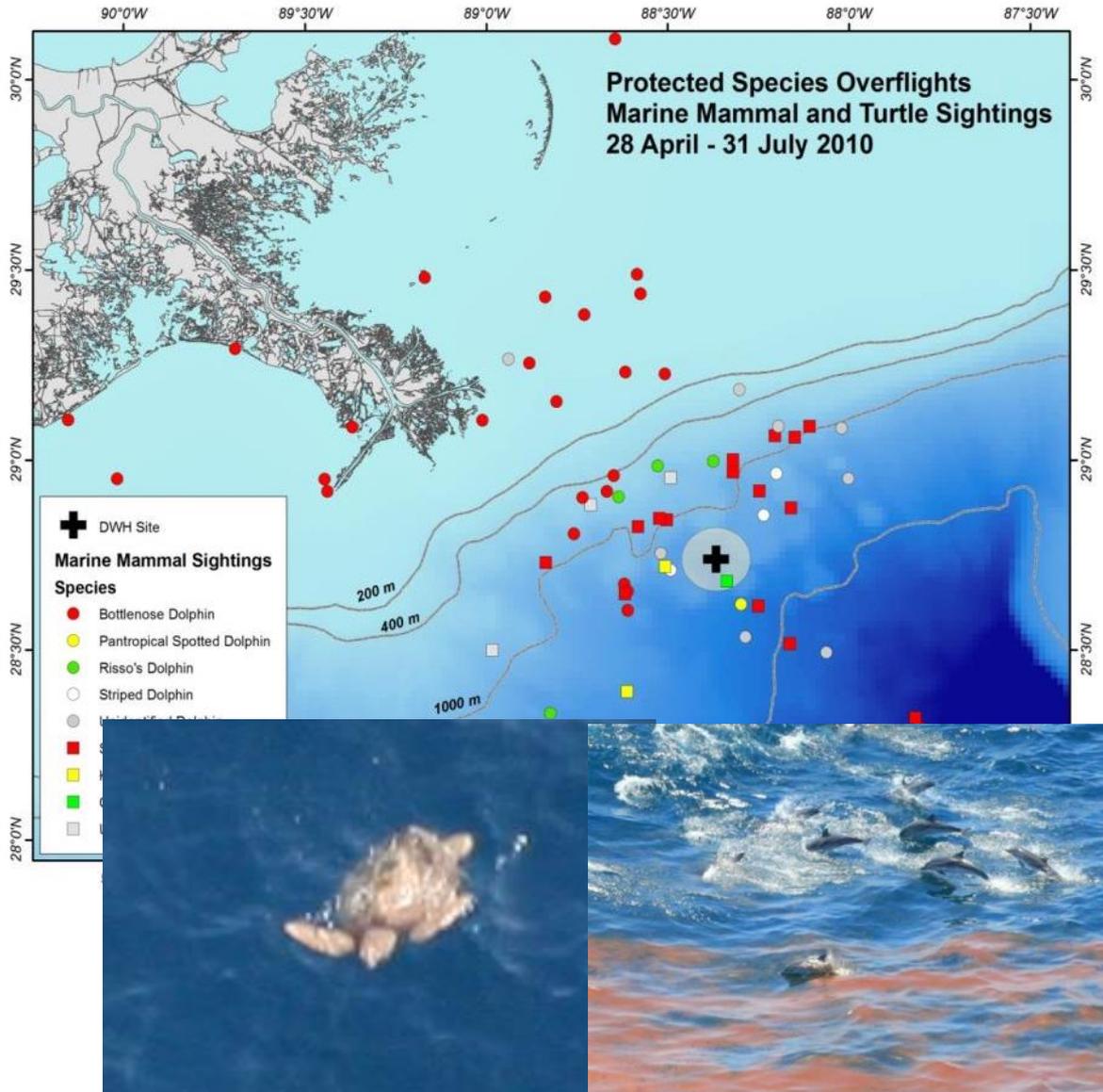


Stranding investigations
2010 – 2015



Laboratory analyses
July 2010 – 2014

Oceanic Species: Helicopter Overflights

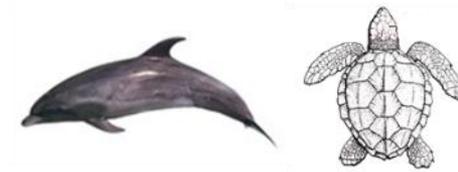


Low altitude (600 ft) helicopter surveys were flown daily between 28 April & 31 July 2010.

Marine mammal & sea turtle species observed

Documented animals swimming in oiled areas & direct observations of exposure

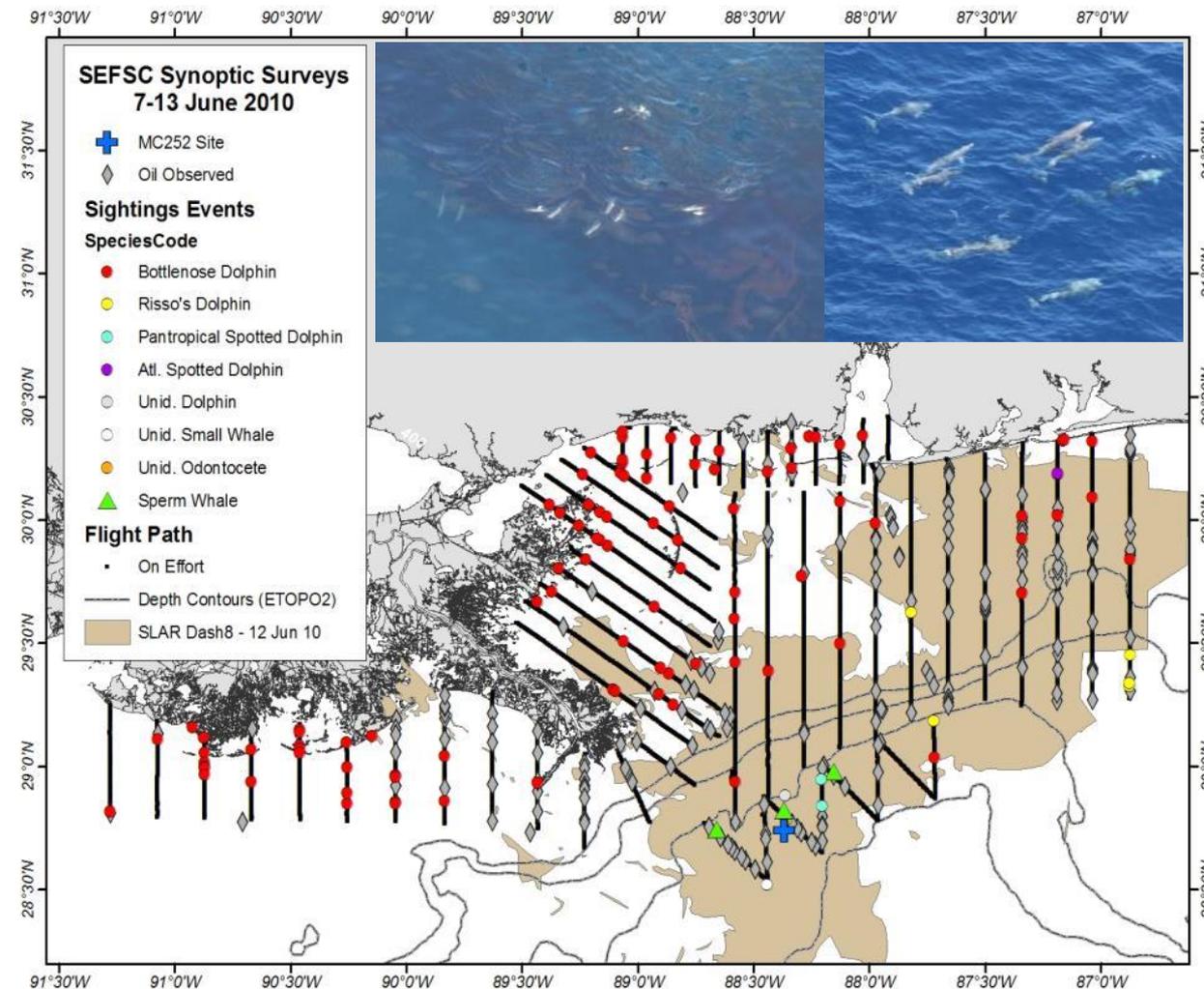
Shelf and Coastal Species: Aerial Surveys 2010



Estimate the abundance of sea turtles & marine mammals within the spill area

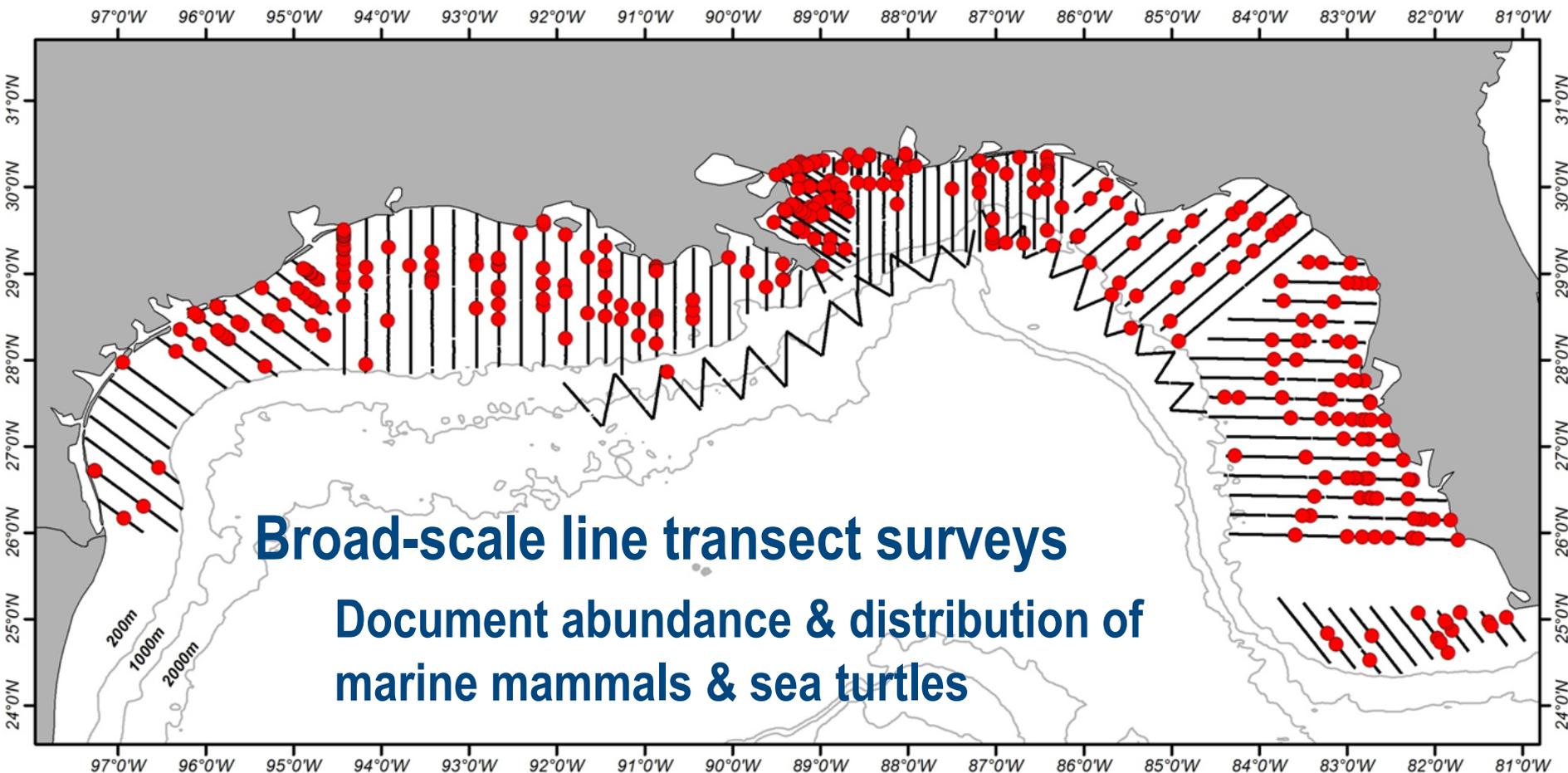
Evaluate spatial overlap between surface oil & surveyed species

7 survey periods, allowing evaluation of change in distribution/abundance over time



Seasonal Broad Scale Aerial Surveys

Spring 2011 - Winter 2012 quarterly surveys



Broad-scale line transect surveys

**Document abundance & distribution of
marine mammals & sea turtles**

Oceanic Marine Mammal Assessment Surveys

Ship based surveys



Goals:

- Document habitat use & distribution of oceanic marine mammals
- Prey effects

Techniques:

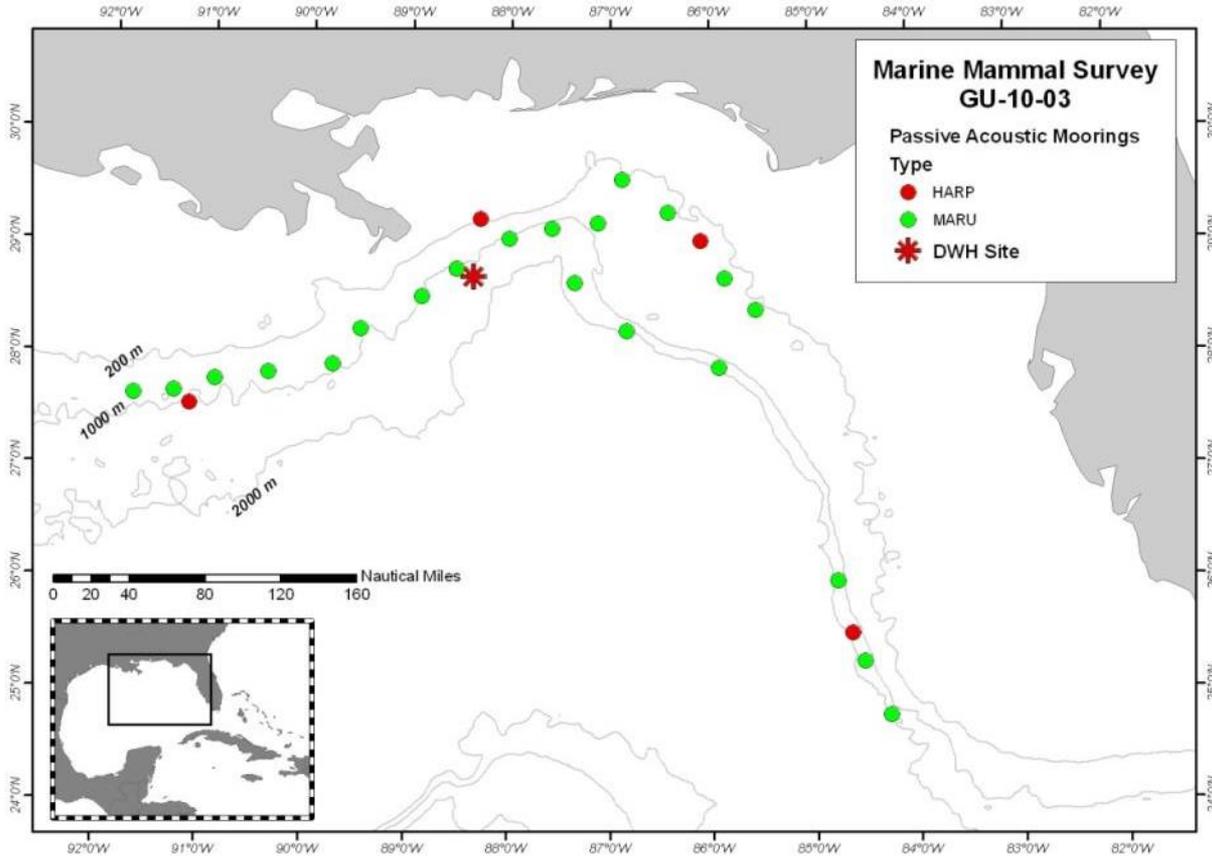
- Visual surveys & passive acoustics
- Deploy acoustic units
- Deploy satellite tags
- Collect biopsies



Bryde's Whale



Passive Acoustic Monitoring Studies



Continuous monitoring
& detection of vocalizing
species

Bottom mounted long-term
passive acoustic units of two
types (Mid-2010 – 2011):
HARPS – Scripps
MARUs – Cornell
Supported by SEFSC staff &
NMFS research cruise

Particularly important for sperm
whales, beaked whales,
Bryde's whales, & *Kogia*

Boat-based surveys: Bottlenose dolphin coastal and BSE stocks



- Remote biopsy tissue sampling
 - Stock structure, stable isotopes, contaminants, hormones
- Photo-identification
 - Capture - mark-recapture - population size & survival
 - Document calving events/ reproductive outcomes



Oil floating on the water



Photo: NOAA, B. Rone

Strandings



- SEFSC coordinated stranding response
- Enhanced sample collection protocols & evidence handling requirements (over 30,000 samples)
- Coordinated NRDA case needs with the northern Gulf of Mexico Cetacean UME investigation
- Stranding data contributions to NRDA:
 - Mortality estimates needed for quantification
 - Genetic stock assignments
 - Understanding mechanism of injury

Bottlenose Dolphin Nearshore Assessment:



Integration of live & dead dolphin data

Live Dolphin Health Assessments



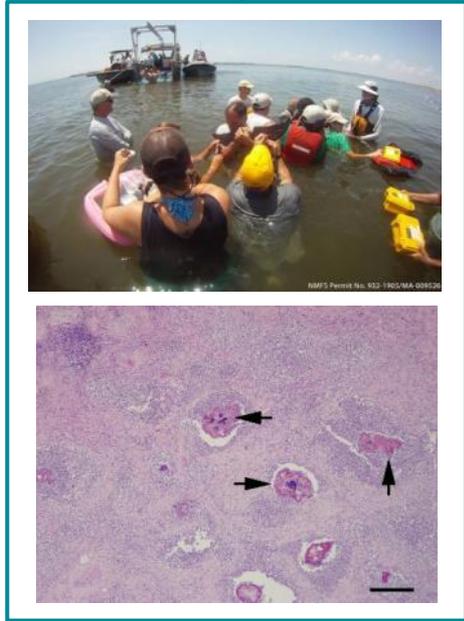
Stranded Dolphins & Tissue Evaluations



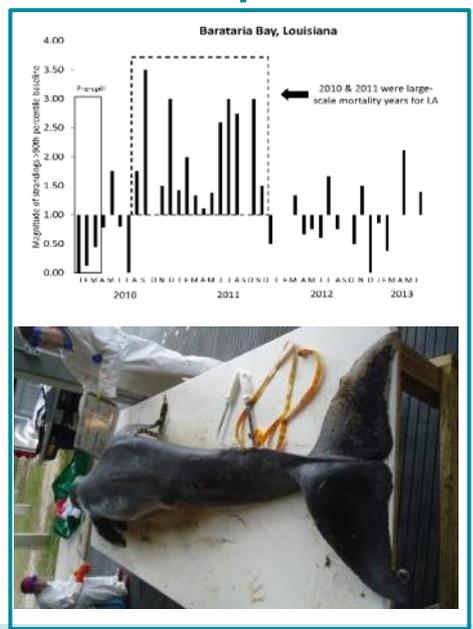
Photo-ID Studies & Biopsy Sampling

led to the identification of key injury findings

Poor Dolphin Health



Increased Mortality



Impaired Reproduction



Timeline of Investigation: SEFSC Participation

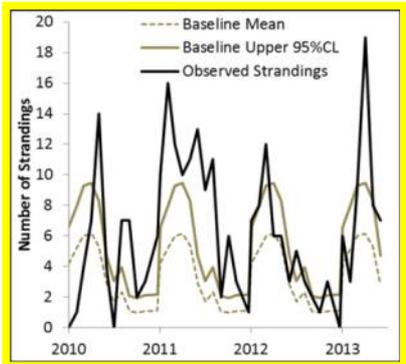
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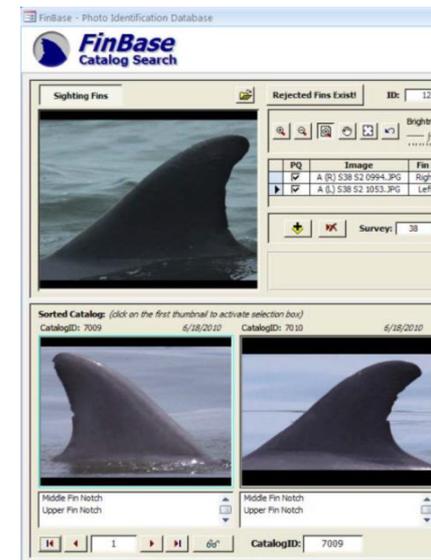
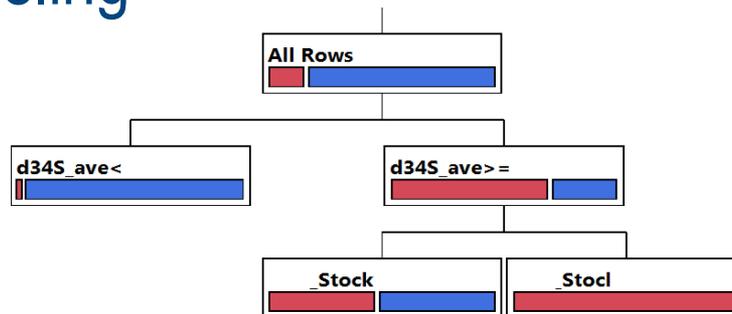


Laboratory analyses
July 2010 – 2014

Laboratory and data analysis



- Genetics – population structure, assignment tests, species ID
- Stomach content analysis – prey studies
- Analysis of stable isotope data – assignment of carcasses to stocks
- Photo analysis from photo-ID surveys
- Stranding network coordination & sample protocols
- Analysis of spatial & temporal patterns
- Quantification of mortality rates
- Population modeling



Project Management

- Project coordination
- Research planning
- Funding requests and data management
- Generation of publications & injury assessment reports
- Data management & evidence handling



Summary - Strengths

- Historical data collected by SEFSC was critical to the assessment
- Pivotal role in large cooperative effort combining data sets & resources across multiple agencies
- Integrated approach of live animal health assessments paired with data from dead strandings
- NRDA data & analyses during the assessment have contributed to SEFSC stock assessment mission



Summary - Challenges

- Highlights the importance of baseline information on population trends & demographic rates for each species
- Balancing the short-term & long-term DWH workload with daily mission duties
- Meeting legal requirements (i.e. confidentiality & evidence handling)
- Short-term funding cycles via the Oil Pollution Act process limits planning & implementing long-term assessments



Summary Future Directions

- Long-term monitoring of impacted populations is critical
- Balancing the continuing DWH workload with our NMFS core missions
- Preparing for the next event
- With the injury assessment ending & the restoration projects yet to begin, uncertainty in funding may result in a gap in critical data collection & loss of trained contract personnel

