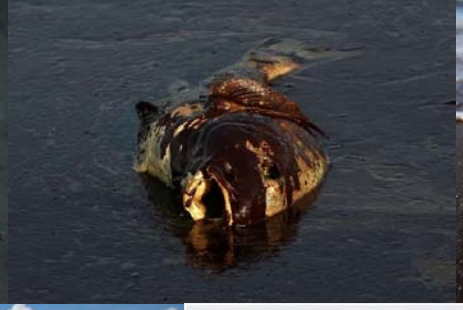
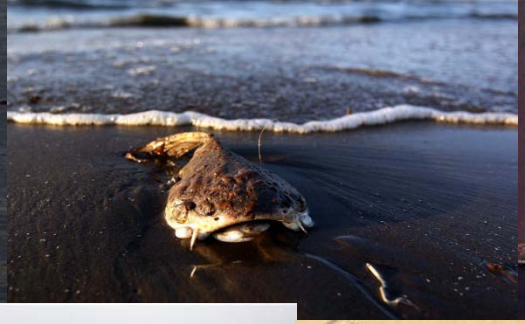
Effect of Macondo oil on insect & spider communities on coastal dunes and in saltmarshes in Louisiana

Linda M. Hooper-Bui

- **Ants on coastal dunes: oil and storm surge**

- **Influences of oil on insect communities in salt marshes**


Julie Dermansky ©2010












http://myrmecos.net/

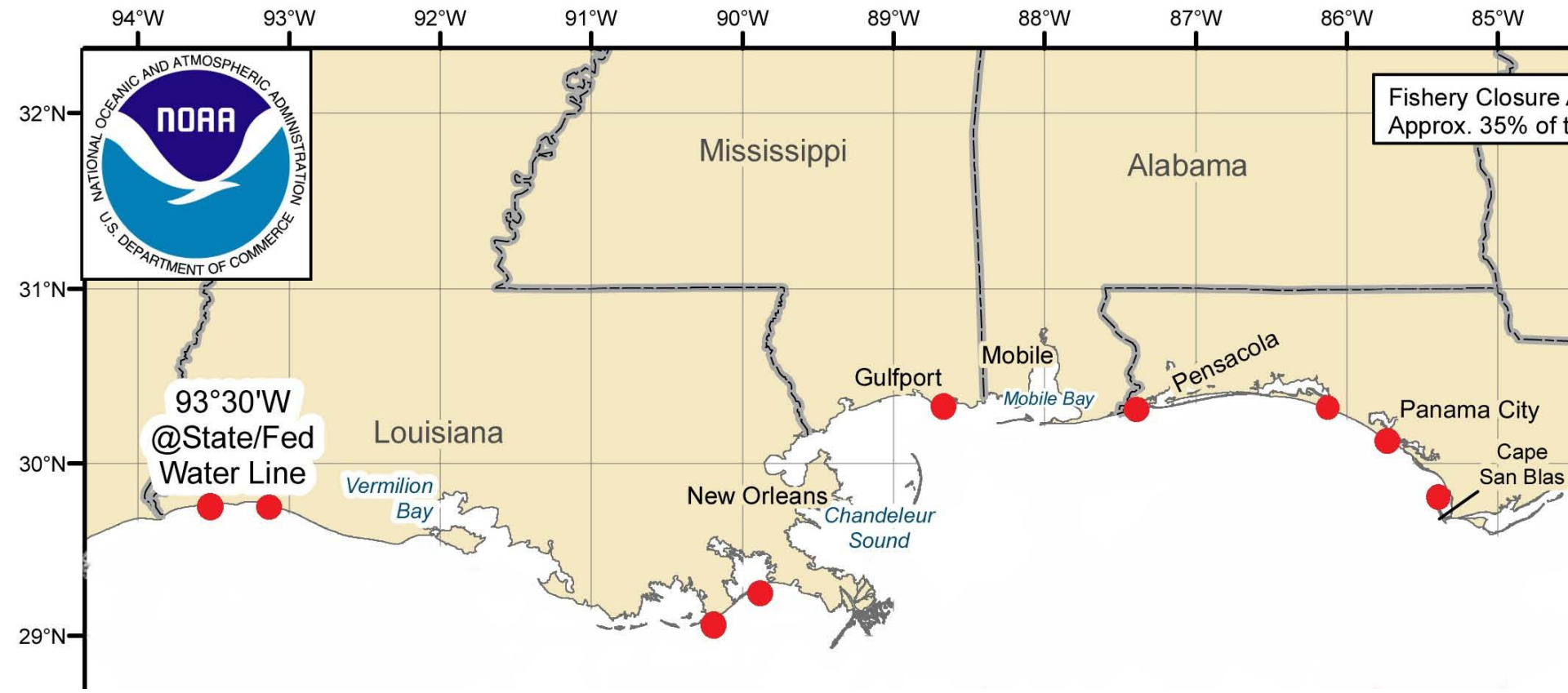
http://kiqaceyo.hostzi.com/what-is-the-sand-dunes-ecosystem.php

Ants are indicators of diversity and environmental changes

Low → Disturbance → High

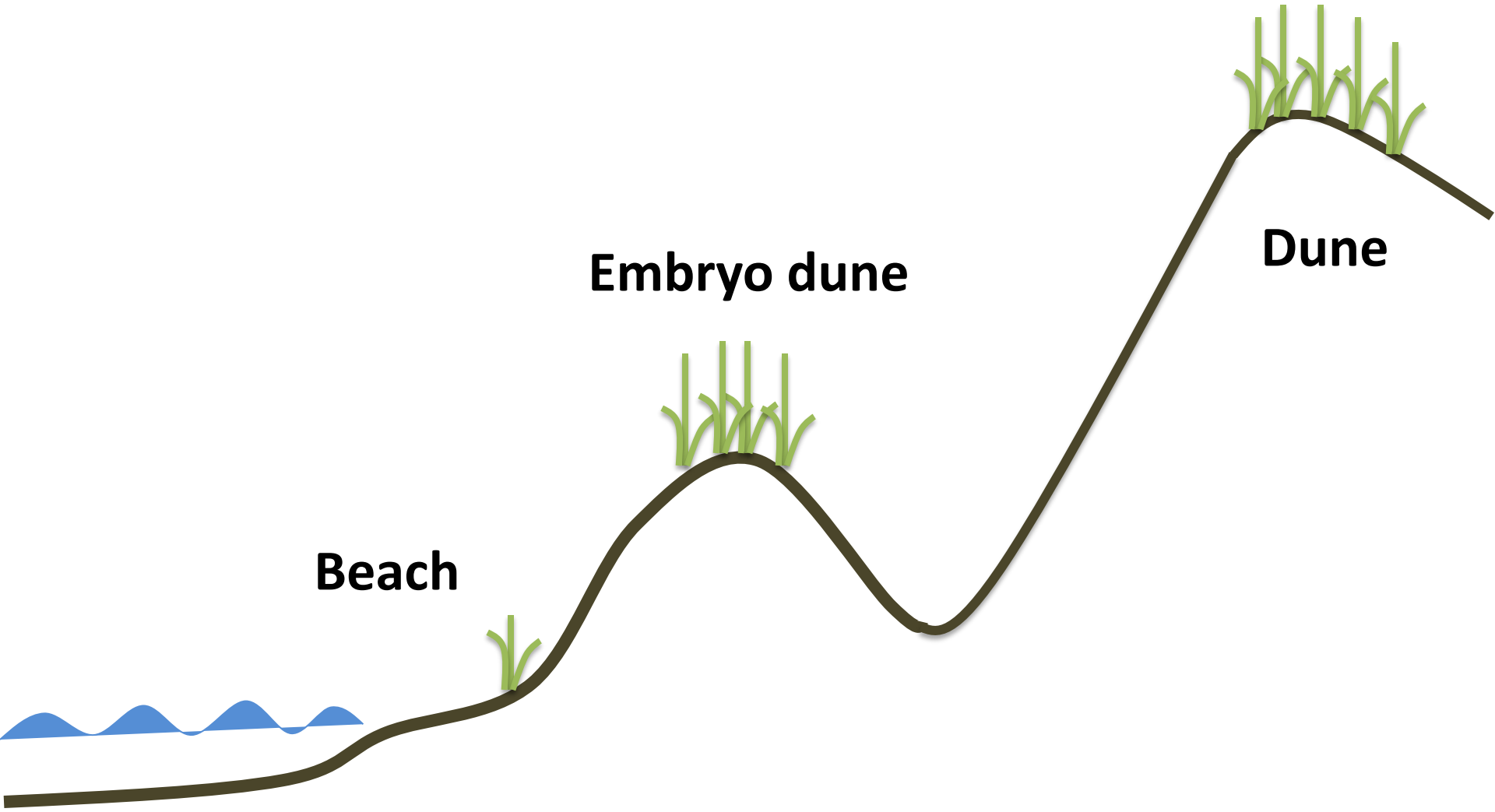
Graham et al., 2004

Sampling Areas 2010-2011: Beaches & Dunes

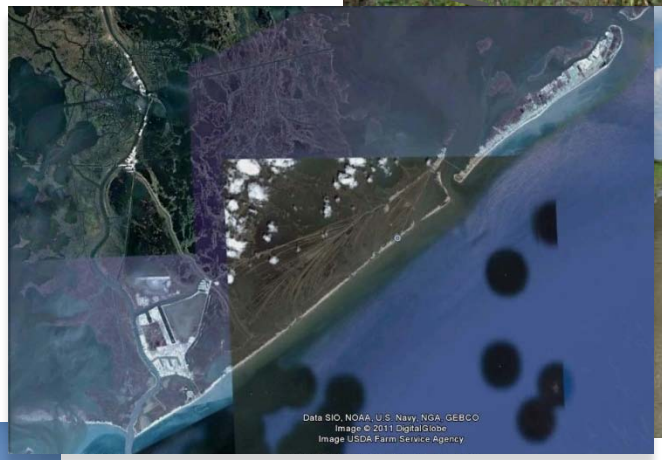


Xuan Chen: Ph.D. Student, LSU

Ants on coastal dunes


Beach
Embryo dune
Dune

Dune



Beach

Embryo dune

NATIONAL GEOGRAPHIC

Hurricane Alex Pushes "Worst Oil" Ashore; Cleanup Slowed

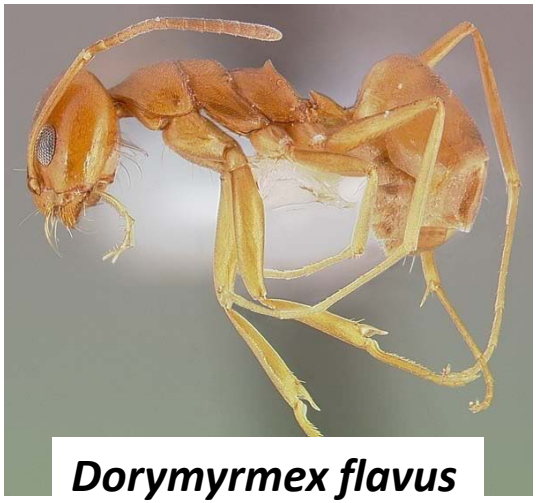
A "wake-up call": Alex stymies Gulf oil spill cleanup in Louisiana.

Pushed by Hurricane Alex, oily seawater hits a Port Fouchon, Louisiana, beach Wednesday, staining oil-absorbing booms.

Effects of oil spill on ants

Forelius mccooki

Cardiocondyla venustula



Dorymyrmex flavus

Brachymyrmex obscurior

Nylanderia arenivaga

Solenopsis invicta


Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2011 DigitalGlobe
Image USDA Farm Service Agency

Before oil pollution

	Forelius mccooki	*Dorymyrmex flavus*	*Nylanderia* sp.	*Cardiocondyla venustula*	*Brachymyrmex* spp.	*Solenopsis invicta*	Total abundance
Beach	√	√	√	√			√
Dune	√√√	√	√	√			√√√√
Embryo dune	√√					√	√√

After oil pollution

	Forelius mccooki	*Dorymyrmex flavus*	*Nylanderia* sp.	*Cardiocondyla venustula*	*Brachymyrmex* spp.	*Solenopsis invicta*	Total abundance
Beach	√			√		√	√
Dune	√*		√	√		√	√√*
Embryo dune	√				√	√√	√√

#√: Ant abundance

*: Significantly different

Yellow: Disappear

√: Colonies appear

After Alex

	Forelius mccooki	*Dorymyrmex flavus*	*Nylanderia arenivaga*	*Cardiocondyla venustula*	*Brachymyrmex obscurior*	*Solenopsis invicta*	Total abundance
Beach	√			√		√	√
Dune	√		√	√		√	√√
Embryo dune	√				√	√√	√√√

After Lee

	Forelius mccooki	*Dorymyrmex flavus*	*Nylanderia arenivaga*	*Cardiocondyla venustula*	*Brachymyrmex obscurior*	*Solenopsis invicta*	Total abundance
Beach							
Dune	√	√	√		√	√	√√
Embryo dune	√				√√	√√	√√√

#√: ant abundance
***: significant different**
Yellow: disappear
√: colonies appear

Before oil	*Forelius mccooki*	*Dorymyrmex flavus*	*Nylanderia arenivaga*	*Cardiocondyla venustula*	*Brachymyrmex obscurior*	*Solenopsis invicta*	Total abundance
Beach	√	√	√	√			√
Dune	√√√√	√	√	√			√√√√
Embryo dune	√√√					√	√√√

After Alex	*Forelius mccooki*	*Dorymyrmex flavus*	*Nylanderia arenivaga*	*Cardiocondyla venustula*	*Brachymyrmex obscurior*	*Solenopsis invicta*	Total abundance
Beach	√			√		√	√
Dune	√*		√	√		√	√√*
Embryo dune	√				√	√√	√√√

After Lee	*Forelius mccooki*	*Dorymyrmex flavus*	*Nylanderia arenivaga*	*Cardiocondyla venustula*	*Brachymyrmex obscurior*	*Solenopsis invicta*	Total abundance
Beach							
Dune	√	√	√		√	√	√√
Embryo dune	√				√√	√√	√√√

Dominant **Climate specialist** **Opportunist** **Invasive** **Introduced species**

Before oil	*Forelius mccooki*	*Dorymyrmex flavus*	*Nylanderia arenivaga*	*Cardiocondyla venustula*	*Brachymyrmex obscurior*	*Solenopsis invicta*	Total abundance
Beach	√	√	√	√			√
Dune	√√√√	√	√	√			√√√√√
Embryo dune	√√√					√	√√√

After Alex	*Forelius mccooki*	*Dorymyrmex flavus*	*Nylanderia arenivaga*	*Cardiocondyla venustula*	*Brachymyrmex obscurior*	*Solenopsis invicta*	Total abundance
Beach	√			√		√	√
Dune	√*		√	√		√	√√*
Embryo dune	√				√	√√	√√√

After Lee	*Forelius mccooki*	*Dorymyrmex flavus*	*Nylanderia arenivaga*	*Cardiocondyla venustula*	*Brachymyrmex obscurior*	*Solenopsis invicta*	Total abundance
Beach							
Dune	√	√	√		√	√	√√
Embryo dune	√				√√	√√	√√√

Dominant

Climate specialist

Opportunist

Invasive

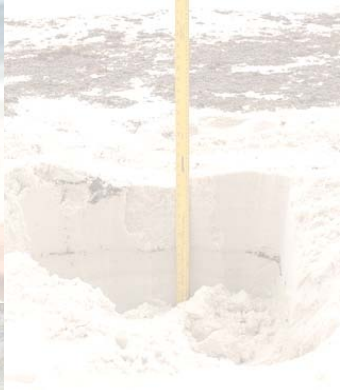
Introduced species

Ant community

http://www.oceanleadership.org/2010/much-gulf-oil-remains-deeply-hidden-and-under-beaches/

Ant community

Ant community

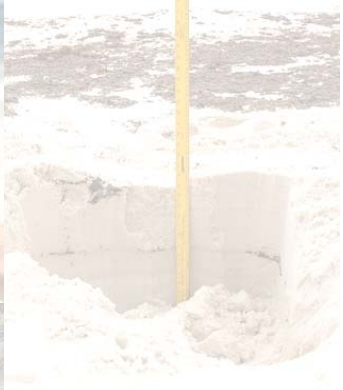


f-oil-remains-deeply-hidden-and-under-

http://myecoproject.org/2010/05/31/bp-readies-new-plan-to-contain-oil-spill/

Ant community

http://www.gulf-shores-alabama-condo-rentals.com/deep-cleaning-orange-beach-sand.html



f-oil-remains-deeply-hidden-and-under-

http://myecoproject.org/2010/05/31/bp-readies-new-plan-to-contain-oil-spill/

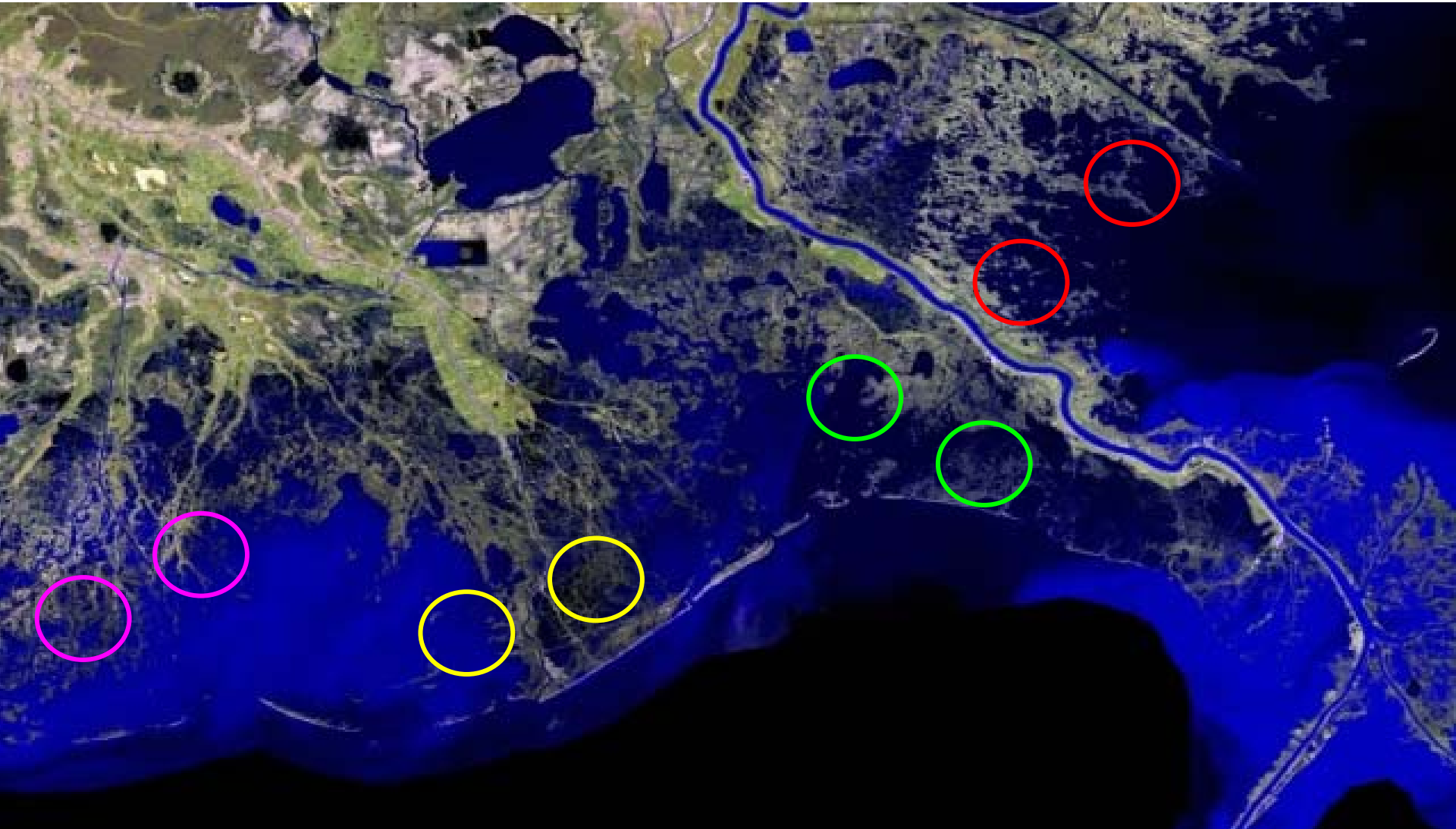
?

Ant community

Marsh: Insects and Spiders

- Food for frogs, fish & birds
- Insects can be indicators of plant stress
- Basis of the terrestrial food web

Sampling Areas 2010- 2011: Marsh



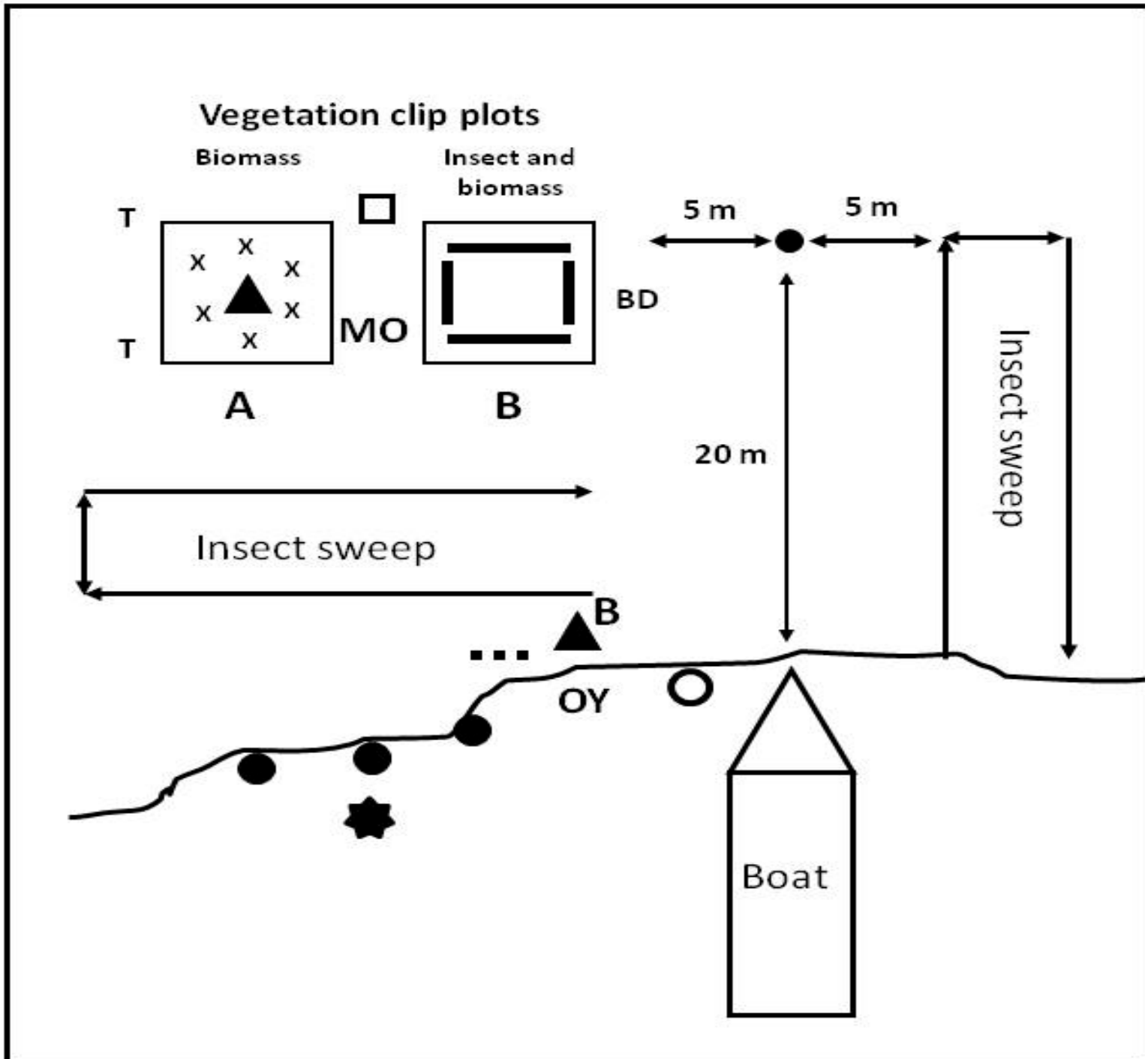
Sweeping

Clip plots


Photo taken 10 Sept 2011

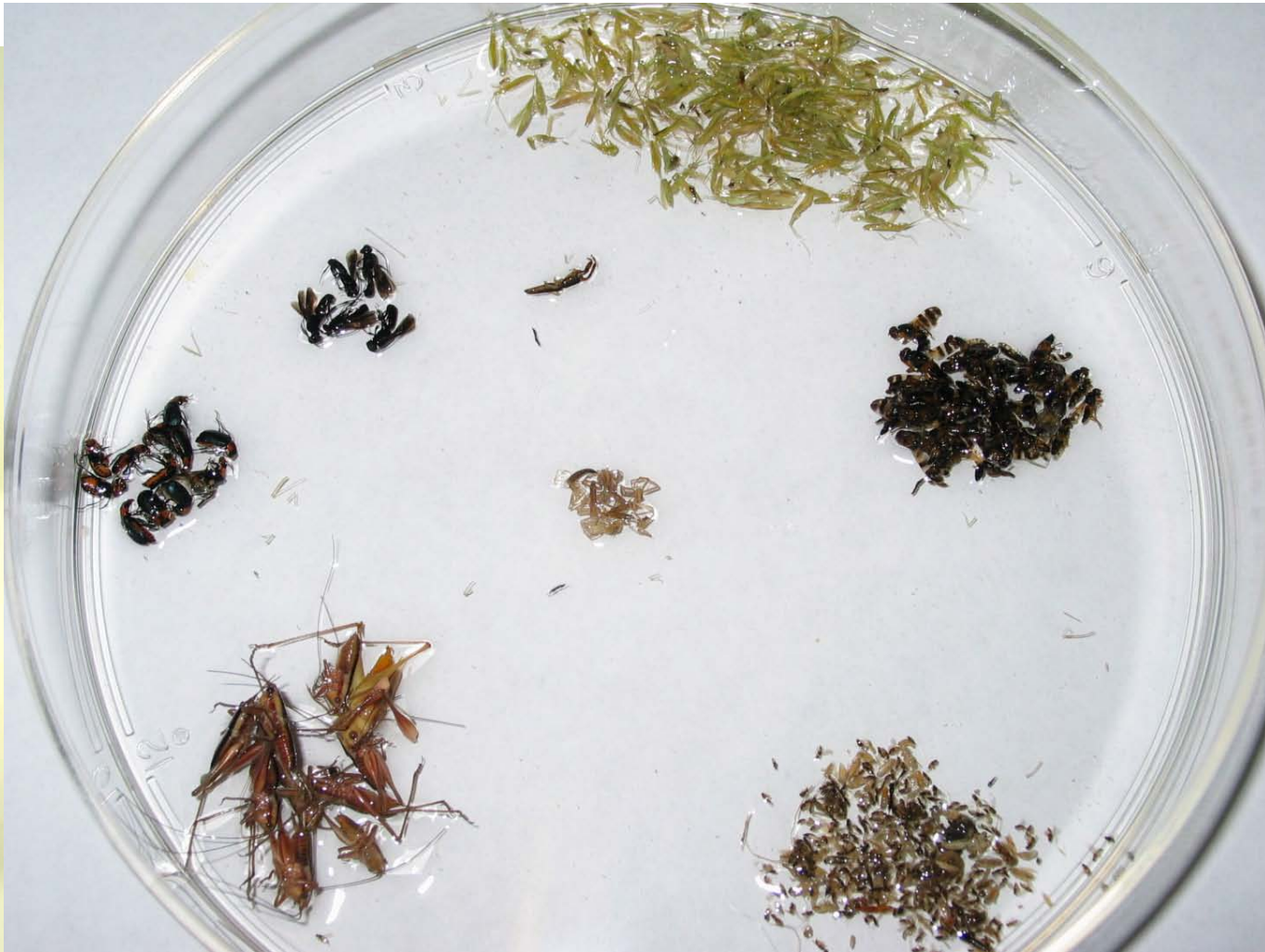

Photo taken 10 Sept 2011


Photo taken 1 Oct 2011


Vegetation clip plots
Biomass
Insect and biomass
T
T
MO
BD
A
B
5 m
5 m
20 m
Insect sweep
Insect sweep
B
OY
O
Boat

Preliminary Data: Abundance

Seed Bugs: 147±10.3 vs. 22±1.0 (mean±SEM, p=0.04)



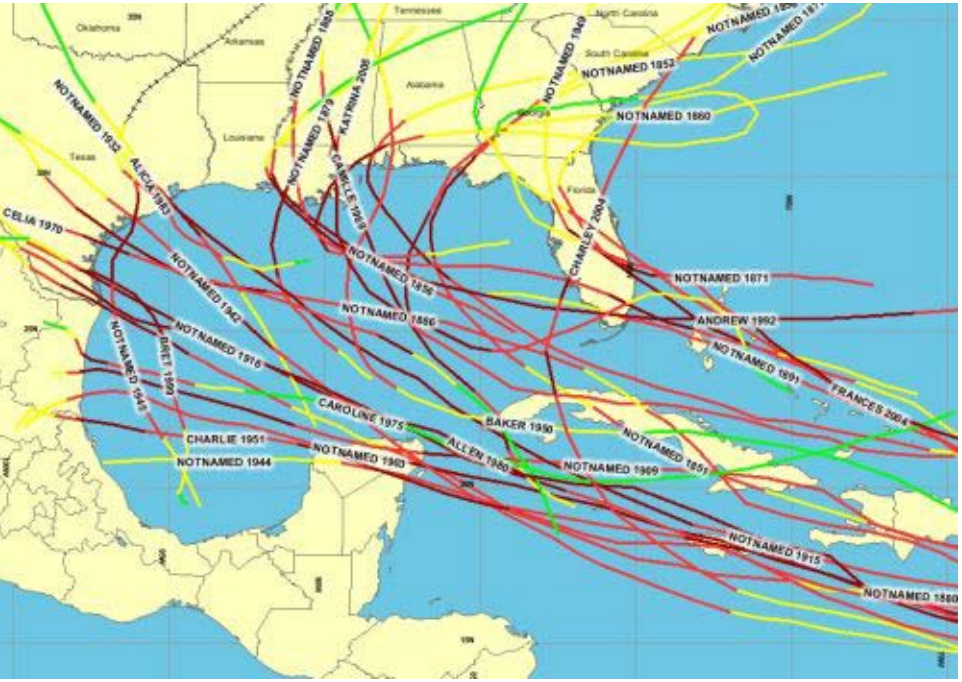
Insects as indicators of plant stress

Non-oiled Oiled

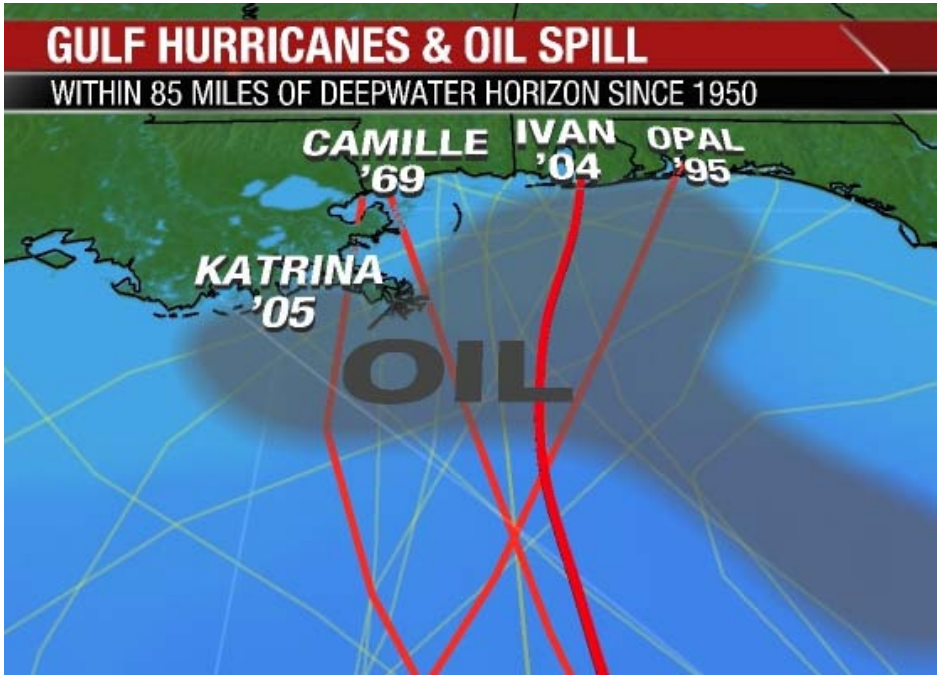
Preliminary Data: Abundance

- Spiders 7.2 $\pm$1.68 vs 2.3$\pm$1.5 (p=0.005)
- Large spiders were more affected than small spiders
- In Sept 2010, only 2 large spiders were found among 4 heavily oiled areas

In the future…



http://climateerinvest.blogspot.com/2008/08/hurricane-watch-gustav-slams-into-haiti.html

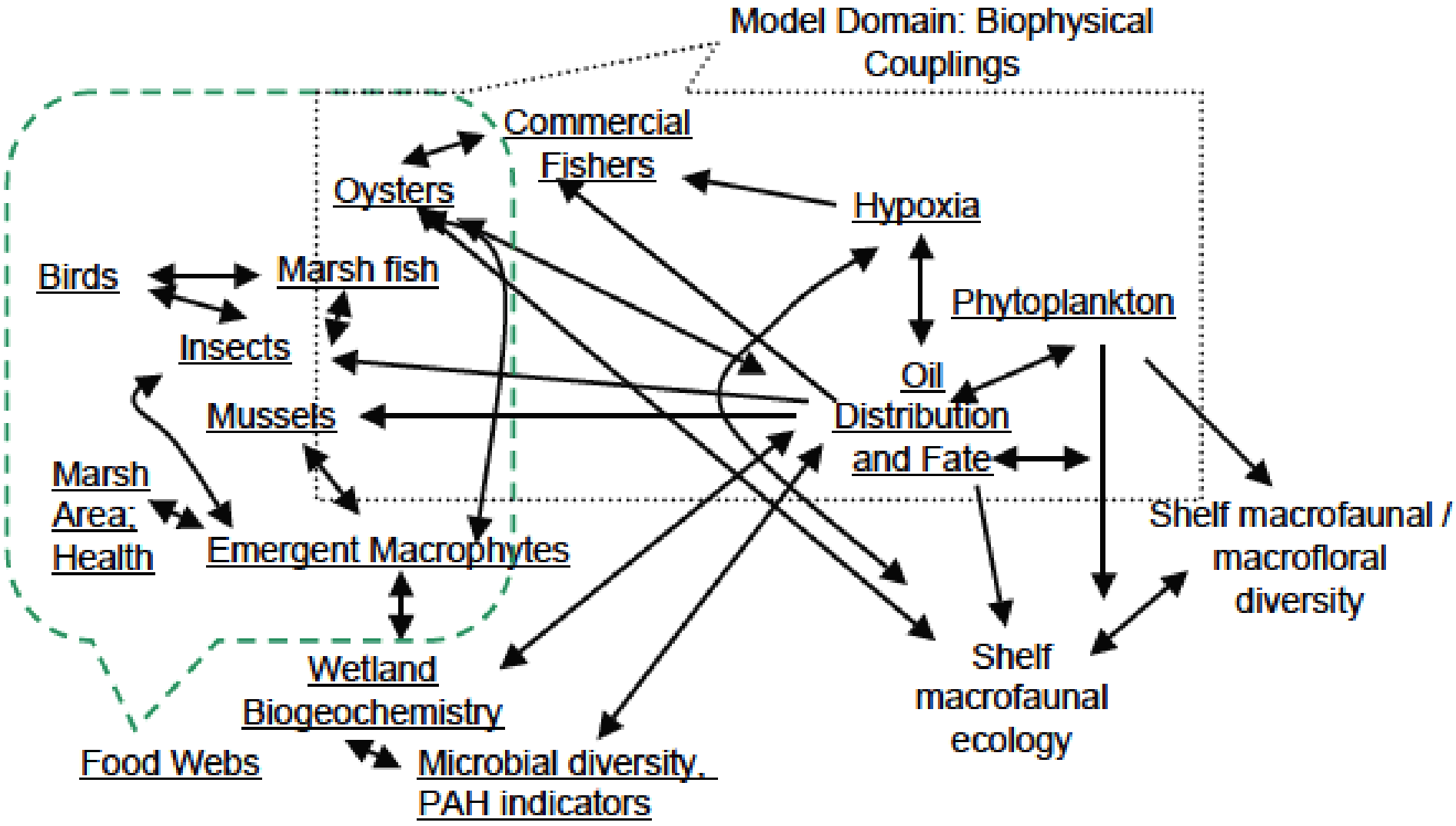


http://wwworigin.weather.com/outlook/weather-news/news/articles/hurricane-history-oil-slick_2010-06-02

Hurricanes & tropical storm surge

Global climate change and sea-level rise

GRI: The Effects of the Macondo Oil Spill on Coastal Ecosystems



Acknowledgements

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- Nancy Rabalais, LUMCON

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LSU BP Round 1 & 2

NGI Northern Gulf Institute

NSF National Science Foundation WHERE DISCOVERIES BEGIN

Gulf of Mexico Research Initiative