

INPUT ON THE GULF LONG-TERM FOLLOW-UP OF CLEANUP WORKERS STUDY

NOAA ACTIVITIES

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NOAA Deepwater Horizon Response

November 17, 2010





Science Actions

- Scientific support to the IC through the USCG Field On-Scene Commander (FOSC)
- Collection of a broad suite of samples to assess baseline environmental conditions
- **Assess the safety of seafood and inform appropriate closures of federal waters**
- Evaluate dispersant and oil related to seafood safety – conduct baseline contaminant studies
- Assist to calculate oil flow from the DWH site to estimate total release of oil (Flow Rate Technical Group)
- Track surface oil and dispersant fate and transport
- Initial studies on effects of dispersants on marine organisms and uptake into seafood
- **Measure distribution and levels of subsurface dispersed oil and dispersant**
- Daily hurricane updates critical for field operations
- **Complement existing air quality efforts through aircraft (P-3) and vessel deployments**
- Initiate and participate in interagency Joint Analysis Group (JAG) for sub-surface oil
- Conduct aerial surveys of protected species distribution and abundance
- Update increased sensitivity of the Loop Current hydrodynamics – P-3s dropping AXBTs, sponsoring oceanographic cruises
- Conduct baseline studies of natural resources (water, sediment, biota, human use)
- Develop/Conduct studies to measure injuries of trust resources (water, sediment, biota, human use) by oil and or response actions
- Daily-weekly weather forecasts critical for field operations



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Results-flights and vessel analysis

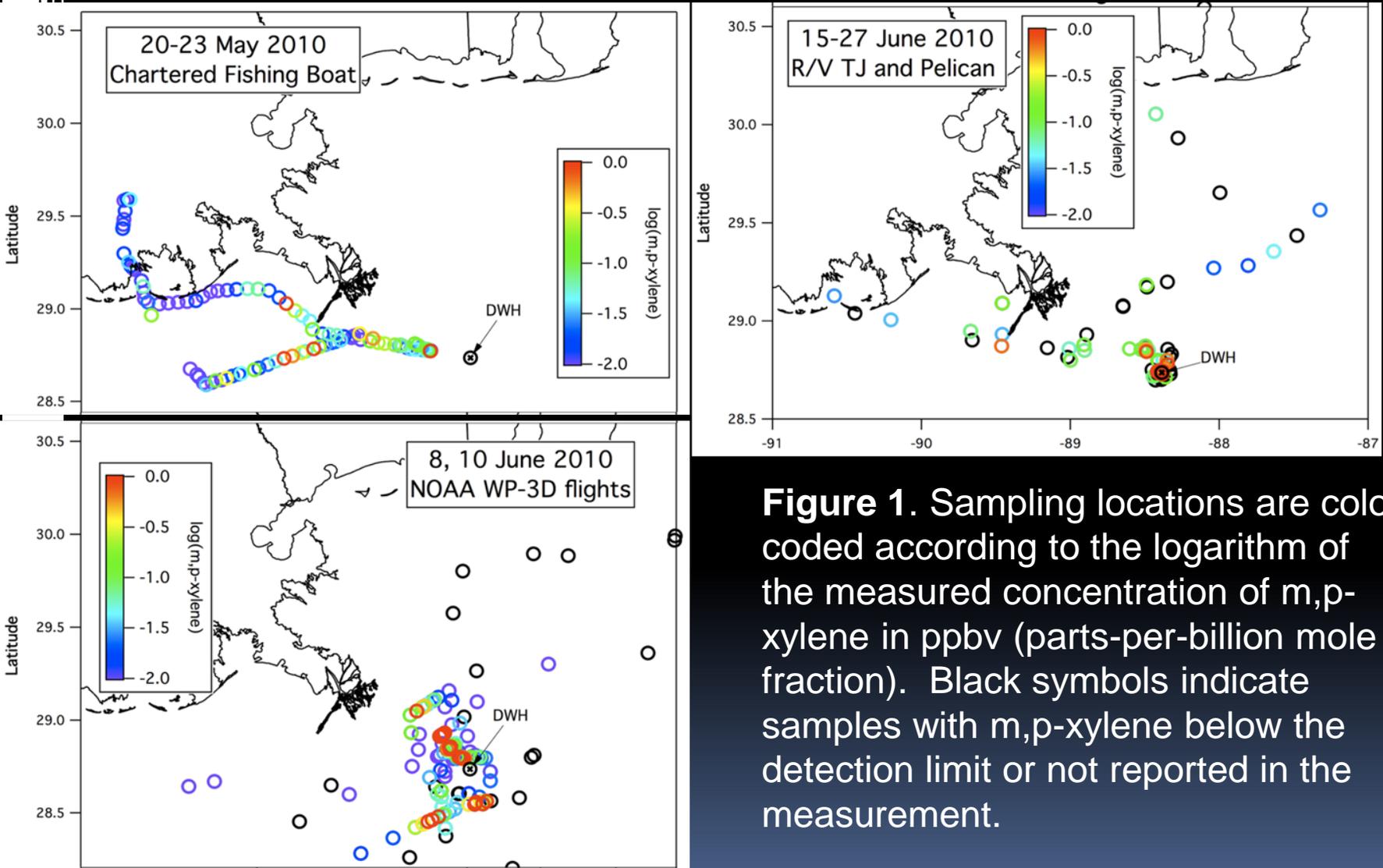


Figure 1. Sampling locations are color coded according to the logarithm of the measured concentration of m,p-xylene in ppbv (parts-per-billion mole fraction). Black symbols indicate samples with m,p-xylene below the detection limit or not reported in the measurement.

ERMA
Provides
Data to the
Public

ERMA Environmental Response Management Application
Gulf of Mexico

Layers Legend Query Tool AOI Labels Zoom Download Print

- Deepwater Horizon Wreckage
- Louisiana Offshore Oil Port (LOOP Platform)
- Small Business Administration Offices
- Areas of Operations
- Gulf Platforms
- BP Claim Centers
- Staging Areas
- BP Community Outreach Centers
- Comprehensive One Stop Career Centers
- Affiliate One Stop Career Centers
- Decontamination Vessels
- Decontamination Locations as of 26-September-2010
- Waste Disposal & Recoverable Facilities
- Waste Management Staging Sites as of 04-November 2010
- Platform Martin
- EMS Locations
- Platform Saratoga
- USACE Emergency Permits
- Incident Milestones Dates

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Environmental Response Management Application (ERMA)

Layers Legend Query Tool Zoom

- Background
- Response Planning
- BP Deepwater Horizon Oil Spill
 - Wellhead Surface Location
 - Deepwater Horizon Wreckage
 - Small Business Administration Offices
 - Areas of Operations
 - BP Claim Centers
 - BP Community Outreach Centers
 - Comprehensive One Stop Career Centers
 - Affiliate One Stop Career Centers
 - USACE Emergency Permits
- Incident Milestones Dates
- Satellite, Radar, and Aerial Images of the Spill
- Overflight
- Resource Management
 - NMFS
 - NMFS Fishery Closure Boundary as of 6pm Eastern Time 22 October 2010
 - NMFS Fishery Reopened Area as of 6pm Eastern Time 22 October 2010
 - NMFS Fishery Reopened Areas - Cumulative 22 October 2010
 - Tentative Sequence of Remaining Sampling Within the Federal Closed Areas as of 10/26/2010
 - NMFS Sampling Grid

Scale: 1: 3M Zoom Level: 7 Location: 28.05259°,-86.6

Scale: 1: 3M Zoom Level: 7 Location: 28.85430°,-87.49512°

National Oceanic and Atmospheric Administration | Environmental Protection Agency
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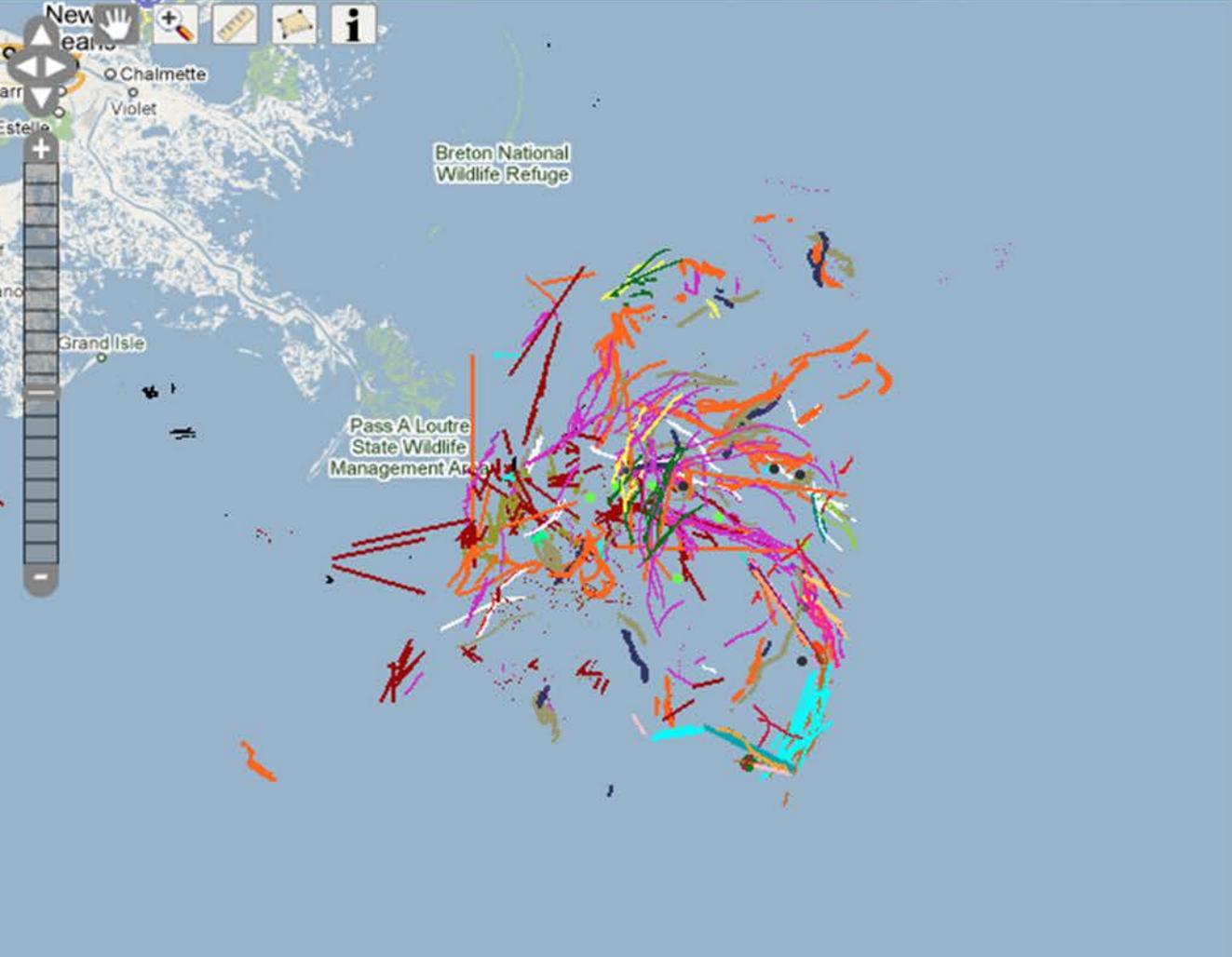
ERMA Sampling Map



ERMA | Environmental Response Management Application Gulf of Mexico

Information Help

Find



Aerial dispersant applications—
April - July

POWERED BY
Google

50 km
20 mi

Map data ©2010 - Terms of Use

Populating ERMA & Geo Platform.gov

Marine Mammal Species in the Gulf

- **21 resident cetacean species**
 - 58 stocks (38 BNDs)
 - 11% of stocks had adequate assessment prior to the spill
 - 1 ESA
- **West Indian Manatee**
- **Recent offshore survey by SEFSC prior to spill**

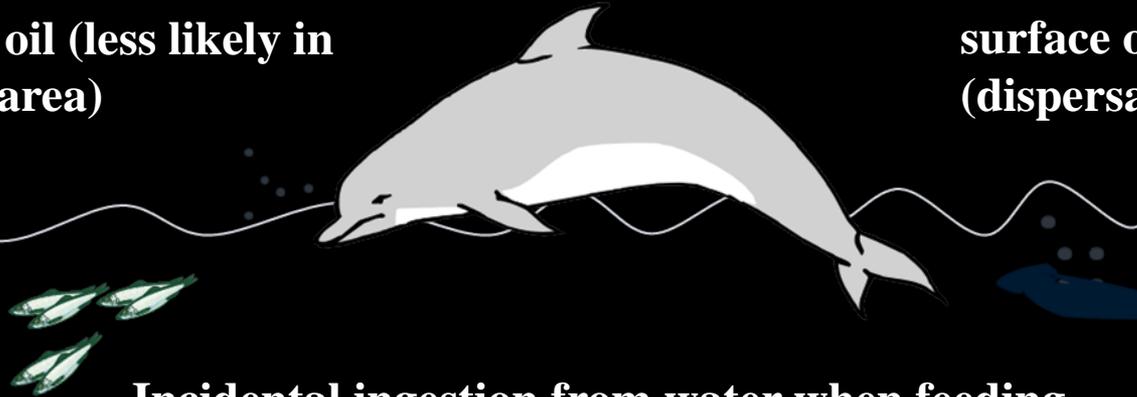


Potential Exposure Pathways

Direct

Inhalation of VOCs from surface oil (less likely in coastal area)

Dermal exposure from surface or subsurface oil (dispersants)



**Incidental ingestion from water when feeding
Ingestion of contaminated prey**

Indirect

- Physical injury from response (burning, ship strike)
- Loss or alteration of prey resources
- Habitat loss/degradation (noise, vessel traffic, physical obstruction, water quality)
- Chronic disease or long term impacts affecting survivorship
- Reproduction

Assessment of Dolphin Health

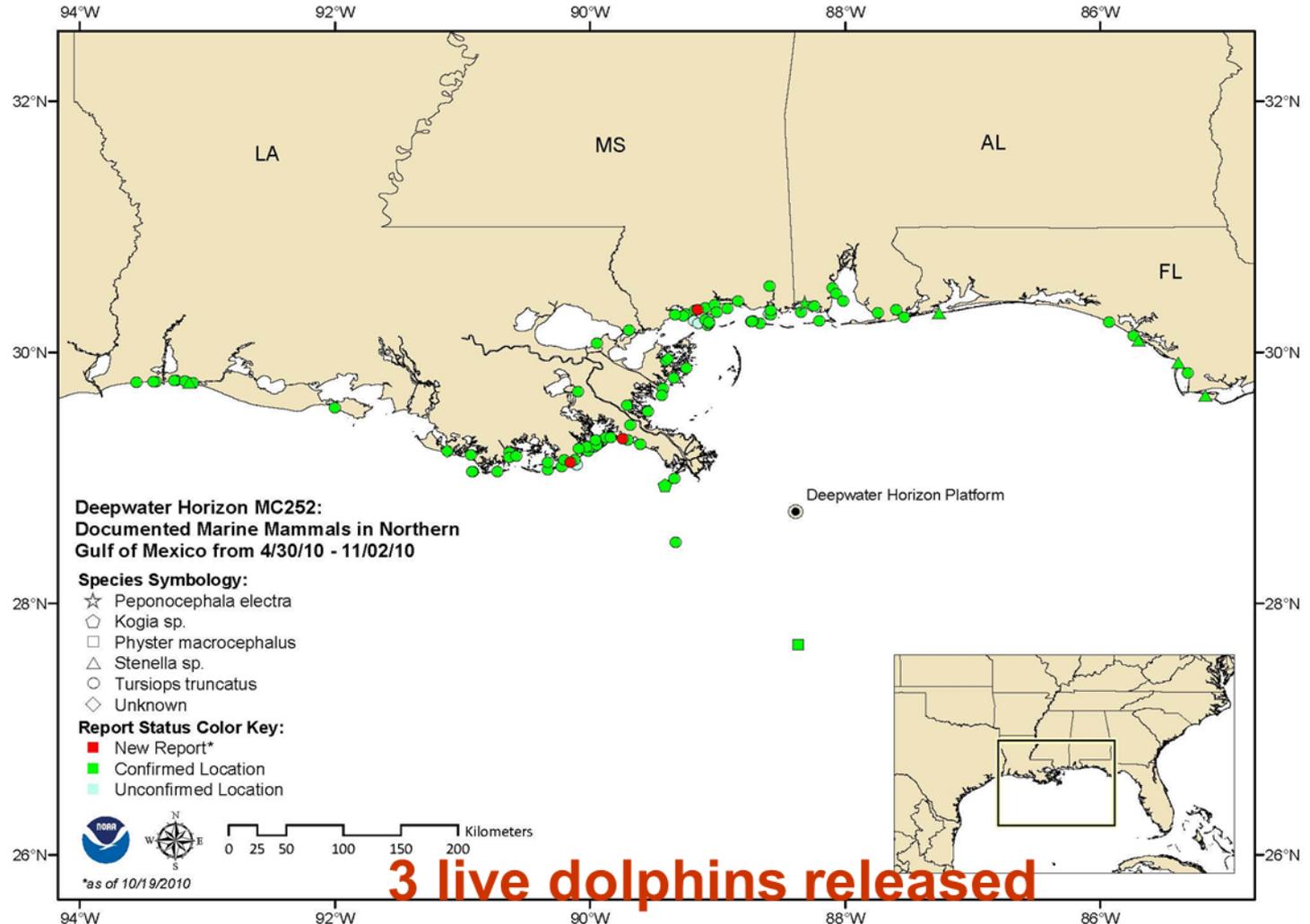
DWH MC252

- Response
 - Stranding Response
 - Exposure Assessment
- Pre-Assessment
 - Surveys
 - Biopsies
 - Photo ID
- Assessment
 - All of Above
 - Live Capture Health Assessments
- Long term monitoring



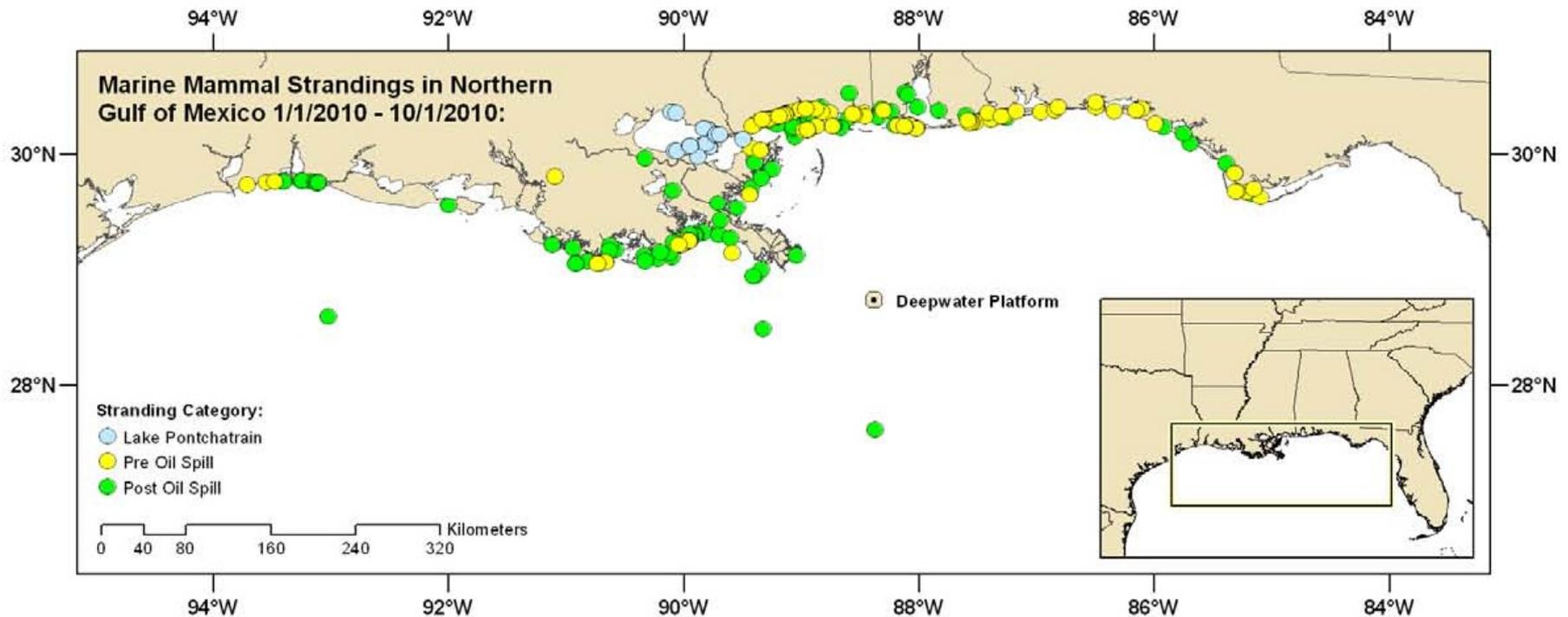
RESPONSE: Strandings

108 dolphins: 2 whales

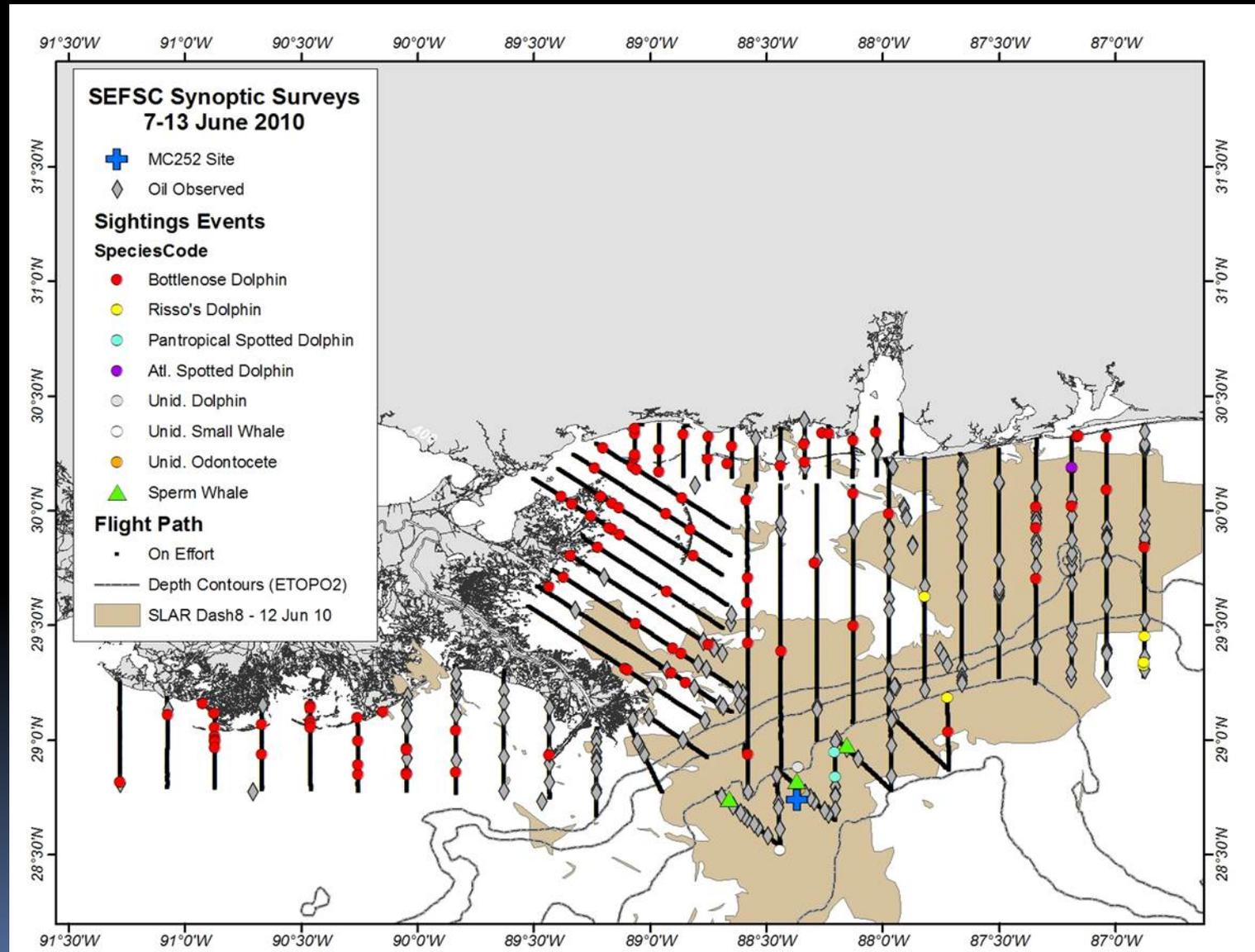


3 live dolphins released
2 live dolphins in rehab

Comparison of Strandings Pre-spill and during spill

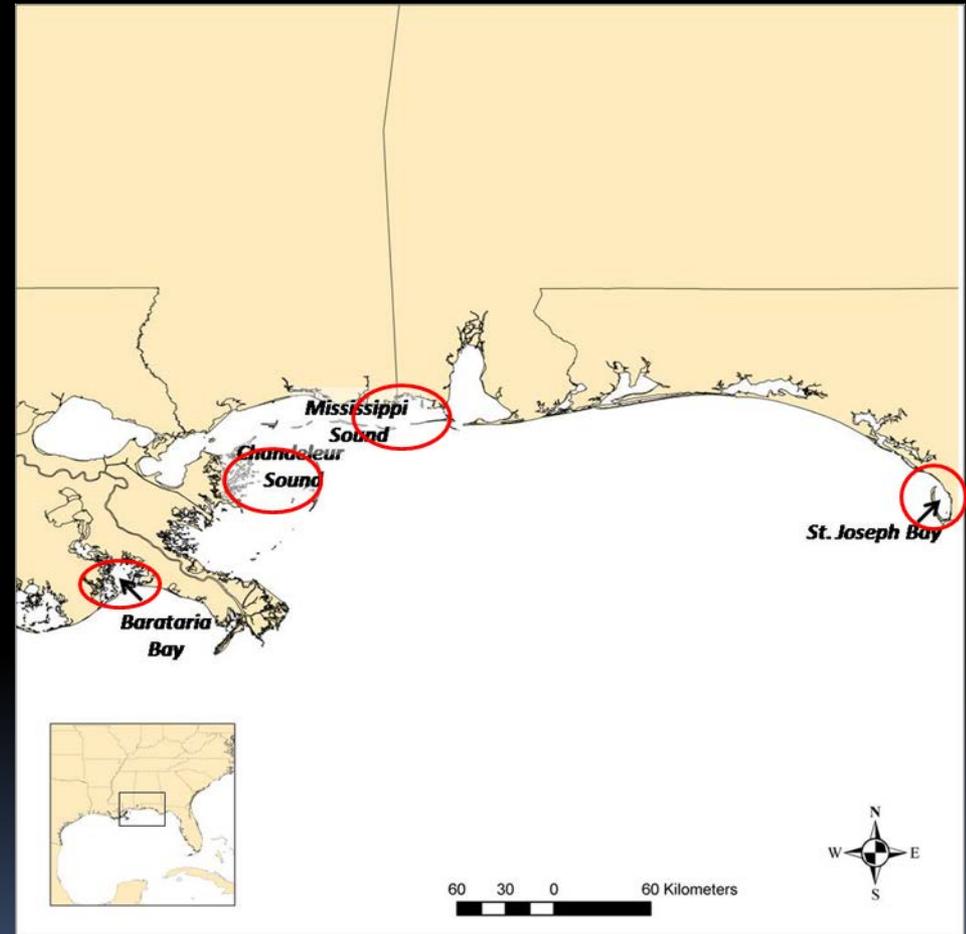


Pre-Assessment: SEFSC Synoptic Protected Species Surveys



Pre-Assessment: Coastal Bottlenose Dolphin Studies

- **Partners: NCCOS, SEFSC, CZS**
- **Miss Sound, St. Joseph Bay previously studied;**
- **Barataria Bay, Chandeleur Sound high likelihood of oil impact**
- **Others: Sarasota, Choctawhatchee, Perdido Bay**



Methods

- Remote biopsy for pre- and post-impact tissue samples
- Photo-identification surveys
 - Mark-recapture analysis for abundance, survival
 - Monitor for signs of distress



Current status

Location	Pre-oil biopsy sampling	Photo-ID Initial Session		
		Mark 1	Mark 2	Mark 3
St. Joseph Bay, FL	X	X	X	
Mississippi Sound, MS	X	X		
Chandeleur Sound, LA	X			
Barataria Bay, LA	X	X	X	

Summary of Observations

- Dolphins observed in proximity to oil (light sheen – thick rust colored mousse) in Louisiana & Mississippi
- Oil patches on skin of some dolphins
- Skin lesions observed on some animals
- Oil still present in most recent surveys



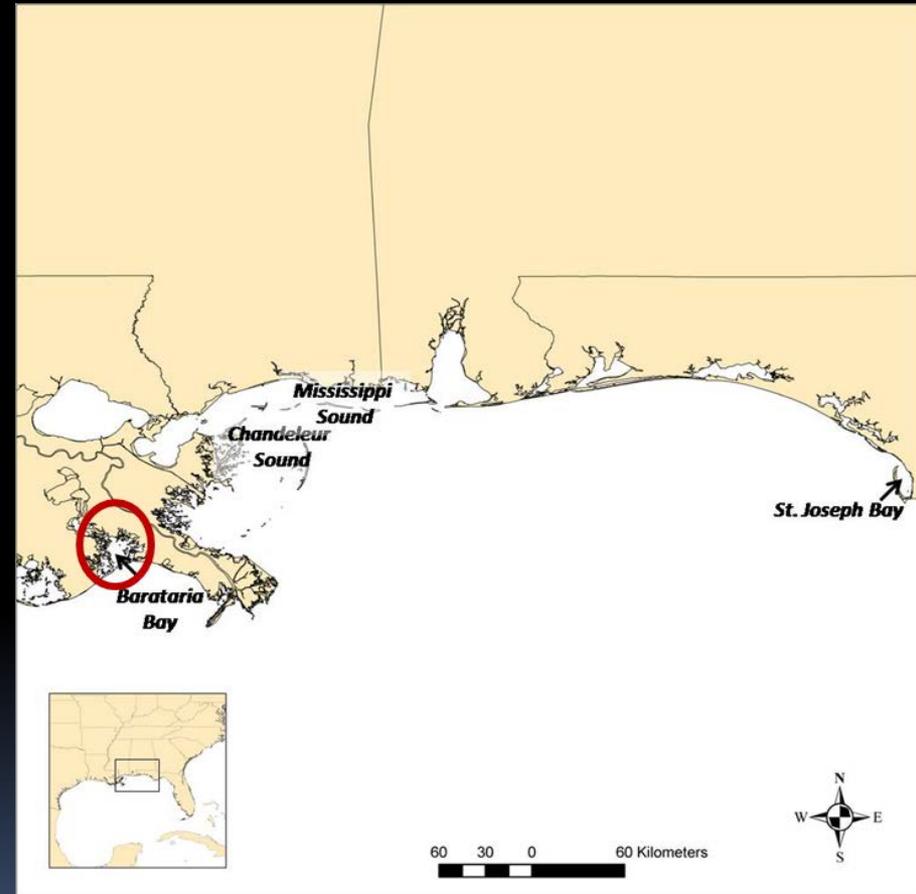
Photo credit: B. Rone



Photo credit: T. Speakman

Assessment Methods: Dolphin Capture-Release

- Planning July 15- August 6, 2011
- 30 independent dolphins captured & temporarily restrained
- Physical examination, blood work, vital signs, tissue sampling for chemical analysis
- Fitted with satellite tags to track movements



Health Data Analysis

Clinical Pathology

- Complete blood count, serum chemistry
- Compared with established reference intervals^a; evaluated by veterinary team

Endocrine Panel

- Total thyroxine (T₄), Free T₄, triiodothyronine (T₃)
- Compared with 2 other populations
- Evaluated in relation to measured PCB s

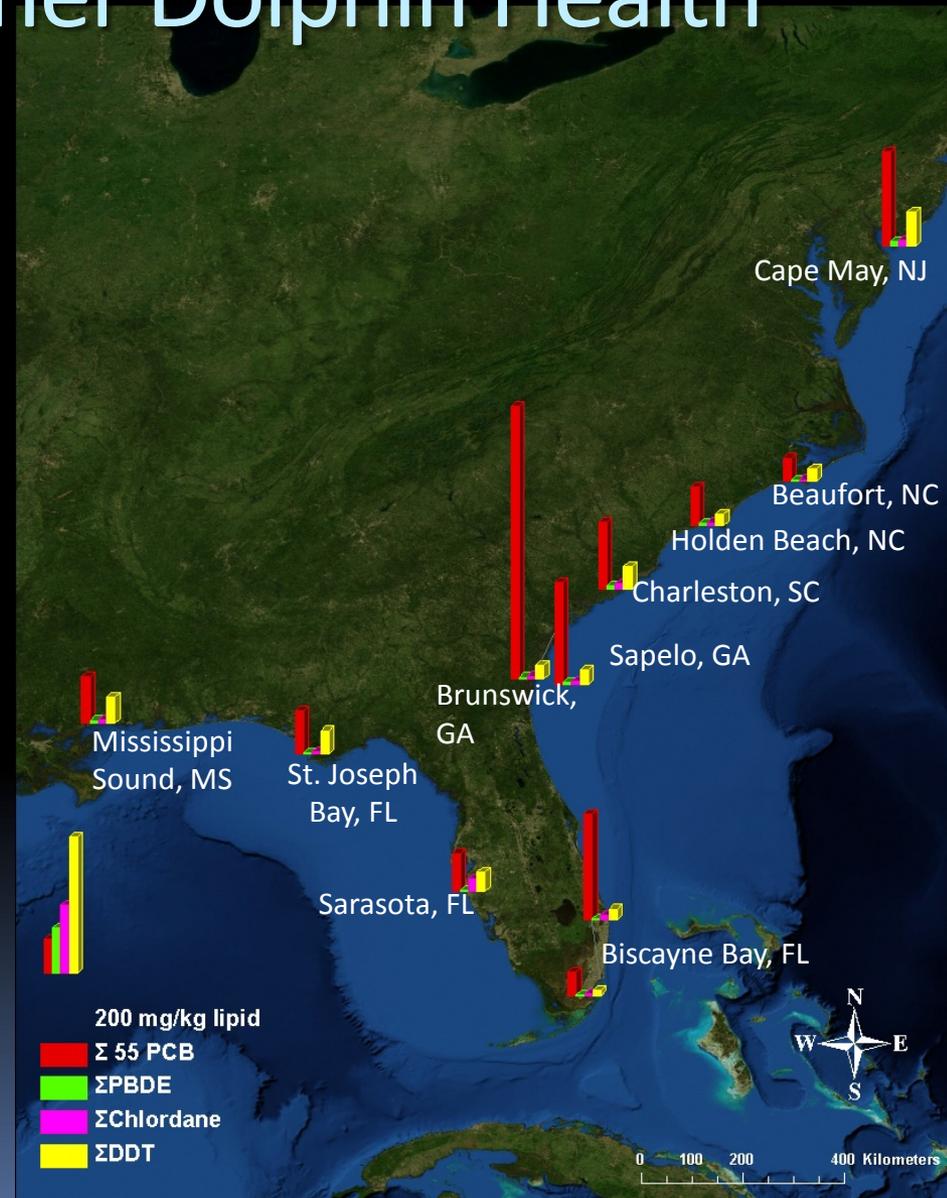
Functional Immune

- Lymphocyte proliferation, phagocytosis indices
- Evaluated in relation to measured thyroid hormones and PCBs

^a Schwacke et al. 2009, American Journal of Veterinary Research 70(8)

Comparison with Other Dolphin Health Studies*

- Data from independent studies; all analyses at Charleston NIST lab (males; N=300)
- Maximum PCB values:
 - Brunswick - 2,895 ppm
 - Sapelo - 2,867 ppm



* Kucklick, Schwacke, Wells, Hohn, Guichard, Yordy, Hansen, Zolman, Wilson, Litz, Nowacek, Rowles, Pugh, Balmer, Sinclair, Rosel (in review)

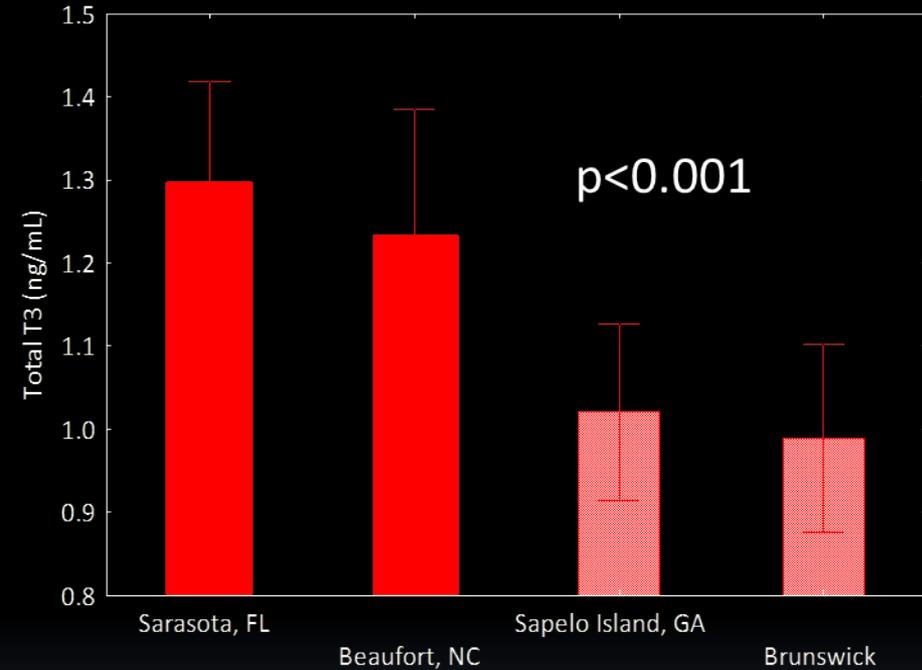
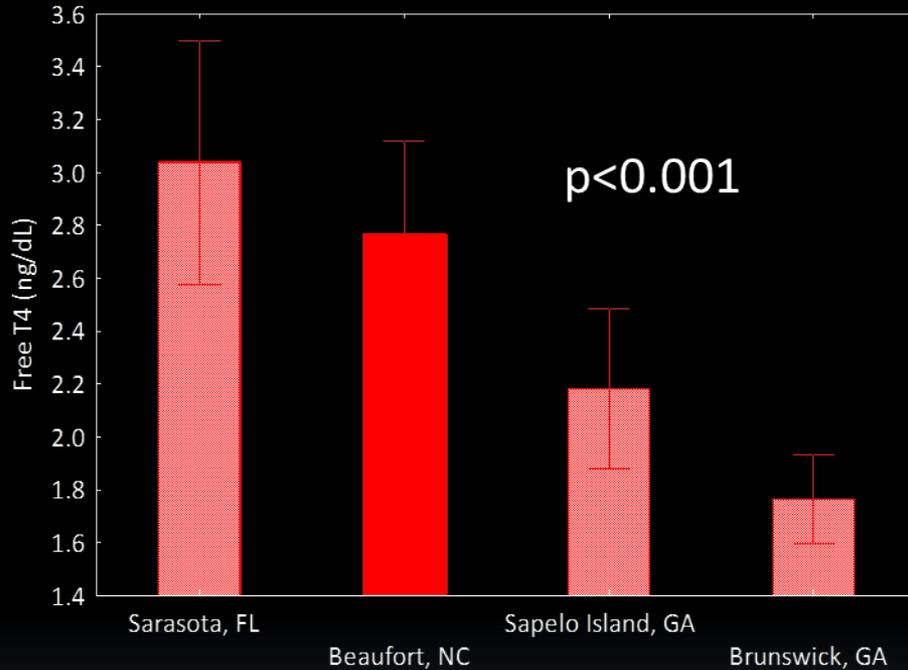
Response Turtles: Acute and Direct



Stay tuned....

Photo by B. Balmer

Thyroid Hormones among Populations



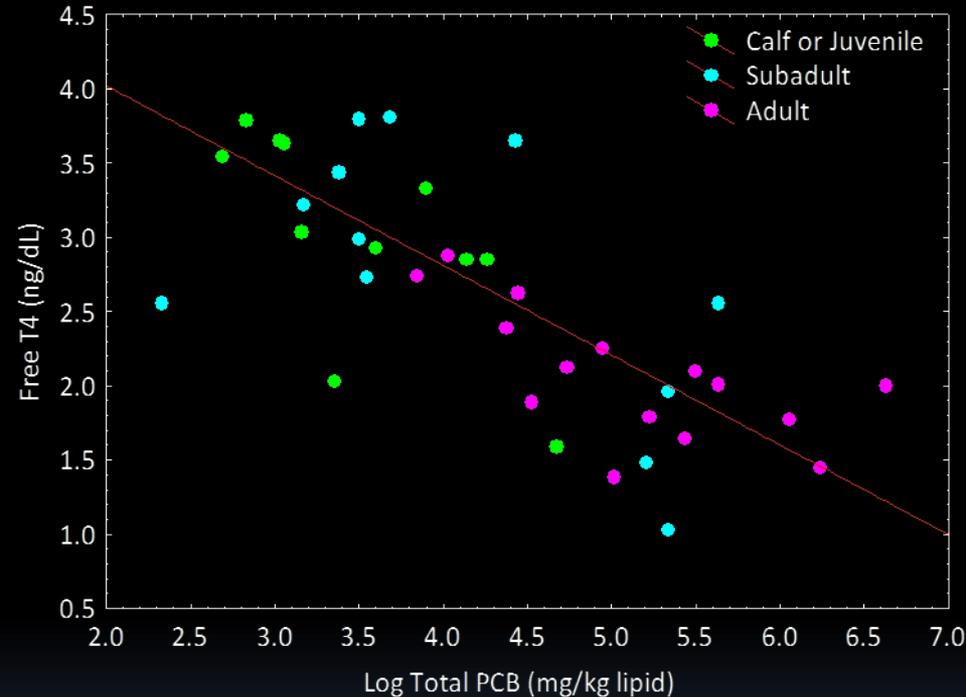
	Total T ₄	Free T ₄	Total T ₃
Location	0.978	<0.001	0.002
Length class	0.024	0.002	0.065
Location*Length class	0.919	0.068	0.827

Functional Immune : Summary

Assay	T3		Total PCBs	
	r	p-value	r	p-value
ConA (T-lymphocyte)	<u>0.62</u>	<u><0.001</u>	<u>-0.57</u>	<u>0.002</u>
LPS (B-lymphocyte)	<u>0.61</u>	<u><0.001</u>	-0.11	0.565
Neutrophil phagocytosis	<u>0.51</u>	<u>0.005</u>	-0.27	0.165
Monocyte phagocytosis	<u>0.52</u>	<u>0.004</u>	<u>-0.52</u>	<u>0.005</u>

- All immune endpoints positively correlated with T3
- ConA proliferation and monocyte phagocytosis indices had significant negative correlation with total PCBs

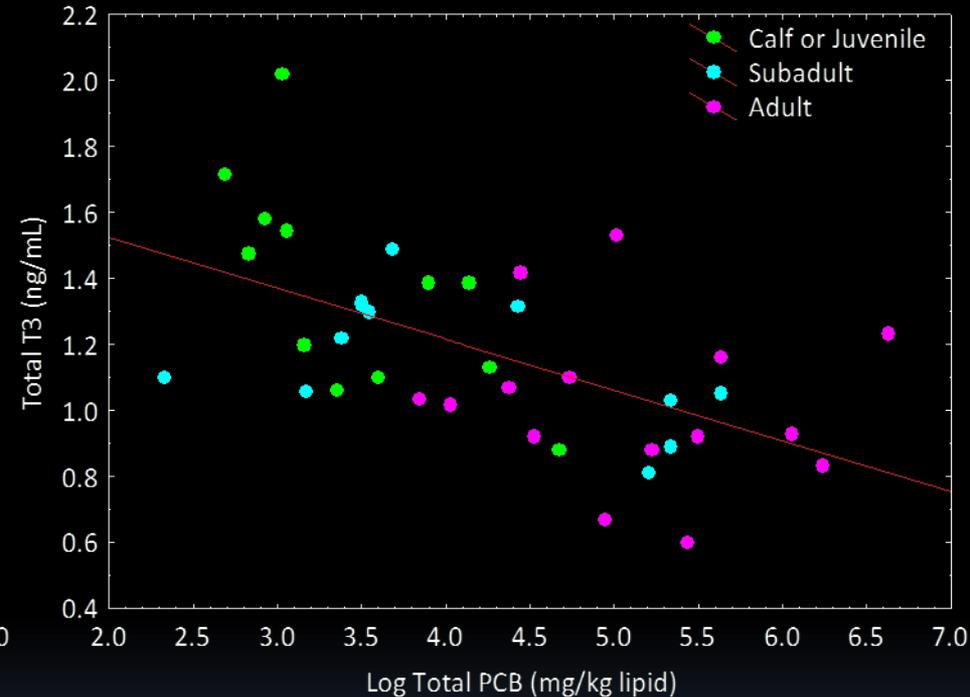
Total PCBs vs. Thyroid Hormones (Males)



Free T4

$r = -0.74$

Log total PCB: $p < 0.001$

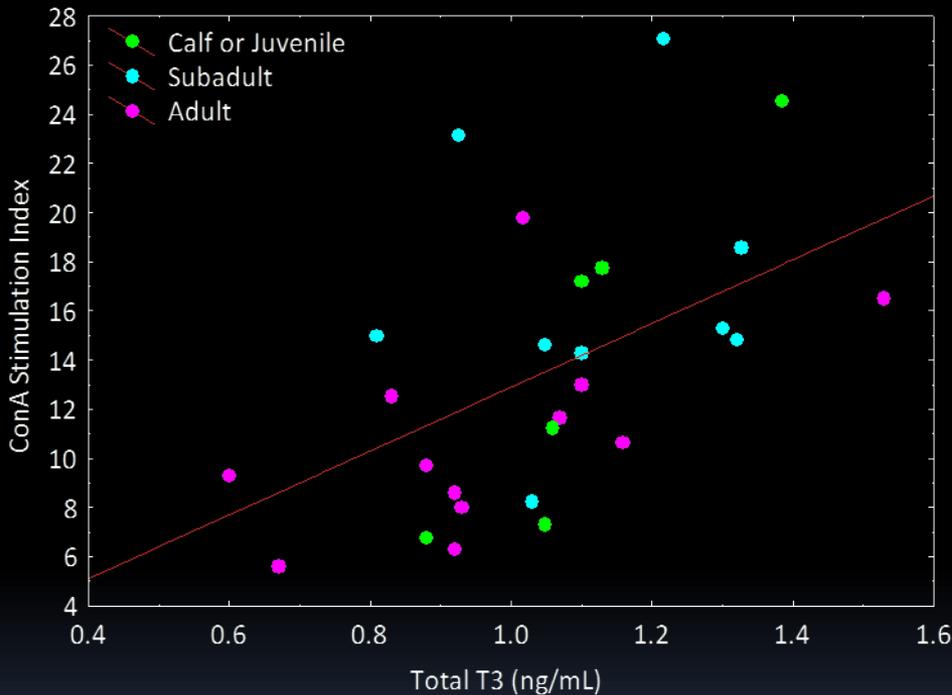


Total T3

$r = -0.66$

Log total PCB: $p < 0.013$

Lymphocyte Proliferation, Thyroid & PCBs

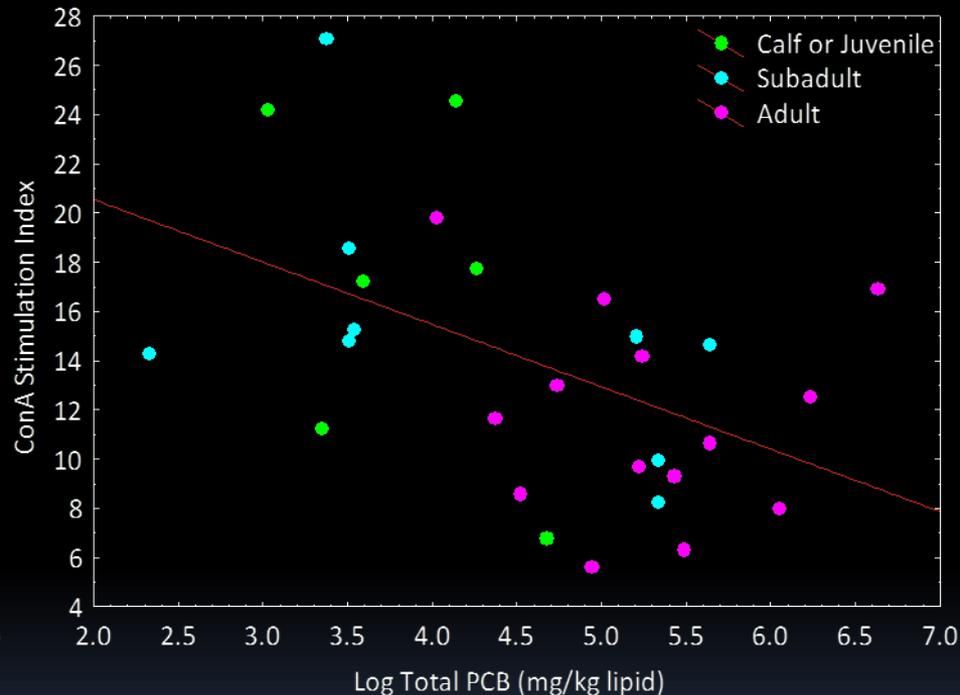


T3 vs. T-lymphocyte

Whole model $R=0.62$

T3: $p<0.001$

Length class: NS



PCBs vs. T-lymphocyte

Whole model $R=-0.57$

Log total PCB: $p=0.002$

Length class: NS