

**Bottlenose Dolphin**  
*(Tursiops truncatus)* Health  
Assessment Studies in the  
**Gulf of Mexico**

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# Why Conduct Population Health Assessments?

- Identify/understand population stressors
  - Mitigate effects
  - Plan effective conservation efforts
- Management Drivers
  - Protected and endangered species (MMPA, ESA)
  - Sentinel species of ecosystem & human health
  - Natural Resource Damage Assessments

**dolphins**  
10-100 ppm

**large fish**  
2-8 ppm

**small fish**  
1-4 ppm

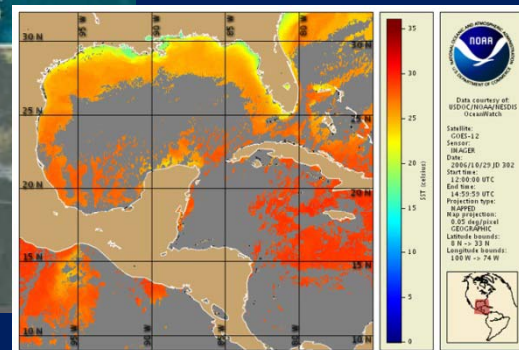
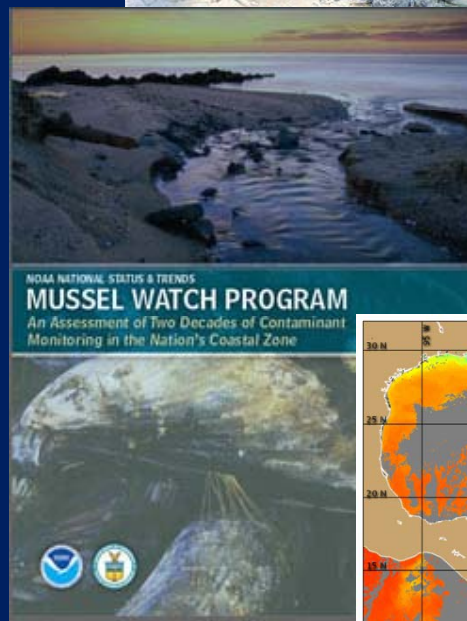
**plankton**  
0.04 ppm





# Tiered Approach to Health Assessment

- **Tier 1, hazard identification**
  - Stranding response, investigation
  - Environmental monitoring (e.g. Status & Trends, HAB monitoring, prey sampling)





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  - Remote biopsy tissue sampling





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  - Photographic monitoring
  - Remote biopsy tissue sampling
- **Tier 3, effects (& exposure) assessment**
  - Capture-release health assessment
  - Tagging, longitudinal photographic monitoring





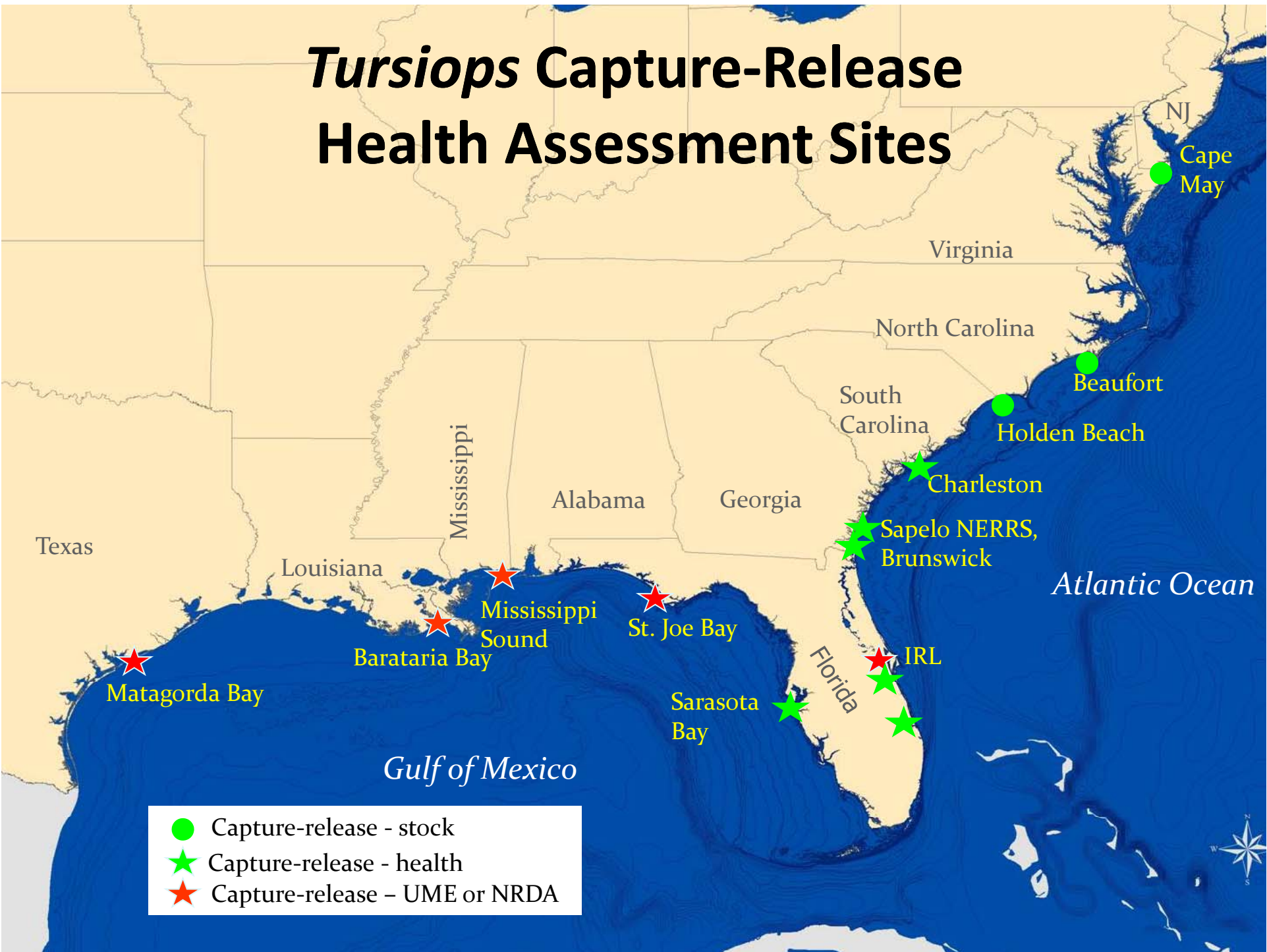
# Health Assessment: Diagnostics

- Physical Exam, ultrasound
- Mass:length ratio
- CBC/blood chemistry/blood gases
- Serology, endocrinology (blood)
- Functional immunology (blood)
- Urinalysis
- Skin, oral assessment
- Biotoxin measures (urine, feces, blood)
- Contaminant measures (blubber, blood, skin)
- Blowhole swabs (cytology, pathogen analysis)



NOAA Permit 932-1905-MA-009526

# *Tursiops* Capture-Release Health Assessment Sites

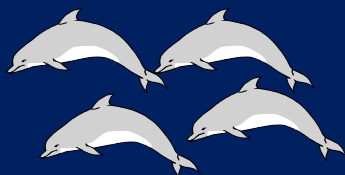




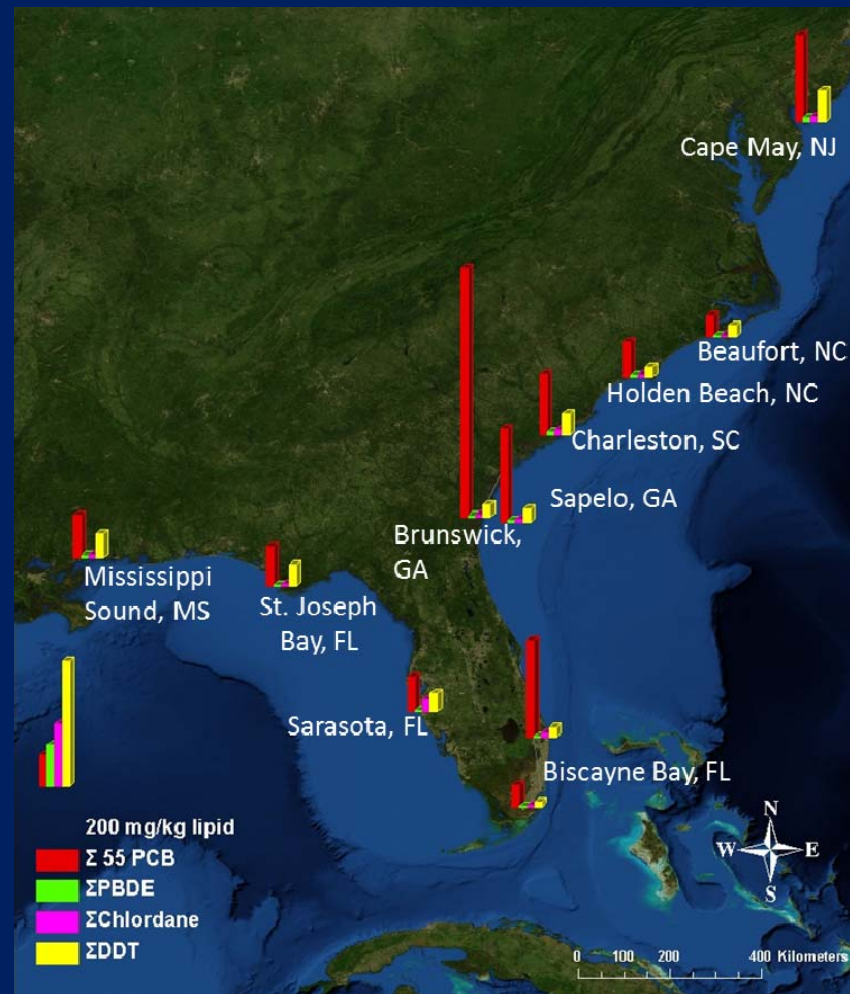
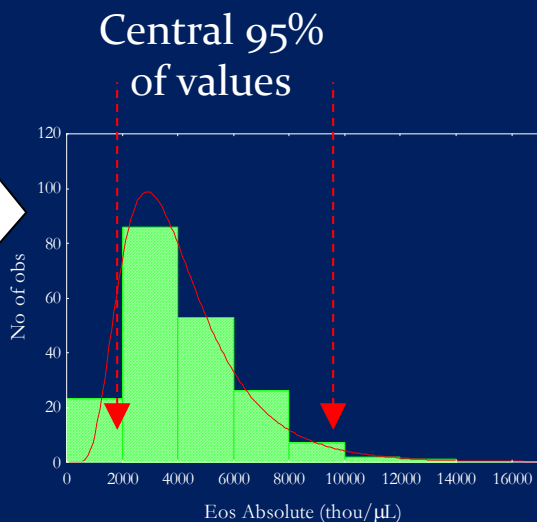
# Tursiops Baseline Data

Samples analyzed by established laboratories (NIST, Cornell)

Established reference intervals for many health parameters (CBC, serum chemistry, mass:length ratio)



Samples from multiple populations

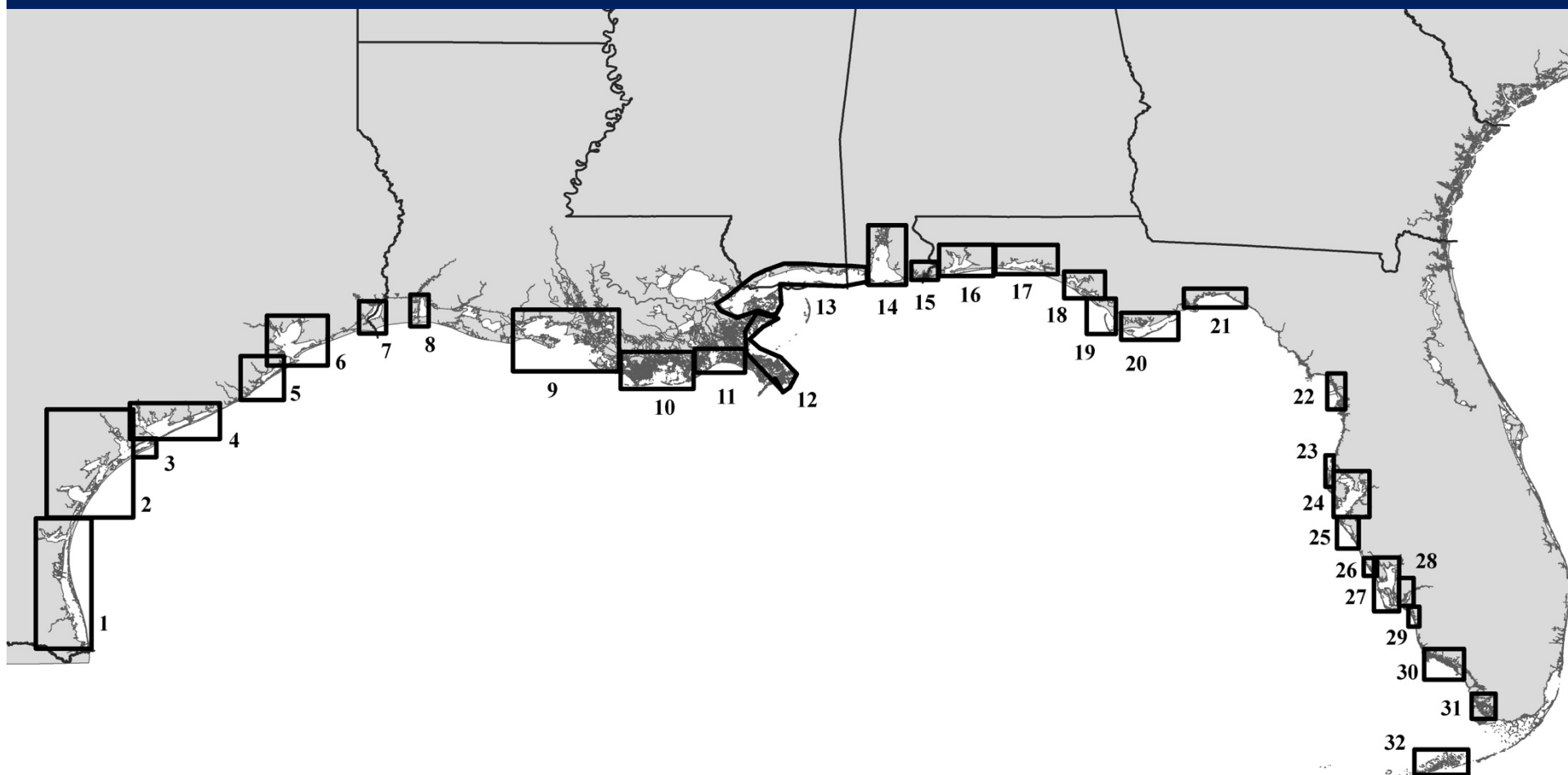


Baseline levels for PCBs, PBDEs, suite of organochlorine pesticides





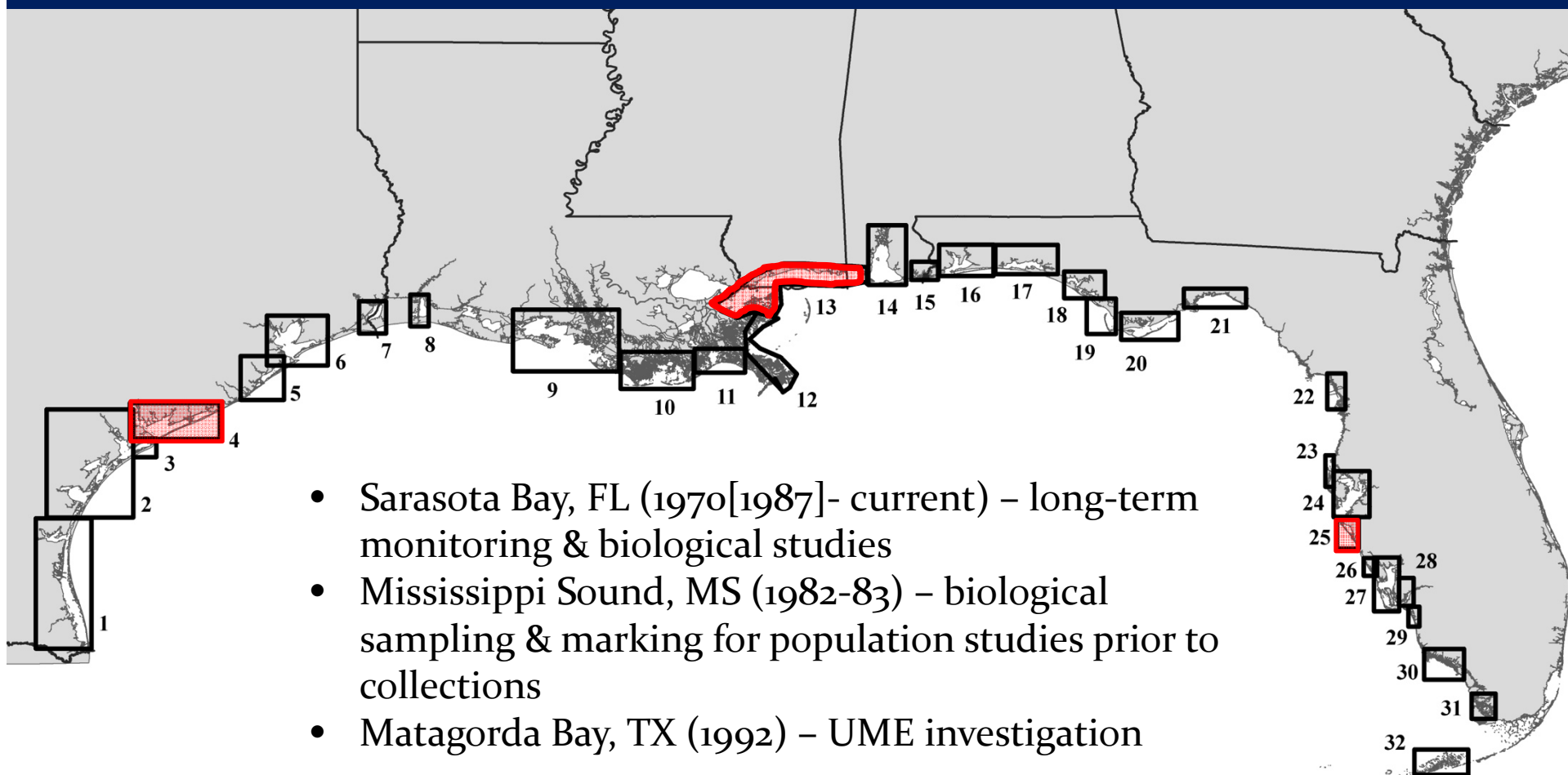
# Gulf of Mexico Health Assessments



Stock map from: Vollmer NL, Rosel PE. 2013. A review of common bottlenose dolphins (*Tursiops truncatus truncatus*) in the northern Gulf of Mexico: Population biology, potential threats, and management. *Southeastern Naturalist* 13:1-43.



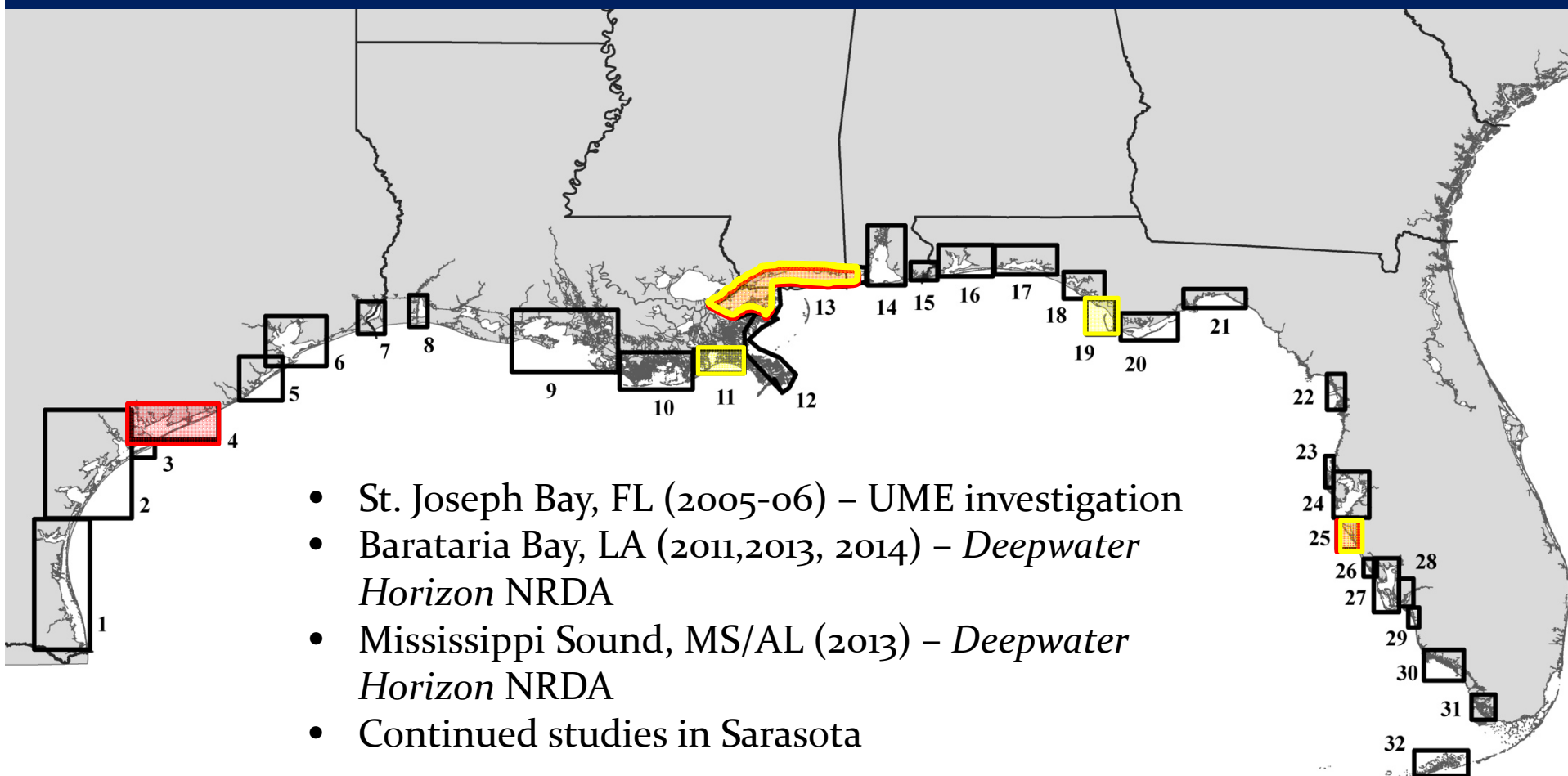
# Gulf of Mexico Health Assessments - Historical



Stock map from: Vollmer NL, Rosel PE. 2013. A review of common bottlenose dolphins (*Tursiops truncatus truncatus*) in the northern Gulf of Mexico: Population biology, potential threats, and management. *Southeastern Naturalist* 13:1-43.



# Gulf of Mexico Health Assessments - Recent



- St. Joseph Bay, FL (2005-06) – UME investigation
- Barataria Bay, LA (2011,2013, 2014) – *Deepwater Horizon* NRDA
- Mississippi Sound, MS/AL (2013) – *Deepwater Horizon* NRDA
- Continued studies in Sarasota

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## Notable Findings Published To-Date

- Exposure to multiple biotoxins for Florida *Tursiops* populations
  - Schwacke et al. 2010, *Environmental Research*
  - Twiner et al. 2011, *PLoS One*
- Morbillivirus circulates in northern Gulf *Tursiops* stocks
  - Rowles et al. 2010, *Marine Mammal Science*
- Highest POP concentrations along mid-Atlantic coast
  - Kucklick et al. 2011, *Environmental Science & Technology*
  - Schwacke et al. 2011, *Proceedings of the Royal Society*
  - Balmer et al. 2011, *Science of the Total Environment*
- POP concentrations vary with sex, reproductive status, temporally; correlation between concentration in blubber versus blood
  - Yordy et al. 2010, *Science of the Total Environment*
- Lung, adrenal health effects & poor body condition in *Tursiops* following oil exposure
  - Schwacke et al. 2013, *Environmental Science & Technology*



# Future Vision

- **More from remote sampling (biopsy, breath, tagging)**
- **Coordinated data management, mapping, spatial/temporal analysis to maximize information**
  - Tier 1
    - Coordinated surveillance (HealthMAP, NOS Coastal Intelligence)
  - Tier 2
    - Photo-ID (GoMDIS, OBIS SEAMAP, GCOOS)
    - Remote Biopsy (HealthMAP)
  - Tier 3
    - Capture-release (HealthMAP)
    - Longitudinal Monitoring (GoMDIS, GCOOS)