

Spatial Analysis of Overlap and Competition Between Human Activities and Critical Sperm Whale Habitat in the Gulf of Mexico

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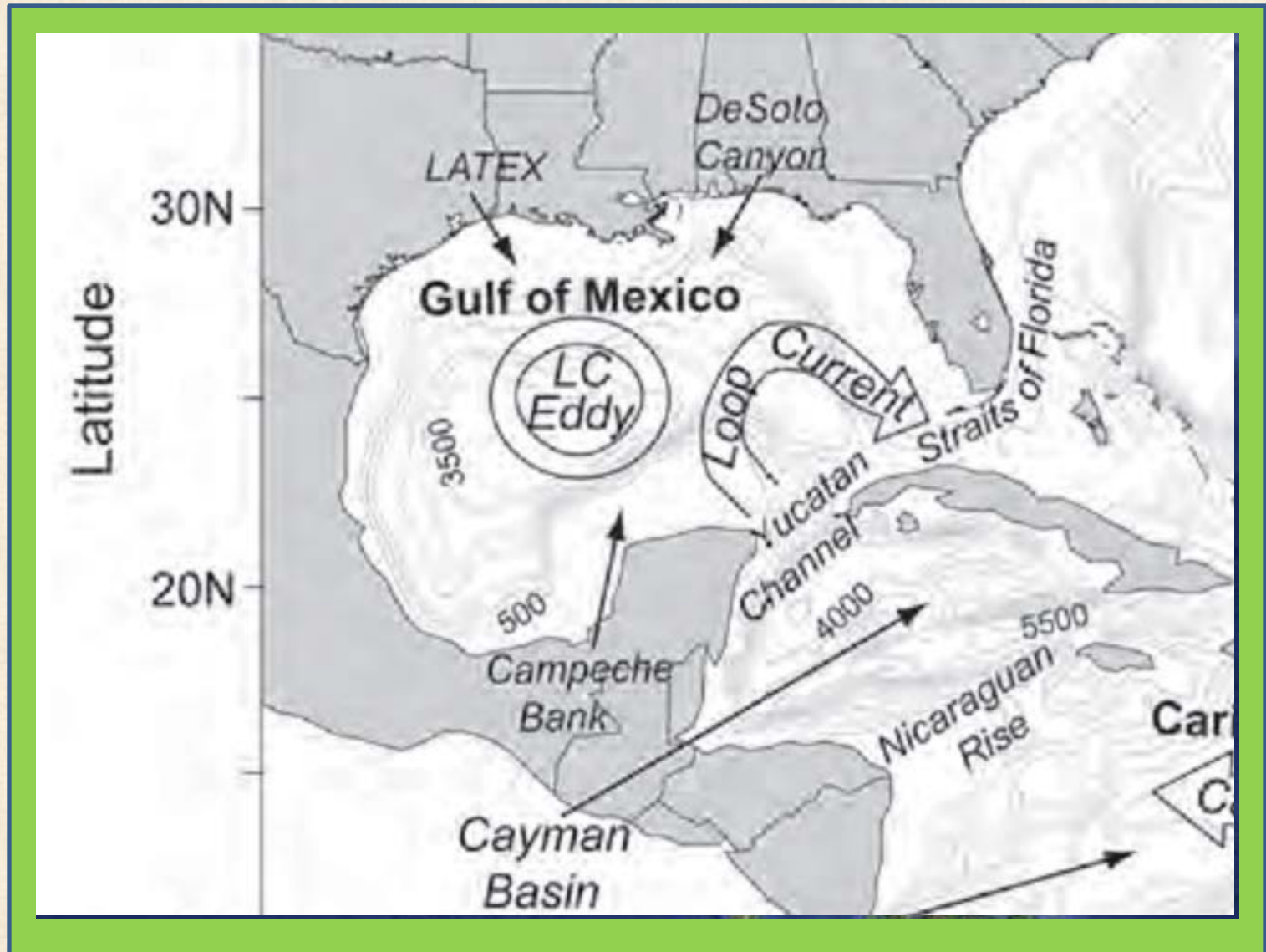
Plan of Action

Preface: This is a dissertation “spin-off”

- Gulf of Mexico background and oceanography
- History of sperm whales in the GoM
- The issue at hand
- Potential mitigation methods

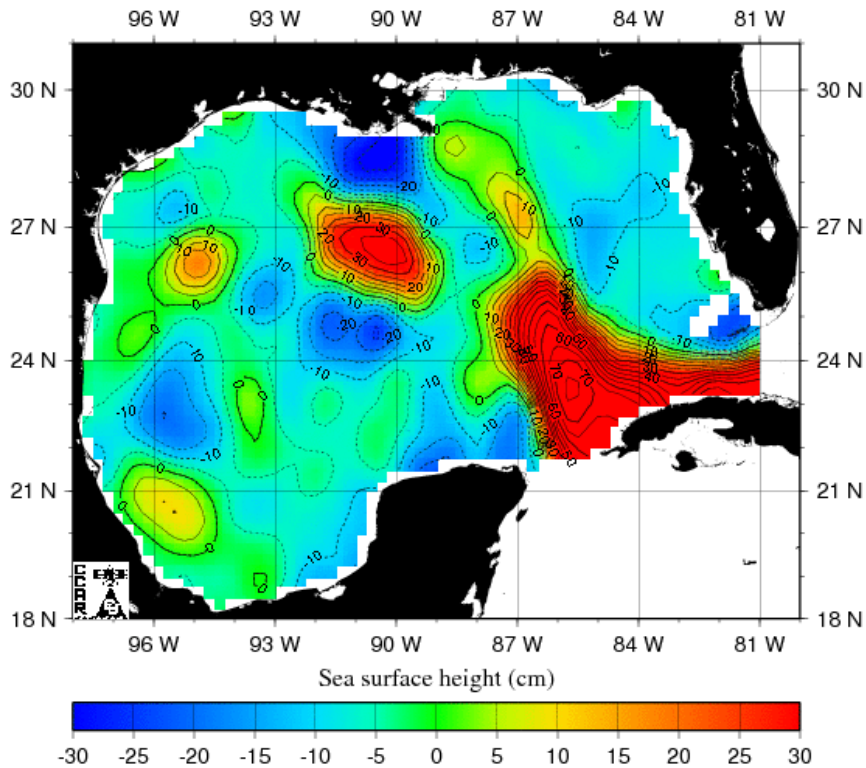


Intro to the Gulf of Mexico (GoM)



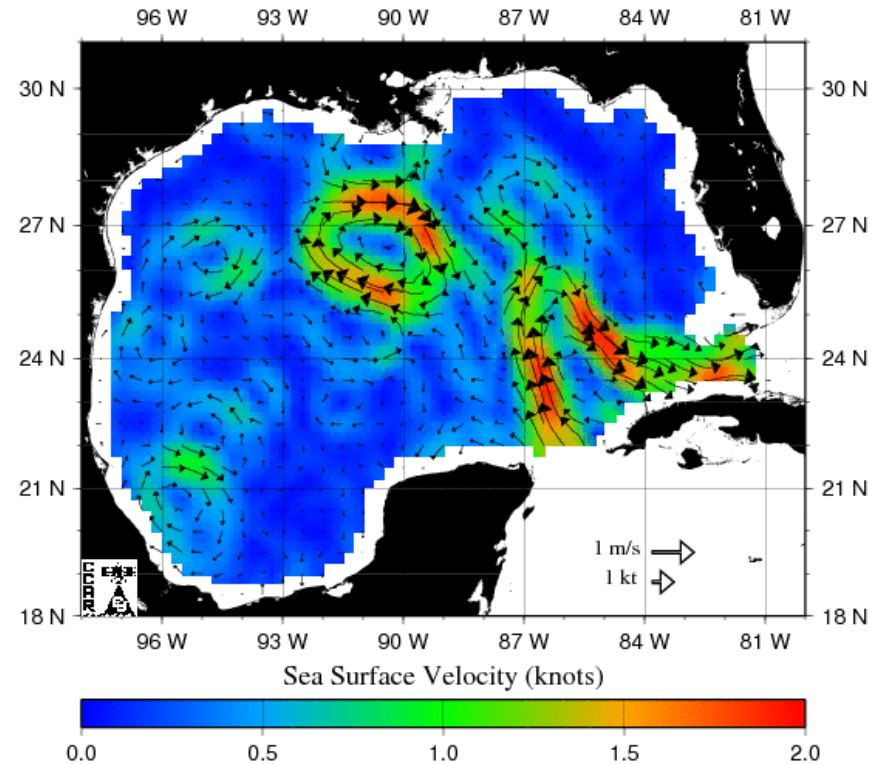
Satellite Images of GoM

Historical Mesoscale Altimetry - May 10, 2001



Sea Surface Height/Temperature

Historical Mesoscale Altimetry - May 10, 2001

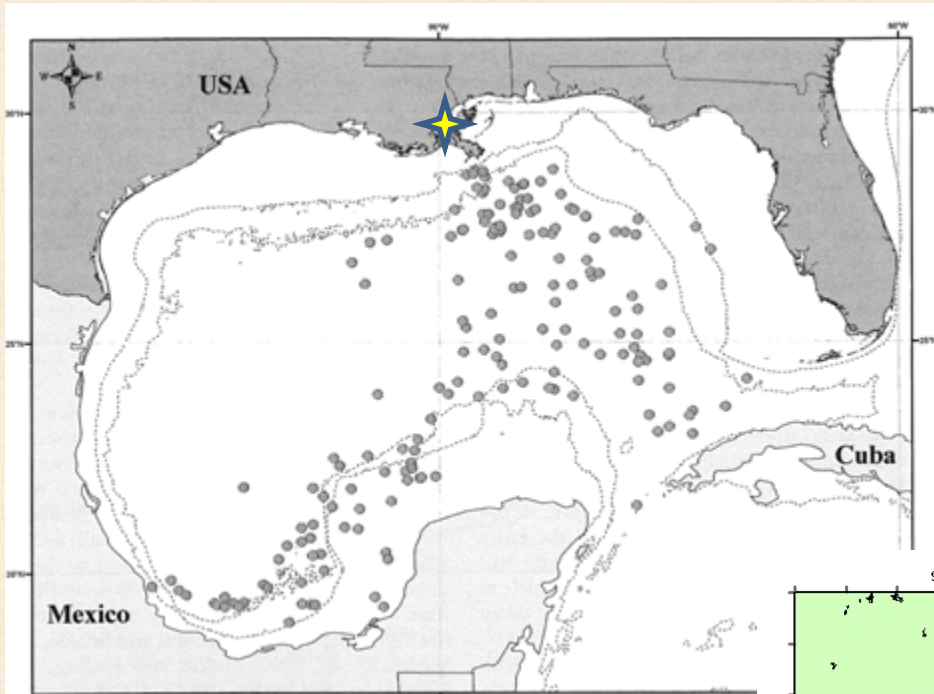


Sea Surface Current Direction/Velocity

GoM Sperm Whales 101

- GoM is home to **29** marine mammal species (5 turtles)
- Of those: 1,660 sperm whales
 - Resident
 - Genetically distinct
 - Endangered
- Preference for Mississippi Shelf shelf
- Family structure
 - GoM is female dominated
 - Young adult bachelor groups
 - Transient males

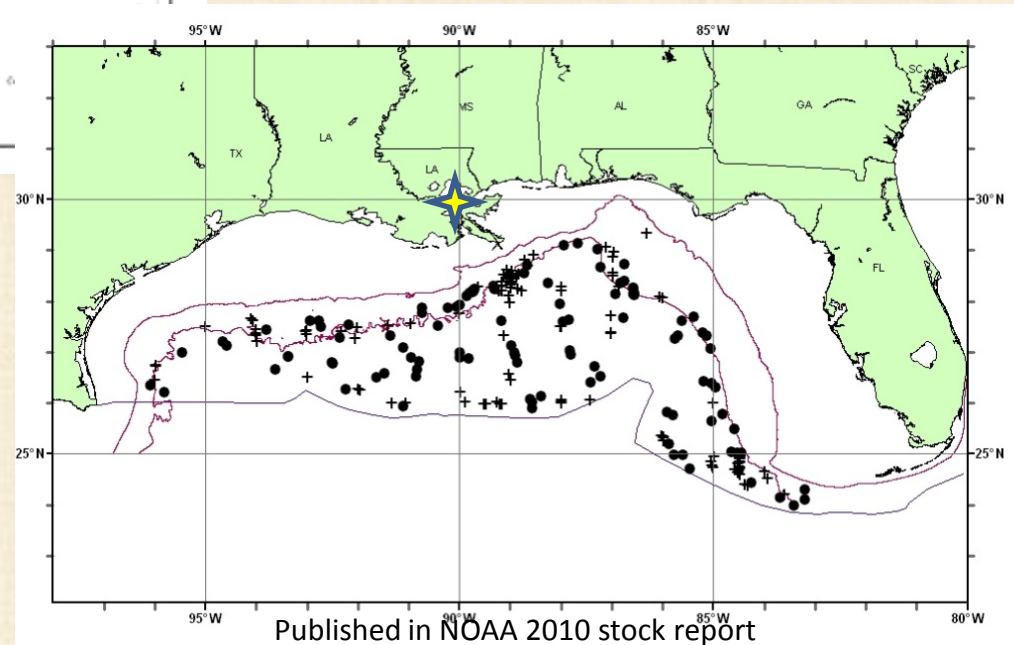
GoM Sperm Whale Distribution



Reeves et al., 2011

Past (1780's-1870's)

- Points taken from whaling logs
- 204 voyages; 1,200 whales

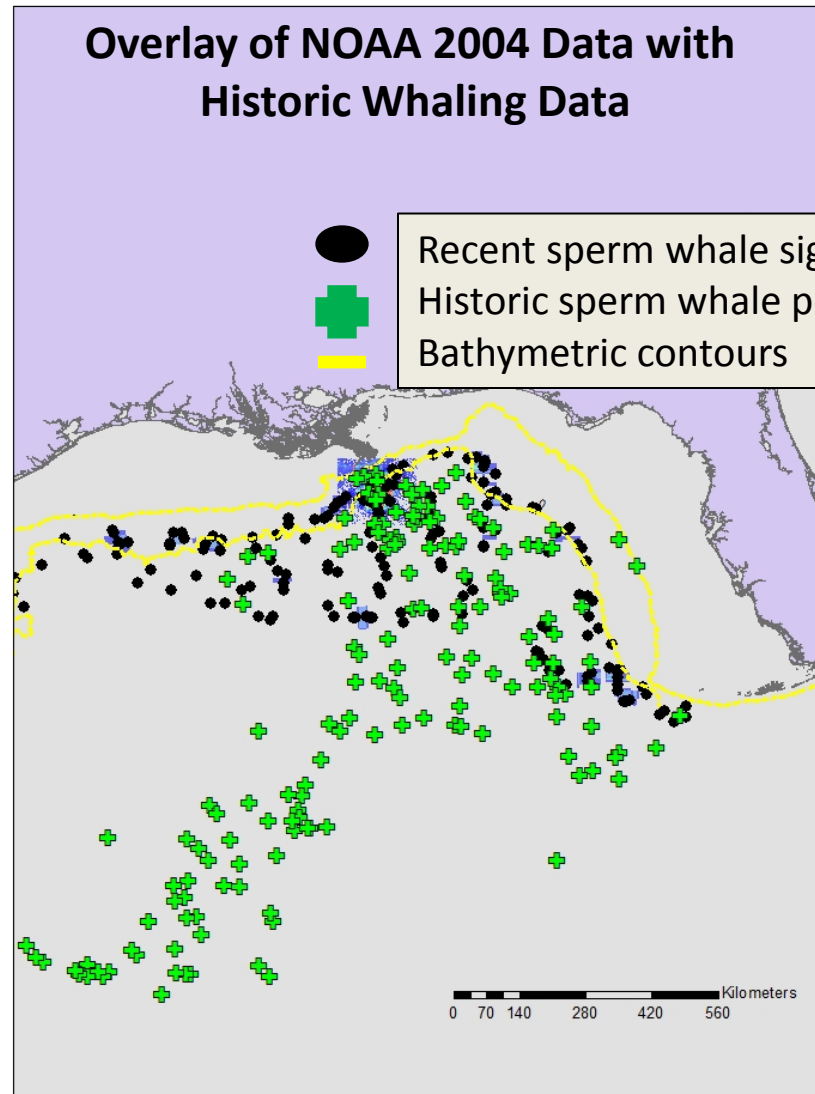


Present (1996-2004)

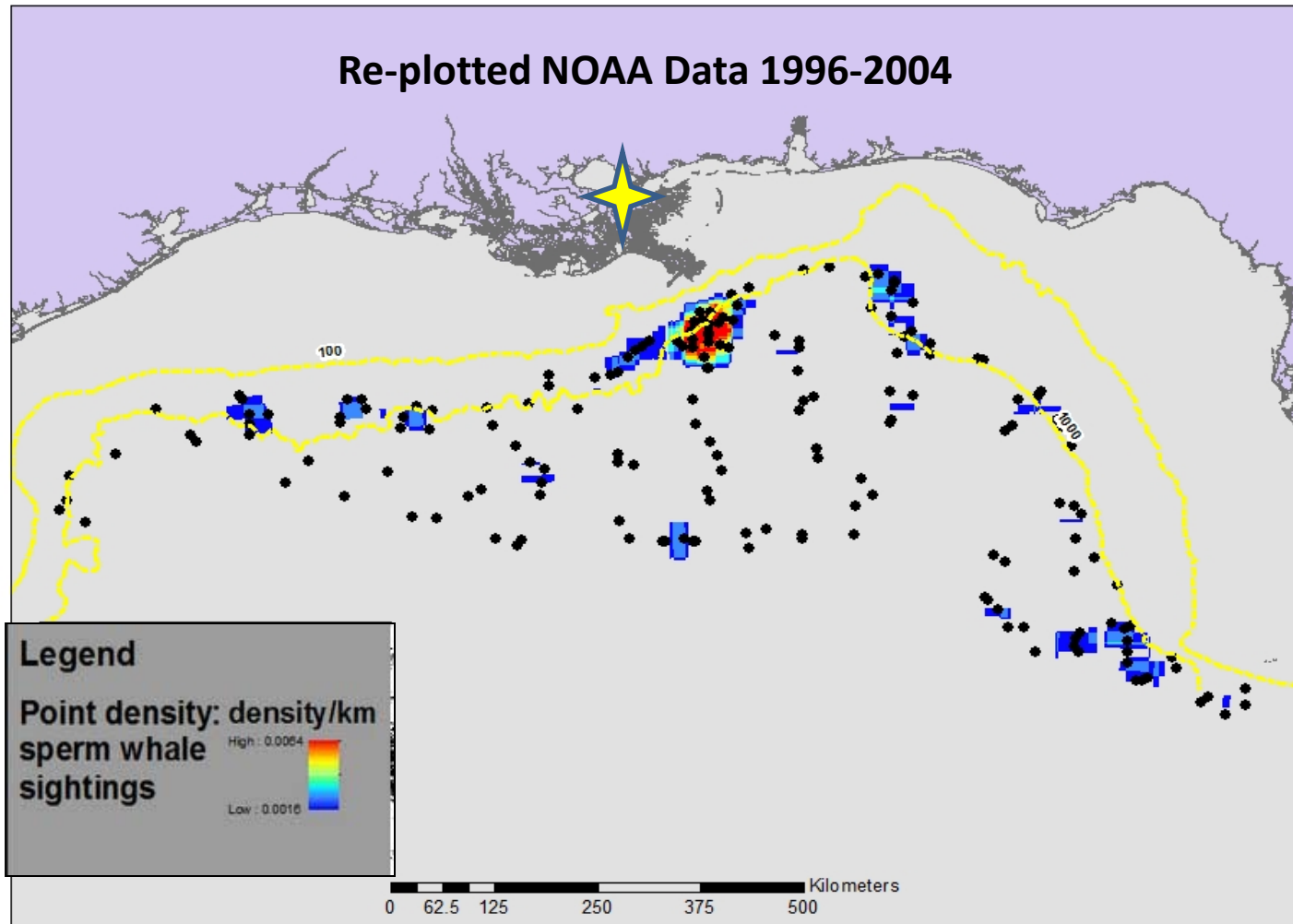
- NOAA survey data

Published in NOAA 2010 stock report

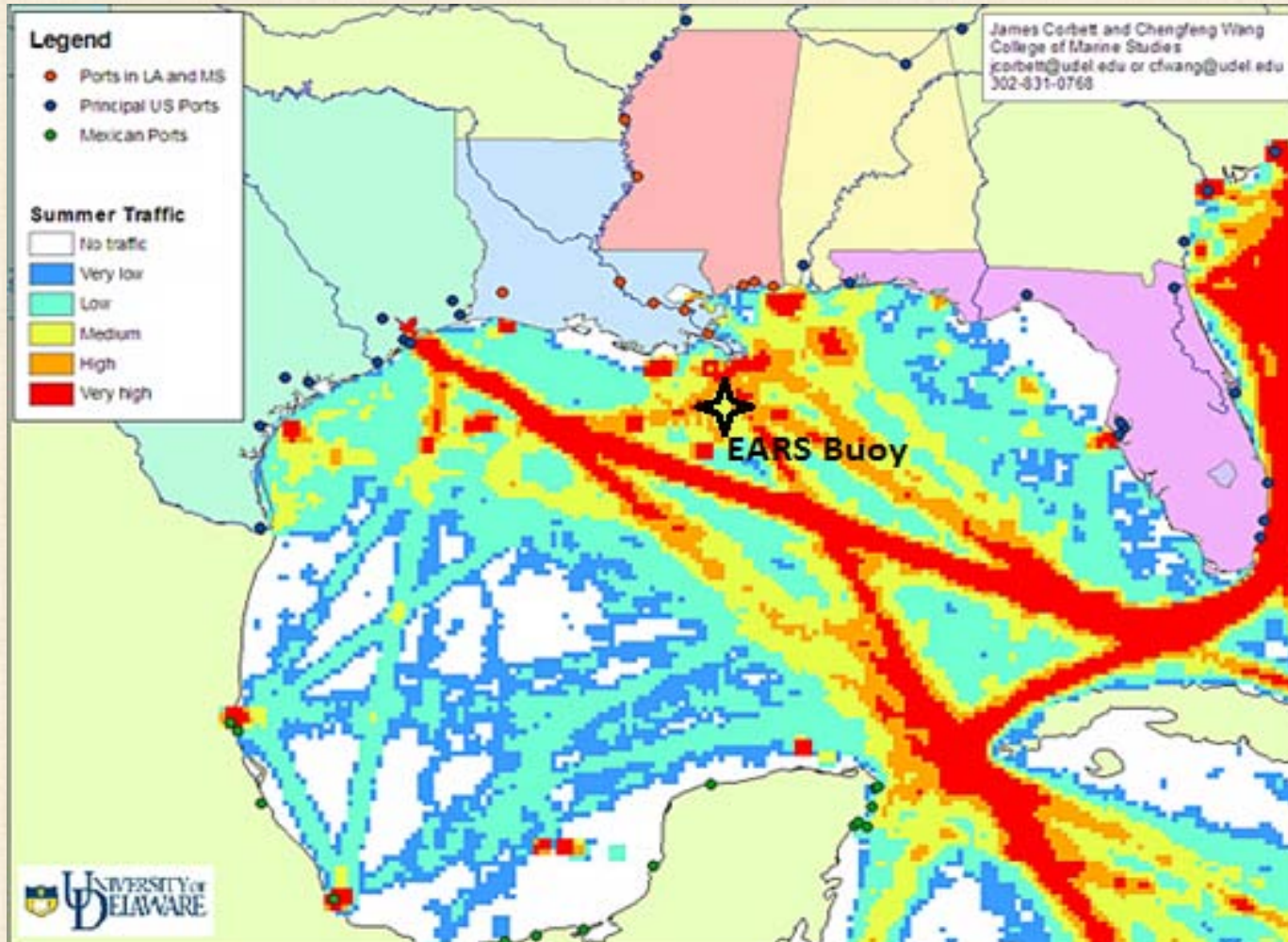
Evidence of Multi-Century Habitat Use



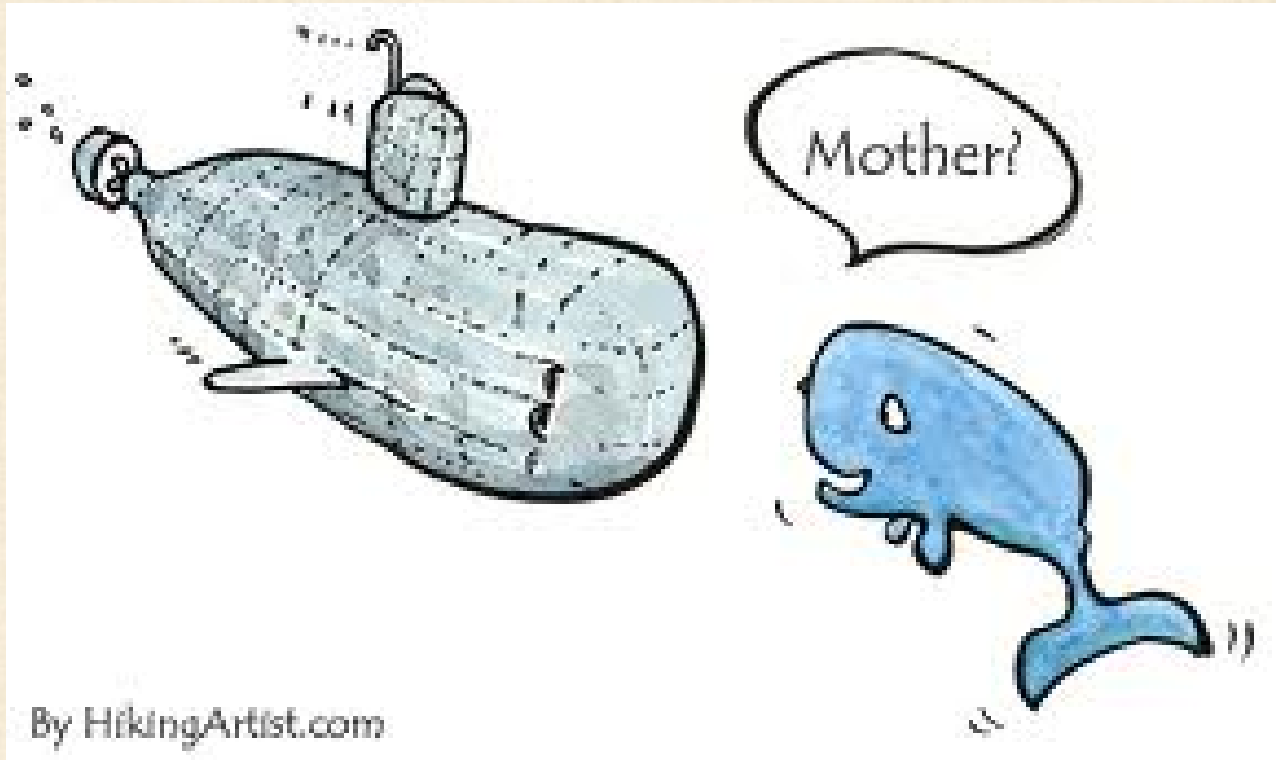
Current Sperm Whale Density Distribution



Major Shipping Lanes in the GoM

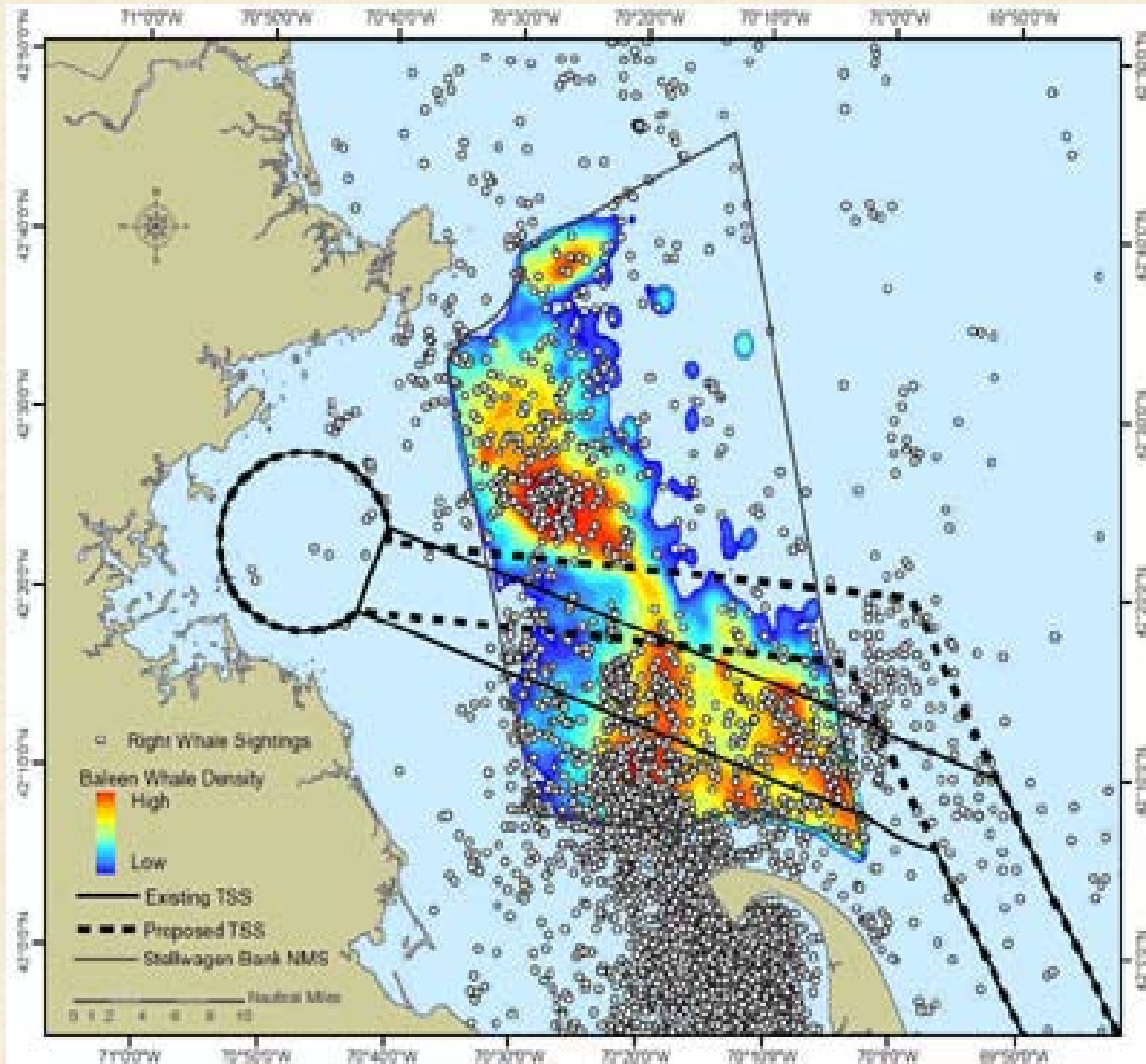


Environmental Acoustic Recording System (EARS)
Acoustic omni-directional hydrophone buoy

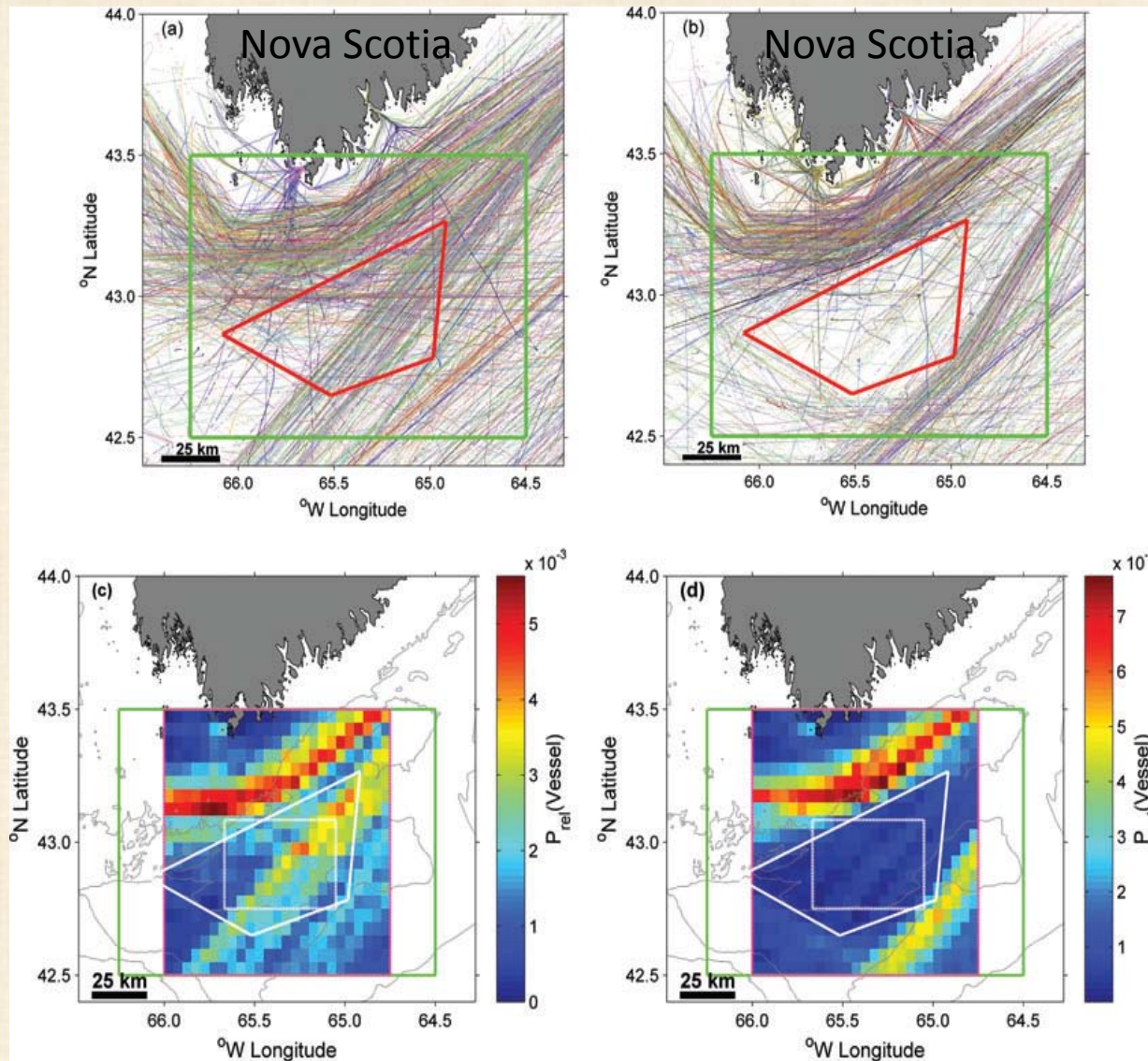


Signals obscured by vessel noise could affect ability to communicate, forage, and navigate.

Great South Channel and Cape Cod Bay Traffic Separation Scheme

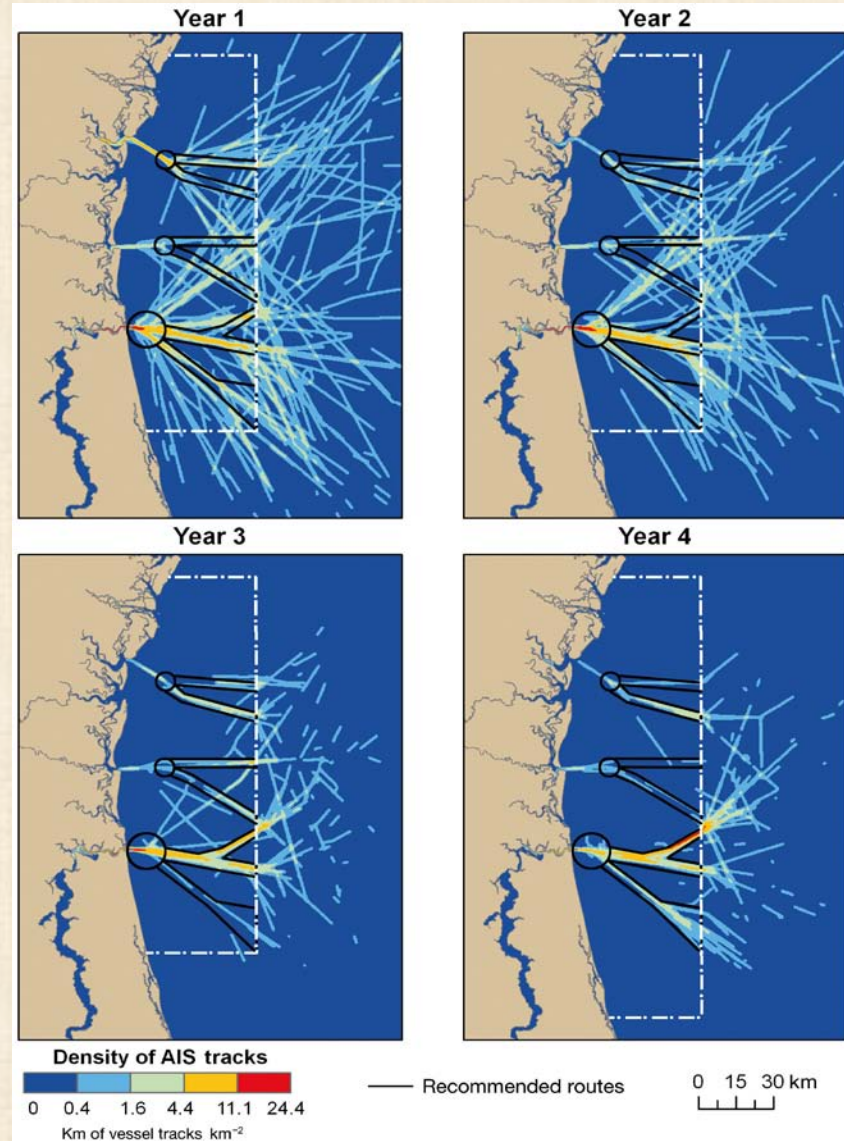
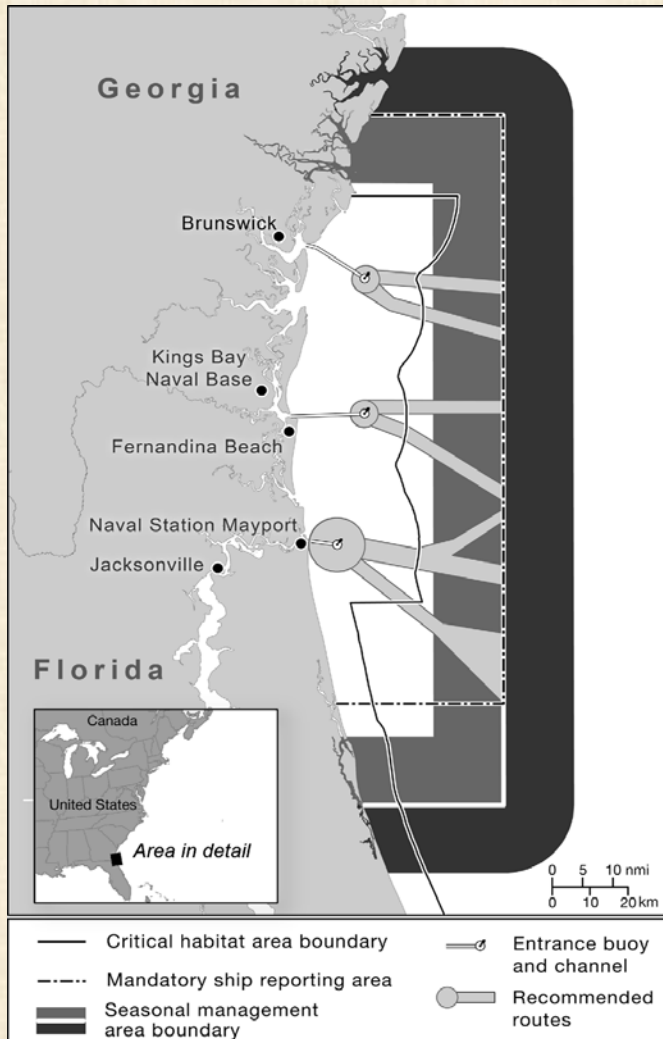


Roseway Basin Area (ATBA)



(Vanderlaan and Taggart, 2009)

Right Whale Calving Area



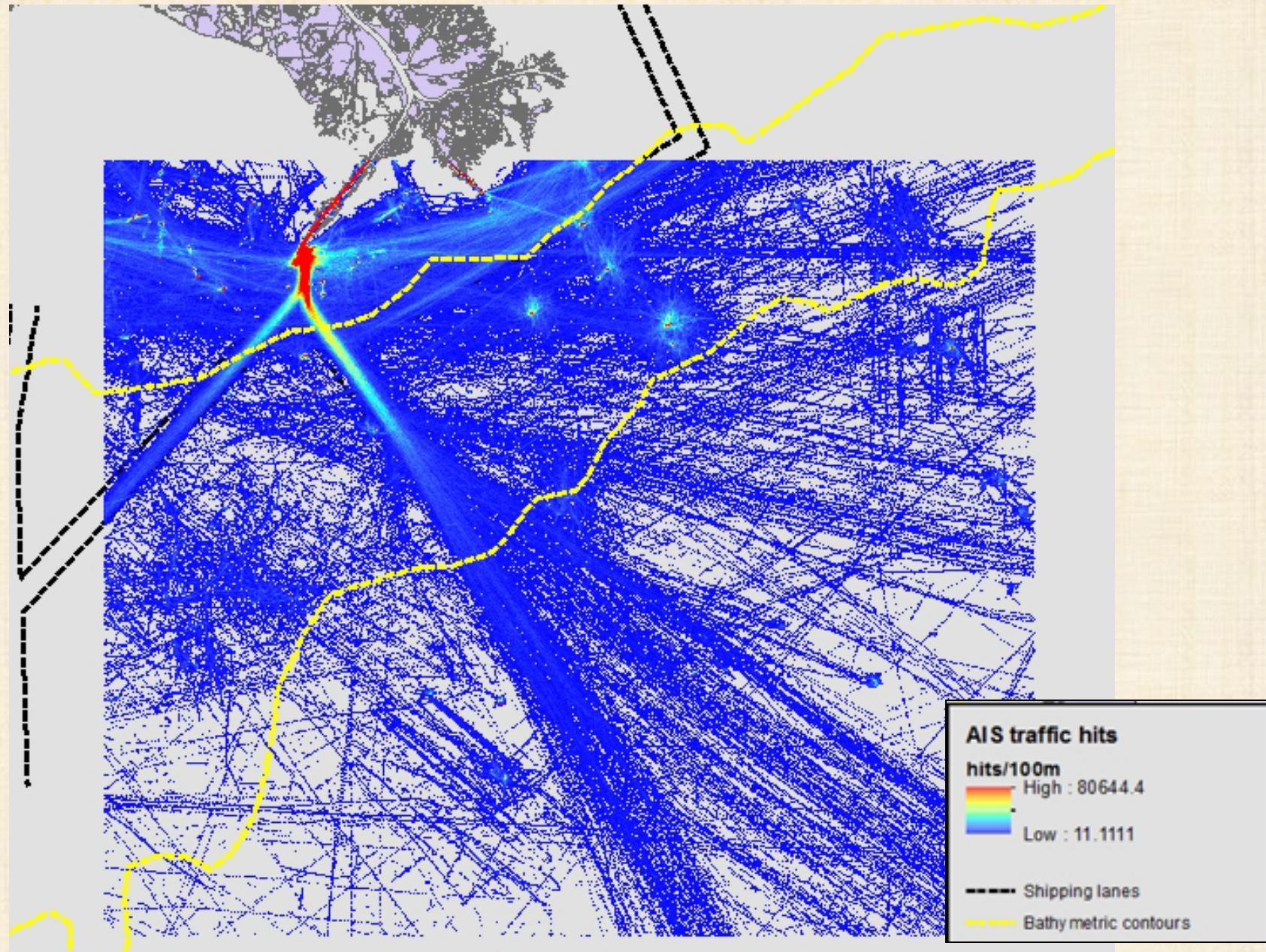
(Lagueux et al., 2011)

Using AIS Data in the GoM

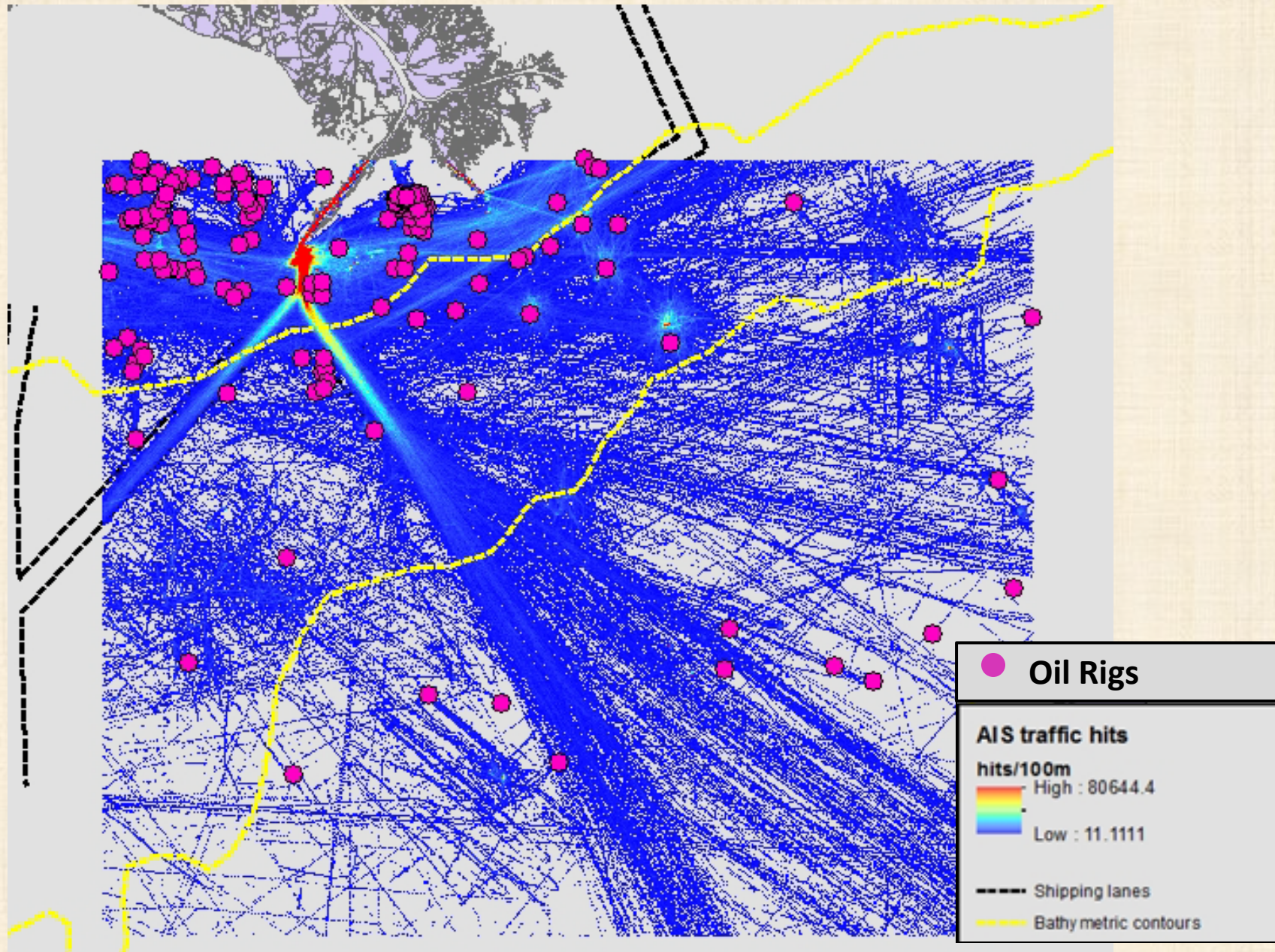
- The IMO currently requires Automatic Identification System (AIS) transponders on all international vessels ≥ 300 gross tonnage and on all passenger vessels



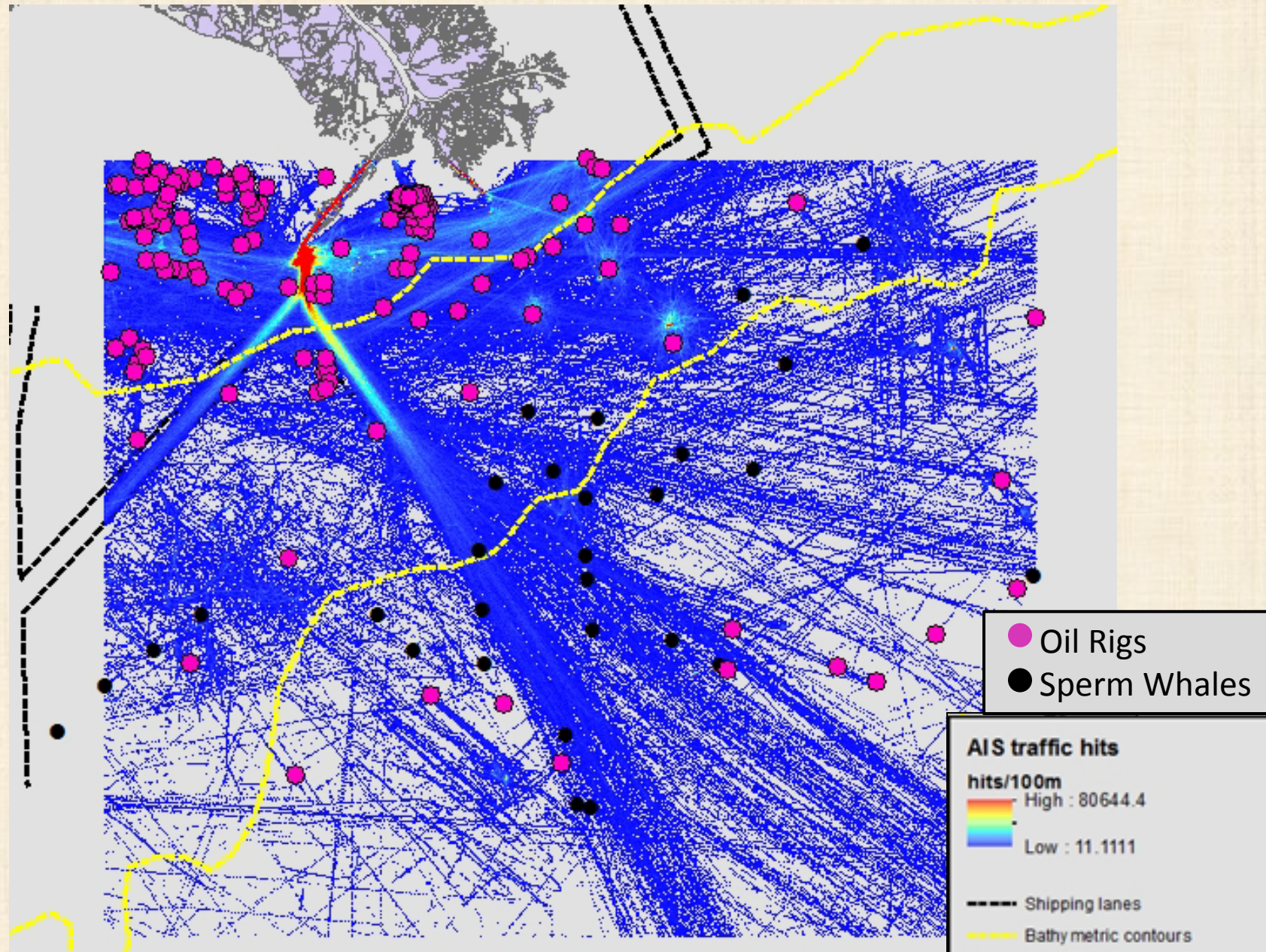
AIS vessel position points Jan-April 2011



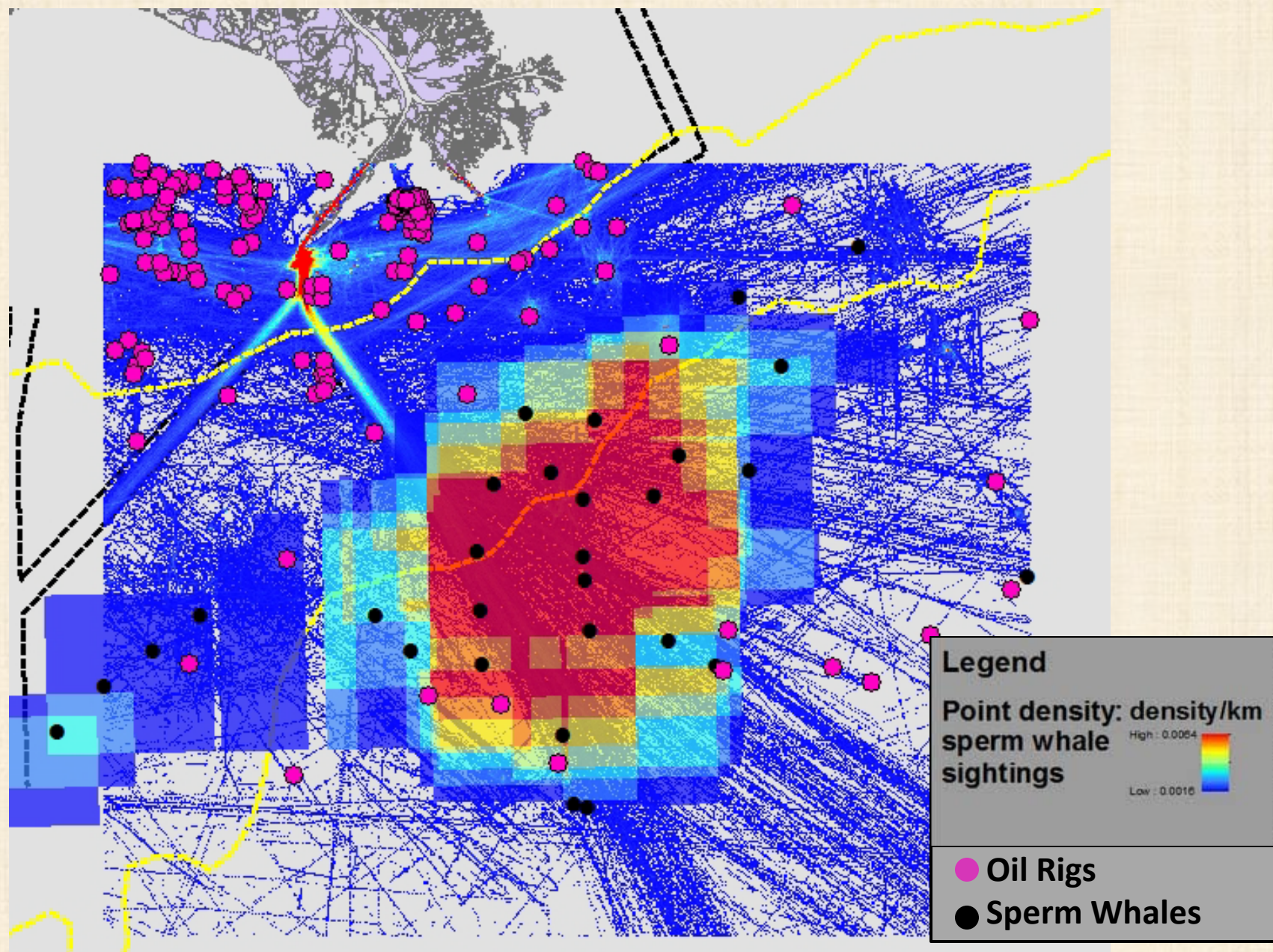
AIS vessel points and oil rigs



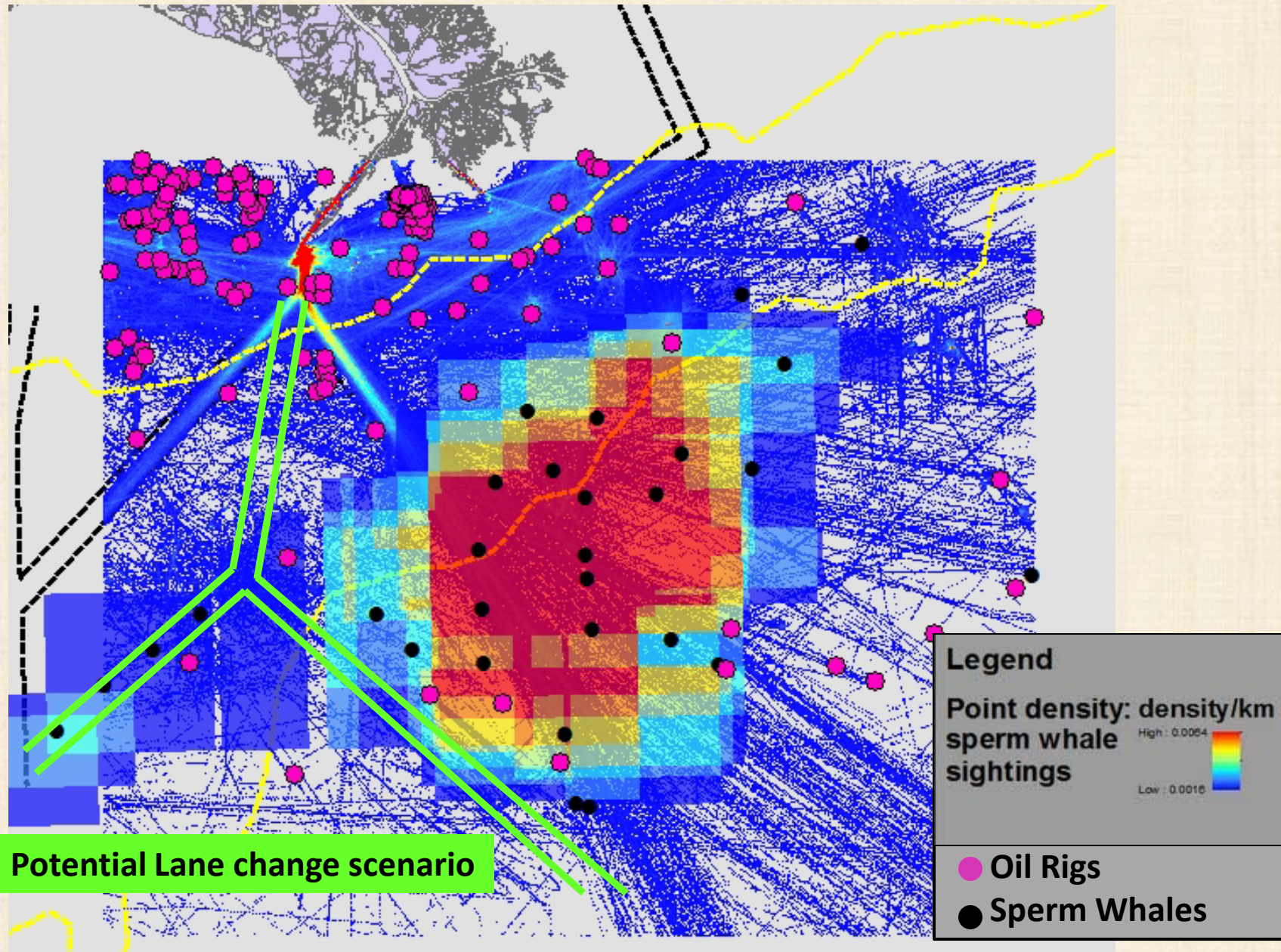
AIS vessel points, oil rigs, and sperm whales



AIS vessel points, oil rigs, and sperm whales density



Possible Scenario for Shipping Lane Relocation



Future Directions

- Two general approaches:
 - Speed limits
 - Lane changes
- Based on results of compliance studies, vessels are more likely to adhere to areas to be avoided (ATBA) and recommended shipping lanes than to speed reductions.
- Possible options for shifting sea lanes in the GoM should be explored to reduce anthropogenic impacts on sperm whales (and other cetaceans).

Acknowledgements

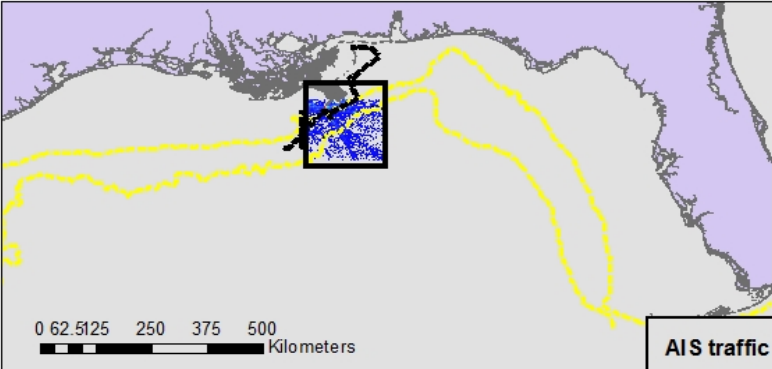
- NOAA Office of Coast Survey
- Brendan Hurley
- Texas A&M University at Galveston
- Marine Technology Society
- NOAA Sea Grant



Thank you!

Questions?

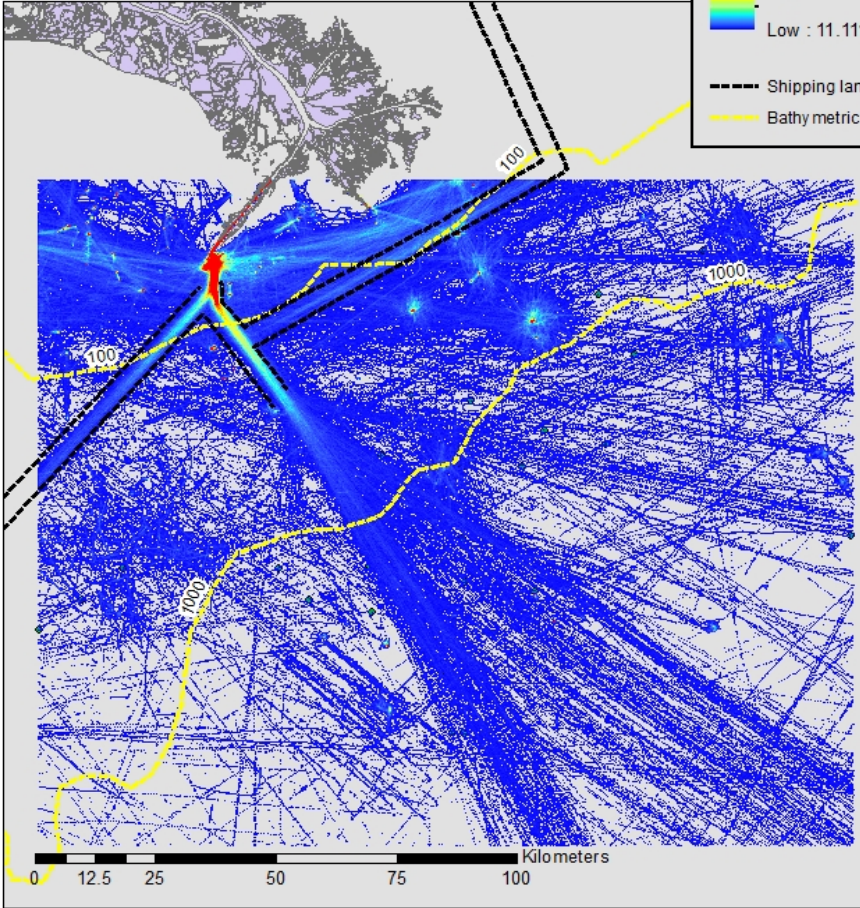


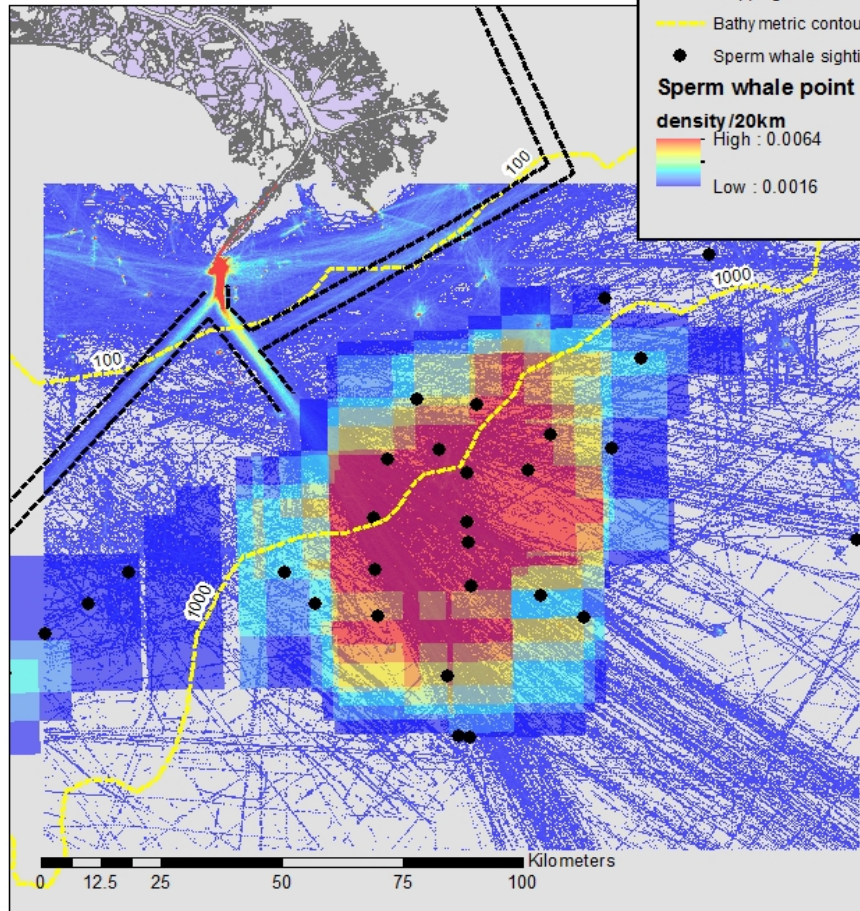
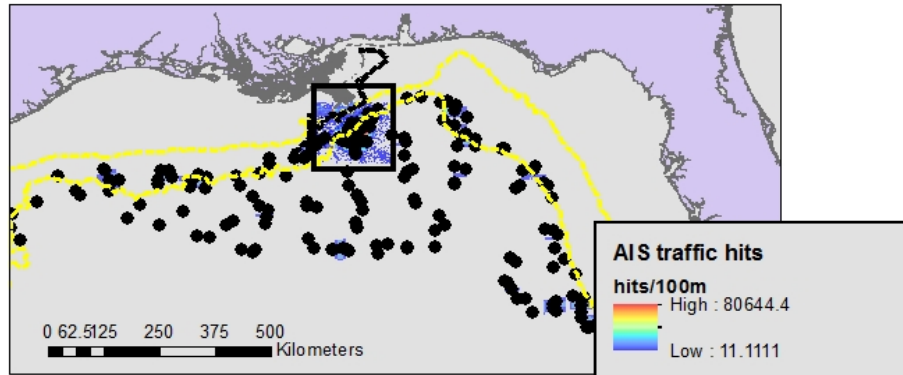


AIS traffic hits

hits/100m
High : 80644.4
Low : 11.1111

- Shipping lanes
- Bathymetric contours





Overlay of Sperm Whale Density Data

