

# Ecological Baseline Study off NJ



NJ Department of Environmental Protection

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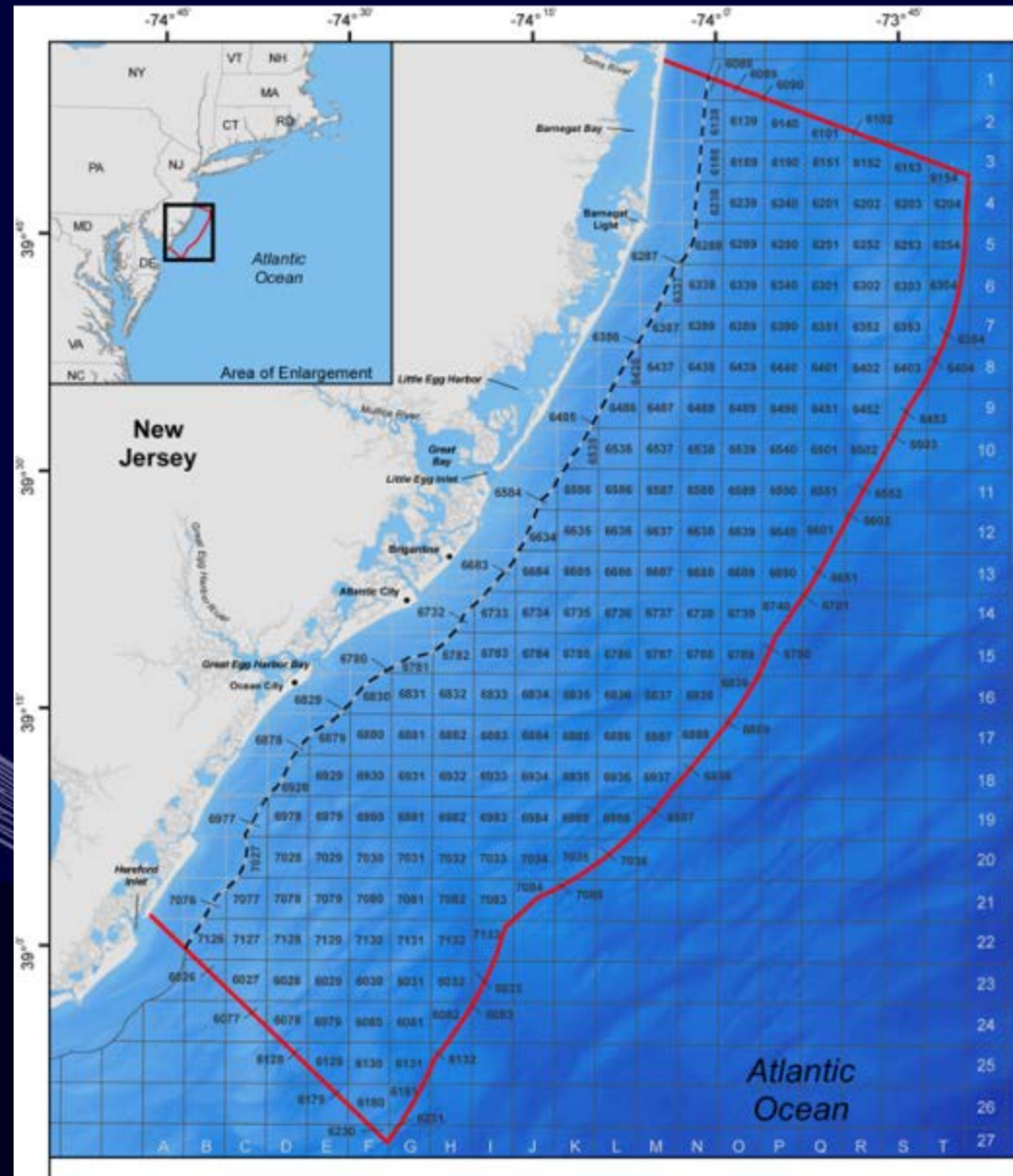
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# Purpose & Objectives

- Provide NJDEP with baseline data in advance of offshore wind development
- Conduct 1<sup>st</sup> year-round study of marine mammals in NJ nearshore waters
- Determine seasonal & spatial occurrence of marine mammal species
- Generate abundance estimates of species/groups

# Study Area

- Cape May to Barnegat Bay
- Shoreline to 37 km
- 0 to 30 m depth
- 4,665 km<sup>2</sup>





# Methods – Shipboard Surveys



- Line transect surveys
- Abundance/density & distribution
- R/V *Hugh R. Sharp*
- Flying bridge 10 m above water
- BSS  $\leq 5$  & 2 km visibility
- GPS location, angle, bearing, group size, species, behavior, etc.

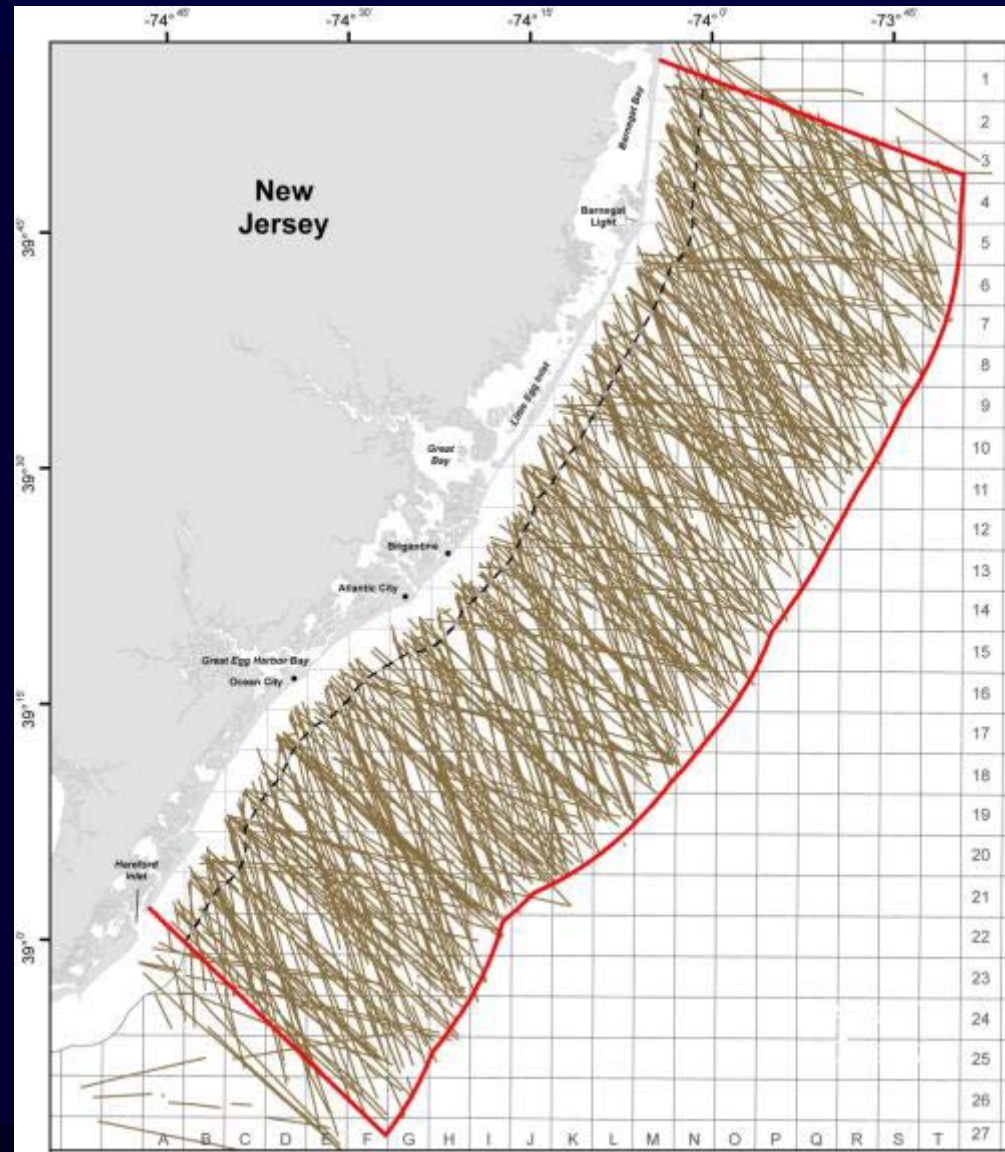
# Methods – Aerial Surveys

- Line transect surveys
- Abundance/density & distribution
- Cessna Skymaster 337
- ~230 m altitude & ~220 km/h
- $BSS \leq 5$  & 3.7 km visibility
- Time, position, declination angle, group size, species, behavior, etc.



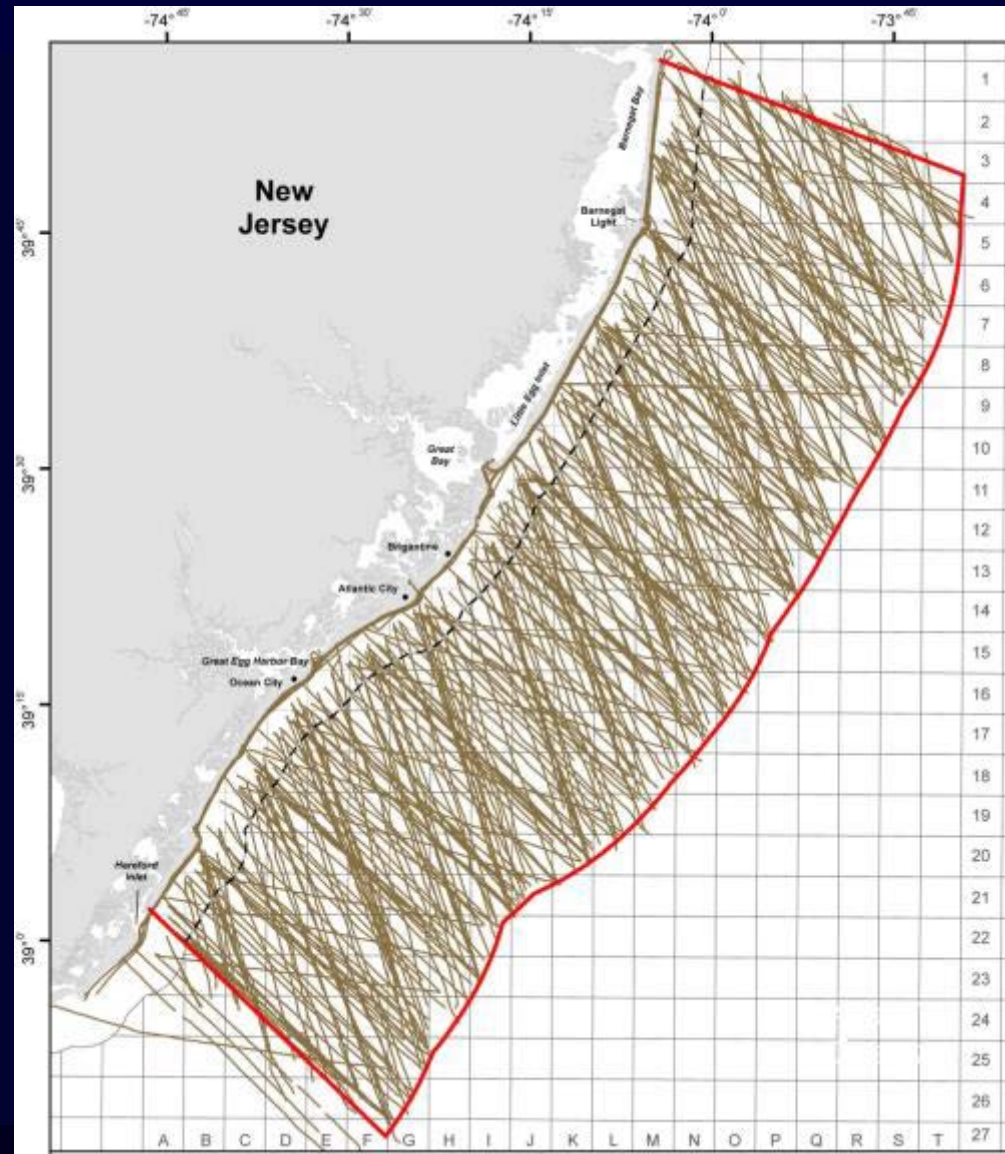
# Methods – Survey Effort

- Double saw-tooth
- NOAA Permit #10014
- Ship Survey
  - Jan 2008 - Dec 2009
  - 13,123 km
- Aerial Survey
  - Feb - Apr 2008
  - Jan - Jun 2009
  - 13,254 km



# Methods – Survey Effort

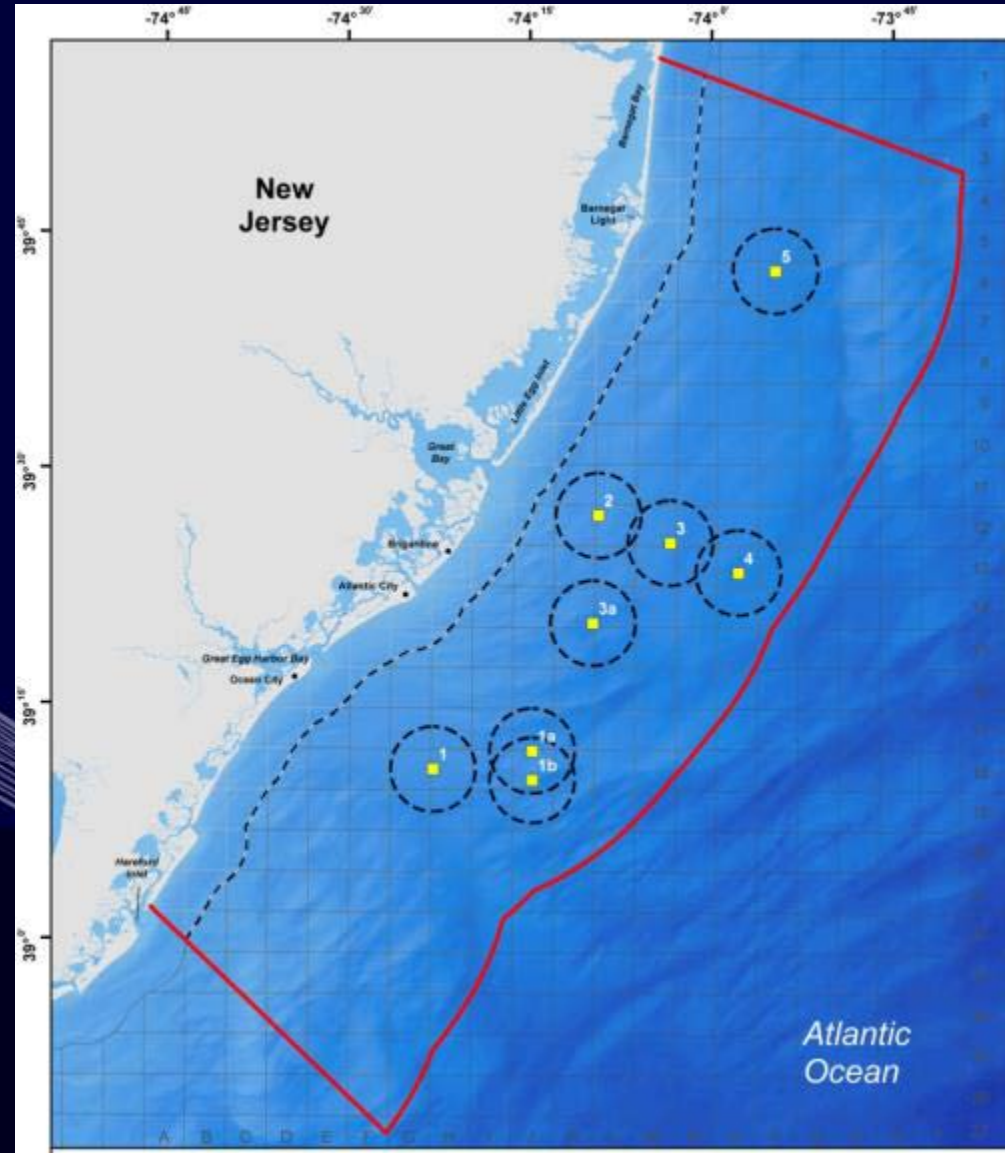
- Double saw-tooth
- NOAA Permit #10014
- Ship Survey
  - Jan 2008 - Dec 2009
  - 13,123 km
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# Methods – Passive Acoustic Monitoring

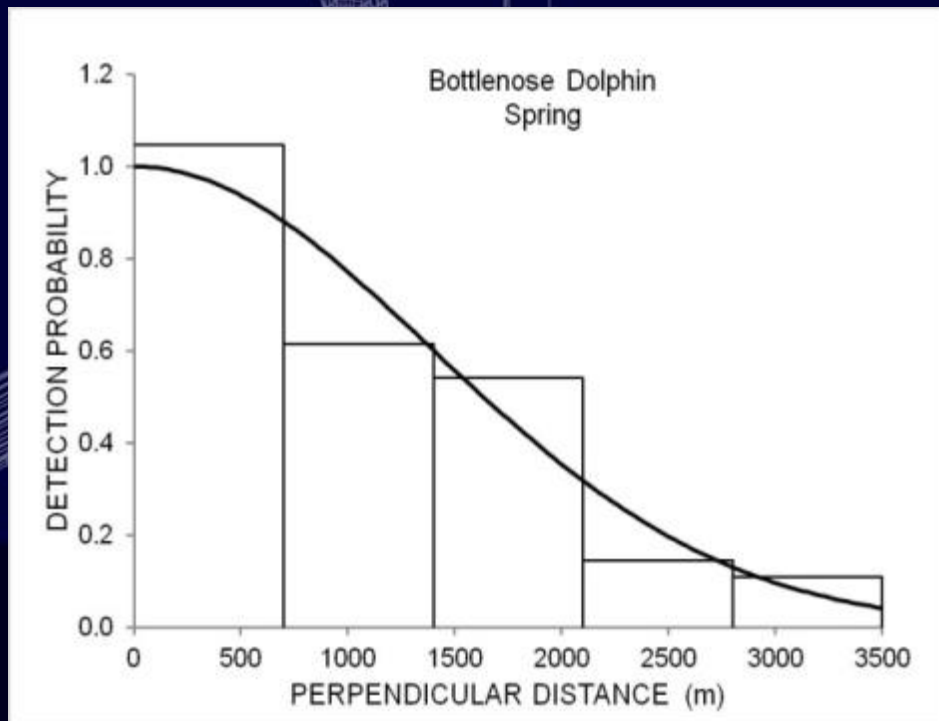
- 5 Pop-ups
- 2 kHz – whales
- 31.25 kHz – dolphins





# Analyses – Conventional Distance Sampling

Abundance/density estimates for overall Study Area

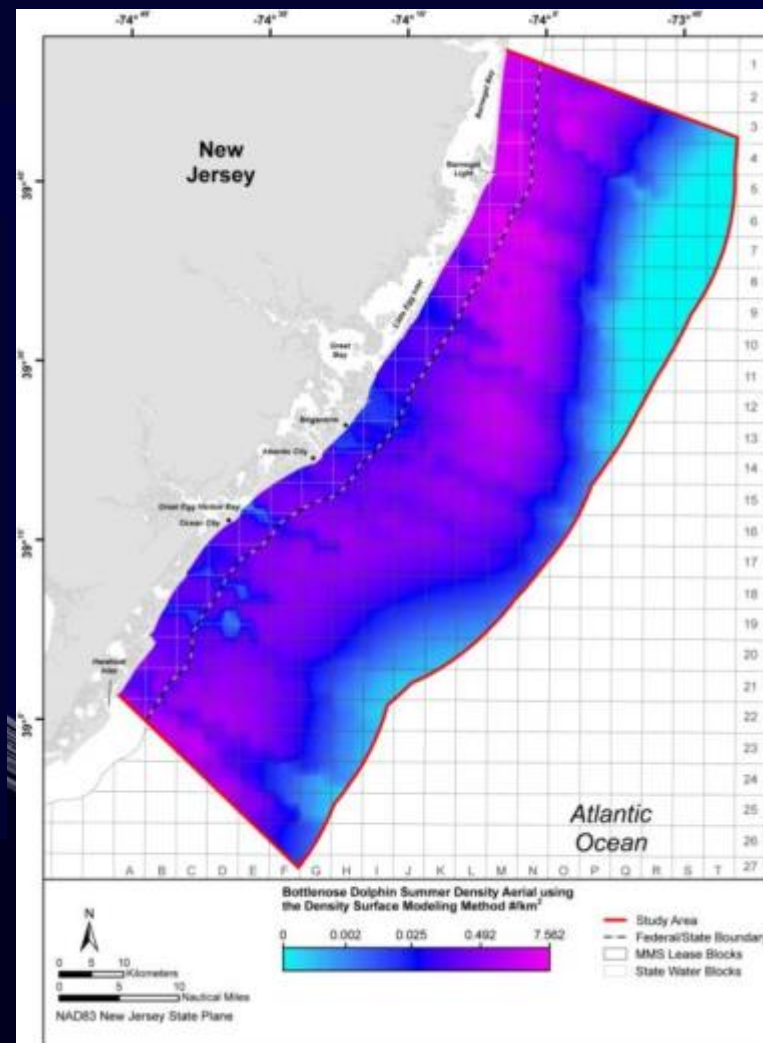


- Separate analyses for aerial & ship data
- Probability detection function
- Encounter rate, detection probability, mean group size

# Analyses – Density Surface Modeling

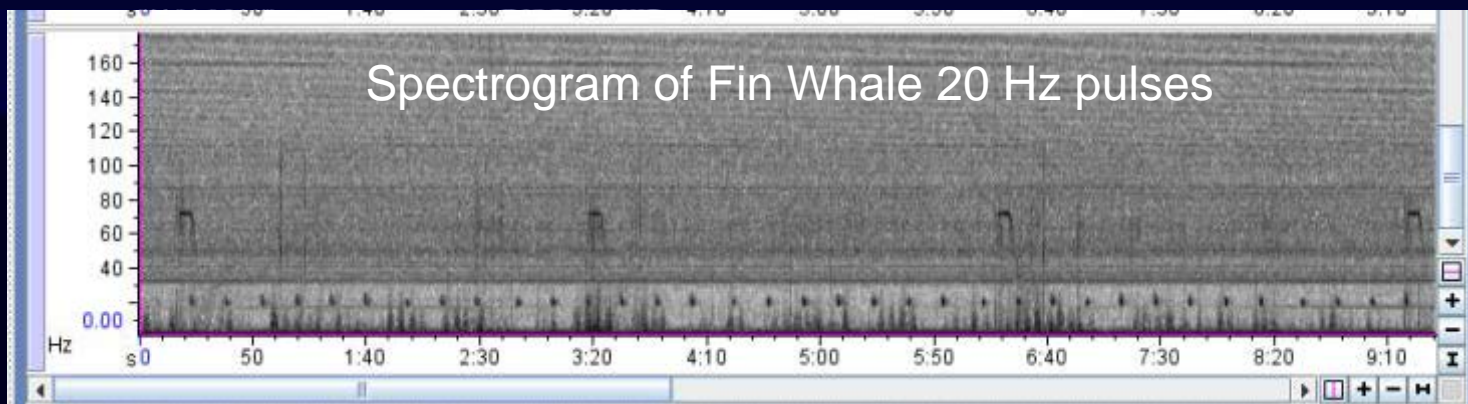
Predicted abundance/density estimates related to environmental covariates

- Generalized additive models
- Static covariates  
lat, long, depth, slope
- Dynamic covariates  
SST, chl *a*



# Analyses – Acoustics

- Total hours collected = 38,700
- Total GB of data = 2.5 TB
- Low frequency data - custom software algorithms
- High frequency data - processed manually





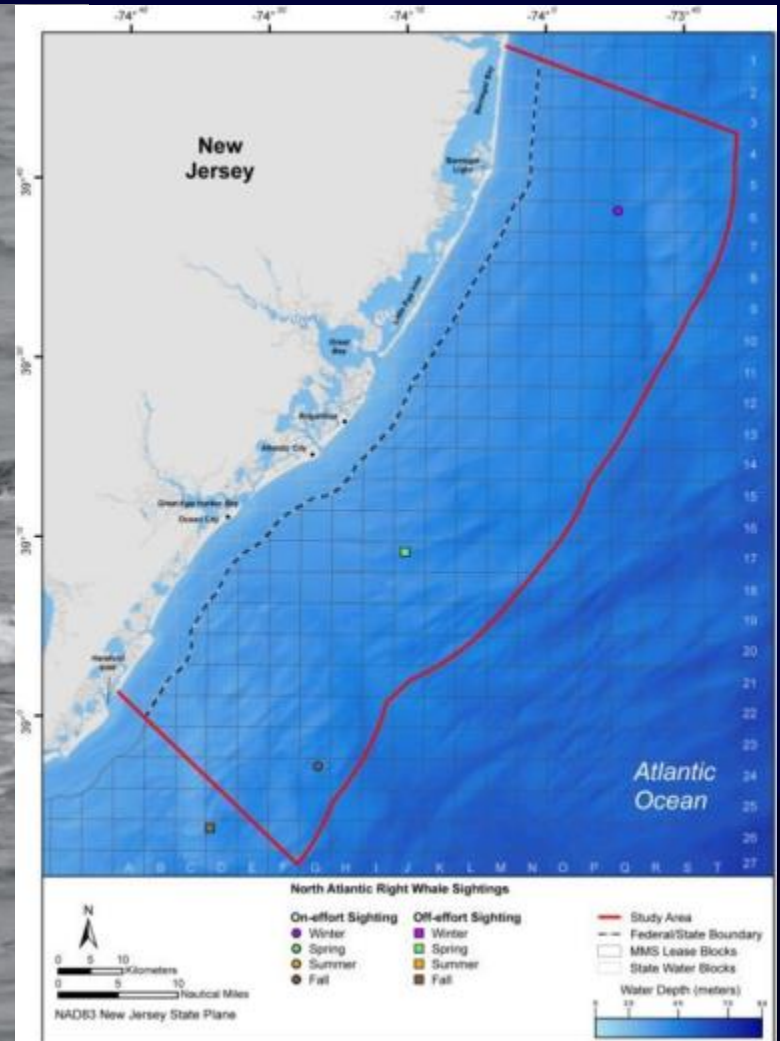
# Results

TOTAL SIGHTINGS = 615 (486 ON-EFFORT)

- 8 Species
- T&E Species = North Atlantic right whale  
Fin whale  
Humpback whale
- Seasonality of Detections
  - Right, fin, humpback whales & bottlenose dolphin detected during all seasons
  - Occurrence of dolphins & porpoises largely seasonal

# North Atlantic Right Whale

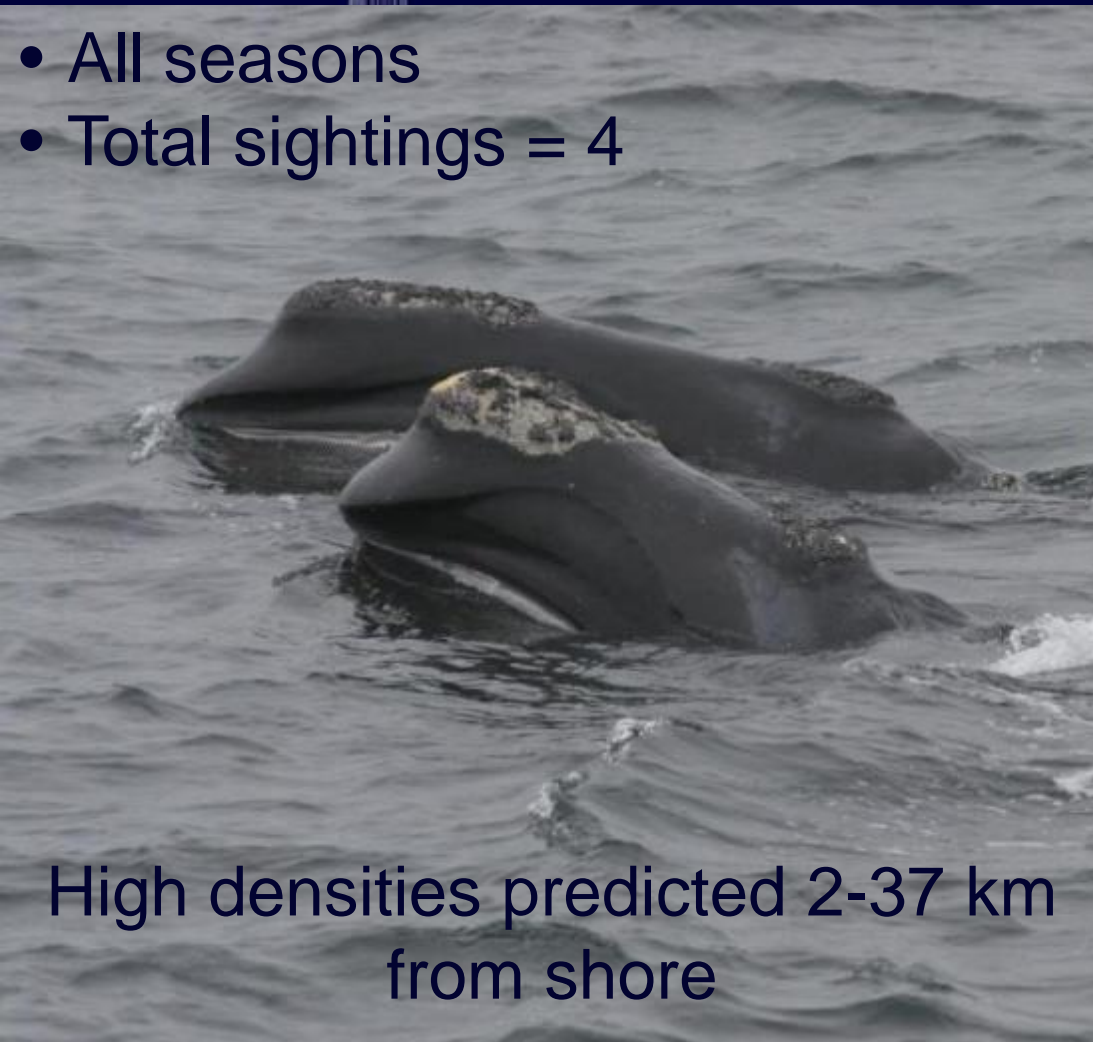
- All seasons
- Total sightings = 4



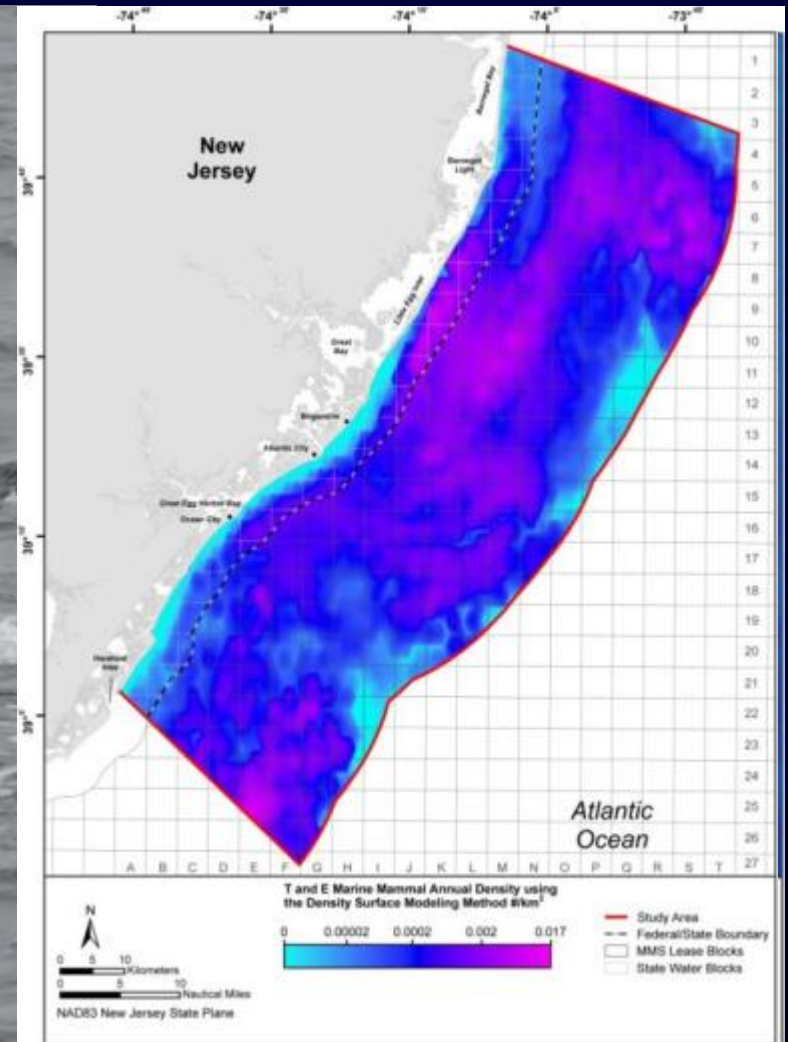
Year-round T&E abundance = 1

# North Atlantic Right Whale

- All seasons
- Total sightings = 4



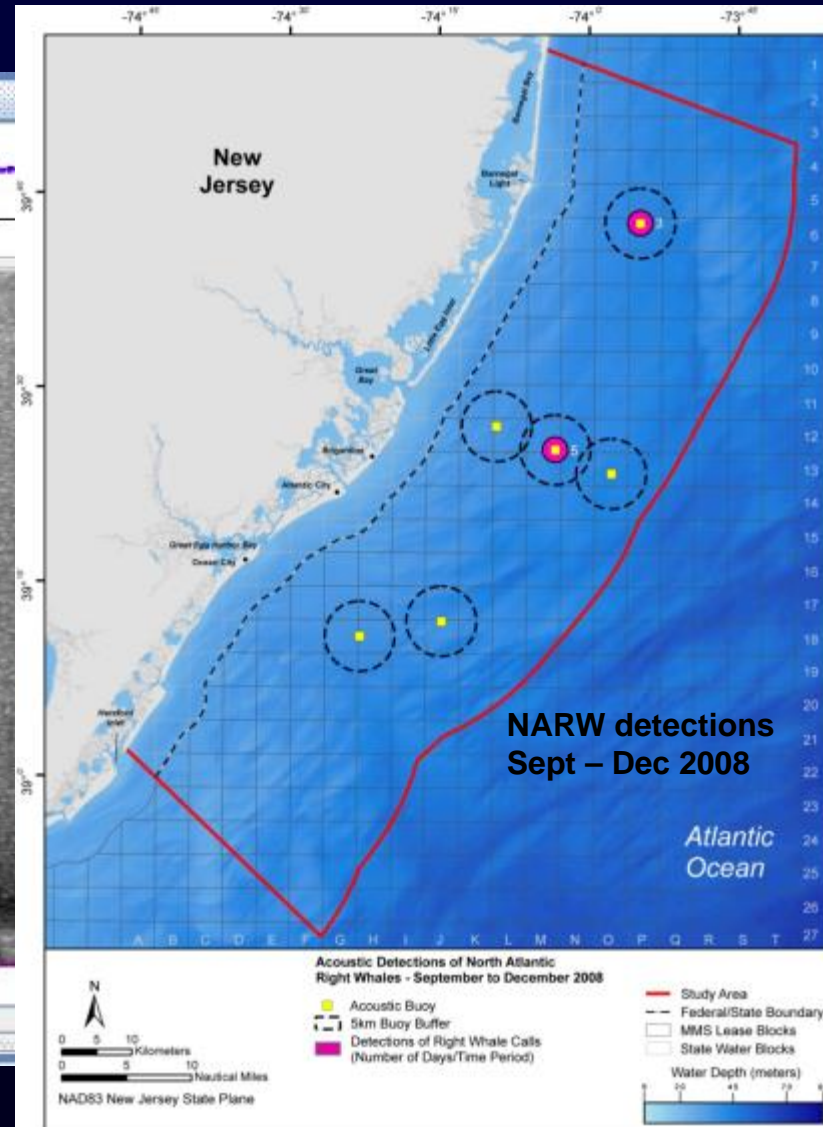
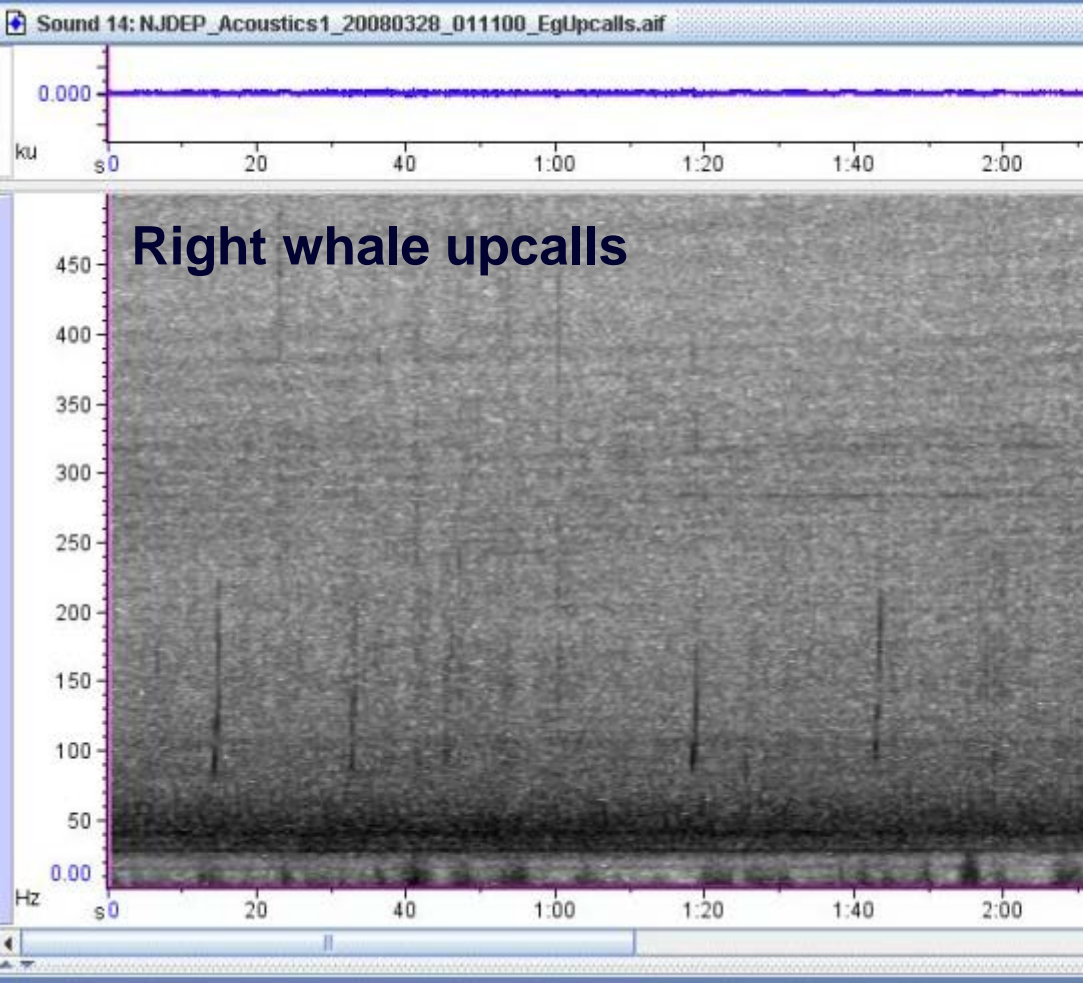
High densities predicted 2-37 km from shore



Year-round T&E abundance = 1

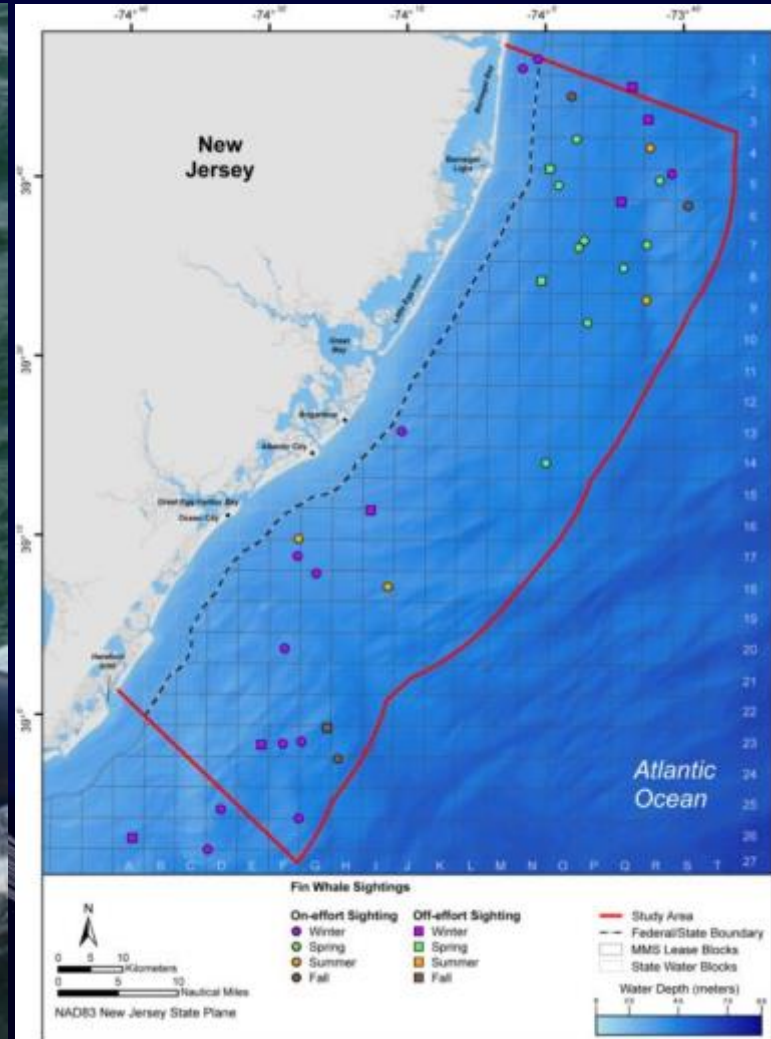


# North Atlantic Right Whale



# Fin Whale

- All seasons
- Total sightings = 37



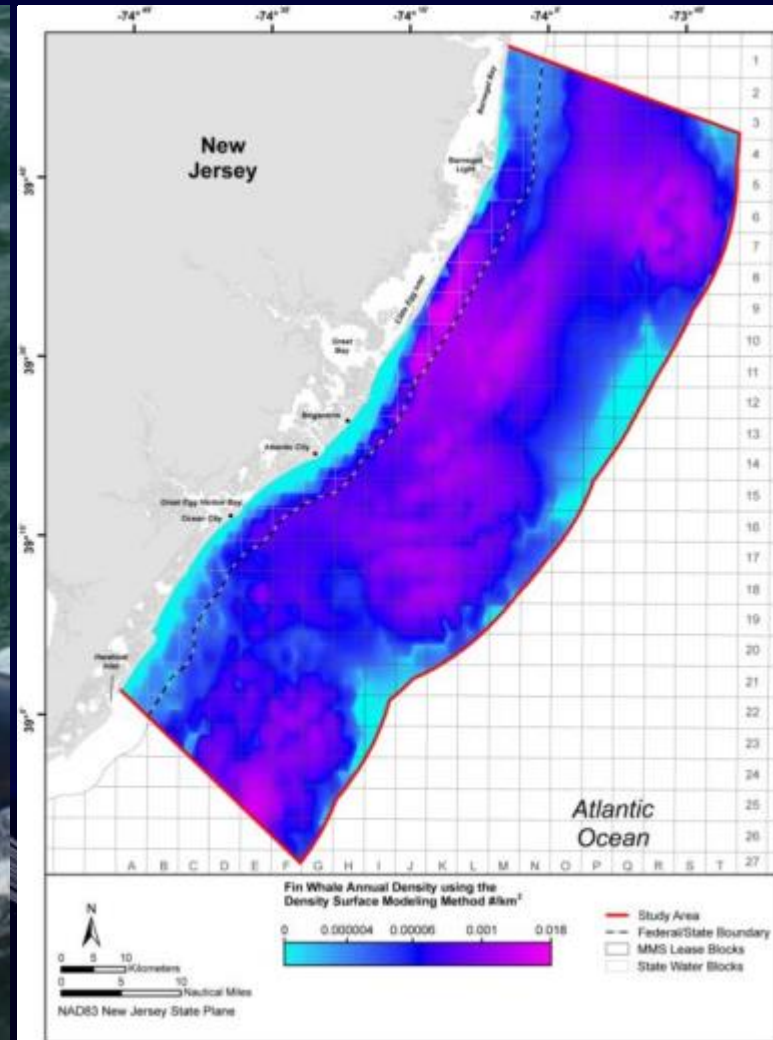
Year-round abundance = 2



# Fin Whale

- All seasons
- Total sightings = 37

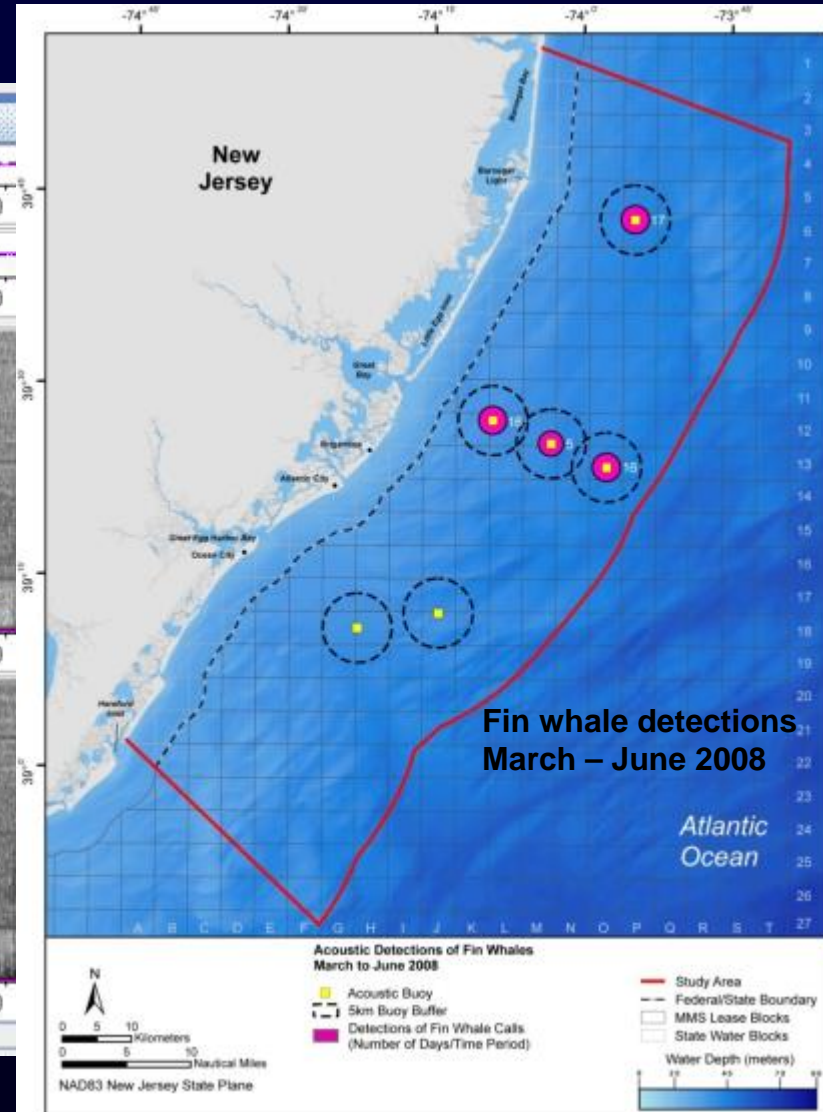
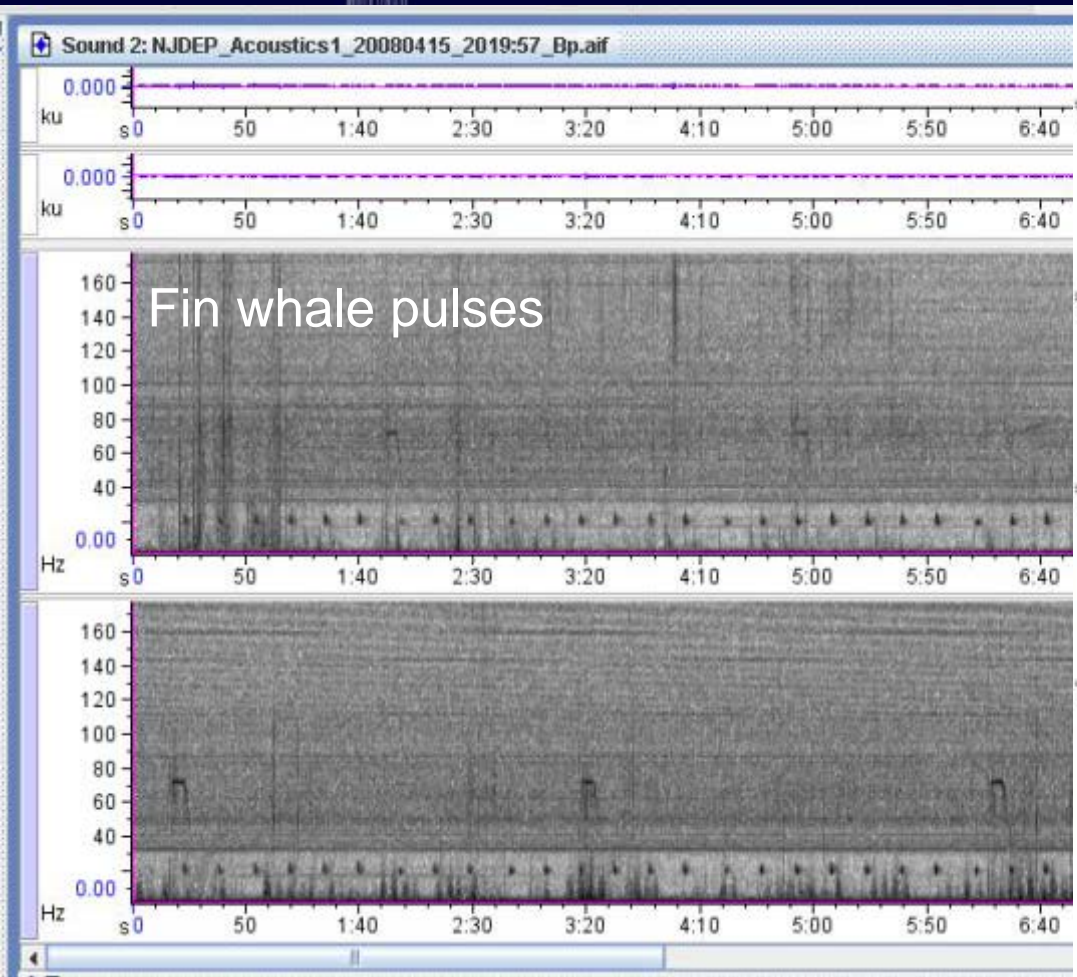
High densities predicted throughout, including in waters as shallow as 12 m & <2 km from shore.



Year-round abundance = 2

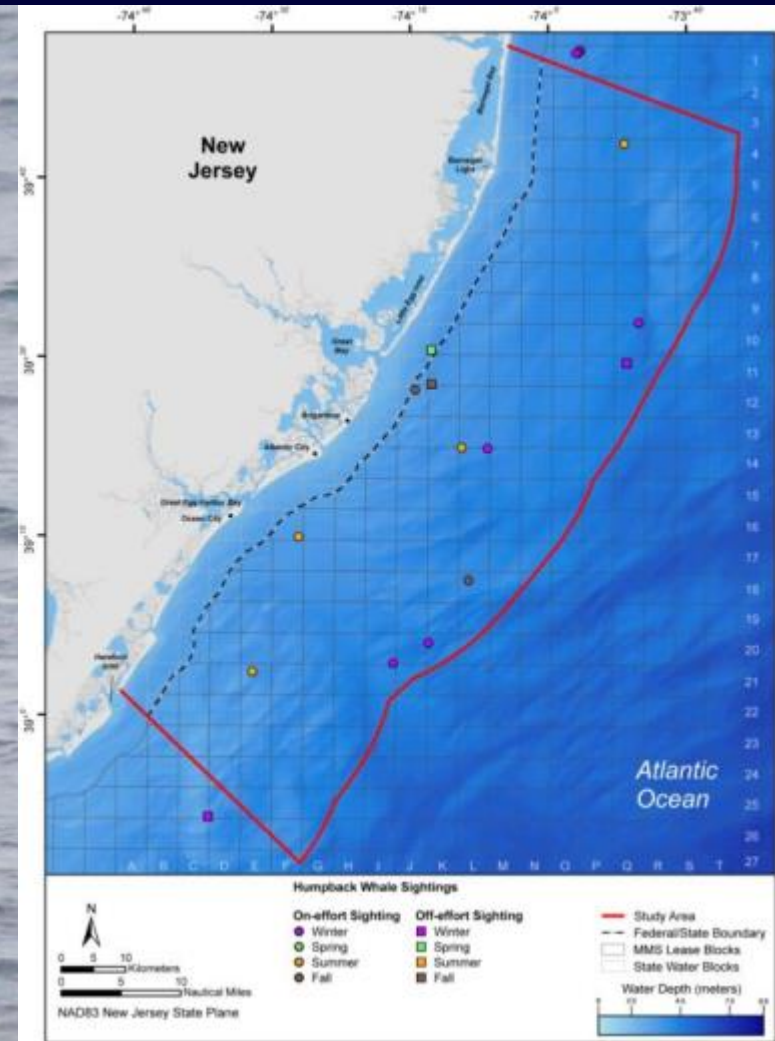


# Fin Whale



# Humpback Whale

- All seasons
- Total sightings = 17



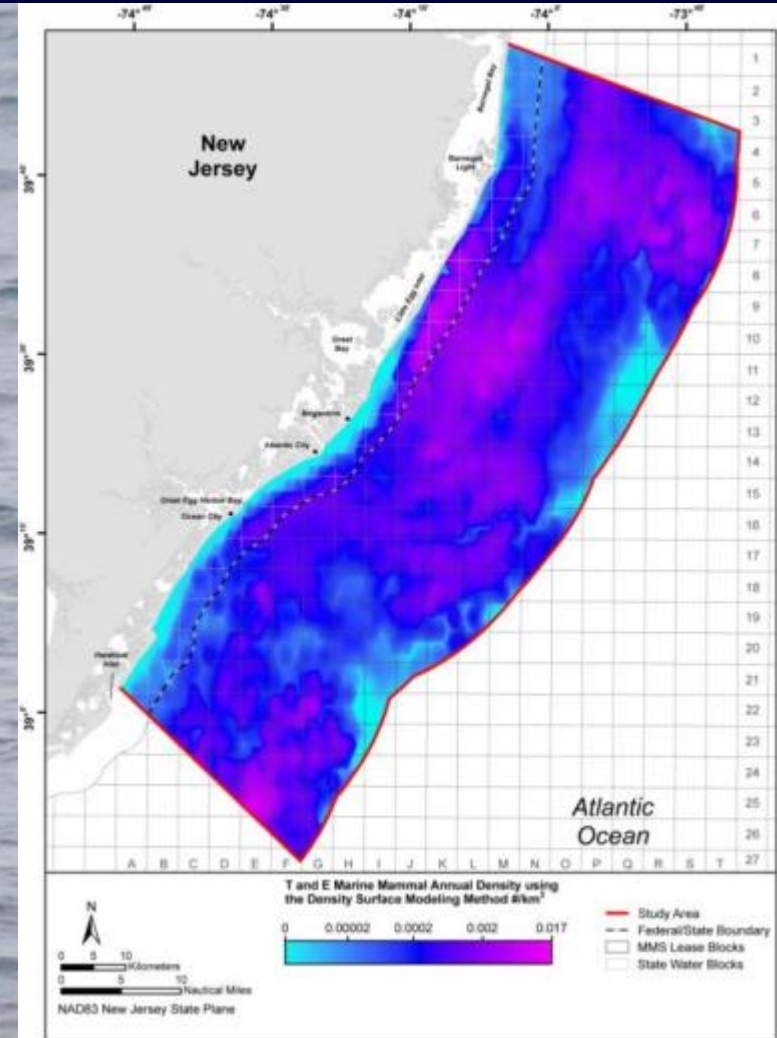


# Humpback Whale

- All seasons
- Total sightings = 17



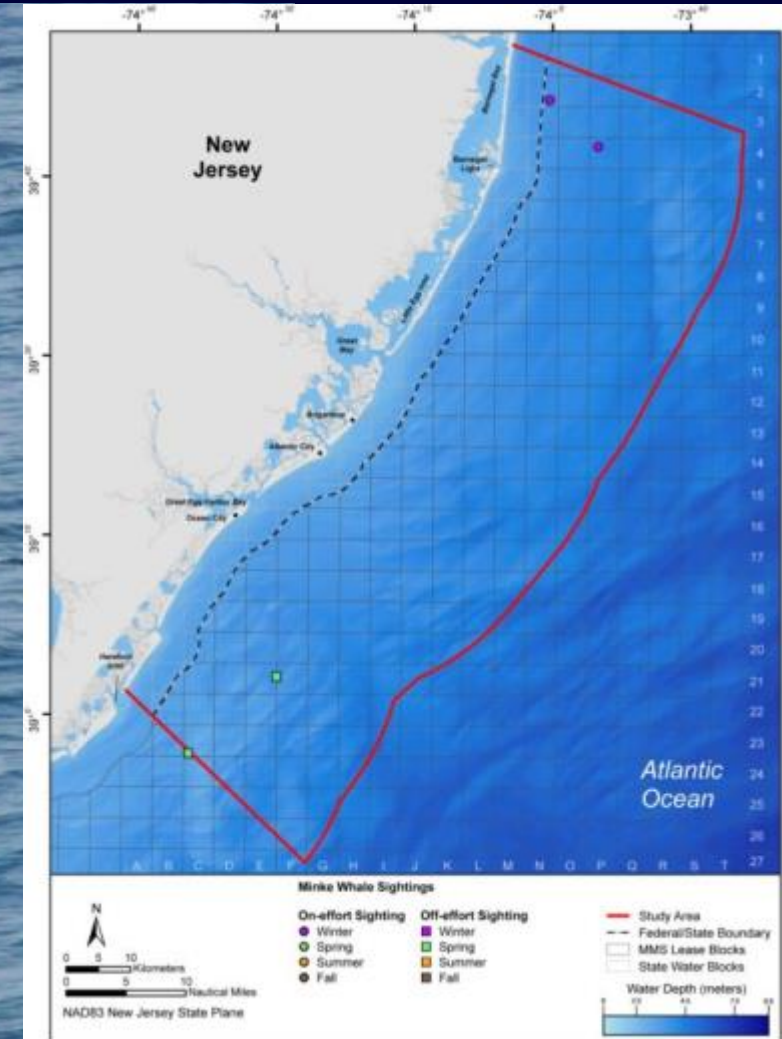
High densities predicted 2-37 km from shore



Year-round T&E abundance = 1

# Minke Whale

- Winter & spring
- Total sightings = 4





# Lessons Learned

- Aerial surveys vs. shipboard surveys
- Weather constraints
- More acoustic analyses time
- Shallow-water passive acoustic recorders

# More Information

- GMI (Geo-Marine Inc.). 2010. Ocean/Wind power ecological baseline studies January 2008 - December 2009. Final report. Trenton, New Jersey: Department of Environmental Protection, Office of Science.

*Available: [www.nj.gov/dep/dsr/ocean-wind/report.htm](http://www.nj.gov/dep/dsr/ocean-wind/report.htm)*

- Dudzinski et al. 2011. Trouble-shooting deployment and recovery options for various stationary passive acoustic monitoring devices in both shallow- and deep-water applications. Journal of the Acoustical Society of America 129(1):436-448.
- Whitt et al. 2013. North Atlantic right whale distribution and seasonal occurrence in nearshore waters off New Jersey, USA, and implications for management. Endangered Species Research 20(1): 59-69.
- Whitt et al. In Prep. Nearshore abundance and distribution of marine mammals in New Jersey waters.
- Whitt et al. In Prep. Predictive modeling of marine mammal densities in nearshore waters of New Jersey.



## Dolphin & Whale 911

### Report and Help Stranded Marine Mammals

*Sick, injured, and dead dolphins, whales, and seals can become stranded along the coast or in nearshore waters.*

- **Report** strandings to your local stranding response hotline.
- **Help** rescue marine mammals by following the list of "dos and don'ts" such as do not push the animal back out to sea.
- **Identify** the marine mammal using the electronic field guide.
- **Send** a photo and GPS coordinates of the stranded animal to the Marine Mammal Stranding Network.



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## SEE & ID Dolphins & Whales

### Identify & Protect Wild Marine Mammals

#### Use the electronic field guide to:

- Identify dolphins, whales, manatees, and seals using images and descriptions;
- Use maps to learn where marine mammals live; and
- Learn about their behavior, diet, life history, and more...

#### Viewing guidelines will help you:

- Protect marine mammals when you see them in the wild, and
- Make sure you are following the law.



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(Android & iPhone)



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Photo credit: Dolphin Ecology Project  
LOG 933-1722

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