

Overview of Sightings per Unit Effort Data Used in the Vertical Line Model



Prepared for Atlantic Large Whale Take Reduction Team
December 2010

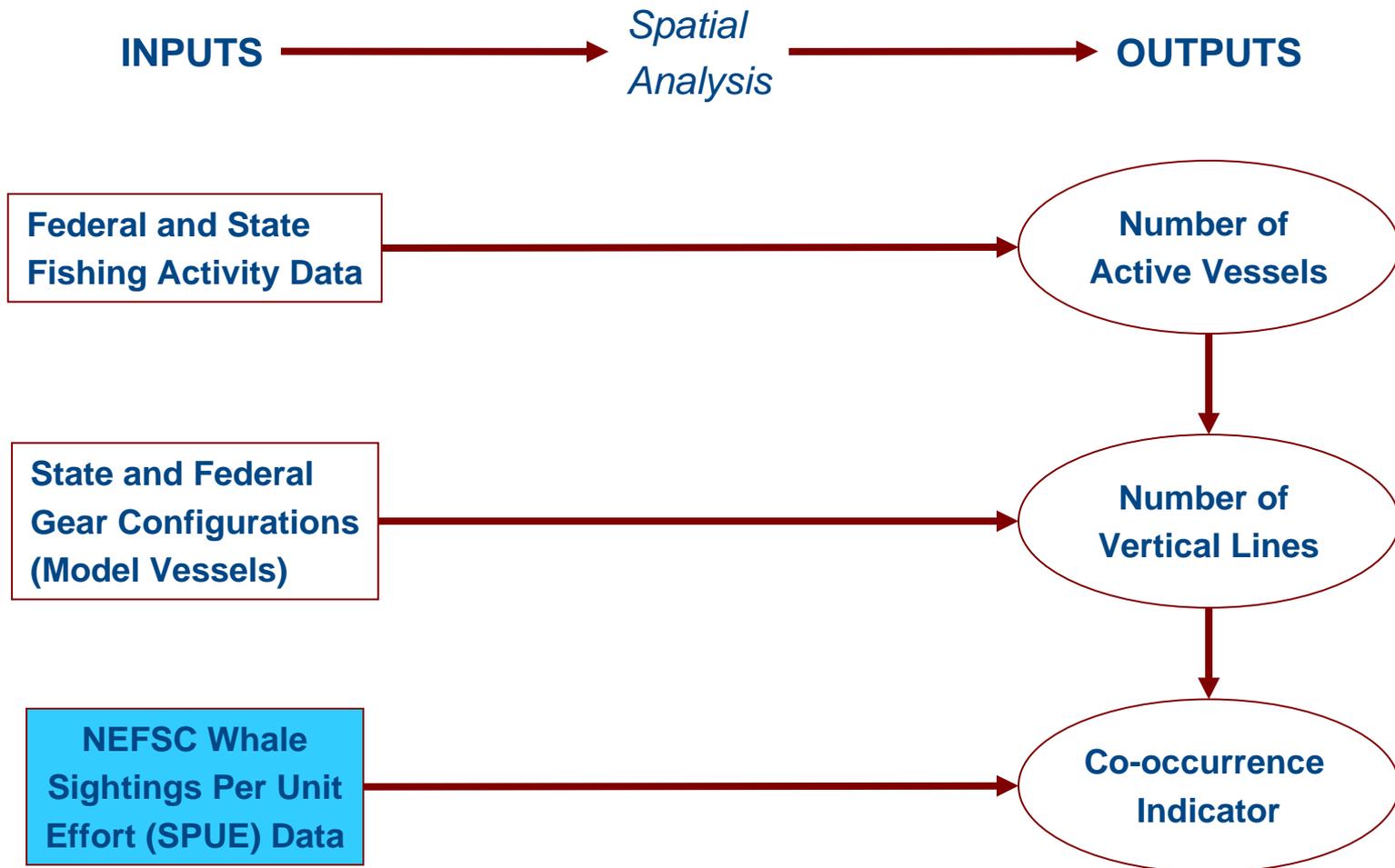
Funded by:
NMFS / Northeast Regional Office

Prepared by:

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2067 Massachusetts Avenue
Cambridge, MA 02140
617/354-0074

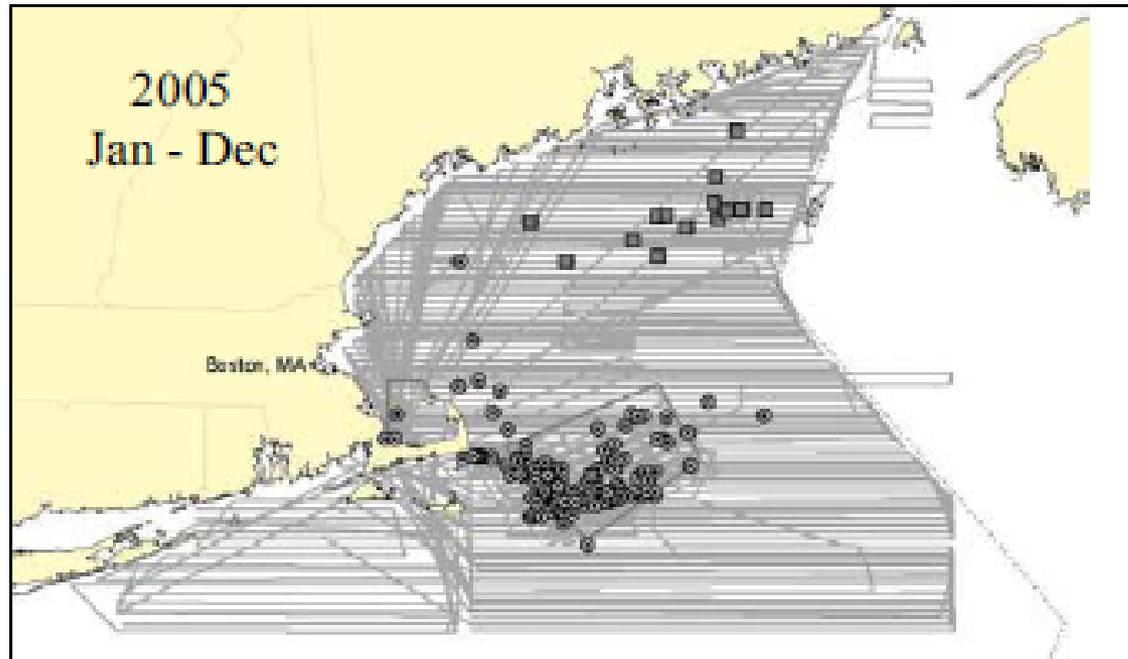
Overview of Indicators



Background on SPUE

- Sightings Per Unit Effort (SPUE) data developed by NEFSC
- Based upon aerial surveys conducted from 2002 through 2007
- Survey covered waters north of 41° 20'N
- Stratified random surveys of transect lines were flown intermittently throughout the study period
- Calculation of SPUE requires information on both number of sightings and the total effort applied

Background on SPUE



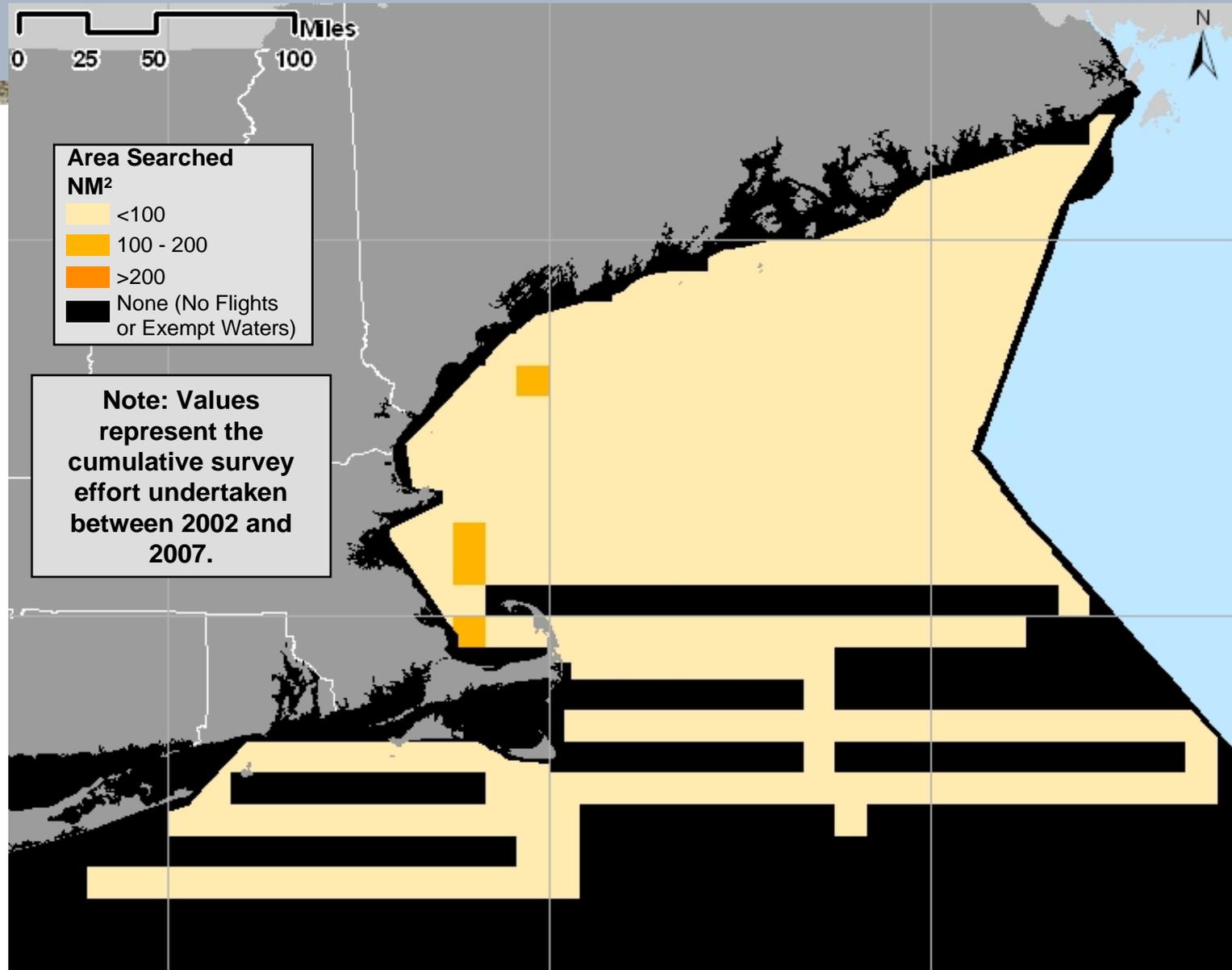
Source:

Cole TVN, Gerrior P, Merrick RL. 2007. Methodologies and preliminary results of the NOAA National Marine Fisheries Service aerial survey program for right whales (*Eubalaena glacialis*) in the northeast U.S., 1998-2006. U.S. Dep. Commer., *Northeast Fish. Sci. Cent. Ref. Doc. 07-02*; 11 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

Effort Data

- Environmental parameters (e.g., sea state and cloud cover) affecting the probability of detecting animals along track lines were logged on all survey flights.
- Effort varies by species based on differences in probability of spotting.
- Effort measured in terms of total square nautical miles covered through the search trips.

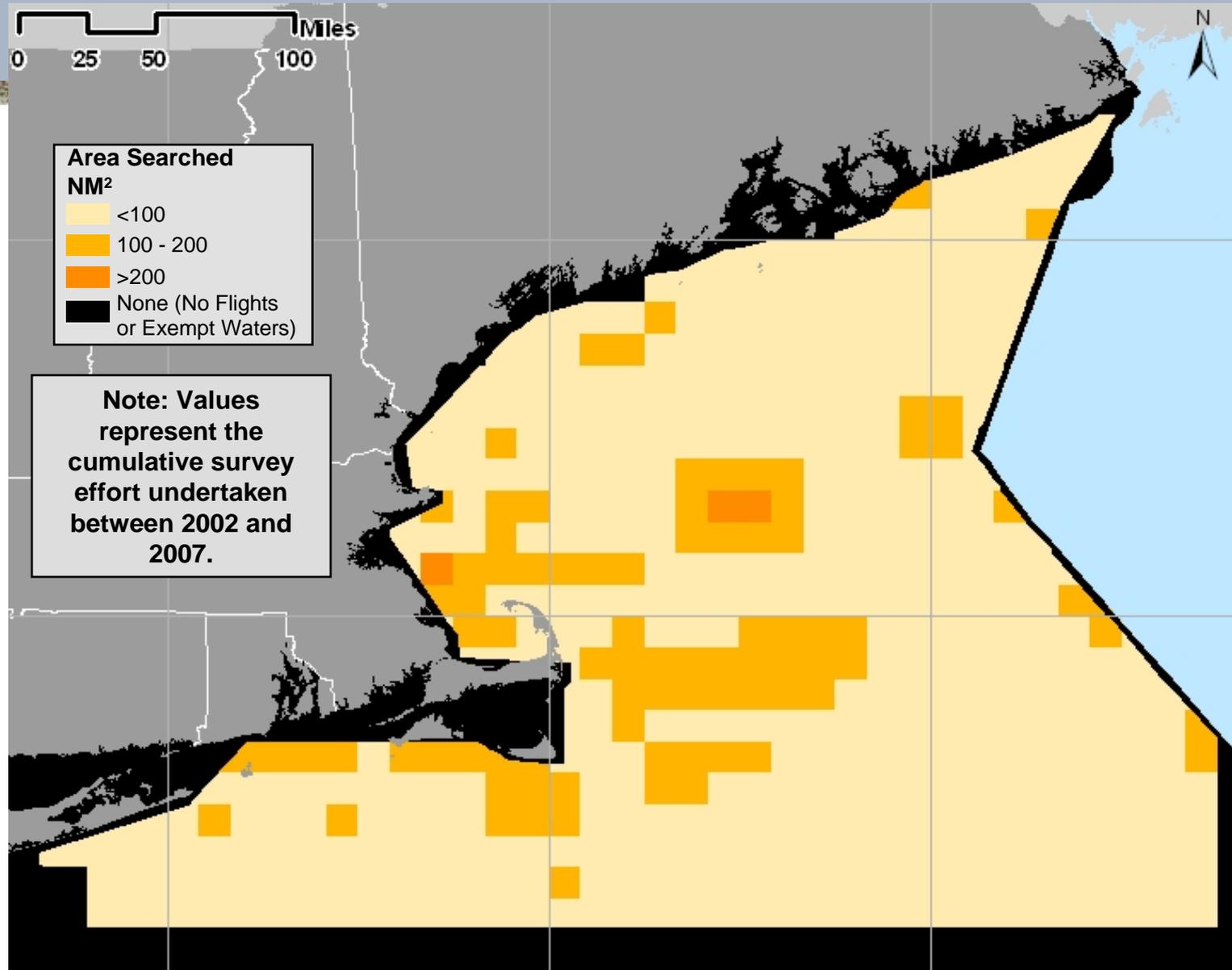
January Right Whale Sighting Effort



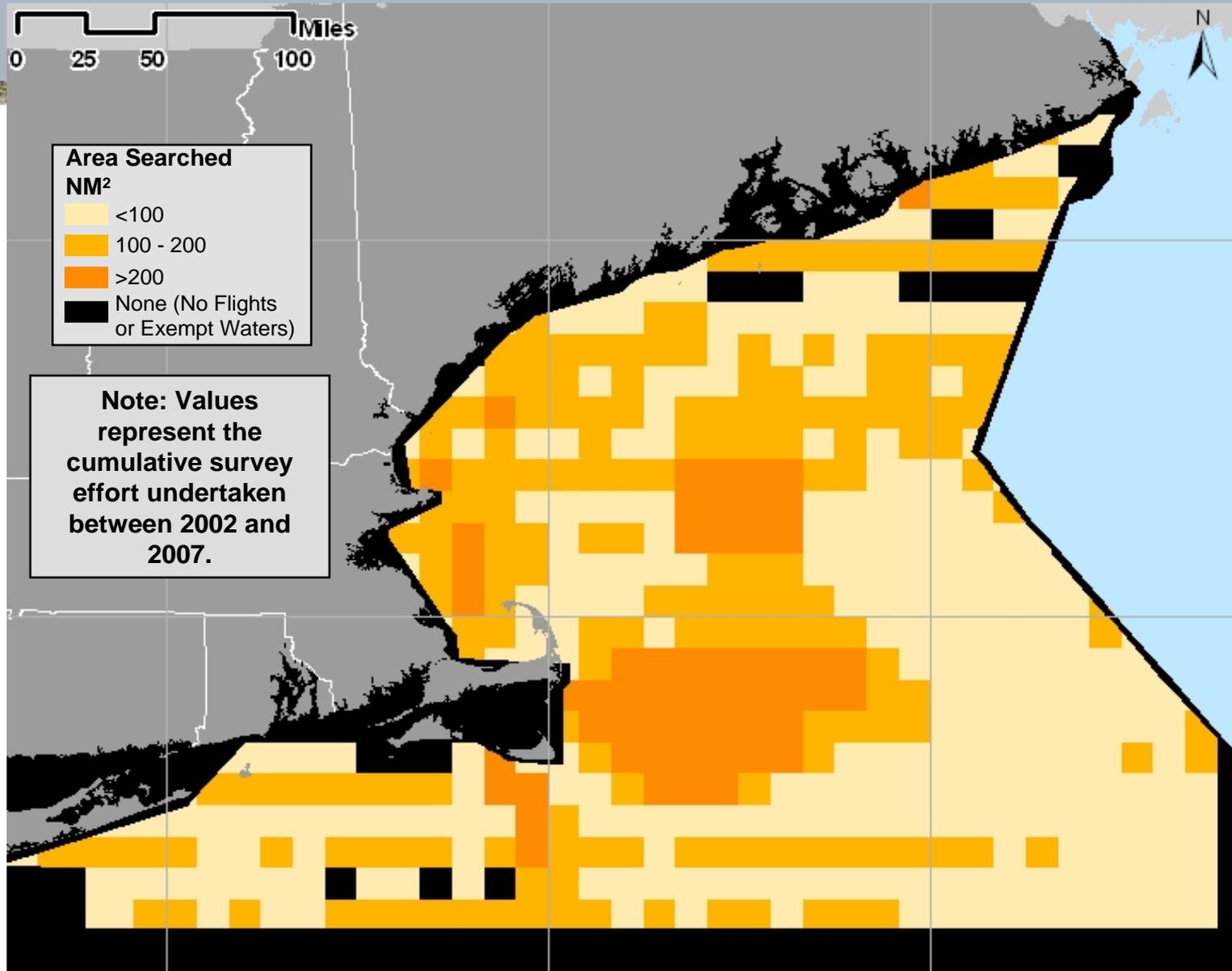
February Right Whale Sighting Effort



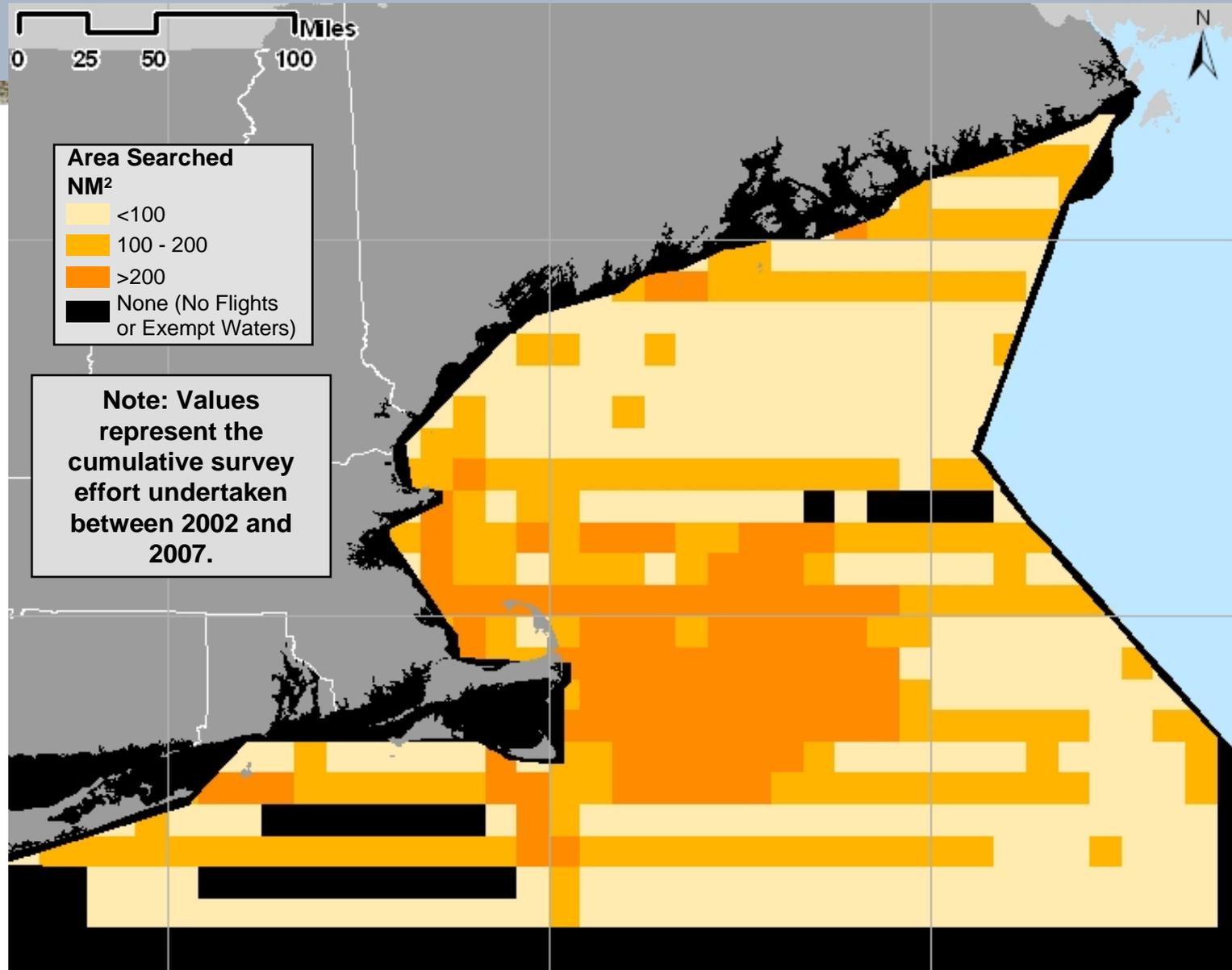
March Right Whale Sighting Effort



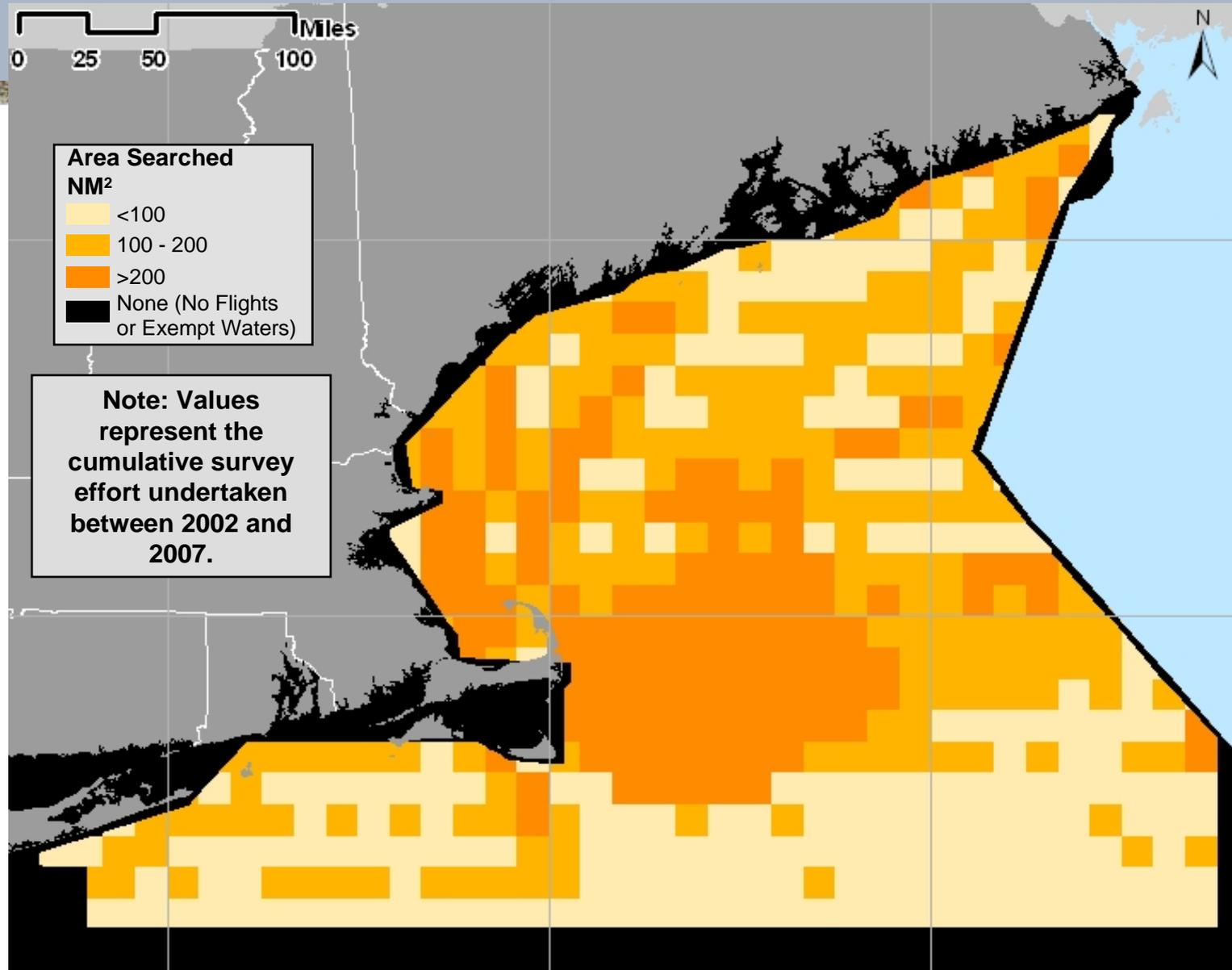
April Right Whale Sighting Effort



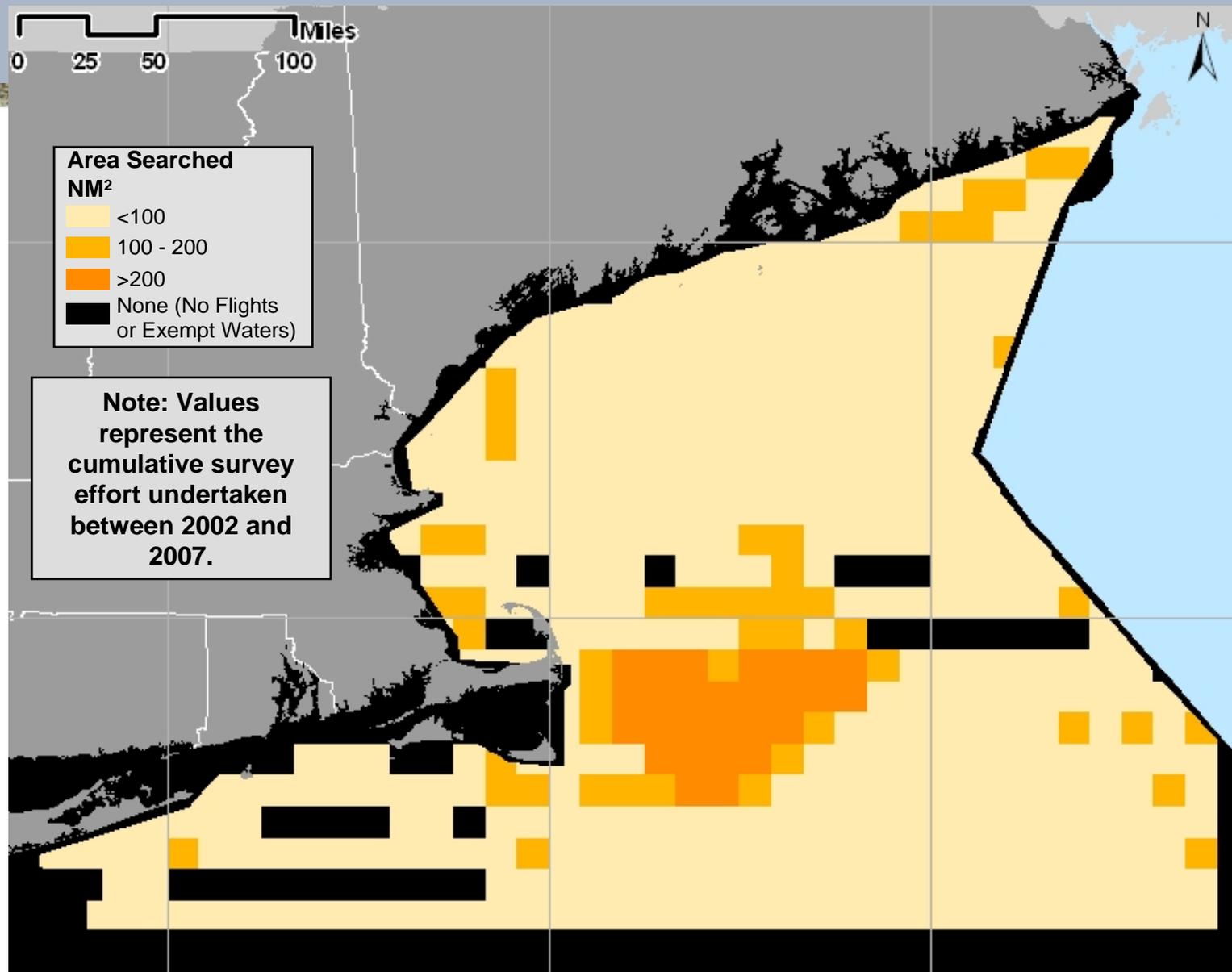
May Right Whale Sighting Effort



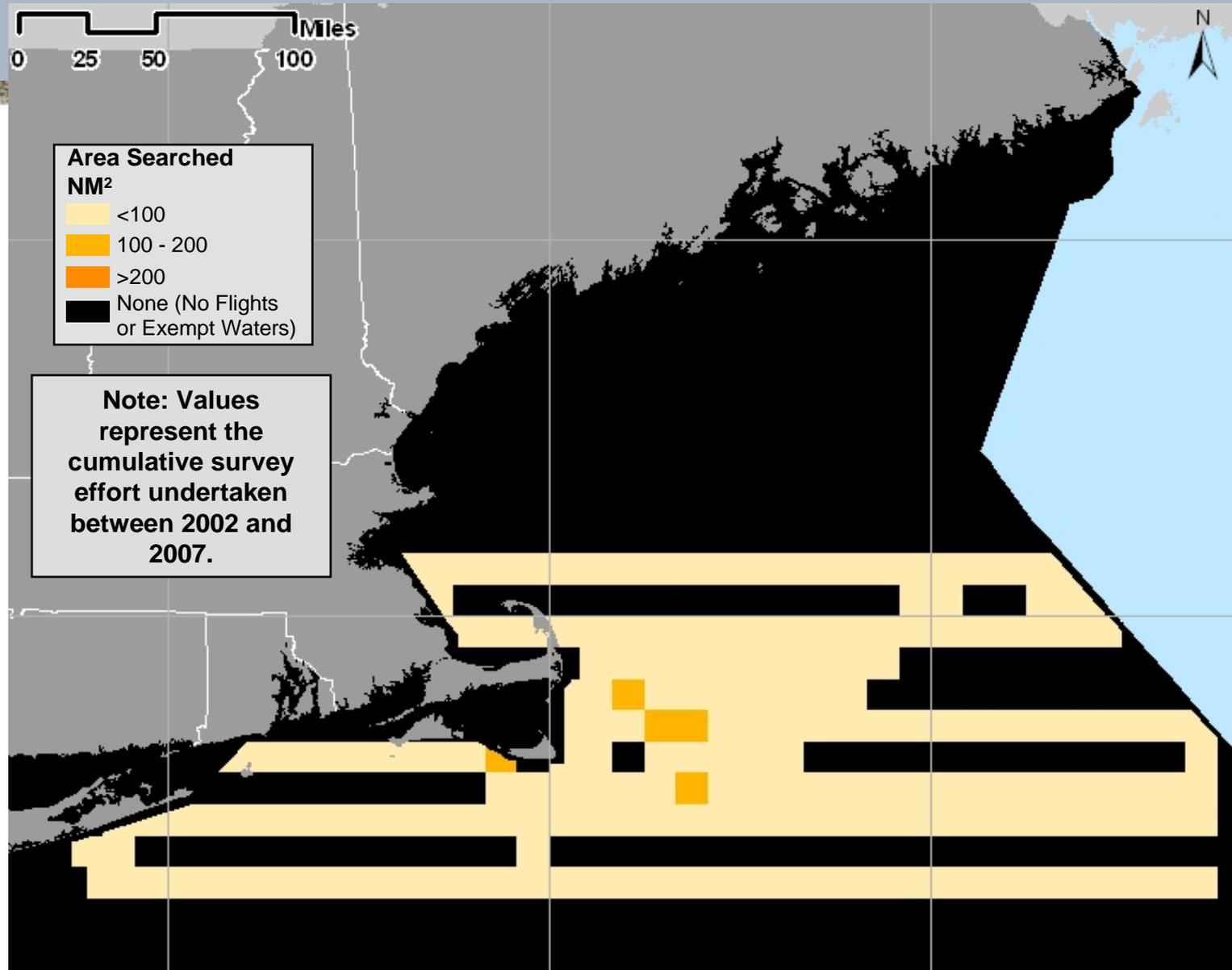
June Right Whale Sighting Effort



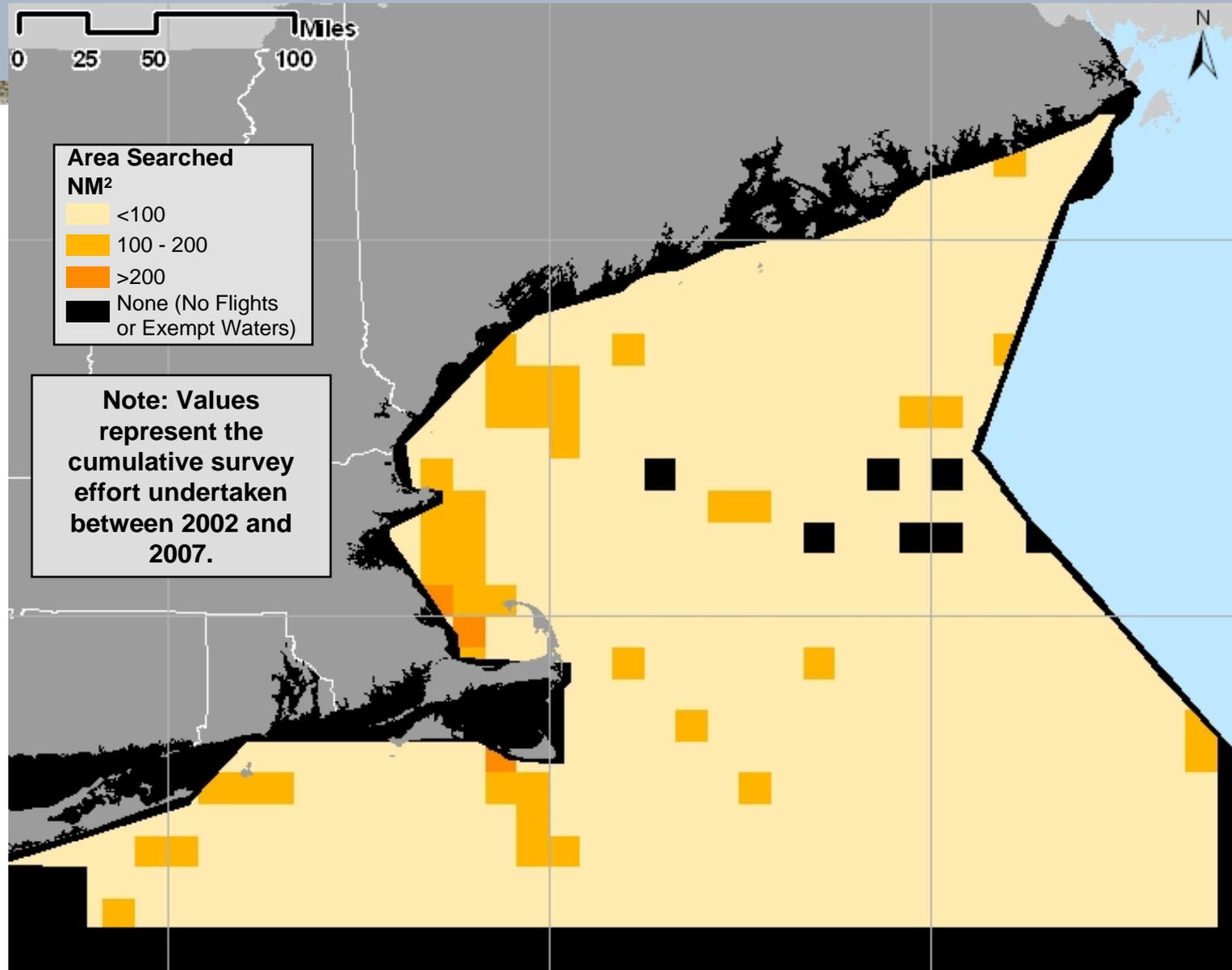
July Right Whale Sighting Effort



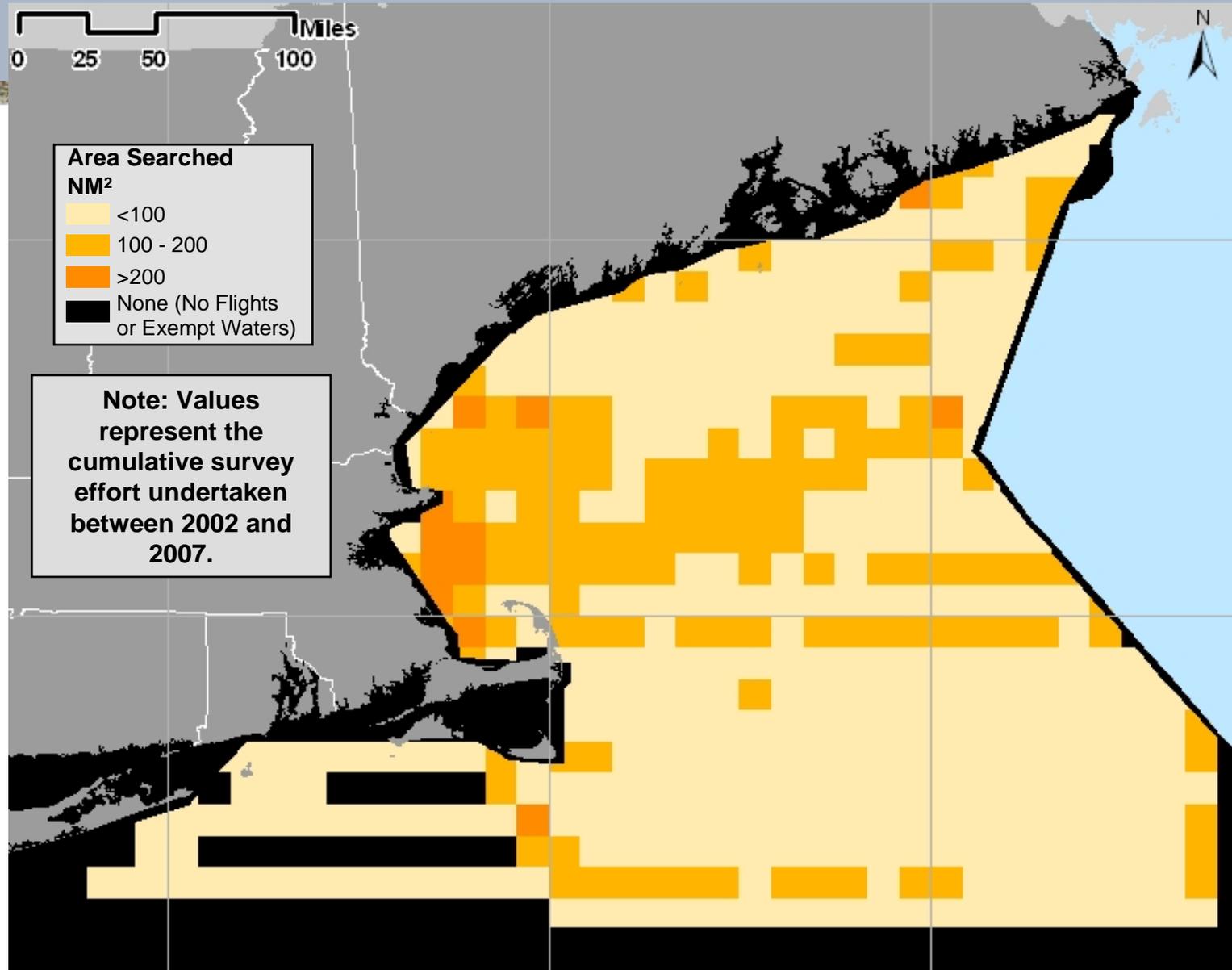
August Right Whale Sighting Effort



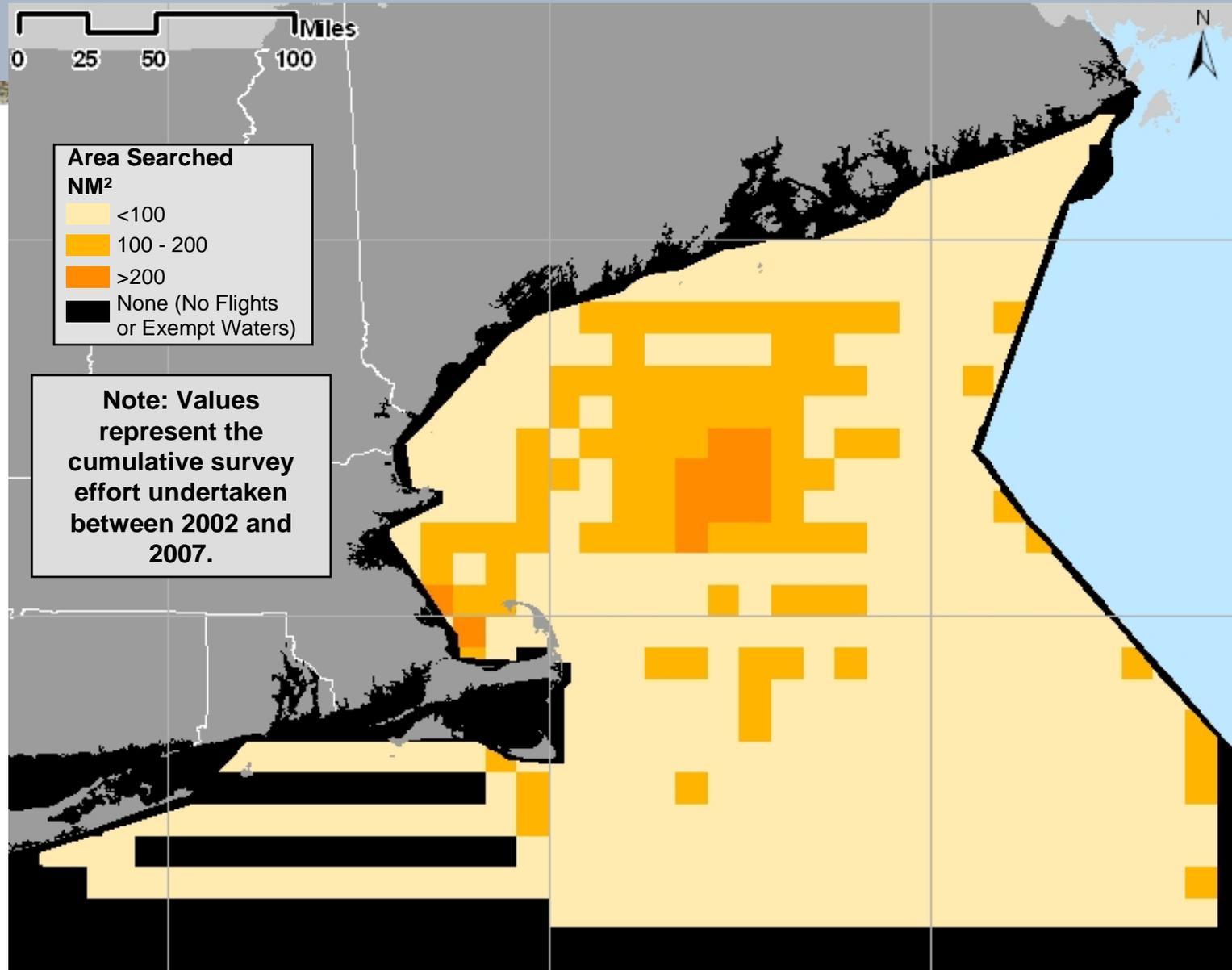
September Right Whale Sighting Effort



October Right Whale Sighting Effort



November Right Whale Sighting Effort



December Right Whale Sighting Effort



Background on SPUE

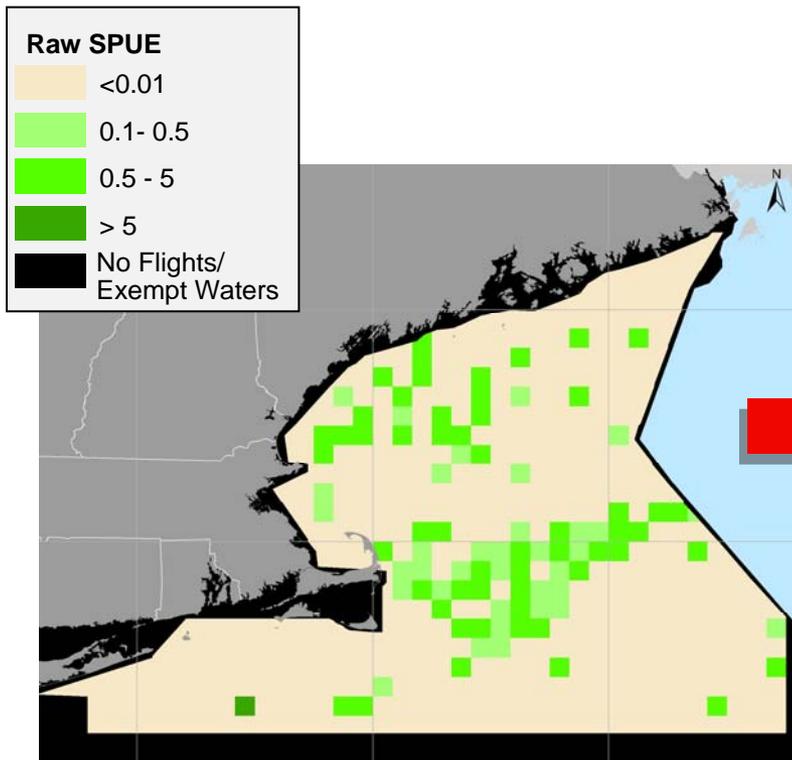
- Dr. Pace provided IEC with SPUE values divided into 10-nautical mile grid cells.
- SPUE values are specific to each species, month, and grid cell.
- SPUE Value =
$$\frac{\text{Number of Sightings}}{\text{Total Effort in that month}}$$
- We then translate the SPUE values to a consistent score ranging from 0 to 1,000.

SPUE Score Methodology

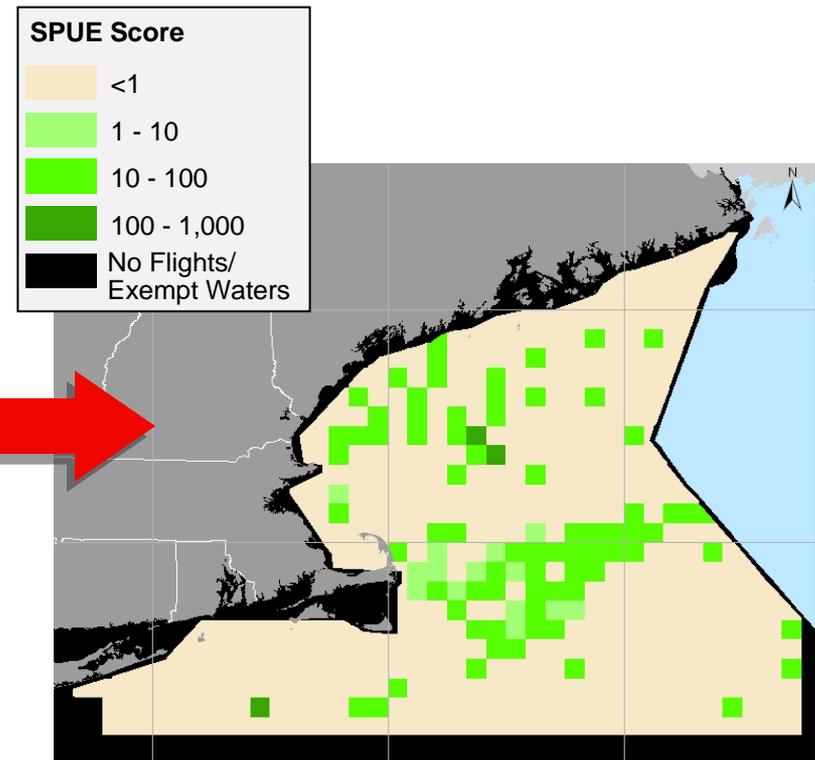
- Index Whale SPUE results:
 - Identify the grid cell with the maximum value across all species and months
 - Set the grid cell with the maximum value to 1,000
 - For all other grid cells, divide each cell's value by the maximum value and multiply by 1,000

SPUE Score Methodology

Raw Fin SPUE data
June

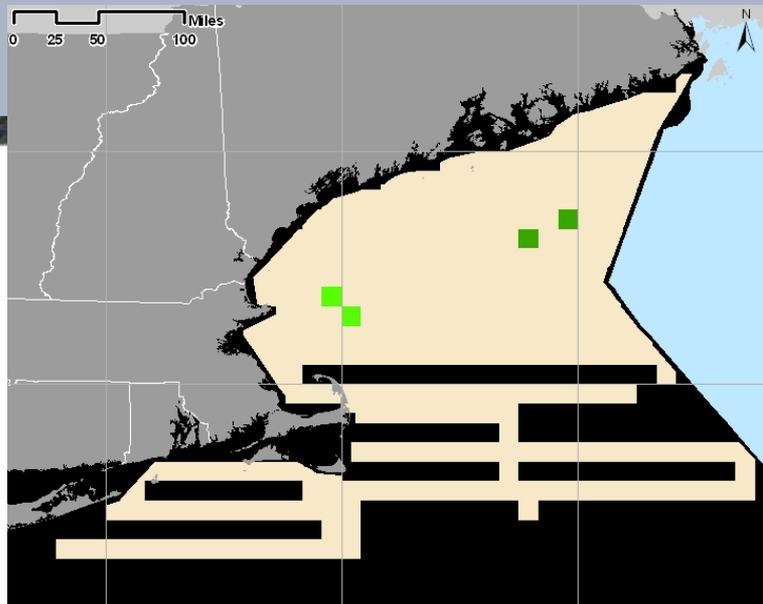


Indexed Fin SPUE
June

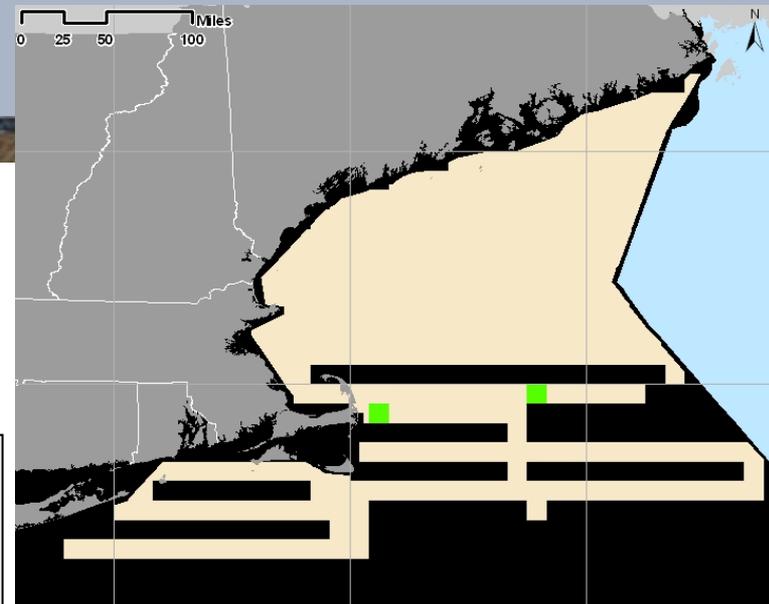


January SPUE (2002-2007)

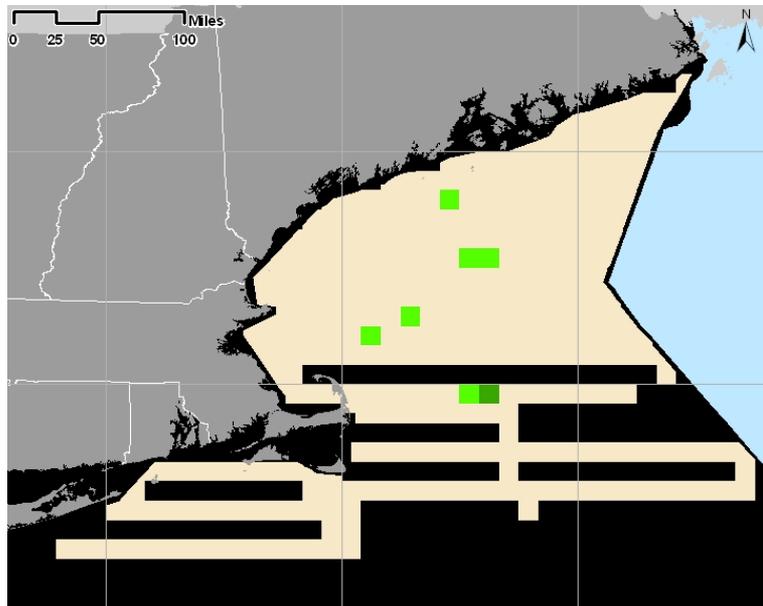
Right Whale



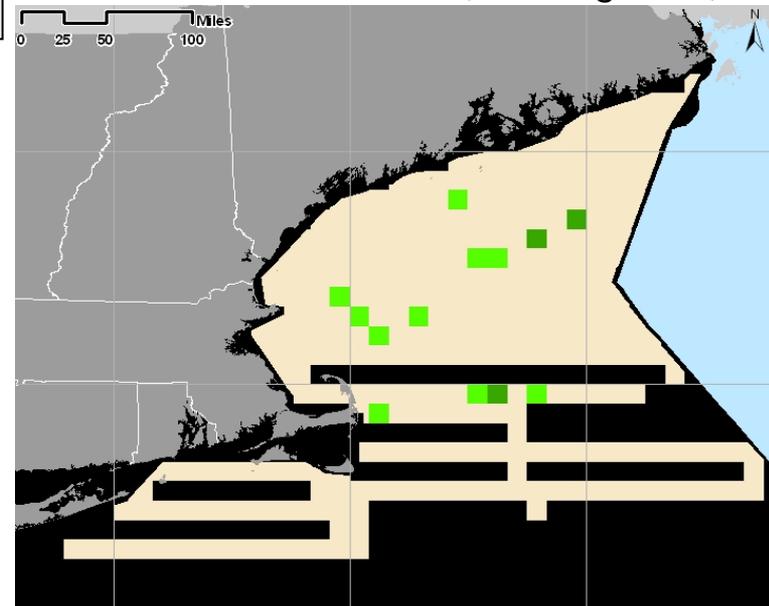
Humpback Whale



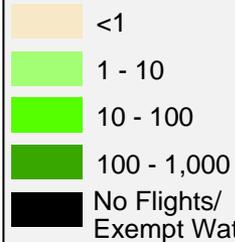
Fin Whale



Combined Whales (unweighted)



SPUE Score



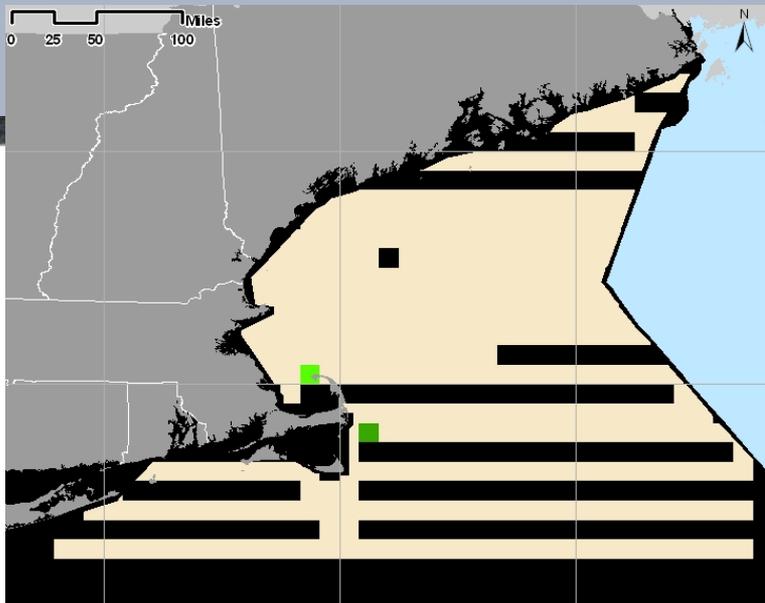
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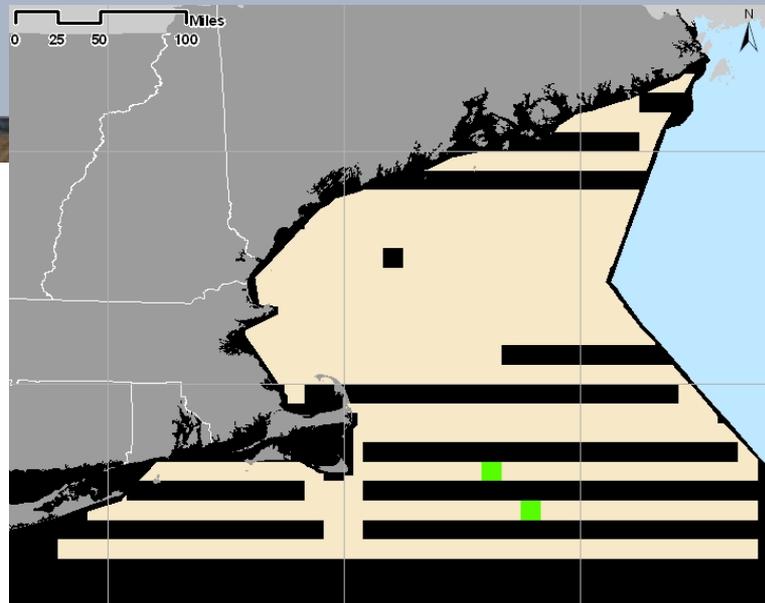
NOAA FISHERIES SERVICE, NORTHEAST REGIONAL OFFICE

February SPUE (2002-2007)

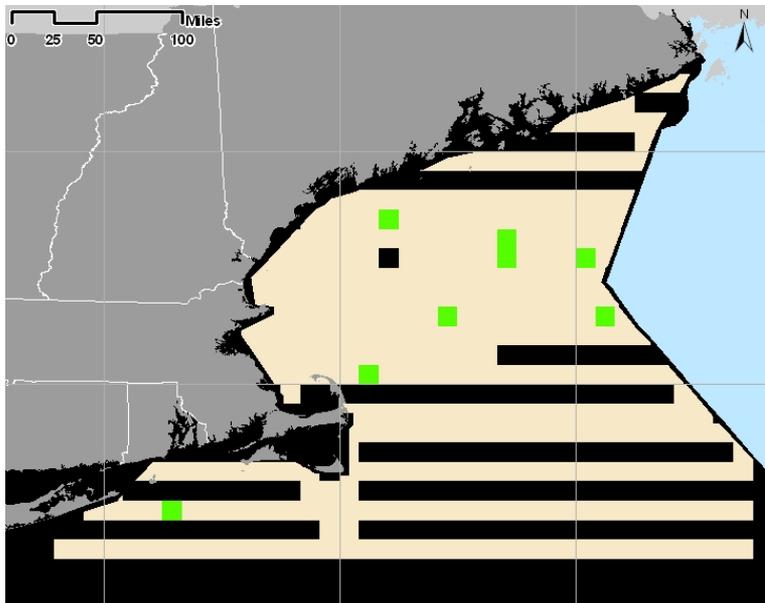
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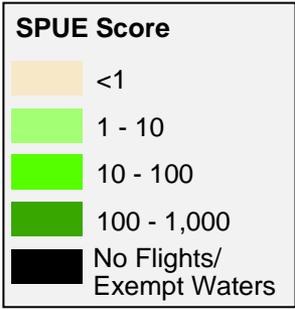
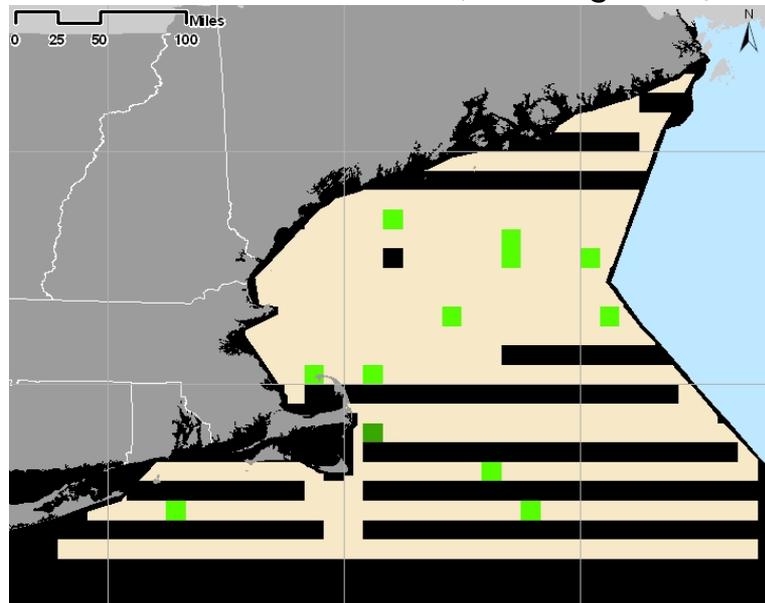
Humpback Whale



Fin Whale

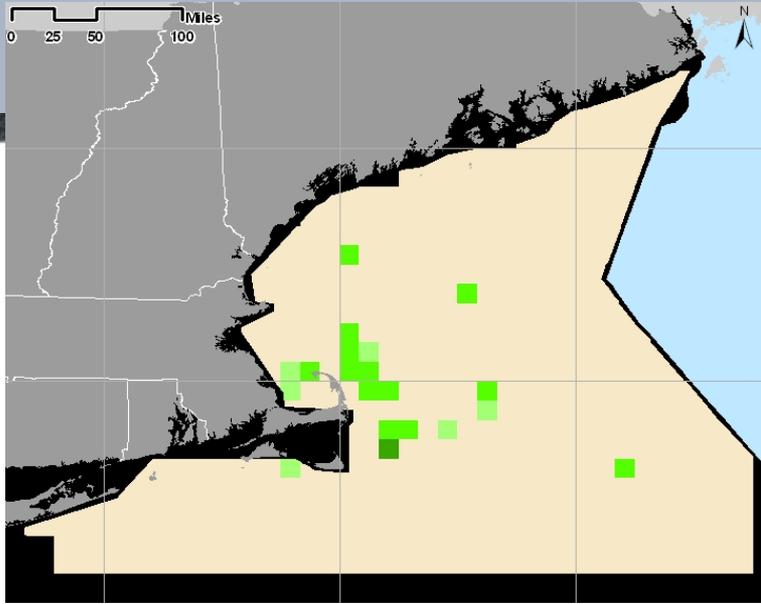


Combined Whales (unweighted)

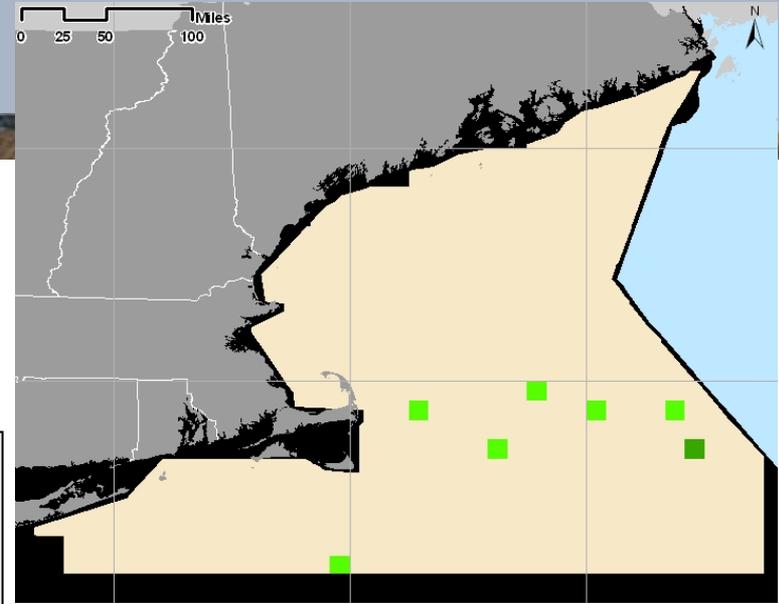


March SPUE (2002-2007)

Right Whale



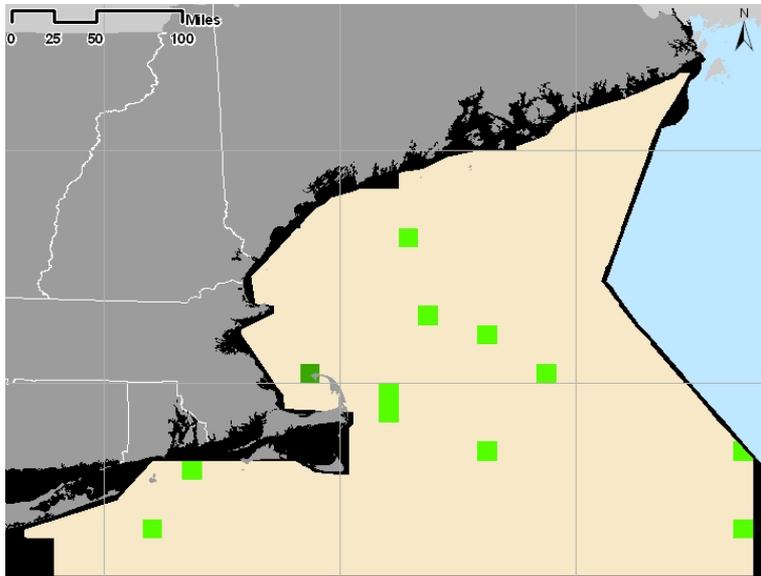
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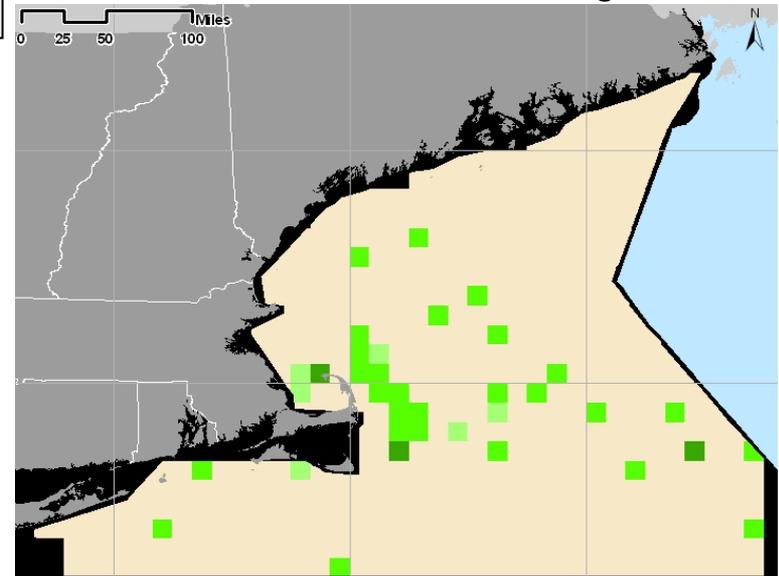
SPUE Score



Fin Whale



Combined Whales (unweighted)



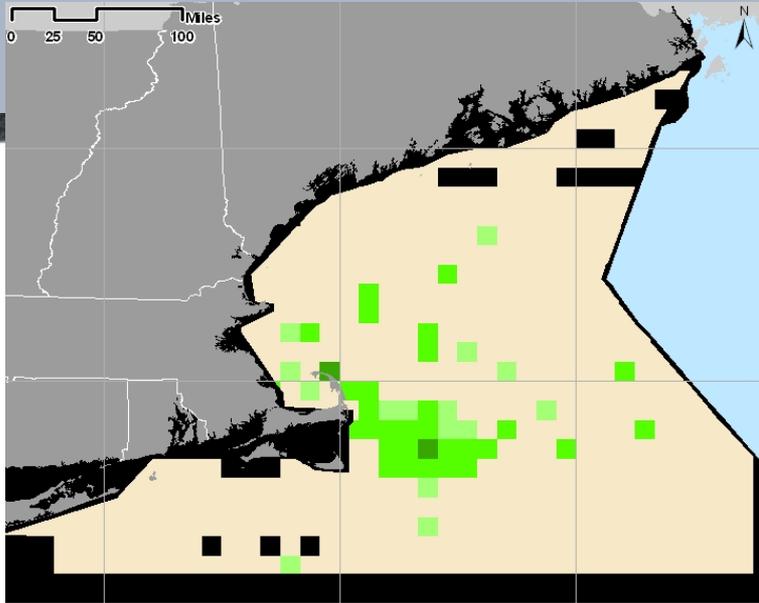
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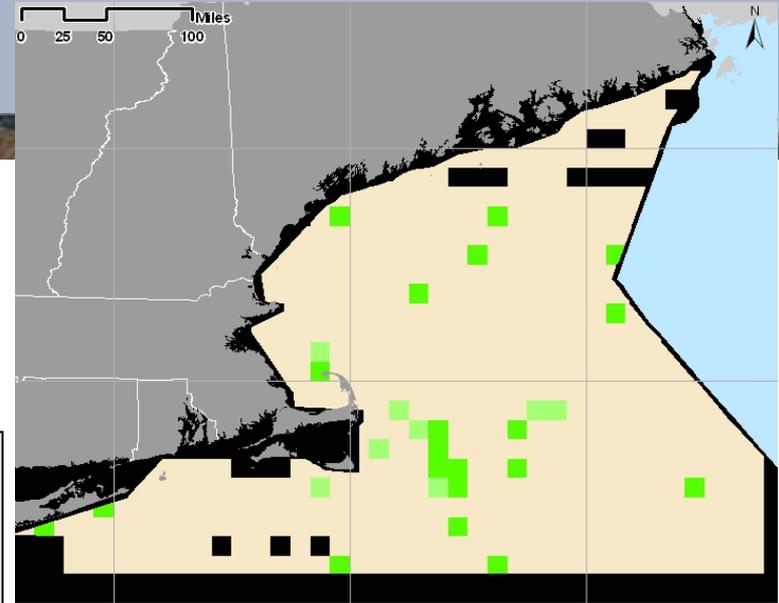
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April SPUE (2002-2007)

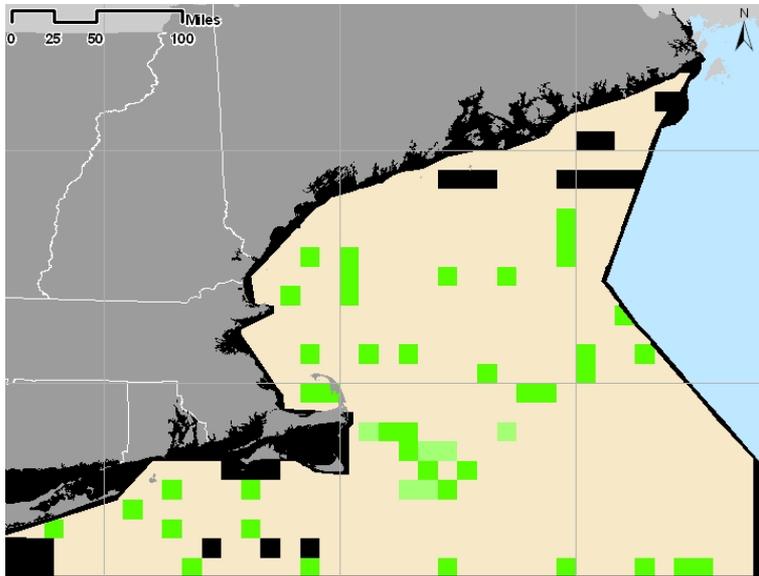
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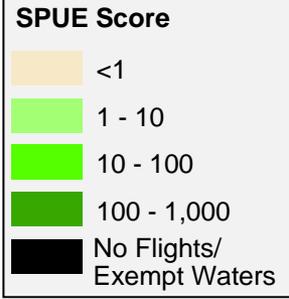
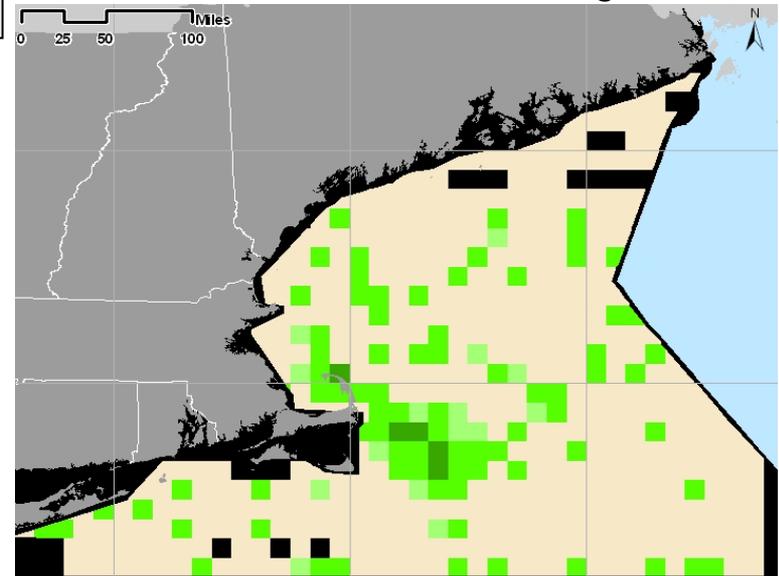
Humpback Whale



Fin Whale



Combined Whales (unweighted)

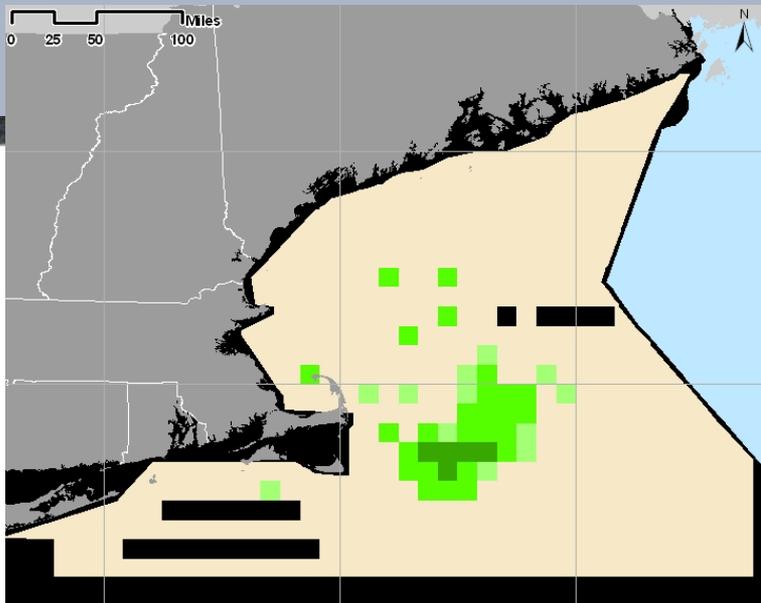


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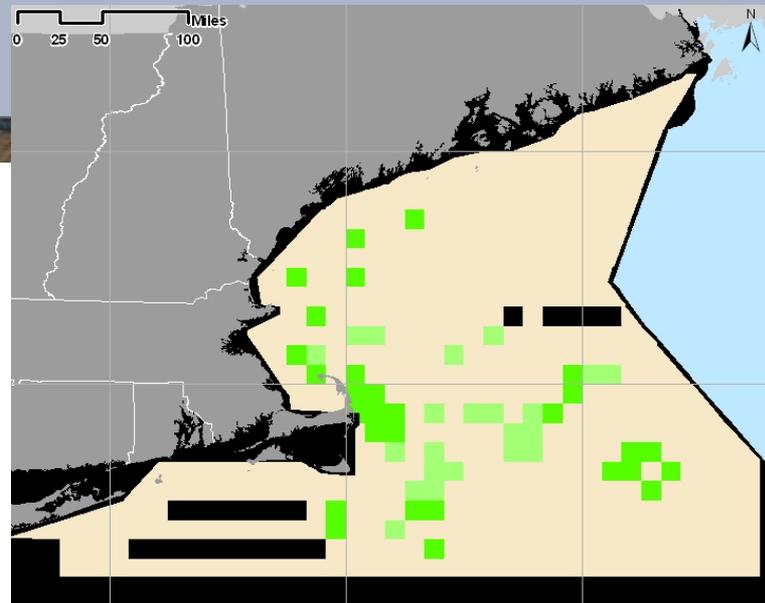
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May SPUE (2002-2007)

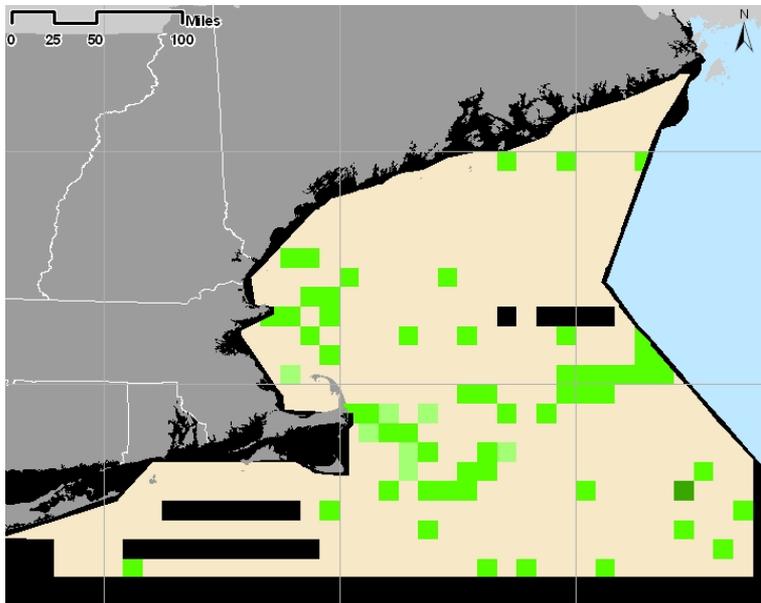
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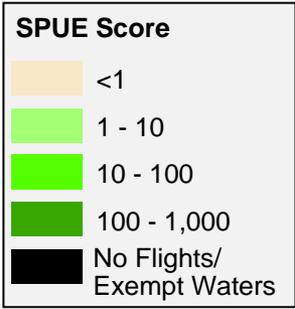
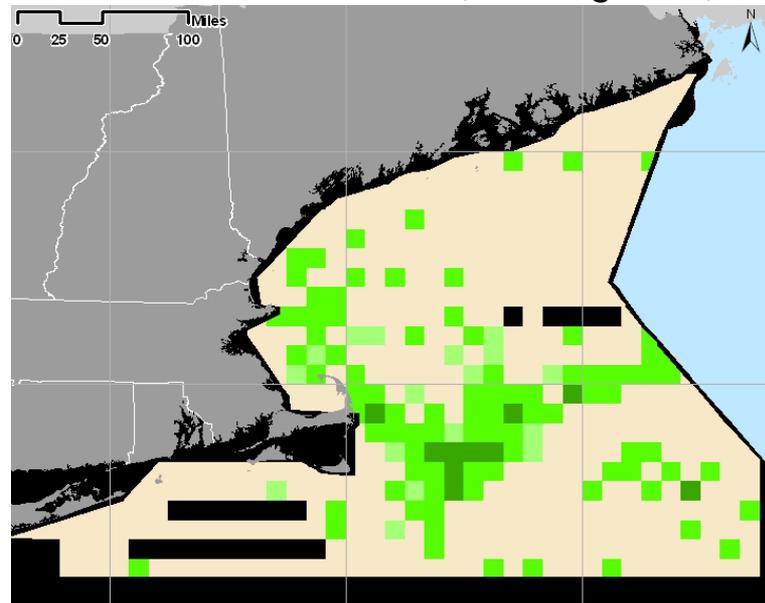
Humpback Whale



Fin Whale

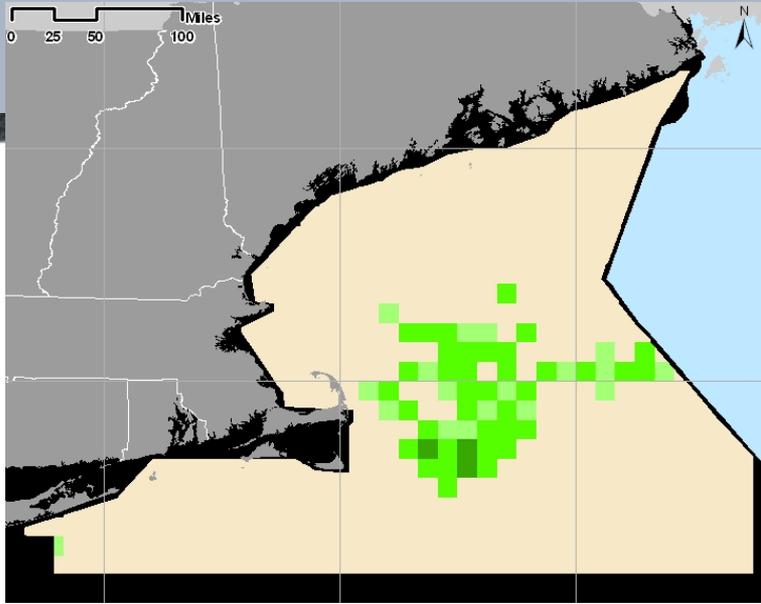


Combined Whales (unweighted)

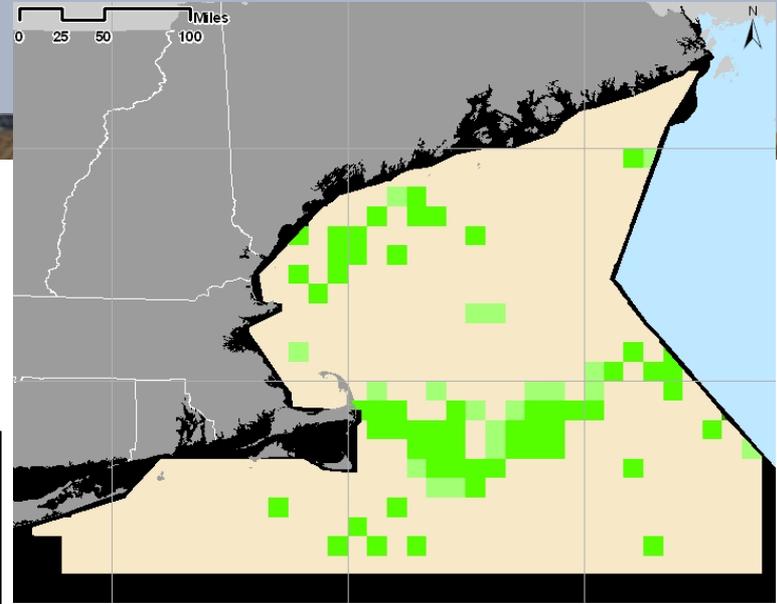


June SPUE (2002-2007)

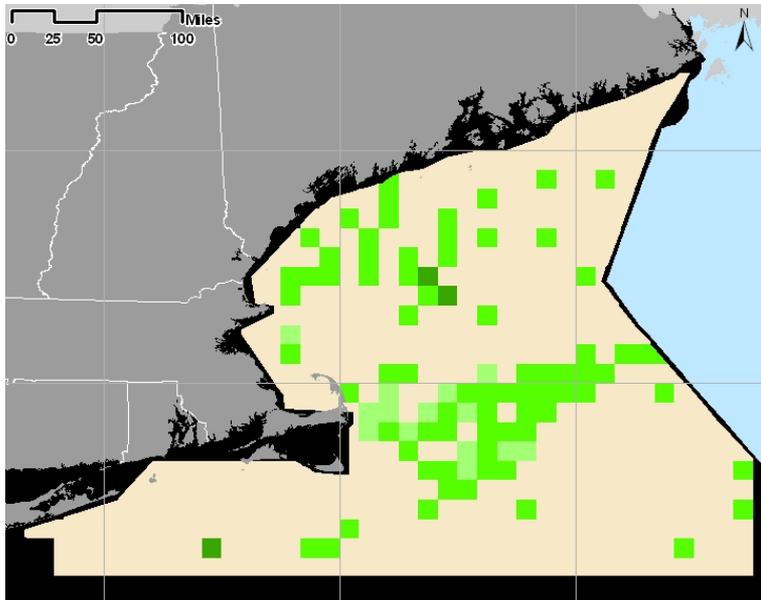
Right Whale



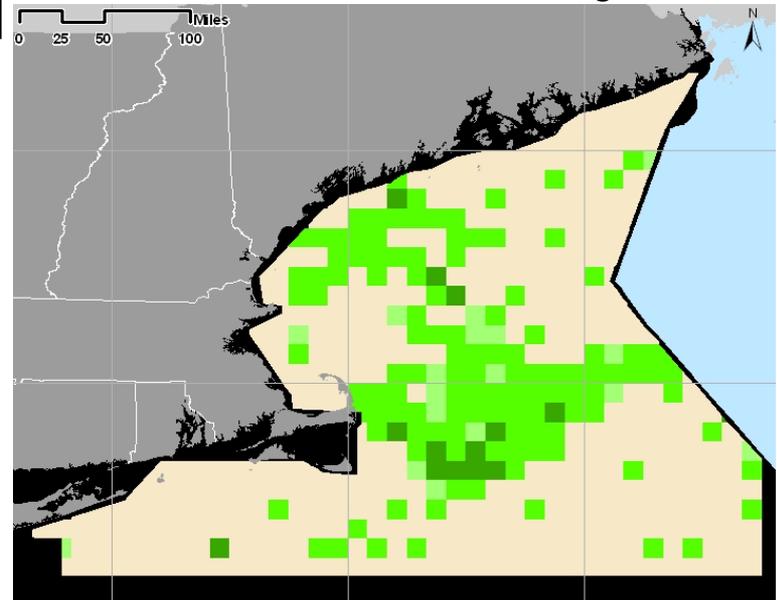
Humpback Whale



Fin Whale



Combined Whales (unweighted)



SPUE Score



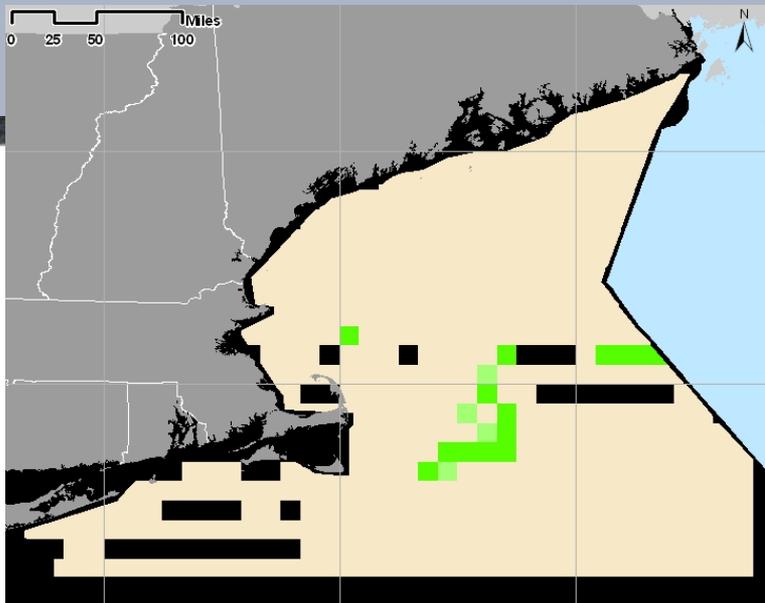
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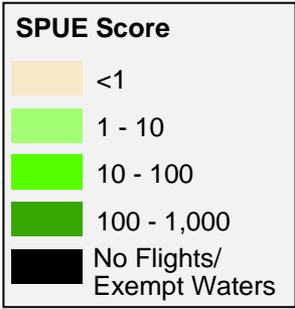
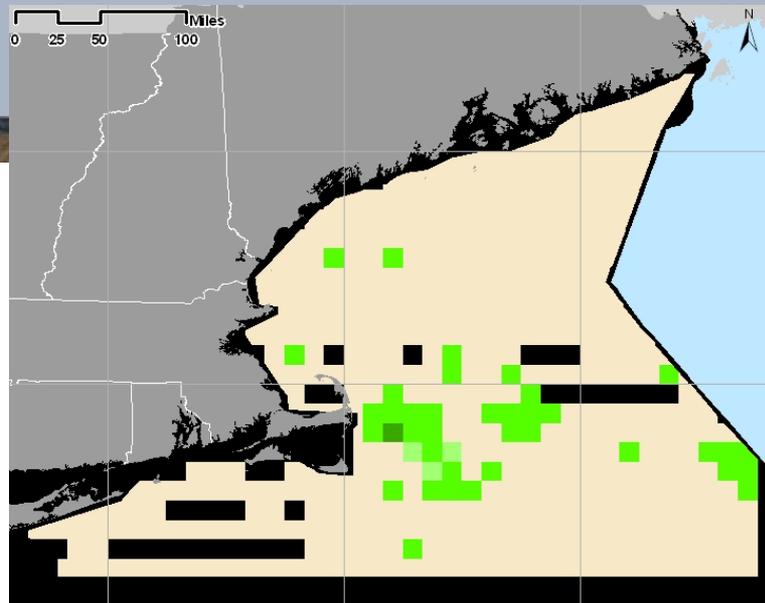
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July SPUE (2002-2007)

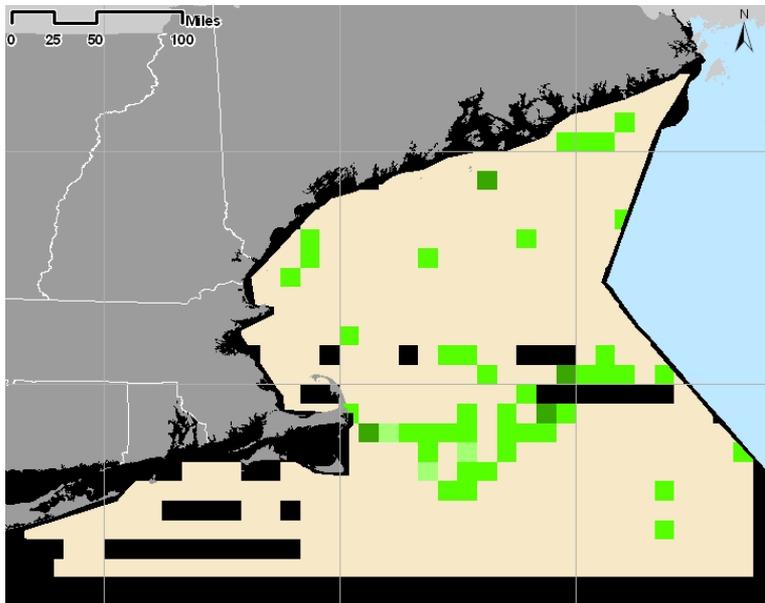
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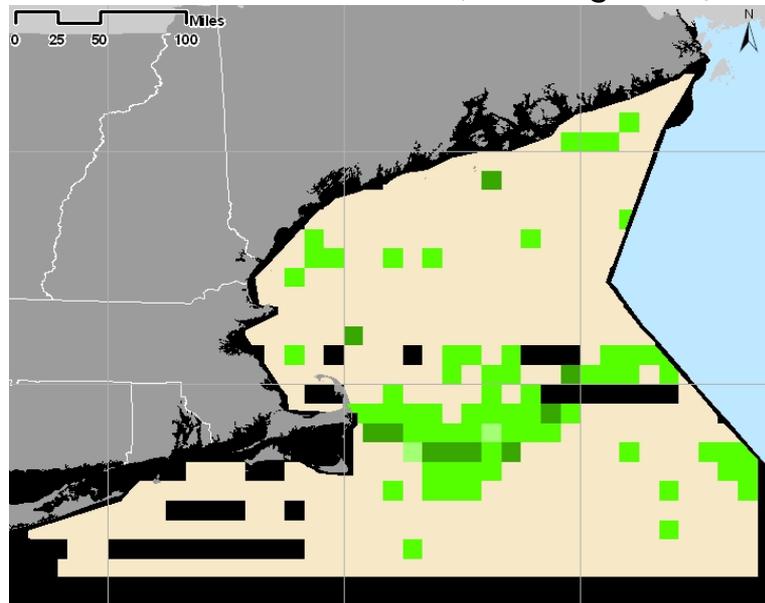
Humpback Whale



Fin Whale

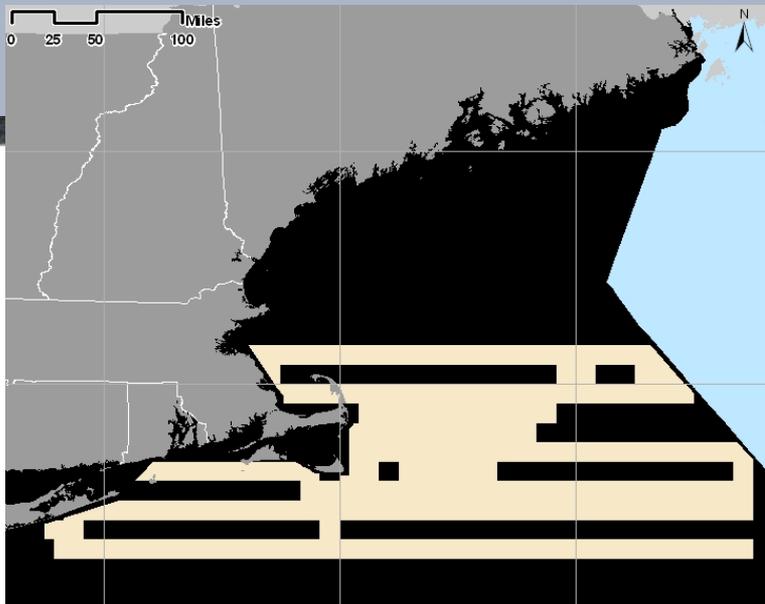


Combined Whales (unweighted)

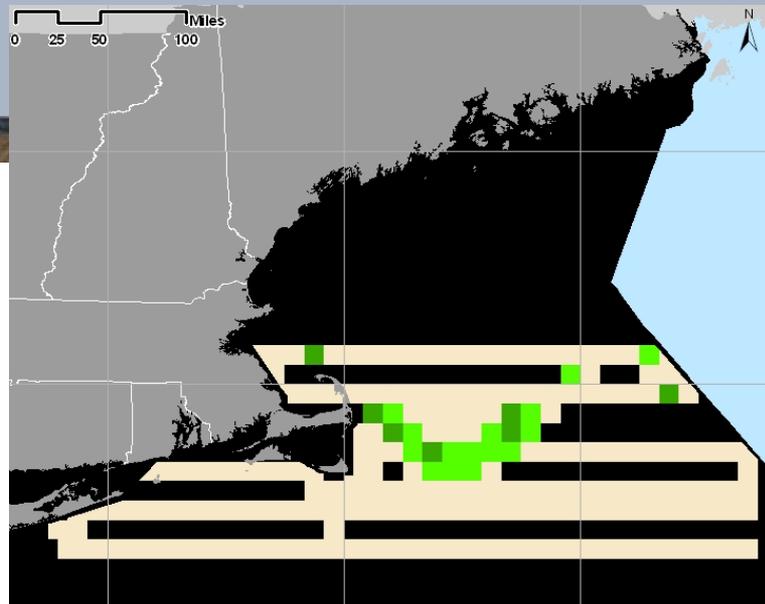


August SPUE (2002-2007)

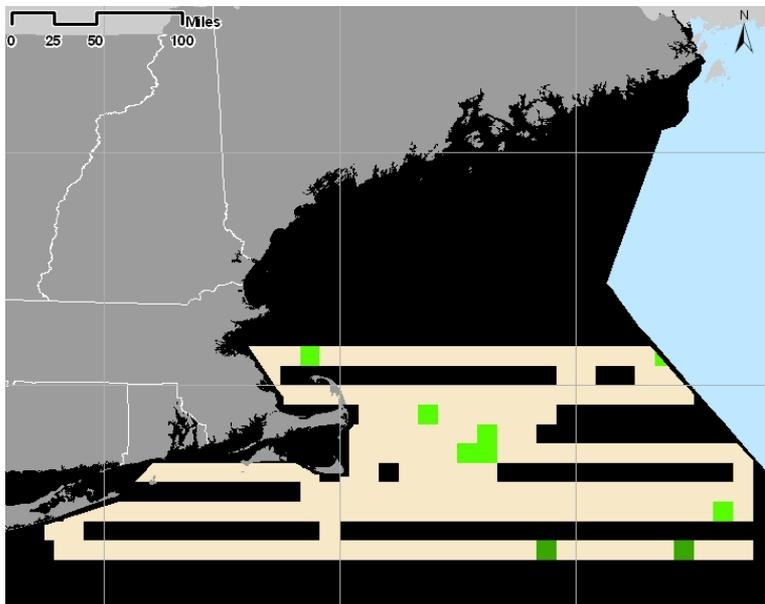
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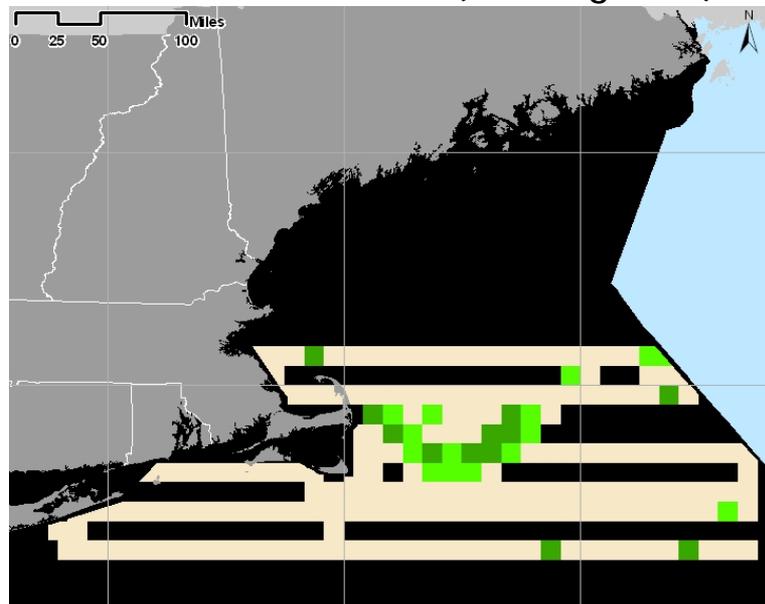
Humpback Whale



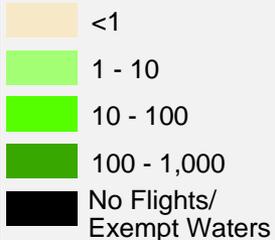
Fin Whale



Combined Whales (unweighted)



SPUE Score



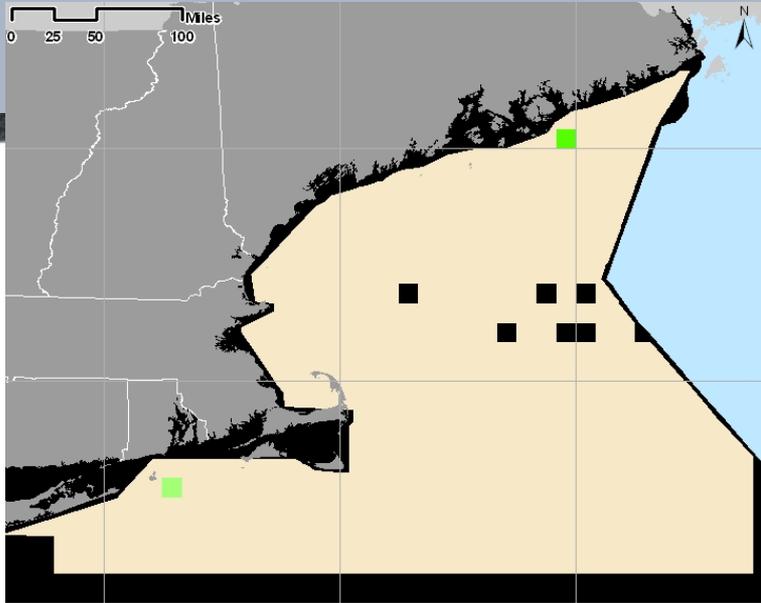
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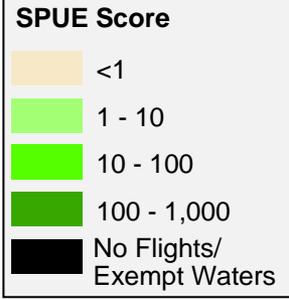
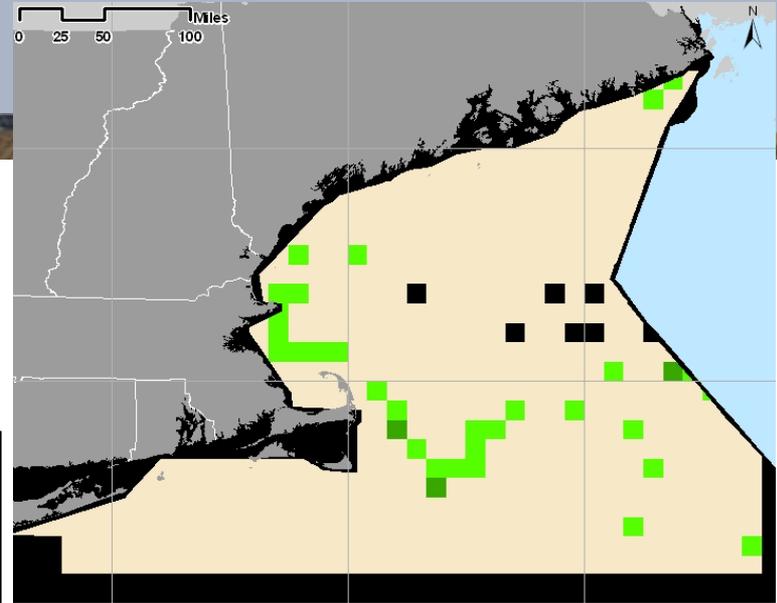
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September SPUE (2002-2007)

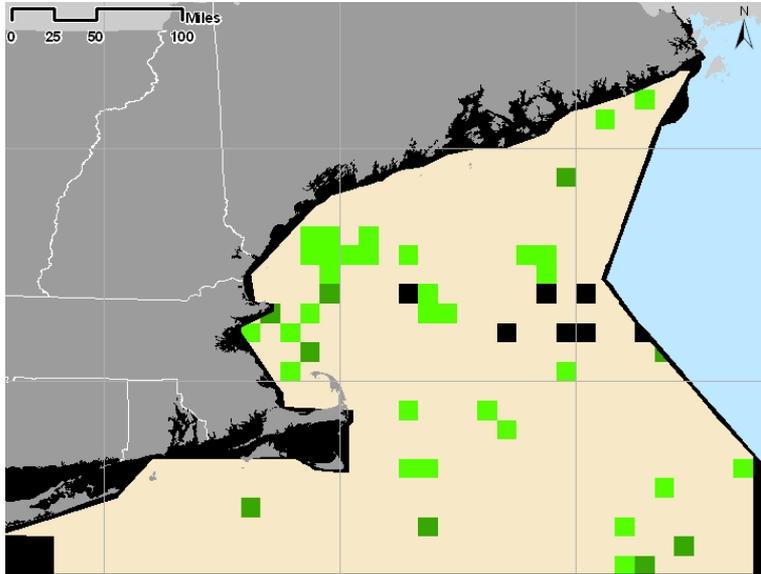
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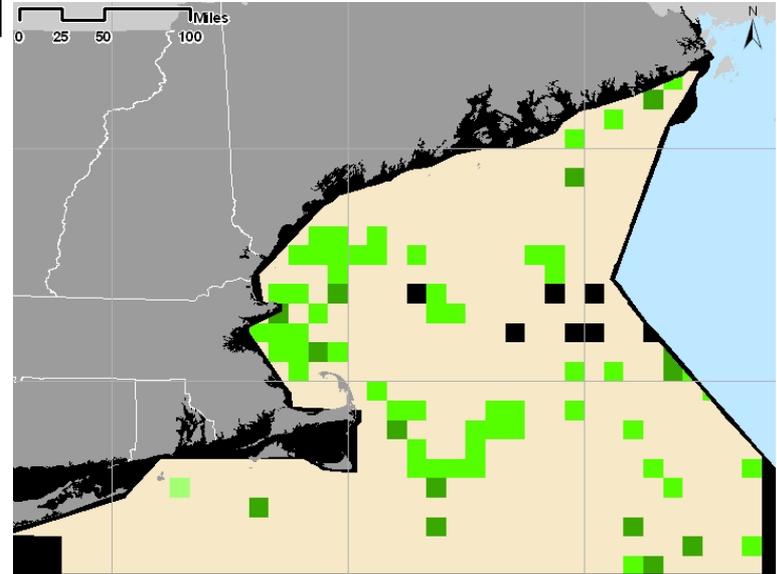
Humpback Whale



Fin Whale

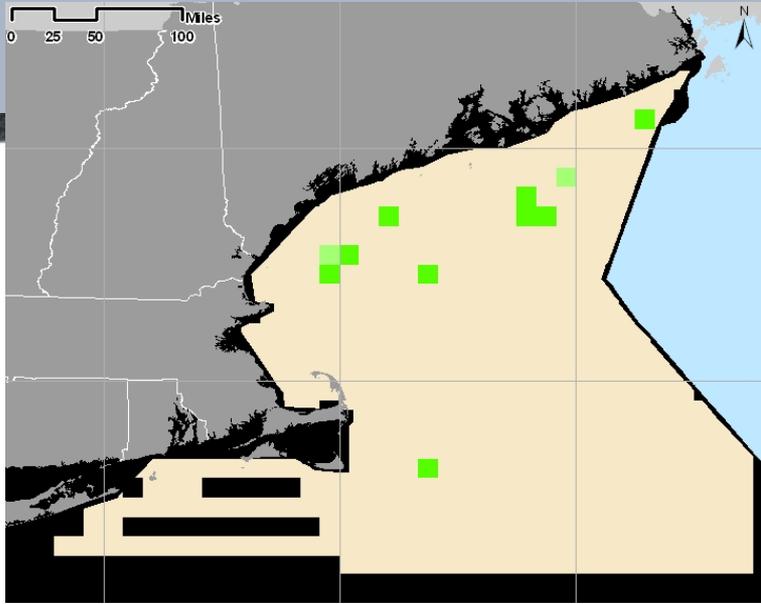


Combined Whales (unweighted)

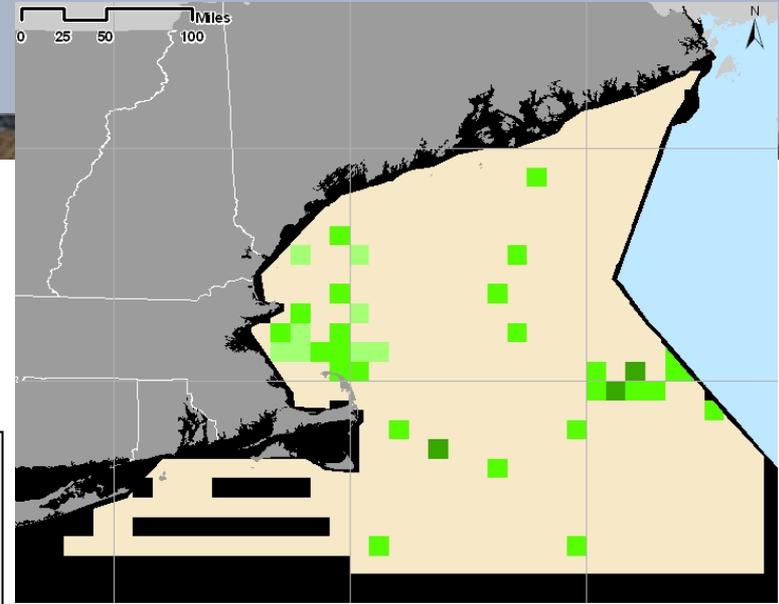


October SPUE (2002-2007)

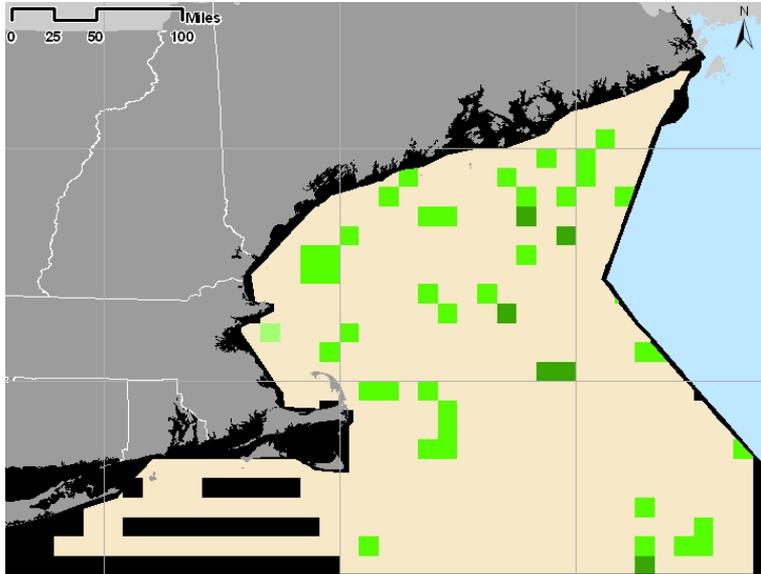
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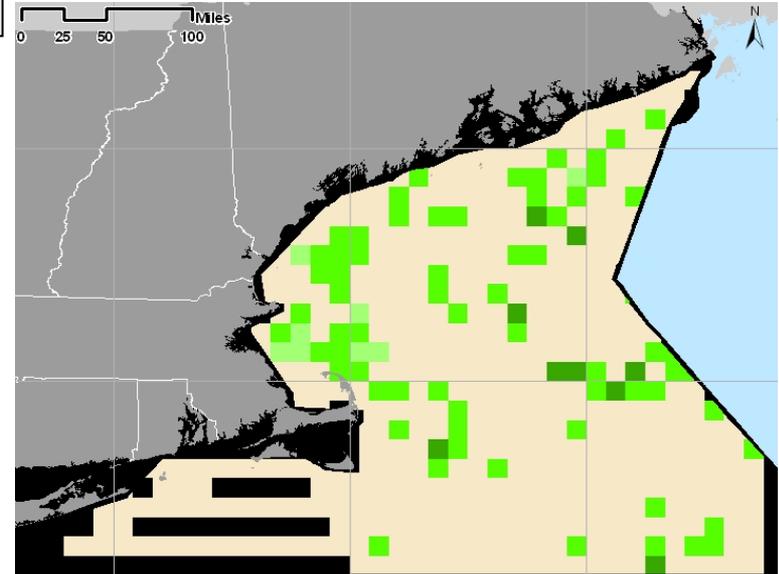
Humpback Whale



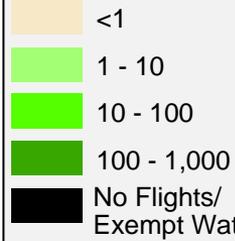
Fin Whale



Combined Whales (unweighted)



SPUE Score



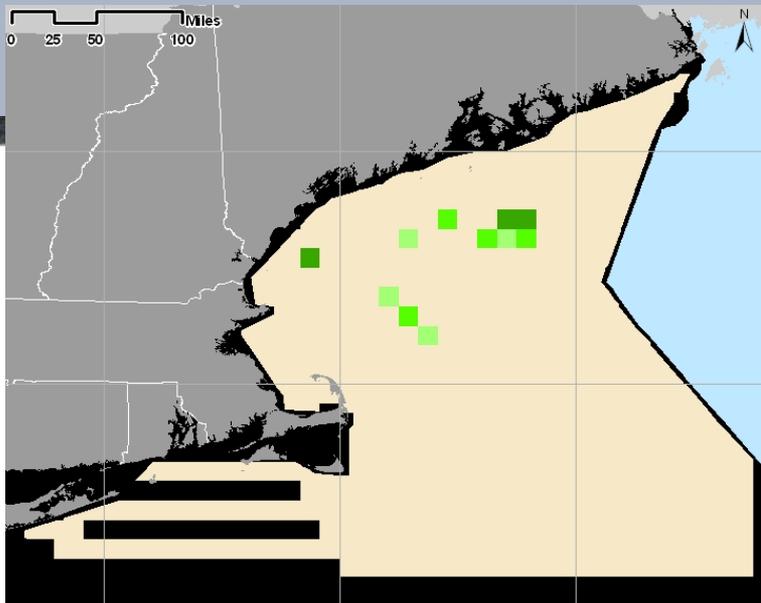
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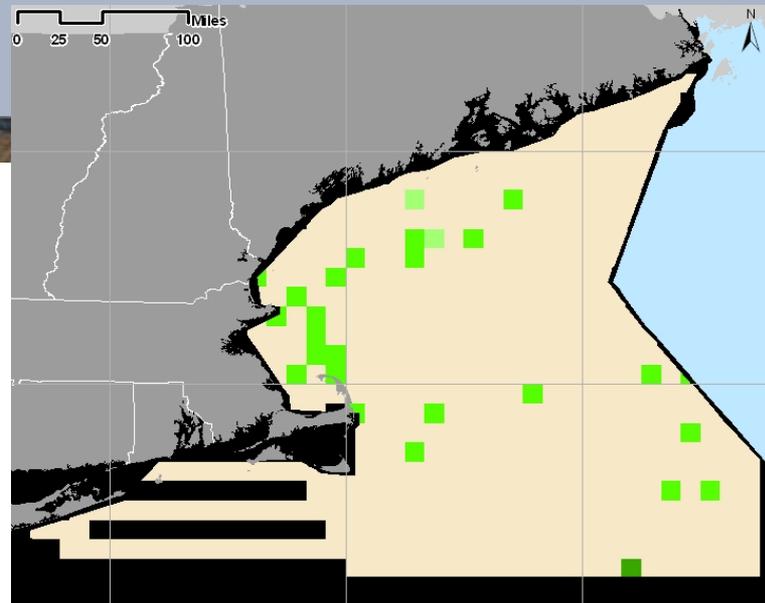
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November SPUE (2002-2007)

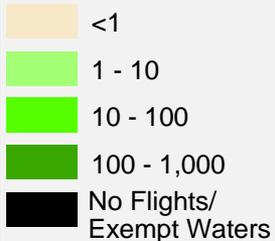
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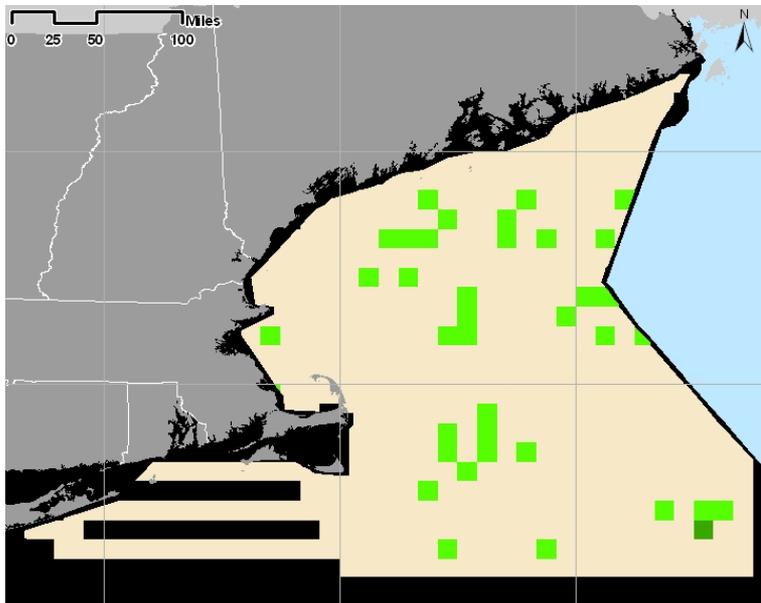
Humpback Whale



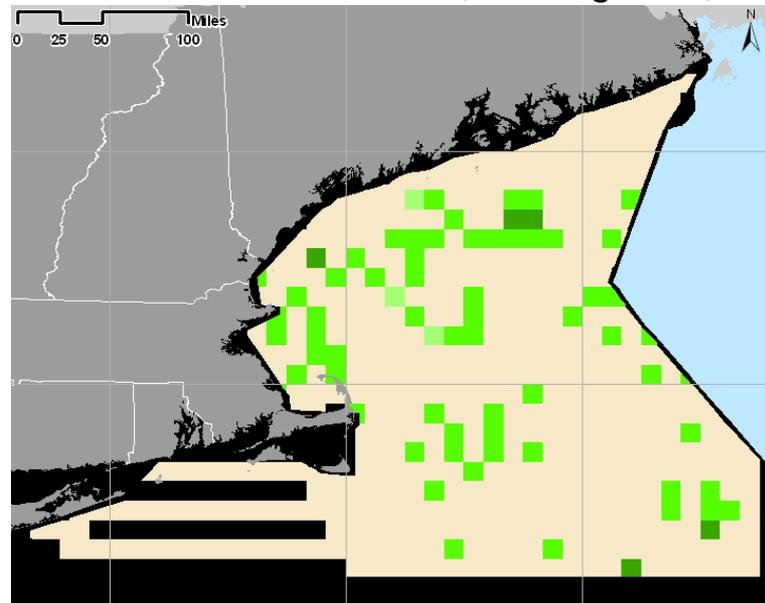
SPUE Score



Fin Whale

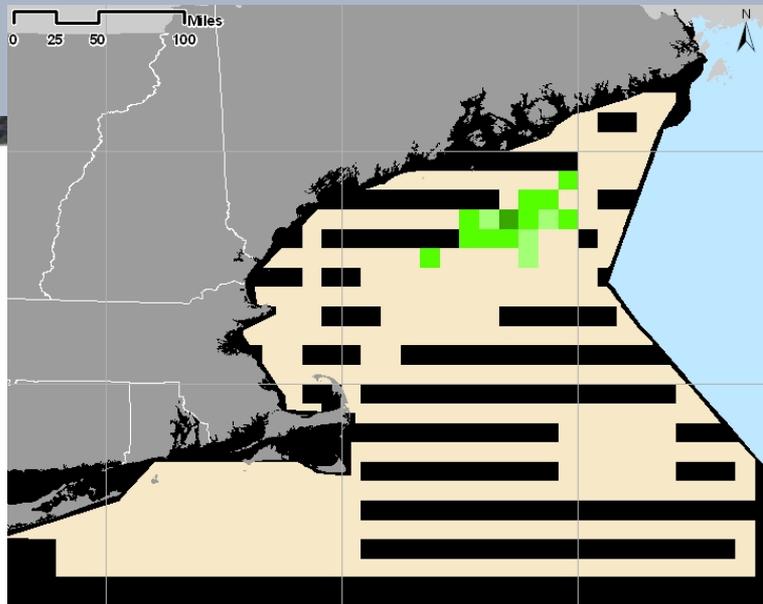


Combined Whales (unweighted)

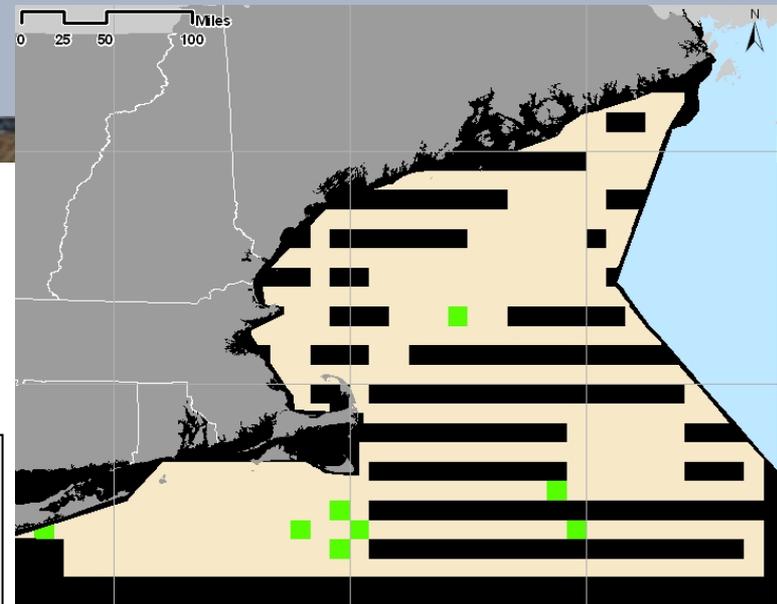


December SPUE (2002-2007)

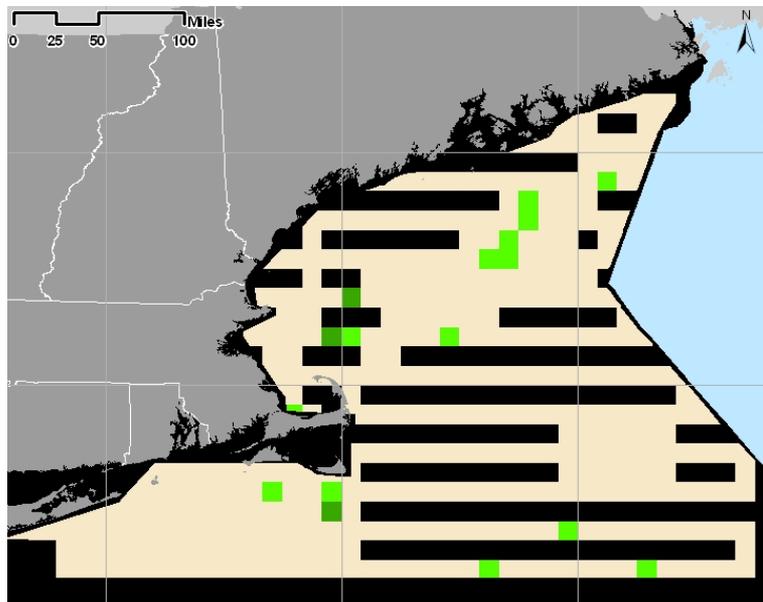
Right Whale



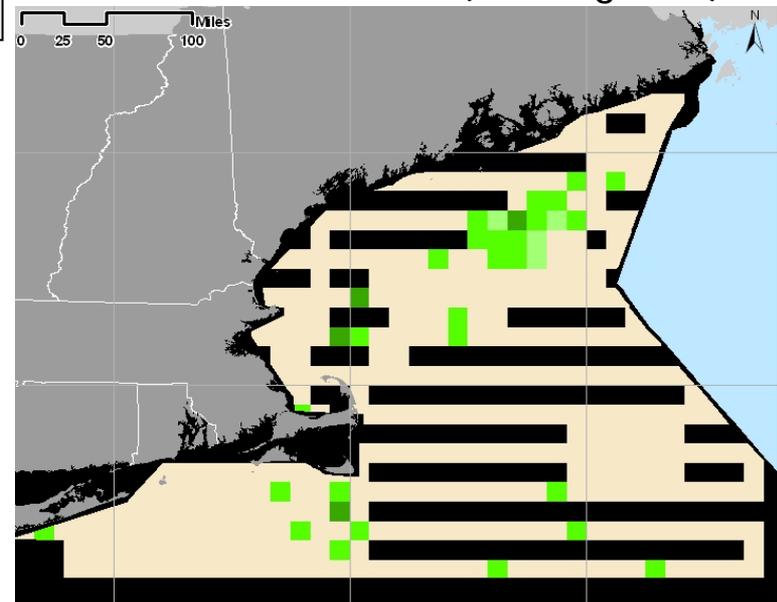
Humpback Whale



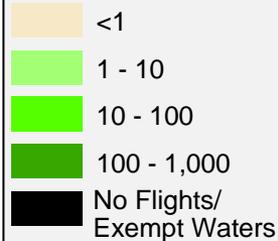
Fin Whale



Combined Whales (unweighted)



SPUE Score



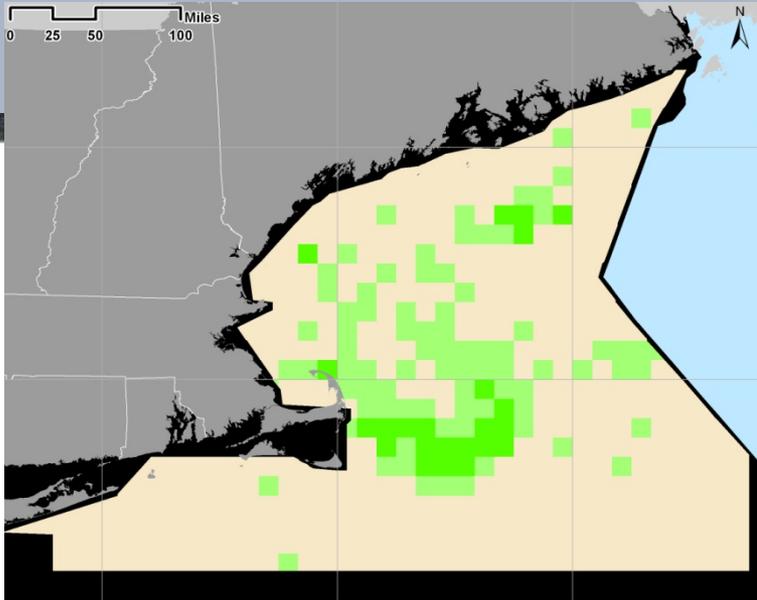
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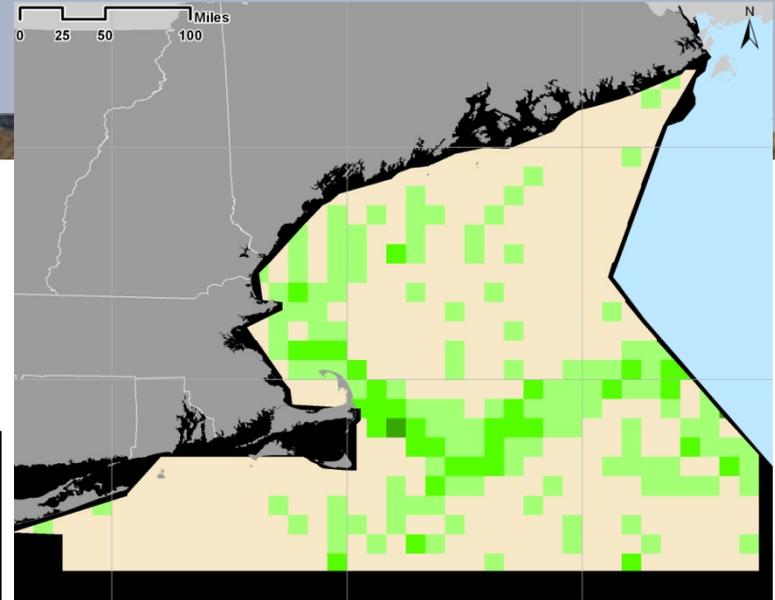
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Average Annual SPUE (2002-2007)

Right Whale



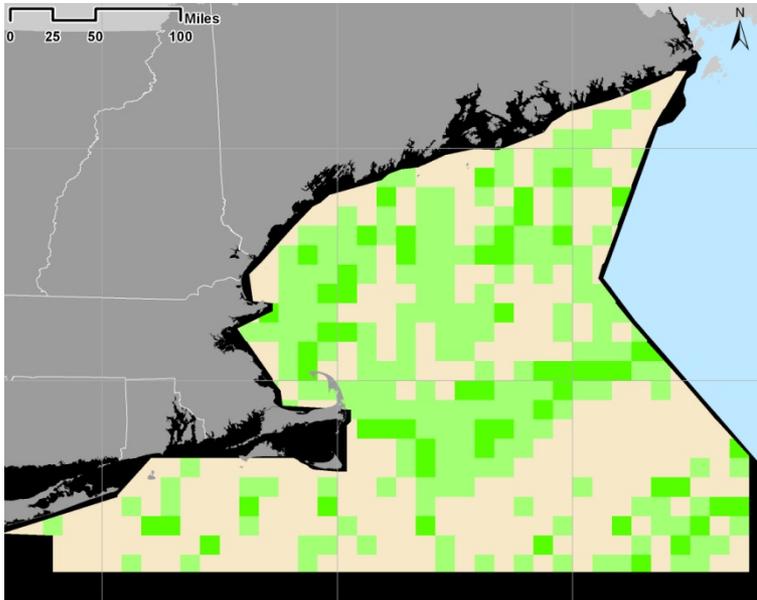
Humpback Whale



SPUE Score



Fin Whale



Combined Whales (unweighted)

