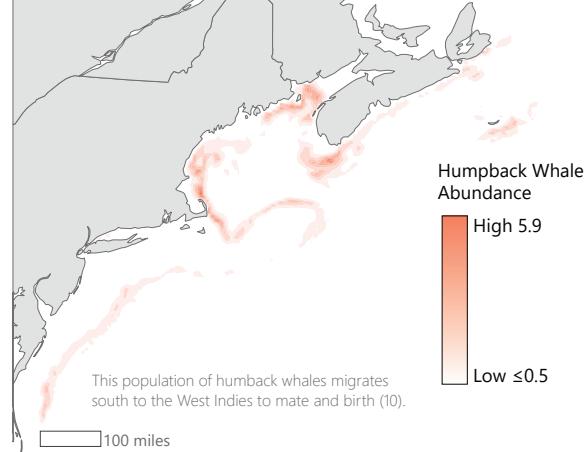
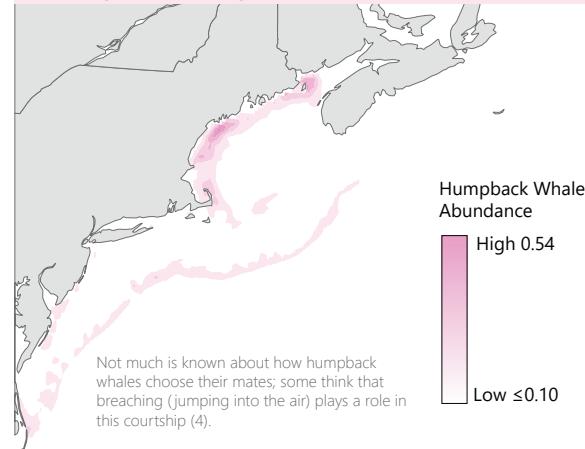


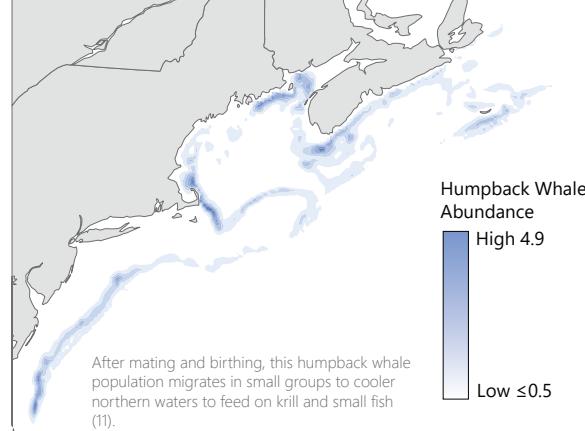
Pre - Mating Season | October - November



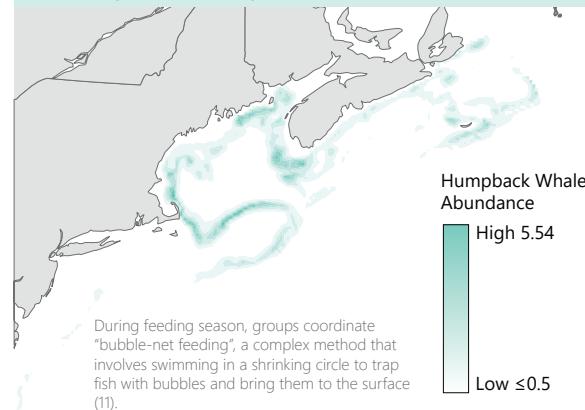
Mating Season | December - March



Pre - Feeding Season | April - May



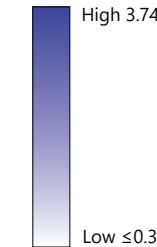
Feeding Season | June - September



HUMPBACK WHALES

What can we learn from listening?

Year-Round Abundance



What is abundance?

Abundance is measured as the number of individuals per sample divided by the total group population. These maps show modeled spatial estimates of humpback abundance year round.

PAM Detection System And Range Modeling

NOAA's Passive Acoustic Monitoring (PAM) records the sounds of the ocean. Using these data, scientists can model the ranges of a variety of ocean mammals, including humpback whales. These abundance maps were all modeled using acoustic data (1, 2).



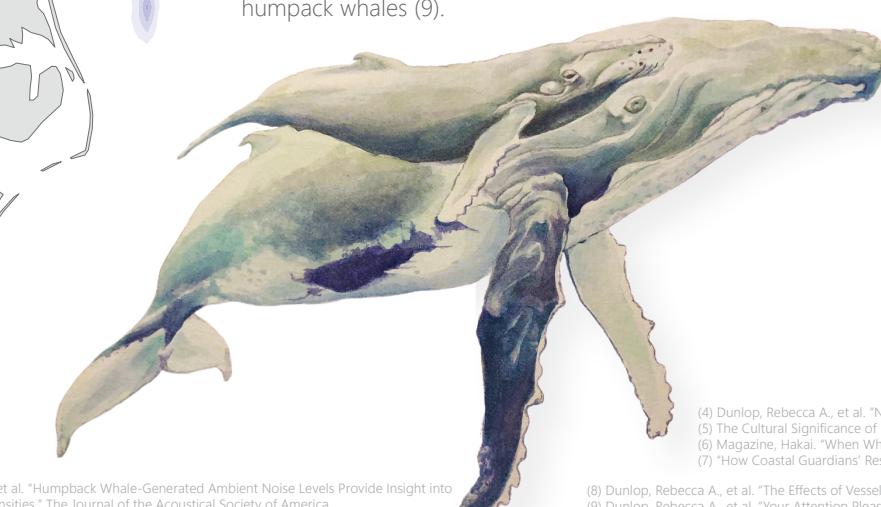
How do humpback whales communicate?

Humpback whales are famous for their thematic songs; these tunes go through cultural shifts every year and help males coordinate their movements (3). Both males and females also use what scientists call "grumbles", "snorts", "thwops", "wops", "groans", "barks", and more to socialize underwater. Surface sounds play a role in socializing too; breaching and fluke-slapping are thought to help whales introduce themselves to new groups (4).

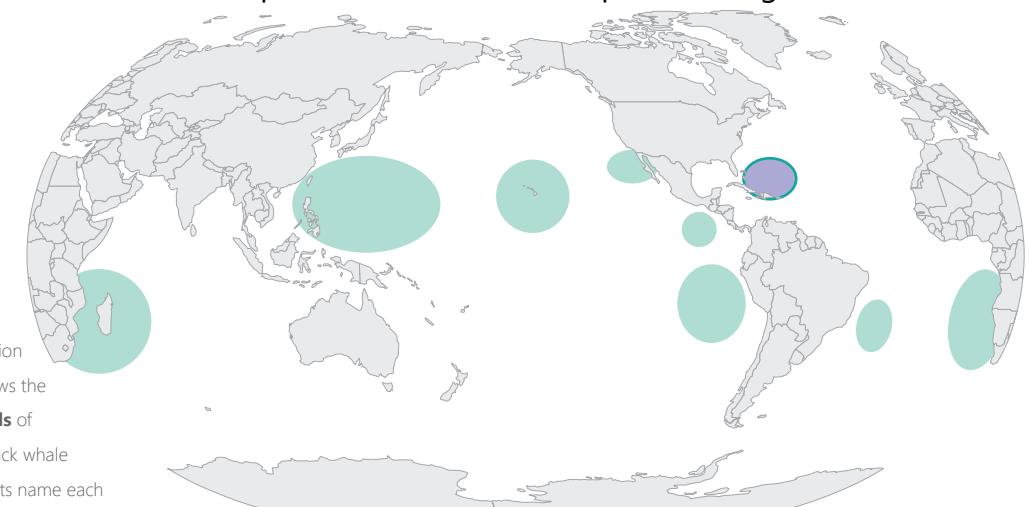


Noisy Ships

Ship noises reduce the range at which humpback whales can communicate (8). This interrupts all aspects of whale life, including socializing and sharing information with new groups. Major shipping ports like New York City may be permanently changing the migration routes of humpback whales (9).



Humpback Whale Distinct Population Segments



Abundance Maps PCS: USA Contiguous Albers Equal Area Conic | CM: -66.18 | SP1: 28.3 N | SP2: 46.4 N
World Map (Inset) PCS: CM: -159 | False Easting: 0 | False Northing: 0
All Maps GCS: WGS 1984

Design and Illustrations by Helen Asimina Tosteson

Data Source for Abundance Models: NOAA
Data Source for Countries: Natural Earth Project

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(2) "Passive Acoustic Monitoring Data Upload" | NOAA Fisheries.
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(9) Dunlop, Rebecca A., et al. "Your Attention Please: Increasing Ambient Noise Levels Elicits a Change in Communication Behaviour in Humpback Whales (*Megaptera Novaeangliae*).". *Proceedings of the Royal Society B: Biological Sciences*.
(10) Fisheries, NOAA. "Humpback Whale | NOAA Fisheries." NOAA.
(11) Bubble-Net Feeding: Humpback Whales Feeding in Kenai Fjords National Park.