

Project #:

B66

Title:

Whale broad-scale distribution

Principal Investigator(s) and Recipient Organization(s):

Nancy Friday (NOAA, Nancy.Friday@noaa.gov) – Lead PI
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Contract Period and Amount of Funding:

1 February 2008 to 31 December 2012
\$299,960

Report Period:

30 September 2008 through 1 April 2009

Report Date:

9 March 2009

Lead Author of Report:

Nancy Friday

Proposed timeline and milestones within report period:

- Prepare sightings data for submission to BSIERP-BEST data management and to B92 Top predator hotpot persistence, Fall, 2008
- Prepare sightings and oceanographic data for preliminary abundance and habitat analyses, Fall, 2008
- Submit data to BSIERP-BEST data management and to B92 Top predator hotpot persistence, December, 2008
- Develop preliminary habitat models, 2009
- Prepare NPRB semi-annual report (Oct-Mar, due Apr 1), March, 2009

Project Summary:

Estimate density and abundance of cetaceans in the survey area of the AFSC/NOAA walleye pollock (*Theragra chalcogramma*) acoustic stock assessment survey. Model cetacean distribution data and density estimates in terms of oceanographic and bathymetric variables and prey distribution and density to investigate cetacean habitat characteristics and to create predictive models of cetacean distribution. All analyses will focus on fin and humpback whales, but other cetaceans will be included as sample sizes permit. We will address the following BSIERP hypotheses:

3. Later spring phytoplankton blooms as a result of early ice retreat will increase zooplankton production, thereby resulting in increased abundances of piscivorous fish (pollock, cod and arrowtooth flounder) and a community controlled by top-down processes [Oscillating Control Hypothesis] with the possible trophic consequences:
 - b. Growing populations of humpback and fin whales increasingly will both consume and compete with forage fish (juvenile pollock) for zooplankton (euphausiids and copepods). By reducing the prey base of forage fish, whales not only reduce the amount of forage fish available to other predators, but also their quality (lipid content).
 - c. In a top-down control community, fishing will reduce the degree of top-down control of forage species (including juvenile pollock) by adult pollock, cod and arrowtooth flounder. Owing to

- light exploitation rates, top-down control by arrowtooth flounder will increase, as will their level of competition with piscivorous fish, seabirds and marine mammals. As a result of these two processes, arrowtooth flounder will determine ultimate community composition, such that the climax community will be arrowtooth flounder-dominated (similar to the Gulf of Alaska).
4. Climate and ocean conditions influencing circulation patterns and domain boundaries will affect the distribution, frequency and persistence of fronts and other prey-concentrating features and thus the foraging success of marine birds and mammals largely through bottom-up processes. Specifically:
 - a. Climate-ocean changes will displace predictably located, abundant prey (hot spots) necessary for successful foraging by central place (seabirds and fur seals while nurturing young) and hot spot (baleen whales, walrus) foragers.
 5. Climate-ocean conditions will change and thus affect the abundance and distribution of commercial and subsistence fisheries. Specifically:
 - c. Current management strategies for fish, seabirds and marine mammals in the Bering Sea are robust to climate scenarios (range of frequencies of cold and warm years) and associated range of trophic relationships and spatial redistributions.

Progress Summary:

Survey data were extracted from WinCruz files and error checked using a customized FORTRAN program (Paul Wade, National Marine Mammal Laboratory). Data were also processed through a customized VBA program (Alex Zerbini, National Marine Mammal Laboratory) in preparation for importing into program DISTANCE for line transect analysis. Tracklines and cetacean sightings were plotted in ArcMap to check for accuracy. Finally, data were error checked by ensuring that the minimum and maximum values and categorical values for each variable were within normal range. Sightings of pinnipeds and ships were not consistently recorded during the survey, so these records were deleted from the file. Metadata were created describing the project, the data collection process, the quality assurance methods and a detailed description of the data fields. Data and metadata were submitted to the BEST-BSIERP data management on 9 March, 2009 and to Mike Sigler for project B92 (Top predator hotpot persistence) on 25 February, 2009. The next step is to coordinate with the AFSC/NOAA walleye pollock survey team and other BEST-BSIERP projects to acquire relevant oceanographic and prey data for preliminary habitat models to be developed later this year and next year.

Lessons learned and project adjustments:

Post-processing and error checking the data and creating metadata took longer than anticipated. The Wincruz data collection program was upgraded mid-survey because of computer issues. This caused unexpected inconsistencies in the way data was recorded (e.g. pinniped and ship sightings) which had to be corrected.

The oceanographic and prey data will be acquired and processed this spring 2009 rather than fall 2008 in preparation for habitat modeling. Preliminary habitat models will be completed 2010 rather than in 2009.

Integration activity:

We prepared the cetacean data and metadata from the AFSC/NOAA walleye pollock (*Theragra chalcogramma*) acoustic stock assessment survey for delivery to the BEST-BSIERP data management. The acoustic survey was an interdisciplinary survey this year including cetacean, seabird, fish, macrozooplankton and oceanographic sampling. Cetacean distribution models will include oceanographic and bathymetric variables and prey distribution and density. Cetacean data were also provided to Mike Sigler for project B92 (Top predator hotpot persistence). We have participated in all of the monthly lead PI calls. Sue Moore attended the PI meeting as a representative for this project and presented a poster of 2008 results (Friday, Zerbini, Waite, Kennedy, Rone, Clapham and Moore. BSIERP Project B66: Baleen Whale Broad-Scale Distribution). Alex Zerbini attended the Alaska Marine Science Symposium as a representative for this project and presented a poster of 2008 results (Friday, Zerbini,

Waite, Kennedy, Rone, Clapham and Moore. Cetacean Distribution in the Bering Sea in the Spring and Summer 2008).

Education and Outreach:

None

Next year's Work plan (not part of the 5 page target length):

B66, Whale broad-scale distribution O4.38, Nancy Friday, Nancy.Friday@noaa.gov, 206-526-6266

Tasks, Assignments, Timeline for the next 12 months

| <i>What</i> | <i>Who</i> | <i>Start (2009)</i> | <i>Other key dates</i> |
|---|------------------------|----------------------|-------------------------|
| Prepare sightings and oceanographic data for preliminary abundance and habitat analyses | Friday, Waite, Zerbini | Spring, 2009 | |
| Develop preliminary habitat models | Zerbini, Friday | 2009 & 2010 | |
| Prepare NPRB semi-annual report (Apr-Sep, due Oct 1) | Friday, Zerbini | September, 2009 | Semi-annually 2008-2012 |
| Prepare NPRB semi-annual report (Oct-Mar, due Apr 1) | Friday, Zerbini | March, 2010 | Semi-annually 2008-2012 |
| Contract with Aquatic Farms for cetacean Observers | Friday, Waite | Mid-March, 2010 | |