

## North Atlantic right whales - NEFSC

### Abstract / Problem

Management of marine mammal populations falls within the jurisdiction of the National Marine Fisheries Service (NMFS) and the Marine Mammal Protection Act (MMPA) of 1972 and for some species, under the Endangered Species Act (ESA) of 1973. The agency is mandated to conserve endangered species, such as North Atlantic right whales (NARW), *Eubalaena glacialis*, under its jurisdiction, and safeguard the quality of their habitat. The Northeast and Southeast Fisheries Science Center are responsible for overseeing and partially funding research on marine mammals, notably those populations listed as Strategic Stocks.

NARW are among the most endangered of cetaceans. Their population size is currently estimated as 455 whales known to be alive in 2010, and the population has been increasing slowly (~2.8%/year) between 1990 and 2010 (Waring et al 2014). The major anthropogenic threats to NARW are entanglement in fishing gear, currently their primary source of mortality (van der Hoop et al. 2013), for which incremental gear modifications to reduce mortality or morbidity have proved unsuccessful (Pace et al. 2014); and ship strike, for which modifications to shipping routes and mandatory reductions in ship speed in specific times and areas appear to have proved more successful (e.g. Conn & Silber 2013).

To provide the scientific data required to meet these responsibilities NMFS undertakes aerial and vessel-based surveys directed at identifying individuals, particularly mother/calf pairs in different habitats. We also have a Passive Acoustics (PA) program that is developing and implementing tools to improve our understanding of right whales' distribution at temporal scales impossible to achieve using other techniques.

Aerial photography and vessel-based biopsy work focuses on identifying individuals and collecting biopsies from individuals known not to have been biopsied. Due to the nature of the research programs (aerial surveys flying a Twin Otter over several months of the year, cruises well offshore on NOAA ships) our NARW research program collects data on NARW that tend not to be collected by other research groups.

We also support NARW work more broadly, by funding the North Atlantic right whale Catalog (curated by the New England Aquarium) and the right whale Database (curated by the University of Rhode Island) as well as supporting other external research projects as funding allows.

### Talks:

Peter C: Introduction (brief).

Tim: Aerial surveys; Serious Injury & Mortality

Lisa: Ship work & work in the SE by the NEFSC / other fieldwork (e.g. collaboration with Susan / NEAq)

Sofie: Passive acoustics (aka her Consortium talk)

Pace: Analytical approaches, right whale SAR

Peter C: NEFSC wrapup: successes; weaknesses; recommendations.

Lance: SEFSC work on right whales

**Issues:**

There are a few issues for the NARW program that need addressing:

*NARW distribution*

The distribution of NARW in the past 3 years or so has changed from what it was previously. There is some evidence to suggest that they might be moving north and offshore, although how much - for either - is unknown. There is also evidence that they move south of their “normal” distribution in winter, perhaps in response to abnormally early plankton blooms occurring off the mid-Atlantic coast.

We ran some aerial surveys off the Canadian coast (Nova Scotia) in 2014 and the few NARW observed tended to be swimming north. We are not in a position to extend substantially the aerial surveys that we're already running (to the north or east) for a few reasons:

- a. We have to maintain a standard survey pattern to ensure that changes we see aren't due to changes in our survey design;
- b. We can't take the plane further offshore – the logistics of the flights simply don't work;
- c. We couldn't fly some places (e.g. the Labrador Sea) in a Twin Otter anyway;
- d. We don't have the money - we managed the Canadian work last year because NOAA Aerial Operations received a windfall of funds & we could fly for free for most of the year. This is unlikely to happen again.

The main way in which we are attempting to over come this problem is by deploying PA receivers in offshore waters, and collaborating with research partners in the USA and Canada. We are also working with NEFSC Oceanography branch to develop new models investigating the relationship between NARW occurrence and oceanographic parameters, especially using the distribution of calanoid copepods from the NEFSC EcoMon survey series.

*Understanding NARW population trends.*

Our estimate of abundance of NARW for the Stock Assessment Report (SAR) is based on a Minimum Number Alive (MNA). By the time a SAR is written, that number can be several years out of date. For example, the most recent SAR available is the 2013 SAR compendium, and the MNA estimate for NARW is for 2010.

A further issue with the MNA approach is that it is dependent on relatively consistent, successful effort over time. There are indications that the increase observed over the past N years in the MNA is slowing, or stopping. Whether this is due to data issues or is a real decline is an open question. Reasons for concern include:

- (a) NARW calving has been relatively poor in the past few years;
- (b) 50 individual whales (~10% of the population) are currently on a “watch list” (managed by the New England Aquarium) as having anthropogenic injuries of concern – 40 from entanglements and 10 from vessel strikes;

We are addressing this by developing new mark-recapture techniques to estimate abundance and survivorship of NARW; and by assessing the extent to which NARW are occurring outside our survey areas, using PA receivers.

#### *Industrial oceans.*

A final issue, that goes beyond NARW, is the increasing industrialization of the ocean area of the US east coast EEZ, especially hydrocarbon exploration and wind energy development. Issues include industrialization's impact not just on marine fauna, but on the way in which we use the scientific enterprise to manage our impacts on marine fauna (and ecosystems more generally). Many problems facing NARW and other cetaceans are inherently problems of marine environmental management.

To give one simple example of how this affects our science, should we maintain and expand past practice (i.e. doing more surveys, using more sophisticated techniques to analyze survey data and attempting to make inference from models)? Or should we include some of the techniques developed in marine environmental science - e.g. Before-After, Control-Impact (BACI) designs; large-scale marine planning that includes design elements to make inference on the success (or otherwise) of management interventions? If so, what mix of the two approaches is appropriate?

As a first step, we have designed large-scale (but simple) project based on a BACI design to start to assess the impact of forthcoming seismic testing on deep-diving whales (not specifically on NARW). This is being funded by external partners (primarily BOEM). PSB staff also are engaged in the planning processes initiated by the Northeast Regional Ocean Council.

#### **References**

Conn PB and Silber GK 2013. Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales. *Ecosphere* 4:art43. <http://dx.doi.org/10.1890/ES13-00004.1>

Pace RM III, Cole TVN, and Henry AG 2014. Incremental fishing gear modifications fail to significantly reduce large whale serious injury rates. *Endangered Species Research* 26:115-126

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