



**UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration**

NATIONAL MARINE FISHERIES SERVICE
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THE DIRECTOR

Genevieve Nesslage
Chair, Atlantic Scientific Review Group
University of Maryland
Center for Environmental Science
P.O. Box 38
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NOV 21 2019

Dear Dr. Nesslage:

Thank you for the letter from Erin Summers to Chris Oliver, Assistant Administrator for Fisheries, transmitting recommendations from the May 2019 meeting of the Atlantic Scientific Review Group (SRG). We also appreciate your follow up letter providing clarification to the SRG's recommendations. We strive to have a response prepared within 60 days of receipt of the SRG's recommendations and appreciate your understanding that our delay was to ensure that all recommendations were addressed.

The SRG has made many valuable recommendations to help guide NOAA Fisheries' marine mammal science and management, which are addressed in the enclosure. We want to thank you for agreeing to Chair the Atlantic SRG upon the end of Ms. Summers' tenure. We appreciate the continued service and contributions by members of the Atlantic SRG in providing advice and support to NOAA Fisheries in accordance with the Marine Mammal Protection Act. We look forward to our continued partnership to improve the science supporting the conservation of marine mammals.

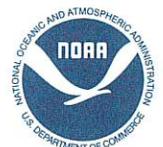
Sincerely,

Francisco Werner, Ph.D.
Director of Scientific Programs and Chief Science Advisor

Samuel D. Rauch III
Deputy Assistant Administrator for Regulatory Programs

Enclosure

cc: Chris Oliver, Assistant Administrator for Fisheries
David Detlor, Acting Director, Office of Science and Technology
Donna Wieting, Director, Office of Protected Resources



Responses to Recommendations of the Atlantic Regional Scientific Review Group

1. *The SRG commends NOAA Fisheries for their work developing methodologies for including cryptic mortality in the North Atlantic right whale and humpback whale Stock Assessment Reports (SARs) and strongly suggests NOAA Fisheries: (a) peer review and publish this method prior to its application to SARs; (b) prior to publication of this method, complete research to identify the percentage of deaths that are human-caused and include an approach to assign anthropogenic mortalities to specific fisheries; (c) initiate a discussion of this approach with the Atlantic Large Whale Take Reduction Team to give them an advance notice that this method could be used in future SARs; and (d) include a more detailed analysis of the relative sightability of vessel-struck versus entangled-at-sea mortalities, and the behavior of carcasses in terms of drift, buoyancy, sink versus float, shark scavenging, and other decomposition factors. Additionally, the cryptic mortality adjustment assumes that all individuals that exit the population are mortalities (and all the entries into the population are births), while some of the “mortalities” could simply be individuals that left the study area. Thus, the estimation of mortality and emigration could be confounded in this approach. Humpbacks, unlike North Atlantic Right Whales, spend a significant portion of their annual cycle well outside of the region where most survey effort and mortality investigations occur, and where the proportion of mortalities that are human-caused could be very different.*

We appreciate the SRG’s support of the development of cryptic mortality estimates. We concur that a publication of this method is worthwhile within a larger context that includes attempts to apportion unseen mortality to various sources while considering detection bias. As part of this effort, we are also investigating whether whales in poor health in their previous sighting (especially when linked to severe entanglement injuries) are less likely to be recovered as a carcass if they are likely to be dead (either by estimation or the presumed dead category). We are collaborating with multiple external partners on a manuscript that includes the presentation of cryptic mortality estimates. As this publication is likely to take some time (>1 year), we would like to clarify for the SRG several key points.

- In editing the preliminary draft 2019 North Atlantic Right Whale (NARW) SAR, we reviewed the final 2018 NARW SAR and 2018 SRG meeting notes. From meeting transcripts, we were reminded that the SRG requested we include a figure estimating cryptic mortality in the 2018 NARW SAR, which we did. Given this, we seek the SRG’s input as to whether it should be removed from FY19 SAR- since it was already published in last year’s SAR.
- Since there were several questions at the 2019 meeting about how cryptic mortality was estimated, we provide clarifying text for you here and in the text of the SAR if the SRG recommends retaining the estimates. The cryptic mortality estimate is calculated by taking the annual population estimate generated from the Pace *et al.* (2017) equation and applying the basic population dynamic formula (Williams *et al.* 2002) in the following way:

a) Parameters estimated in the model include: N_t , N_{t+1} and B_t (Number of entrants B or “births,” Population in year $t = N$, Deaths = D)

b) Simple equation for population growth: $N_{t+1} = N_t + B_t - D_t$

c) This yields: $D_t = N_t + B_t - N_{t+1}$ where the cryptic mortality estimate is taking: D_t - observed deaths = unobserved deaths

- We emphasize that the biological differences highlighted by the SRG between humpback and right whales are not as different as described. While these species have different home ranges, both species spend considerable time outside the area surveyed each year (examples of right whale sightings in Iceland and France in recent years) and often do not return for multiple years. In addition, for the given concentrations of both species, the entire population is never observed in any survey area. During most of the year, despite an intense survey effort, we do not know where the majority of either population occurs.

Regarding the SRG’s concern that the cryptic mortality estimate is based on the assumption that all mortalities are deaths and all entries are births, the SRG raises an excellent and valid point. If immigration is occurring, new mature animals would be documented and captured in the estimate of B. It is true that the estimate of cryptic mortality assumes all departures from the population are deaths, which is safe to assume given the lack of any evidence for emigration from the population. We note that temporary emigration (*e.g.* the animal is not observed in the survey area for multiple years) only adds to individual capture heterogeneity, which is accommodated by the model given the longevity of the data sets. We would also like to clarify that assumption is not a novel introduction to the cryptic mortality estimate but a core part of the published Pace *et al.* (2017) population estimate -- as such, it was already an embedded calculation prior to estimating cryptic mortality. There is a larger source of literature outside the field of marine mammalogy on the mark and recapture methodology that considers these assumptions. The novelty of many marine mammal population studies compared to studies of other taxa is that, particularly in humpback and right whale species, the recapture rate (and hence, both the precision and confidence of the results) is significantly higher.

With regard to the SRG’s recommendation that we “*initiate a discussion of this approach with the Atlantic Large Whale Take Reduction Team (ALWTRT) to give them an advance notice that this method could be used in future SARs,*” it should be noted that the ALWTRT was briefed at the close of their last meeting that the next meeting would be focused upon humpback whales to address the potential that fishery-related mortality and serious injury exceed Potential Biological Removal (PBR). Once the SAR is finalized and released for public comment, we will alert the ALWTRT of relevant updates to the humpback whale SAR and the opportunity to provide public comment.

2. *The SRG recommends that the application of the Pace mark-recapture method for estimating humpback whale abundance be incorporated into the SAR only after publication in a peer-reviewed journal (or a NEFSC reference document) and include a more complete description of how the observations were taken, the design of the annual photo-ID sampling cruise, as*

well as model inputs, assumptions, and diagnostics. Referencing a book chapter in Pace et al. (Hamilton et al. 2007: "The Urban Whale") that has limited access obscures the reader's ability to interpret the validity of this application.

We appreciate the SRG's input on the humpback whale abundance estimate. However, the use of mark and recapture to assess uniquely identifiable species of marine mammals is a common practice. Once a method is well described in the literature (*e.g.*, Pace *et al.* 2017), we regularly apply that method to other species with similar biological characteristics- as has been the case with the multiple species that have been assessed with line-transect survey abundance methodology without a prior publication. Humpback whales meet the key criteria for applying mark and recapture methodology as an animal with an established stock/range that is also uniquely identifiable.

The SRG has historically been interested in time-series and trend analysis. The application of mark and recapture methods to this population provides annual estimates with tight confidence intervals that go back many years. The alternative line-transect survey methodology provides estimates only when resources are available to conduct an extensive survey of the entire region with ships and planes in a small time window for a much greater cost than the annual photo sampling effort. These estimates typically have such large CVs that even when the center point of the estimates differ by 50% or more, they often do not represent a trend because there is little statistical difference (*e.g.*- there is no trend from the 2011 line transect humpback whale survey estimate of 335 animals versus the 2016 estimate of 4,165 as both have CV >0.4 - and reciprocally- if trending the center points would conclude a biologically impossible 1,200% population growth in 5 years).

We appreciate the SRG's recommendation to provide additional detail about how survey data are collected and will endeavor to include those details in the SAR in a way that is comparable to other SARs. With reference to the citation of the book chapter, we appreciate that not all literature is easily accessible; as with all citations contained in the SARs, we will make references available upon request.

3. The SRG strongly encourages the agency to finalize designation of critical habitat for the recently ESA-listed Gulf of Mexico Bryde's whale and prioritize hiring a recovery coordinator. This is essential in light of an increase in proposals for large scale oil and gas-related projects in or near their range in the eastern Gulf of Mexico.

We have been working on the conservation and recovery of the Gulf of Mexico Bryde's whale in various ways. For example, we have modified the portfolio of the Southeast Region's Right Whale Recovery Program Coordinator to include the Gulf of Mexico Bryde's whale. We have also been collecting extensive data on Gulf of Mexico Bryde's whale habitat as part of a RESTORE funded grant, which will likely form a large basis of our analysis for designating critical habitat. Additionally, we are in the final stages of hiring an MMPA and an ESA Coordinator for RESTORE activities in the Gulf of Mexico. These positions will support restoration coordination and environmental compliance by working with the RESTORE council, funding partners, and the public on the planning, design, implementation, and adaptive management of projects in the Gulf of Mexico. These coordinators will maximize conservation

and restorative benefits while identifying, avoiding, and minimizing impacts to protected species, including Bryde's whales. These positions will work closely with the SERO's Large Whale Recovery Program Coordinator.

- 4. The SRG supports the efforts of the North Atlantic Right Whale Recovery Plan U.S. Implementation Team Population Evaluation Tool (PET) Subgroup to forecast population dynamics and suggests that the final report clearly state how this tool differs from and is an improvement over, other well-established population viability analysis (PVA) tools such as Vortex. The SRG also suggests the PET Subgroup conduct a subset of comparison runs for several high priority scenarios using both the PET and a standard PVA package to compare performance and consult with the Implementation Team to prioritize scenarios for exploration. The SRG requests the opportunity to review preliminary runs via webinar prior to completion of the project.*

We appreciate the SRG's support of the Implementation Team PET Subgroup's efforts. This is an important initiative involving a diverse group of experts that will allow the Agency to characterize right whale extinction risk, taking into account current and future threats, and will allow inquiry into how much improvement to present-day mortality and reproduction schedules is needed to improve population trajectories. As part of its work, the PET Subgroup is reviewing all previous efforts to forecast the dynamics of the species, as well as related efforts for select marine mammals. This review will be included in the final report, both to provide background for the reader and to justify the choice of the model structure.

As requested by the SRG, we will explain why we chose to create a custom-designed PVA, rather than use an existing PVA platform (like Vortex or RAMAS), and the benefits and costs of doing so. The PET Subgroup is reluctant, however, to take the SRG's recommendation to conduct comparison runs between our model and an established PVA platform. Such a comparison would be costly: customizing the structure and estimating the parameters to set up a Vortex (or RAMAS) scenario is not trivial, and would add to the financial cost and timeline of the PET project. We do understand that carefully done, such a comparison is likely to show largely congruent results, which may give readers and reviewers comfort in the model. But, differences may very well arise, not as a result of any failure of the PET Subgroup's right whale model but as a result of the limitations of existing PVA platforms to accommodate the life-history, ecological, and management details of right whales. The PET Subgroup is not convinced that the benefits of undertaking model platform comparisons outweigh the costs. The PET Subgroup has been actively consulting with the Implementation Team on suggestions for scenarios to explore and will continue to do so, per your recommendation.

We appreciate the SRG's interest in future updates, and we will continue to keep the SRG informed of the PET Subgroup's progress as this effort continues. The PET Subgroup will be providing an update on the initiative at an Implementation Team meeting this fall when preliminary runs are expected to be available. We welcome the opportunity to organize a similar presentation to the SRG via webinar later in the year and would be grateful for feedback from the SRG before the completion of the project.

5. *The SRG suggests that analyses for the Southern North Carolina Estuarine Stock System (SNCESS) stock of bottlenose dolphins make use of the perspective provided by the Mid-Atlantic Bottlenose Dolphin Catalog (MABDC) to better define the stock before further efforts are made to estimate abundance. The MABDC should be accessed through appropriate channels respecting the collaborative relationships involved.*

We agree that the perspective provided by the Mid-Atlantic Bottlenose Dolphin Catalog could help with estimating the abundance of the SNCESS, and staff at the Southeast Fisheries Science Center (SEFSC) are working to accomplish this. SEFSC has contacted the curator of the MABDC catalog to review the protocols for data requests and data sharing and will evaluate whether or not data from the catalog can be integrated into the current assessment of SNCESS distribution and abundance in a timely manner. We plan to re-examine stock structure in North Carolina using newer genetic methods, and data are being collected for that purpose.

6. *The SRG recommends the 2016 Cetacean Survey Report include a table that compares estimates and CVs before and after the availability correction is applied, to allow readers to understand how much the new additions have increased the estimates. Additionally, it should be noted that not all the Gulf of Maine was surveyed; and therefore, many of the estimated numbers are lower than they would otherwise be.*

We thank for the SRG for this insight. We will endeavor to provide a table with estimates before and after the availability correction is applied. Also, we have provided additional information in the humpback whale SAR clarifying that there is no significant difference between the mark and recapture vs line-transect abundance estimates for humpback whales due to the high overlap in confidence intervals, due mostly to the very large confidence interval around the line transect survey estimate. Finally, we have generated a figure that identifies the regions surveyed by line transect survey methods and those surveyed to support mark-recapture modeling efforts. In addition, text has been added to the SAR to address impacts of incomplete survey effort in the Gulf of Maine.

7. *The SRG encourages NOAA Fisheries to work on expanding and clarifying the maps used to identify the range of the species in each of the SARs. In the short term, the maps should be larger for ease of use by the reader, the symbology and legend should be easier to read, and the entire range of the species should be depicted in some way. In the long term, NOAA Fisheries should move to an electronic interactive version of the distribution maps that can include additional data layers, such as habitat characteristics and depth.*

We appreciate the SRG's support to include enhanced stock range maps in the SARs as proposed by the NOAA Office of Science and Technology GIS Best Practices working group. We have now finalized national guidelines for developing GIS-based stock-specific range maps (and species range maps, when applicable) that address most of the changes requested by the SRG. The first prototype will be developed for the Alaska Fisheries Science Center to include in the 2020 Alaska SARs. We anticipate working with the Atlantic region afterward or in parallel for prioritized marine mammal stocks.

8. *The SRG highlights the importance of NOAA Fisheries' continued support for, or renewed funding of, habitat data collection programs such as the full capacity of the Ecosystem Monitoring (ECOMON) surveys (four or more a year), Continuous Plankton Recorder survey data collection and analysis, and funding of other long-term time-series programs for habitat and copepod sampling.*

We appreciate the SRG's support of habitat data collection programs. We are continuing to collect habitat and copepod data through ECOMON (with Atlantic Marine Assessment Program for Protected Species seabird/marine mammal/turtle observers also simultaneously collecting data while the plankton and habitat data are being collected). AMAPPS is also funding the continued processing of plankton and tuna larvae data. In addition, a separate project has been funded to collect ship-based visual and passive acoustic marine mammal data plus other environmental data in the area south of Cape Cod including the shelf break. In addition, the AMAPPS coastwise abundance survey in 2021 will continue to collect habitat data in conjunction with marine mammal detections. Another recently funded project will help automate the processing of the massive numbers of pictures from the visual plankton recorder.

9. *The SRG reiterates their recommendation that NOAA Fisheries make every effort to prioritize the collection of biopsy samples for genetic analyses during Gulf of Mexico cruises, and to identify ways to accomplish this without compromising cruise tracks.*

We appreciate the SRG's support for biopsy effort. We will attempt to identify ways to increase the number of biopsies collected during the future Gulf of Mexico ship surveys. During the recent Gulf of Mexico Marine Assessment Program for Protected Species (GoMMAPPS) project, priorities were set by the funding agency, and biopsy collection and subsequent data analysis was not a high priority. We appreciate this recommendation and will work with funding collaborators to make biopsy collection a higher priority on future surveys.

10. *The SRG highlights the following suggested operating guidelines: (a) published data should be used for SARs; (b) results reported without appropriate review should not be included in the SARs; (c) SARs should be given to the members of the SRG at least two weeks prior to the meeting; and (d) any "in press" or "in review" documents that are fundamental to the SAR should be provided to the SRG with the SAR at the time of review.*

We concur with these recommendations and will ensure that these guidelines are followed in future SARs submitted for SRG review. As articulated in the SRG Terms of Reference:

"The marine mammal SARs are to be based on the best available science. NMFS and the FWS strive to use peer-reviewed data as the basis for SARs. However, in many cases, the best available science may not have been published or subjected to a juried professional journal review, as this process can take months or years to complete. In other cases, data pertinent to assessments of stocks are routinely collected and analyzed but are not suitable for a stand-alone external peer-reviewed publication. Therefore, NMFS often relies on science that has been through the NMFS Science Center's internal expert review process and/or has been subjected to another external expert review to ensure that information is not only high quality but is available for management decisions in a timely

fashion. In these cases, all NOAA authored literature should meet, at the least, the standards for Fundamental Research Communications established by the NOAA Research Council and by NOAA Fisheries. NMFS and the FWS may rely on the SRGs to provide independent expert reviews of particular components of new science to be incorporated into the SARs to ensure that these components constitute the best available scientific information. Likewise, upon SRG review of these components and the draft SARs themselves, NMFS considers the SRG review of the draft SARs to constitute peer review and to meet the requirements of the OMB Peer Review Bulletin and the Information Quality Act. The use of unpublished reports and data within SARs is discouraged as such materials do not meet NOAA standards for IQA or for Fundamental Research Communications. NMFS and the FWS, as appropriate, will provide draft SARs, data, background documents and other documents to be reviewed to the SRG in advance of their annual meetings.”

References:

Pace, R.M., III, P.J. Corkeron and S.D. Kraus. 2017. State-space mark-recapture estimates reveal a recent decline in abundance of North Atlantic right whales. *Ecol. and Evol.* 7:8730–8741. DOI: 10.1002/ece3.3406

Williams, B. K., J. D. Nichols, and M. J. Conroy. 2002. *Analysis of Animal Populations, Modeling, Estimation and Decision Making.* Academic Press.