

August 25, 2017

Dr. Walter Cruickshank  
Acting Director  
Bureau of Ocean Energy Management  
1849 C Street, NW  
Washington, D.C. 20240

Mr. Chris Oliver  
Assistant Administrator  
NOAA Fisheries  
1315 East-West Highway  
Silver Spring, MD 20910

**Re: Modeling Analysis for Final Programmatic Environmental Impact Statement for Geological & Geophysical Activities on Gulf of Mexico Outer Continental Shelf**

Dear Dr. Cruickshank and Mr. Oliver:

The International Association of Geophysical Contractors and the American Petroleum Institute (the “Associations”) respectfully provide the enclosed report, titled “Gulf of Mexico Acoustic Exposure Model Variable Analysis” (“Model Analysis”), for your consideration. We request that the Bureau of Ocean Energy Management (“BOEM”) include the Model Analysis in its administrative record for the forthcoming record of decision related to BOEM’s Programmatic Environmental Impact Statement evaluating the potential environmental effects of geological and geophysical activities on the Gulf of Mexico Outer Continental Shelf (“PEIS”). We also request that the National Marine Fisheries Service (“NMFS”) include the Model Analysis in its administrative record for its Marine Mammal Protection Act (“MMPA”) Section 101(a)(5)(a) rulemaking for the Gulf of Mexico. Below, we provide some important context for the Model Analysis.

As explained in our comments on the Draft PEIS, the Associations are very concerned with the repeated application of precautionary assumptions across many variables within the model that was used for the PEIS to estimate marine mammal exposures to certain sound levels. Models are tools, but it is important to remember that models are simplifications of the real world and the parameters of a model are assumptions made by the decision-maker(s). It is the assumptions that lead to overestimates or underestimates of the results. By design, a multivariate model incorporates numerous variables to produce a single predicted result. When “precautionary” values are used for each of those variables—instead of the best available or most likely (*e.g.*, mean or median) values—and the uncertainty, or error (*i.e.*, standard deviation), is

not adequately quantified, the predicted outcome from the multivariate model can be inflated by significant orders of magnitude larger than a result based upon the input of the most likely or best available values for each variable. In certain cases, such as marine mammal take modeling, this can be on order of thousands or millions higher. The reason for this phenomenon is that the variables are multiplied within the model and when each variable is given a seemingly innocuous “precautionary” value not supported by proper analysis of variance or error, the multiplicative effect of compounding all those variables produces an extraordinarily unrealistic result.

To illustrate this problem, the Associations requested and received permission from BOEM and NMFS to engage the same contractor that performed the modeling for the PEIS (JASCO Applied Sciences) to run that same model, with the same data, but with alterations to four variables. The alternate values used for these four variables were chosen to attempt to reflect the central or most likely tendency for each value, based upon the best available information or practice. The four altered variables are described as follows:

- Sound Source Size. In the Draft PEIS, an artificial sound source was applied to all surveys, roughly comparable to the largest sound source used in the Gulf of Mexico (8,000 cubic inches). In contrast, the Model Analysis assumes an array of 4,130 cubic inches—a survey sound source used frequently in the Gulf that is near the mean or median size range of arrays used in the Gulf over the past decade. This single change results in a four-fold decrease in exposure estimates. *See* Model Analysis at Tables 15-16 and Appendix B.
- Population Density. The Draft PEIS applies a novel method for estimating animal distribution and abundance (Roberts et al. 2016).<sup>1</sup> The approach used in Roberts et al. (2016) (“Roberts Model”) is new and untested, and differs significantly from the official, MMPA-required population data produced by NMFS (NOAA Stock Assessment Reports or “SARs,” <http://www.nmfs.noaa.gov/pr/sars/species.htm>). For some species, SAR values and Roberts Model values have little difference, but for other species, the Roberts Model predicts abundance estimates 8, 16, or even 30 times greater than the SAR estimates. The Roberts Model abundance estimate was smaller than the SAR estimate for only one species. Appendix H of the Model Analysis provides a detailed explanation of how the intermediate values were generated for the analysis. The impact of a slight alteration of animal density data is a decrease in takes of less than 50% by itself, but when combined with the other changes, the more central estimates of population parameters contribute to a much larger reduction to the total take estimates, as illustrated by Tables 15-19 in the Model Analysis.

---

<sup>1</sup> Roberts J.J., B.D. Best, L. Mannocci, E. Fujioka, P.N. Halpin, D.L. Palka, L.P. Garrison, K.D. Mullin, T.V.N. Cole, C.B. Khan, W.A. McLellan, D.A. Pabst, G.G. Lockhart. 2016. Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico. *Nature: Scientific Reports*: 6:22615 | DOI: 10.1038/srep22615. [www.nature.com/scientific-reports/](http://www.nature.com/scientific-reports/).

- Aversion. In the Draft PEIS, behavioral avoidance or movement away from the source was acknowledged to be a well-documented and significant factor influencing the number of potential “takes,” especially “Level A” takes (as defined under the MMPA). In essence, the animals avoid coming within the zone containing sound levels that may cause Level A take. Avoidance or “aversion” is a well-documented phenomenon across many, if not all, marine mammal species. However, the PEIS modeling did not account for aversion. The Model Analysis includes a relatively slight degree of aversion—a few degrees deviation from course for a few seconds (*see* Model Analysis, Appendix F). Even incorporating a conservatively small amount of aversion results in a predicted reduction of Level A exposures of 40-80%. Stronger aversion that is more consistent with research studies and observer data would further reduce the estimated Level A exposures.
- Mitigation. Although visual and acoustic monitoring and mitigation measures have been required of industry vessels for decades, the Draft PEIS models give zero value to the benefits of these monitoring and mitigation measures. However, mitigation effectiveness likely varies by species and observing conditions, from as low as 5-10% at times to close to 100% for certain species and observing conditions. The Model Analysis includes a modest set of species-dependent mitigation factors (Model Analysis, Section 4.5, Tables 18-19). This has a straightforward impact on reducing predicted takes that scales to the assumed probability of observers detecting the animals, but which, we reiterate, interacts in a multiplicative manner with the other variables to create the highly inflated totals seen in the PEIS.

A fifth variable, the risk threshold criteria, was re-modeled by JASCO under contract to NMFS. This variable has been included along with the four variables selected by IAGC and API, with permission from NMFS, and is consistent with the points made by the other four changed variables: that small movements toward best available science have a greater impact on final model outcome than might be expected from the relatively small change to a single variable, through the multiplicative interactions with the other variables. We note, however, that the NOAA 2016 criteria, while a significant improvement over the criteria used in the Draft PEIS, still contain precautionary assumptions above and beyond the best available science.

We provide the Model Analysis solely to illustrate the substantial overestimation that can result from compounding precautionary assumptions in a multivariate model and to provide quantitative support for the qualitative comments we provided on the Draft PEIS.<sup>2</sup> It is not the structure of the model that is necessarily problematic, but it is the precautionary assumptions allocated to particular variables in the model by BOEM and NMFS that are problematic. The evaluation of alterations to only four of these variables sufficiently demonstrates the significant consequences of redundantly applied precaution in a complex multivariate model. As shown in

---

<sup>2</sup> See Letter from the Associations to Dr. Jill Lewandowski, dated November 29, 2016.

Dr. Walter Cruickshank and Mr. Chris Oliver  
August 25, 2017  
Page 4

the Model Analysis, these alterations produce marine mammal exposure estimates that are substantially lower than what are predicted by the model used for the PEIS.


The alternative values used for the Modeling Analysis do not reflect a position by industry about what is or should be considered the best available or most likely values for given variables. Rather, our intent is to demonstrate the importance of having a more thorough and inclusive expert discussion about what are the best available or most likely values for the different variables used in the PEIS model. Additionally, the Model Analysis should not be interpreted as the Associations' agreement with the model generally or a belief that the re-modeled results are indicative of actual effects. For example, we believe the re-modeled results presented in the Model Analysis still substantially overestimate the number of potential "Level B" exposures due to, among other factors, precautionary conservatism applied to the values used for Level B thresholds. Finally, we reiterate that the Model Analysis does not address all of the beneficial effects of mitigation, including benefits that may be qualitatively analyzed. We continue to believe, based upon many years of supporting experience and data, that mitigation measures substantially reduce, if not eliminate, potential takes.

We appreciate your consideration of the Model Analysis and respectfully invite further discussion on this issue. We will contact each of you to schedule a meeting so that we may discuss the Model Analysis in more detail and answer any questions that you or your respective colleagues may have.

Sincerely,



Nikki Martin  
International Association of Geophysical Contractors  
President



Andy Radford  
American Petroleum Institute  
Sr. Policy Advisor – Offshore

Attachment

Dr. Walter Cruickshank and Mr. Chris Oliver  
August 25, 2017  
Page 5

cc: David Bernhardt, Deputy Interior Secretary  
Kate MacGregor, Deputy Assistant Secretary for Land and Minerals  
Vincent DeVito, Counselor to the Secretary for Energy Policy  
Chairman Rob Bishop, House Committee on Natural Resources  
Chairman John Thune, Senate Commerce Committee  
Chairman Lisa Murkowski, Senate Energy and Natural Resources Committee