January 23, 2017

VIA Email (ITP.Laws@noaa.gov)

Ms. Jolie Harrison
Chief, Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910

Re: Comments on Revised Application for Marine Mammal Incidental Take Regulations for Geophysical Surveys in the Gulf of Mexico

Dear Ms. Harrison:

This letter provides the comments of the International Association of Geophysical Contractors ("IAGC"), the American Petroleum Institute ("API"), the National Ocean Industries Association ("NOIA"), and the Offshore Operators Committee ("OOC") (collectively, the "Associations") in response to the National Marine Fisheries Service's ("NMFS") request for comments on the Bureau of Ocean Energy Management's ("BOEM") revised application for marine mammal incidental take regulations ("ITRs") for geophysical surveys in the Gulf of Mexico ("GOM") (the "Application"). *See* 81 Fed. Reg. 88,664 (Dec. 8, 2016). We appreciate NMFS's consideration of the comments set forth below.

I. THE ASSOCIATIONS

IAGC is the international trade association representing the industry that provides geophysical services (geophysical data acquisition, processing and interpretation, geophysical information ownership and licensing, and associated services and product providers) to the oil and natural gas industry. IAGC member companies play an integral role in the successful exploration and development of offshore hydrocarbon resources through the acquisition and processing of geophysical data.

API is a national trade association representing over 625 member companies involved in all aspects of the oil and natural gas industry. API's members include producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of the industry. API and its members are dedicated to meeting environmental requirements, while economically developing and supplying energy resources for consumers.

NOIA is the only national trade association representing all segments of the offshore industry with an interest in the exploration and production of both traditional and renewable energy resources on the United States' outer continental shelf ("OCS"). NOIA's membership comprises more than 325 companies engaged in a variety of business activities, including production, drilling, engineering, marine and air transport, offshore construction, equipment manufacture and supply, telecommunications, finance and insurance, and renewable energy.

OOC is an organization of 47 producing companies and 61 service providers to the industry who conduct essentially all of the OCS oil and gas exploration and production activities in the GOM. Founded in 1948, the OOC is a technical advocate for the oil and gas industry regarding the regulation of offshore exploration, development, and producing operations in the GOM.[1]

II. OVERVIEW

The GOM OCS is a significant source of oil and gas for the Nation's energy supply. In 2014, the GOM OCS region was responsible for 16% of the total United States crude oil production and 5% of dry natural gas production.[2] Likewise, GOM OCS leases are an important source of federal revenues, generating substantial bonuses, rentals, and royalties paid to the United States. Since 2008, lessees have paid over $11 billion in bonus bids for lease sales in the GOM OCS.[3] Total oil and gas royalty revenues from the GOM OCS amounted to almost $5 billion in fiscal year 2015 alone.[4] Moreover, BOEM has recently estimated the net economic value of future GOM leasing to be as high as $197 billion.[5] Geological and geophysical survey activities ("G&G activities") are crucial to the discovery, development, and valuation of OCS resources that lead to such production.

For over 40 years, the federal government and academic scientists have studied the potential impacts of G&G activities on marine mammal populations and have concluded that any

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[1] By submitting this letter, the Associations do not intend to limit the ability of their individual member companies to submit separate comments or present their own views on the issues discussed in this letter.

[2] *See* U.S. Energy Information Administration, *Gulf of Mexico Fact Sheet* (June 22, 2016), http://www.eia.gov/special/gulf_of_mexico/data.cfm.

[3] *See* BOEM, *Outer Continental Shelf Lease Sale Statistics, Gulf of Mexico Oil and Gas Lease Offerings* (Dec. 31, 2015), http://www.boem.gov/Outer-Continental-Shelf-Lease-Sale-Statistics/.

[4] *See* DOI, Office of Natural Resources Revenue, Statistical Information, http://statistics.onrr.gov/ReportTool.aspx (Reported Revenues [Single Year Only], FY2015, Accounting Year, Federal Offshore, Offshore Gulf).

[5] *See* BOEM, *2017-2022 OCS Oil and Gas Leasing Proposed Final Program*, at Table 5-8 (BOEM, Nov. 2016), https://www.boem.gov/2017-2022-OCS-Oil-and-Gas-Leasing-PFP.

such potential impacts are insignificant. This conclusion has been publicly reaffirmed on multiple occasions by BOEM:

> To date, there has been no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting marine animal populations or coastal communities. This technology has been used for more than 30 years around the world. It is still used in U.S. waters off of the Gulf of Mexico with no known detrimental impact to marine animal populations or to commercial fishing.

In http://www.boem.gov/BOEM-Science-Note-August-2014/ (*Science Notes*, Aug. 22, 2014); *see also* https://www.boem.gov/BOEM-Science-Note-March-2015/ (*Science Notes*, Mar. 9, 2015) (there has been "no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting animal populations"). These statements accurately summarize the best available scientific information regarding the potential effects of G&G activities on marine mammals. There are no other data to the contrary.

We appreciate the hard work that BOEM has invested in the Application. Because there is no precedent for ITRs governing GOM geophysical activities, we understand the difficulties that presumably have been associated with the preparation of the Application. With that said, however, the Application contains significant and substantial flaws. These flaws are summarized as follows:

- The Application's requested levels of incidental take are not supported by the best available science, ignore the beneficial effects of the mitigation measures included as part of the proposed action, and result from overly conservative modeling that BOEM admits does not accurately reflect the anticipated impact. Consequently, the Application does not accurately present "[t]he anticipated impact of the activity" or the number of incidental takes that are "likely to occur." 50 C.F.R. § 216.104(6), (7) (emphasis added).

- The Application fails to utilize all of the best available science. Specifically, the Application does not sufficiently consider (1) the historical record showing that the known effects of geophysical activities on marine mammals are insignificant, (2) marine mammal monitoring data collected from numerous geophysical surveys in the GOM, and (3) new acoustic criteria for estimating incidental take by Level A harassment that may result from geophysical activities.

- The Application does not clearly present "[t]he species and number of marine mammals likely to be found within the activity area." 50 C.F.R. § 216.104. The Application and the associated Appendix confusingly use different abundance values and different models for distributing the animals within the GOM. Moreover, some of the abundance values and distribution models used by BOEM are either

acknowledged to be flawed, have insufficient statistical inference to support the interpretation of modeled results, or are the product of untested modeling assumptions about habitat suitability and not direct field observation.

- The Application fails to present a practicability assessment (including a cost-benefit analysis) of the proposed mitigation measures. Additionally, some of the proposed mitigation measures are economically and operationally infeasible and are highly unlikely to result in benefits to marine mammals.

- The Application presents little information about the proposed monitoring plan. The Marine Mammal Protection Act ("MMPA") does not authorize NMFS to require the operators of geophysical activities to carry out a large-scale, expansive monitoring plan that reaches beyond the time and area in which site-specific activities are undertaken. However, based upon the information presented in the Application, we cannot determine whether the contemplated monitoring plan is consistent with the MMPA's scope of authority.

Our detailed comments on the Application, set forth below, address these overarching flaws along with several other important topics. Although we encourage BOEM and NMFS to proceed with this rulemaking on a schedule that is compliant with court-ordered deadlines, they must do so in a manner that is aligned with MMPA requirements and based upon an Application that is free of the substantial errors contained in the present version of the Application.[6] In order to do so, the Application, and particularly Chapters 6 and 7, must be substantially revised and resubmitted on a schedule that complies with litigation deadlines.

III. COMMENTS

A. G&G Activities Play a Critical Role in the Safe and Orderly Development of the Oil and Gas Resources of the GOM

1. Legal context

The Outer Continental Shelf Lands Act ("OCSLA") calls for the "expeditious and orderly development" of the OCS "subject to environmental safeguards." 43 U.S.C. § 1332(3); *see California v. Watt*, 668 F.2d 1290, 1316 (D.C. Cir. 1981) (OCSLA's primary purpose is "the expeditious development of OCS resources"). Congress enacted OCSLA to "achieve national

[6] The Associations filed a comment letter, dated November 29, 2016, in response to BOEM's draft programmatic environmental impact statement to evaluate the potential environmental effects of multiple G&G activities on the GOM OCS ("DPEIS"). *See* 81 Fed. Reg. 67,380 (Sept. 30, 2016). We hereby incorporate those comments by reference and expect the Association's November 29, 2016 comment letter on the DPEIS to be included in the administrative record for the rulemaking initiated by the Application.

economic and energy policy goals, assure national security, reduce dependence on foreign sources, and maintain a favorable balance of payments in world trade." 43 U.S.C. § 1802(1). Indeed, Congress expressly intended to "make [OCS] resources available to meet the Nation's energy needs as rapidly as possible." *Id*. § 1802(2)(A). "The first stated purpose of OCSLA, then, is to establish procedures to expedite exploration and development of the OCS. The remaining purposes primarily concern measures to eliminate or minimize the risks attendant to that exploration and development. Several of the purposes, in fact, candidly recognize that some degree of adverse impact is inevitable." *Watt*, 668 F.2d at 1316.

Here, the geophysical activities to which the contemplated ITRs would apply are authorized by BOEM pursuant to OCSLA. *See* 43 U.S.C. § 1340. Neither OCSLA nor the MMPA requires an applicant for a G&G permit under OCSLA to obtain an incidental take authorization under the MMPA. However, unlawful incidental takes of marine mammals may be subject to MMPA-based penalties. *See* 16 U.S.C. § 1375. Marine mammal incidental take authorizations for GOM G&G activities in the GOM have rarely, if ever, been issued by NMFS. As indicated in the Application, applications for ITRs for GOM geophysical activities have been pending or in various stages of preparation since 2002.

Notwithstanding the lack of GOM-specific ITRs, industry operators have for years complied with measures imposed under the terms of seismic activity authorizations to protect marine mammals. *See* Joint Notice to Lessees ("NTL") No. 2016-G02 (previously NTL No. 2012-G02 and NTL No. 2007-G02).[7] By all accounts, these measures have been successful. Based on the best available scientific information, there has been no demonstration of any biologically significant negative impacts to marine life from G&G activities in the GOM. *See supra* http://www.boem.gov/BOEM-Science-Note-August-2014/ (*Science Notes*, Aug. 22, 2014); https://www.boem.gov/BOEM-Science-Note-March-2015/ (*Science Notes*, Mar. 9, 2015). In fact, BOEM recently reconfirmed that "G&G surveys have been ongoing in the northern GOM for many years, with no direct information indicating reduced fitness in individuals or populations." DPEIS at 4-57 (emphasis added).

On June 30, 2010, a consortium of environmental advocacy groups filed a federal lawsuit challenging BOEM's determination that the authorization of G&G activities in the GOM does not require the preparation of an environmental impact statement ("EIS"). *See NRDC et al. v. Jewell et al*., No. 2:10-cv-01882, Dkt. 1 (E.D. La.) ("*NRDC v. Jewell*"). The claims asserted in *NRDC v. Jewell* have been resolved through a settlement agreement dated June 18, 2013 ("Settlement Agreement"), as amended by a stipulation dated February 8, 2016 ("Stipulation to Amend"). *See NRDC v. Jewell*, Dkts. 118-2 (Settlement Agreement), 127-2 (Stipulation to Amend); *see also id*., Dkts. 119 and 128 (court orders granting approval of Settlement Agreement and Stipulation to Amend, respectively).

[7] In this comment letter, we refer to these measures as the "Standard Mitigation Measures."

The Settlement Agreement addresses, *inter alia*, BOEM's application for ITRs for GOM geophysical activities and programmatic NEPA analysis of the potential effects of such activities. Under the terms of the Settlement Agreement and the Stipulation to Amend, G&G operators are required to implement a suite of "interim" mitigation measures that substantially expand upon the Standard Mitigation Measures. However, the parties to the Settlement Agreement and the Stipulation to Amend did not agree, and there has otherwise been no demonstration, that the mitigation measures imposed pursuant to the Settlement Agreement and Stipulation to Amend are feasible, appropriate, supported by the best available science, or otherwise required by law.[8]

The G&G industry has performed the terms of the Settlement Agreement and Stipulation to Amend in good faith. The Associations have also constructively participated in the regulatory processes pertaining to the Application and the DPEIS.[9] However, notwithstanding the Associations' diligent participation in the pending judicial and regulatory processes, we cannot support applications for ITRs, or ITRs, that are not faithful to the law or consistent with the best available science. Similarly, we cannot support mitigation measures that are infeasible, impracticable, or of no demonstrated benefit to marine mammal populations.[10]

2. Operational context

Seismic surveying has been and continues to be essential to achieving OCSLA's goals because it is the only feasible technology available to accurately image the subsurface of the OCS before a single well is drilled. Industry has made significant improvements in acquisition

[8] *See NRDC v. Jewel*, Dkt. 118-2, Section IX ("Intervenor-Defendants do not agree that all of the measures described in paragraph IX.A and IX.B are feasible or appropriate. Intervenor-Defendants shall be free to challenge any such measures should one or more of the Federal Defendants develop and implement them."); *id*. at Dkt. 127-2, Section G ("The terms of this Stipulation have been agreed to for purposes of compromise. No party concedes by entering into this Stipulation that any of the permit requirements described above are warranted by scientific evidence or should be imposed after the Stay expires, or that these requirements are sufficient to achieve legal compliance or reduce biological risk over the long term.").

[9] IAGC and API are "applicants" in the Endangered Species Act ("ESA") Section 7 consultation that will be initiated to address the effects of the contemplated ITRs on ESA-listed species. *See* 50 C.F.R. § 402.02 (definition for "applicant"). IAGC and API requested confirmation of their applicant status in May 2016 and are still awaiting a response. We again request confirmation of our applicant status.

[10] The Associations request that the contemplated ITRs provide flexibility for letter of authorization ("LOA") applicants to obtain LOAs for any periods of time not exceeding the expiration date of the regulations and for reasonable renewals and modifications of LOAs. *See, e.g.*, 50 C.F.R. §§ 216.17-.18, 216.66-.67.

efficiency in recent years. Using standard hardware, we now acquire more and better quality data due to advancements in vessels, configurations, acquisition planning and execution, and data processing. Additional advancements in geophysical technology—including seismic reflection and refraction, gravity, magnetics, and electromagnetics—afford industry significant precision in subsurface imaging and will continue to provide more realistic estimates of potential resources. By utilizing these tools and applying increasingly accurate and effective interpretation practices, industry can better locate and dissect prospective areas for exploration.

Furthermore, modern geophysical imaging reduces risk by increasing the likelihood that exploratory wells will successfully tap hydrocarbons and by decreasing the number of wells that need to be drilled in a given area, thereby reducing associated safety and environmental risks and the overall environmental footprint for exploration. For example, subsurface imaging can predict potentially hazardous over-pressurized zones in a reservoir and thus allow an operator to better design a well to reduce its associated types and levels of risk. As technology advances, the geophysical industry can continue to reduce drilling risk and increase potential production. Just as physicians today may use MRI technology to image an area that previously had been imaged by X-ray technology, geophysical experts are actively using and enhancing the most modern technology to make improved evaluations. Moreover, because G&G activities are temporary and transitory, seismic surveying is the least intrusive and most cost-effective means to determine the likely locations of recoverable oil and gas resources in the GOM.

Finally, seismic air sources remain the most effective, commercially available technology to obtain necessary, accurate sub-surface data. Although alternative technologies, including marine vibroseis, continue to be explored, such technology is not yet commercialized and has not yet been shown to provide comparable seismic data quality. The substantial cost to modify vessels and to use vibroseis requires a significant market to make the technology commercially viable. Moreover, the hypothetical environmental benefits of alternative technologies have not been demonstrated.

B. Chapters 6 and 7 of the Application Are Substantially Flawed

The MMPA implementing regulations require an application for ITRs to describe, among other things:

- "The type of incidental taking authorization that is being requested . . . and the method of incidental taking" (50 C.F.R. § 216.104(5));

- "[T]he number of marine mammals (by species) that may be taken by each type of taking . . . and the number of times such takes by each type of taking are likely to occur" (*id*. § 216.104(6)); and

- "The anticipated impact of the activity upon the species or stock of marine mammal" (*id*. § 216.104(7)).

The purpose of this information is to allow NMFS to assess the impacts that are "reasonably likely" or "reasonably expected" to occur based on the best scientific information available. 50 C.F.R. §§ 216.102(a), 216.103.

Unfortunately, the Application presents an unrealistic and inaccurate assessment of the number of marine mammals that may be incidentally taken and the associated impacts. Specifically, the Application (1) is intentionally designed to overestimate take, (2) is based upon biased modeling derived from flawed assumptions, (3) does not utilize all of the best available scientific information, and (4) improperly fails to incorporate the known beneficial effects of mitigation measures. As a result, the Application does not present the number of incidental takes that are "likely to occur," does not describe the "anticipated" impact of the geophysical activities, and ultimately prevents NMFS's from determining the "reasonably expected" or "reasonably likely" impacts of the contemplated ITRs. These flaws are addressed in the following subsections.

1. Chapter 6 is designed to substantially overestimate the amount of potential incidental takes

By BOEM's admission, the modeling used to estimate the anticipated number of incidental takes is intentionally designed to overestimate takes and impacts. *See* Application at 93 (the "modeling results are meant to be precautionary and likely overestimate 'exposures' and therefore 'takes'"; "modeling inputs and results are purposely precautionary in order to avoid underestimating potential impacts to marine mammals"). BOEM candidly describes the modeling effort in the DPEIS as follows:[11]

> This estimate alone does not reflect BOEM's determination of the actual expected physical or behavioral impacts to marine mammals but rather an overly conservative upper limit because none of the mitigations examined in this Programmatic EIS were modeled. Biological significance to marine mammals is left to interpretation by the subject-matter experts.

DPEIS at 1-16.

The estimates of "exposures" that are used in the Application as surrogates for estimated takes "are based on acoustic and impact models that are, by their nature, conservative and complex." DPEIS at 1-19. Indeed, "[e]ach of the inputs into the models is purposely developed to be conservative, and this conservativeness accumulates throughout the analysis." *Id.* (emphasis added). As a result, the exposure estimates are "higher than BOEM expects would

[11] The same modeling results were used for both the DPEIS and the Application. These results are described in Appendix D to the DPEIS and in the Appendix to the Application, which are identical.

actually occur in a real world environment." *Id*.; *id*. at 1-20 ("This estimate does not reflect an actual expectation that marine mammals will be injured or disturbed. It is an overly conservative estimate."). BOEM has further admitted that using this methodology "requires accepting a worst-case scenario, which ultimately overestimates the numbers of 'take' under the MMPA by equating those numbers with the exposures identified in the modeling rather than real world conditions." *Id*. (emphasis added).[12]

The Associations appreciate BOEM's candor in describing the substantial shortcomings of the exposure modeling. However, such candor does not excuse BOEM from accurately estimating the number of likely takes and the associated anticipated impacts, as is required by the MMPA's implementing regulations. An estimate that "does not reflect BOEM's determination of the actual expected physical or behavioral impacts to marine mammals" is plainly not a description of the "anticipated" impact or the number of incidental takes that are "likely to occur." 50 C.F.R. § 216.104(6), (7). Chapters 6 and 7 of the Application (and the Appendix) are intentionally designed to be inaccurate by evaluating the worst possible consequences that could hypothetically result from unmitigated seismic surveying, based on overly conservative modeling. By taking this approach, BOEM has skirted the regulatory requirements for MMPA incidental take authorization applications.

2. The modeling relied upon by BOEM is biased and premised upon unrealistic scenarios that are unsupported by actual data

The exposure modeling set forth in the Appendix makes many biased assumptions that substantially contribute to the inaccuracy of the Application's take and impact analyses. Specifically, the modeling analyses in the Appendix contain multiple layers of precaution that aggregate in the annual and 10-year estimates. Attachment A to this letter provides a more detailed assessment of the overly conservative (*i.e.*, unrealistic) assumptions used in the modeling. These assumptions result in an exposures outcome that is anywhere from 10% to multiple orders of magnitude above the mean or most likely exposures outcome (*i.e.*, 100 to 1,000 times the "most likely" number of exposures) for any given single variable. In the

[12] This "worst-case scenario" includes repeated exposures, but does not identify the number of repeated exposures. Instead, the Application simply presents a total number of estimated exposures by species. Application at 97 ("the numbers of exposures in the following tables does not equate to the number of individual animals exposed"). This generalized presentation of exposures is insufficient because the MMPA's "small numbers" standard is based upon the number of marine mammals that are anticipated to be incidentally taken, regardless of how many times each of those marine mammals may be taken. The Application must separately present (1) the total number of anticipated incidental takes, including repeats (for the "negligible impact" assessment) and (2) the number of marine mammals, by species, anticipated to be incidentally taken, regardless of repeats (for the "small numbers" assessment). *See* 16 U.S.C. § 1371(a)(5)(A); 50 C.F.R. § 216.104(6).

aggregate, these compounding conservative assumptions produce a predicted number of exposures across all variables together that is thousands to millions of times greater than the average or most likely outcome.

For example, the Phase II model assumes a seismic source array of 8,000 cubic inches. This is at, or very near, the upper limit of the largest source arrays used in the GOM. *See* Appendix at D-25. The actual distribution of array sizes in the GOM ranges from 8,400 cubic inches to less than 2,000 cubic inches, with a mean value of 5,600 cubic inches. The scaling differences in the range to threshold criteria produced by an overestimated array size of 8,000 cubic inches cascade down through the calculations, so that when a threshold range four times larger than produced by a typical survey source is established using hearing injury thresholds 10 or 100 times lower than actual measured thresholds, and applied to numbers of animals that can be up to 10 times higher than any previous federal estimates (*see infra* § III.C), the outcome is a prediction that 10,000 to 100,000 times more exposures might occur than use of the "best available data" values might otherwise have calculated. *See* Attachment A. Instead of this overly precautionary and unrealistic approach, BOEM could have used the data for all array sizes used in the GOM in the past 10 or 20 years, plotted them on a typical bell-shaped curve, and calculated the mean or median and variance.

Further overestimation is caused by the accumulation of sound without hearing recovery during calculation of both SPL_{rms} and SEL exposure thresholds, for which sound is summed over 24 hours. *See* Appendix, Section 6.5.1.2.2, page D-64. For an intermittent source, such as a seismic survey, there is a considerable interval of 10-20 seconds or longer between individual pulses that are only a fraction of a second in duration. However, the model inappropriately sums multiple exposures that may be many hours apart as if the separate exposures are one continuous block of sound. This is not a biologically realistic assumption—hearing recovery takes place during intervals as short as a few seconds and exposures separated by hours are almost certain to involve full recovery from prior sub-threshold encounters. *See* Finneran (2015).[13] The result of this biologically unrealistic assumption that SEL accumulates without recovery over a 24-hour window is an overestimation of SEL threshold exceedance that may be at least twice the actual value and possibly many times greater. The fact that the exact hearing recovery function has not yet been empirically derived for marine mammals should not be used to ignore this well-known aspect of mammalian hearing that has been repeatedly observed during the temporary threshold shift ("TTS") data collections that form the basis for NOAA's *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing* (Aug. 2016) (the "Guidance"). *See infra* note 21 (including comments in referenced attachment).

[13] Finneran J. J. 2015. Noise-induced hearing loss in marine mammals: A review of temporary threshold shift studies from 1996 to 2015. J. Acoust. Soc. Am., 138 (3): 1702-26. http://dx.doi.org/10.1121/1.4927418.

Additionally, as Section 6.5.1.3.2 of the Appendix acknowledges, the single-day overestimates are then used in a way that creates additional overestimation during the calculation of takes for a survey period of 30 days or more. Paradoxically, BOEM states on page D-65 of the Appendix that this simple multiplication of 24-hour values should not be done: "It is, therefore, inappropriate to scale the 24 h exceedance times to estimate the exceedance times for longer durations." Nonetheless, this method is used in the Phase II modeling (Appendix at D-180) to produce the final exposure estimates (Appendix, Section 7.3.4).

Next, Section 6.5.2 of the Appendix analyzes potential contributions to uncertainty from the sound source characterization modeling, and from sound speed profiles, geoacoustic parameters, bathymetric data, and sea state inputs to the acoustic propagation modeling. This analysis concludes that the various uncertainties in the acoustic field represent a "multi-dimensional envelope" and that these different dimensions "cannot be summed to yield a 'total' uncertainty as this would be a meaningless quantity." However, this conclusion is incorrect. There are ways to quantify the uncertainty in a meaningful way despite challenges to directly calculating the total uncertainty (or statistical variance). For example, the combined uncertainty contributed by environmental and model parameters could be further evaluated by comparing the outputs from multiple runs of the entire modeling process (both acoustic propagation modeling and exposure modeling) in which one or more of the parameters are adjusted across reasonable levels in each competing model run. The parameter-specific uncertainty analyses presented in Phase I of the Appendix are useful for identifying which parameters to adjust within the competing full modeling runs, but alone they only reinforce the fact that significant uncertainty is present at many steps within the modeling process. Multiple runs of the full modeling process using alternative parameter estimates should be conducted to improve the understanding of the total uncertainty surrounding the final results.

Furthermore, the analyses set forth in Section 6.5.2 of the Appendix use various methods to assess uncertainty around the parameters used in acoustic propagation modeling. However, in all examples, only the "typical" (average or median) and "worst case" values are evaluated. As a result, uncertainties are only characterized in <u>one direction</u> from the typical or expected result, and that direction results in longer-range propagation of sounds. When characterizing uncertainty around estimates, it is common practice to not only report the upper confidence limits ("worst case" results in this example), but to also report the lower confidence limits. Without an understanding of the lower confidence limit values, it is not possible to properly bound and assess the range of outcomes from the modeling and interpret the likelihood of potential impacts. The failure to characterize the lower confidence limits results in a flawed and significantly biased analysis.

In sum, BOEM summarizes the significant biases of the modeling as follows:

> The existing modeling largely does not account for uncertainty in the data inputs and also selects highly conservative data inputs. <u>This bias often produces unrealistically high exposure numbers and "takes" that *exponentially* increase uncertainty throughout each</u>

> step of the modeling. The modeling does not incorporate mitigation or risk reduction measures designed to limit exposure. The modeling is an overestimate and should be viewed with that understanding.

DPEIS at 4-47 (emphases added). As demonstrated above, these biases result in modeled overestimates of exposures that are thousands to millions of times greater than the average or most likely outcome. Again, this approach is contrary to the MMPA regulations, which require BOEM to estimate the number of takes that are "likely to occur" and the "anticipated" impact. 50 C.F.R. § 216.104(6), (7).[14]

3. The Application's take estimates and impact analyses are not based upon all of the best available scientific information

As addressed above, and in Attachment A, Chapters 6 and 7 of the Application are based on overly conservative, unrealistic, and biased modeling of "exposures." Aside from the legal and methodological flaws with this approach, there is a wealth of available information, including new acoustic criteria, as forth in the Guidance, that actually informs the analysis of the reasonably anticipated impacts of geophysical activities. This information, as addressed below, is either minimized or not addressed at all in the Application.

a. The history of formal assessments of offshore seismic activities

The history of formal assessments of offshore seismic activities demonstrates that levels of actual incidental take are far smaller than even the most balanced pre-operation estimates of incidental take.[15] Indeed, more than four decades of worldwide seismic surveying and scientific

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[14] The Application also erroneously requests take authorization for all estimated exposures even though, as BOEM acknowledges, not all exposures result in incidental take. Application at 93; *see* 75 Fed. Reg. 49,709, 49,716 (Aug. 13, 2010) ("Although it is possible that marine mammals could react to any sound levels detectable above the ambient noise level within the animals' respective frequency response range, this does not mean that such animals would react in a biologically significant way. According to experts on marine mammal behavior, the degree of reaction which constitutes a take, *i.e.*, a reaction deemed to be biologically significant that could potentially disrupt the migration, breathing, nursing, breeding, feeding, or sheltering, etc., of a marine mammal is complex and context specific, and it depends on several variables in addition to the received level of the sound by the animals."). Again, the numbers of incidental takes that are "likely to occur" are not reported in the Application. Table 7-4 of the Appendix appears to vaguely address the topic of translating exposures into incidental takes, but it is not apparent whether or how this table is considered in the Application.

[15] *See, e.g.*, BOEM, *Final EIS for Gulf of Mexico OCS Oil and Gas Eastern Planning Area Lease Sales 225 and 226*, at 2-22 (2013), http://www.boem.gov/BOEM-2013-200-v1/

(continued . . .)

research indicate that the risk of physical injury to marine life from seismic survey activities is extremely low. *See supra* § II. As BOEM concludes in the DPEIS, "within the GOM, there is a long-standing and well-developed OCS [oil and gas] Program (more than 50 years) and there are

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(. . . continued)
("Within the CPA, which is directly adjacent to the EPA, there is a long-standing and well developed OCS Program (more than 50 years); there are no data to suggest that activities from the preexisting OCS Program are significantly impacting marine mammal populations."); BOEM, *Final EIS for Gulf of Mexico OCS Oil and Gas Western Planning Area (WPA) Lease Sales 229, 233, 238, 246, and 248 and Central Planning Area (CPA) Lease Sales 227, 231, 235, 241, and 247*, at 4-203 (v.1) (2012), http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/BOEM-2012-019_v1.aspx (WPA); *id*. at 4-710 (v.2), http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/BOEM-2012-019_v2.aspx (CPA) ("Although there will always be some level of incomplete information on the effects from routine activities under a WPA proposed action on marine mammals, there is credible scientific information, applied using acceptable scientific methodologies, to support the conclusion that any realized impacts would be sublethal in nature and not in themselves rise to the level of reasonably foreseeable significant adverse (population-level) effects."); BOEM, *Final Supplemental EIS for Gulf of Mexico OCS Oil and Gas WPA Lease Sales 233 and CPA Lease Sale 231*, at 4-30, 4-130 (2013), http://www.boem.gov/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/2013/BOEM%202013-0118.pdf (reiterating conclusions noted above); MMS, *Final Programmatic EA, G&G Exploration on Gulf of Mexico OCS*, at III-9, II-14 (2004), http://www.nmfs.noaa.gov/pr/pdfs/permits/mms_pea2004.pdf ("There have been no documented instances of deaths, physical injuries, or auditory (physiological) effects on marine mammals from seismic surveys."); *id*. at III-23 ("At this point, there is no evidence that adverse behavioral impacts at the local population level are occurring in the GOM."); LGL Ltd., *Environmental Assessment of a Low-Energy Marine Geophysical Survey by the US Geological Survey in the Northwestern Gulf of Mexico*, at 30 (Apr.-May 2013), http://www.nmfs.noaa.gov/pr/pdfs/permits/usgs_gom_ea.pdf ("[T]here has been no specific documentation of TTS let alone permanent hearing damage, i.e., PTS, in free-ranging marine mammals exposed to sequences of airgun pulses during realistic field conditions."); 75 Fed. Reg. 49,759, 49,795 (Aug. 13, 2010) (issuance of IHA for Chukchi Sea seismic activities ("[T]o date, there is no evidence that serious injury, death, or stranding by marine mammals can occur from exposure to airgun pulses, even in the case of large airgun arrays.")); MMS, *Draft Programmatic EIS for OCS Oil & Gas Leasing Program, 2007-2012*, at V-64 (Apr. 2007) (citing 2005 NRC Report), http://www.boem.gov/Oil-and-Gas-Energy-Program/Leasing/Five-Year-Program/5and6-ConsultationPreparers-pdf.aspx (MMS agreed with the National Academy of Sciences' National Research Council that "there are no documented or known population-level effects due to sound," and "there have been no known instances of injury, mortality, or population level effects on marine mammals from seismic exposure ").

no data to suggest that activities from the previous OCS Program are significantly impacting marine mammal populations." DPEIS at 4-77 (emphasis added).

In addition, the 2016 report from the National Academy of Sciences, Ocean Studies Board (the "NAS Report"),[16] makes the following findings regarding marine sound from seismic acoustic sources:

- "The National Research Council report Marine Mammal Populations and Ocean Noise (NRC, 2005) noted that: 'No scientific studies have conclusively demonstrated a link between exposure to sound and adverse effects on a marine mammal population.' That statement is still true…." (NAS Report at 16);

- "Evidence of the effects of noise on marine mammal populations is largely circumstantial or conjectural" (NAS Report at 28);

- "The probability of marine mammals experiencing PTS [injury] from anthropogenic activities will likely be sufficiently low as to preclude any population-level effects" (NAS Report at 35);

- "Miller et al. (2009) conducted controlled approaches of a commercial seismic survey vessel to make pass-by's of sperm whales in the Gulf of Mexico. The whales, which were exposed to received levels varying from 120-147 dBRMS at ranges varying from 1.4-12.8 km, did not change their direction of travel or behavioral state in response to exposure, but did decrease the energy they put into swimming and showed a trend for reduced foraging. Madsen et al. (2002) studied responses of sperm whales in Norwegian waters to seismic surveys at ranges > 20 km, and reported no responses at exposure ranging up to 123-130 dBRMS." (NAS Report at 56).

Consistent with the NAS Report's findings, there are well-documented examples of long-term exposures of acoustically sensitive species where no biologically significant chronic or cumulative impacts have occurred. For example, oil and gas seismic exploration activities have been regularly conducted in the Beaufort and Chukchi Seas of the Arctic Ocean for decades, with regular monitoring and reporting to NMFS under the auspices of MMPA incidental take authorizations issued since the early 1990s. During this lengthy period of acoustic exposures, and despite annual lethal takes by Alaska Natives engaged in subsistence activities, bowhead whales have consistently increased in abundance to the point that they are believed to have

[16] National Academies of Sciences, Engineering, and Medicine. 2016. Approaches to Understanding the Cumulative Effects of Stressors on Marine Mammals. Washington, DC: The National Academies Press. doi: 10.17226/23479. https://www.nap.edu/download/23479#.

reached carrying capacity. Similarly, no effects of G&G activities have been observed in Arctic ice seal populations.[17]

Finally, BOEM's Environmental Studies Program has spent more than $50 million on protected species and sound-related research over more than four decades without finding evidence of adverse effects. *See* http://www.boem.gov/BOEM-Science-Note-August-2014/ (*Science Notes*, Aug. 22, 2014) ("Since 1998, BOEM has partnered with academia and other experts to invest more than $50 million on protected species and noise-related research."). The geophysical and oil and gas industries, the National Science Foundation, the U.S. Navy, and others have spent a comparable amount of money on researching potential impacts of seismic surveys on marine life and have found no evidence of significant effects. *See* http://www.scandoil.com/moxie_issue-bm2/bm.doc/sogm_1-2-16_sml-jip.pdf; www.soundandmarinelife.org.

None of the information above is meaningfully discussed in the Application. Yet, this information is plainly relevant to the development of an accurate assessment of the "anticipated" impacts of geophysical activities on marine mammals in the GOM. 50 C.F.R. § 216.104(7). This information is also indisputably part of the best available scientific information relevant to the Application.

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[17] *See, e.g.*, 84 Fed. Reg. 25,829, 25,834 (May 1, 2012) ("Bowhead whales have continued to travel to the eastern Beaufort Sea each summer despite seismic exploration in their summer and autumn range for many years (Richardson *et al.* 1987), and their numbers have increased notably (Allen and Angliss 2010). Bowheads also have been observed over periods of days or weeks in areas ensonified repeatedly by seismic pulses (Richardson *et al.* 1987; Harris *et al.* 2007)."); *id*. at 25,837 ("There is no specific evidence that exposure to pulses of air-gun sound can cause PTS [physical injury] in any marine mammal, even with large arrays of air-guns."); *id*. at 25,838 ("To date, there is no evidence that serious injury, death, or stranding by marine mammals can occur from exposure to air-gun pulses, even in the case of large air-gun arrays."); *id*. at 25,839 ("Thus, the proposed activity is not expected to have any habitat-related effects on prey species that could cause significant or long-term consequences for individual marine mammals or their populations."); 75 Fed. Reg. 49,760, 49,795 (Aug. 13, 2010) ("To date, there is no evidence that serious injury, death or stranding by marine mammals can occur from exposure to air-gun pulses, even in the case of large air-gun arrays."); *see also* Reichmuth, C., Ghoul, A., Sills, J., Rouse, A. and B. Southall. 2016. Low-frequency temporary threshold shift not observed in spotted or ringed seals exposed to single air gun impulses, J. Acoust. Soc. Am., 140: 2646-2658 ("There was no evidence that these single seismic exposures altered hearing – including in the highest exposure condition, which matched previous predictions of temporary threshold shift (TTS) onset …. The absence of observed TTS confirms that regulatory guidelines (based on M-weighting) for single impulse noise exposures are conservative for seals.").

b. PSO monitoring data

The Application also fails to present and consider the accumulated observational data collected by Protected Species Observers ("PSOs") on survey vessels in the GOM. This information is clearly relevant to the assessment of the potential effects of seismic vessels operating in the GOM. Not surprisingly, the PSO data indicate a negligible level of effects that undermines the results of the exposure modeling presented in the Appendix. For example, the Application implausibly concludes that many thousands of marine mammals will experience incidental take as a result of seismic activities. These estimates would result in tens of thousands of shutdown events per year. However, based on actual monitoring data, as reported in relatively recent environmental assessments, an average of only 55 shutdowns occur per year in the GOM with operations conducted under the Standard Mitigation Measures. *See also* Attachment B; Barkaszi et al. (2012) (reporting a total of 144 shutdowns from 2002 to 2008, or 24 per year).[18] The PSO data must be fully disclosed and evaluated in the Application because they are relevant to an accurate estimate of the incidental takes that are "likely to occur" and the "anticipated" impact. 50 C.F.R. § 216.104(7).[19] These data are also part of the best available science.

c. The take estimates and impact analyses are not based on the best available acoustic criteria

The Guidance establishes acoustic criteria for evaluating Level A harassment and TTS. Despite the availability of drafts of the Guidance and the scientific basis for the Guidance for many months prior to August 2016, the Application's exposure modeling analysis does not use the Guidance:

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[18] A study of more than a decade's worth of marine mammal observation data performed by the Joint Nature Conservation Committee ("JNCC") demonstrates that mitigation measures significantly reduce the effects of seismic activities on marine mammals. The JNCC study's results should be addressed in the Application. *See* http://jncc.defra.gov.uk/page-6985.

[19] Under the MMPA, Level A harassment is defined as "any act of pursuit, torment, or annoyance which . . . has the potential to injure a marine mammal or marine mammal stock in the wild." 16 U.S.C. § 1362(18)(A)(i) (emphasis added); *see also* 50 C.F.R. § 216.3. As described above, there is no scientific evidence demonstrating that G&G activities have resulted in the injury of marine mammals. Rather, the record shows that commonly employed avoidance and mitigation measures are effective in avoiding Level A harassment and minimizing the amount of Level B harassment. For this additional reason, the Associations are opposed to the modeled Level A exposures presented in the Application. At the very most, a *de minimus* amount of Level A incidental takes could be requested based on an approach that calculates a rate of reported shutdowns during seismic surveys in the GOM over the past several years and applies that rate to the levels of activity projected in the Application, using a multiplier to address the potential unmitigated exposures that may occur.

> The NMFS has advised BOEM that the use of the previous acoustic criteria to model exposure estimates is acceptable given the timing of the petition being complete and the issuance of the revised acoustic guidelines. BOEM does anticipate, however, that the July 2016 changes to NMFS' acoustic criteria likely mean the Level A exposures predicted in the modeling used for the [DPEIS and the Application] are, in most cases, overestimates.

Application at 94-95. The Application does present estimates using metrics similar to those set forth in the Guidance, but the amount of Level A incidental take for which the Application requests authorization is inexplicably based upon the outdated 1995 criteria. *See* Application, Table 6-14. Similarly, the Application presents Level B incidental take estimates generated from both the outdated 1995 criteria and newer criteria based upon Wood et al. (2012). However, again, the amount of Level B incidental take for which authorization is requested is inexplicably based upon the 1995 criteria. *Id*.

Additionally, the analytical methods and criteria that are used in the acoustic analyses supporting the Appendix modeling are less than straightforward. For example, the Appendix uses the outdated 1995 criteria, but applies Southall et al. (2007) M-1 weighting to those values, which were originally unweighted values. The Appendix modeling also uses Southall et al. (2007) SPL peak Permanent Threshold Shift ("PTS") onset values, but for low-frequency cetaceans creates its own PTS onset threshold of 192 dB re 1 μPa^2 s SEL by subtracting 6 dB from the mid-frequency cetacean onset value of 198 dB re 1 μPa^2 s (another precaution layered on top of already precautionary numbers). Appendix at D-55. Another example of unclear development of a threshold value appears in the very next paragraph where the analysis cites a value of 187 dB SEL as the mid-frequency cetacean threshold, derived by using a beluga TTS onset of 186 dB, applying Finneran and Jenkins (2012) Type II M-weighting to derive a weighted value of 172 dB and then adding 15 dB to produce a PTS threshold for mid-frequency cetaceans of 187 dB. In short, the methods for deriving the criteria used in the analysis are hardly clear.

BOEM is required to use the best available scientific information when preparing the application. *See* 50 C.F.R. §§ 216.102(a), 216.104(c), 216.105(c). It is undisputed that NMFS's 1995 acoustic criteria for Level A and Level B incidental take by harassment are no longer the best available science. For Level A incidental take (and TTS), the best available science is, by NMFS's own assertion, currently the Guidance. For Level B incidental take, the criteria set forth in Wood et al. (2012) is more current than NMFS's 1995 criteria and more consistent with a large number of similar behavioral effects models (*e.g.*, as cited in Southall et al. (2016)[20]).

[20] Southall, B., Nowacek, D., Miller P., and Tyack, P. 2016. Experimental field studies to measure behavioral responses of cetaceans to sonar. Endangered Species Res. 31:293-315. doi: 10.3354/esr00764.

Accordingly, the Application, and the subsequent rulemaking, must use the more current sources of information that are the "best available."[21]

4. The Application's incidental take estimates and impact analyses improperly ignore mitigation measures

By BOEM's admission, the Application's incidental take estimates and impact analysis do not take into account the beneficial effects of the mitigation measures that will be required of operators who receive authorizations under the contemplated ITRs. *See* Application at 93 ("the model is not able to consider the effect of reduction of exposures from any of the 19 mitigation measures analyzed in the associated [DPEIS]"); *id*. at 129 (the mitigation measures are "meant to decrease and reduce the potential for Level A and Level B exposures[, but] [t]he modeled exposures largely do not take into account the effect these mitigations have in reducing exposures (and therefore potential for take)."[22]

BOEM's decision to ignore the beneficial effects of mitigation measures is particularly arbitrary because BOEM knows—unconditionally—that the mitigation measures will substantially decrease any adverse effects postulated by the overly conservative exposure modeling. *See, e.g.*, Application at 83, 129. In addition, the Appendix demonstrates the likely effectiveness of currently employed mitigation measures. Specifically, in Phase I of the exposure modeling described in the Appendix where various modeling methods, inputs, and assumptions are assessed, Sections 6.5.3 and 6.5.4 consider the effects of incorporating mitigation measures and aversive responses into the exposure modeling. Tables 40 and 44 show that the implementation of shutdowns may reduce the number of estimated Level A exposures by 10% to 80%.[23] Similarly, the effect of modeling aversive responses by marine mammals also

[21] As the Associations addressed in three comment letters submitted during the process for developing the Guidance, there are technical flaws in the Guidance. We have attached those three comment letters to this letter, and request that they be included in the administrative record for the contemplated ITRs. *See* Attachment C. There are also flaws with Wood et al. (2012), but that paper is more current than the 1995 criteria.

[22] *See also* DPEIS at 1-16 ("The modeling is conservative because it did not apply any of the 19 different mitigations analyzed in [the DPEIS]."); *id*. at 1-19 ("The modeling effort in Appendix D does not, for example, take into account any mitigation measures incorporated into the alternatives because the effect of those measures cannot be quantified with statistical confidence at this time."); *id.* at 4-14 (mitigation measures not considered as part of effects analysis).

[23] The effectiveness of mitigation varies by species as it is related to the probability of detecting each species; however, those species that form large groups and/or are most abundant are the ones for which mitigation is most effective. Thus, the percent reduction in estimated exposures is likely greatest for the species with the highest absolute estimated exposures.

shows potentially large reductions in the percentages of animals exposed above Level A criteria (40% to 85% for the peak SPL criteria and 14% to 20% for the rms SPL).

Despite these demonstrations of significant and meaningful reductions in the number of estimated exposures as a result of mitigation measures and aversive responses, and the fact that both are very likely to occur, they are inexplicably not included in the final (Phase II) modeling used to estimate exposures for the impact assessments and ultimately not considered as part of the effects analysis. Although there are uncertainties associated with including these measures in the modeling process, those uncertainties are not substantially different than uncertainties associated with other inputs to the modeling process, and they should not be disqualified from use for that reason.

BOEM's failure to incorporate the known benefits of mitigation measures, many of which are standard best practices that the geophysical industry already implements, results in take estimates that, by BOEM's admission, are not "likely to occur" and an assessment of impacts that are not "anticipated." *See, e.g.*, DPEIS at 1-16 ("This estimate alone does not reflect BOEM's determination of the actual expected physical or behavioral impacts to marine mammals but rather an overly conservative upper limit because none of the mitigations examined in this Programmatic EIS were modeled."). BOEM's approach is arbitrary, unsupported, and contrary to the MMPA. *See* 50 C.F.R. § 216.104(6), (7).

5. Conclusions—Chapters 6 and 7

As set forth above, the estimates, analyses, and conclusions presented in Chapters 6 and 7 are unrealistic, flawed, incomplete, and unlawful. The conclusions are exclusively based upon a modeling exercise that uses a multiplicative series of conservatively biased assumptions for all uncertain parameter inputs. These assumptions lead to accumulating bias as the cumulative conservative assumptions add up to increasingly unlikely statistical probabilities that are not remotely representative of real-world conditions. Consequently, the results quickly become little more than improbable worst case scenarios—not fair simulations or representations of likely effects.

Aside from being scientifically and legally indefensible, BOEM's conclusions are not supported by the best available information, which demonstrates that no significant impacts to marine mammal populations from seismic activities have occurred in the GOM. Furthermore, the scenario presented in the Application is unrealistic and not representative of real-world activities as there is no meaningful consideration of mitigation measures and their effectiveness. Insofar as we are aware, no seismic activities in the United States OCS have caused impacts amounting to anything more than temporary changes in behavior, without any known injury, mortality, or other biologically significant consequence to any marine mammal species or

stocks.[24] For the reasons detailed above, Chapters 6 and 7 of the Application must be substantially revised and resubmitted, on the schedule set forth in the Settlement Agreement and the Stipulation to Amend, to comply with applicable MMPA regulations.[25]

C. The Application Fails to Clearly Present Marine Mammal Population Information

In the Application, BOEM is required to report "[t]he species and number of marine mammals likely to be found within the activity area." 50 C.F.R. § 216.104. However, as set forth below, the Application fails to clearly present this required information and sufficiently explain how the alternative sources are used in the impact analysis.

The Application provides two abundance values for each species based upon the 2016 Duke habitat-correlated density modeling ("Duke model")[26] and NMFS's stock assessment reports ("SARs"). *See* Application, Table 3-1. The Phase I modeling set forth in the Appendix uses Navy Operating Area Density Estimates ("NODES") and population data from the SARs. The Phase II modeling in the Appendix uses the Duke model values. The following summarizes some of the problems associated with the Application and Appendix's use of different datasets and models related to marine mammal abundance and density.

First, habitat-correlated density modeling may not capture all of the habitat variables that are important to the animals and consequently places modeled animals in areas where they are never or rarely present. For example, Bryde's whales are rarely observed outside the region around and south of De Soto Canyon,[27] yet the Duke model places modeled Bryde's whales in

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[24] The Associations' position that there are currently no demonstrated adverse effects from seismic surveys on marine mammal populations does not preclude our taking a proactive and environmentally responsible approach by actively investigating legitimate concerns raised by subject matter authorities, and doing so in the best traditions of independent, peer-reviewed scientific study. *See* E&P Sound and Marine Life Joint Industry Programme, www.soundandmarinelife.org).

[25] Additional technical comments are provided in Attachment D to this letter.

[26] *See* Roberts JJ, Best BD, Mannocci L, Fujioka E, Halpin PN, Palka DL, Garrison LP, Mullin KD, Cole TVN, Khan CB, McLellan WM, Pabst DA, Lockhart GG. 2016. Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico. *Scientific Reports* 6: 22615. doi: 10.1038/srep22615. http://seamap.env.duke.edu/models/Duke-EC-GOM-2015/.

[27] *See* Waring, G., Josephson, E., Maze-Foley, K, and Rosel, P., eds. 2016. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments-2015. NOAA Technical Memorandum NMFS-NE-238. http://www.nmfs.noaa.gov/pr/sars/pdf/atlantic2015_final.pdf. ("The vast majority of the small number of Bryde's whale sightings from each survey occurred in a very restricted area of the northeastern Gulf (Figure 1) during surveys that uniformly sampled the entire oceanic northern Gulf.").

relatively high density at the continental shelf edge from Texas to the Florida Straits because the habitat suitability model indicates that they "could" use those places. The Duke model thus results in the calculation of densities of Bryde's whales in Zone 4 of the Appendix's seven zone system when that clearly is not supported by the available sighting data.

Second, the Appendix makes unsupported revisions to some of the results from the Duke model. For example, the Appendix modeling pushes all sperm whales into 1,000 m water depth, causing a discrepancy between the Duke model results as well as the actual observations of whales (Waring et al. 2015).

Third, the Appendix modeling evenly spreads species for which little data are available (*e.g.*, killer whales, false killer whales, Fraser's dolphins) across all habitats that the modelers deem appropriate (generally deeper water, Zones 4-7). Some species, such as Fraser's dolphins and false killer whales, are therefore assumed to be abundant and widespread in areas where they are historically seldom seen.[28]

Fourth, rather than use a specific value for each 100 km^2, the Appendix modeling averages the values from each 100 km^2 box across an entire zone containing hundreds or thousands of 100 km^2 boxes. This enables the placement of animals into the outermost Zone 7 where there is little or no data and therefore no modeling by Duke. By expanding the Duke model averages into areas outside the scope of the model, the Appendix increases the total number of animals present beyond the predictions of the SARs, NODES, or the Duke model. The Appendix presents the averaged values as a minimum, maximum, and mean, which is an appropriate way to convey some of the statistical uncertainty about the model numbers. *See* Appendix at D-201. However, there is insufficient information to determine how these values were obtained from the source information.[29]

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[28] *See* Waring, G., Josephson, E., Maze-Foley, K, and Rosel, P., eds. 2013. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments-2012. Fraser's Dolphin. http://www.nmfs.noaa.gov/pr/pdfs/sars/ao2012dofr-gmxn.pdf ("sightings of groups of Fraser's dolphins have historically been uncommon to rare"); *see also* Roberts JJ, Best BD, Mannocci L, Fujioka E, Halpin PN, Palka DL, Garrison LP, Mullin KD, Cole TVN, Khan CB, McLellan WM, Pabst DA, Lockhart GG (2015) Density Model for Fraser's Dolphin (*Lagenodelphis hosei*) for the U.S. Gulf of Mexico Version 1.3, 2015-09-26, and Supplementary Report. Marine Geospatial Ecology Lab, Duke University, Durham, North Carolina. http://seamap.env.duke.edu/models/Duke-EC-GOM-2015/ ("Because this taxon was sighted too infrequently to fit a detection function to its sightings alone, we fit a detection function to the pooled sightings of several other species that we believed would exhibit similar detectability.").

[29] The Appendix also refers to a set of Excel workbooks (*see, e.g.*, Appendix at D-213) that cannot be found on the BOEM website and for which a link is not otherwise provided.

In sum, the Application's presentation and use of "[t]he species and number of marine mammals likely to be found within the activity area" in estimating incidental takes is unclear and premised on erroneous assumptions and data. Regardless of what specific dataset is used to generate the population estimates for marine mammal species and stocks, it is imperative that the same dataset be used by NMFS when it assesses whether the requested incidental take levels will impact "small numbers" of marine mammals and have a "negligible impact" on marine mammal species and stocks. It would be arbitrary and capricious, and in violation of the MMPA and the Administrative Procedure Act, if NMFS were to use one dataset for the purpose of estimating the population sizes of relevant marine mammal species and stocks and another dataset for the purpose of determining whether the requested incidental take levels satisfy the MMPA's "small numbers" and "negligible impact" standards.[30]

D. The Application's Presentation of Mitigation Measures is Flawed

The record demonstrates that the Standard Mitigation Measures, as applied to geophysical operations in the GOM, are already more than adequate to protect marine mammals in a manner consistent with the MMPA.[31] Despite this record, the Application recommends certain mitigation measures that are more stringent (and less supported) than the measures that have already been successfully implemented. As described below, the Application's

[30] As NMFS prepares the proposed rule, the Associations direct NMFS's attention to *Ctr. for Biological Diversity v. Salazar*, 695 F.3d 893 (9th Cir. 2012). This decision provides the most current statement of the law regarding various aspects of MMPA Section 101(a)(5)(A) in the specific context of offshore oil and gas exploration. The Ninth Circuit held, *inter alia*, that the federal agency issuing the regulations is not required "to quantify or estimate the number of mammals that would be taken." *Id*. at 906. The court upheld the agency's "small numbers" finding based upon a reasonable qualitative analysis performed by the agency. *Id*. at 906-07.

[31] *See supra* note 15; *see also* Mary Jo Barkaszi et al., *Seismic Survey Mitigation Measures and Marine Mammal Observer Reports* (2012); A. Jochens et al., *Sperm Whale Seismic Study in the Gulf of Mexico: Synthesis Report*, at 12 (2008) ("There appeared to be no horizontal avoidance to controlled exposure of seismic airgun sounds by sperm whales in the main SWSS study area."); 78 Fed. Reg. 11,821, 11,827, 11,830 (Feb. 20, 2013) ("it is unlikely that the proposed project [a USGS seismic project] would result in any cases of temporary or permanent hearing impairment, or any significant non-auditory physical or physiological effects"; "The history of coexistence between seismic surveys and baleen whales suggests that brief exposures to sound pulses from any single seismic survey are unlikely to result in prolonged effects."); 79 Fed. Reg. 14,779, 14,789 (Mar. 17, 2014) ("There has been no specific documentation of temporary threshold shift let alone permanent hearing damage[] (i.e., permanent threshold shift, in free ranging marine mammals exposed to sequences of airgun pulses during realistic field conditions."); 79 Fed. Reg. 12,160, 12,166 (Mar. 4, 2014) ("To date, there is no evidence that serious injury, death, or stranding by marine mammals can occur from exposure to air gun pulses, even in the case of large air gun arrays.").

presentation of mitigation measures is flawed because it (1) contains no practicability assessment and (2) proposes some mitigation measures that are impracticable, unnecessary, and otherwise without support.

1. The Application fails to provide a practicability assessment, contrary to applicable regulations

The Application must describe the "[t]he availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks. . . ." 50 C.F.R. § 216.104(a)(11) (emphasis added). Identification of the measures sufficient to effect the "least practicable adverse impact" necessarily requires an assessment of what measures are "practicable" in the first place, including a cost-benefit analysis. However, by BOEM's admission, the Application fails to present any such assessment. *See* Application at 139 ("The analysis of these measures does not include issues of operational practicability or cost."). As a result, the Application is deficient and the public is unable to sufficiently comment on the practicability of the mitigation measures that NMFS will consider as it prepares a proposed rule.[32]

2. Certain mitigation measures proposed in the Application are impracticable, unnecessary, and without support

As addressed in the following subsections, the Application proposes some measures that are not practicable. If implemented, these measures will have substantial adverse effects on offshore geophysical operations and substantial economic impacts, thereby threatening the economic viability of G&G activities in the GOM. Seismic surveys not conducted because of operational inefficiencies, seasonal shutdown, survey restrictions, or area closures are not simply displaced to other times or areas. With unreasonable mitigation measures continually in place, surveys originally planned for Year 1 would replace surveys that would have occurred in Year 2, while even more Year 2 planned surveys would be pushed to Year 3, and so on. Over time, the

[32] A practicability assessment must take into account, *inter alia*, the number of wells that will not be drilled as a result of certain mitigation measures and how reduced drilling will have significant negative impacts on production, government revenue, gross domestic product, and employment. The potential economic impact would be dependent on the number of quality oil and gas targets in the four areas. In addition, there are at least 5,350 active leases in areas for which potential value would be greatly compromised. Any current investment in these areas would be essentially stranded and the value of lost revenue could be in the billions of dollars, yet BOEM has not provided estimates for these lost opportunities. We are concerned that the contemplated ITRs could have an annual effect of $100 million or more on the economy and/or a significant adverse effect on the supply, distribution, or use of energy. Accordingly, analyses under Executive Orders 12866 and 13211 should be conducted.

ripple effect of delayed or forgone surveys will reduce overall seismic data collection, adversely impacting the industry's ability to drill new wells and curtailing future production. Timing delays large enough to affect drilling schedules are more important to potential economic impacts than seismic cost increases. Additionally, these impracticable measures will result in increased survey duration, which, in turn, can increase the potential exposure of marine mammals to sound from seismic surveys and the potential for interference with other users of the GOM.[33]

a. Seasonal restriction for coastal waters

The Application includes a seasonal restriction for seismic surveys "in Federal coastal waters of the GOM shoreward of the 20-m (67-ft) depth contour to the State-Federal boundary between January 1 and April 30 to protect calving dolphins." Application at 141. However, this proposed restriction is unsupported for a number of reasons, as set forth below. For these reasons, we request that the seasonal restriction be eliminated from further consideration.

First, the rationale originally offered by the plaintiff parties to the Settlement Agreement for the nearshore restriction was in response to coastal bottlenose strandings and mortalities (*i.e.*, the Northern GOM UME). However, the UME has since been closed. *See* http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico.htm. Moreover, none of the strandings or deaths in the UME have been attributed to deep penetration seismic survey activities. Instead, recent research demonstrates that seismic impulses at even higher thresholds fail to induce even TTS in dolphin hearing. *See* Finneran J.J. et al. (2015). There are no data suggesting that sound is a problem for the bottlenose dolphin population in general or the mother-calf pairs in particular, and it is equally, if not more, plausible that the animals are completely unaffected by sound. The fact that these populations may be affected by coastal pollution, vessel traffic in the estuaries, or endemic diseases is not a basis for restricting an activity that has no demonstrated adverse effect. Accordingly, no relevant scientific evidence supports a further restriction of deep penetration seismic surveys, let alone suggests that such a restriction would result in any meaningful benefit to coastal bottlenose dolphin populations.

Second, another possible rationale for the nearshore restriction is that seismic activity is an additional stressor to an already stressed bottlenose dolphin population in the UME, and that such additional stress may impact dolphin breeding rates. However, there is no evidence that sound from deep penetration seismic surveys is a stressor to coastal bottlenose dolphin populations or contributes in any way to dolphin late-term pregnancy complications or to perinatal and postnatal responses that would lead to increased calf mortality, or UMEs. *See* Litz et al. (2014); Venn-Watson et al. (2015).

[33] The mitigation measures also increase the amount of time the vessel spends surveying because shutdowns and delays necessarily result in overall increased surveying time to preserve data quality and integrity.

Third, there are unleased blocks within the area covered by the seasonal restriction. Because existing seismic data in these areas is outdated and inadequate to inform decisions regarding future lease sales, such a restriction would significantly impede industry's and BOEM's evaluation of blocks for planned future lease sales. Moreover, given the amount of time required to acquire additional seismic data, the proposed seasonal exclusion significantly increases the likelihood that it will not be feasible for an affected deep penetration seismic survey to be completed within its one-year permit term, thereby increasing the overall number of surveys that will need to be conducted.

b. Reduced activity levels

The Application mentions reduced levels of deep-penetration, multi-client seismic activities by either 10% or 25%, but leaves it ambiguous as to whether BOEM or NMFS will attempt to mandate these reduced levels through issuance of the contemplated ITRs. *See* Application at 121-22. The purpose or likelihood of this "measure" is not discussed anywhere in the Application. However, it is addressed in the DPEIS, which states that the measure would be a "Gulfwide strategy designed to reduce overall exposures and sound levels," the stated purpose of which is to "reduc[e] protected species cumulative sound exposures because a reduced number of surveys would be performed." DPEIS at 2-47. To the extent BOEM or NMFS plans to implement the contemplated 10% or 25% activity reductions through the contemplated ITRs, the Associations strongly object because they have no legal basis and are arbitrary.

First, under the MMPA, NMFS has the authority to grant or deny, or to reasonably condition, marine mammal incidental take authorizations. *See Ctr. for Biological Diversity v. Salazar*, 695 F.3d 893, 916 (9th Cir. 2012) (MMPA incidental take authorizations only authorize incidental take, not the underlying activity). Accordingly, any mitigation measures premised upon NMFS's MMPA authority may only address the proposed MMPA action—*i.e.*, authorization of incidental take, not the actual exploration activities. *See id.*; *see also* 16 U.S.C. § 1371(a)(5)(A)(i) (Secretary "shall allow" incidental taking that meets applicable statutory standards). Thus, there is no authority under the MMPA for NMFS to impose generalized reduction measures on the underlying activities through the contemplated ITRs.

Second, the contemplated activity reductions also present practical implementation problems. For example, one could perform a 3D survey with a 4,000 cubic inch array or a 2D survey with 10 km track spacing and have half or fewer the number of incidental takes in the same number of track miles. In this example, would 50,000 track miles at half the exposure levels be translated into 25,000 track miles for purposes of calculating the remaining allocations available? How would the reductions be fairly apportioned among the various applicants over the course of a year? Such questions are not addressed at all in the Application (or the DPEIS), further highlighting the impracticability of the contemplated measure.

Third, as detailed in Sections II and III.B.3.a *supra*, even if NMFS did have authority to require activity reductions (which it does not), there is no demonstrated need for such reductions because all of the best available information shows that the potential impacts of G&G activities

on marine mammal populations are insignificant. Any such reductions would also directly contradict the "first stated purpose of OCSLA," which is "to establish procedures to expedite exploration and development of the OCS." *Watt*, 668 F.2d at 1316.

c. Exclusion zones

The Application does not address how the size of exclusion zones will be established. However, the DPEIS explains that exclusion zones "will be dependent upon the source levels, array configuration, operational parameters, and environmental and oceanographic conditions" and that the "actual extent of the acoustic isopleths around the sound source will depend on the source level, source configuration, water depth, bottom properties, and sound propagation through the immediate environment." *Id*. The DPEIS's suggested approach for exclusion zones will require a substantial modeling effort and will result in exclusion zones that are many times greater than those that have typically been implemented (with success) in the GOM. Any such expanded exclusion zones are especially concerning because they will ultimately be dictated by the marine mammal hearing group with the largest modeled radii once new group-specific acoustic criteria are implemented. Because the Application does not address this issue in any detail, we are unable to provide more specific comments.

Any exclusion zone measures included in the proposed rule should be based on the best available information, and if that information demonstrates that exclusions zones of less than 500 meters are warranted, then there is no basis for arbitrarily requiring a minimum exclusion zone of 500 m (if the Application intends for 500 m to be a minimum). *See* Application at 147. If a minimum 500 m exclusion zone requirement is not applied, the Associations would support the incorporation of power-down procedures to mitigate any potential effects. Power-down procedures acceptable to the Associations are a <u>modified</u> version of the procedures described at 79 Fed. Reg. 14,780, 14,797 (Mar. 17, 2014) ("Langseth IHA").[34]

d. Passive acoustic monitoring

BOEM proposes to <u>require</u> Passive Acoustic Monitoring ("PAM") in certain circumstances. *See* Application at 142-43. PAM is one of several monitoring techniques that offers a monitoring capability during periods of poor visibility or night conditions. PAM complements (rather than replaces) traditional visual monitoring. Mandatory use of PAM may substantially increase survey cost, require the placement of more personnel on vessels (*i.e.*, four dedicated PAM observers onboard), and potentially increase entanglement risk due to more gear

[34] Specifically, the Associations would support power-down procedures similar to those in the Langseth IHA <u>provided that</u>: (1) power-down would be implemented only if a marine mammal is observed <u>in or entering</u> (<u>not</u> "likely" to enter) the exclusion zone; (2) power-down procedures may involve a reduction in the <u>volume and/or pressure of the array</u>; and (3) if a marine mammal is observed within the 500 m exclusion zone, then the reduced array would be shut down and shutdown procedures would apply.

being towed in the water. The Associations therefore urge NMFS to propose the use of PAM as a mitigation option that can be elected by an LOA applicant on a case-by-case basis.

e. National standards for PSOs

The Application proposes to apply the observer qualifications addressed in NOAA Technical Memorandum NMFS-OPR-49, *National Standards for a Protected Species Observer and Data Management Program: A Model Using Geological and Geophysical Surveys* (Nov. 2013) (the "Observer Standards"). *See* Application at 143, 145. However, the Observer Standards are flawed in a number of respects. It is imperative that the agencies consider public input on the Observer Standards and make the revisions necessary to ensure that the standards are workable, accurate, and appropriate before they are required. The standards should encourage adaptive technology, remote monitoring, reduction of health, safety, and environmental risks, and use of an updated reporting form that provides substantive data from observations to inform the need (if any) for additional or revised mitigation measures. The letter by IAGC, API, and NOIA, dated May 2, 2014, addressing the Observer Standards more specifically states our concerns with the Observer Standards and offers constructive solutions. *See* Attachment E. We appreciate the agencies' consideration of our concerns.[35]

E. The Adaptive Monitoring Plan Must Be Consistent with Applicable Law

The Application states that BOEM and NMFS are presently developing an adaptive monitoring plan that will be implemented for the life of the contemplated ITR, the "overarching goal" of which is to "inform our understanding of how geophysical activities may affect marine mammals in the GOM." Application at 152. However, the Application includes very little additional information about the monitoring plan.

The Associations have a strong interest in environmental monitoring—both to better understand the environment in which our members work and to mitigate potential risks of activities to living marine resources. The Associations support efforts that improve the quantity and quality of information related to determining the nature and magnitude of the potential effects of offshore geophysical activities on marine mammals. Such information assists with developing reasonable and workable incidental take authorizations, including appropriate mitigation measures to minimize incidental take, and correctly assessing the type and amount of incidental take that occurs in the course of geophysical operations. In this light, the Associations support both ongoing and future research endeavors by industry and its partners that help to inform the understanding and mitigation of potential effects of geophysical activities on marine mammals in the GOM. We also support agency efforts to improve the collection and use of the best available science consistent with the requirements and limits of the MMPA.

[35] We agree with BOEM's decision to not propose buffer zones between concurrent surveys or shutdown requirements applicable to dolphins. As stated in our comments on the DPEIS, there is no support for either of these hypothetical measures.

Nonetheless, the Associations have expressed concern on multiple occasions that the agencies' envisioned monitoring requirements for the contemplated ITR will exceed the authority granted to NMFS. We have explained in detail that the MMPA does not authorize NMFS to require as a condition of an incidental take authorization the preparation or development of a large-scale, expansive monitoring plan that reaches beyond the time and area in which site-specific activities are undertaken or the performance of actions related to such a plan. Our comments detailing these concerns are attached as Attachment F so that they may be included in the administrative record for the contemplated ITR. The Associations look forward to working collaboratively with BOEM and NMFS to complete the preparation of a legally compliant and operationally effective monitoring plan.

IV. CONCLUSION

As explained above, the performance of G&G activities is critical to the federally mandated "expeditious and orderly development" of the GOM OCS. A wealth of data and information demonstrates that the geophysical activities addressed by the Application will have no more than a temporary, localized, and negligible impact on marine life. Unfortunately, the information presented in the Application is not consistent with this well-established record and erroneously requests authorization for incidental take at levels that are exponentially higher than the levels that are reasonably anticipated to occur based upon the best available science. Because the Application is so deeply flawed, and the exposure estimates so inaccurate, the Application must be substantially revised and resubmitted on a schedule that complies with the Settlement Agreement and the Stipulation to Amend.

We appreciate your consideration of all of the comments set forth in this letter, which are intended to be constructive and to facilitate the improvement of the scientific and legal integrity of the Application and the contemplated ITR. Should you have any questions, please do not hesitate to contact Nikki Martin (713.957.5068) or Andy Radford (202.682.8584).

Sincerely,

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International Association of Geophysical Contractors
President

Andy Radford
American Petroleum Institute
Sr. Policy Advisor – Offshore

Jeff Vorberger
National Ocean Industries Association
Vice President Policy and Government Affairs

Greg Southworth
Offshore Operators Committee
Associate Director

ATTACHMENT A

BOEM

BOEM'S PRECAUTIONARY MODEL vs BEST AVAILABLE SCIENCE (BAS) MODEL

BAS

1

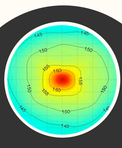
Sound Source

According to the Precautionary Model, the sound source is 1.5 – 2 times bigger than in reality.

Actual size of a seismic sound source.

2

SOUND FIELD



Precautionary Method Sound Field 10-60 Times Bigger

Best Available Science Actual Sound Field

3

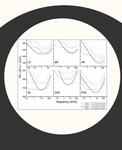
AFFECTED ANIMAL POPULATION

The Precautionary Model Shows 2-80 Times as Many Affected Animals

BAS Population Estimate for Affected Animals

4

ACOUSTIC THRESHOLDS



Precautionary Acoustic Threshold are 10-30 dB Aboe Acoustic Threshold Established by BAS

BAS Acoustic Threshold

5

MITIGATION

No Reduction for Mitigation on Precautionary Method

Some Reduction for Mitigation on BAS

Results

FINAL RESULTS OF PRECAUTIONARY METHOD VS. BAS

The results of over-statements in the precautionary method equation results in millions of estimated takes.

The results of a realistic equation based on Best Available Science shows a much more realistic number of takes.

BOEM has analyzed a strawman through the DPEIS by relying on unrealistic assumptions as opposed to the best available science as U.S. law requires. The above graphic shows how precautionary assumptions stacked upon each other lead to a multiplicative over estimation of impacts that will never occur.

Total Multiplicative Precautions (short list)
[Source+Propagation (90-120x)] x [abundance (2x)] x [conservative threshold criteria (100-10,000x)]x [no recovery factor (10-100x)] x [no allowance for aversion (6.7 x Level A)] x [no mitigation (1.1 – 2x)] = 1.3 million to 3.2 billion more takes than the number that would be produced by using average or most likely values for all variables.

ATTACHMENT A

SYNOPSIS OF PRECAUTIONARY ASSUMPTIONS

GULF OF MEXICO DPEIS

Bob Gisiner, IAGC

BACKGROUND

The BOEM Gulf of Mexico DPEIS is structurally very similar to most recent NEPA analyses for environmental risk from manmade sound in the marine environment. The interaction of the source, the propagation of the sound from source to animals, and the resulting sound exposures interact to produce a calculated estimate of effect, usually stated as MMPA Level A and Level B "takes", since the MMPA requires that the impact of an activity be quantified in those terms (NEPA and ESA do not have such strictly numerical requirements for estimating impact).

Historically and in this EIS, each element of the model is assessed relative to the available information and a value is selected that is considered sufficiently conservative or precautionary, given uncertainties about the scientific data or about natural variability in factors such as animal distribution, location and movement of the sound source or the sound propagating properties of the water column. Selection of conservative values in multiple steps of the model leads to an outcome that is not an average of the precautionary assumptions, or even an addition of uncertainty, but multiplication of each uncertainty by the uncertainty in the other steps. Simply put, doubling the expected value for four different parts of the model does not double the outcome, nor does it result in a 2+2+2+2 = 8-fold increase in the predicted outcome. Instead the effect of multiple precautions is multiplicative, and the outcome is 2x2x2x2 = 16-fold more than if the model was run with 'most likely' values like averages. Doubling all values out of precaution therefore does not predict an outcome of 200 takes when 100 was the most likely expected outcome, but instead produces an outcome of 1,600 takes.

As we will see from the following quick-look at the GOM DPEIS, there are many more variables in the model than the simple four variable example described above. And the levels of precaution are not simple doubling of expected values, but multiples that may range from addition of some percentage (less than doubling) to increases that are orders of magnitude greater than the "most reasonable" value (orders of magnitude are multiples of ten, such as 10, 100, 1000, etc.). The downstream consequences are also more complicated than the simple two times two example above, with some variables interacting in other than simple multiplicative ways.

For example, use of an 8000 cubic inch sound source rather than the mean or median of sizes actually used (5,600-5,100 cubic inches) would appear to only create a difference of about 30-37%, but that

difference in size produces a difference in source sound level of 3-6 decibels, depending also on the number of elements in the source array. The difference in source level needs to get translated into a difference in the area covered by the sound from the two different sources, because that will change how many animals are within the two respective areas, all other factors being equal. The 33-37% difference in the size of the two arrays translates into an increase of some 45-50% (roughly) in the area exposed and therefore the number of animals taken. That is, if one uses an 8000 cubic inch array as the precautionary standard and that results in a take estimate of 150 individuals, then use of the more likely mean value of 5,600 cubic inches will result in a take of 100 individuals. Needless to say, this is a pretty large downstream consequence from alteration of a single value by what might superficially look like a pretty small amount. As we will see, factoring in the other parts of the model where similar conservative assumptions are exercised results in a prediction of takes that is millions, possibly billions, of times greater than the outcome predicted by using most likely outcomes only.

[for ease of locating information, references to the DPEIS are to the .pdf file page number, not the page numbers on the document itself]

SUMMARY OF PRECAUTIONARY ASSUMPTIONS IN THE BOEM DPEIS

This list includes only the most obvious and clearly unsupported precautionary assumptions of the model:

- Source
    - Extreme array size and number of elements increases exposures by 1.5 to 2 times.
    - Six additional precautionary assumptions were not analyzed.
- Propagation
    - Conservative or simplifying assumptions about the propagating environment add 10-16 dB minimum to the propagated sound.
    - Combined with the precautionary source assumptions, this results in a 90-120 time increase in estimated takes, all other variables being equal.
    - Six additional precautionary assumptions were not analyzed.
- Animal Abundance, Density and Movements
    - NMFS's Stock Assessment Reports ("SARs") and Duke Model differ on average by a factor of 2. A minimum compromise for uncertainty would be to reduce abundance and density estimates by 25% to 1.5 times SAR.
    - Three specific groups showed even more extreme differences, but were not separated in this simple analysis: expansion of Bryde's whale habitat leading to more takes; large increases in numbers of deep divers (beaked whales, sperm whales, Kogia); extremely large increases in pelagic dolphin numbers (over 80 times for two species)
    - Five additional precautionary assumptions were not analyzed.
- Threshold Criteria
    - Level A calculations from SPLrms and SEL used precautionary assumptions that overestimated take by 10-1,000 times. SPLpeak takes were overestimated at least twofold by using 6 dB instead of 15 dB to derive PTS from TTS.

- Level B calculations make generous assumptions about the likelihood of response and assume all exposures that exceed threshold are biologically significant, over-estimated biological consequence by at least 1,000 to more than 100,000 times.
- No allowance for reduced Level A due to behavioral avoidance of the source (reductions of Level A up to 85%).
- No allowance for hearing recovery between pulses (likely reduction of cumulative SEL from a continuous pulse train of 50% or more); no allowance for hearing recovery between passes separated by hours or days (fewer than 1% of successive passes, those within 8 hours or less, will accumulate and trigger Level A criteria).
- Four additional contributors to precautionary over-estimation were not analyzed, including application of weighting functions to impulse SPL metrics.

- Mitigation
  - No reduction in take was allocated for mitigation. While setting a specific value for mitigation may be difficult, it clearly is not zero and therefore some reduction of takes due to mitigation should be factored into the model.
  - Reductions from multiple proposed mitigations were not estimated.
    - Vessel separation and dolphin shutdowns modeled, with questionable effectiveness
    - Increased time/area closures and 10-25% effort reductions were not estimated.
- Total Multiplicative Precautions (short list)
  - [Source+Propagation (90-120x)] x [abundance (2x)] x [conservative threshold criteria (100-10,000x)]x [no recovery factor (10-100x)] x [no allowance for aversion (6.7 x Level A)] x [no mitigation (1.1 – 2x)] =
  - **1.3 million to 3.2 billion** more takes than the number that would be produced by using average or most likely values for all variables.

RECOMMENDATION

Re-calculate takes using average or most-likely values, quantify and report the overall level of uncertainty in the modeling results, and add an agreeable level of precaution to the final results, not the individual elements.

- Maybe double is reasonable?
- A statistical measure of extreme confidence like 3 sigma still covers 99.7% of all possible outcomes (370 times the central value) and is not nearly so unreasonable as the present model
- It seems unlikely that 1 million to 3 billion times the most likely outcome, which covers 99.9999% or more of all possible outcomes, is a reasonable level of ‘precaution’.

PRECAUTIONARY ASSUMPTIONS

<u>The Sound Source</u>.

As discussed above, BOEM treats all geophysical surveys as if they were all conducted with the largest arrays in use. The nominal value of 8000 cubic inches is an approximation of the maximum array size currently used in the Gulf, typically 7900 to 8500 cubic inches. Based on a quick survey of IAGC members over the past decade, a little less than one third of all surveys use arrays of that size. The other two-thirds of surveys in the GOM use arrays that range in size from 6000-2000 cubic inches, for a

mean array size of 5600 cubic inches. Since the different sizes are not distributed normally around that mean value (i.e. not a smooth bell shaped distribution), some other value of central tendency, like the median (5100 cubic inches) might be deemed a more appropriate central value. But in any case, using 8000 cubic inch sources for all modeled surveys greatly overestimates actual use.

The source level of a compressed air array increases as the cube root of its volume, all else being equal, so a difference of 8000 and 5600 cubic inches might seem trivial. But we have seen that it is not trivial in terms of the outcome of concern; the number of animals exposed, because of the resulting expansion of the acoustic 'footprint' of the array and the number of animals likely to be found within that footprint.

Furthermore, the modeled array is not only extreme in the total volume modeled, but also in the number of elements within the array. A typical large array of 8000 cubic inches might include 48 elements and sometimes as many as 60, but the BOEM DPEIS used 72 elements. Why is this important? Because array source level may only increase trivially with total volume, but it is directly proportional to the number of elements. An array with 72 elements has double the amplitude of an array of 36 elements; volume and air pressure being equal.

Therefore the combination of using an array at the extreme upper end of normally used array sizes, coupled with a number of elements in that array which also greatly exceeds the average, can by itself produce estimates of takes that are 1.5 to over 2 times as large as would be predicted by using the normal range of array sizes and numbers of elements actually in use. Based on this variable alone one would be justified in taking the final model predictions and halving them. But there are many more conservative assumptions in the model.

Also potentially capable of altering the model outcome, but not addressed in this quick analysis, are:

- The number of source vessels. When multiple source vessels are used they are used at intervals that are similar to a single source. The total acoustic energy is therefore not increased over using a single source operated at the same inter-pulse intervals, but the total area ensonified is slightly increased, depending on the spatial separation of the vessels. This may be compensated by the fact that each vessel is only producing sound every 60 seconds instead of every 15 seconds for a single source vessel). In the BOEM DPEIS, the maximum number of source vessels, four, is used for all surveys that might use multiple sources, even though many of those surveys, such as NAZ, WAZ and coil surveys, might more often use only one or two sources, and rarely use as many as four source vessels.
- Longitudinal tracks were only used during modeling on the slope region of the Gulf, which has the potential to alter sound fields and estimated takes relative to using both lateral and longitudinal tracks typical of most surveys.
- The choice of depth at which the array was towed was set at 8 meters, but other tow depths are common (6 meters is considered the default 'standard') and the choice of tow depth affects the frequency structure and propagation of the resulting sound field.
- The choice of pulse intervals typically varies from 10 to 20 seconds, with the DPEIS selection of 15 seconds being fairly typical. A four source survey would result in each source operating at 60 second intervals.

- Durations of surveys were not clear. On page 3-23 a nominal survey duration of 10.5 months was applied to all surveys, but elsewhere in the document, e.g. D-177, the survey durations varied.
- Survey areas, line separations, and other parameters on page D-177 appear to be in the same conservative direction as the array size and element count; suggesting that line spacing and area covered by a modeled 2D, 3D, WAZ or other survey may be greater than average and thus produce elevated sound exposures and take estimates.

Sound Propagation.

BOEM is to be commended for having run some preliminary models (Phase I modeling in Appendix D) to quantify some of the consequences of using simplifying or conservative assumptions (e.g. see pages D-100; D-106; D-113; D-122). Therefore we can assign some quantities to what is otherwise a very complicated variable, the day-to-day fluctuations in wind, temperature, currents, and other factors that affect sound propagation through the water between the sound source and the animals of concern.

The modeling of sources of variance yielded a 10 decibel difference in sound transmission between an average sound speed profile in the water and the extreme case used in the model (10 decibels is an order of magnitude or ten times the average). Use of hard or median properties for the seafloor added another 4 dB over the most likely outcome, with most of the Gulf being covered with soft sediment that is a poor reflector of sound). Use of a flat sea surface instead of a rough sea surface adds another 2 dB minimum, resulting in a conservative value of over-estimated propagation of 16 decibels or 60 times (!) the amount of energy propagated than would be expected on average. Add this to the conservatism we saw for the source itself, and we already have an ensonified area and number of animals ensonified that would be 90 to 120 times the reasonably expected exposures. A “best reasonable estimate” of 100 would become an estimate of 9,000 to 12,000 from these two precautionary measures alone.

Also potentially capable of altering the model outcome, but not addressed in this quick analysis, are:

- A single uniform propagation regime is used for the entire deepwater zone (Zone 7). Assumptions of flat bottom and maximum depth are not met in all cases and propagation is therefore subject to additional over-estimation factors in the deep water region.
- Survey days and survey effort appear to have been evenly distributed across the area and seasons, although this is likely not the case for actual survey effort. Theoretically this might average out, but it is also possible that fewer actual survey days in winter, when propagation conditions are best, will lead to actual surveys producing fewer takes than the model estimated by using equal division across winter and summer.
- SPLrms for longer range propagation is derived from the SEL values produced by the model. As JASCO acknowledges (D-49), modeled SEL at range tends to over-predict SPLrms as the signal is spread over time. Time resolution of the model also hinders accurate modeling of SPLrms based on proper analytic units such as rms.90 (average sound pressure over the time than encompasses 90% of the total pulse energy).
- Single frequency long range propagation modeling leads to increased errors in pulse properties with range. For modeling purposes a single frequency at the center of each 1/3 octave band is treated as ‘representative’ of all the sound energy within that frequency band. In practice, selection of a non-representative frequency (e.g. located at a ghost notch or filtered by

propagating environment) can lead to errors in weighted SEL values needed for determining effects thresholds.

- Use of "maximum over depth" in some model estimates of take creates a worst-case scenario where all individuals are assumed to be at the depth of highest sound exposure all the time. It is not clear in what context JASCO used maximum over depth as a simplifying step in modeling, but it will always greatly over-estimate takes when used.(D-296)
- Ranges to effect for mitigation monitoring and shutdown (but not for take estimation?) were calculated from unweighted values, whereas hearing frequency weighting needs to be applied to SEL threshold values (JASCO also seems to have applied weighting to SPLrms data, which may also be inappropriate – see section on Threshold Criteria, below).

Animal Abundance, Density and Movements.

This is a complex set of variables, with precautionary assumptions literally varying for each of the species modeled. But overall, the use of the Duke model creates an increase in predicted abundance that is about double the official NMFS abundance numbers in the SARs. Some additional modifications in the use of those data by JASCO add to the conservatism (over-prediction) by a fractional amount, in most cases.

The Duke model is a novel approach to forecasting animal distribution and density from historical correlations with readily available environmental data, typically not the true environmental predictors like prey patches or features like fronts, currents and eddies that are less easy to predict or track. As such, there are some things that the Duke model likely does better than the SARs, such as predicting average abundance of pelagic dolphins that move in and out of the US EEZ from one survey to the next, leading to large sampling variability. However, other similar models for the US west coast, for the UK, and for global oceans, have shown some extreme misses in their predictions, an expected outcome for models in the early stages of development for species that are infrequently counted and whose habits are still poorly understood relative to land animals for example. Too great dependence on a single very new model like the Duke model can therefore be expected to result in some improvements on the SAR or US Navy NODES data resources, but is also likely to produce some extreme "misses". Species with wide disparities between historical data and Duke model predictions include Atlantic spotted dolphins (from no historic estimates in SAR, to over 45,000 animals predicted by the Duke model, making them the third most abundant species in the Gulf, virtually overnight. Duke predictions of Clymene dolphin abundance are about 85 times higher than the SAR figures, Kogia numbers are increased by a factor of 12, rough-toothed dolphins by a factor of 8 and killer whales by a factor of more than 7. These are radical changes to our understanding of marine mammal abundance in the Gulf that require more than blind acceptance of a new model simply because it is generally "better" than the SARs (D-65).

Some of the animal abundance and distribution modeling may be unfamiliar and counter-intuitive to the average reader. The model in the BOEM DPEIS uses electronic representations of individual animals, or 'animats', to construct time series of exposure for a realistic number of animals, 'behaving' in realistic ways, so that the animats move about and dive at realistic speeds and distances relative to the sound source, which is also moving. As might be expected, capturing the complexities of animal behavior and all of the other variability of the sound source and the propagating ocean is impossible, so certain statistical techniques are used to smooth out some of the variability in outcome that can occur just from sampling errors alone. These techniques, such as over-populating the sound field with hundreds or

thousands of times more animats than animals (and then reducing the result proportionally to the actual population) do not affect the outcome but do reduce the likelihood of random extreme variation in outcomes. Monte Carlo methods, or running the same simulation over and over hundreds or thousands of times also helps smooth out the distribution of outcomes. Because the animats are seeded randomly for each model run and because they run independently according to user-specified rules, no single model run will produce the same result (as in real life) and so the model must be run many, many times in order to arrive at a statistical average. This process, which is widely accepted as statistically legitimate and even necessary to producing realistic model outcomes, should not be confused with the selection of variables to put into the animat models and Monte Carlo simulations: those variables, like the source and propagating environment variables, can and do produce biases in the outcome, as will be discussed in detail below.

Animal survey data for the Gulf of Mexico is sparse overall, and therefore statistically weak. Various techniques have been applied to the data to generate estimates of population abundance, density and distribution. The official NMFS Stock Assessment Reports (SAR) are an official estimate by NMFS of the best estimate of population abundance in a region, but they do not offer information about animal distribution, forcing the user to either evenly distribute the animals even across the habitat, even though it is known the animals do not use all of the habitat equally. Alternatively, the modeler can generate 'expert' assumptions about how the animals use the habitat, but those assumptions can create unrealistic estimates of take if the assumptions are not good. For example, JASCO placed all sperm whale animats in water depths greater than 1000 meters because sperm whales are deep divers that tend to occupy deep water. However, a look at the data show that many, if not most, sightings of sperm whales occur in water depths of 400-800 meters, and this is largely confirmed by tagged whale data from the BOEM SWSS research project.

Alternative to applying a population estimate for the entire Gulf evenly or selectively across the Gulf is to use habitat features correlated with animal sightings to predict where animals are most likely to be seen based on 'suitability' of habitat. The statistical aspect of this process is quite well worked out as in the Duke University model applied in the BOEM DPEIS, but there are still 'human-in-the-loop' decisions that can affect model outcome. Something like the Duke model is therefore a "work in progress" in which model predictions may be more or less accurate, depending on the habitat variables available to the modeler and whether they are in fact strongly predictive of where animals will in fact be. A few "warning flags" about the novel predictions by the Duke model are:

- The distribution of Bryde's whales across the entire GOM shelf edge by the inclusion of "unidentified baleen whale" data as Bryde's whale data. Actual observations suggest that the Bryde's whales are confined to a relatively small area of habitat around DeSoto Canyon in the Eastern Planning Area (EPA), and in fact this site has been selected as a special mitigation zone. But the Duke model "places" Bryde's whales across large swaths of area where they have never been seen, greatly elevating the predicted takes in the WPA and CPA by what are probably orders of magnitude (hundreds or even thousands of modeled takes not supported by the real data).
- Several species for which there are low sighting data produced low likelihoods of occurrence across vast areas of the Gulf in the Duke model, which were further simplified to even probabilities across entire modeling zones: false killer whales, killer whales and several other species are therefore equally likely of being taken wherever surveys occur, when in reality there

are probably higher and lower areas of likelihood. It is hard to predict how the "fuzzy" predictions of the Duke model, and the modifications of the JASCO model affect take outcomes but generally speaking, these species tend to have predicted abundances derived from Duke density models that are among the highest deviations of the Duke model from SARs (e.g. 6 times SAR for killer whale, 14 times SAR for pygmy killer whale).

- Deep divers that are seldom seen during visual surveys were subjected to some assumptions about sightability that greatly elevated predicted abundance and greatly expanded habitat occurrence over the SARs; 12 times the SAR for Kogia and about 8 times the abundance for beaked whales (based on Cuvier's beaked whale modeling). This radical departure from historical estimates of abundance is somewhat consistent with comparisons elsewhere (Atlantic, California, Bahamas, eastern north Atlantic sites), but on the high side. It is also higher than predictions by passive acoustic surveys and modeling by Hildebrand, Moretti, and others. Just how "precautionary" the Duke model is for these species is hard to estimate at this time, but it is fairly clear that the Duke model is over-predicting deep diver abundance and distribution leading to excessive estimates of takes.

Additional aspects of animal distribution and movements information that may lead to over-prediction of takes include:

- Assumptions used to deal with the large number of modeling cells that yield zero abundance and zero takes can lead to over-prediction of takes. JASCO notes that the outcomes that yielded a probability of Level A take greater than one (1) was less than 0.2% (i.e., only 2 out of a thousand model results yielded a take of 1 or more animals)(D-123, D-129). The average number of Level A takes was 0.0195 or about 2 per 100, the result of a very small number of model outcomes that yielded more than one Level A take.
- The 3MB model used to set swimming and dive parameters for the animals rely on limited data, quite often from related species studied at different locations than the Gulf. It is therefore hard to predict whether the overall effect of the values entered into the 3MB model resulted in over-prediction of takes or under-prediction, but the most likely outcome is that the values used were conservative, precautionary values that added to the over-prediction of takes.
- The modelers assumed that the animals did not undergo long-term, large-scale movements. Certainly it is widely assumed that animals do not migrate in and out of the Gulf in great numbers, although sperm whales, a variety of baleen whales, and probably many other species do move between the Gulf and Atlantic or Caribbean. But the currently available data do not offer enough information, especially for winter months, to determine whether other species exhibit moderate north-south or east-west movements with the seasons similar to the inshore-offshore movements of estuarine bottlenose dolphins in the late winter and spring, or during other seasons. It is well known that large numbers of animals may travel from east to west, tracking the warm core rings spun off by the Loop Current, but this phenomenon is not sufficiently documented to inform the model.
- JASCO modeled the effect of group size on outcome. They did not see a significant difference in average outcome from using single, ungrouped animats, although they did note that obtaining the same outcome regardless of group size means that there will be more zero-take model runs as group size increases (D-135; D-174).

- As animats move over time, and if animats are removed once they exceed a take threshold, then the probability of take will decline over time as there are fewer and fewer animats in the field. JASCO used a common technique for keeping the number of animats constant and thus keeping probability of take constant over time by introducing new animats on the opposite side from which an animat had just left (D-49; D-82; D201). It is also not clear if and how animals were removed or replaced once taken. This is especially important where animats were left in the field to accumulate SEL for days or weeks. There are other nuance to re-seeding the sound fields that can result in skewed results, but a full treatment is beyond the scope of this short review.

Take (Acoustic Risk) Thresholds.

Both Level A and Level B thresholds range from more than 100 times higher than best scientific evidence to over 100,000 times higher. There are multiple conservative assumptions that produce this extraordinary outcome: the assumption that exposure equals take, the conservative linkage of permanent hearing decrements to temporary hearing decrements, assumptions about the accumulation of hearing effects over time without recovery between exposures, and assumptions about how many of these exposures actually have any meaningful biological consequences.

The MMPA defines "harassment" with reference to two categories: Level A harassment (potential to "injure") and Level B harassment (potential to "disturb"). NMFS applies acoustic thresholds to estimate the amount of harassment for each category that may result from an activity. The acoustic thresholds are often mistakenly assumed to mean that an injury or mortality will occur, with 100% of the exposed animals being injured or killed, or that 100% of exposures at behavioral thresholds will cause behavioral change and that the consequences of the change are a significant and meaningful loss of food, energy, or some other key biological function. In fact, both thresholds imply a probability of there being an effect upon exposure. BOEM was quite emphatic in stating that exposure does not equal take, but the model still treats any exposure that exceeds threshold as a take. This is the first of many features within the Acoustic Risk Threshold part of the model that lead to large over-estimates of take.

Additionally, the DPEIS is not always clear when and how animals are removed from the model to prevent multiple takes of the same individual (e.g., being counted as a Level B take and then exceeding Level A criteria and also being counted as a Level A take). Removals need to be handled carefully to prevent gradual reductions of model 'animats' in the sound field as "taken" animats are removed.

The most recent threshold criteria for Level A takes are based on empirical data for the threshold at which a temporary decrease in hearing sensitivity (TTS) occurs across a narrow frequency range of hearing (NMFS, 2016; Finneran, 2015). BOEM also variously cites NMFS 1995; Southall et al 2007; Finneran and Jenkins, 2012: it is not yet clear which criteria they plan to use in the Final EIS, making analysis of the DPEIS difficult. JASCO in Appendix D modeled the 1995 threshold

The simplest Level A threshold, long since superseded by scientific data but still in use by NMFS, is 180 dB SPLrms (root mean squared – an average over some specified time period, and since it is an average of a logarithmic scale, dB, a square root of the mean of summed square values is required rather than a simple average). Despite being outdated by more than 20 years, BOEM still modeled takes using this hyper-precautionary threshold. This provides a threshold that is some 10 to 1,000 times more precautionary than the current best data derived from TTS thresholds for both impulse and tonal sources; the peak SPL or the summed sound energy over time (SEL), although we shall see later in this

section that the SEL has also been subjected to additional conservative assumptions that render it some 10-1,000 times more conservative than SPLpeak. The values of 10 to 1000 times are based on SPLpeak thresholds of 230-200 dB SPLpeak, and an estimate of 180 dB SPL rms being comparable to 190 dB SPL peak (200 dB is ten times 190 dB and 2230 dB is one thousand times 190 dB on the same scale, in this case SPLpeak).

Permanent Threshold Shift (PTS) is not tested directly, and is assumed to occur at a level above TTS consistent with marine mammal TTS data and human/lab animal data. PTS, as for TTS, is not a threshold for deafness or major loss of hearing, but for a small decrement of hearing sensitivity within a narrow frequency range, a 'hearing notch'. This is a liberal interpretation of "injury", since the original sense of the term in MMPA was intended for animals that lost eyes, limbs, or suffered broken bones and spinal injuries during interactions with fisheries or due to being struck by ships, shot at, or otherwise seriously injured.

The criterion is rendered even more conservative by the use of a 15 decibel difference between TTS and PTS when the data from other species, including humans, indicates PTS onset at 20-40 dB above TTS threshold. Since even this conservative addition of only 15 dB to TTS produces thresholds of PTS above the source level of the sound source, Southall et al (2007) and subsequent criteria (NMFS 2016) have arbitrarily set the SPL peak metric for PTS at a mere 6 dB above TTS threshold, or almost ten times lower (and therefore productive of ten times as many exposures and takes).

The best predictor of TTS and therefore PTS, at least for tonal sounds, is SEL, a product of both signal intensity (not amplitude) and duration. It is not clear how well this relationship holds up for an impulse signal like compressed air (CA) sources, so relationships for tonal signals are applied to impulse thresholds. SEL is referenced to a time duration, typically one second, but for sounds less than 1 second long, like impulse sounds, SEL does not always hold up.

Furthermore, models like the BOEM DPEIS treat multiple exposures separated by many seconds or even hours or days, as if the sound exposure had been continuous. Near the source a geophysical survey produced 0.1 s of sound every 10-20 seconds, expressed as a "duty cycle" of approximately 1-2%. Further from the source the energy in the impulse may spread in time, increasing the duty cycle, but at ranges meaningful for Level A determination, the duty cycle remains below 10%, meaning that 90% of the time the ear is capable of recovering from some of the induced fatigue or threshold shift. Early TTS studies noted that the animals recovered from low levels of TTS within seconds or minutes, and subsequent ongoing studies are consistent, suggesting that it make take considerably more intermittent exposures to produce TTS or PTS than would be predicted by simply adding up multiple pulses as if they all occurred in succession without any time for recovery (In other words 12 pulses of 0.1 second duration each are treated as a continuous 1.2 second pulse and not what they are, which 1.2 seconds of sound within ten 15 second intervals or 150 seconds of ambient sound only).

The case for some sort of recovery function is even stronger for intermittent passes of an array that may be separated by 4, 8, 16 or more hours, in which case hearing is likely fully recovered and no accumulation of SEL should be carried forward. NMFS has traditionally carried SEL forward for 24 hours, a scientifically unwarranted precaution that leads to over-estimations of take by another 10-100 times, if not more. The current modeling exercise suggests in places that SEL accumulation was carried forward even further for weeks or even months. Appendix K offers annual summations of SEL and a

similar cumulative sound metric, Leq, for an entire year. This is not scientifically justified and leads to overestimates of takes by tens or even hundreds of thousands of takes, both Level A and Level B.

Because we do not have a specific recovery function to offer yet, BOEM has not included ANY recovery in their model, whereas a model consistent with best available science should include at the very least a recovery function consistent with human and other mammalian hearing. Absence of a recovery function is likely adding another 10 to 100 fold over-estimation to Level A take.

Thresholds for Level B take have been difficult to derive, although more and more publications have offered data and a proposed threshold function: most of these papers are not cited or reviewed in the EIS, or in the reference used by the Phase II model (Appendix D), which is an unpublished contract report to a California utility company (Wood et al 2012). Wood et al (2012) also presents a potential conflict of interest, since the author of Appendix H (Brandon Southall) is also a co-author of the Wood et al (2012) report. The industry is sponsoring a review of the behavioral effects literature, but that review will not be published in time to inform the current PEIS.

In any case, the Wood et al recommendation was a step function of increasing behavioral response at increasing exposure levels, and in this respect Wood et al (2012) is similar to other Level B risk assessments like the US Navy Programmatic EISs (2009; 2014, draft 2017). All recognize that out of a given group of animals, a few will respond at low levels, with increasing recruitment up to an exposure level that approaches thresholds for TTS and PTS. BOEM also applied the outdated NMFS 1995 Level B threshold of 160 dB SPLrms.

The outcome of applying any of these thresholds is the generation of tens of thousands to millions of Level B takes in which the vast majority of "takes" are transitory disturbances that last hours or a day or two and have no impact at all on foraging success, breeding success, growth, health or any other biologically meaningful metric. The hypothetical possibility that cessation of feeding for a day or movement a few miles from the source, or a change in vocal behavior "might" lead to biologically meaningful consequences means that the model calculations are treated as "takes" under MMPA even though all acknowledge that exposures don't equal takes and takes do not equal meaningful effects. The development of the PCOD model, and population of that model with data, confirm that behavioral disturbance from sound needs to be reduced to a "biologically significant" number that is a fraction of the counted exposures; anywhere from a conservative 1% to a more realistic 0.001% or less. In other words, estimates of thousand to millions of takes in the model are like to result in fewer than 1 to 1000 takes with actual biological consequences. These numbers, spread across large areas like the Gulf and multiple species are mathematically too low to result in a population level consequence from Level B takes (e.g. elevation of baseline mortality, decrease in baseline fecundity). This is consistent with history, where more than five decades of regular geophysical survey effort all over the globe has not generated any evidence that observed behavioral responses to the sound has any biological consequence.

Calculation of grossly inflated Level B take numbers in the GOM DPEIS is not consistent with current best information, and greatly over-estimates the consequences for the stocks of marine mammals being managed.

Finally, behavioral aversion was not applied to this model, even though a preliminary Phase I model showed that even small amounts of aversive greatly affected both Level A and Level B takes. If

behavioral aversion is a trigger for Level B take then it cannot subsequently be omitted from modeling of Level A takes, since the low level exposures that trigger aversion will reduce the likelihood of higher levels of exposure.

Additional aspects of threshold assessment that may lead to over-prediction of takes include:

- Conservative thresholds for low frequency whales. Current conservative thresholds for whales increase the estimated Level A and Level B takes for these species by some 4 to 10 times over best available science predictions. Arguments for unreasonable precaution in the face of uncertainty are not consistent with mammalian auditory biology in general.
- JASCO applied novel uses of weighting functions, using outdated M1 weighting functions from Southall et al (2007) on SPL thresholds, where weighting functions should not be applied.
- Kogia are considered to have the same hearing thresholds as porpoises, even though they are unrelated and the evidence for high sensitive is based largely on data about Kogia vocal behavior and some inconsistent evoked potential audiometry.
- Modifications to beaked whale Level B thresholds unique to this EIS are applied without justification other than precaution.

Mitigation.

BOEM allowed no reduction in the estimated take for mitigation. This is a highly over-conservative assumption, justified by the relatively little data available on mitigation effectiveness, together with the likely variability in mitigation effectiveness between mitigation service providers, types of marine species present, monitoring conditions and other variables. Some analysis on page D-151 suggests ranges of observer mitigation effectiveness from near zero to over 70%. One cannot require mitigation and at the same time treat it as if it provides no reduction in takes. BOEM needs to come up with some metric for the benefits from required mitigation.A variety of other possible mitigations have been proposed in the GOM DPEIS, ranging from alternative source technologies and active acoustic mitigation to time/area closures, vessel separation schemes, and reduced quantities of geophysical survey effort of 10-25%. At least two of the suggested mitigation measures, vessel separation (Table ES-1; page 1-10; page 2-10; B-32; page 2-38; and D-162-163) and shutdowns for dolphins approaching vessels or bowriding (p. 2-24) offer the possibility of actually increasing takes through expansion of ensonified areas (vessel separation), or extremely high increases in shutdowns with associated prolongation of survey effort (and sound exposure) to achieve survey completion (an estimated 35-40% increase).

ATTACHMENT B

PSO Data 2009 - March 2014: Dolphin Sightings ***Provided by CGG based on MMO reports submitted to BOEM during this period representing approximately 23% of total vessel activity days in the GOM since 2009.[1]***		
Species Identification		
% of Unidentified Dolphin	69%	In many reports, PSOs contribute sea state, distance, or the sun's glare as a key factor for not being able to identify species.
% of Identified Dolphin	31%	
PAM		
% of PAM Detections	60%	PAM detections accounted for over half of the total dolphin sightings/detection reports. However, only 3% of the acoustic detections made identified a specific dolphin species. The majority of this small percentage is due to the PSO visually confirming the acoustic detection.
Source Activity Comparison		
% of sightings and/or acoustic detections – source active	54%	The frequency of sightings and acoustic detections are proportional regardless of whether the source is active.
% of sightings and/or acoustic detections –source silent	46%	
Animal Behavior		
% of sightings when bow-riding was observed (active or silent)	12%	The data indicates source status (active or silent) had no impact on dolphin bow-riding. The number of dolphins observed when the source was silent was proportional to when the source was active.
Average Distance of Animal at Initial Sighting	560m	Average sighting distance between 500m and 800m.

PSO Data 2009 - March 2014: Turtle Sightings ***Provided by CGG based on MMO reports submitted to BOEM during this period representing approximately 23% of total vessel activity days in the GOM since 2009.[2]***		
Total Sightings	335	335 sea turtles were observed overall.
Average Distance of Animal at Initial Sighting	42m	Analysis of turtle sightings indicates observations are typically within 100m.

[1] Estimated calculation based on level of activity from January 2009 to March 2014 from IHS SeismicBase Vessel Search Database.

[2] *Id.*

ATTACHMENT B

ATTACHMENT C

March 13, 2014

VIA Federal eRulemaking Portal

Chief, Marine Mammal and Sea Turtle Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3226

Re: Comments on Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals - **NOAA-NMFS-2013-0177**

To Whom It May Concern:

This letter provides the comments of the American Petroleum Institute ("API"), the International Association of Geophysical Contractors ("IAGC"), the National Ocean Industries Association ("NOIA"), and the Alaska Oil and Gas Association ("AOGA") (collectively, the "Associations") in response to the National Marine Fisheries Service's ("NMFS") Notice and Request for Comments on its Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals ("Draft Guidance"). *See* 78 Fed. Reg. 78,822 (Dec. 27, 2013). We appreciate NMFS's consideration of the comments set forth below.

I. INTRODUCTION

A. The Associations

API is a national trade association representing over 500 member companies involved in all aspects of the oil and natural gas industry. API's members include producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of the industry. API and its members are dedicated to meeting environmental requirements, while economically developing and supplying energy resources for consumers. API is a longstanding supporter of the Marine Mammal Protection Act's ("MMPA") regulatory process as an effective means of balancing and rationalizing responsible oil and gas activities with the conservation of marine mammals.

IAGC is the international trade association representing the industry that provides geophysical services (geophysical data acquisition, processing and interpretation, geophysical information ownership and licensing, and associated services and product providers) to the oil and natural gas industry. IAGC member companies play an integral role in the successful

exploration and development of offshore hydrocarbon resources through the acquisition and processing of geophysical data.

NOIA is the only national trade association representing all segments of the offshore industry with an interest in the exploration and production of both traditional and renewable energy resources on the U.S. Outer Continental Shelf ("OCS"). The NOIA membership comprises more than 275 companies engaged in a variety of business activities, including production, drilling, engineering, marine and air transport, offshore construction, equipment manufacture and supply, telecommunications, finance and insurance, and renewable energy.

AOGA is a non-profit trade association located in Anchorage, Alaska. AOGA's 15 member companies account for the majority of oil and gas exploration, development, production, transportation, refining, and marketing activities in Alaska. AOGA's members are the principal oil and gas industry stakeholders that operate within the range of marine mammals in Alaskan waters and in the adjacent waters of the OCS. AOGA and its members are longstanding supporters of wildlife conservation, management, and research in the Arctic, and also support the continued issuance of incidental take authorizations in the Arctic. AOGA has for many years successfully petitioned for, and defended in court, incidental take regulations applicable to offshore oil and gas activities.

B. General Comments

The Associations want to acknowledge the significant effort involved in examining the scientific literature available on the topic of marine sound and its potential impacts on marine mammals. We recognize that this topic is complex and informed by an evolving base of scientific knowledge, and we appreciate the challenges associated with translating the available information into clear criteria. In this light, we support the goal of updating and developing acoustic criteria that are informed by, and consistent with, the best available science. We also support a continued effort in furtherance of this goal that is transparent and does not result in unnecessary or unsupported new processes for the regulated community. We have carefully reviewed and analyzed the Draft Guidance and have a number of specific comments, as detailed in the following sections of this letter, in which we identify opportunities for improvement, request clarity on technical issues, and address legal concerns. Our general comments are summarized as follows.

1. In certain respects, the Draft Guidance either does not consider all of the best available science or presents other scientific, technical, implementation, or operational concerns. These concerns are addressed in detail in Sections III.A and III.B below and in the Appendix that accompanies this letter. Given the scope of our comments, and the need for more information and analyses to facilitate a sufficiently informed process, we request that NMFS issue a second version of the Draft Guidance jointly with a draft implementation guide for public review and comment.

2. The Draft Guidance does not provide a full explanation of the anticipated impact of the proposed acoustic criteria on the regulated community, and there is no clear discussion of the regulatory implications of the proposed changes. Because the Guidance will be applied in a range of regulatory actions, we recommend that NMFS undertake a study comparing the assessment approach described in the Draft Guidance with the current assessment methods to demonstrate the regulatory implications of the proposed criteria. The results of this study should be presented in the second version of the Draft Guidance that is made available for public review and comment. Although the Draft Guidance's proposed metrics are not directly comparable to current assessment methods, we believe the results of such a study would be very informative to the regulated community.

3. The Draft Guidance presents uncertainty and potential complications regarding the implementation of the proposed criteria. The complexity of the methods proposed in the Draft Guidance will result in increased time and expenses for applicants, and may lead to confusion in both the regulated community and the general public. In addition, the Draft Guidance does not address a significant category of Level B take (i.e., behavioral modification). We request that NMFS provide a more detailed description of how the proposed acoustic criteria will be implemented generally (e.g., how and when it will be formally adopted and applied in the incidental take authorization process) and specifically (e.g., how it will translate into operational mitigation and monitoring measures for project applicants).

4. We commend NMFS for its commitment to undertake review and revision of this guidance every three to five years to incorporate knowledge as it is acquired. We also welcome the opportunity for applicants to propose alternative approaches to those presented in the Draft Guidance. This flexibility will enable innovation within the bounds of regulatory compliance. There are many ways to estimate potential exposures of marine mammals to various sound levels, and future applicants should not be limited to estimating exposures using the criteria set forth in the Draft Guidance if there are other methods that are more appropriate and scientifically justified. The Draft Guidance should emphasize the agency's discretion to assess and approve approaches that differ from those described in the Draft Guidance.

5. In the Draft Guidance, NMFS has developed criteria based on extrapolations from limited data sets. We do not believe that the methods used in parts of the Draft Guidance to obtain conservative criteria are always reflective of, or consistent with, the best available science. Accordingly, we recommend that the next version of the Draft Guidance address and explain the potential shortcomings associated with extrapolation from limited data and, where appropriate (as identified in the comments below), utilize other data that, although also limited, may more accurately reflect the best available science.

6. Marine mammal incidental take authorizations for the oil and gas industry have, for many years, been authorized by NMFS and the U.S. Fish and Wildlife Service ("FWS"). The best available science demonstrates that these authorizations have resulted in no detectable adverse impacts to marine mammal populations. Although we support NMFS's development of

new criteria that are consistent with the best available science, these new criteria should not be applied in a manner that results in increased regulatory burdens. The Associations are concerned that the Draft Guidance will unnecessarily result in an increased burden to the applicant during the permitting process. In addition, if the new criteria results in an increased number of shutdowns, or longer survey duration, not only will there be increased costs, but the safety risks for the activity will also increase.

II. STATUTORY CONTEXT

The Draft Guidance is primarily relevant to federal authorizations made pursuant to the Outer Continental Shelf Lands Act ("OCSLA"), the MMPA, and the Endangered Species Act ("ESA"). To add context for our comments, this section provides a short summary of the key provisions and requirements of the OCSLA, MMPA, and ESA.

A. OCSLA

The OCS is a significant source of oil and gas for the nation's energy supply. In 2012, offshore areas of the United States supplied over 12 percent of the country's natural gas and oil production, and are estimated to contain roughly 23 percent of the oil and 12 percent of the natural gas resources in remaining undiscovered fields in the United States. The important role of oil and gas exploration and development in the OCS is clearly reflected in OCSLA and its implementing regulations. Under those authorities, implementing agencies are mandated to preserve, protect, and develop oil and natural gas resources in the OCS in a manner that is consistent with the need to (i) make such resources available to meet the Nation's energy requirements as rapidly as possible, and (ii) balance orderly energy development with protection of human, marine, and coastal environments. *See* 43 U.S.C. §§ 1332(3)-(5), 1346, 1348; 30 C.F.R §§ 250.101, 250.107.

Geophysical surveys using seismic reflection are an essential, state-of-the-art component of oil and gas exploration in the OCS. Geophysical data are used by both industry and federal agencies to make informed economic and regulatory decisions regarding potential accumulations of oil and natural gas. As one of the earliest components of the lengthy process leading from leasing of lands, to exploration, to development and production of hydrocarbon resources, seismic surveys are critical to the OCS resource development mandated by Congress in OCSLA and have been demonstrated to have no detectable long-term impacts on the marine environment.

B. MMPA and ESA

Section 101(a)(5)(A) of the MMPA empowers NMFS (and FWS) to authorize the incidental take of marine mammals, subject to certain requirements. These authorizations occur in two forms: (i) incidental harassment authorizations ("IHAs"), which are issued for a period of no more than one year; and (ii) incidental take regulations ("ITRs"), which are effective for a period of up to five years and pursuant to which incidental take from a single activity is

authorized with a letter of authorization ("LOA"). 50 C.F.R. §§ 216.105, 216.106. When issuing ITRs and IHAs, NMFS must find, among other things, that the authorization will (i) have a negligible impact on marine mammal stocks; (ii) not have an unmitigable adverse impact on subsistence needs for marine animals; and (iii) minimize effects through implementation of appropriate mitigation. *See* 16 U.S.C. § 1371(a)(5)(D).

In addition, federal "agency actions" that are likely to adversely affect an ESA-listed species or its critical habitat are subject to consultation under Section 7 of the ESA, in which the consulting agency (NMFS or FWS) issues a biological opinion as to whether the action is likely to jeopardize the continued existence of the listed species or to destroy or adversely modify its critical habitat. 16 U.S.C. § 1536(a)(2). Section 7 consultation may result in the issuance of an incidental take statement ("ITS") that includes "reasonable and prudent measures" to minimize the effects of the proposed action. *Id*. § 1536(b)(3)(A), (b)(4)(C). For MMPA incidental take authorizations that involve ESA-listed species, NMFS (or FWS) typically issues a biological opinion containing an ITS and reasonable and prudent measures applicable to the activity that may cause incidental take.

Congress has mandated that decisions made under both the MMPA and the ESA must be based on the best scientific information available. *Id*. §§ 1373(a), 1536(a)(2). The U.S. Supreme Court has explained that Congress intended this requirement to both (i) serve the goal of species preservation and (ii) prevent unnecessary economic impacts caused by the precautionary application of incomplete or speculative information. *See Bennett v. Spear*, 520 U.S. 154, 176-77 (1997).[1]

III. DETAILED COMMENTS

A. NMFS Should Provide More Clarity and Explanation Regarding the Implementation of the Proposed Criteria

[1] The National Marine Sanctuaries Act ("NMSA") requires federal agencies whose actions are likely to destroy, cause the loss of, or injure a sanctuary resource to consult with the Office of National Marine Sanctuaries ("ONMS") before taking any action. *See* 16 U.S.C. § 1434(d)(1). The term "injure" is defined as to "change adversely, either in the short or long term, a chemical, biological or physical attribute of, or the viability of." 15 C.F.R. § 922.3. Through the sanctuary consultation process, ONMS may recommend reasonable and prudent alternatives to protect sanctuary resources, as well as monitoring. *See* 16 U.S.C. § 1434(d)(2). The Draft Guidance does not address whether NMFS will apply the acoustic criteria any differently in the NMSA context (compared to the MMPA and ESA contexts). If NMFS plans to apply the acoustic criteria differently in the NMSA context, it should provide an explanation for the public's consideration and comment.

The Draft Guidance should provide an explanation of the anticipated impact of the proposed acoustic criteria on the regulated community and a clear discussion of the regulatory implications of the proposed changes. In addition, to eliminate uncertainty and potential future complications, it would be helpful if the Draft Guidance contained a specific analysis of how the implementation of the proposed criteria will affect existing offshore activities, monitoring protocols, estimated incidental take assessment, and the development of mitigation measures.[2] These explanations and clarifications would increase transparency, allow for more informed public review and comment, and help to "ensur[e] and maximiz[e] the quality, objectivity, utility, and integrity" of the information provided in the Draft Guidance, as required by the Information Quality Act. *See* Pub. Law No. 106-554, § 515 (2000); *see also* 67 Fed. Reg. at 8,456 ("The more important benefit of transparency is that the public will be able to assess how much an agency's analytic result hinges on the specific analytic choices made by the agency. Concreteness about analytic choices allows, for example, the implications of alternative technical choices to be readily assessed.").[3]

We offer the following suggestions and examples to identify specific improvements that could be made to the Draft Guidance and topics for which additional explanation would be helpful.

1. We recommend that NMFS undertake a study comparing the assessment approach described in the Draft Guidance with the current assessment approach using case studies of various sources, both impulsive and non-impulsive, in different OCS regions, to demonstrate the regulatory and technical implications of the proposed criteria. Although the proposed criteria are not directly comparable to the criteria currently used, we believe the results of such a study

[2] *See* 67 Fed. Reg. 8,452, 8,459 (Feb. 22, 2012) ("In assessing the usefulness of information that the agency disseminates to the public, the agency needs to consider the uses of the information not only from the perspective of the agency but also from the perspective of the public."). We also recommend that the Draft Guidance include a summary of the additional costs that are expected to result from implementation of the new criteria, with a comparison of the expected benefits.

[3] NMFS considers the Draft Guidance to be a "highly influential scientific assessment" subject to the *National Oceanic and Atmospheric Administration Information Quality Guidelines* ("NOAA IQG"). "[I]nfluential scientific, financial, or statistical information" is specifically held to higher information quality standards. *See* 67 Fed. Reg. at 8,452, 8,455 ("OMB guidelines apply stricter quality standards to the dissemination of information that is considered 'influential.'"). These standards further counsel in favor of more information addressing the implications and implementation of the proposed criteria. *See generally* NOAA IQG at 1-2.

would be very informative to the regulated community and would facilitate the development of additional public comments that would be helpful to NMFS as it revises and refines the Draft Guidance.

2. NMFS can improve the usefulness of the Draft Guidance and enhance the regulated community's ability to meaningfully comment by providing for public review a draft of the "user guide" that will inform and assist NMFS's implementation of new acoustic criteria. The draft of this implementation guide should be provided for review and comment along with the second version of the Draft Guidance.

3. The Associations support NMFS's determination that the proposed SEL_{cum} metric will be applied to discrete activities/sources and not used to accumulate sound exposure for multiple activities occurring over the same time period. The Draft Guidance also states that application of the proposed criteria "do[es] not represent the entirety of the impact assessment" and explains that other qualitative factors will be considered. However, the Draft Guidance provides little discussion or explanation of how these qualitative factors will be considered, the relative weight given to the factors, or how the factors will be implemented. We encourage the agency's consideration of qualitative factors in a manner that adds flexibility to the regulatory process. In addition to providing more discussion of these qualitative factors, it would be helpful for the Draft Guidance to include an explanation of the important role served by currently implemented mitigation and monitoring measures, which have been proven to substantially avoid and reduce incidental take.

4. The Draft Guidance does not address a significant category of Level B take (i.e., behavioral harassment). The vast majority of offshore oil and gas incidental take authorizations involve Level B take in the form of behavioral modification. It would greatly improve the regulated community's ability to meaningfully assess the implications of the proposed criteria if the Draft Guidance included an explanation of how the proposed acoustic criteria will be implemented in the absence of new criteria applicable to Level B behavioral harassment. Again, this will be an area for which flexibility is important.

5. It is not clear from the Draft Guidance whether NMFS intends there to be five different mitigation zones for five different functional hearing groups or whether NMFS will prescribe the most precautionary mitigation zone based on the most sensitive species but applicable to all marine mammals in the area. Both of these potential options present concerns. On the one hand, the application of multiple radii for different species will be operationally challenging to implement. If NMFS is considering the implementation of varying exclusion zones, then this approach may also require changes to the standards applicable to observer programs and additional training of protected species observers. As further addressed in the Appendix (¶ 6.1.3), it is also not clear how NMFS will address effects at multiple depths under this approach. On the other hand, prescription of a single mitigation zone based on the most sensitive species but applicable to all marine mammals in the area would not be consistent with the best available science. It would be helpful for NMFS to provide a clear description of how it

foresees the proposed criteria translating into specific operational mitigation and monitoring requirements.

6. The Draft Guidance appropriately recognizes that TTS is not an "injury," but addresses TTS as a form of Level B harassment separate from behavioral modification. The Draft Guidance states that TTS "will be addressed for purposes of take quantification" after NMFS develops guidance for behavioral modification and that, in the meantime, "the TTS thresholds presented represent the best available science and will be used in the comprehensive effects analyses under the MMPA and the ESA and may inform the development of mitigation and monitoring." However, it is not clear from the Draft Guidance as to how NMFS will specifically address TTS in the permitting process before behavioral modification criteria are finalized. For example, it is unclear as to whether NMFS is now going to require the use of three separate take thresholds (for PTS, TTS, and behavioral modification) and, if so, how NMFS will ensure that the permitting and implementation processes do not become too burdensome and complex. The Draft Guidance should more fully explain how these issues will be addressed.

7. It is not clear from the Draft Guidance whether or where NMFS will require sound source verification ("SSV"). In the experience of the Associations' members, SSV poses a complicated and unnecessary burden on operations because the results of SSV are highly variable due to constantly changing conditions in the water column. If SSV is intended to be part of the standard protocol in the implementation of the proposed criteria, then it is important that the regulated community have the opportunity to provide informed input on this potential requirement. Specific recommendations regarding SSV are provided in the Appendix (¶ 6.1.2).

8. The Draft Guidance addresses a complex subject, and this is reflected in an equally complex proposed approach with several options provided to applicants. The complexity of the proposed approach will result in increased time and expenses for applicants, as well as potentially strain the limited resources of specialized modeling firms. Additionally, the complexity of the Draft Guidance could create confusion among public stakeholders, possibly leading to mistaken interpretations or public statements regarding the purpose and intent of the Draft Guidance. More clarity on the purpose of the Draft Guidance, and how it will be implemented, would enhance both the regulatory and public perception aspects of the Draft Guidance.

9. In determining PTS and TTS onset levels, NMFS adopts two methodologies for determining quantitative factors that can be considered in conjunction with utilizing the numeric acoustic threshold levels: a marine mammal weighting function and an alternative acoustic threshold level. In so doing, NMFS recognizes that the applied weighting function will likely result in a lower estimate of take, but that the new methodology "might extend beyond the capabilities of some applicants" (i.e., smaller operators). This system could have inequitable results for operators who, for either cost or time reasons, may not be able to use the more complicated applied weighted factor methodology. It would be helpful for the Draft Guidance to

include more explanation to inform applicants about the potential costs, benefits, and consequences of each of these two methodologies.

10. In addition, if the incidental take estimate in a five-year ITR is based on non-weighted PTS and TTS thresholds, then the estimate will be unrealistically high. Alternatively, if an ITR is based on a weighted approach using contemporary modeling, LOA applicants who use the unweighted approach may complicate the agency's ability to reasonably manage and implement the ITR. We recommend that NMFS explain how it plans to implement future ITR/LOA processes, or multiple IHAs, in a context in which two approaches to estimating potential takes are stated in the agency's guidance.

We provide the above suggestions and examples to highlight the need for more information regarding the implementation of the proposed criteria and to identify specific opportunities for improvement. We respectfully request that NMFS revise and reissue the Draft Guidance, and a draft implementation guide, in a manner that comprehensively addresses the concerns described above and below.[4]

B. The Draft Guidance Presents a Number of Scientific and Technical Concerns That Must Be Addressed Before NMFS Issues Final Guidance

In general, the Associations support the development of new acoustic criteria based upon the best scientific information available, such as the findings and principles stated in Southall et al. (2007) and Finneran and Jenkins (2012). However, we have several scientific, technical, and operational concerns about the Draft Guidance. The following comments address these concerns.

1. TTS Thresholds

The Draft Guidance concludes that TTS is not an "injury" for MMPA purposes and should, at most, be considered Level B harassment. The Associations concur with this finding. The best available science indicates that hearing for marine mammals that have experienced TTS returns to normal within hours or days and that post-exposure behavior returns to normal. *See, e.g.*, Mooney et al. (2009a, 2009b); Popov et al. (2011); Finneran and Schlundt (2013). Moreover, behavioral studies indicate that marine mammals tend to move away from a sound

[4] It is not clear whether NMFS reviewed the Draft Guidance pursuant to the National Environmental Policy Act ("NEPA") or, alternatively, determined that NEPA does not apply. The second version of the Draft Guidance should clarify NMFS's determination regarding the applicability of NEPA and provide NEPA review documentation, if any, for public review.

source if it is disruptive, which significantly diminishes the potential for any TTS-related effects. *See* Nowacek et al. (2007). The data collected in experiments in which animals are exposed to sounds in a controlled setting likely result in overestimates of exposure because the subjects are exposed to much longer and louder sounds than they would be in the natural environment.

In addition, the Draft Guidance does not incorporate significant recent research regarding the auditory effects on bottlenose dolphins from multiple impulses of a seismic source (Finneran et al. (2011); Finneran et al. (2012); Schlundt et al. (2013)). These studies exposed three different bottlenose dolphins to multiple (10) impulses of a seismic airgun, SEL_{cum} 195 dB re 1 μPa^2-s, without any measurable TTS. The Draft Guidance proposes a TTS onset for impulsive sounds for mid-frequency cetaceans at SEL_{cum} 172 dB re 1 μPa^2-s. This is an extraordinarily low and unrealistic threshold given that the Finneran research could not induce TTS at 195 dB re 1 μPa^2-s. The draft TTS onset criteria should be revisited to consider Finneran and Schlundt's recent and more directly applicable work. As stated in Finneran et al. (2012), "[t]hese data suggest that the potential for seismic surveys using air guns to cause auditory effects on dolphins and similar delphinids may be lower than previously predicted."

Finally, the Draft Guidance describes criteria applicable to animals likely to experience TTS during marine operations that produce underwater sounds.[5] In most cases, the authors of the available relevant studies have not used the highest levels required to induce TTS, and NMFS has excluded studies in which TTS was not induced by sound levels equivalent to those in the proposed criteria. *See* SEAMARCO (2011); Kastelein et al. (2013). As a result, animals exposed at levels associated with TTS as currently proposed will not necessarily experience TTS and, therefore, the methods described in the Draft Guidance can only be used to estimate the number of animals that could potentially experience TTS.[6] Accordingly, the highest exposure that did not induce TTS in recent studies must be included in the data set used to develop the TTS thresholds, as referenced above. The Draft Guidance should also identify and describe each

[5] The data for establishing TTS for representative species come from a small number of animals. The lack of available data underlying the proposed acoustic criteria is not clearly addressed or explained by NMFS. Although NMFS is required to consider the best available science, it also has an obligation to explain the limitations of the information being used as a basis to develop important agency policy and guidance.

[6] The Draft Guidance references recent studies by Kujawa and Liberman (2009) and Lin et al. (2011) that indicate that even if a full recovery is observed after TTS in small mammals, some neurological damage was permanent. However, these results cannot be extrapolated to other species because the data are very limited and the implications for actual negative effects on the animal's ecology, behavior, or fitness have yet to be measured. Additionally, these two studies investigated extreme TTS, and, therefore, it is not known whether similar effects would occur in marine mammals at lower TTS levels.

instance in which conservative thresholds are selected (i.e., selecting the lowest TTS threshold in a small sample size), and TTS onset in these instances should be described as potential, not actual. This distinction is important because the Draft Guidance defines TTS, not "potential TTS," as Level B harassment, and how Level B harassment is estimated has important relevance to the "small numbers" and "negligible impact" determinations that must be made in support of MMPA incidental take authorizations.

2. Functional Hearing Groups, Weighting Functions, and Threshold Criteria

In general, knowledge of basic hearing is still limited for most species of marine mammals. Finneran and Jenkins (2012) provided the most updated list of species whose hearing has been scientifically measured. Although some groupings of marine mammals that hear similarly may be appropriate, the extrapolated hearing ranges presented in the Draft Guidance are not consistent with the best available science (Southall et al. (2007) and Finneran and Jenkins (2012)) in a number of respects.

First, the extension of the hearing range of low-frequency cetaceans is not supported by empirical evidence. There is no evidence indicating that mysticetes hear above 20-22 kHz, and there are no empirical data to support the Draft Guidance's expansion to 30 kHz. The data presented in the Draft Guidance do not provide additional scientific information to justify expanding the hearing of low-frequency cetaceans to 30 kHz.

Southall et al. (2007) indicated that vocalizations are unlikely to always predict hearing ranges. Animals tend to hear best around the frequencies they use for communication and echolocation (Ketten 2002), but can also extend below and above the range of frequencies they use. There is empirical evidence that animals can produce sounds that they cannot necessarily hear and, therefore, Au et al. (2006) should not be used in determining the hearing range of low-frequency cetaceans. For instance, Nachtigall et al. (2007) showed that white beaked dolphins do not hear past 181 kHz, even though they are often recorded producing sounds up to 305 kHz (Mitson 1990) and clicks have secondary peak at 250 kHz (Rasmussen et al. 2002). Therefore, harmonics above 20 kHz do not necessarily imply hearing in mysticetes. The Draft Guidance cites Tubelli et al. (2012) and Ketten and Mountain (2009), which are predictions based on anatomical modeling and are yet to be validated by empirical data.[7]

Moreover, the frequency weighting functions in Figure 2 of the Draft Guidance are based on no empirical data and imply that low-frequency cetaceans are much more sensitive to acoustic exposure than was formerly believed or than what the current research supports. There is also no clear explanation or support for the low-freqeuncy cetacean auditory weighting function

[7] Tubelli and Stein (2007) reported only potential response to 22 kHz signals.

parameters presented in Table 3. The low-frequency criteria should be based on Southall et al. (2007) and Finneran and Jenkins (2012).

Second, the hearing ranges of otariids and phocids, as proposed in the Draft Guidance, are different than the hearing ranges stated in Finneran and Jenkins (2012) (respectively, 75 Hz to 75 kHz and 100 Hz to 50 kHz). Southall et al. (2007) defined the hearing range limits as being approximately 80 dB above the lowest thresholds. However, in Kastelein et al. (2009), thresholds for phocids are more than 80 dB above the most sensitive thresholds and should not be considered to be within the functional hearing range. Likewise, Hemilä et al. (2006)'s data were based on anatomical studies, not empirical hearing data and should not substitute for actual hearing measurement data. Accordingly, for establishing reliable hearing ranges for otariids and phocids, the Draft Guidance should use the thresholds reported in Finneran and Jenkins (2012) and in Reichmuth et al. (2013). Recent work by Sills et al. (2014) provides additional support that the 70-80 kHz range encompasses the high frequency cut-off for phocids with a threshold of 101 and 102 dB at 72.4 kHz. For otariids, Finneran and Jenkins (2012) reviewed all of the best available data and recommended an underwater hearing range of 100 Hz to 50 kHz (100 Hz to 35 kHz in air). The Draft Guidance does not clearly explain why 40 kHz was selected as a high frequency cut-off for otariids instead of 50 kHz and there is no recent empirical study to support that proposed modification.

Third, the Associations are concerned with the proposed criteria for both impulsive and non-impulsive sound for high-frequency cetaceans. For impulsive sound, the proposed high-frequency cetacean thresholds are based on the underlying data from a single study involving a single animal (harbor porpoise) (Lucke et al. 2009) in which large variations in ambient noise may have caused confounding effects on the SEL_{cum} and SPL_{peak} threshold estimates.[8] For non-impulsive sound, the extrapolation for high-frequency cetaceans is based on a single study involving only two animals (Popov et al. 2011), and the non-impulsive SPL_{peak} values are extrapolated from data on impulsive sounds rather than using the data available for non-impulsive sounds. Popov et al. (2011) recognized that their data might be biased due to multiple exposures in one day and the absence of data on the variability of baseline thresholds, which could add uncertainty and confounding factors to the TTS estimates. This highlights the need for flexibility in the implementation of the final acoustic criteria in future regulatory processes.

3. Addressing Limited Data

[8] Finneran and Jenkins (2012) separated harbor porpoises from other high-frequency cetaceans for their behavioral thresholds because there is evidence showing that this species reacts to quieter sounds than most high-frequency cetaceans. Accordingly, using the harbor porpoise as a surrogate species for high-frequency cetaceans is unlikely to be representative.

Generally, the Draft Guidance notes that the proposed criteria are based upon research using very few marine mammals. To address limited data, the agency explains that it will choose the lowest threshold value if there are less than five relevant studies and that it will identify a median value if there are five or more studies. The Associations respectfully disagree with this approach and propose that NMFS consider the best available information, regardless of the number of available studies and, as required by the MMPA and the ESA, develop thresholds that most accurately reflect all of the available science rather than applying a conservative approach by choosing a low reported value to the exclusion of other available information.

4. Equal Energy Hypothesis

The use of SEL_{cum} is practical in the sense that it allows researchers and operators to compare sound events with various SPL and time durations. For transient sounds, SEL_{cum} is also practical as it expresses the total energy as opposed to the maximum energy. However, SEL_{cum} is used under the assumption that a low amplitude and long signal with an equal SEL_{cum} as a loud and short signal will have the same effects on the auditory system (the Equal Energy Hypothesis ("EEH")). The EEH may be correct in certain conditions, but an increasing body of evidence indicates that the EEH does not hold true in most marine mammal sound exposures. As recognized in the Draft Guidance, the EEH is not supported by several studies. *See* Kastelein et al. (unpublished); Popov et al. (2011); Popov et al. (unpublished), Supin (Aug. 2013 Abstract); *see also* Mooney et al. (2009a); Finneran et al. (2010b); Kastak et al. (2005); Kastak et al. (2007); Mooney et al. (2009b); Finneran et al. (2010a); Kastelein et al. (2012a); Kastelein et al. (2012b). Therefore, the use of SEL_{cum} has some practical aspects, particularly in the absence of a complete data set. However, as more data become available, more analyses should be performed to determine what model or equation best fits the EEH, and how the SEL_{cum} criteria should be revised to more accurately reflect the potential for TTS changes with duration and amplitude.

5. Marine Mammals' Ability to Adjust Hearing

There is a growing body of science regarding the ability of marine mammals to adjust their hearing when exposed to loud sounds. *See* Popov (Aug. 2013 Abstract); Nachtigall and Supin (2013). This research describes the ability of cetaceans to voluntarily reduce the level of incoming sound by up to 13 dB through the use of an active noise control system. However, these studies do not appear to have been considered in the Draft Guidance. Consistent with its obligation to use all of the best available science and the recognized need for flexibility, NMFS should address and consider these studies if presented by applicants during the permitting in process, and review and update the Guidance as necessary as this area of science becomes more fully developed.

6. Recovery

In general, SEL_{cum} is an appropriate way to measure transient sounds because it allows comparisons between sound exposures of different natures or durations. However, the proposed

threshold criteria assume no recovery between sound exposure events for intermittent and repeated exposures. Given the current knowledge of TTS, this assumption may be inaccurate. Existing studies indicate that recovery may occur in both terrestrial and marine mammals, and research suggests that marine mammals have other adaptive strategies that protect them from sound (Nachtigall and Supin 2013). We recommend that NMFS include a recovery function in the Draft Guidance, and incorporate the work of Finneran et al. (2010) and Finneran and Schlundt (2013). Although these studies are limited in scope, their validity is not in question.

7. Accumulation Periods

The selection of one-hour and 24-hour accumulation periods are not biologically based, and we suggest that NMFS revise the Draft Guidance to expressly allow for the option of SEL_{cum} modeling for the duration of the activity in addition to the one-hour and 24-hour options. We also request that NMFS provide additional information to footnote 15 on page 13 of the Draft Guidance. This footnote indicates that the SEL_{cum} metric is not meant to accumulate sound exposure for multiple activities or for naturally occurring sounds, but very little supporting explanation is provided.

8. Continuous and Impulsive Sounds

The Draft Guidance's definitions of continuous and impulsive sounds are vague and do not objectively distinguish these two types of sound. Impulsive sounds become increasingly continuous with distance, due to multipath arrivals and other factors, and may have continuous components even at short distances, due to reverberation. Accordingly, clear technical definitions of continuous (non-impulsive) and impulsive sounds from geophysical sources, based on the best available scientific literature, should be included in the Draft Guidance. *See* Southall et al. (2007). NMFS should also consider waveform data at the location of the receiver (i.e., the marine mammal) as one of the parameters to determine the impulsive nature of signals covered by these criteria.

9. Relevant Recent Research

A substantial amount of information recently presented at scientific conferences should be considered in the Draft Guidance. *See* Abstracts from The Effects of Noise on Aquatic Life

(Budapest, Aug. 2013);[9] Popov et al. (unpublished). Among other things, this new information addresses (i) the effects of low-frequency sound as well as EQL for pinnipeds, and (ii) the validity of EEH. Moreover, Southall et al. (2007) will be updated to address the results of recent research, and the proceedings of the August 2013 International Conference on the Effects of Noise on Aquatic Life will soon be published. If this work is available when NMFS prepares a second version of the Draft Guidance or before final guidance is issued, it should be considered and incorporated.[10]

C. New Acoustic Criteria Should Not Result in More Regulatory Burdens for Offshore Industries

For many years, marine mammal incidental take authorizations for the oil and gas industry have been authorized by NMFS and FWS on a project-by-project basis (i.e., IHAs) or through the issuance of ITRs and related LOAs. The best available science and information demonstrates that these authorizations have resulted in no detectable adverse impacts to marine mammal populations. Although we support NMFS's development of new criteria that are consistent with the best available science, these new criteria should not be implemented in a manner that results in increased regulatory burdens because the best available information shows that offshore sound-producing operations, as currently regulated, have had no more than a negligible impact on marine mammal species and stocks. The Associations are concerned that the Draft Guidance will unnecessarily result in more difficulties with the permitting process, an increased number of shutdowns, longer survey duration, increased costs, and increased exposure to safety risks. We therefore ask that NMFS consider the record of offshore sound-producing activities in effectively minimizing and mitigating effects to marine mammals as it further refines the implementation processes for the proposed criteria.

IV. CONCLUSION

We appreciate the effort that NMFS has devoted to the development of new acoustic criteria. We support this effort generally but, as detailed above, we have a number of concerns about the implementation processes and the lack of substantive support for some of the proposed criteria. We respectfully ask NMFS to address these concerns and issue a revised version of the Draft Guidance, as well as a draft implementation guide, for public review and comment. The Associations will continue to support a process that is comprehensive, transparent, consistent with the best available science, and fully informed by the public.

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[9] More information and citations regarding the work presented at this conference are provided in the "References" section of this comment letter.

[10] Sills et al. (2014) and Wensveen et al. (2014) are examples of emerging science that NMFS should consider in its development of acoustic criteria.

Should you have any questions, please contact the undersigned at 202.682.8584, or via e-mail at radforda@api.org. Thank you for considering and responding to these comments.

Sincerely,

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ATTACHMENT C

REFERENCES

Allen, B.M., and Angliss, R.P. 2013. Alaska marine mammal stock assessments, 2012. U.S. Department of Commerce, NOAA Technical Memomorandum, NMFS-AFSC-245, 282 p.

Angliss, R.P., and Outlaw, R.B. 2008. Alaska marine mammal stock assessments, 2007. Department of Commerce. NMFS-AFSC-180.

Finneran, J.J., and Schlundt, C.E. 2013. Effects of fatiguing tone frequency on temporary 10 threshold shift in bottlenose dolphins (*Tursiops truncatus*). *Journal of the Acoustical Society of America,* 133:1819-1826.

Finneran, J.J., Schlundt, C.E., Branstetter, B.K., Trickey, J.S., and Jenkins, K. 2012. Auditory effects of seismic air gun impulses on bottlenose dolphins (*Tursiops truncatus*). *In* Institute of Acoustics' Proceedings of the 11th European Conference on Underwater Acoustics (ECUA 2012). July 2-6, 2012. Edinburgh, United Kingdom. Vol. 34, Pt. 2, pp. 377-380. Hertfordshire, United Kingdom: Curran Associates.

Finneran, J.J., and Jenkins, A.K. 2012. Criteria and thresholds for U.S. Navy acoustic and explosive effects analysis. San Diego, California: SPAWAR Systems Center Pacific.

Finneran, J.J., Trickey, J.S., Branstetter, B.K., Schlundt, C.E., and Jenkins, K. 2011. Auditory effects of multiple underwater impulses on bottlenose dolphins (*Tursiops truncatus*). *Journal of the Acoustical Society of America*, 130(4): 2561.

Finneran, J.J., Carder, D.A., Schlundt, C.E., and Dear, R.L. 2010a. Growth and recovery of temporary threshold shift at 3 kHz in bottlenose dolphins: Experimental data and mathematical models. *Journal of the Acoustical Society of America,* 127:3256-3266.

Finneran, J.J., Carder, D.A., Schlundt, C.E., and Dear, R.L. 2010b. Temporary threshold shift in a bottlenose dolphin (*Tursiops truncatus*) exposed to intermittent tones. *Journal of the Acoustical Society of America,* 127:3267-3272.

Harris, R.E., Miller, G.W., and Richardson, W.J. 2001. Seal responses to airgun sounds during summer seismic surveys in the Alaskan Beaufort Sea. *Marine Mammal Science,* 17(4): 795-812.

Hemilä, S., Nummela, S., Berta, A., and Reuter, T. 2006. High-frequency hearing in phocid and otariid pinnipeds: An interpretation based on inertial and cochlear constraints. *Journal of the Acoustical Society of America,* 120:3463-3466.

Ireland, D.S., Funk., D.W., Rodrigues, R., and Koski, W.R. (eds.). 2009. Joint monitoring program in the Chukchi and Beaufort seas, open water seasons. 2006-2007. LGL Alaska Report pp. 971-972, Report from LGL Alaska Research Associates, Inc., Anchorage, Alaska; LGL Ltd.,

environmental research associates, King City, Ontario; JASCO Research, Ltd., Victoria, British Columbia; and Greeneridge Sciences, Inc., Santa Barbara, California; for Shell Offshore, Inc., Anchorage, Alaska; ConocoPhillips Alaska, Inc., Anchorage, Alaska; the National Marine Fisheries Service, Silver Springs, Maryland; and the U.S. Fish and Wildlife Service, Anchorage, Alaska. 485 p. plus appendices.

Kastak, D., Southall, B.L., Schusterman, R.J., Reichmuch, C., and Kastak, D. 2005. Underwater temporary threshold shift in pinnipeds: Effects of noise level and duration. *Journal of the Acoustical Society of America,* 118:3154-3163.

Kastak, D., Reichmuth, C., Holt, M.M., Mulsow, J., Southall, B.L., and Schusterman, R.A. 2007. Onset, growth, and recovery of in-air temporary threshold shift in a California sea lion (*Zalophus californianus*). *Journal of the Acoustical Society of America*, 122:2916- 2924.

Kastelein, R.A., Verboom, W.C., and Terhune, J.M. 2009. Underwater detection of tonal signals between 0.125 and 100 kHz by harbor seals (*Phoca vitulina*). *Journal of the Acoustical Society of America*, 125:1222-1229.

Kastelein, R. 2013. TTS and recovery in harbor porpoises, Abstract. Third International Conference on the Effects of Noise on Aquatic Life. Aug. 11-16, 2013. Budapest, Hungary. http://budapest2013.conferencespot.org/talks-1.28460/monday-1.28740/f-002-1.28772/a-003-1.28791#sthash.sBkTergH.dpuf.

Kastelein, R.A., R. Gransier, L. Hoek, and A. Macleod, and J.M. Terhune. 2013. Auditory and behavioral responses of two harbor seals (*Phoca vitulina*) to playbacks of offshore pile driving sounds, phase1: Behavioral response in one seal, but no TTS.

Kastelein, R.A., Gransier, R., Hoek, L., Macleod, A., and Terhune, J.M. 2012a. Hearing threshold shifts and recovery in harbor seals (*Phocina vitulina*) after octave-band noise exposure at 4 kHz. *Journal of the Acoustical Society of America*, 132:2745-2761.

Kastelein, R.A., Gransier, R., Hoek, L., and Olthuis, J. 2012b. Temporary hearing threshold shifts and recovery in a harbor porpoise (*Phocoena phocoena*) after octave-band noise at 4 kHz. *Journal of the Acoustical Society of America,* 132:3525-3537.

Ketten, D.R. 1998. Marine mammal auditory systems: A summary of audiometric and anatomical 43 data and its implications for underwater acoustic impacts. NOAA Technical Memorandum, 44 NOAA-TM-NMFS-SW FSC-256. La Jolla, California: National Marine Fisheries Service.

Kujawa, S.G., and Liberman, M.C. 2009. Adding insult to injury: Cochlear nerve degeneration after “temporary” noise-induced hearing loss. *The Journal of Neuroscience,* 29:14077-2 14085.

ATTACHMENT C

Lin, H.W., Furman, A.C., Kujawa, S.G., and Liberman, M.C. 2011. Primary neural degeneration in the guinea pig cochlea after reversible noise-induced threshold shift. *Journal of the Association for Research in Otolaryngology*, 12:605-616.

Lucke, K., Siebert, U., Lepper, P.A., and Blanchet, M.A. 2009. Temporary shift in masked hearing thresholds in a harbor porpoise (*Phocoena phocoena*) after exposure to seismic airgun stimuli. *Journal of the Acoustical Society of America*, 125:4060-4070.

Madsen, P.T. 2005. Marine mammals and noise: Problems with root mean square sound pressure levels for transients. *Journal of the Acoustical Society of America*, 117:3952-3957.

Miller, G.W., Moulton, V.D., Davis, R.A., Holst, M., Millman, P., MacGillivray, A., and Hannay, D. 2005. Monitoring seismic effects on marine mammals—southeastern Beaufort Sea, 2001-2002. pp. 511-542. *In*: S.L. Armsworthy et al. (eds.), Offshore oil and gas environmental effects monitoring/Approaches and technologies. Battelle Press, Columbus, Ohio.

Mitson, R.B. 1990. Very-high-frequency acoustic emissions from the white-beaked dolphin (*Lagenorhynchus albirostris*). NATO ASI (Advanced Science Institutes) Series A: Life Sciences, 196:283-294.

Møhl, B., Wahlberg, M., Madsen, P.T., Miller, L.A., and Surlykke, A. 2000. Sperm whale clicks: Directionality and source level revisited. *Journal of the Acoustical Society of America*, 107(1): 638-648.

Mooney, T.A., Nachtigall, P.E., and Vlachos, S. 2009a. Sonar-induced temporary hearing loss in dolphins. *Biology Letters*, 5:565-567.

Mooney, T.A., Nachtigall P.E., Breese, M., Vlachos, S., and Au, W.W. 2009b. Predicting temporary threshold shifts in a bottlenose dolphin (*Tursiops truncatus*): The effects of noise level and duration. *Journal of the Acoustical Society of America*, 125:1816-1826.

Moulton, V.D., and Lawson, J.W. 2002: Seals. 2001. *In*: Richardson, W.J., and Lawson, J.W. (eds.), Marine mammal monitoring of Western Geco's open-water seismic program in the Alaskan Beaufort Sea, 2001. LGL Report TA2564-4. Report from LGL Ltd., King City, Ontario, for Western Geco LLC, Anchorage, Alaska; BP Exploration (Alaska) Inc., Anchorage, Alaska; National Marine Fisheries Service, Anchorage, Alaska; and Silver Spring, Maryland, 3-1 to 3-48.

Nachtigall, P.E., Mooney, T.A., Taylor, K.A., Miller, L.A., Rasmussen, M.H., Akamatsu, T., and Vikingsson, G.A. 2008. Shipboard measurements of the hearing of the white-beaked dolphin *Lagenorhynchus albirostris*. *Journal of Experimental Biology*, 211(4):642-647.

Nachtigall, P.E., and Supin, A.Y. 2013. A false killer whale reduces its hearing sensitivity when a loud sound is preceded by a warning. *Journal of Experimental Biology*, 216(16): 3062-3070.

ATTACHMENT C

Nowacek, D. P., Thorne, L. H., Johnston, D. W., & Tyack, P. L. 2007. Responses of cetaceans to anthropogenic noise. *Mammal Review*, 37(2): 81-115.

Popov, V. 2013. Temporary threshold shifts in naïve and experienced belugas: learning to dampen effects of fatiguing sounds? Abstract Third International Conference on the Effects of Noise on Aquatic Life. Aug. 11-16, 2013. Budapest, Hungary.
See more at: http://budapest2013.conferencespot.org/posters-1.28798/posters-1.28918/78-1.29057/78-1.29058#sthash.XWjFsN06.dpuf.

Popov, V.V., Supin, A. Ya, Rozhnov, V.V., Nechaev, D.I. and Sysueva, E.V. (in press) The limits of applicability of the sound exposure level (SEL) metric to temporal thresholds shifts (TTS) in beluga whales, *Delphinapterus leucas*. *Journal of Experimental Biology*

Popov, V.V., Supin, A.Y., Wang, D., Wang, K., Dong, L., and Wang, S. 2011a. Noise-induced temporary threshold shift and recovery in Yangtze finless porpoises *Neophocaena phocaenoides asiaeorientalis*. *Journal of the Acoustical Society of America,* 130:574-584.

Popov, V.V., Klishin, V.O., Nechaev, D.I., Pletenko, M.G., Rozhnov, V.V., Supin, A.Y., Sysueva, E.V., and Tarakanov, M.B. 2011b. Influence of acoustic noises on the white whale hearing thresholds. *Doklady Biological Sciences*, 440:332-334.

Raftery, A.E., Givens, G.H., and Zeh, J.E. 1995. Inference from a deterministic population dynamics model for bowhead whales. *Journal of the American Statistical Association*, 90(430): 402-416.

Rasmussen, M.H., Miller, L.A., and Au, W.W. 2002. Source levels of clicks from free-ranging white-beaked dolphins (*Lagenorhynchus albirostris* Gray 1846) recorded in Icelandic waters. *Journal of the Acoustical Society of America*, 111(2):1122-1125.

Reichmuth, C., Holt, M.M., Mulsow, J., Sills, J.M., and Southall, B.L. 2013. Comparative assessment of amphibious hearing in pinnipeds. *Journal of Comparative Physiology*, 199:491-507.

Schlundt, C. 2013 Auditory effects of multiple impulses from a seismic air gun on bottlenose dolphins (*Tursiops truncatus*), Abstract. Third International Conference on the Effects of Noise on Aquatic Life. Aug. 11-16, 2013. Budapest, Hungary. See more at: http://budapest2013.conferencespot.org/talks-1.28460/wednesday-1.28610/f-006-1.28634/a-069-1.28651#sthash.YhWXJrRA.dpuf.

SEAMARCO. 2011. Temporary hearing threshold shifts and recovery in a harbor porpoise and two harbor seals after exposure to continuous noise and playbacks of pile driving sounds.

ATTACHMENT C

SEAMARCO Ref: 2011/01. Harderwijk, The Netherlands: SEAMARCO (Sea Mammal Research Company).

Sills, J.M., Southall, B.L., and Reichmuth, C. 2014. Amphibious hearing in spotted seals (*Phoca largha*): Underwater audiograms, aerial audiograms and critical ratio measurements. *Journal of Experimental Biology*, 217: 726-734.

Širović, A., Hildebrand, J.A., and Wiggins, S.M. 2007. Blue and fin whale call source levels and propagation range in the Southern Ocean. *Journal of the Acoustical Society of America*, 122(2):1208-1215.

Supin, A.Y. 2013. Sound exposure level: Is it a convenient metric to characterize fatiguing sounds? A study in beluga whales, Abstract. Third International Conference on the Effects of Noise on Aquatic Life. Aug. 11-16, 2013. Budapest, Hungary. http://budapest2013.conferencespot.org/talks-1.28460/tuesday-1.28684/f-006-1.28685/a-048-1.28696#sthash.M0qJPtPz.dpuf.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, Jr., C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., and Tyack P.L. 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. *Aquatic Mammals*, 33:411-521.

Wensveen, P.J., Huijser, L.A., Hoek, L., and Kastelein, R.A. 2014. Equal latency contours and auditory weighting functions for the harbour porpoise (*Phocoena phocoena*). *Journal of Experimental Biology*, 217(3): 359-369.

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Appendix
NMFS Draft Acoustic Criteria Implementation Issues
Comments of API, IAGC, NOIA, and AOGA

1. Introduction

1.1. The draft acoustic criteria guidelines proposed by NMFS (the "Draft Guidance") provide a significant change of approach and level of complexity in evaluating acoustic impacts on marine life. While much of the Draft Guidance primarily presents topics as research-related technical issues to inform the agency's decisions regarding threshold levels, the document does highlight the importance and difficulty in operationalizing or implementing the proposed criteria in the context of applying for, issuing, and complying with incidental take authorizations pursuant to the MMPA, ESA and NMSA.

1.2. Overall, there is insufficient discussion in the Draft Guidance explaining how the proposed criteria would be implemented, how they will be measured by the regulated community in a meaningful way, how the permitting process may be affected, how monitoring requirements will change, or how common mitigation practices employed by the oil and gas industry for years and are proven to reduce sound impacts on marine mammals will be adequately considered.

1.3. The Draft Guidance provides little explanation of the anticipated impact of the new criteria on the offshore oil and gas industry. Unfortunately, the NMFS did not undertake – or did not present – information from any modeling exercises to show the practical effect of the proposed changes on either environmental protection or burden on industry. The Associations would encourage such an evaluation be conducted before the Criteria is finalized and/or an Implementation Guide is prepared.

1.4. Although we appreciate that comparison is made more difficult because the new criteria are based on different metrics, it is certainly possible for the agency to perform a rigorous analysis - perhaps using case studies or examples - of a "baseline" of how the agency now handles implementation versus how it will practically work in the future in the context of demonstrable risks to marine life from industry activities. Such a risk-based approach is encouraged.

1.5. Due to the lack of clarity around these practical issues, the Associations suggest that NMFS revisit these issues and (1) publish a revised Draft Acoustic Criteria document and (2) prepare a companion Acoustic Criteria Implementation Guide issued concurrently to bring greater certainty to both resource managers and the regulated community about the practical path forward. Both of these documents should be subject to public review and comment.

1.6. Industry is ready and willing to support and actively participate in discussions with agency officials and/or in workshops to facilitate greater input to development of the recommended Implementation Guide. Below, we offer preliminary input on a variety of implementation-related issues that should be addressed in this dialogue.

2. Balance Between Flexibility & Predictability

In general, the Associations believe that flexibility in assessing and mitigating effects is prudent given the diversity of marine mammal species' hearing ranges, the range of effects, and acoustic source characteristics. However, this flexibility should be balanced by the objective of greater clarity, predictability and consideration of effort, resource availability and expense borne by the agencies and industry. The Guidance, as noted, should provide a comparison of the previous approach and what is now recommended. The Associations are particularly interested in the agency's view of the impact the changes will have on permit applications and the agency's time requirements to process them.

3. Use of the Criteria in the Permitting Process

The Draft Guidance provides a brief reference to its use in the current 14-question IHA permit application. It is recommended that the Implementation Guide include a much fuller presentation of how this process will be applied. Below are a few associated issues such a guide should address.

3.1. How will the Draft Guidance be implemented in (i) the context of a five-year ITR (with specific take authorizations by LOA) and (ii) when numerous IHAs are issued for a given area in the absence of an ITR? Specifically, will the agency use different methods to estimate the amount of authorized incidental take in each of these contexts? In addition, how, if at all, will authorized take be allocated over certain periods of time in one or both of these contexts?

4. Clarification Regarding PTS/TTS

4.1. The Draft Guidance is confusing and should be further clarified regarding PTS/TTS. On page 20 NMFS says, ""NOAA equates the onset of PTS, which is an auditory injury, with "Level A Harassment" as defined in MMPA and with "harm" as defined in ESA…NOAA does not consider TTS to be an auditory injury and thus it does not qualify as Level A Harassment or harm. Nevertheless, TTS is an adverse effect that constitutes another kind of "take."…NOAA currently is in the process of developing new thresholds for onset of behavioral effects. When that process is completed, TTS will be addressed for purposes of take quantification. In the meantime, the TTS thresholds presented here…will be used in comprehensive effects analysis…and may inform the development of mitigation and monitoring."" This language is too vague and open-ended to inform meaningful comments.

4.2. While NMFS has limited the Draft Guidance to Level A takes, defined as auditory injury equated with PTS, the Draft Guidance makes extensive reference to TTS. Clarification is needed as to why TTS is included in the present document, which does not include behavior. The Guidance and Implementation Guide should be explicit if TTS serves another role in discussion of injury. If it does not, the potential role of TTS in behavior should be deferred to publication of draft criteria for Level B behavioral harassment.

5. Model Related Issues

5.1. The Draft Guidance identifies a diverse set of approaches in evaluating acoustic effects and provides a general point of view that models provide a more accurate assessment of acoustic effects. The Associations would note that without model validation/verification this assumption is untested and recommends that NMFS undertake this as part of the process of developing the final acoustic criteria.

5.2. The Draft Guidance suggests that a variety of model approaches and models could be employed. It is noted that the regulated community is responsible for selecting a methodology for implementing the acoustic criteria and presenting it to NMFS. While the Associations appreciate and encourage this flexibility, we also recommend that NMFS establish more specific model acceptance criteria.

5.3. Depending upon NMFS's decisions on the extent and depth of modeling requirements, it is likely that both the current range of modeling vendor choices and their capacity will be inadequate to fulfill the agency's requirements, which could lead to unwarranted permitting delays or costs. The Implementation Guide should address how this transition period, which will necessitate an expansion of the pool of adequate modeling expertise and vendors, will be effectively managed.

6. Data Input Requirements

6.1. Data input requirements should be more explicit. These requirements should be practicable and should consider the whether the demand for precision and survey-by-survey information will really yield a substantively more informed resource management decision considering the overall lack of information, natural variability, and environmental confounding factors.

6.2. Sound Source Verification: For the Gulf of Mexico, an area of high seismic survey activity, project specific sound source verification is impractical. The Associations recommend that NMFS model a typical source array in 9 GoM zones (3 (shallow, shelf and deep) in each of the 3 Planning Areas) by season using a number of sound velocity profiles available from publically available NOAA CTD data. NMFS should then conduct sensitivity analyses on these profiles to determine seasonal variability and create a range of transmission loss profiles for individual model outputs to satisfy. Then, empirical data could be collected on a select number of representative projects rather than all projects, to also verify that the empirical data falls within the modeled range.

6.3. Water Depth Differentials: Industry recommends continuation of the existing BOEM approach to evaluate acoustic effects within standardized categories of submerged lands depth and bottom conditions rather than individual project assessments. Such an approach would provide a level of accuracy/precision sufficient for informed monitoring/mitigation decision-making. In the Gulf of Mexico, this would consider shallow water, the slope and deep water within the Western, Central and Eastern planning areas. This approach could include bottom conditions such as hard bottoms or soft sediments, which substantively affect sound propagation.

7. Implementation of Observation/Exclusion Zones

7.1. The Draft Guidance provides thresholds for five hearing groups, but it is not clear how these thresholds will be applied when determining safety or exclusion zones. The Implementation Guide should address how this will be practically and flexibly carried out. The Guidance should include recent approaches that give discretion for decisions involving shutdowns for dolphins that are deemed to be in the ensonified area voluntarily.

7.2. It is possible that the size of model-established exclusion zones will be larger than that which can be effectively monitored. Where that is the case, the Associations recommend that NMFS employ a practical limit to an area that can be effectively be monitored as it has in LOAs issued to the U.S. Navy.

8. Exposure Duration

8.1. Provisions are made for use of either a 1-hour or a 24-hour accumulation period depending upon whether models that calculate animal and/or source movement and exposure are used.

8.2. Exposure is a function of both movement of the vessel and movement of animals. In addition, animal movement is both lateral and vertical. The Draft Guidance should clarify and confirm NMFS's consideration of these factors as well as consider the reduction in incidental takes that results from avoidance.

8.3. We suggest that NMFS revise the Draft Guidance to expressly allow for the option of SEL_{cum} modeling for the duration of the activity in addition to the 1-hour and 24-hour options and utilize the approach with the smallest estimated number of estimated potential marine mammal exposures.

8.4. Implementation of the acoustic accumulation period should provide a way to consider periods of reduced or no sound propagation for power-downs and line turns (which could allow for recovery) to be more accurate.

8.5. Clarification regarding NMFS's approach for use of the SEL_{cum} metric would be helpful. The agency indicates SEL_{cum} is not meant to accumulate sound exposure for multiple activities or for naturally occurring sounds; however, no alternative metric is provided for this type of assessment.

9. Consideration of Mitigation Factors

The Draft Guidance notes that a variety of factors, some of which are not explicitly considered in the quantification of incidental takes, are in fact relevant. The Associations agree. In particular, avoidance behavior and the effect of ramp-up, power down, and shutdown in reducing takes are significant. The Implementation Guide should review and consider improvements in how these impact avoidance factors are given equal consideration in the agency's effects analysis. It is very likely that these avoidance factors are especially meaningful in explaining the discrepancy between the numbers of model-predicted incidental takes and actual observations in the field.

September 14, 2015

VIA Federal eRulemaking Portal

Chief, Marine Mammal and Sea Turtle Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3226
Attn: Acoustic Guidance

Re: Comments on Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing—**NOAA-NMFS-2013-0177**

To Whom It May Concern:

This letter provides the comments of the American Petroleum Institute ("API"), the International Association of Geophysical Contractors ("IAGC"), and the Alaska Oil and Gas Association ("AOGA") (collectively, the "Associations") in response to the National Marine Fisheries Service's ("NMFS") Notice and Request for Comments on the second version of its Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing ("Second Draft Guidance"). *See* 80 Fed. Reg. 45,642 (July 31, 2015). We appreciate NMFS's consideration of the comments set forth below.

I. INTRODUCTION

A. The Associations

API is a national trade association representing over 625 member companies involved in all aspects of the oil and natural gas industry. API's members include producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of the industry. API and its members are dedicated to meeting environmental requirements, while economically developing and supplying energy resources for consumers.

IAGC is the international trade association representing geophysical services companies that support and provide critical data to the oil and natural gas industry. IAGC members (including companies engaged in geophysical data acquisition, processing, and interpretation; geophysical information ownership and licensing; and associated services and product providers)

play an integral role in the successful exploration and development of offshore hydrocarbon resources through the acquisition and processing of geophysical data.

AOGA is a non-profit trade association located in Anchorage, Alaska. AOGA's 14 member companies account for the majority of oil and gas exploration, development, production, transportation, refining, and marketing activities in Alaska. AOGA's members are the principal oil and gas industry stakeholders that operate within the range of marine mammals in Alaskan waters and in the adjacent waters of the Outer Continental Shelf ("OCS"). AOGA and its members are longstanding supporters of wildlife conservation, management, and research in the Arctic. AOGA has for many years successfully petitioned for, and defended in court, incidental take regulations applicable to offshore oil and gas activities.

B. Responsible Offshore Development

The OCS is a significant source of oil and gas for the nation's energy supply. In 2014, offshore areas of the United States supplied over 9 percent of the country's natural gas and oil production, and are estimated to contain roughly 17 percent of the oil and 12 percent of the natural gas resources in remaining undiscovered fields in the United States. The important role of oil and gas exploration and development in the OCS is clearly reflected in the Outer Continental Shelf Lands Act ("OCSLA") and its implementing regulations. Under those authorities, implementing agencies are mandated to preserve, protect, and develop oil and natural gas resources in the OCS in a manner that is consistent with the need to (i) make such resources available to meet the nation's energy requirements as rapidly as possible, and (ii) balance orderly energy development with protection of human, marine, and coastal environments. *See* 43 U.S.C. §§ 1332(3)-(5), 1346, 1348; 30 C.F.R. §§ 250.101, 250.107.

Geophysical surveys using seismic reflection are an essential, state-of-the-art component of oil and gas exploration in the OCS. Geophysical data are used by both industry and federal agencies to make informed economic and regulatory decisions regarding potential accumulations of oil and natural gas. As one of the earliest components of the lengthy process leading from leasing of lands to exploration, development, and production of hydrocarbon resources, seismic surveys are critical to the OCS resource development mandated by Congress in OCSLA and have been demonstrated to have no detectable long-term impacts on the marine environment.

Geophysical surveys facilitate the safe and orderly development of OCS oil and gas reserves. Seismic modeling not only helps to delineate reserves, it also significantly reduces environmental risk by increasing the likelihood that exploratory wells will successfully tap hydrocarbons and decreasing the number of wells that need to be drilled in a given area. This reduces the overall environmental impact of oil and gas development by limiting the footprint of exploration. Because survey activities are temporary and transitory, they are the least intrusive and most cost-effective means to understanding where recoverable oil and gas resources likely exist.

More than four decades of worldwide seismic surveying and scientific research indicate that the risk of physical injury to marine life from seismic survey activities is extremely low. Currently, there is no scientific evidence demonstrating biologically significant negative impacts to marine life from seismic surveying. As stated by the Bureau of Ocean Energy Management in its August 22, 2014, *Science Note*:

> To date, there has been no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting marine animal populations or coastal communities. This technology has been used for more than 30 years around the world. It is still used in U.S. waters off of the Gulf of Mexico with no known detrimental impact to marine animal populations or to commercial fishing.

http://www.boem.gov/BOEM-Science-Note-August-2014/.

II. COMMENTS

The Associations want to again acknowledge the significant effort involved in examining the scientific literature available on the topic of marine sound and its potential impacts on marine mammals. We recognize that this topic is complex and informed by an evolving base of scientific knowledge, and we appreciate the challenges and effort associated with translating the available information into functional criteria. We continue to support the goal of updating and developing acoustic criteria that are informed by, and consistent with, the best available science. We also support a continued effort in furtherance of this goal that is transparent and does not result in unnecessary or unsupported new processes or requirements for the regulated community.

The Associations carefully reviewed and analyzed the first version of the Draft Guidance ("First Draft Guidance") and provided many specific comments, in which we identified opportunities for improvement, requested clarity on technical issues, and addressed legal concerns. We appreciate NMFS's consideration of our earlier comments, some of which have been addressed in the Second Draft Guidance. Below, we address new issues specific to the Second Draft Guidance as well as restate some of our earlier comments that do not appear to have been incorporated in the Second Draft Guidance. We have divided these comments into those that are largely related to "procedural" matters and those that are largely related to "technical" matters (recognizing that there may be some overlap in these general categories). On the whole, the Associations support the agency's issuance of the Second Draft Guidance in final, subject to the comments and recommendations provided below, which are intended to be constructive and to further improve the final guidance document.

A. Procedural Comments

1. Regulatory impacts

Marine mammal incidental take authorizations ("ITAs") for the oil and gas industry have, for many years, been authorized by NMFS and the U.S. Fish and Wildlife Service. The best available science demonstrates that these authorizations have resulted in no detectable adverse impacts to marine mammal populations and that related monitoring and mitigation measures are effective. Although we support NMFS's development of new criteria that are consistent with the best available science, these new criteria should not be implemented in a manner that results in increased regulatory burdens. The Associations are concerned that the Second Draft Guidance will require more time, more advanced technical expertise, and, therefore, higher costs associated with the preparation and federal review of ITA applications. The lack of guidance regarding the implementation of the new criteria (addressed below) will create regulatory uncertainty and result in unnecessarily burdensome and inconsistent permitting processes.

In this light, the Second Draft Guidance does not provide a full explanation of the anticipated impact of the proposed threshold levels and related modeling techniques on the regulated community, and there is no clear discussion of the regulatory implications of the proposed changes. In the final guidance, NMFS should provide a thorough explanation of the anticipated regulatory and economic impacts. Because the final guidance will be applied in a range of regulatory actions, we continue to recommend that, before the acoustic criteria become final, NMFS undertake a comparative assessment of the approach described in the Second Draft Guidance with the current assessment methods to demonstrate the regulatory implications of the proposed criteria. We recognize that the proposed metrics in the Second Draft Guidance are not directly comparable to current assessment methods, but we believe it is possible, and would be informative, to generally evaluate the regulatory impacts of both approaches for applicants.[1] Such scenarios or simulations could clarify implementation issues, but may also reveal limitations or unintended consequences that could be addressed before the new criteria are used in regulatory actions.

[1] In the same vein, in the *Supplemental Draft Environmental Impact Statement Effects of Oil and Gas Activities in the Arctic Ocean*, which was released March 21, 2013, NMFS stated its intent to incorporate the new acoustic criteria into the final environmental impact statement ("EIS"). We urge, due to the lack of clarity on the regulatory impact from implementation of the guidance, that the pubic be given an opportunity to provide written comments, in advance, regarding the incorporation of the final acoustic criteria into the Arctic EIS. This will ensure that the public can review and comment on the application of the acoustic criteria in the Arctic EIS.

2. Implementation concerns

As an initial matter, the Second Draft Guidance provides no clear explanation for how the agency uses "guidance," the legal import of a guidance document, when the agency can and cannot deviate from guidance (as opposed to regulatory requirements), and how the agency will evaluate any deviations proposed by applicants. A clear discussion of these issues at the beginning of the document would be helpful and informative for the regulated community and the general public.

Additionally, the Second Draft Guidance presents uncertainty and potential complications regarding the implementation of the proposed criteria. As indicated above, the complexity of the methods proposed in the Second Draft Guidance will result in increased time and expenses and additional technical expertise for applicants, and will almost certainly lead to confusion in the regulated community as well as inconsistent applications and inefficient permitting processes. Although the Second Draft Guidance provides some general context for how the proposed criteria will be implemented, it does not provide a meaningful discussion outlining the key practical aspects or standards to be applied for the implementation of the criteria.

To eliminate uncertainty and potential future complications, the final guidance document should include a specific recommendation (with supporting analysis)[2] of how the implementation of the proposed criteria will affect existing offshore activities, monitoring protocols, estimated incidental take assessment, and the development of mitigation measures.[3] For example, NMFS currently requires shut down and/or power down mitigation measures that are based on specific, non-cumulative acoustic criteria. However, the Second Draft Guidance contains no meaningful discussion about how similar avoidance-based mitigation measures will be implemented under the new criteria. The document also provides very little guidance to applicants regarding the take estimation methods (as opposed to exposure estimation) that the agency would prefer to be used in ITA applications.

[2] We strongly recommend that NMFS undertake a modeling exercise using available industry data and work with industry in developing a realistic scenario before publication of the final guidance. Completing a specific modeling exercise with the proposed draft criteria will provide the regulated community with proper guidance and clarity on how the proposed criteria should be implemented.

[3] *See* 67 Fed. Reg. 8452, 8459 (Feb. 22, 2012) ("In assessing the usefulness of information that the agency disseminates to the public, the agency needs to consider the uses of the information not only from the perspective of the agency but also from the perspective of the public."). As indicated above, we also recommend that the final guidance include a summary of the additional costs that are expected to result from implementation of the new criteria, with a comparison of the expected benefits.

We agree that it is important for NMFS to allow for sufficient flexibility in the regulatory process so that applicants can appropriately address the specific situations that arise in their ITA requests. Such flexibility enables innovation within the bounds of regulatory compliance. For example, there are many ways to estimate potential exposures of marine mammals to various sound levels, and future applicants should not be limited to estimating exposures using the specific criteria set forth in the Second Draft Guidance (or in Appendix E) if there are other methods that are more appropriate and scientifically justified.[4] However, balanced against that flexibility, general guidance from the agency regarding take estimation methodologies and application of avoidance and mitigation measures—even if provided as nonexclusive examples—would be informative and would facilitate efficient and consistent permitting processes.[5] Moreover, such general guidance would increase transparency, allow for more informed public review and comment, and help to "ensur[e] and maximiz[e] the quality, objectivity, utility, and integrity" of the information provided in the Second Draft Guidance, as required by the Information Quality Act. *See* Pub. L. No. 106-554, § 515 (2000); *see also* 67 Fed. Reg. at 8456 ("The more important benefit of transparency is that the public will be able to assess how much an agency's analytic result hinges on the specific analytic choices made by the agency. Concreteness about analytic choices allows, for example, the implications of alternative technical choices to be readily assessed.").[6]

[4] It would be helpful for the final guidance document to provide more clarity regarding the timing and process for applicants that wish to utilize alternative approaches in their ITA applications.

[5] As addressed in our comments on the First Draft Guidance, NMFS can improve the usefulness of new criteria by providing a "user guide" that will inform and assist NMFS's implementation of the new acoustic criteria. If NMFS were to prepare a user guide, it should provide a draft for public review and input. In addition, IAGC is working with its members to develop processes to assist with the preparation of ITA applications and would welcome the opportunity to collaborate with NMFS, where appropriate, on efforts that facilitate efficient and consistent regulatory processes based on the best available science.

[6] NMFS considers the Second Draft Guidance to be a "highly influential scientific assessment" subject to the *National Oceanic and Atmospheric Administration Information Quality Guidelines* ("NOAA IQG"). "[I]nfluential scientific, financial, or statistical information" is specifically held to higher information quality standards. *See* 67 Fed. Reg. at 8452, 8455 ("OMB guidelines apply stricter quality standards to the dissemination of information that is considered 'influential.'"). These standards further counsel in favor of more information addressing the implications and implementation of the proposed criteria. *See generally* NOAA IQG at 1-2.

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3. Consideration of qualitative factors

The Second Draft Guidance also recommends that certain qualitative factors be "considered within the comprehensive effects analysis." Second Draft Guidance at 29. However, the document provides little discussion regarding how these qualitative factors will be considered, the relative weight given to these factors, or how these factors will be implemented. We encourage the agency's consideration of qualitative factors in a manner that adds flexibility to the regulatory process and recommend that NMFS include more discussion in the final guidance regarding the application of qualitative factors. In addition, the discussion of qualitative factors in the Second Draft Guidance indicates that NMFS does not intend for qualitative information to be "used to reduce quantitatively predicted exposures produced by acoustic threshold levels." Second Draft Guidance at 30. However, in many instances, consideration of qualitative factors (such as violation of the EEH or the failure to account for recovery in the 24-hour cumulative calculation) may demonstrate that there is less risk of PTS occurring than the quantitative analysis predicts. In these circumstances, consistent with the agency's obligation to use the best available science and information, the qualitative information should be factored into the estimated exposure and take analyses, whether it results in an increase or decrease in the number of predicted incidental takes.

4. TTS thresholds and Level B harassment

The Second Draft Guidance appropriately concludes that TTS is not an "injury" for Marine Mammal Protection Act ("MMPA") purposes and should, at most, be considered Level B harassment. The Associations concur with this finding, as it is based on the best available scientific information. However, the Second Draft Guidance also states that the TTS threshold levels "will be used in the comprehensive effects analyses under the MMPA and the Endangered Species Act ("ESA") and *may* inform the development of mitigation and monitoring." Second Draft Guidance at 40 (emphasis in original). Respectfully, this cryptic statement provides no meaningful value to the regulated community and, instead, creates uncertainty and confusion regarding NMFS's intentions for future regulatory processes. We strongly recommend that NMFS provide more clarity and discussion in the final guidance regarding how the TTS threshold levels may or may not inform mitigation and monitoring. Without clarity from the agency on this topic, future ITA applicants will have no direction on whether and how they should address the TTS threshold levels when developing the mitigation and monitoring measures to be proposed in their applications.

In addition, the Second Draft Guidance does not address a significant category of Level B take (i.e., behavioral harassment), but also provides no explanation for how ITA applications will be processed after the new Level A thresholds are issued and before new Level B thresholds are developed. It would greatly improve the regulated community's ability to meaningfully assess the implications of the proposed criteria if the final guidance includes an explanation for how the proposed acoustic criteria will be implemented in the absence of new criteria applicable to Level B behavioral harassment. It is also not clear from the Second Draft Guidance as to how NMFS

will specifically use the TTS threshold levels in the permitting process before behavioral modification criteria are finalized. For instance, it is unclear as to whether NMFS is going to require the use of three separate take thresholds (for PTS, TTS, and behavioral modification) and, if so, how NMFS will ensure that the permitting and implementation processes do not become too burdensome and complex. The Second Draft Guidance suggests that the TTS thresholds will not be used for "take quantification" purposes until the Level B threshold levels are developed; however, it also states that the TTS threshold levels will presently "be used in the comprehensive effects analyses under the MMPA and the ESA." *Id*. The final guidance should clarify these statements and more fully explain how these issues will be addressed in ITA permitting processes.

5. Ongoing review of the best available science

We commend NMFS for its commitment to undertake review and revision of the final guidance on a regular basis to incorporate knowledge as it is acquired. We further suggest that NMFS maintain flexibility to promptly consider and address highly relevant new information that arises between the agency's formal reviews. In addition, we encourage NMFS to continue supporting the science that has been, and is being, developed under the Sound and Marine Life Joint Industry Programme. *See* http://www.soundandmarinelife.org/. This program is one of the few coordinated efforts focused specifically on increasing the scientific understanding of the effects of sound on marine life.

6. NMSA concerns

The Second Draft Guidance clarifies that the new threshold criteria will be considered by NMFS and the Office of National Marine Sanctuaries for purposes of the National Marine Sanctuaries Act ("NMSA"). The Second Draft Guidance goes on to state, without any explanation, that TTS and "behavioral impacts" constitute "injury," as that term is defined in the NMSA. *See* 15 C.F.R. § 922.3 ("injure" is defined as to "change adversely, either in the short or long term, a chemical, biological or physical attribute of, or the viability of"). It is not clear why the agency has made this conclusion, and, indeed, the studies cited in the Second Draft Guidance are not consistent with this conclusion. *See* Second Draft Guidance at 44 (citing Southall et al. (2007) (TTS is not a tissue injury) and Ward (1997) ("TTS is within the normal bounds of physiological variability and tolerance and does not represent physical injury")). If NOAA is determined to make such a sweeping legal conclusion regarding the application of the new criteria to the NMSA consultation process, then it must provide a detailed and well-supported explanation based on applicable law and the best available science. In addition, the public should have the opportunity to review and comment on this explanation, consistent with Administrative Procedure Act requirements.

B. Technical Comments

1. Alternative approach for estimating exposure

We appreciate NMFS's effort to provide a simplified alternative method for calculating estimated exposures to sound at the levels set forth in the Second Draft Guidance (Appendix E). However, while this alternative method might provide flexibility for calculations, simplifying the application of weighting functions as well as the source/receptor movement scenarios for SEL_{cum} calculations will introduce variability across activities, resulting in significant overestimation of exposure numbers. NMFS indicates in the Second Draft Guidance that it is prepared to provide tools to enable applicants to apply frequency-specific weighting functions without necessarily performing the mathematical calculations. However, these tools have not been made available for public review. Moreover, this two-tiered system for estimating exposures could have inequitable results for operators who, for either cost or time reasons, may not be able to use the more complicated applied weighted factor methodology and will resort to applying for an ITA that overestimates the amount of incidental take actually caused by the underlying activity.[7] We strongly recommend that NMFS include a detailed discussion in the final guidance that informs applicants about the potential costs, benefits, and consequences of each of the two methodologies described in the Second Draft Guidance.[8]

Specifically, the final guidance should provide examples that demonstrate the quantitative metrics of the difference in outcome for a number of given signals when individual-based models are used and when Appendix E methods are applied. These examples should include comparison calculations that indicate how use of the "safe distance" calculation differs from models in which exposure is accumulated for individual computer entities (e.g., "animats") that may or may not move relative to the source. In addition, there are other assumptions in this "safe distance" calculation, such as exposures occurring at a constant depth and exposures being constant over a consistent swath for 24 hours, that may contribute to overestimation of exposure and that should be quantitatively demonstrated (or disproven) by calculated examples rather than requiring the user to assume that the "rounding error" associated with the Appendix E methodology is not significantly different than performing a more sophisticated analysis.

[7] This will have negative impacts that extend beyond a single applicant. For example, if the incidental take estimate in a five-year incidental take regulation ("ITR") is based on the Appendix E methodology, then the estimate will be unrealistically high. Alternatively, if an ITR is based on a weighted approach using contemporary modeling, then letter of authorization applicants that use the unweighted approach may complicate the agency's ability to reasonably manage and implement the ITR. These are significant issues that, among others, are not addressed in the Second Draft Guidance.

[8] The Associations recognize that the simplified movement methodology may be used in non-U.S. jurisdictions where there is less regulatory focus on exposure numbers.

2. Transition from impulsive to non-impulsive acoustic threshold levels

The Second Draft Guidance acknowledges that most analyses are based on sound characteristics at the source and that NMFS analyzes impacts at the receiver, which is provided as justification for creating an impulsive to non-impulsive transition zone at 3 km. NMFS recommends this 3 km transition zone based on a "peak pressure to pulse duration of 5000" as "an appropriately precautionary approximation of where most impulsive sound sources begin to transition to having physical characteristics less likely to result in auditory injury." Second Draft Guidance at 119. We are aware of no biological basis for this assumption, and it appears to have been chosen through an arbitrary process of attempting to identify a value that generally provides a consistent break in the pressure/duration ratio (although the available data vary considerably). However, as NMFS recognizes, a pressure duration ratio of 5,000 is more often attained at ranges of 1-2 km, rather than 3 km as stated in Table B2, which argues even more strongly for a different criterion for switching from impulse to continuous thresholds. Contributions to spreading of the acoustic energy over time include frequency-differential travel paths and times, and multi-path reflections from the surface and bottom, as well as refractive effects within the water column and geology of the sea bottom. These effects do not usually contribute substantively to signal "spread" at such short ranges, especially in deep water. Furthermore, the possibility of multiple pressure peaks from multi-path propagation and frequency-differential propagation effects suggest that weighting calculations and even integration time windows might need to be changed at different distances in order to correctly characterize the dynamic change from an impulse waveform to something increasingly resembling a "continuous" sound of highly varying duration, frequency structure, and pressure peak(s). Instead of using this arbitrary process, NMFS should have applied the time/amplitude waveforms from the examples used in the Second Draft Guidance to generate the transition threshold, and then should have generated examples showing the difference that would result from applying impulse and non-impulse criteria at these ranges (1-3 km).

We recommend that NMFS prepare further quantitative applications of various source types and scenarios, include full explanations in the final guidance, and provide, as appropriate, a revised transition range for impulsive to non-impulsive acoustic threshold levels. In addition, we recommend that NMFS clearly state that establishing such a transition from impulsive to non-impulsive only applies to Level A harassment and not Level B harassment.

3. Accumulation period

The period over which SEL_{cum} is calculated is stated as 24 hours; however, there is no discussion in the Second Draft Guidance regarding the potential for recovery between pulses or intermittent periods of exposure within this 24-hour period. This is a significant issue that is not directly addressed in the Second Draft Guidance but that, if addressed, would potentially lead to more realistic results. In addition, although the Second Draft Guidance makes allowances for a shorter accumulation period, it does not, but should, make similar allowances for a longer accumulation period.

4. Proposed threshold limits

In addition to the comments set forth above, we have the following specific comments regarding certain elements of the proposed threshold limits:

- The upper and lower threshold limits are not set consistently as they were in Southall et al. (2007) at 80 dB above threshold of best hearing. For example, the upper threshold limit for phocid seals of 100 kHz is based on Kastelein et al. (2009), in which the threshold at 100 kHz is much higher than 80 dB above best hearing.

- The very low threshold limits presented for high-frequency cetaceans are based almost exclusively on a single study (Lucke et al. 2009). These data are most likely to be obtained by using Evoked Potential ("EP") methods, rather than behavioral methods, which necessitates a change in acceptance of EP data since the criteria set forth in the Second Draft Guidance (and in the paper from which the criteria are derived) do not incorporate the extensive and growing body of EP hearing data. Finneran (2015) and NMFS provide an explanation based on the different outcomes of EP and behavioral testing. However, studies by Finneran, Popov, and other researchers are demonstrating that this relationship is consistent and, accordingly, that NMFS should allow greater reliance on EP data in future iterations of the guidance.

- The upper end of the auditory weighting function for low-frequency cetaceans—which is reduced from 30 to 25 kHz—is a significant improvement. The 25 kHz value is still arguably too high, but it is more consistent with the best available science than was the value proposed in the First Draft Guidance.

- The method used to arrive at a SEL_{cum} PTS threshold for low-frequency cetaceans and seals is determined in the Second Draft Guidance to be "unrealistic" for arriving at a peak-pressure PTS threshold for those groups, but no explanation is given for this conclusion. This section of the Second Draft Guidance needs more explanation.

- The method for deriving PTS onset values (SEL_{cum} and peak) from TTS onset threshold for impulse sounds is not well explained in the Second Draft Guidance. It appears that a very basic method was used, which the Associations understand may have been necessitated by the paucity of available data. Nonetheless, a more complete explanation of the values selected should be provided in the final guidance.

5. Sound source verification

It is not clear from the Second Draft Guidance whether NMFS will require sound source verification ("SSV") measurements to be made during permitted activities. In the experience of the Associations' members, SSV poses a complicated and unnecessary burden on operations because the results of SSV are highly variable due to constantly changing conditions in the water column. If SSV is intended to be part of the standard protocol in the implementation of the new threshold levels, then it is important that the regulated community have the opportunity to provide informed input on this potential requirement and that it be based on the best available science.

III. CONCLUSION

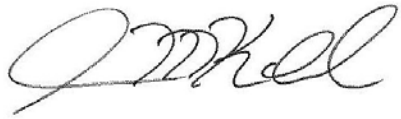
We appreciate the effort that NMFS has devoted to the Second Draft Guidance, which represents a significant improvement over both the First Draft Guidance and the acoustic criteria guidelines that are currently used by NMFS. The Associations will continue to support a process that is comprehensive, transparent, consistent with the best available science, and fully informed by the public. We specifically support issuance of the Second Draft Guidance in final, subject to the additional comments and recommendations provided above.

Should you have any questions, please contact the undersigned at 202.682.8584, or via email at radforda@api.org. Thank you for considering and responding to these comments.

Sincerely,

Andy Radford
American Petroleum Institute

Nikki Martin
International Association of Geophysical Contractors



Joshua Kindred
Alaska Oil and Gas Association

ATTACHMENT C

March 30, 2016

VIA Federal eRulemaking Portal

Chief, Marine Mammal and Sea Turtle Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3226
Attn: Acoustic Guidance

Re: Comments on Proposed Changes to Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing—**NOAA-NMFS-2013-0177**

To Whom It May Concern:

This letter provides the comments of the American Petroleum Institute, the International Association of Geophysical Contractors, the Alaska Oil and Gas Association, and the National Ocean Industries Association (collectively, the "Associations") in response to the National Oceanic and Atmospheric Administration's ("NOAA") notice and request for comments on proposed changes to NOAA's Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing ("Draft Guidance"). *See* 81 Fed. Reg. 14,095 (Mar. 16, 2016). The Associations previously submitted extensive comments on both the first and second versions of the Draft Guidance.[1] Our comments on the newly proposed changes to the Draft Guidance are set forth below.

I. INTRODUCTION

As stated in our previous comments, the Associations recognize that the topic of marine sound and its potential impacts on marine mammals are complex and informed by an evolving base of scientific knowledge, and we appreciate the challenges and effort associated with translating the available information into functional guidance criteria. We also appreciate

[1] We incorporate our previous comments by reference, and expect that those comments will be included in the administrative record and fully addressed by NOAA. Collectively, the Associations represent the vast majority of all stakeholders engaged in the exploration and development of offshore oil and gas resources in the United States. The Associations are described in more detail in our previous two comment letters.

NOAA's efforts to appropriately obtain public and peer review input on the first two versions of the Draft Guidance. The Associations have been fully engaged in this process and have spent substantial amounts of time and resources evaluating both versions of the Draft Guidance and preparing comments to constructively inform this important process. Our position has been, and continues to be, that we will support a process that is comprehensive, transparent, consistent with the best available science, and fully informed by the public.

Unfortunately, NOAA has suddenly proposed to incorporate changes to the Draft Guidance in a manner that is not comprehensive, transparent, or consistent with the best available science. These proposed changes, if finalized, will also not be meaningfully informed by the public. NOAA's proposed changes are substantial, significant, and result in very different criteria than were proposed in the 2015 version of the Draft Guidance. Despite the magnitude of these proposed changes, NOAA has provided little or no supporting scientific analyses or explanations, has not yet subjected the proposed changes to peer review, and has offered the public an insufficient 14 days to evaluate the proposed changes and provide comments.[2]

We struggle to understand how a process that began three years ago, and that was intended to meaningfully involve the public at all stages, has so abruptly and inexplicably changed course. Considering that development of the Draft Guidance is a multi-year process, it would have been reasonable for NOAA to afford the public more than 14 days to review and provide comments on the proposed changes, particularly when those changes will drastically affect the application of the Draft Guidance. We cannot support the arbitrary process the agency has adopted as a means to quickly implement significant and substantial changes immediately prior to finalizing the Draft Guidance. Below, we have endeavored to provide objective comments as best we can in the short time allowed for public comment.

We recommend that NOAA retract the March 2016 proposed changes and instead engage in the peer review process applicable to highly influential scientific assessments, as occurred with the first and second versions of the Draft Guidance. Once that process is completed, NOAA should re-propose any necessary changes to the 2015 Draft Guidance and provide for a sufficient public review and comment period. If NOAA finds it necessary to produce final guidance before the process of incorporating any such changes can be completed, it should proceed with a final version of the 2015 Draft Guidance (revised, as appropriate, based on previously submitted public feedback), along with a user guide and implementation tools as promised in July 2015.

[2] Numerous requests for extensions of the public comment period were submitted to, and rejected by, NOAA.

II. PROCESS COMMENTS

Aside from the inadequate opportunity for public review and input, there are a number of other unsatisfactory aspects of NOAA's process for proposing changes to the Draft Guidance. These are detailed as follows.

First, although the proposed changes to the Draft Guidance are extensive and mathematically complex, they are incompletely documented and insufficiently explained in the March 2016 supplemental materials. This lack of substantive support is compounded by the fact that NOAA has not provided the technical tools or modeling scenarios that are necessary for the proper assessment of the new criteria and, particularly, the implications of the proposed changes. The absence of these user aids, which NOAA previously indicated would be made available, renders the analysis of the proposed changes very difficult and time-consuming. The completion of specific modeling scenarios or simulations is essential to inform the regulated community on how the proposed criteria will impact planning and operations during implementation. Additionally, such scenarios or simulations would also reveal limitations or unintended consequences that must be addressed before the new criteria (and particularly the proposed changes) are finalized and used in regulatory actions.[3] NOAA's failure to provide the support necessary for the newly proposed criteria to be readily assessed further emphasizes the unreasonableness of the 14-day comment period.

Second, NOAA commissioned peer reviews of the first and second versions of the Draft Guidance before those versions were released for public review. As a result, the public was able to review and comment on draft criteria that were already informed by expert peer review, and summaries of the peer review results were provided to the public. In contrast, the currently proposed changes to the Draft Guidance were inexplicably rushed out for public review and comment without any peer review. NOAA states that it will, at some point, submit these proposed changes for peer review, which will almost certainly result in corrections and modifications to what is currently proposed. However, the public will have no opportunity to review and comment on the peer-reviewed version of the changes to the Draft Guidance.[4]

[3] Rather than rushing significant changes to the Draft Guidance through an uninformed process, NOAA should be seeking to "ensur[e] and maximiz[e] the quality, objectivity, utility, and integrity" of the Draft Guidance, as required by the Information Quality Act. *See* Pub. L. No. 106-554, § 515 (2000); *see also* 67 Fed. Reg. 8452, 8456 (Feb. 22, 2012) ("The more important benefit of transparency is that the public will be able to assess how much an agency's analytic result hinges on the specific analytic choices made by the agency. Concreteness about analytic choices allows, for example, the implications of alternative technical choices to be readily assessed.").

[4] NOAA admits that the Draft Guidance is a "highly influential scientific assessment" subject to the *National Oceanic and Atmospheric Administration Information Quality Guidelines*

Third, NOAA's statement that it may "re-evaluate [its] methodology for LF [low-frequency] cetaceans when th[e] updated Southall et al. publication becomes available" further raises the question of why NOAA is hurriedly implementing the proposed changes now. Given the significance of the proposed changes, and the fact that the proposed criteria may change again upon release of the anticipated Southall *et al.* publication (as referenced in footnote 3 of the March 2016 proposed changes to the Draft Guidance), the Associations request that NOAA expressly commit to updating the acoustic criteria no later than six months after the issuance of that publication. This request is particularly reasonable given that NOAA apparently plans to finalize the proposed acoustic criteria with full knowledge that the new Southall *et al.* paper will be published soon.

Fourth, NOAA continues to remain silent on how the agency plans to use the Draft Guidance, under what circumstances the agency believes it can and cannot deviate from guidance (as opposed to regulatory requirements), and how the agency will evaluate any deviations proposed by applicants. The errors and unjustified assumptions contained in the proposed changes further emphasize the fact that future applicants for incidental take authorization will almost certainly be compelled to propose analyses that necessarily deviate from NOAA's acoustic criteria in order to remain faithful to the best available science.

Fifth, the proposed changes appear to be driven by (non-public) discussions internally among NOAA staff and possibly experts within the U.S. Navy. The proposed changes most significantly affect the thresholds applicable to low-frequency ("LF") cetaceans, especially for LF sound sources. Sound produced by offshore oil and gas exploration and development activities is predominately LF, yet these proposed changes are being undertaken without any meaningful comment from the industry to which they are most relevant. Moreover, as indicated in our previous comments, our industry has continued to support relevant independent peer-reviewed science via the E&P Sound and Marine Life Joint Industry Programme ("JIP"). *See* http://www.soundandmarinelife.org/. Scientific results from JIP-funded independent research has and can continue to inform this process of developing meaningful criteria so long as the process is transparent, flexible, and consistent with the best available science.

and, therefore, to a peer review requirement. Moreover, "influential scientific, financial, or statistical information" is specifically held to higher information quality standards. *See* 67 Fed. Reg. at 8452, 8455 ("OMB guidelines apply stricter quality standards to the dissemination of information that is considered 'influential.'").

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III. CONTENT COMMENTS

A. The Proposed Changes Applicable to LF Cetaceans Are Arbitrary and Contrary to the Best Available Science

The proposed changes to the LF cetacean weighting function parameter '*a*' are scientifically unjustified and do not fit the models that NOAA references as support for these changes. As described below, the auditory curve and weighting functions that result from NOAA's proposed model exhibit an anomalous LF slope that differs from all other marine mammal, human, and other mammalian hearing curves, as well as from the slopes of both the rejected and cited references for modeling hearing in LF cetaceans.

NOAA recognizes that "[m]ost mammals for which thresholds have been measured have low-frequency slopes ranging from 30-40 dB/decade." Accordingly, the audiogram, and therefore the weighting function, should change from zero dB at 1 kHz to 30-40 dB at 100 Hz, and 60-80 dB at 10 Hz. However, instead of using the data that NOAA acknowledges are most accurate, NOAA proposes the "most conservative" metric by arbitrarily halving the data-supported metric to arrive at the proposed 20 dB/decade slope. The significance of this proposal, and its departure from the best available information, is readily depicted in Figure PC1,[5] which clearly shows that the NOAA-proposed slope differs significantly from the two sources referenced by NOAA (Cranford and Krysl 2015; Houser et al. 2001). At 100 Hz, NOAA's new proposal predicts hearing that is only 10 dB worse than best hearing, whereas both the Cranford and Houser models predict decrements of 25-35 dB at the same frequency. The slope of the proposed curve from 1000 to 10 Hz is less than 20 dB/decade, but the slope of the Cranford and Houser models is approximately 25 dB/decade. NOAA's proposed departure from the best science is also highlighted in Figure PC2,[6] in which the slope of the left side of the LF cetacean curve stands out as an anomaly compared to the other slopes presented in Figure PC2.

Another anomalous consequence of the LF cetacean slope proposed by NOAA is that there is no point at which LF cetacean hearing crosses the stated 80 dB range above best hearing. In other words, the proposed model provides no lower limit for whale hearing. Our graph demonstrates this anomaly (Fig. 1).

[5] NOAA Proposed Changes: DRAFT Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing. Mar. 2016.

[6] NOAA Proposed Changes: DRAFT Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing. Mar. 2016.

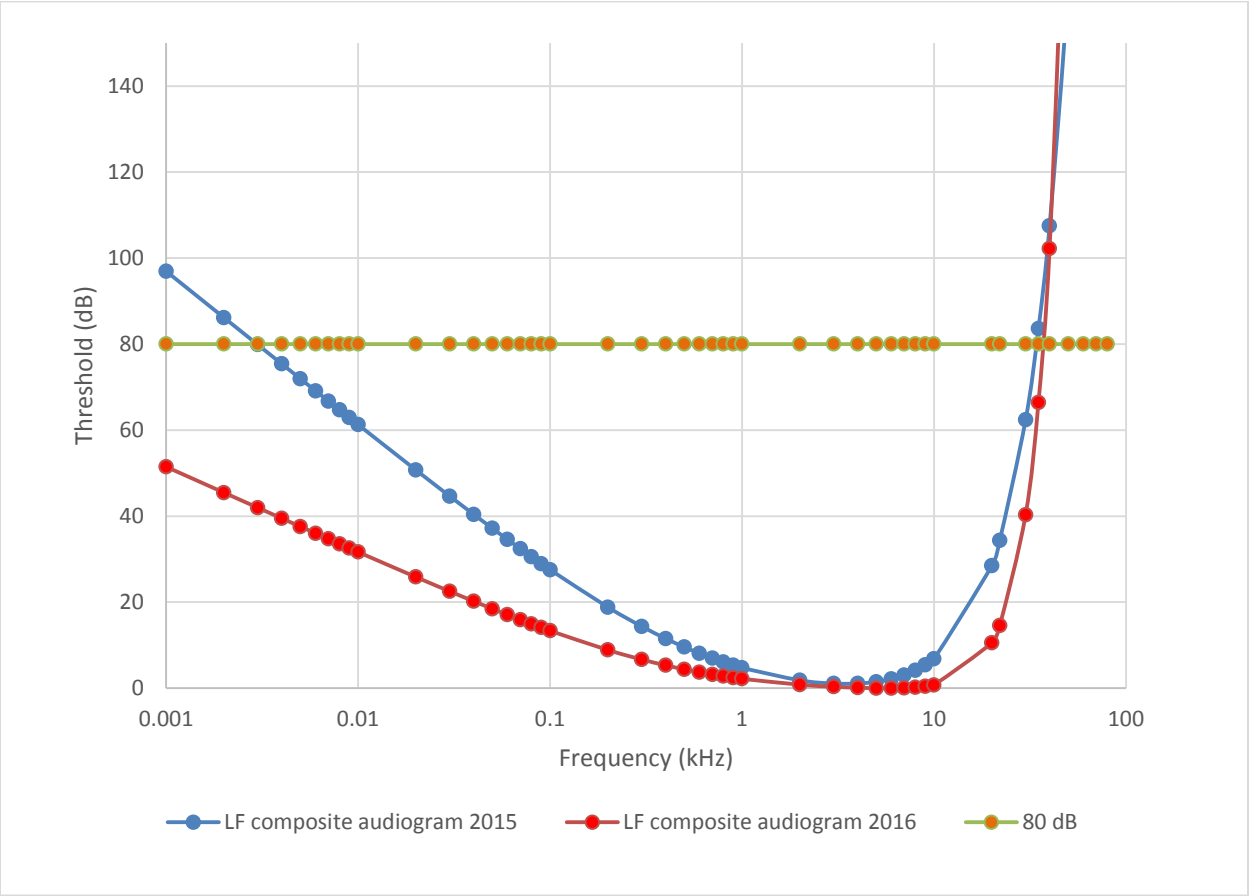

Figure 1. The consequence of the proposed changes to the LF cetacean modeled audiogram (in red) produce a hearing curve at the lowest frequencies that never approaches the 80 dB decrement from best hearing (in green) that NOAA had set as the upper and lower limiting frequencies of hearing (also a general mammalian metric of upper and lower hearing limits). The July 2015 modeled hearing curve (in blue), on the other hand, produces a crossing point with the 80 dB threshold at 3 Hz that provides a reasonable if generous lower limit of hearing.

In addition, on page 7 of the 2016 proposed changes, NOAA reviews four models for frequencies of best hearing and states that these models predict "thresholds within ~40 dB of best sensitivity as low as ~30 Hz and up to 25 kHz." However, rather than use the predictions of these models, NOAA proposes a curve that predicts LF cetaceans can hear 30 Hz at 10 dB above best hearing, not 40 dB. Under NOAA's model, whales could even hear sound at 10 Hz with only a 25 dB decrement from best hearing—which the best available science for baleen whale hearing modeling (*e.g.*, Houser et al. 2001; Cranford and Krysl 2015) and general mammalian hearing data strongly suggests is impossible. *See infra* footnote 8.

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The impact of the new LF cetacean parameters is immediately obvious in our Figure 2 below, which compares Figure PC3[7] of the new 2016 criteria (*see right plot below*) with the curve depicted in NOAA 2015 Draft Guidance (page 12) (*see left plot below*). In contrast to the similar shapes of all the 2015 weighting functions, the new LF cetacean curve produces a biologically unrealistic, extended, and flattened curve.

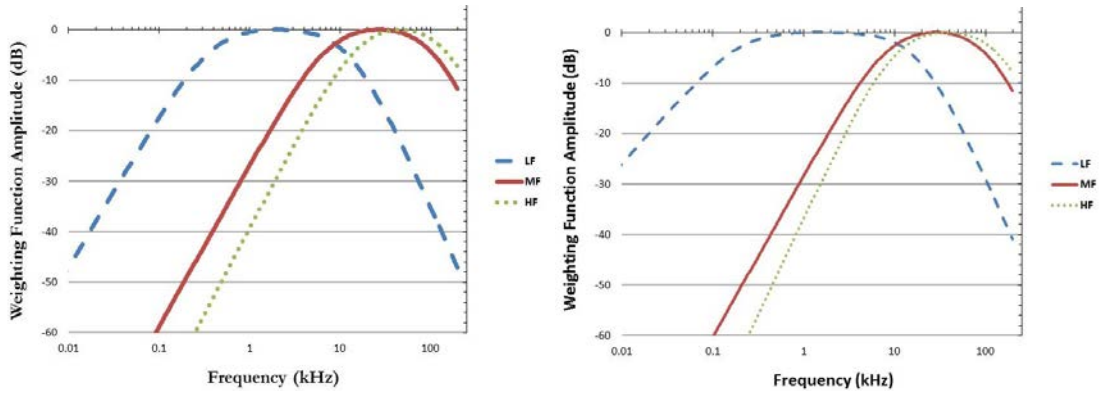

Figure 2. The left plot shows initial July 2015 cetacean weighting functions: LF in dashed blue, MF cetacean in red and HF cetacean in dotted black. While the frequency range of best hearing for LF cetaceans is conservatively generous given uncertainties in the models, the slope of the weighting functions are all parallel, consistent with what is generally observed across mammalian hearing and weighting functions. The right plot shows that the modified March 2016 weighting functions not only create a much broader and obviously unrealistic span of best hearing (the flat upper part of the curve normalized to zero), but also provide a slope of increased weighting (decreased hearing ability) at the lower frequencies that is clearly out of alignment with the measured decrement of hearing acuity in all other marine mammals, as well as for mammals in general, including other LF specialist species.

NOAA's proposed LF cetacean model also sharply deviates from data pertinent to other LF specialist mammals. For example, humans are LF hearing specialists that have a best hearing range of approximately 400 Hz to 16 kHz.[8] But, unlike the LF cetacean model proposed by NOAA, human hearing ability is 25 dB below best hearing at 200 Hz—not the 10 Hz value generated by NOAA's proposed hearing curve. As another example, the kangaroo rat (another LF hearing specialist) has best hearing that starts to diminish at approximately 500 Hz. By 100 Hz, the kangaroo rat's hearing threshold is at least 10 dB above best hearing, and at 20-30 Hz is

[7] NOAA Proposed Changes: DRAFT Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing. Mar. 2016.

[8] A comprehensive summary of human hearing data can be viewed here: http://www.iso.org/iso/catalogue_detail.htm?csnumber=34222, which includes reference to the seminal Fletcher and Munson curve (JASA 5, 82-108;1933).

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40-60 dB above best hearing.[9] In contrast, under NOAA's proposed LF cetacean model, whale hearing at 30 Hz is still within 10 dB of best hearing (1 kHz)—even though every other LF specialist mammal experiences an increase in threshold of more than 40 dB across the same frequency span. It is contrary to best available science to have a model that predicts a slope for LF hearing fall-off that is far flatter than that of any other mammal, and that does not predict an LF limit for the auditory system at all.[10]

Overall, NOAA's proposed changes result in unsupported conclusions that LF cetaceans are able to hear a broader range of frequencies at lower sound levels, compared to the 2015 version of the Draft Guidance. These changes will result in significantly longer ranges to potential permanent threshold shift ("PTS")/temporary threshold shift ("TTS"; *see infra* Section III.C) thresholds. When coupled with other unrealistic changes such as the slope of the LF hearing and weighting curves (discussed above) and the application of high-frequency ("HF") specialist harbor porpoise dynamic range data to the LF cetacean group, the new criteria result in unrealistic thresholds of PTS risk and ranges that are approximately up to eight times greater than those produced by the peer-reviewed July 2015 Draft Guidance (based on modeling scenario results with previous guidance thresholds and some initial calculations with the 2016 changes conducted within the limited time allotted for public comments).

More generally, NOAA's approach to statistical uncertainty results in unrealistic conclusions because NOAA makes improbably conservative assumptions at each step of the analysis, and these compounded assumptions accumulate substantial errors in the end result, as is apparent with the proposed LF cetacean model. These erroneous assumptions are further compounded by the absence of empirical data and by NOAA's failure to test confidence in its curve fitting of non-linear relationships between data input and weighting functions. It is not apparent that NOAA has used any of the acceptable methods to account for limited data, such as those that have been suggested in public comments submitted on the previous versions of the Draft Guidance. In sum, the Associations object to the proposed changes to the LF cetacean criteria because they are not supported by the best available science and are the result of extrapolated conjecture based upon arbitrary and unsupported assumptions.

[9] *See* Shaffer, L.A. and G.R. Long. 2004. Low-frequency distortion product otoacoustic emissions in two species of kangaroo rats: implications for auditory sensitivity. J. Comp. Physiol. A (2004) 190:55-60.

[10] We agree with NOAA's statement that the frequency structure of an animal's vocalizations is not a good predictor of hearing sensitivity. The fact that blue whales, fin whales, and other baleen whale species may produce sound below 100 Hz should not be construed to mean that those are the frequencies of best hearing.

B. The Proposed Changes Applicable to Phocid ("PW") Pinnipeds Are Arbitrary and Unexplained

NOAA has proposed similar changes to the PW pinniped parameter '*a*'. These proposed changes are apparently due to the elimination of some data points, the reasons for which are not clearly explained. NOAA begins by stating that it is removing datasets containing "individuals with hearing loss" and individuals with hearing "not representative of their functional hearing group." However, neither of these reasons is the stated basis for the removal of four of the five peer-reviewed datasets. Instead, NOAA states that it has removed those datasets "due to high thresholds likely being masked."

NOAA provides no explanation for why these data are believed to suffer from masking-related issues more significantly than any other audiogram data used to support the Draft Guidance. As NOAA knows, masking is a common problem when conducting studies to develop audiograms, and the degree to which it is controlled can vary considerably from one study to the next. Before removing the data, NOAA must provide a specific explanation for why these particular datasets contain unique masking problems that are unlike the other datasets upon which the Draft Guidance relies.

C. The Proposed Changes Applicable to Peak Sound Pressure Acoustic Threshold Levels Are Partially Acceptable but Contain Serious Flaws

We generally agree that removal of SPL_{peak} acoustic threshold levels for non-impulsive sounds is reasonable as it would be quite rare that continuous sounds would have a peak level that causes potential impacts at distances greater than the SEL_{cum} metric would predict. We also support NOAA's proposal to adopt the national and international standard of dynamic range as the difference between the auditory threshold and the threshold of pain.

However, the specifically proposed changes to parameter '*K*'—a metric of hearing dynamic range—are arbitrary and not based on a rigorous scientific rationale. The creation of a new TTS threshold for LF cetaceans by averaging the MF cetacean TTS threshold with the clearly anomalous and unique porpoise TTS threshold is not a science-based decision, but one designed to introduce added "precaution" to a dynamic range substitute (*i.e.*, TTS) that already contains multiple conservative assumptions relative to the normative human dynamic range definition.

The onset of TTS is not the same as the onset of pain. In fact, TTS was adopted as a measurable metric of marine mammal hearing upper limits specifically because it fell below the levels associated with PTS and pain in humans. The difference between TTS onset in humans and onset of pain is about 40 dB (Melnick 1991[11]), and it is reasonable to expect that the

[11] Melnick, W. 1991. Human temporary threshold shift (TTS) and damage risk. J. Acoust. Soc. Am. 90(1), July 1991.

difference would be the same or greater for marine mammals, given the shorter durations of exposure and lower levels of induced TTS used in marine mammal TTS standards relative to human TTS standards. For these reasons, the MF cetacean dynamic range metric in the 2015 version of the Draft Guidance already represented a compromise to err on the side of caution. Application of the hybrid weighting function is unwarranted for LF cetaceans. We would also point out that substitution of this same MF/HF hybrid weighting function is unnecessary for both pinniped groups (PW and OW), since they both possess sufficient data within their own taxonomic group (*e.g.*, Kastak et al. 2005[12]) to support a dynamic range metric based on their own data as set forth in the July 2015 Draft Guidance, without having to resort to the unwarranted generation of a dynamic range metric based on a scientifically unjustifiable averaging of two very different hearing groups.

D. NOAA's Proposal to Move White-Beaked Dolphins from the MF Cetacean Group to the HF Cetacean Group Lacks Sufficient Supporting Data and Analysis

NOAA provides no substantive explanation for its conclusion that the white-beaked dolphin's audiogram is "more similar" to other HF cetaceans (*e.g.*, harbor porpoise). At a minimum, it would have been reasonable for the agency to provide a figure comparing the two audiograms, along with a discussion of the differences between the auditory evoked potential-derived white-beaked common dolphin audiogram and the behaviorally derived harbor porpoise audiograms. NOAA also fails to provide the actual parameter estimates for the revised composite audiograms. Although NOAA does provide the parameter estimates for the weighting function derived from the revised composite audiogram, and these may be used to infer what changes were made, the lack of disclosure of a complete revised analysis, with comparisons, makes it essentially impossible to meaningfully assess the differences, and comment on them.

E. NOAA's Proposed Update of the HF Cetacean Audiogram Lacks a Sufficient Explanation

We generally agree that it is appropriate to add another audiogram to derive a composite audiogram for the HF cetacean hearing group. However, again, NOAA fails to provide the parameter estimates for the updated HF audiogram, which makes it impossible to conduct a meaningful comparison to the 2015 Draft Guidance within the 14-day comment period. As with essentially all the changes NOAA has proposed, the agency has provided incomplete information and failed to present clear comparisons between the 2015 Draft Guidance and the currently proposed revisions.

[12] Kastak, D., B. Southall, R. Schusterman, and C. Kastak. 2005. Underwater temporary threshold shift in pinnipeds: Effects of noise level and duration. J. Acoust. Soc. Am. 118(5), Nov. 2005.

IV. CONCLUSION

We are genuinely disappointed that what was a constructive process involving meaningful public input has been supplanted with the abrupt issuance of arbitrary conclusions resulting from NOAA's election to prioritize speedy, unilateral, and rash decision-making above transparency, diligence, and adherence to best science. As set forth above, we cannot support the adoption of the 2016 proposed changes, particularly when the changes modify criteria that were already peer reviewed and subject to a reasonable public review and comment period. We urge NOAA to correct this failure of process, policy, and science by re-engaging in an appropriate process, as recommended in Section I *supra*, to incorporate any changes to the 2015 Draft Guidance that may be necessary.

Should you have any questions, please contact the undersigned at 202.682.8584, or via email at radforda@api.org. Thank you for considering and responding to these comments.

Sincerely,

Andy Radford
American Petroleum Institute
Sr. Policy Advisor - Offshore

Nikki Martin
International Association of Geophysical Contractors
President

Josh Kindred
Alaska Oil and Gas Association
Environmental Counsel

Jeff Vorberger
National Ocean Industries Association
Vice President, Policy and Government Affairs

cc: U.S. Senate Committee on Energy and Natural Resources
U.S. House Committee on Natural Resources
Dr. Jill Lewandowski, BOEM, Division of Environmental Assessment Chief

ATTACHMENT C

ATTACHMENT D

Additional Detailed Comments – IAGC/API/NOIA/OOC

#	Page # (Petition or Appendix [paginated as D])	Text from Petition or the Appendix to the Petition	Comment
1	37	Table 2-1	The values in this table (number of days of survey effort) are nearly, but not entirely, consistent with the values shown in Appendix, Table 75. However, neither of these tables is consistent with the level of activities described in the DPEIS in Table 3.2-1. Differences in assumed activity levels between the Petition and the DPEIS, upon which it will rely for NEPA compliance, should be clarified.
2	44-45	For the marine mammal species/stocks within the proposed activity area, Table 4-1 provides the predicted mean density estimates per acoustic zone used in the modeling…	Unlike the DPEIS the petition does not appear to explain how a simplified average density was created for each zone rather than using Duke's actual 10 x 10 km grid cells. Given that the model can predict wide variations in density on small spatial scales; short-cut averages must be developed and applied very carefully … and well documented. There is no such explanation in the Petition, and if features of the model like the amount of different surveys, their spatial and seasonal distribution vary, then the averages ought to differ accordingly. But this cannot be determined from the information provided.
3	44	"Table 4-1. Mean Density Estimates of Marine Mammals in the GOM..." "Table 4-1 provides the predicted mean density estimates per acoustic zone..."	Units of measurement are not reported here, making the estimates appear to be the number of animals for the entire zone. These appear to be estimates of the number of animals per some unit of area, *e.g.*, 100 km^2, within that zone. However, this needs to be clarified.
4	97	BOEM and NMFS undertook a predictive case study modeling	This sentence is incomplete, but appears to lead to an explanation of the very high exposures estimates. Such an explanation should be provided here.
5	108	Table 6-14	Table 6-14 says the numbers shown are for "…All Deep-Penetration Seismic Surveys", but the values are not quite right if Tables 6-14 and Tables 6-15 are supposed to sum to the same values shown in tables 6-2 through 6-6 that supposedly show "…totals for all sources."
6	111	Table 6-17	Table 6-17 says the numbers shown are exposures "…per species across all survey types…." The values shown are accurate summations of the

			values shown in Table 6-14 and 6-15; however, they do not quite match the corresponding values shown in Tables 6-2 through 6-6 or the appropriate columns in Table 6-18.
7	118	Table 7-4. Estimate Level A Exposures per Species for Five Years and Across All Survey Types (unmitigated)	The text on page 117 where reference to this table occurs does not provide any explanation of where the values came from and why they are different from those shown in Table 6-18 where the estimated Level A exposures are also noted. The reason for differences between Tables 6-18 and 7-4 should be clearly explained, including which represents BOEMs determination and request of potential Level A takes.
8	128	The highest percentages of populations potentially experiencing Level B exposures were the sperm whale (80.12%) and beaked whales (49.74%); most delphinid species are estimated at 30-40 percent of the population on an annual basis	Using the abundance estimates (from either source) shown in Table 3-1 and the estimated exposures on an annual basis shown in Tables 6-2 through 6-6, it is not possible to arrive at the percentages of populations exposed quoted on page 128. The method used to arrive at these percentages needs to be clearly explained.
9	D-6	Source descriptions	None of the source descriptions include source levels or primary operating frequencies or show representative figures of spectral density, etc.
10	D-7	Pulsed versus non-pulsed sounds	This section describes the definition recommended by Southall et al., but it does not clearly state this is what was used in the report and how/why certain sources were categorized as one versus the other.
11	D-25	For geotechnical source propagation modeling, a fixed +10 dB factor was used to convert SEL to rms SPL.	Although a 10 dB adjustment is common, there is insufficient detail provided here to support that it is appropriate for the HRG sources. This is especially true at greater ranges where the impulse shape of the signal is changed to an amplitude modulated signal over a variable time window.
12	D-35	Exposure estimates for cSEL metric were based on the exposure history of the animats (this is appropriate). Exposure estimates for peak SPL were based simply on the how many animats came within the range of the threshold	Using only the range value would appear to neglect the depth of the animat at the time it was within the (assumed maximum-over-depth) range. If slant range and 3D peak SPL sound field were used, this should be specified.
13	D-42	Max value in the downward direction is used to estimate exposure	AASM generates a vector-specific level at any angle and in fact downward energy does not make a substantial reflective or refractive contribution

			to the longer range propagated signal, so this use of the downward maximum overestimates exposure.
14	D-44 D-45	red boxes in Figures 13 and 14 within which densities are calculated from the NODES database	These boxes do not appear to show the same geospatial shift as shown for the two survey areas in Figure 10.
15	D-49	Propagation modeling specifics involved 16 radials (22.5°) with 10 m horizontal and 10 m vertical sampling Frequencies summed up to 5 kHz; however, from 2–5 kHz the transmission loss was assumed identical to 2 kHz.	Assuming transmission loss in all 1/3 octave bands from 2–5 kHz (n=4) is the same as in the 2 kHz band is precautionary and will cause over-estimation of broadband received levels (and distances to thresholds).
16	D-49	Animats coming within the 230 dB (18.7 m) and 200 dB (575.4 m) isopleths were counted as exposed	Not enough detail is provided, but if the ranges to animats used were simply horizontal distance rather than slant-ranges, then this calculation assumes maximum over-depth, which would result in more exposures of deep-diving marine mammals than is realistic.
17	D-84	**Sound Speed Profile Analysis Results.**	There is insufficient description of how the Median and standard deviation values shown in Table 30 were calculated to interpret the results. Presenting differences between worst-case and median models in terms of dB at a maximum distance to a threshold is not as useful as showing actual variation in distances to that threshold or areas exposed above the threshold. Table 30 shows that the median difference between “worst-case” and “median” SSPs in the Shelf Zone result in +0–15 dB at/near the 160 dB range. +15 dB SPL would be a very large distance and therefore very large difference between median and worst case results.
18	D-99	**Sea State.** propagation in sound speed profiles that cause surface sound channels can be quite strongly affected, as sound can be scattered out of the duct.	No actual analysis was performed to assess the variability in model results caused by increasing sea state. All modeling assumes perfect reflectance; however, this statement makes it clear that the long-distance estimates resulting from the presence of sound channels in unrealistic in high sea states, and perhaps moderate, however, no effort is made to quantify this. This should have been quantified and/or a moderate (median) sea state used in all modeling scenarios.

ATTACHMENT E

Via Electronic Mail

May 2, 2014

Kyle Baker
NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
kyle.baker@noaa.gov

Subject: Comments of the American Petroleum Institute, the International Association of Geophysical Contractors, and the National Ocean Industries Association on NOAA Technical Memorandum NMFS-OPR-49, *National Standards for a Protected Species Observer and Data Management Program: A Model Using Geological and Geophysical Surveys*

Mr. Baker,

This letter provides the comments of the American Petroleum Institute ("API"), the International Association of Geophysical Contractors ("IAGC"), and the National Ocean Industries Association ("NOIA") (collectively, the "Associations") on the National Oceanic and Atmospheric Administration ("NOAA") Technical Memorandum NMFS-OPR-49, *National Standards for a Protected Species Observer and Data Management Program: A Model Using Geological and Geophysical Surveys* ("Observer Standards"). We appreciate your consideration of the comments set forth below.

API is a national trade association representing over 600 member companies involved in all aspects of the oil and natural gas industry. API's members include producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of the industry. API and its members are dedicated to meeting environmental requirements, while economically developing and supplying energy resources for consumers. API is a longstanding supporter of the Marine Mammal Protection Act ("MMPA") regulatory process as an effective means of balancing and rationalizing responsible oil and gas activities with the conservation of marine mammals. We continue to support issuance of incidental take authorizations under the MMPA because, for example, it has been demonstrably effective in the Arctic in protecting marine mammal species without unduly and unnecessarily burdening industry.

ATTACHMENT E

IAGC is the international trade association representing the industry that provides geophysical services (geophysical data acquisition, processing and interpretation, geophysical information ownership and licensing, associated services and product providers) to the oil and natural gas industry. IAGC member companies play an integral role in the successful exploration and development of offshore hydrocarbon resources through the acquisition and processing of geophysical data.

NOIA is the only national trade association representing all segments of the offshore industry with an interest in the exploration and production of both traditional and renewable energy resources on the U.S. Outer Continental Shelf ("OCS"). The NOIA membership comprises more than 275 companies engaged in a variety of business activities, including production, drilling, engineering, marine and air transport, offshore construction, equipment manufacture and supply, telecommunications, finance and insurance, and renewable energy.

General Comments

The Associations commend NOAA's National Marine Fisheries Service ("NMFS"), together with the Bureau of Ocean Energy Management ("BOEM") and the Bureau of Safety and Environmental Enforcement ("BSEE"), (collectively "the agencies") for providing recommendations for a Protected Species Observer and Data Management Program ("PSO program"). We understand that a technical memorandum is used for timely documentation and communication of preliminary results, interim reports, or more localized or special purpose information that may not have received formal outside peer reviews or detailed editing and that there is not a formal comment process. It is evident, however, that the agencies intend the recommendations in this technical memorandum to be immediately implemented for G&G surveys in the US OCS, and have incorporated the Observer Standards in the Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas Final Programmatic Environmental Impact Statement ("Atlantic PEIS"). The Atlantic PEIS "Seismic Airgun Survey Protocol" requires that protected species observers complete a PSO training program "in accordance with the recommendations described in [the Observer Standards]."

In general, we are supportive of a process to standardize PSO eligibility requirements, training courses, data collection and reporting requirements. After carefully reviewing the Observer Standards, however, we have identified a number of concerns and opportunities for improvement, which are briefly summarized below and described in more detail in the following sections of this letter. Although we appreciate the agencies' attempt to clarify and standardize observer guidelines and requirements, it is imperative that the agencies consider public input on the Observer Standards and make the revisions necessary to ensure that the standards are workable, accurate, and appropriate. The standards should encourage adaptive technology, such as remote visual and acoustic monitoring and infrared technology, reduction of health and safety risks, and also the use of an updated reporting form that would be able to provide substantive data from observations to substantiate the implementation of appropriate mitigation measures.

The Associations' comments are intended to be constructive and further the goal of improving the PSO Program for G&G surveys consistent with the best available science and technology, clearly written, transparently implemented, and fully informed by the public.

Role of the US Fish and Wildlife Service

With jurisdiction over several marine mammals, the US Fish and Wildlife Service (USFWS) is an important stakeholder to the PSO process; however, it does not appear that USFWS was a part the Protected Species Working Group or that USFWS provided any input into the development of the Observer Standards. While the Observer Standards provide recommendations of report requirements for PSO sightings of polar bear and walrus (*see* p.31), the Observer Standards specifically exclude these species and all other species under USFWS jurisdiction from the purview of the standards (*see* p.v). A comprehensive national PSO program necessitates the review and input of the USFWS in addition to NMFS.

Establishment of a PSO Standardized Training Program

The Associations generally support the establishment of a standardized training program for PSOs and are interested in working with the agencies to ensure that appropriate standards are set for the "approved" vendors. We are concerned, however, that some of the recommendations for the program are based on unsupported assertions that current PSO training and reporting is inconsistent. The agencies should provide context to these assertions so that stakeholders can better understand the improvement the recommendations seek to achieve.

The Observer Standards recommend that any standardized training program should not only provide training in mitigation and monitoring requirements, but also provide health and safety considerations. The Associations agree. All PSOs should be trained to ensure complete compliance with all applicable safety procedures. A standardized training program should cover knowledge of the heightened risks working offshore on a vessel in remote locations with no or limited shore side infrastructure, and should teach personnel how to minimize risks. Training should also include information on safe travel, logistics, onboard medical infrastructure, and security including International Ship and Port Facility Security (ISPS) information.

As the Observer Standards acknowledge, many geophysical companies will also have specific requirements related to health and safety risks associated with their operations. The PSO is required to adhere to those requirements as well as any PSO provider or agency requirements. The Observer Standards should note, and any PSO training program should advise, that industry standards often exceed those of the federal agencies. Most oil and gas companies and geophysical companies require contractors to provide evidence of safety programs and requirements that meet those defined through company management systems. This should be acknowledged in any discussion of health and safety, and the agencies should also clarify whether the program intends to include medical and helicopter underwater egress training (HUET) typically required of PSOs by the industry.

The Observer Standards recommend that as part of "health and safety training," a vessel owner should "allow a PSO to briefly walk through the vessel to ensure no hazardous conditions exist

according to a safety checklist, and to visually examine any safety item, upon request." PSOs are not, however, safety professionals qualified to conduct safety walkthroughs or inspections on every vessel to which they are assigned. The agencies should provide additional information on what information will be included on the safety checklist to clarify what the PSO would be looking for during this initial walkthrough to prevent misunderstandings and unnecessary effort.

The Associations suggest that a standardized training program for PSOs should include a course in effective communications. It is vital that PSOs establish direct communications with the instrument room on a seismic vessel to prevent problems and delays in the event of sightings that trigger shutdown requirements and to ensure the visual observation timeframes are adhered to before ramp up and after shutdown. All parties must work effectively together to ensure compliance: PSO, Seismic Technicians, Vessel Captain, and crew.

In addition, as the use of Passive Acoustic Monitoring ("PAM") to identify marine mammals increases in geophysical operations, the PSO Program should also include a course specific to PAM operations. PAM is a highly specialized skill and it is not appropriate to expect PSOs to possess those skills. If PAM is included in the program, training should also include rigging, mobilization and demobilization of equipment.

Finally, while the Observer Standards provide opportunity for PSO candidates who do not successfully pass an approved training course to reapply, there should be a limit on the number of times a potential PSO candidate can reapply for training.

Recommendations for BOEM/BSEE

The Observer Standards provide a list of recommendations for BOEM and BSEE to satisfy the objectives of the national standards. The Associations respectfully request that as BOEM and BSEE act on these recommendations, they solicit input from industry stakeholders and consider the following comments.

The Observer Standards recommend that BOEM and BSEE "develop permits or agreements detailing expectations and data collection and reporting of third-party PSO provider companies, including performance standards, conflicts of interest, and standards of conduct." The Associations respectfully request the agencies provide additional information and opportunity for stakeholder input regarding any proposed permitting program for PSO provider companies, including the requirements, process times, reporting requirements, and any penalties for alleged permit violations. Without well-defined boundaries, an open-ended PSO provider permitting program will provide little utility.

In addition, the Observer Standards recommend that BOEM and BSEE "develop a mechanism, procedure, or regulation to ensure that selected PSO providers are being compensated prior to deployment of approved observers." The Observer Standards do not, however, provide sufficient explanation of the need for PSO provider compensation prior to deployment of observers. More information would need to be provided to support the development of any requirement for prior compensation.

Development of Permit Fees

The Observer Standards recommend that BOEM and BSEE "consider assessing permit fees to financially support the PSO program needed for industry activities." It is unclear how the agencies would determine the amount of the fees or how the fees would be assessed. The Associations recommend that all monies generated from any such permit fees be developed solely for, and directly benefit, the PSO program and not be used for any other, non-related federal activities. Because other industries conduct similar activities requiring PSOs, the agencies should also ensure that any permitting fees are equitable to supporting the PSO program.

Recommended PSO Eligibility Requirements

In addition to a national PSO training course and PSO eligibility standards, the Observer Standards recommend the development of a policy for national PSO qualifications and eligibility. The difference between these two objectives is not immediately apparent. Qualifications, including education and competency, should be satisfied with completion of the training program. An additional policy on qualifications and eligibility is unnecessary and the Associations are concerned that limiting qualified PSO candidates to those who possess a science degree would result in a shortage of personnel.

In the recommended PSO training and provider services model, *NMFS-Approved Private Sector PSO Trainers and PSO Providers*, the Observer Standards explain that "PSO providers and PSO eligibility requirements would be defined by NMFS." While the Associations agree that the recommended mechanism for PSO training would provide more flexibility and less concern of the availability of PSO staff than the other mechanisms analyzed (*see* p.10), the agencies should clarify that NMFS' definition of PSO providers would only entail identification of those providers that meet eligibility requirements.

In the recommended waiver of education and experience requirements for PSOs, PSO candidates can provide proof of previous work experience as a PSO overseas. Some additional detail or information should be required for eligibility based on overseas work as programs and processes in other countries can vary substantially from what is expected/required for US programs. The Observer Standards also provide that the approving federal agency official has the sole discretion to waive eligibility requirements on a case-by-case basis after reviewing a waiver request and written justification. The Associations are concerned that the agency can waive "some or all of the education/experience requirements on a case-by-case basis if a lack of qualified PSOs is demonstrated." It would not be in the best interests of the regulators or the geophysical industry to employ PSOs who lack some critical or all necessary qualifications or experience. The Associations respectfully request that the waiver request, supporting justification and agency decision be made available to the PSO provider to ensure that a complete record of a PSO's experience is on file should issues arise.

The Associations agree that PSO candidates should also be in good health and have no physical impairments that would prevent them from performing their assigned tasks. The agencies should

clarify, however, whether documentation or medical certification would be required similar to the *National Minimum Eligibility Standards for Marine Fisheries Observers*.

PSO Demand & Cost Estimates

The Observer Standards estimate that currently 30 PSOs are needed on a daily basis for G&G surveys in the Gulf of Mexico, with an average of 15 PSOs at sea on any given day. Based on 2009 data in the GOM, the total estimated annual costs are $2,116,547. BOEM and BSEE indicate, however, that future demand for PSOs is likely to "significantly increase over the next 5 years, and many G&G surveys are expected to occur in federal water of the Atlantic EEZ." Accordingly, the Observer Standards severely underestimate the costs and level of PSO demand. Assuming daily rates of $700.00 for each PSO, a reasonable estimate of 30 PSOs would cost $21,000 per day or $3.8M for 6 months. Travel, reporting, and health insurance would likely entail additional costs. The Associations request that the agencies update the cost and level of demand estimates with more recent data.

In addition, the Observer Standards estimate the training for each PSO in the Gulf of Mexico to cost $3,000.00. The agencies should provide a description of the various training costs detailed in this estimate, as described in Table 3, recognizing the uncertainties/unknowns associated with each estimate. For example, the estimated costs of safety training and medical examination appear lower than the industry standard.

PSO Evaluation During Permit/Authorization Approval

The Observer Standards specify that the recommended time to evaluate PSO coverage required for all G&G projects is during BOEM's permit application review or when applications for incidental take authorizations are submitted to NMFS. When weighing factors to determine the number of PSOs required for each survey, in addition to vessel size, the agencies should consider the number of bunks available on board the survey vessel.

Once the number of required PSOs is determined, the agencies assert that a single entity responsible for scheduling and deploying PSOs would result in "a greater level of consistency in many aspects of the PSO program…including maintaining an appropriate number of PSOs to meet scheduling and deployment needs." The Associations are concerned, however, that the selection of a single entity, whether a third-party provider or federal agency, to meet PSO scheduling demand would be inefficient and would result in a strain on the ability to timely contract with and obtain the number of PSOs required for each geophysical survey.

In addition, the Associations are concerned that requiring a senior-level (or lead) PSO who has specific experience observing protected species in the proposed survey geographic area will drastically limit the number of available senior-level PSOs, potentially resulting in unnecessary project delays.

During monitoring, the Observer Standards recommend that in order to reduce bias, observation periods should be limited to "favorable viewing conditions." It is unclear what is meant by unfavorable viewing conditions. During periods of "low visibility" PAM is currently required in

water depths greater than 100 meters (328 feet) in the Gulf of Mexico. The agencies should be careful not to define unfavorable conditions as anything different than low visibility or nighttime to ensure there is no gap in monitoring coverage.

Conflicts of Interest

Throughout the Observer Standards, the agencies reference "inherent conflicts of interests" between PSO providers and industry, allegedly influencing accurate reporting of data. There are several unsupported assertions of inappropriate influence and pressure by industry. These assertions are unsubstantiated, and in the absence of supporting statements or examples provided by the agencies, should be deleted. If a statement denying conflict of interest is required from the PSOs prior to deployment as recommended, the statement should also include language to the effect that the PSO will conduct all their activities and report all data in full compliance with all applicable laws and regulations.

The Observer Standards defines "a direct financial interest" as payment or compensation received directly from the owner of the seismic survey's vessel, the G&G surveying company, or associated shore-based facility. The definition should also include any entity or leaseholder who employs or contracts with the survey company.

Standardized Data Collection

The Associations agree with and reaffirm the recommendation of the agencies to implement "standardization including data collection methods, standardized electronic forms, and software used in collaboration with NMFS and non-federal stakeholders." Collaboration with NMFS should result in a form that produces data the agency can use and rely on to assess population numbers, stock assessments, and effects on marine species. The Associations note that Industry best practices already recommend the use of a standard reporting form, *the Marine Mammal Recording Form*, developed under a project funded by the Exploration and Production (E&P) Sound and Marine Life Joint Industry Programme.[1] The Associations would be interesting in working with the agencies to update current reporting forms to enable the reporting of substantive data from observations that could substantiate the implementation of appropriate mitigation measures.

Creation of PSO Database

The Associations support the creation and maintenance of a database to manage PSO data for geological and geophysical surveys. This information is already supplied to NMFS and BSEE, but it would be useful for interested stakeholders to have full and timely access to such a database as a means to assess PSO activities and monitor their effectiveness.

[1] *See* Barton, Carolyn J.S., Jaques, Robert, and Mason, Mike. 2008. Identification of Potential Utility of Collation of Existing Marine Mammal Observer Data. RSK Environmental Ltd., Cheshire, UK. The Marine Mammal Recording Form can be accessed at: http://www.iagc.org/files/3193/.

Conclusion

We appreciate the effort that the agencies have devoted to the development of PSO and data management programs for geological and geophysical surveys. We support this effort generally but, as detailed above, we have a number of concerns about the implementation of the recommendations. We respectfully request that the agencies engage with stakeholders prior to taking action on many of the recommendations, including the development of a PSO provider permit program, and system for permitting fees. We also encourage the agencies to pursue a program that encourages technology and remote monitoring, reducing health and safety risks. In addition, any program established should provide opportunity for feedback not only from PSOs, but also industry stakeholders. The Associations look forward to working with the agencies towards implementation of a PSO Program for geophysical surveys that is consistent with the best available science and technology, clearly written, transparently implemented, and fully informed by interested stakeholders.

Should you have any questions, please contact the undersigned at 202.682.8584, or via e-mail at radforda@api.org. Thank you for considering and responding to these comments.

Sincerely,

Andy Radford
American Petroleum Institute

Karen St. John
International Association of Geophysical Contractors

Jeffrey Vorberger
National Ocean Industries Association

cc: Deborah Epperson, BSEE Environmental Enforcement Division
Gregg Gitschlag, NMFS Southeast Fisheries Science Center
Howard Goldstein, NMFS Office of Protected Resources

Jill Lewandowski, BOEM Environmental Assessment Division
Kimberly Skrupky, BOEM Environmental Assessment Division
Brad Smith, NMFS Alaska Region Office
Teresa Turk, NMFS Office of Science and Technology

ATTACHMENT F

September 9, 2016

VIA Email

Dr. Jill Lewandowski
Chief, Division of Environmental Assessment
Bureau of Ocean Energy Management

Ms. Jolie Harrison
Chief, Permits and Conservation Division
National Marine Fisheries Service

Re: Draft G&G Monitoring Plan Concept for Marine Mammals in the Gulf of Mexico

Dear Dr. Lewandowski & Ms. Harrison:

We write on behalf of the American Petroleum Institute ("API") and the International Association of Geophysical Contractors ("IAGC") (together, the "Associations") to provide the Bureau of Ocean Energy Management ("BOEM") and the National Marine Fisheries Service ("NMFS") (together, the "Agencies") with our recommended draft concept for a Monitoring Plan ("MP") for marine mammals in the Gulf of Mexico ("GOM"). The MP, as described in the attached concept paper, would both (i) accommodate the monitoring necessary to satisfy NMFS's obligations under the Marine Mammal Protection Act ("MMPA") with respect to the forthcoming incidental take regulations ("ITRs") for geophysical surveys in the GOM, and (ii) advance a framework for the efficient compilation, review, and adaptive management response for a wide variety of monitoring data and information relevant to GOM marine mammal species of interest and marine mammal responses to sound from oil and natural gas geological and geophysical (G&G) activities. Respectfully, we believe this draft concept for the MP and associated draft framework will benefit marine mammals in the GOM, the interested public, the regulated industry, and the Agencies in carrying out their respective missions.

The Associations have a strong interest in environmental monitoring; both to better understand the environment in which our members work, but also to mitigate potential risks to living marine resources. The Associations support efforts that improve the quantity and quality of information related to determining the nature and magnitude of the effects of offshore G&G activities on marine mammals. Such information assists with performing accurate incidental take MMPA authorizations, developing appropriate mitigation measures to minimize incidental take, and correctly assessing the type and amount of incidental take that occurs in the course of

G&G operations. In this light, the Associations support both ongoing and future research endeavors by industry and its partners related to determining and mitigating the effects of G&G activities on marine life in the GOM. We also support agency efforts to improve the collection and use of the best available science consistent with the requirements and limits of the MMPA.

Nonetheless, the Associations have expressed concern on multiple occasions that the Agencies' envisioned monitoring requirements for the forthcoming ITRs for geophysical surveys in the GOM will exceed the authority granted to NMFS. In response to BOEM's November 7, 2014 "Request for Information on the Development of a Long-Term Monitoring Plan for Marine Mammals," which described an expansive monitoring plan for the GOM ITRs, the Associations submitted a letter detailing our objections to and concerns about the described plan. In our letter, among other things, we explained in detail that the MMPA does not authorize NMFS to require as a condition of a Letter of Authorization ("LOA") the preparation or development of a large-scale, expansive monitoring plan that reaches beyond the time and area in which site-specific activities are undertaken or the performance of actions related to such a plan. We reiterated this concern in a letter dated June 24, 2015, and in several meetings with Agency staff. The letters are attached for your reference.

In our efforts to assist the Agencies' work toward the final GOM ITRs, we have also previously provided proposed language that could be included in the documents developed during the process of preparing the ITRs. Those materials are attached again for your reference. Specifically, we have provided language that could be included in BOEM's petition to NMFS requesting the ITRs and in the Draft Programmatic Environmental Impact Statement that will evaluate the ITRs. In these materials, we have drawn a clear distinction between the type of monitoring that the Agencies may require as a condition of LOAs and other, broader research and monitoring efforts that cannot be required of LOA applicants under the MMPA.

Despite these concerns, we have also indicated that the Associations and their members are willing to work with the Agencies to identify, apart from any requirements in the ITRs, broader monitoring and data collection opportunities that facilitate a greater understanding of the potential effects of sounds produced by G&G activities on marine mammals in the northern GOM. In this light, we have developed the attached draft concept for an MP to initiate a mutually beneficial path forward.

Consistent with the comments above and our prior communications with the Agencies, the attached MP concept paper describes a plan that distinguishes between two elements of monitoring: (1) site-specific monitoring and reporting for individual LOAs under the monitoring framework established in the ITRs, and (2) additional efforts not required as a condition for obtaining an LOA that may inform future ITRs or the terms included in LOAs under the forthcoming ITRs. The MP concept paper also presents a draft framework that would provide for the compilation, review, and adaptive integration of resultant data and information developed under each of those two elements, as well as development of goals, an annual MP review, and

appropriate refinements through a collaborative adaptive management process between our members and the Agencies.

As always, the Associations look forward to productively working with the Agencies throughout the development of the GOM ITRs. In particular, we look forward to discussing the attached MP concept paper and potential path forward with the Agencies. We ask that you please contact the signatories below (Andy Radford, radforda@api.org or 202.682.8584) and Nikki Martin (nikki.martin@iagc.org or 713.957.5068) as soon as possible to schedule a meeting in the very near future to discuss the MP concept paper.

Sincerely,

Andy Radford
American Petroleum Institute
Sr. Policy Advisor - Offshore

Nikki Martin
International Association of Geophysical Contractors
President

Attachments

cc: Walter Cruickshank, Deputy Director, BOEM
Jennifer Bosyk, Division of Environmental Assessment, BOEM
Tamara Arzt, Division of Environmental Assessment, BOEM
Donna Wieting, Director, Office of Protected Resources, NMFS
Ben Laws, Office of Protected Resources, NMFS

ATTACHMENT F

Draft Concept for Gulf of Mexico G&G Monitoring Program

NMFS is expected to propose Incidental Take Regulations (ITRs) for geological and geophysical (G&G) surveys in the Gulf of Mexico (GoM) under the Marine Mammal Protection Act (MMPA), in response to a forthcoming petition for such ITRs from BOEM. In this context, the federal agencies and industry recognize the importance and value of both (i) monitoring and mitigation required of individual operators specific to the activity for which incidental take is authorized under a Letter of Authorization (LOA), and (ii) data collection, aggregation and analysis performed outside of the ITR framework. This document describes, for further discussion with NMFS and BOEM, a draft concept for a GoM G&G Monitoring Program (MP) that would establish a framework for managing both the data obtained through required monitoring from LOA holders and the information generated outside of the ITR framework, including the collection, aggregation, review, reporting, and use of data and information, as described below..

1. GoM G&G Monitoring

a. Monitoring and Reporting Under ITRs/LOAs

We expect the forthcoming ITRs to include monitoring and reporting requirements intended to require that each LOA holder: (1) provide information about the specific impacts of the incidental take authorized under a particular LOA and the related underlying activity, and (2) provide information that informs the assessment of the overall impact of the incidental take authorized under the regulations. These monitoring and reporting requirements, in and of themselves, would satisfy the statutory requirements applicable to the ITRs. The monitoring and reporting requirements included in each LOA may require, for example, the documentation of: (1) observations of the number of marine mammals potentially affected by the specified activity, including species identification, location observed, date and time of the observation, and, if possible, whether juvenile or adult, sex, and group size of the observed marine mammal(s); (2) behavioral reactions, if any, of the observed marine mammal(s) to the specified activity; and/or (3) other data that directly inform the question of whether, and if so, to what degree, marine mammal populations addressed in the regulations may be affected by the incidental take authorized by LOAs. We also expect that the ITRs will establish an adaptive management framework through which the monitoring requirements included in LOAs may be tailored based on the best available information and empirical learnings, consistent with the terms of the ITRs.

b. Efforts Beyond Monitoring and Reporting Under ITRs/LOAs

Beyond and separate from obligations under the MMPA, through a framework such as the one proposed below, additional efforts would identify, prioritize and manage any agreed upon additional data collection and analysis efforts. These efforts would not be included in the ITRs and would not be required as a condition for obtaining an LOA. Oil and gas operators and geophysical contractors would, as appropriate, help identify and participate in broader opportunities that would facilitate a greater understanding of how marine mammals in the GoM region may be affected by sounds from G&G activities. These opportunities could include relevant industry data collection and research, government

data collection, analysis, and research, and collaborative efforts among industry, the federal government and other parties. Data and information collected in efforts beyond required monitoring may include, but would not be limited to, marine mammal physiological and/or behavioral data, and data related to the basic distribution, abundance, and habitat use of marine mammal species.

2. Monitoring Program Framework

The MP would include a framework that addresses the two distinct monitoring elements described above. This framework would allow for the compilation, review, and adaptive integration of resultant data and information from these monitoring elements. The specific details of the MP framework, including reporting mechanisms, infrastructure needs and a process for ongoing coordination would be developed during initial MP start-up meetings between industry representatives and the responsible federal agencies (*i.e.*, BOEM, NMFS).

a. Reporting, Review, and Recommendations

In general, the MP framework would include mechanisms for the consideration of reports, aggregation, reviews, and other information and data generated by the regulated industry and responsible regulatory agencies. The MP framework would also establish an annual data and information exchange and discussion (Annual Review) between the regulated industry and responsible regulatory agencies on the following components:

- mandatory and standardized data reports provided by individual LOA holders under the ITRs;
- aggregation and analysis of those mandatory reports into an annual summary dataset of LOA-holder monitoring and mitigation; and,
- a review of other relevant activities undertaken by industry, the federal government, or other parties over the preceding year.[1]

Collectively, these components would form the basis of an adaptive management plan for the succeeding year(s) that may result in changes to the LOA-holder monitoring and mitigation requirements (consistent with the ITRs) based on lessons learned from preceding years of monitoring in the GOM or in changes to the monitoring requirements of future ITRs. Additionally, the Annual Review would inform planning to address mutually identified high priority information gaps, data needs, or potential technological innovations through efforts outside the scope of the ITRs. Each Annual Review would enable the assessment of relative benefits and costs of monitoring and mitigation requirements previously placed upon individual LOA holders, allowing for future adjustments to LOA requirements consistent with the terms of existing ITRs or as reflected in changes to future ITRs.

Similar to the existing research and monitoring programs, public information, reports, adaptive management plans, etc. could be made available and archived on a dedicated website. Additionally,

[1] For example, the Sound and Marine Life Joint Industry Program (SAML JIP) regularly conducts multi-partner research and data collection, publicly reported on its website, www.soundandmarinelife.org, that is relevant to the mitigation of environmental risk in the GoM from industry activities.

appropriate items could be subject to an external or public review process. Any final products (*i.e.*, reports, adaptive management plans, etc.) should be made available for public review.

b. Goals and Metrics of Success

The MP would have clear and explicit monitoring goals identified by the regulated industry and regulatory agencies during the initial start-up meetings. The Annual Review would address success or failure in meeting those goals as part of the adaptive management planning process of the MP framework. This process is expected to increase confidence in regulatory decisions and reduce concerns about potential environmental risks. Also, as part of the Annual Review, a monitoring requirement may be evaluated and determined to be impracticable, not feasible with current scientific or technical capabilities, or of limited or no value to the regulatory process, thus freeing resources and effort for emergent questions or rising priorities.

Performance under the MP would depend on available resources and priorities that are affected by factors beyond the control of the regulatory agencies or regulated industry, including but not limited to fluctuations in federal budgets, the fiscal health of the regulated industry, and relevant contributions by other parties (*e.g.*, federal research programs like the National Science Foundation and Office of Naval Research; academic institutions; states; and other industries or GoM user groups, such as commercial fisheries, shipping, military, or other entities).

c. Further Planning and Considerations

Some of the activities considered under the MP would be beyond the means and capabilities of individual LOA holders. As such, to achieve the MP goals would require appropriate trade associations or similar industry-wide coordinating organizations to participate in the MP. These entities need to be identified during initial MP start-up meetings. Other specific MP framework details that need to be addressed include a timeline for industry reporting; data management structure for monitoring data, regulatory agency aggregation and analysis, external expert reviews, and mechanisms for implementing adaptive management decisions.

December 8, 2014

VIA email to *monitoringplan@boem.gov*

Bureau of Ocean Energy Management
Gulf of Mexico OCS Region & Atlantic Activities
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

Re: Comments on Request for Information on the Development of a Long Term Monitoring Plan for Marine Mammals in the Gulf of Mexico — BOEM-14-0075

To Whom It May Concern:

This letter provides the comments of the American Petroleum Institute ("API"), the Offshore Operators Committee ("OOC") and the International Association of Geophysical Contractors ("IAGC") (collectively, the "Associations") in response to the Bureau of Ocean Energy Management's ("BOEM") Request for Information on the Development of a Long Term Monitoring Plan for Marine Mammals in the Gulf of Mexico (the "Request"). *See* 79 Fed. Reg. 66,402 (Nov. 7, 2014). We appreciate BOEM's consideration of these comments.

The Associations have a strong interest in environmental monitoring, both to better understand the environment in which our members work, but also to mitigate risks to living marine resources. As set forth in more detail below, the Associations support efforts that improve the quantity and quality of information related to determining the nature and magnitude of the effects of offshore activities on marine mammals. Such information is essential for performing accurate incidental take analyses to support Marine Mammal Protection Act ("MMPA") authorizations, for developing appropriate mitigation measures to minimize incidental take, and for correctly assessing the type and amount of incidental take that occurs in the course of operations. In this light, the Associations support industry's ongoing and continued research related to determining and mitigating any potential effects of seismic surveys on marine

life in the Gulf of Mexico ("GOM") and support agency efforts to improve the collection and use of information and use of best available science while also remaining consistent with the requirements and authority of the MMPA. We are not supportive of efforts that will impose requirements on the regulated community beyond the scope of the MMPA.

I. THE ASSOCIATIONS

API is a national trade association representing over 600 member companies involved in all aspects of the oil and natural gas industry. API's members include producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of the industry. API and its members are dedicated to meeting environmental requirements, while economically developing and supplying energy resources for consumers.

IAGC is the international trade association representing the industry that provides geophysical services (geophysical data acquisition, processing and interpretation, geophysical information ownership and licensing, and associated services and product providers) to the oil and natural gas industry. IAGC member companies play an integral role in the successful exploration and development of offshore hydrocarbon resources through the acquisition and processing of geophysical data.

OOC is a non-profit organization comprised of any person, firm or corporation owning offshore leases and/or engaged in offshore activity as a drilling contractor, service company, supplier or other capacity that chooses to participate. Currently, OOC has 142 member companies. The Committee's activities are focused supporting its member companies in operations that protective of human health and the environment.

API, OOC, IAGC, and our members are longstanding supporters of the MMPA regulatory process as an effective means of balancing responsible offshore exploration activities with the conservation of marine mammals. In addition, as described in more detail below in § II.E, the oil and natural gas and geophysical exploration industries have made a considerable investment in research related to determining and mitigating the effects of seismic surveys on marine life.

II. COMMENTS

A. BOEM Is Not Required to Prepare a "Long Term Monitoring Plan"

As an initial matter, the Request states that BOEM's contemplated long-term monitoring plan "is a required element of BOEM's petition for rulemaking under the Marine Mammal Protection Act." 79 Fed. Reg. at 66,402. However, this statement is demonstrably incorrect as there is no such requirement contained in the MMPA or in any other legal authority. In fact, every statutory and regulatory MMPA provision that refers to "monitoring" does so in the context of the "site-specific" monitoring plans that are required as a condition of incidental take authorizations issued pursuant to MMPA § 101(a)(5). None of those provisions refer to "long term" monitoring. For example, the MMPA regulations require a petition for an incidental take authorization to include, among other things:

> The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding. Guidelines for developing a site-specific monitoring plan may be obtained by writing to the Director, Office of Protected Resources….

50 C.F.R. § 216.104(a)(13) (emphases added).

Consistent with the requirement to include a "site-specific" monitoring plan in a petition for an incidental take authorization, the MMPA simply requires incidental take regulations to include "requirements pertaining to the monitoring and reporting of such taking." 16 U.S.C. § 1371(a)(5)(A)(i)(II)(bb) (emphasis added); *see also id*. § 1371(a)(5)(D)(ii)(II) (same description for incidental harassment authorization). The MMPA regulations similarly refer only to monitoring that is limited to the specific incidental take authorized by the agency in a particular authorization. *See* 50 C.F.R. § 216.102(c) (NMFS must prescribe requirements or conditions "pertaining to the monitoring and reporting of such taking") (emphasis added); 50 C.F.R. § 216.105(b)(3) (referring to monitoring and reporting requirements "for each allowed activity").[1]

Additionally, the settlement agreement reached by the parties in *NRDC et al. v. Jewell et al.*, No. 2:10-cv-01882, Dkt. 118-2 (June 18, 2013, E.D. La.) ("GOM Settlement Agreement") does not require BOEM to develop a long-term monitoring plan. In the GOM Settlement Agreement, the Federal Defendants simply agreed "to analyze in any EIS or EA for BOEM's MMPA Application the development of a long-term adaptive monitoring plan that addresses potential cumulative and chronic impacts from seismic surveys on marine mammal populations in the Gulf of Mexico." *Id*. § IX.B (emphasis added). In other words, BOEM did not agree to develop a plan, just to analyze the development of one. Moreover, as addressed above, the MMPA does not authorize (i) NMFS to require the development of a long-term monitoring plan as a condition of an incidental take authorization or (ii) BOEM to undertake development or implementation of a long-term monitoring plan as part of a MMPA § 101(a)(5) petition. The GOM Settlement Agreement does not and cannot legally authorize BOEM or NMFS to take actions that are not otherwise allowed by law. *See United States v. Carpenter*, 526 F.3d 1237,

[1] Indeed, in the nearly two-decade history of the issuance of incidental take authorizations in the Beaufort and Chukchi Seas, no federal agency has ever imposed an obligation to prepare a long-term monitoring plan or to take any action related to such a plan.

1241-42 (9th Cir. 2008) (terms in settlement agreement may not "violate the civil laws governing the agency"). [2]

In sum, there is no requirement for a petitioner under MMPA § 101(a)(5) (BOEM, in this instance) to prepare a long-term monitoring plan and there is no legal authorization for NMFS, as the agency authorizing incidental take, to require as a condition of an authorization the preparation or development of a long-term monitoring plan or the performance of actions related to a long-term monitoring plan. Accordingly, although the Associations support efforts to improve the quantity and quality of information related to determining the nature and magnitude of the effects of geophysical exploration activities on marine mammals and use this information to make informed decisions, we are not supportive of efforts that will impose requirements on the regulated community beyond the scope of the MMPA.

B. BOEM Should First Consider Extensive Existing Information

Notwithstanding our comments above, should BOEM pursue a long-term monitoring program for marine mammals in the GOM, it should first consider the large volume of data and information that has already been collected but remains unanalyzed due to the unavailability of sufficient resources. A complete assessment of these existing data sets should first be conducted to ensure that existing and relevant information is utilized to the fullest extent practicable.

For example, the current protected species observer program in the GOM provides BOEM and the Bureau of Safety and Environmental Enforcement ("BSEE") with important information that could be used more meaningfully by the agencies to determine, among other things, species density and their occurrence during ramp-up, full operation, and when no sound source is active. The current program requires sighting reports for each marine mammal or sea turtle observed during operations and those reports must include information regarding species present, group size, direction in relation to the vessel, and behavior – and could be bolstered to collect other key data that would allow proper geospatial and sighting condition dependent analysis of observer effort and sightings.[3] This data should also be more readily shared with stakeholders. Additionally, G&G permits issued since June 2013 must comply with the terms of the GOM Settlement Agreement, which imposes interim additional mitigation and monitoring measures, including the use of passive acoustic monitoring during periods of low visibility,

[2] This is consistent with the position of the Intervenor-Defendants in *NRDC v. Jewell*, who expressly stated that they "do not agree that all of the measures described in paragraph[s] IX.A and IX.B are feasible or appropriate." *See* GOM Settlement Agreement § IX.D. Both API and IAGC are Intervenor-Defendants in the *NRDC v. Jewell* litigation. NMFS is not a party to the *NRDC v. Jewell* litigation.

[3] All on-lease and off-lease geophysical and geological ("G&G") surveys in the GOM must comply with the requirements of Joint Notice to Lessees No. 2012-G02 for Seismic Survey Mitigation Measures and Protected Species Observer Program. These mitigation measures include, among other things, ramp-up procedures, visual monitoring, shutdown for all marine mammals except dolphins within a 500-meter exclusion zone, and reporting requirements.

extended shutdown requirements for manatees, and the submittal of bi-weekly reports to BSEE. This required reporting is another source of valuable information that has not been fully utilized by the agencies.

The monitoring and reporting requirements that have been implemented over the years have generated a significant amount of information, but from the regulated community's perspective, that information does not appear to have been meaningfully analyzed, organized, or otherwise put to productive use by federal agencies. We suggest that an initial effort be made to understand the existing data and information — i.e., who is collecting it, why is it being collected, where is it being collected, where is it stored, and what is its content. It may also be useful to generate a visual representation showing specifically where the data are currently collected, including temporal, spatial and parameter elements, and use this map to identify gaps in monitoring. Such an effort could be followed by a meaningful analysis of how the currently collected data and information can be organized and used to inform future decisions.

C. Considerations for an Effective Monitoring Program

As stated above, the Associations support efforts to improve the quantity and quality of information related to determining the nature and magnitude of the effects of offshore activities on marine mammals so long as those efforts are consistent with applicable law. To the extent that BOEM plans to design a monitoring program that complies with the MMPA and will not impose unauthorized requirements on the regulated community, we offer the following considerations.

1. A monitoring program should establish clear and straightforward goals that help guide and bring focus to all efforts conducted as a part of the program. These could include the collection of basic, baseline distribution, abundance, and density information for GOM marine mammal species that are of most concern. A component of the program could also focus on the measurement of GOM ambient sound levels and anthropogenic sound.

2. A monitoring program should include an adaptive management component that is based upon the best available scientific information and assessment of relevant risks and is used to forecast emerging conditions for response and efficacy of mitigation measures industry applies.

3. A monitoring program should provide flexibility for adaptive technology and methodology, such as remote visual and passive acoustic monitoring, infrared technology, and active acoustics. The industry has worked with BOEM, NMFS, and BSEE for years in the GOM and other OCS regions, field testing different monitoring technologies and reporting their results.

4. A monitoring program should use updated reporting forms that capture substantive data from observations to substantiate the implementation of appropriate mitigation measures. For example, Technical Memorandum NMFS-OPR-49, *National Standards for a Protected Species Observer and Data Management Program: A Model Using Geological and Geophysical Surveys*, recommends that agencies implement "standardization including data collection methods, standardized electronic forms, and software used in collaboration with

NMFS and non-federal stakeholders." In comments submitted May 2, 2014, the Associations agreed with this recommendation and reaffirm it here.

Collaboration with NMFS should result in a reporting form that produces data the agency can use and rely upon to assess population numbers, stock assessments, and effects on marine species. The Associations also note that best practices implemented by industry already recommend the use of a standard reporting form developed under a project funded by the Exploration and Production ("E&P") Sound and Marine Life Joint Industry Program.[4] In addition, these reporting forms are recommended for use by the United Kingdom's Joint Nature Conservation Committee (http://jncc.defra.gov.uk/page-1534). The Associations are sincerely interested in working with the agencies to update the current reporting forms.

5. Data generated from the monitoring program should be contributed to a publicly available database, such as OBIS-SEAMAP, so that the data are readily available to other government agencies, industry, researchers, and the public. Data and metadata should meet widely accepted standards.

6. Data analysis and synthesis must be a clear and explicit priority in a monitoring program. The plan for how, when, and to what purpose this data analysis will occur should be specifically stated and resources must be provided to support this analysis.

7. An effective monitoring program should be properly scoped to address relevant geographic areas and the activities within those areas. For example, because marine mammals are not restricted to just U.S. jurisdictional waters, BOEM should explore opportunities to partner with Mexico on monitoring projects. Additionally, a marine mammal monitoring program that focuses only on G&G activities, and does not account for other industries active in the GOM, would result in a piecemeal approach to long-term monitoring. Observed patterns in monitoring data can be explained by a number of factors that would not be accounted for in a monitoring plan focused solely on G&G activities.

8. BOEM should consider funding research to further the development of the "Population Consequences of Disturbance" framework, using the key data referred to above. *See* http://www.smru.co.uk//pcod, http://www.onr.navy.mil/reports/FY11/mbfleish.pdf.

[4] *See* Barton, Carolyn J.S., Jaques, Robert, and Mason, Mike. 2008. Identification of Potential Utility of Collation of Existing Marine Mammal Observer Data. RSK Environmental Ltd., Cheshire, UK. The Marine Mammal Recording Form can be accessed at: http://www.soundandmarinelife.org/research-categories/mitigation-and-monitoring/collection-and-analysis-of-existing-marine-mammal-observer-mmo-data.aspx.

9. IAGC also recently provided suggested studies programs to BOEM, including marine mammal spatial density maps and research concerning the Bryde's whale (a baleen whale species that has been petitioned for listing under the Endangered Species Act).[5]

D. Any Effect of Seismic Surveys on Marine Mammals is Negligible

The best available scientific data and information demonstrate that the mitigation measures applied to offshore operations in the GOM is already more than adequate to protect marine mammals and sea turtles in a manner consistent with federal law. Insofar as we are aware, no seismic activities (in the GOM or anywhere else) have caused impacts amounting to anything more than temporary changes in behavior, without any known injury, mortality, or other adverse consequence to any marine mammal species or stocks. *See*, *e.g.*, the following sources:

- BOEM, *Final EIS for Gulf of Mexico OCS Oil and Gas Eastern Planning Area Lease Sales 225 and 226*, at 2-22 (2013), http://www.boem.gov/BOEM-2013-200-v1/ ("Within the CPA, which is directly adjacent to the EPA, there is a long-standing and well-developed OCS Program (more than 50 years); there are no data to suggest that activities from the preexisting OCS Program are significantly impacting marine mammal populations."); *id*. at 2-23 (with respect to sea turtles, "no significant cumulative impacts to sea turtles would be expected as a result of the proposed exploration activities when added to the impacts of past, present, or reasonably foreseeable oil and gas development in the area, as well as other ongoing activities in the area");

- BOEM, *Final EIS for Gulf of Mexico OCS Oil and Gas Western Planning Area (WPA) Lease Sales 229, 233, 238, 246, and 248 and Central Planning Area (CPA) Lease Sales 227, 231, 235, 241, and 247*, at 4-203 (v.1) (2012), http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/BOEM-2012-019_v1.aspx (WPA); *id*. at 4-710 (v.2), http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/BOEM-2012-019_v2.aspx (CPA) ("Although there will always be some level of incomplete information on the effects from routine activities under a WPA proposed action on marine mammals, there is credible scientific information, applied using acceptable scientific methodologies, to support the conclusion that any realized impacts would be sublethal in nature and not in themselves rise to the level of reasonably foreseeable significant adverse (population-level) effects."); *id*. at 4-235, 4-741 ("[T]here are no data to suggest that routine activities from the preexisting OCS Program are significantly impacting sea turtle populations.");

[5] Provided to BOEM via email dated November 6, 2014. Receipt acknowledged December 2, 2014.

- BOEM, *Final Supplemental EIS for Gulf of Mexico OCS Oil and Gas WPA Lease Sales 233 and CPA Lease Sale 231*, at 4-30, 4-130 (2013), http://www.boem.gov/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/2013/BOEM%202013-0118.pdf (reiterating conclusions noted above); MMS, *Final Programmatic EA, G&G Exploration on Gulf of Mexico OCS*, at III-9, II-14 (2004), http://www.nmfs.noaa.gov/pr/pdfs/permits/mms_pea2004.pdf ("There have been no documented instances of deaths, physical injuries, or auditory (physiological) effects on marine mammals from seismic surveys."); *id*. at III-23 ("At this point, there is no evidence that adverse behavioral impacts at the local population level are occurring in the GOM.");

- MMS, *Draft Programmatic EIS for OCS Oil & Gas Leasing Program, 2007-2012*, at V-64 (Apr. 2007) (citing 2005 NRC Report), http://www.boem.gov/Oil-and-Gas-Energy-Program/Leasing/Five-Year-Program/5and6-ConsultationPreparers-pdf.aspx (MMS agreed with the National Academy of Sciences' National Research Council that "there are no documented or known population-level effects due to sound," and "there have been no known instances of injury, mortality, or population level effects on marine mammals from seismic exposure ");

- A. Jochens et al., *Sperm Whale Seismic Study in the Gulf of Mexico: Synthesis Report*, at 12 (2008) ("There appeared to be no horizontal avoidance to controlled exposure of seismic airgun sounds by sperm whales in the main SWSS study area.");

- *Takes of Marine Mammals Incidental to Specified Activities; Low-Energy Marine Geophysical Survey in the Gulf of Mexico, April to May, 2013*, 78 Fed. Reg. 11,821, 11,827, 11,830 (Feb. 20, 2013) ("[I]t is unlikely that the proposed project [a USGS seismic project] would result in any cases of temporary or permanent hearing impairment, or any significant non-auditory physical or physiological effects"; "The history of coexistence between seismic surveys and baleen whales suggests that brief exposures to sound pulses from any single seismic survey are unlikely to result in prolonged effects.");

- *Takes of Marine Mammals Incidental to Specified Activities; Marine Geophysical Survey in the Northwest Atlantic Ocean Offshore New Jersey, May to August 2014*, 79 Fed. Reg. 14,779, 14,789 (Mar. 17, 2014) ("There has been no specific documentation of temporary threshold shift let alone permanent hearing damage[] (i.e., permanent threshold shift) in free ranging marine mammals exposed to sequences of airgun pulses during realistic field conditions.");

- *Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Seismic Survey in Cook Inlet, Alaska*, 79 Fed. Reg. 12,160, 12,166 (Mar. 4, 2014) ("To date, there is no evidence that serious injury, death, or stranding by marine mammals can occur from exposure to air gun pulses, even in the case of large air gun arrays.").

E. Other Research Efforts and Collaboration Opportunities

For many years, the oil and gas and geophysical exploration industries have made a considerable investment in research related to determining and mitigating the effects of seismic surveys on marine life. That investment continues today. In 2006, a group of international oil and gas companies and the geophysical industry committed to uniting their resources to fund a research program to improve understanding of the potential physical and behavioral effects on marine life from the sound created during the process of finding and producing oil and gas. The E&P Sound and Marine Life Joint Industry Program ("JIP") is the most extensive industry research program in this field.

The JIP supports research to increase understanding of the effects of sound on marine life generated by oil and gas exploration and production activity and to remove some of the uncertainty about the possible effects of seismic surveys. The research also helps governments make regulatory decisions based on the best science and helps the regulated community develop effective mitigation strategies. The JIP's research is divided into five categories — from understanding how sound travels in water, to the possible effects of sound on the physical and behavioral well-being of marine life, as well as new technologies and methodologies that might further mitigate hypothetical but as yet poorly understood sources of risk. More information on the JIP is available at www.soundandmarinelife.org.

The JIP has also researched and developed a range of research tools that are used to assist the understanding of the behavior of marine mammals in their environment. These tools include, but are not limited to, animal tracking tags, improved passive acoustic detection, classification and tracking tools, and methodologies for assessing and monitoring subtle behavioral and physiological responses to manmade sound. These techniques have not just helped the JIP in its studies, but have also advanced general scientific knowledge of marine animals. The JIP has also developed PAMGuard, which is software designed to facilitate passive acoustic monitoring of marine mammals at sea in poor-visibility conditions. The Associations strongly encourage BOEM to coordinate its monitoring efforts with the efforts of the JIP.

In addition to the JIP, the following sources contain programs or information that may be helpful to BOEM's GOM monitoring efforts:

- *National Academy of Sciences Gulf Research Program,* http://nationalacademies.org/gulf/index.html.
- *National Oceanographic Partnership Program,* www.nopp.org.
- *NOAA RESTORE Act Science Program,* http://restoreactscienceprogram.noaa.gov/
- *National Fish and Wildlife Foundation Gulf Environmental Benefit Fund,* http://www.nfwf.org/gulf/Pages/home.aspx

- *US Navy Living Marine Resources (LMR) Program*, http://www.lmr.navy.mil/Home.aspx

- *Integrated Ocean Observing System / GOM Coastal Observing System*, http://gcoos.org/

- *Cetacean & Sound Mapping (CetSound)*, http://cetsound.noaa.gov

III. CONCLUSION

In addition to industry's continued research to understand and mitigate the potential effects of industry activities on marine life in the GOM, the Associations support agency efforts to improve the collection and use of information in support of monitoring and reporting efforts in the GOM within the scope of the MMPA. We appreciate BOEM's consideration of the recommendations set forth above and we strongly encourage the agency to continue to reach out to, and coordinate with, the regulated community should it proceed with the development of a GOM monitoring program.

Should you have any questions, please contact the undersigned at 202.682.8584, or via e-mail at radforda@api.org.

Sincerely,

Andy Radford
American Petroleum Institute

Karen St. John
International Association of Geophysical Contractors

Evan Zimmerman
Offshore Operators Committee

June 24, 2015

By Electronic Mail and U.S. First Class Mail

Dr. Walter Cruickshank
Deputy Director
Bureau of Ocean Energy Management
1849 C Street NW
Room 5211
Washington, DC 20240

Samuel D. Rauch, III
Deputy Assistant Administrator for Regulatory Programs
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, Maryland 20910

Dear Sirs:

The American Petroleum Institute ("API") and the International Association of Geophysical Contractors ("IAGC") submit this letter as part of our ongoing engagement with the Bureau of Ocean Energy Management ("BOEM") and the National Marine Fisheries Service ("NMFS") regarding geological and geophysical ("G&G") exploration in the Gulf of Mexico ("GOM"). G&G exploration is vitally important to our members and to our nation's energy needs, and we hope that API and IAGC can continue to serve as valuable partners with BOEM regarding your efforts on this issue.

In particular, we hope to have a productive discussion with you about the petition for an incidental take regulation ("ITR") addressing the incidental take of marine mammals in the GOM under the Marine Mammals Protection Act ("MMPA") that BOEM has submitted to the National Marine Fisheries Service ("NMFS").

I. BOEM's Petition for Incidental Take Regulation

As you know, BOEM's predecessor agency submitted a petition to NMFS in 2002 for the issuance of an ITR addressing the incidental take of marine mammals in the GOM.[1] In 2011, BOEM submitted a revised ITR petition to NMFS, for which NMFS accepted public comments.[2] The 2011 petition requested an ITR covering a five-year period and authorizing the incidental

[1] *See* 68 Fed. Reg. 9991 (Mar. 3, 2003).
[2] 76 Fed. Reg. 34,656 (June 14, 2011).

take of 21 species of cetaceans incidental to seismic surveys undertaken for G&G exploration in the GOM.

We recognize that BOEM is now re-amending its petition. We also know that that BOEM published a Request for Information ("RFI") last November regarding a potential long-term monitoring plan ("LTMP") "on the potential impacts to marine mammals from [G&G] data acquisition activities, including seismic surveys," which stated that an LTMP "is a required element of BOEM's petition for a rulemaking under the [MMPA]."[3] In addition, we participated in the webinar for industry stakeholders that BOEM held in March 2015 on this issue.

II. Overview of Comments from December 8, 2014 Letter

API and IAGC, with the Offshore Operators Committee, submitted a letter to BOEM on December 8, 2014, commenting on the November 2014 RFI. While API and IAGC support BOEM's efforts in principle, we have significant concerns about BOEM's apparent intention to include an LTMP in its amended petition.

In our December 8 letter, we strongly contested BOEM's assertion in the RFI that the petition must include an LTMP. As we explained, the MMPA includes no such requirement; to the contrary, every statutory and regulatory reference to monitoring refers to "site-specific" monitoring plans, not long-term monitoring. We also noted that the settlement agreement in *NRDC v. Jewell*[4] regarding seismic surveying in the GOM does not require BOEM to develop an LTMP. Finally, we explained that there is no legal authority for NMFS to require an LTMP as a condition for authorizing incidental take.

We also provided comments for BOEM to consider in developing a LTMP concept, should BOEM move forward with one. As we explained in significantly greater detail in the letter, in any action to develop an LTMP, BOEM should:

- Assess the voluminous existing and relevant information;
- Establish clear and straightforward goals;
- Include an adaptive management component;
- Provide flexibility for adaptive technology and methodology;
- Use updated reporting forms;
- Contribute generated data to a publicly available database;
- Prioritize data analysis and synthesis;
- Properly scope the program;
- Consider funding research to further the development of the "Population Consequences of Disturbance" framework; and
- Take into account studies programs that IAGC has recommended.

[3] 79 Fed. Reg. 66,402 (Nov. 7, 2014).
[4] Case No. 2:10-cv-01882 (E.D. La.).

Our letter also explained that the best available scientific data and information demonstrate that any effect of G&G activities on marine mammals is negligible, in particular because of the effectiveness of mitigation measures already applied to offshore operations in the GOM. Finally, our letter summarized the many research efforts that our industries have made, and continue to make, with respect to determining and mitigating the effects of seismic surveys on marine life.

III. Requests

API, IAGC, and our respective members are committed to environmental protection and ensuring that G&G exploration is carried out in a responsible manner. Industry's long-standing and ongoing research into these issues reflects those interests. We do not, however, support ineffective, unproductive, or unreasonable requirements, and we have concerns that the contemplated LTMP would include these types of requirement.

In our December 8 letter, we strongly encouraged BOEM to continue its outreach to, and coordination with, the regulated community should it proceed with any marine mammal monitoring program. To BOEM's credit, a series of stakeholder webinars were held in March 2015. During the March webinar, BOEM had stated that they planned to include the monitoring plan in the petition based on assertion from NMFS that such a plan was required. Upon further inquiry during the webinar, NMFS stated that they would provide an explanation of those requirements for the monitoring plan in writing and have since reiterated that commitment (in a call with both associations on June 8). We have not received any follow-up and to that end, by this letter we respectfully request that NMFS provide the promised justification as soon as possible.

In addition, BOEM has stated on number of instances its intention to provide API and IAGC a draft copy of the proposed monitoring plan for review prior to inclusion in the revised petition. We respectfully request that the draft be provided as soon as possible so that industry can have ample time to review and discuss any concern we might have with BOEM.

We appreciate the ongoing cooperation and access to the BOEM and NMFS staffs as we work through the rulemaking process. Should you have any questions, please contact Andy Radford (radforda@api.org, 202-682-8584) or Nikki Martin (nikki.martin@iagc.org, 713-957-5068).

Sincerely,

Andy Radford
American Petroleum Institute

Nikki Martin
International Association of Geophysical Contractors

ATTACHMENT F

Proposed Monitoring Language for GOM ITR Petition

The MMPA requires incidental take regulations issued under Section 101(a)(5)(A) to set forth requirements pertaining to the monitoring and reporting of the incidental take authorized under the regulations. The authorization of incidental take occurs through letters of authorization ("LOAs") issued to specific operators for certain activities. Accordingly, monitoring and reporting of authorized take under the Section 101(a)(5)(A) regulatory framework is accomplished through the imposition of specific requirements identified in LOAs issued to individual operators. These monitoring and reporting requirements are intended to (1) provide information about the specific impacts of the incidental take authorized under a particular LOA and the related underlying activity, and (2) inform the assessment of the overall impact of the incidental take authorized under the regulations.

Each LOA issued under the regulations will include a requirement to monitor and report on marine mammals and any observable reactions they may have to exploration activities. The monitoring and reporting requirements included in each LOA will generally require the documentation of the following information: (1) observations of the number of animals encountered by the exploration activity covered by the LOA, including species identification, location observed, date and time of the observation, and, if possible, whether juvenile or adult, sex, and group size of the observed marine mammal(s); (2) behavioral reactions, if any, of the observed marine mammal(s) to the exploration activity covered by the LOA; and (3) other data that directly inform the question of whether, and if so, to what degree, marine mammals addressed in the regulations are affected by the incidental take authorized by LOAs issued under the regulations. All of the information collected under the terms of LOAs will be reported to the appropriate agencies on a specific schedule to be determined by BOEM and NMFS.

Although a suite of monitoring and reporting measures will be set forth in the incidental take regulations, each LOA issued under the regulations may be tailored to address the specific facts and circumstances of the specific action. LOA applicants will be expected to include details of the specific monitoring and reporting requirements in Marine Mammal Monitoring Plans, and NMFS will coordinate with the applicant to ensure its monitoring and reporting efforts meet applicable standards. *See, e.g.*, 50 C.F.R. § 216.104(a)(13). The goal is to ensure that there is sufficient flexibility built into the regulations to allow NMFS and each applicant to construct an effective monitoring and reporting plan that meets the requirements of the MMPA. For example, if multiple LOA applicants propose concurrent seismic surveys, NMFS will work with the applicants to identify efficient and effective monitoring strategies.

In addition to the monitoring and reporting requirements that will be implemented through the issuance of individual LOAs under the regulations (as described above), BOEM recognizes that it would be useful to collect additional data that address specific science questions that do not directly relate to the potential impacts of the incidental take authorized by LOAs or are not otherwise collected under the terms of LOAs. Such additional data generally include, but are not limited to, marine mammal stock information, marine mammal physiological data, and data related to the basic distribution and habitat use of marine mammal species. While this type of information, and the means of acquiring such information, will not be mandated by the incidental take regulations, industry, BOEM, and NMFS will discuss appropriate additional

scientific monitoring efforts that could be undertaken at the election of LOA applicants. A substantial body of scientific data has been collected by BOEM, academic and other research institutes, and industry from this and other regions over the years, which has helped to inform this rulemaking and any additional steps that are needed to better understand how marine mammals react to anthropogenic sound in the marine environment. For example, these studies have gathered information relevant to sound source characterization and sound propagation, physical and physiological effects, behavioral reactions and biological significant effects, mitigation and monitoring procedures and tools, deep-sea marine animals (SERPENT), sperm whales (BOEM-funded SWSS and SWAPS), other cetaceans and sea turtles (BOEM-funded GULFCET), and the development of transfer functions for the Population Consequences of Acoustic Disturbance Model (PCOD). The goal of any private industry/federal partnership formed to acquire such additional data will be to assess the value of past and existing research and monitoring efforts, avoid redundant studies going forward, and focus on those studies that provide high quality and useful data to inform future decisions.

Finally, the development of the monitoring and reporting requirements that are implemented through the incidental take regulations and LOAs should follow principles of adaptive management through which the requirements included in new LOAs may be modified based on the acquisition of additional information. Accordingly, the identification of additional information, and the methods through which that information is voluntarily acquired, will also be subject to an adaptive process that is informed by new data and information, other research efforts, and input from the scientific and regulated communities. All monitoring and research—whether accomplished through LOA requirements or voluntary efforts—should be based on the best available scientific information, incorporate information generated from past research and monitoring efforts, and be coordinated with other relevant research efforts.

Proposed Language Addressing Adaptive Management for GOM ITR Petition

BOEM recognizes there is significant value in developing and executing a flexible, scalable, and adaptable GoM G&G mitigation and monitoring program. This program should be designed in a manner that accounts for the likely differences among the various G&G activities covered by the regulations (*e.g.*, the technical characteristics of individual projects, their location, time of year, species likely to be present, etc.), while also satisfying the requirements of the MMPA, NEPA, and other applicable law.

The requested incidental take regulations will identify specific measures that may be necessary to mitigate and monitor the anticipated effects of the incidental take authorized through LOAs. The measures will be based upon the best available science and reasonably identifiable as potential means of mitigating and monitoring marine mammal impacts. During the LOA application process, each applicant will, as appropriate, determine whether one or more of the mitigation and monitoring measures identified in the regulations should be included in its LOA application. NMFS will include in each LOA only those measures that are practicable and necessary to accomplish the mitigation and monitoring goals specified in the regulations.

In some instances, there may be a need to include mitigation and monitoring measures in an LOA that are in lieu of, or in addition to, the measures specifically identified in the incidental take regulations. Sufficient flexibility must be built into the regulatory process to allow individual applicants and NMFS to identify any such additional measures. This flexibility is necessary to allow for the inclusion of additional measures that cannot reasonably be identified and assessed when the regulations are issued but that can reasonably be identified and assessed at the time an LOA application is submitted, based on the activity-specific information provided in the LOA application.

Accordingly, BOEM recommends that the incidental take regulations describe: (1) the process for identifying and including appropriate mitigation and monitoring measures from those identified in the regulations in specific LOAs; (2) the process for identifying and including appropriate mitigation and monitoring measures in specific LOAs that are in lieu of, or in addition to, the mitigation and monitoring measures identified in the regulations; (2a) the potential effects from the specified activity for which any such additional measures may be needed; (2b) if feasible, general non-exclusive examples of such additional measures; (2c) the reasons why the additional measures cannot be specifically identified in the regulations; and (3) how NMFS will assess the practicability (*e.g.*, cost, safety, feasibility, benefits) of the mitigation and monitoring measures included in LOAs.

Ultimately, the process for identifying the mitigation and monitoring measures that may be necessary in LOAs should (1) allow G&G seismic operators to execute individual G&G surveys in a reasonable, timely, and cost-effective manner; (2) allow NMFS to tailor mitigation and monitoring measures to the specific location and circumstances associated with individual LOAs; and (3) be supported by information sufficient to complete the required regulatory reviews and associated findings under the Marine Mammal Protection Act, the National Environmental Policy Act, and the Endangered Species Act.

ATTACHMENT F

A plan to monitor the potential impacts of G&G activities on marine mammals is being developed with BOEM's petition to NMFS requesting the issuance of ITRs for G&G activities in the Gulf. Monitoring activities would be implemented for the life of the rule and will monitor how and to what extent G&G activities may affect marine mammals in the Gulf of Mexico. The monitoring and reporting ~~methods identified in the monitoring plan~~ measures implemented through the rule and the letters of authorization (LOAs) issued under the rule will allow for an "increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity" 50 CFR 216.104(a))(13).

Monitoring activities will include the standard monitoring and reporting measures currently required of regulated industry in the GOM (see **Chapter 2** and **Appendix B**). Although the full suite of these standard monitoring and reporting measures will be set forth in the rule, each LOA issued under the rule may be tailored to address the specific facts and circumstances of the specific action. The monitoring and reporting requirements included in each LOA will generally require the documentation of the following information: (1) observations of the number of animals encountered by the exploration activity covered by the LOA, including species identification, location observed, date and time of the observation, and, if possible, the age, size, sex, and group size of the observed marine mammal(s); (2) behavioral reactions, if any, of the observed marine mammal(s) to the exploration activity covered by the LOA; and (3) other data that directly inform the question of whether, and if so, to what degree, marine mammals addressed in the rule are affected by the incidental take authorized by LOAs issued under the rule. All of the information collected under the terms of LOAs will be reported to the appropriate agencies on a specific schedule to be determined by BOEM and NMFS. LOA applicants will be expected to include details of the specific monitoring and reporting requirements in Marine Mammal Monitoring Plans, and NMFS will coordinate with the applicant to ensure its monitoring and reporting efforts meet applicable standards. *See, e.g.*, 50 C.F.R. § 216.104(a)(13). ~~Additional monitoring activities may include visual or acoustic observation of animals, new or ongoing research and data analysis, in-situ measurements of sound sources or other potential impact producing factors, or any other number of activities aimed at understanding the coincidence of marine mammals and G&G activities in space and time as well as the impacts that may occur from this overlap.~~

The monitoring ~~plan~~ program implemented through the rule may be adaptively managed through a process of design, implementation, periodic evaluation, and revision as needed. ~~Any modifications to the monitoring plan through this adaptive process will be made available to the public.~~ Through this adaptive process, the requirements included in LOAs may be modified based on the acquisition of additional information. ~~In addition to the public comment process associated with this Draft PEIS, opportunity for public input on the monitoring plan would occur through any process that NMFS undertakes in response to BOEM's petition for rulemaking under the MMPA.~~ For example, in some instances, there may be a need to include mitigation and monitoring measures in an LOA that are in lieu of, or in addition to, the measures specifically identified in the rule. Sufficient flexibility will be built into the regulatory process to identify any such additional measures. This flexibility is necessary to allow for the inclusion of additional measures that cannot reasonably be identified and assessed when the rule is issued but that can reasonably be identified and assessed at the time an LOA application is submitted, based on the activity-specific information provided in the LOA application. The process for identifying any such additional measures will be specifically set forth in the rule, and will be subject to public review and comment through both the MMPA rulemaking process and the NEPA process.

The development of the monitoring plan is ongoing. BOEM and NMFS are working collaboratively with the anticipated regulated parties to identify specific monitoring questions and activities that may be implemented during the period for which a rule would be issued. BOEM understands the importance of early and substantive public input in our environmental review processes. In early 2015, BOEM put out a request for information to seek input on the development of the monitoring plan (79 FR 66402) and held a series of webinars to solicit recommendations for monitoring goals and activities for marine mammals in the Gulf of Mexico. This process identified ongoing and planned activities in the GOM that may serve to inform, among other things, ~~monitoring needs~~the monitoring and reporting requirements implemented through rule.~~.~~ ~~BOEM continues to coordinate with both industry and external stakeholders to understand how a marine mammal monitoring plan in the GOM for G&G activities may fit into other efforts in order to prevent duplication and address monitoring needs in the context of the larger Gulf ecosystem.~~

The specific details of the monitoring plan are not essential to make a reasoned choice among the alternatives in this Draft PEIS. Monitoring will be required regardless of the alternative chosen. Any impacts resulting from monitoring activities are expected to result in negligible or beneficial impacts to marine mammal species subject to the monitoring activities and are not expected to modify the impact conclusions in this document. Monitoring could be used adaptively to inform the suite of mitigation measures employed, resulting in similar or reduced levels of impacts to the species evaluated in this Draft PEIS. The specifics of the monitoring plan will be available prior to the issuance of any ITRs and the publication of the Final PEIS.

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ATTACHMENT F