



July 18, 2016

Ocean Acoustics Program  
NOAA Office of Science & Technology  
National Marine Fisheries Service  
1315 East-West Highway  
Silver Spring, MD 20910-3225  
Attn: Jason Gedamke, Ph.D.

**Re: Comments on the Draft Ocean Noise Strategy Roadmap**

Dear Dr. Gedamke:

We write on behalf of the American Petroleum Institute (“API”) and the International Association of Geophysical Contractors (“IAGC”) (together, the “Associations”) to provide our collective comments on the recently circulated draft Ocean Noise Strategy Roadmap (“ONS Roadmap”). Thank you for your attention to the Associations’ comments and concerns addressed in this letter.<sup>1</sup> We look forward to future opportunities to work with the National Oceanic and Atmospheric Administration (“NOAA”) in the development of regulatory and voluntary programs that are science-based and that balance ocean uses with acoustic protection and mitigation.

### **THE ASSOCIATIONS**

API is a national trade association representing over 650 member companies involved in all aspects of the oil and natural gas industry, including offshore exploration and development. 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 play an integral role in the successful exploration and development of offshore hydrocarbon resources through the acquisition and processing of geophysical data. Collectively, the Associations represent nearly all of the stakeholders engaged in the exploration and development of offshore

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<sup>1</sup> The original comment deadline established by NMFS was July 1, 2016; however, the Associations were granted an extension of time until July 18, 2016. We sincerely appreciate NMFS’ accommodation of our request for additional time.

oil and gas resources in and adjacent to U.S. coastal and Outer Continental Shelf (“OCS”) ocean waters.

### **COMMENTS ON THE DRAFT ONS ROADMAP**

The Associations commend NOAA for the long-term planning, transparency and agency coordination principles underlying development and publication of the ONS Roadmap. The Associations further commend and strongly support advancement of science-based coordinated programs such as envisioned in the ONS Roadmap. As emphasized in the current draft, there is much that is unknown and, accordingly, a great deal to be gained for all stakeholders in ocean resources, through well-designed and focused data collection and studies directed at filling important gaps in our present knowledge and understanding of marine animal abundance, soundscape characteristics, noise sources and their potential acoustic impacts, and effective mitigation strategies. The Associations especially appreciate NOAA’s express acknowledgement that its statutory mandates require management that *balances* competing needs and uses of ocean resources.<sup>2</sup> Further, as a roadmap and strategy, we understand that this document is not intended to reach conclusions as to acoustic effects or to establish specific criteria or requirements regarding evaluation, identification or mitigation of potential noise impacts. Accordingly, as further addressed below, the goal of the ONS Roadmap should be to serve as a resource for science and collaboration planning that contributes to responsible use of ocean resources, and not be treated as a formal policy or enforceable instrument.

The remainder of our comments, organized below according to the four chapters of the draft ONS Roadmap, focus on identifying our high level concerns. In addition, where feasible, we have also provided alternative recommendations for your consideration and an Attachment with specific comments.

#### **A. Executive Summary and Chapter 1**

The Associations agree with a key premise of Chapter 1 - that the starting point for assessing acoustic effects must be a reliable understanding of resource presence, abundance, density, habitat use and trends. We agree that the existing body of scientific information may not be as comprehensive as NOAA would like, but decisions related to resource management and industrial activities must be based on the “best available science.” This is not to suggest, however, that additional scientific research should not be conducted. The Associations are committed to advancing public-private scientific partnerships, and even identifying new and creative opportunities to expand our collective understanding of ocean noise and its potential impacts on marine resources.

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<sup>2</sup> ONS Roadmap at pp. 1, 29.

In general, we agree that the list of baseline science needs identified in Chapter 1 is useful. However, we urge NOAA to prioritize science directed at species or stocks that are exhibiting a decline in abundance or other important measures of biological fitness for which ocean noise is a plausible significant factor. We also recommend that NOAA prioritize science directed at sound sources that have been less studied but are known to pose more risk to species or known to be the predominate source of observed ocean noise increases.

As stated at the outset, the Associations strongly endorse NOAA's acknowledgement that existing statutory authorities mandate balancing competing needs and uses. Unfortunately, it appears that this important concept of achieving balance is not carried forward into the body of the draft strategy. This shortcoming undermines the vitality and promise of the roadmap. Moreover, there is a lack of clarity surrounding the interplay between the proposed Roadmap and existing statutory and regulatory programs.

The policy foundation of the ONS Roadmap starts from the perspective that the natural state, or baseline conditions, of the oceans and their soundscapes are defined by conditions before human influence.<sup>3</sup> This perspective, by definition, makes the assumption that all anthropogenic sounds (and the activities that emit them) are unnatural and harmful. This policy perspective and the regulatory regime it dictates are one-sided, reflecting a judgment that human activity is "bad" and that the absence of human activity is "natural." The Associations are concerned that NOAA's perspective, based on factors not enumerated in law, could bias the outcome of future regulatory processes. Such a policy and regulatory approach is most likely to lead to discord and conflict. Moreover, there is no statutory mandate that NOAA regulates oceans generally or with specific respect to ocean noise so as to return to conditions before human existence (nor would such a goal be attainable). Rather, Congress has mandated that NOAA balance species preservation and habitat protection with the conduct of responsible and valued commercial activity.

The policy perspective that human-caused effects are not natural, and assumed as always harmful, is carried forward through a series of one-sided statements about the purpose of the ONS Roadmap. For example, the widely used term "management" is narrowly defined in the ONS Roadmap as actions by NOAA to reduce or eliminate acoustic effects, not actions to achieve the broader and more functional goal of balancing responsible use and preservation of ocean resources.<sup>4</sup> Every subsequent restatement of the purpose of the Roadmap identifies resource protection only, not balanced resource management, as the basis for NOAA's ocean

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<sup>3</sup> See ONS Roadmap at p. 45 ("By their very nature, therefore, the introduction of these man-made sources of sound into the aquatic environment alters soundscapes from their natural and historical states."); *id.* at p. 46.

<sup>4</sup> ONS Roadmap at p. 2, n.3.

noise strategy.<sup>5</sup> Similarly, although the ONS Roadmap often identifies cooperation and collaboration as key elements, this document was assembled by NOAA without stakeholder participation and, as a whole, encourages a very prescriptive regulatory approach to acoustic effects and issues.<sup>6</sup> In doing so, the Roadmap takes the form of a unilateral policy that seeks to further control and eliminate anthropogenic ocean noise, uninformed by Congress's intent for balance or the perspectives, knowledge, and experience of those whose activities would be controlled or eliminated.

NOAA's one-sided policy perspective is also evident in the discussion of scientific understanding. One key premise of the ONS Roadmap is a working assumption that there are significant adverse chronic and cumulative acoustic impacts. However, the ONS Roadmap repeatedly acknowledges that scientific support for this presumption is lacking, and there are well-documented examples of long-term exposures of acoustically-sensitive species where no biologically significant chronic or cumulative impacts have occurred.<sup>7</sup> Further study and improved understanding of these issues is well-warranted; however, a presumption that ocean noise is having undetected and pervasive adverse chronic and cumulative impacts is not.

Finally, with respect to Chapter 1, the Associations urge great caution in the early endorsement of models to predict risk in an area where basic species abundance data are mostly lacking and so much else, like habitat use and availability, is poorly understood. Particularly, NOAA's statutory authorities and regulatory programs almost universally require the use of best available scientific information or an equivalent standard. Further, this standard incorporates a level of granularity in modeling of potential impacts, standards for data quality, and related thresholds that ensure that the information is not only the best available but that it meets appropriate standards of quality and specificity for use in particular agency decisions. There is

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<sup>5</sup> *E.g.*, ONS Roadmap at pp. 3, 5, 18.

<sup>6</sup> The draft document appears to suggest that NOAA's strategy should include advocacy that engages the public in acoustic issues against commercial and industrial stakeholders. *See* ONS Roadmap at p. 41 (encouraging "conversations [that] expose people to new scientific information regarding environmental effects as well as more nuanced perspectives on the practices of industries").

<sup>7</sup> 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 National Marine Fisheries Service under the auspices of Marine Mammal Protection Act ("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 reached carrying capacity.

limited data and scientific information to test and calibrate model results against reliable real-world conditions. Our experience suggests that a cascading series of conservatively-biased assumptions will be used for all uncertain parameter inputs and that this leads to accumulating bias as the cumulative conservative assumptions add up to increasingly unlikely statistical probabilities (NAS, 2012).<sup>8</sup> As a consequence, the results from otherwise well-designed models quickly become little more than improbable precautionary worst-case scenarios, not a fair simulation or representation of likely environmental conditions.

## **B. Chapter 2**

Building on Chapter 1, we understand Chapter 2 to express a core policy preference for taking a programmatic large-scale approach to acoustic management based upon the premise that current activity-specific and place-based permitting under existing authorities is inadequate. Respectfully, we question the premises for this policy preference for at least the following reasons:

- NOAA's end goal of the ONS Roadmap is not clear except to comprehensively regulate ocean soundscapes to the point of eliminating human sound sources. However, Congress has chosen not to create such a regulatory regime, and alternative interpretations of existing authorities are highly questionable.
- Indeed, the ONS Roadmap does not address, and we are unaware of any evidence, that unilateral actions by an agency to scale up components of multiple existing programs into an unmandated comprehensive regulatory program has led to increased effectiveness by any measure.
- The scientific data and regulatory tools to programmatically and effectively regulate soundscapes at the scale envisioned in the ONS Roadmap do not exist.
- NOAA has authority to address, and is addressing, acoustic issues under existing statutory authorities. In the Associations' experience, acoustic management of specific commercial and industrial noise sources at specific locations under authorities such as the MMPA has been rigorous (*e.g.*, holding activities to a negligible impact standard) and successful over long time scales. We are aware of no examples of MMPA-authorized commercial and industrial activities where existing regulatory management proved inadequate to address ocean noise effects.

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<sup>8</sup> National Academies of Science. 2012. *Assessing the Reliability of Complex Models: Mathematical and Statistical Foundations of Verification, Validation, and Uncertainty Quantification*. National Research Council ISBN 978-0-309-25634-6, doi: 10.17226/13395

- A balanced approach dictates that NOAA not unfairly and disproportionately regulate certain stakeholders. For example, NOAA acknowledges that the commercial shipping industry is a significant contributor to ocean noise, but admits it is “impossible” to regulate this industry under existing law. NOAA should not put forth new soundscape management regimes that risk unfair burdens on presently regulated entities absent additional authority from Congress to regulate additional stakeholders.
- Before launching a new strategy to address ocean noise, NOAA should complete work to finalize the Technical Memorandum, “National Standards for a Protected Species Observer and Data Management Program” (Baker et al, 2013) and to revise the thresholds for assessing acoustic impacts on marine mammals. In addition, NOAA should also review and process the Protected Species Observer and other data it has yet to analyze.

In sum, the Associations encourage NOAA to work within existing statutory mandates, rather than to conceive of a strategy premised upon a comprehensive ocean noise regulatory scheme that does not exist. We do so not to discourage or deter NOAA from addressing potential ocean noise impacts and effects, but rather because our experience is that (i) existing authorities are more than adequate and effective, and (ii) efforts to increase regulatory effectiveness should come through advancing the best available science, not creating a new programmatic ocean noise regulatory scheme.

### **C. Chapter 3**

The Associations do not have any specific comments pertaining to Chapter 3 beyond those concerns expressed above and below.

### **D. Chapter 4**

The Associations appreciate and support the authors’ decision to provide case studies as a means of giving better definition to how NOAA envisions implementing and benefiting from its ocean noise strategy. However, we think that these examples better highlight the shortcomings of the ONS Roadmap as now envisioned, rather than its strengths.

Case Study 1 focuses on soundscape characterization and potential acoustic risk to blue, humpback and fin whales in the portion of their range off the coast of Southern California. The fundamental premises of this study are that (i) blue, humpback and fin whales represent important acoustically-sensitive species; (ii) NOAA has concluded that ocean noise in Southern California ocean waters has substantially increased and is likely to continue to increase; and (iii) NOAA believes that noise and risk characterization for these three cetacean species and their Southern California habitats will provide important information for regulatory soundscape management of chronic noise impacts.

From our perspective, NOAA's selection of these circumstances as its lead example of how the ONS Roadmap may serve to focus and guide future coordinated agency action highlights at least two major flaws. First and foremost, although reliable abundance information for many species is lacking, it is well-documented that blue, humpback and fin whales in this region of the Pacific Ocean have experienced decades of sustained population growth, with one or more of these species reaching its carrying capacity. This sustained period of reproductive success and population growth has occurred over the same time period during which data show ocean noise in Southern California waters has been increasing (McDonald et al 2008).<sup>9</sup> Accordingly, although blue, fin and humpback whales are important ocean resources with well-acknowledged acoustic sensitivities, and although there is a great deal that we do not know or understand about these whales and environmental stressors, we do know to a very high degree of certainty that these species are not just surviving, but have flourished to the point of a remarkable recovery. The end of commercial whaling and existing regulatory protections have proven sufficient for this recovery. Given limited agency resources, the number of ocean resources at risk, and the number of significant data and information gaps, focusing time and attention on the undetected risks to healthy populations from a stress source that abundance data demonstrates has neither alone nor cumulatively impeded a robust population recovery, seems misguided and unwarranted. Indeed, this case study highlights an example of just how some of the policy biases embedded in the ONS Roadmap may turn an otherwise promising initiative into a solution in search of a problem (*i.e.*, a search for adverse acoustic effects and impacts not known to exist and not likely to be biologically significant).

Case Study 1 also serves to highlight a second shortcoming of the ocean noise strategy as currently envisioned. As discussed previously, one fundamental premise underlying the ONS Roadmap is that broad programmatic soundscape management would significantly improve the effectiveness of regulatory management of potential acoustic impacts. However, all noise sources are not equally responsible for increased ocean noise, and all noise sources are not equally regulated. In the instance of ocean noise off the coast of Southern California, NOAA has identified increases in commercial shipping as the predominant cause.<sup>10</sup> However, noise from commercial shipping is unregulated by NOAA under existing authorities. Insofar as increases in commercial shipping traffic are an important source of increased ocean noise, but are unregulated by NOAA, broad soundscape analysis and greater regulatory management seem unlikely to produce positive results. Specifically, risk management efforts under such circumstances will inevitably focus on tightening regulation of noise sources that are already highly managed under existing authorities even though these sources are not the predominate

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<sup>9</sup> McDonald MA, Hildebrand JA, Wiggins SM, Ross D. 2008. A 50 year comparison of ambient ocean noise near San Clemente Island: a bathymetrically complex coastal region off Southern California. *J Acoust Soc Am* 2008 124(4):1985-92. Doi: 10.1121/1.2967889.

<sup>10</sup> ONS Roadmap at p. 63.

cause of increased ocean noise. Were this to occur, already highly regulated industries will bear the regulatory brunt of NMFS's strategy while such additional requirements may have no productive result for ocean resources, since significant unregulated noise sources will continue to operate with little management or incentive to analyze acoustic effects and to innovate operating solutions.

In brief, Case Study 2 highlights several similar shortcomings. This example starts from the premise that there are certain acoustically sensitive fishes and invertebrate species. However, little if any evidence is provided that (i) fish stocks are depressed other than as a result of commercial overfishing that is directly regulated by NMFS under the Magnuson-Stevens Act, (ii) acoustic effects have ever been demonstrated or thought to have population-level impacts to any invertebrate population, or (iii) enhanced acoustic risk assessment and noise management would meaningfully contribute to recovery of fish stocks that are overfished or to the health of invertebrate populations. Accordingly, as with Case Study 1, this example also has strong elements of a solution in search of an acoustical problem under circumstances where the problem is known to be something else (overfishing) or where there is no known problem at all (invertebrates). Also similar to Case Study 1, the predominate source of increased ocean noise under discussion is commercial shipping vessel engines that are generally not regulated by NOAA.

In sum, an ocean noise strategy that drives NOAA to (i) focus on risk assessments of species and areas that are flourishing despite noise increases, or of species where the key environmental risk is well-known and not acoustic, and (ii) to characterize risk untethered from the ability of NOAA to regulate the predominate noise sources of concern, is not a useful roadmap to achieving balanced and responsible use of ocean resources.

## **CONCLUSION**

Thank you for the opportunity to provide comments on the draft ONS Roadmap. In general, the Associations endorse the need for more baseline data and scientific study of potential acoustic effects and impacts, and we similarly endorse efforts to better coordinate, collaborate and share information within agencies and among all stakeholders. However, as addressed above, much of the ONS Roadmap appears to be premised upon unwarranted policy assumptions that the desired goal is a return to pre-human conditions instead of balanced use of ocean resources, that existing statutory mandates and regulatory measures are inadequate despite ongoing successes, and that an un-mandated comprehensive ocean noise regulatory regime may somehow be cobbled together and scaled up through unilateral actions of NOAA to address assumed chronic and cumulative potential acoustic impacts for which there is little to no scientific evidence. As to these latter issues, we respectfully urge your careful reconsideration. Finally, we welcome additional opportunities to collaborate and share insights with NOAA on marine sound issues. However, we question whether working to reform this document into a more realistic and workable long term strategy to guide future planning is worthwhile, given the



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seemingly unsurmountable challenges laid out in the ONS Roadmap and NOAA's current ability to meet its statutory goals in a resource constrained environment.

Sincerely,



Andy Radford

American Petroleum Institute

Sr. Policy Advisor - Offshore



Nikki Martin

International Association of Geophysical Contractors

President

cc: Jolie Harrison, NMFS

Attachment – Specific Technical Comments

**Executive Summary:**

Page 1, Generally:

- The Associations suggest NOAA be more explicit in the Introduction that its noise strategy and any regulation of activities applies across all anthropogenic sound sources and it should apply the strategy consistently across all industries.
- No definitions are provided for ‘sound’ or ‘noise’. These terms are used interchangeably throughout. Chapter 4 on ‘soundscapes’ uses ‘sound’ more than other chapters. Noise is mentioned related to anthropogenic activities (implying a definition that noise is all sound from human activities), but the use of both terms is still mixed. Suggest either using one term throughout (preferably sound as it can be used independent of whether it’s the source or receptor that is being considered.) or provide a definition and apply it consistently throughout. It should be noted that the national and international standard definitions of “noise” refer to it as “unwanted sound”, implying a judgement by the listener that we cannot obtain from nonhumans. All too often the word noise is used to refer to sound that is “unwanted” by a particular advocacy group, but has not been demonstrated to be “unwanted” by the receiver of concern (e.g. marine mammals). Overuse and misuse of the word “noise” therefore carries political implications that do not further dispassionate, thoughtful consideration of the evidence for or against manmade sound having, or not having, adverse environmental consequences.
- The assertion that there is increasing human activity and that is leading to rising levels of noise is treated as an indisputable fact. However, it is actually only documented for few areas and in those cases there have often been both upward and downward trends, usually with economic conditions (e.g. recession of 2008).
- The document places heavy emphasis throughout on increasing the inclusion of acoustic habitat in NOAA assessments of all types (permit process, stock assessment report, EFH reviews, inter-agency consultation, etc.). Acoustic habitat is not precisely defined and can be very broadly interpreted. It seems that one of the major overall intents of this document is to encourage NOAA to expand regulation of anthropogenic sound sources through the establishment of “acoustic habitat” as a term of art to allow the use of existing regulations protecting habitats.
- The sentence in Paragraph 1, “[n]umerous studies illustrate specific adverse physical and behavioral effects that exposure to certain sound types and levels can have on different species”, needs modification. There is a tangible difference between effects that “can” occur and those that have been actually demonstrated to occur. In fact there are very few studies that have shown or demonstrated an effect, and most of those have not demonstrated any biologically adverse consequences from the demonstrated effect (such as temporary cessation of vocalization or short term movement away from the sound source). The fact that there are numerous studies that have speculated or hypothesized

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about possible, plausible or potential effects does not change the fact that such effects remain undemonstrated.

- Likewise the sentence, “[t]hese changes can lead to reduced ability to detect and interpret environmental cues that animals use to select mates, find food, maintain group structure and relationships, avoid predators, navigate, and perform other critical life functions”, implies a certainty or inevitability that has not been demonstrated or documented. Not only are positive effects not considered, but hypothetical consequences are being used as a rationale for an extensive scope of evaluation and proposed effort while more substantively demonstrated effects like competition with fisheries, bycatch, introduced disease, chemical contaminants and ship strike are not given consideration proportional to their impact, nor to the benefit that would accrue to the marine species if greater mitigations were applied in proportion with the mitigations in place and under consideration for sound.

### Page 4, paragraph 1:

- The ONS Roadmap recommends coordination among agencies, but primarily to advance NOAA’s agenda. The Associations believe that some recognition is needed of partner needs, mission, and mandates (such as the Outer Continental Shelf Lands Act). Also important is more recognition of national and international standards bodies like ISO, ANSI, which may already have developed standards for things like PAM technology or terminology for characterizing properties of underwater noise. Even if this is a NOAA internal document, NOAA needs to recognize that not all authorities and expertise reside within NOAA and any actions taken pursuant to the strategy must be done in a manner consistent with existing federal authorities.

## **Chapter 1 – Managed Species**

### Page 6, paragraph 1:

- The term “acoustically sensitive” is unnecessary. All animals from coelenterates on up have acoustic sensing capacity.
- Why is only seismic characterized as “high energy”? The per-pulse energy of impact pile driving and explosives is equal to or greater than seismic.
- It should be noted that that seismic surveys are widely used for purposes other than oil and gas exploration.

### Page 6, Paragraphs 2 and 3:

- The Associations believe that the characterization of the issue in these paragraphs is overstated. The word choices present an overly dramatic scenario that is not supported by evidence. In addition, these paragraphs include a chain of cascading, increasingly

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speculative outcomes: the aforementioned effects can translate into adverse (and apparently only adverse) effects, they can ultimately lead to only negative vital rate consequences, and that in turn is treated as leading (inevitably?) to adverse (again, only adverse) population consequences. The agency needs to modify its language so that these chains of conclusions are not represented as necessarily adverse and inevitable when there is little or no evidence to support this outcome. The Associations understand the difficulties with obtaining the needed evidence, but while “absence of evidence may not be evidence of absence” it also is most certainly not evidence of effects that remain undemonstrated and controversial.

### Paragraph 4:

- The Associations believe that the sentence, “[e]xamples of the effects described in previous paragraphs are known across many marine taxa...” is vastly overstated and needs to be stricken or modified considerably. As noted in our comments earlier, there are few studies that have shown or demonstrated an effect and numerous studies that have speculated or hypothesized effects that remain undemonstrated.

### Page 7, last of four bullets:

- The noted “high priority science” needs to be characterized as NOAA internal priorities, not general multi-stakeholder priorities.

### Page 8, *Sound Use and Production*:

- The use of swim bladder in hearing is not related to whether swim bladder is physoclistous or physostomous. The subsequent more detailed explanation is better, but much of the discussion is the personal speculation of the author without references.
- Throughout paper there is frequent reference to sea turtle hearing not being well studied. But references drop off after 2008, and there is no reference to:
  - Lavender, A.L., Bartol, S.M., and Bartol, I.K. (2014). Ontogenetic investigation of underwater hearing capabilities in loggerhead sea turtles (*Caretta caretta*) using a dual testing approach. *J. Exp. Biol.*, 2014, 217(14):2580-2589.
  - Martin, K.J., S.C. Alessi, J.C. Gaspard, A.D. Tucker, G.B. Bauer, and D.A. Mann. (2012) Underwater hearing in the loggerhead turtle (*Caretta caretta*): a comparison of behavioral and auditory evoked potential audiograms. *J. Exp. Biol.*, 215:3,001-3,009.

### Page 8, *Impacts of Noise*:

- The Associations find this discussion to be overstated and needs to be qualified. In addition, at end of second paragraph only seismic is mentioned with regard to behavioral change, while behavioral effects from other sounds like pile driving or sonar are actually equally if not better documented.

### Page 8, *Species Presence, Abundance and Distribution*:

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- The statistics regarding the percentage of marine mammal stocks with good data is important and is documented in even more detail in Appendix B. There should be a reference to Appendix B in this section.

### Page 9, Evaluating Population-level and Cumulative Impacts of Noise:

- This section mentions stress as a potential impact that has not typically been comprehensively addressed, but doesn't provide any further context in relation to sound. The Associations believe that clarifying that it's important to understand the relationship between stress and sound before a potential impact can be 'addressed'.

### Page 10, paragraph 2:

- References are needed for assertions about potential for adverse effects on immune suppression, inhibition of other hormonal systems, disruption of reproductive function, rather than to say "such studies within marine systems remain rare".
- At end of that paragraph there is a statement about current inability to interpret stress markers. We could say the same about other potential stressors, such as interaction with fisheries (e.g. ETP tuna fisheries), and other stressor, some of which have been studied and documented even more than noise and are nonetheless entirely missing from the discussion in the ONS Roadmap.

### Page 10, Acoustic Habitat Effects

- The Associations believe that the explanation for emphasis on Acoustic Habitat Effects is too short and, in conjunction with Appendix A, is unconvincing in rectifying the decision to shift NOAA's focus.

### Page 11, PCoD

- We agree with increasing emphasis on PCoD framework for linking exposure-effect-consequence. However, the reliability of the expert elicitation process in the marine mammal field is unknown.

### Page 12, Aggregate of Cumulative Effect of Sound:

- The first sentence should be modified to read, "While there is not as yet any supporting evidence, there is general belief that cumulative effects..."

### Page 13, paragraph 1:

- Streever, 2012 reference. This work has recently been published; here is a more robust reference: <http://www.int-res.com/articles/esr2016/30/n030p095.pdf>

### Page 14, paragraph 4:

- There needs to be additional specificity added about sonar-related strandings, particularly "Mediterranean Sea, Spain 2006" which would be better described as occurring in the

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Alboran Sea. The list is also out of date and incomplete, as it fails to mention similar strandings in Malta in 2011 and Corfu/southern Italy in 2011, among others. Also, including a speculative and very inconsistent event in Madagascar with five other very consistent and well documented cases of military mid-frequency sonar strandings needs additional footnotes or qualifications.

### Page 16, Acoustic Thresholds:

- The subject of historical RMS SPL acoustic thresholds and their use is discussed, but there is no mention of the shortcomings of the RMS SPL approach and the reasoning to develop updated threshold guidance. The update efforts to move away from RMS SPL numbers are mentioned later in the document (Page 19). By not mentioning the update effort in the context of the old RMS SPL thresholds, the audience is not made aware of the limited scientific basis for the RMS SPL approach.
- Measurements of hearing from AEP; Auditory Evoked Potential are available but not used in the NMFS acoustic criteria.

### Page 17, Mitigation:

- The first sentence suggests NOAA may be interested in pursuing a one-size-fits-all strategy to mitigating effects of ocean noise. The Associations strongly believe that actions need to be assessed based on their individual merits; mitigation for one action need not be the same as other activities.
- The omission of the importance of particle motion for fish hearing and injury needs to be addressed, both here and throughout the document.

### Page 18, paragraph 1

- The NOAA Technical Memorandum on “National Standards for PSO and Data Management Program” is identified as a guidance document that should be used more heavily. This is an example of an internal guidance document getting closer to formal regulation without having gone through the formal process. Industry has submitted comment on this technical memorandum that have never been acknowledged or addressed.

### Page 18, last paragraph:

- The ONS Roadmap needs to reference relevant new and in-development ISO and ANSI standards. As noted earlier, NOAA needs to recognize standards and protocols developed outside NOAA.

### Page 19, paragraph 3:

- Need to update the date for final issuance of acoustic criteria.

Page 19, paragraph 4:

- Guidance from agency on how to do source verification, estimate isopleths (e.g. TL model) and design PAM would be welcome, but is long overdue and has been taken over by other processes (JIP projects on source modeling, TNO development of standards for metrics, ASA towed PAM standards, etc.)

Page 20, paragraph 5:

- The proposed use of risk assessment approaches is, in general, a move in the right direction. However, the Associations believe that switching emphasis to acoustic habitat is still a secondary surrogate for the explicitly stated primary NOAA mandate to manage species and populations. There will still be a need to verify that the effect of managing the acoustic habitat is indeed having the desired population effect. At worst, the creation of an entirely *de nova* method of acoustic habitat management without associated metrics to verify that actions taken under that methodology create the potential for consequences that are the opposite of what was intended, i.e. a negative impact on the species of concern due to an incomplete and incorrect understanding of their acoustic habitat needs and the consequences of altering that habitat.

Page 21, third full paragraph

- The referenced model for acoustic space (Clark 2009) has numerous widely recognized defects. Foremost is the tendency to oversimplify masking, especially for intermittent signals; also tendency to confuse maximum range of audibility with effective or typical communication space, which is usually much smaller than max range of audibility. Additional references such as Erbe et al 2016, Mar Poll Bull, should also be provided, along with a discussion of the dangers of overly simplistic interpretation of equal-energy models of masking; something that Clark (2009) recognizes in principle, but which has frequently been omitted in application examples, like the current NOAA plan.

Page 21, last paragraph

- The Associations question whether contextual factors are “critical” for assessing noise impacts, or is population status and trend sufficient? One cannot know context for each and every individual, but can generate statistical metrics of time spent in different behavioral states, or places or other contexts. In the end, it is only possible to know the statistical distribution of contextual factors such as behavioral states, which then become part of the statistical population model. In other words, it is not necessary or “critical” to know whether an individual exposed to sound is breeding or feeding, whether it is winter or summer, or whether the sound source is moving toward or away from an individual. It is only necessary, or critical, to know what the aggregate sound exposure has been for that population and what population outcomes, if any, have ensued. While it may be “important” for some people to understand whether mothers and calves are more sensitive or whether animals are more or less reactive to sound on the feeding grounds, in the end whether the population remains healthy and stable is the aggregate product of the

unknown and not at all critical information from mothers and calves, males, juveniles; in summer and winter; and whether feeding, breeding or resting. Just as it is not necessary to know whether one individual exercises and another does not in order to evaluate the effect of exercise on human health, similarly it is not necessary to know the context of each and every sound exposure in order to assess the effect of sound on marine life.

Page 22, Prioritize Baseline Science Needs:

- The list of Baseline Science Needs is quite comprehensive. An evaluation of how well NOAAs current structure and internal funding decision align with these needs would be valuable and may suggest ways the administration could reorganize or reprioritize funding to better address basic population level data gaps.
- Bullet 6 fails to explain how noise related stress would be distinguished from other sources of stress. Is the science sufficiently mature to support confidence in the collected data?

Page 23, paragraph 2:

- It is not clear how the interests of regions will be reconciled with a national, headquarters level process for establishing priorities and then coordinating those with other stakeholders who will be impacted by and might be able to contribute to addressing internal NOAA goals.

Page 23, Enhance Efficacy and Transparency of Monitoring Approaches:

- We agree that mitigation should be commensurate with reasonably anticipated impact, not any imaginable impact. If this is a ‘precautionary’ area, there needs to be some boundary to precaution within the limits of what is practicable and has some likelihood of producing a detectable and quantifiable benefit after having been put into practice.

**Chapter 2, Managing Acoustic Habitat in U.S. Waters**

Page 27, paragraph 2:

- The only sufficiently supported role for mysticete vocalizations is sexual; either male display or courtship. In many cases only males produce the vocalizations of interest. Use of vocalizations to “share food resource information” or “navigate at ocean basic scales” lack any substantive scientific support decades after first being hypothesized. They most certainly should not be taken seriously as a phenomenon that requires regulatory action.

Page 29, paragraph 2:

- NOAA properly acknowledges the very high levels of natural variation in sound levels on large spatial and temporal scales and that this variation must be accounted for when evaluating impacts from anthropogenic sources.



Page 29, paragraph 1

- The discussion related to ‘life spans of marine organisms’ relative to the ‘rapid rise’ of human activities includes a statement suggesting marine life is not able to adapt to increased sound levels in its environment. No reference is provided to support this.

Page 30, paragraph 2

- Most, if not all, of the cited studies for effects of sound on foraging success or predator awareness use surrogate metrics in a laboratory setting with unrealistic sound sources. Five days of exposure to continuous sound at levels not normally encountered for more than a few seconds, and altering the sound to fall within the technical limits of playback sound sources are not metrics of real consequences from exposure to real sound sources. This differs from, and should not be confused with, the development of psychophysical sensory performance metrics generated by artificial signals like pure tones, where the relationship between the signal in the laboratory and complex stimuli in the field is well understood and carefully documented.

Page 34, paragraph 2:

- The Association note that Biologically Important Areas (BIA) not only lack statutory authority, they were also internally developed, without adequate stakeholder input or input from the broader expert community.

Page 35, Table 2-2

- NOAA should review the last two columns of the table with an eye towards what constitutes a “wish list” of what the agency would like to do under these statutory authorities versus an accurate statement as to what the agency has authority to undertake vis a vis monitoring, management or mitigation measures.
- 4th row discussing monitoring – NOAA states it “must require monitoring” for science, but it “can require monitoring” for management. Why is there a difference? What makes one mandatory and the other permissive?

Page 36, last paragraph:

- The Associations question if actions involving international policy or regulatory vehicles should be led by NOAA or the State Department?

Page 39, paragraph 2:

- The Associations believe the ONS Roadmap encourages regulatory overreach through the use of very broadly defined areas such as HAPCs and CetMap boundaries, which have not undergone a formal rulemaking process nor scientific peer review, to influence management decisions. For example, there is a clear statement that CetMap-based BIAs are intended to “inform management action across the many permitting and consultation actions currently being taken to address noise impacts on these species.” The CetMap products have not undergone full scientific peer review, validation, or rulemaking

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processes and should not be given the same weight as habitat designations that have been through such processes. Again, rationale for BIAs is insufficient and unconvincing. Isn't this need met by ESA Critical Habitat designations, and if not, how does ESA Critical Habitat fall short? If animals rely on more biologically important area than Critical Habitat then isn't the species recovery plan and Critical Habitat inadequate, by definition?

### Page 40, paragraph 2:

- The document contains clear suggestion that National Marine Sanctuaries should be used to regulate sources outside the boundaries of the Sanctuaries that may be causing impacts within the Sanctuaries. Before doing so, NMFS should have to clearly show how sounds produced outside of a sanctuary are truly having biologically meaningful effects within the sanctuary.
- In addition, MPAs are not National Parks and the two should not be compared. Much of the referenced National Park action is focused on visitor experience and not the creation of acoustically “pristine” or “aboriginal” environments.

## **Chapter 3**

### Page 45, paragraph 3:

- The list of anthropogenic sounds is incomplete. For instance, it should include noise from fishing activities, including gear and fish finding sonars.

### Page 49:

- It is important to note that although time-compressed representations of sound exposure can be useful, for phenomena like masking the sound must also be resolved to biologically relevant time scales (< 1 second) in order to appropriately assess the potential for masking by many sounds, especially those that are amplitude modulated or operate at a low duty cycle, such as shipping sounds or seismic survey sounds.

### Page 56, *Establishment of NOAA-led, long-term, standardized passive acoustic research capacity across the agency*

- The Associations cannot overemphasize how important it is for the agency to acknowledge that there are national and international standards that NOAA should be aware of and follow. Even for a document that seems to aim mainly at internal agency goals, it is necessary to acknowledge that there are other sources of information and expertise, and that agency conformity with standards of practice that go beyond the agency are vital to the success of internal agency protocols.

### Page 57, *Standardization of basic data analysis routines and output metrics:*

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- For “a.”, it is not clear that this set of metrics has any biological or ecosystem relevance. It seems arbitrary and may be driven by habit or convenience more than biological relevance.

### Page 61, paragraph 1:

- Estimates of loss of communication space can be a valuable tool, but current methods of estimating communication space and loss due to noise are not established enough to provide meaningful guidance.

## **Chapter 4**

### Page 61, paragraph 3:

- “Gisner” misspelled (see reference at the bottom of the page).

### Page 61, paragraph 4:

- It is not clear what the “proposed risk assessment framework” is. If it is PCOD, it should be made clear.

## **Appendix A**

### Page 92, paragraph 1:

- The statements regarding “electrical” methods typically underestimate, and “[g]ender and age issues” need references.

### Page 94, Fish with Swim Bladders:

- Information on physoclistous vs physostomous is incorrect and rationale for effect on swim-bladder mediated hearing is speculative and lacks references. Remove the second and third paragraphs of this section.

### Page 95, fish without swim bladders:

- Having “relatively poor hearing” is not correct. Sharks and other fish that hear primarily through particle motion have good hearing and directional hearing. They may detect dipole sources (like other fish) and low frequency sources below 10 Hz better than fish with swim bladder mediated hearing. The ability to hear at greater ranges and at higher frequencies are only two aspects of hearing capability.

### Page 97, final paragraph:

- The statement that the mammalian ear is believed to be “highly conserved” needs more information. While shape of hearing curve, frequency resolution, critical bandwidth, critical ratio, dynamic range and other features are similar, there are differences in

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cochlear architecture and innervation that are worth noting. Also note the ideas Cranford and Krysl have put forth about the function of the middle ear in both low frequency and mid – high frequency cetaceans are very novel and still controversial within the expert scientific community.

### Page 98, paragraph 3:

- NOAA needs to further research the difference between shock wave or “blast” and the acoustic wavefront. The shock wave is not “sound” – it travels faster than sound, decays faster and has other properties that differ from sound. Shock wave in water is considerably diminished by the rho-c (density and viscosity) of water relative to air. It is important to understand the physics behind these phenomena.

### Page 100:

- First sentence is missing an important reference – Erbe et al 2016 Mar Poll Bull

### Pages 101-103 on fish:

- The Association noted many problems in this area and suggest extensive rewriting, including but not limited to the following:
  - No evidence of fish kills from seismic.
  - Citation of Gisiner 1998 is inappropriate. That was a review that Gisiner edited; need to cite the chapter, and chapter authors.
  - Sverdrup used blasting caps to simulate old type explosive seismic; explosives do not mimic seismic air sources – signal duration, frequency content, bubble oscillation phenomena all differ.
  - Discussion of fish mortality and injury needs to mention particle motion. Absence of info on particle motion, Scholte waves, etc. is a major defect in this document.
  - Paragraph 3 and paragraph 4 on page 102 end in unsupported speculations about outcomes; “could lead” to increased predation risk; “could affect” species fitness. Or maybe it could not. Stick to the cited information; don’t create hypothetical outcomes unsupported by data.
  - Masking does not “result from” a sound “impeding” an animal’s “ability to hear” “other” sounds of interest. Review proper definition and don’t deviate.
  - This paragraph contains several speculative statements that are unsupported.
  - Strike entire first paragraph of page 103; it is overly speculative.
  - Work by Andre’ et al has methodological problems; results are not from “seismic exposure” but a prolonged loudspeaker in close proximity to specimens in a small tank with unrecorded particle motion data. There is better work on squid hearing – Mooney et al, e.g. Research indicating damage by a continuous sound is not appropriate to predicting effects of seismic which is an intermittent source with a low duty cycle.
  - First paragraph on sea turtles is out of date. See references 2012, 2014 by Moein and colleagues on hearing of multiple age/size classes.

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- Strike second paragraph; no evidence of effect – There is no evidence of effect, which should be identified before speculating on the potential meaning. Or explore all equally plausible alternatives, e.g. no effect, beneficial effect, etc.

### **Appendix B**

#### Page 113, paragraph 1:

- Not all would agree that NOAA’s data for marine mammals and ESA listed species provides the best overview of the status etc. Even NMFS is using more “outsider” data from mark-recapture (photo-ID), PAM, or purpose designed surveys by Navy, others.

#### Tables B4-B7:

- Very good and very helpful, but they paint a discouraging picture with respect to NOAA’s ability to support its own data needs with the resources it is given and how it applies them.

#### Page 117:

- The structured, semi-quantitative process by which NOAA ranks the quality of its data for stock assessments is very useful. The Associations believe that similar structured evaluations born out of greater stakeholder and expert community participation should be in place for setting Critical Habitat, BIAs, establishing and defining MPAs, etc.

#### Page 121, Table of Authorities – Cooperative Agreement cell:

- Why would cooperative agreements only be with states and AK Native Organizations when the statute allows for agreements with private and public partners? The comment needs to be revised to reflect a broader pool of potential partnerships.

#### Page 134, Table of Authorities

- The Associations are confused as to why there are references to Department of the Interior administered statutes in a NOAA document. It is misleading to include the Park Systems Resource Protection Act where NOAA doesn’t administer the program.

#### Page 135, Table of Authorities

- Why is the International Whaling Commission referenced in a Table of Authorities when its measures are not enforceable against states?