



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Re: Comments on Proposed Changes to Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing—**NOAA-NMFS-2013-0177**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Oceanic and Atmospheric Administration’s (“NOAA”) notice and request for comments on proposed changes to NOAA’s Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (“Draft Guidance”).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 The Associations previously submitted extensive comments on both the first and second versions of the Draft Guidance.¹ Our comments on the newly proposed changes to the Draft Guidance are set forth below.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NOAA's efforts to appropriately obtain public and peer review input on the first two versions of the Draft Guidance.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fully engaged in this process and have spent substantial amounts of time and resources evaluating both versions of the Draft Guidance and preparing comments to constructively inform this important process.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* (continued . . .)

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.

(. . . continued)

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.’”).

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.

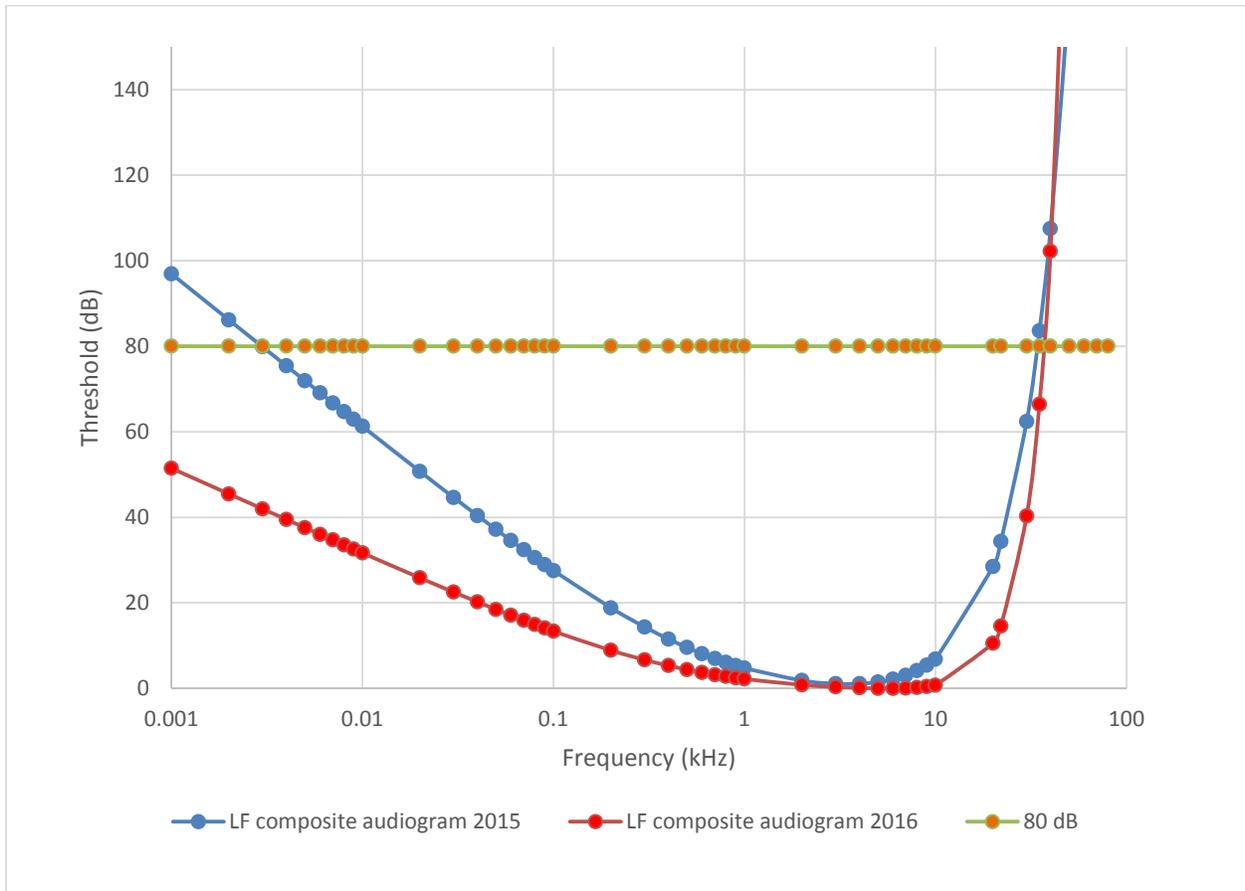


Figure 1. The consequence of the proposed changes to the LF cetacean modeled audiogram (in red) produce a hearing curve at the lowest frequencies that never approaches the 80 dB decrement from best hearing (in green) that NOAA had set as the upper and lower limiting frequencies of hearing (also a general 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.

The impact of the new LF cetacean parameters is immediately obvious in our Figure 2 below, which compares Figure PC3⁷ 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.

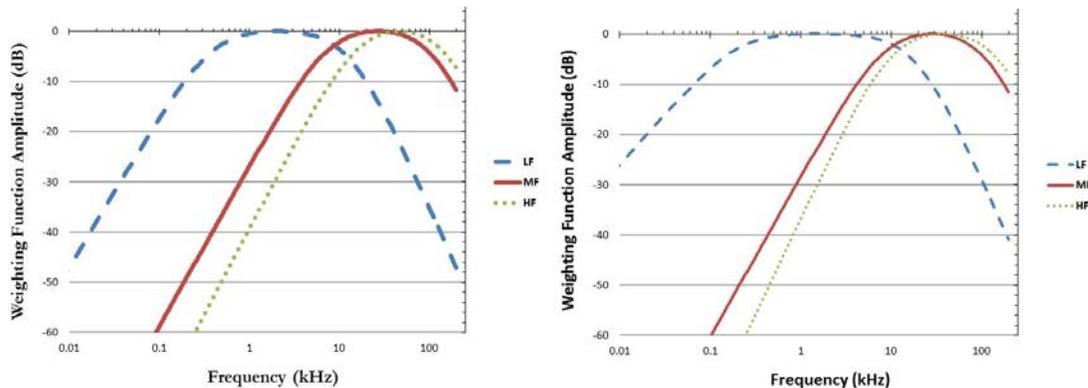


Figure 2. The left plot shows initial July 2015 cetacean weighting functions: LF in dashed blue, MF cetacean in red and HF cetacean in dotted black. While the frequency range of best hearing for LF cetaceans is conservatively generous given uncertainties in the models, the slope of the weighting functions 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).

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 1991¹¹), 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. 2005¹²) 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,



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U.S. House Committee on Natural Resources
Dr. Jill Lewandowski, BOEM, Division of Environmental Assessment Chief