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From "Mathew Dunn" <mdunn@nmma.org>
Date Monday, March 14, 2005 12:23 pm
To <AcousticEIS.Comments@noaa.gov>
Subject ID 060804F: Public Comment on NOI to Prepare an EIS on Noise and Marine Mammals
Attachments NMMA Comments Re NMFS Notice of Public Scoping and Inten t ..pdf 104K

Dear Mr. Payne:

Please see NMMA's attached comments to the National Marine Fisheries Service regarding its Notice of Public Scoping and Intent to Prepare an Environmental Impact Statement on New Criteria for Sound Exposure Threshold Guidelines for Marine Mammals under the Marine Mammal Protection Act and Endangered Species Act. Please let me know if you have any problems downloading this file. I will also be faxing you a copy of these comments.

Best regards,

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March 14, 2005

P. Michael Payne
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Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910

VIA FACSIMILE [301-427-2581] & EMAIL [AcousticEIS.Comments@noaa.gov]

RE: Public Comment on Notice of Public Scoping and Intent to Prepare an Environmental Impact Statement on New Criteria for Sound Exposure Threshold Guidelines for Marine Mammals under the Marine Mammal Protection Act and Endangered Species Act

Dear Mr. Payne:

The National Marine Manufacturers Association (NMMA) appreciates the opportunity to present the National Marine Fisheries Service (NMFS) with the following comments in response to the Agency's Notice of Public Scoping and Intent to prepare and Environmental Impact Statement (EIS). The EIS is being undertaken to assess the potential impacts of applying new criteria in guidelines to determine what constitutes a "take" of a marine mammal under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) as a result of exposure to anthropogenic noise in the marine environment.[1]

NMMA is the nation's largest recreational marine industry association, representing more than 1,500 boat builders, engine manufacturers, and marine accessory manufacturers. NMMA is also submitting these comments in conjunction with the Personal Watercraft Industry Association (PWIA), an NMMA affiliate that represents personal watercraft (PWC) manufacturers. NMMA members collectively produce more than 80 percent of all recreational marine products made in the United States, including boats, engines, and marine accessories and components. With 13 million registered boats and almost 72 million boaters nationwide, the recreational boating industry contributes $30 billion and 400,000 jobs annually to our nation's economy.

The National Marine Manufacturers Association and its membership are steadfastly committed to sound environmental stewardship. The association and its membership appreciate the need to protect important wildlife, particularly marine mammals. Nevertheless, NMMA has some concerns and questions regarding the available science upon which new sound exposure criteria will be based. 1

[1] 70 Fed. Reg. 18716 (Jan. 11, 2005).

In general, NMMA supports efforts to utilize sound science and to apply new research and information to federal resource protection and management efforts. In concept, NMMA does not oppose the National Oceanic and Atmospheric Administration's (NOAA) desire to establish new "science-based guidelines" for determining an acoustic take under MMPA. We are deeply concerned, however, that the current action may be premature. There are significant data and knowledge gaps in existing research, which NOAA openly acknowledges in its Notice of Intent.
NMMA has conducted a comprehensive review of the scientific literature on the auditory 2
thresholds of marine mammals and consulted with acoustic experts. We have found that there is consensus in the scientific and regulatory community that acoustic research on marine mammals is incomplete at this time. The National Research Council (NRC), following a comprehensive review of available science in this area, summarized this point quite lucidly: "existing data are insufficient to predict accurately any but the grossest acoustic impacts on marine mammals."[2] Therefore, NMMA strongly recommends that NOAA continue studying this issue, but refrain at this time from developing any guidelines based on woefully inadequate data.

NMMA is pleased to present its perspective on this matter, and our comments will focus largely
on the following: (1) determining the true impact of this current effort on the recreational boating 3
community poses significant challenges due to shortfalls in information provided by the Agency in its Notice of Intent and at its scoping meetings; (2) the existing base of research on marine
mammal hearing, auditory threshold levels, biologically significant disturbance, and noise levels 4
from various sources suffers from numerous—and substantial—knowledge gaps, which hinders the current effort to establish new sound exposure criteria to such a degree that the effort should
be postponed; (3) several of the alternatives presented are, in our judgment, untenable as 5
management options and should not be pursued.

I. The Impact of the Proposal is Impossible to Determine

The National Marine Fisheries Service is asking stakeholders and constituent groups to provide comment on its current effort to establish "science-based thresholds to improve and replace the current generic exposure level thresholds that have been used since 1997."[3] NMMA appreciates the opportunity to provide comment, although our ability to do so is constrained by an incomplete set of information supplied by NMFS.

Specific Sound Threshold Levels for All Marine Mammals Are Necessary

In its Notice of Intent, NMFS indicates its desire to establish a new set of criteria based on varying levels of TTS and PTS onset, and, in Alternative III, behavioral avoidance. The Agency provides an example by way of the Gray Whale, for which it specifically applies its proposed
noise exposure criteria based on the limited auditory information available. NMMA and other 6
stakeholders will be unable to provide meaningful comment on the appropriate scope of an EIS and to assess whether new criteria would impact our interests unless NMFS provides a similar

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[2] Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals, Ocean Studies Board, National Research Council, Ocean Noise and Marine Mammals (National Academies Press, 2003) at 86.
[3] 70 Fed. Reg. at 1872.

chart outlining the sound exposure thresholds for each mammal species in the five functional hearing groups for which these guidelines are to be used. Since some limited direct TTS studies have actually been conducted with bottlenose dolphins[4] and a beluga whale,[5] one individual harbor seal,[6] one individual northern elephant seal and California sea lions subjects,[7] the Agency should demonstrate the proposed application for mid- and high-frequency cetaceans as well as underwater and above water pinnipeds as it has extrapolated for the Gray Whale. We realize this 6
would be a significant undertaking, but we feel it would substantially aid the ability of stakeholders to comment in a meaningful way. The National Environmental Policy Act scoping process is intended to make impact statements more relevant by clarifying the issues to be discussed in an Environmental Impact Statement. In our view, the Agency has not properly identified the proposed agency action, making it impossible for the public to assist the agency by identifying its concerns. Until the Agency is able to provide specific sound exposure levels for all classes of marine mammals and for all alternatives, this scoping process and any Draft Environmental Impact Statement prepared subsequently will be deficient.

In addition, the EIS must fully consider the impacts of NOAA's proposed actions on the human environment, which is impossible unless and until NOAA provides specific sound exposure levels for all classes of marine mammals in the five functional hearing groups.[8] In particular, NOAA must study how these alternatives will impact human activities, including socioeconomic impacts. NOAA guidelines and policies on NEPA define the human environment as including 7
the "natural and physical environment and the relationship of people with that environment. . . when an EIS is prepared and economic or social and natural or physical environmental impacts are interrelated, the EIS must discuss all of these impacts on the quality of the human

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[4] Nachtigall, P. E., J. L. Pawloski, and W. W. L. Au. 2003, "Temporary threshold shifts and recovery following noise exposure in the Atlantic bottlenosed dolphin (Tursiops truncatus)," Journal of the Acoustical Society of America 113, 3425-3429; Finneran, J. J., C. E. Schlundt, R. Dear, D. A. Carder, and S. H. Ridgway. 2002. "Temporary shift in masked hearing thresholds in odontocetes after exposure to single underwater impulses from a seismic watergun," Journal of the Acoustical Society of America 111, 2929-2940.

[5] Finneran, J. J., Schlundt, C. E., Carder, D. A., Clark, J. A., Young, J. A., Gaspin, J. B., and Ridgway, S. H. 2000, "Auditory and behavioral responses of bottlenose dolphins (Tursiops truncatus) and a beluga whale (Delphinapterus leucas) to impulsive sounds resembling distant signatures of underwater explosions," Journal of the Acoustical Society of America 108, 417-431; Schlundt, C. E., J. J. Finneran, D. A. Carder, and S. H. Ridgway. 2000, "Temporary shift in masked hearing thresholds of bottlenose dolphins and white whales after exposure to intense tones," Journal of the Acoustical Society of America 107, 3496-3508.

[6] Kastak, D., and R. J. Schusterman. 1996, "Temporary threshold shift in a harbor seal," Journal of the Acoustical Society of America 100, 1905-1908; Nachtigall, P. E., J. L. Pawloski, and W. W. L. Au. 2003, "Temporary threshold shifts and recovery following noise exposure in the Atlantic bottlenosed dolphin (Tursiops truncatus)," Journal of the Acoustical Society of America 113, 3425-3429.

[7] Finneran, J. J., R. Dear, D. A. Carder, and S. H. Ridgway. 2003, "Auditory and behavioral responses of California sea lions (Zalophus californianus) to single underwater impulses from an arc-gap transducer," Journal of the Acoustical Society of America 114, 1667-1677; Kastak, D., R. J. Schusterman, B. L. Southall, and C. J. Reichmuth. 1999, "Underwater temporary threshold shift induced by octave-band noise in three species of pinniped," Journal of the Acoustical Society of America 106, 1142-1148.

[8] Environmental Review Procedures for Implementing the National Environmental Policy Act, NOAA Administrative Order Series 216-6 (May 20, 1999), § 3016 ("NOAA NEPA Procedures"). Pursuant to NOAA's policies on NEPA, the Agency must "fully consider the impacts of NOAA's proposed actions on the quality of the human environment." See also § 6.01.

environment."[9] Central to the natural and human environment are recreational boaters and 7
anglers. As such, a complete socioeconomic assessment is necessary in this case.

A socioeconomic evaluation in the development of an EIS on this issue is particularly important
given the size of the recreational marine industry, which is more than twice the size of the cruise
ship industry, larger than the commercial fishing industry and recreational saltwater angling, and
in many years even outpaces the offshore oil and gas business.[10] Nationally, our industry
supplies more than 400,000 Americans with good paying jobs, providing nearly $7 billion in
wages every year.[11] Recreational boating also drives millions of Americans to the nation's 8
coastal communities for recreation and tourism annually, contributing billions in spending and
sustaining hundreds of thousands—if not millions—of related jobs for people who work in
hotels, restaurants, marinas, gas stations, grocery stores, and other retail shops in those local
economies. Recreation and tourism is one of the fastest growing sectors of the U.S. economy,
and more and more Americans are choosing the nation's waterways as their preferred venue for
relaxation and enjoyment.

In addition, saltwater recreational fishing, which is inexorably tied to boating, is a substantial
economic force in the United States. The more than 13 million recreational saltwater anglers
took approximately 82 million fishing trips in 2003, generating more than $30 billion in
economic impact and supporting nearly 350,000 jobs nationwide, something which has been
acknowledged in NOAA's new Recreational Fisheries Strategic Plan, *A Vision for Marine* 9
Recreational Fisheries.[12] Together, recreational boating and angling contribute more than $60
billion a year to the nation's economy and provide nearly a million American jobs. Both
constituent groups are uniquely affected by federal regulations related to the marine
environment. As such, any EIS must fully assess the impacts of all proposed actions on these
stakeholders specifically.

Proposed Rule or Draft Guidelines?

At the scoping hearings, attended by NMMA, the Agency failed to clarify the nature of the
agency action, indicating that it was undetermined at the present time whether the sound
exposure criteria would serve strictly as guidelines (as in the status quo) or if the new criteria 10
would ultimately become a regulation through a full rulemaking process. Thus, we are unsure if
the agency action under study is a proposed rule or draft guidelines. This lack of clarity is of

[9] NOAA NEPA Procedures, § 4.011.

[10] We might note that recreational watercraft are not a significant source of ocean noise. See discussion on p. 11-12 of these comments.

[11] National Marine Manufacturers Association (2004). These estimates are conservative. In California alone, for example, a recent economic impact assessment indicated that the 8,500 boating-related businesses in the state contribute approximately $16.5 billion to the Gross State Product annually, $1.6 billion in state and local taxes annually, and more than 284,000 jobs to the economy. Department of Boating and Waterways, California Resources Agency, California Boating Facilities Needs Assessment. Vol. 5. Boating Economic Assessment and Demand Projections (Oct. 15, 2002).

[12] U. S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, A Vision for Marine Recreational Fisheries: NOAA Recreational Fisheries Strategic Plan, FY2005-FY2010 (Dept. of Commerce, 2005).

considerable concern to NMMA and NMFS should indicate its intent with respect to the end use
of these guidelines in order for NMMA and the public to fully assess the Agency's action. 10

NMFS Should Explain the Proposal's Impact on CZMA Plans

NMMA is also concerned about the impact of this rulemaking on states, which have authority under the Coastal Zone Management Act (CZMA) to regulate underwater noise levels from
human sources. Some states, including California and Hawaii, have undertaken to regulate 11
underwater noise.[13] NMFS should consider and explain to the public how these new guidelines will impact existing state Coastal Zone Management Plans, for example. Such a review is required by NOAA's NEPA procedures and would be of interest to public stakeholder groups including NMMA.[14]

Sound Exposure "Guidelines" Should only be used on a Case-by-Case Basis

NMMA is pleased that NOAA has recognized the significance of its proposal to adopt new sound exposure threshold guidelines and decided to prepare an EIS. However, NMMA is particularly concerned about this agency action since it clearly will provide a precedent for future
actions by NOAA, other federal agencies, and the states in managing marine noise. As such, it 12
would be irresponsible for the Agency to take any "short cuts" by not fully explaining its proposal or by rushing to take action before the science is ready. NOAA should assess the degree to which this action will establish a precedent for future actions.

If NOAA insists on pressing ahead with this proposal (either as a proposed rule or as draft guidelines), the Agency should indicate that it will be limited to use for the issuance of individual incidental take permits by NMFS on a case-by-case basis only, as is done in the status quo. Such an approach will be far more effective in terms of resource management and protection and far less onerous on the regulated community. To be accurate, any effort to assess the impact of noise on marine mammals must consider important contextual variables in specific marine environments, such as seafloor topography, ambient noise levels, water depth, and others. These new noise threshold guidelines should not be utilized for the development of blanket
regulations on human activities, such as recreational boating and angling, and they should not be 13
applied by federal agencies not in the business of issuing incidental take permits for marine mammals under the Marine Mammal Protection Act. NMMA cautions that the U.S. Fish and Wildlife Service (FWS), which manages manatees, polar bears, and sea otters under MMPA, should also not utilize these guidelines since NOAA is not developing in this agency action guidelines for these species. Such use is conceivable and is of great concern to NMMA and the millions of recreational boaters who enjoy our nation's public waterways each year. Recreational boating access, which underpins the viability of the entire boating industry, is a priority for NMMA. We are concerned that, without prior notice or scientific justification, these guidelines may be used by federal and state agencies other than NMFS to justify restrictions on

[13] See, for example, Mark Delaplaine, Federal Consistency Supervisor, California Coastal Commission, "State Regulation of Underwater Noise" (Nov. 20, 2001), available at http://www.channelislands.noaa.gov/sac/pdf/11_20_01.pdf, Accessed March 11, 2005.

[14] NOAA NEPA Procedures, § 5.02c.3(e).

recreational boating access in federal and state marine protected areas. Such a general 13
application of these guidelines would be inappropriate, scientifically unsound, and something that NMFS should be clear about as it proceeds.

II. The Science is Underdeveloped and Incomplete

Even as interest in underwater acoustics and ocean noise has grown over the last several years, research has often failed to keep pace with demand. To be sure, researchers have made significant advances in data collection and have generally expanded our understanding of how some, though not nearly all, marine mammals hear and why sound is biologically important. But serious gaps in knowledge persist and considerable research remains to be done before any regulatory effort which strives to be "science-based" can occur. Clearly, responsible management must concern itself with locating a balance between the risks posed by overregulation and those posed by underregulation—in the case of marine mammals and ocean noise, the extent of scientific uncertainty should give considerable pause to federal resource managers as they move forward with any attempt to significantly modify status quo guidelines and regulations.

NMMA is not alone in concluding that scientific uncertainty in this field is substantial. A 2003 study, *Ocean Noise and Marine Mammals*, by the Oceans Studies Board of the National Research Council (NRC) takes a comprehensive look at the body of existing research on marine mammals and ocean noise. This study characterizes the effect of anthropogenic noise on marine mammals as one of the "least understood subjects" in marine science, further noting that
"remarkably few details are known about the characteristics of ocean noise, whether it be of 14
"human or natural origin, and much less is understood of the impact of noise on the short- and long-term well-being of marine mammals and the ecosystems on which they depend."[15] In addition, the U.S. Commission on Ocean Policy's (USCOP) Final Report, *An Ocean Blueprint for the 21st Century*, makes its clear that "very little is known about marine mammal physiology, including baseline data on hearing, making it difficult to assess the potential biophysical impacts of noise on marine animals."[16] Although it is widely assumed that noise impacts marine environments, the impacts associated with natural geophysical and biological sounds (ambient noise) and those induced by human beings through various ocean activities are not easily parsed out, and in many situations and environments, impossible to segregate.

The National Research Council study, which reviewed all available data, found "no documented evidence of ocean noise being the direct physiological agent of marine mammal death under any circumstance"[17] The 192-page report lays out a series of recommendations for improving research on marine mammals and noise, highlighting the substantial lack of knowledge in this field. In 2005, NRC released another report on marine mammals and ocean noise which reveals that many of its earlier recommendations for additional research remain unmet. Although NRC developed a new conceptual model potentially capable of determining biologically significant

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[15] National Research Council, Ocean Noise and Marine Mammals (2003) at 1.
[16] United States Commission on Ocean Policy, An Ocean Blueprint for the 21st Century, Washington, D.C., (Sept. 2004) at 264.
[17] National Research Council, Ocean Noise and Marine Mammals (2003) at 6.

impacts associated with sound in the marine environment, the report concluded that such a model will lack functionality for at least a decade until and unless additional research is completed. Moreover, the U.S. Ocean Commission in its Final Report makes clear that federal agencies must expand their research efforts as well as improve data dissemination in order to fully understand marine mammal interactions with sound.[18] NMMA strongly supports additional scientific research pursuant to NRC and U.S. Ocean Commission recommendations.

NMMA as well as acousticians and marine mammal bio-acousticians understand that there are various parameters still un-calibrated or even measured that effect any proposed modeling effort. The simplest parameters, like calibrated source levels and spectrums of specific noise sources; direct physical oceanographic data and site specific bathymetry; sound speed profiles; and transmission loss and propagation curves unique to specific habitats and influenced by various times of the day, season and climatic conditions, need to be measured. In addition to these parameters, more research is needed on the hearing abilities of each species group of concern, such as their representative audiograms, critical masking ratios for various types of sounds, critical bandwidths of hearing, directional hearing, temporary threshold shifts for various types of sounds and the source levels and spectra of their vocalizations. Still unknown are the actual 14
sound fields that directly cause measurable and statistically significant disturbances that affect the health of the populations. Until such research is undertaken, it seems clear that models and matrices are not operable and should not form the basis of regulatory decisions. The public and stakeholders will lack confidence in Agency management decisions related to sound if the Agency proceeds at this time.

NMFS, for its part, acknowledges the paucity of current data, indicating that "there are no direct data on the effects of many kinds of sound on many species of marine mammals," and that it will be necessary to "extrapolate" to "cover cases of missing data."[19] The lack of science in this area coupled with the agency's desire to move forward with more specific guidelines signals that NMFS plans to pursue a precautionary approach to management, something with which NMMA has reservations. NMMA feels strongly that NMFS should, prior to establishing new sound exposure threshold criteria, initiate a comprehensive research program which seeks to dramatically improve scientific data in this area. This research program should be fully transparent and include public participation and review from the beginning. Only once the research is completed should NMFS begin developing sound exposure threshold guidelines for marine mammals.

Assumptions and Extrapolations are Problematic

NMMA is concerned that NMFS, by seeking to establish a new set of guidelines with an incomplete set of information, is merely replacing one set of generic guidelines with another. In any event, the effort seems forced and premature. The many assumptions and extrapolations the Agency has identified it will need to make are problematic. NMMA believes that the extreme 15
variability in mammalian auditory thresholds undermines the reliability of such extrapolations, which may be inaccurate, imprecise, and often inappropriate for management. Our view is

[18] U.S. Commission on Ocean Policy, An Ocean Blueprint for the 21st Century at 272.
[19] 70 Fed. Reg. at 1872.

bolstered by the experts, who have observed that "researchers have generally investigated either very basic mechanisms of hearing or induced and explored human auditory system diseases and hearing failures through these test species. Ironically, because of this emphasis, remarkably little is known about natural, habitat, and species-specific aspects of hearing in most mammals."[20] Based on the Notice of Intent, this seems not to have changed. Although NMFS claims to be establishing guidelines "tailored to particular species groups and sound types," its limited data set constrains its ability to do so.[21] The lack of audiograms is just the tip of the audiometric iceberg. Current science has to offer only limited masked threshold information, and even less on critical bandwidths and directional hearing. The sample size in existing behavioral studies is extremely small and may not be representative of the species that was tested, much less an entire functional hearing group. Furthermore, most controlled audiometric evaluations have been conducted with pure tones and/or narrow band emissions and do not reflect many of the real world sounds of concern. While auditory brain stem ABR studies provide new data on more subjects and hopefully more species in the future, the estimates of hearing sensitivity derived from electro-physiological methods are not as accurate as estimates from behavioral procedures. More importantly, the vast audiometric data needed on absolute hearing, masked thresholds, critical bandwidths, directional hearing, and TTS for various noise and signal types and with various representative species in order for them to act as exemplars are not in hand or on the near horizon.

NMFS has outlined in its notice some of the assumptions it will need to make during the development of its acoustic matrix of threshold levels, including: 15

1. All species in a functional hearing group have the same threshold;
2. The relatively limited set of data is capable of covering cases of missing data, so that information about the auditory of sensibilities of dolphins will apply to "other cetaceans;"
3. Applying hearing data from mid-frequency mammals to low-and high-frequency mammals is appropriate;
4. Utilizing data from terrestrial mammals is appropriate;
5. Extrapolating permanent threshold shift (PTS) levels from a limited set of temporary threshold shift (TTS) data, since no data on PTS exist, is appropriate; and
6. Behavioral avoidance constitutes a biologically significant disturbance.

This long list of assumptions that NMFS is apparently willing to make is troubling from both a scientific and a regulatory perspective. The Agency's willingness to apply data across functional hearing groups and even among mammals within the same species fails to account for well-known and well-documented variability in species' auditory characteristics. According to NRC, "the behavioral responses of marine mammals to acoustic stimuli vary widely, depending on the species, the context, the properties of the stimuli, and prior exposure of the animals."[22]

[20] National Research Council, Ocean Noise and Marine Mammals (2003) at 84.
[21] 70 Fed. Reg. at 1872.
[22] Committee on Characterizing Biologically Significant Marine Mammal Behavior, Ocean Studies Board, National Research Council, Marine Mammal Populations and Ocean Noise: Determining when Noise Causes Biologically Significant Effects (National Academies Press, 2005) at 26.

Moreover, marine mammals are an "extreme example" of habitat adaptations and adaptations in ear structure and hearing capacity.[23] In other words, external factors affect hearing even within species. It is also known that marine mammals suffer hearing loss with age, and may be impacted by natural sounds as well. The new guidelines proposed by NMFS also fail to consider 15
a wide array of variables, including demographics, habituation and prior experience with loud or sustained noise levels, resource availability, the health of individuals and other factors of individual variability, sound transmission characteristics, ambient noise levels, weather conditions, and others.[24] These variables are extremely difficult—if not impossible—to address through broad-based criteria and guidelines.

Marine Mammals and Hearing Thresholds are Largely Unknown

NMMA is deeply concerned about the lack of audiograms on marine mammals available to regulators and other policymakers. Although there are 119 marine mammal species, audiograms are currently available only for 10 species of odontocetes and 11 species of pinnipeds.[25] As has been noted, the subject sample size of these species within these investigations has been very small and, in many instances, inclusive of only a single individual. The result is that "direct behavioral or physiologic hearing data for nearly 80 percent of the genera and species of concern for coastal and open-ocean sound impacts *do not exist*."[26]

Even with the existing data garnered from available audiograms, it is clear that considerable variation in hearing range and sensitivity exists among marine mammals.[27] Given that, NMMA is perplexed as to why NMFS thinks it appropriate to extrapolate data among and across different marine mammal species and even data from terrestrial mammals where none for marine mammals exists.

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Defining the audiometric capabilities (audiogram, masked threshold critical ratios, critical bands, directional hearing, TTS) of the functional groups is primary and essential to begin predicting zones of audibility, masking, potential hearing damage and biological disturbance. Defining the spectra and source levels of different sources and species-specific calls is also necessary for mapping areas of concern. Aside from these parameters to which we have repeatedly referred, the physical data on bathymetry, surface and bottom boundaries, acoustical transmission losses, and propagation are all vital parameters that change with location, time, and environmental climatic conditions. The high variability of physical parameters, audiometric limits, and animal behavior make modeling untenable without meaningful data to input.

In addition, science in the area of marine mammals and underwater acoustics seems to be stagnating, something which may only be exacerbated by the current effort to utilize the existing base of incomplete scientific data to draft new sound exposure threshold guidelines. The National Research Council has noted that critical issues about the effects of transient and long-term anthropogenic sound on individuals and populations "remain unanswered," while indirect

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[23] National Research Council, Ocean Noise and Marine Mammals (2003) at 84.
[24] National Research Council, Ocean Noise and Marine Mammals (2003) at 95.
[25] National Research Council, Ocean Noise and Marine Mammals (2003) at 86.
[26] National Research Council, Ocean Noise and Marine Mammals (2003) at 86.
[27] National Research Council, Ocean Noise and Marine Mammals (2003) at 86.

effects of sound on marine mammals are "largely uninvestigated."[28] Many of NRC's calls for improved scientific research have gone unheeded. Should NMFS proceed with this effort, research may stagnate further out of a perceived lack of need. Since more science is needed, this unintended outcome would be unfortunate. NMFS should take every opportunity to actively encourage independent scientific inquiry in marine acoustic research. 16

Biological Significance is not Understood

Of particular concern to NMMA is the lack of scientific understanding of what constitutes "meaningful biological disturbance" from marine sound in both the short- and long-term. Although little is known about marine mammals and noise in general, even less is understood about biologically significant disturbance. Long-term effects of noise on individuals and particularly on populations are not known. In many instances, studies that refer to noise effects, particularly of recreational boats, have failed to convincingly parse out noise from physical presence or surface activities. Unfortunately, this has not restrained biologists from making inferences about sound impacts without the benefit of careful acoustical measurements and calibrated acoustical data. It is widely known that scientific investigation into the "biology of disturbance" has not been pursued in a comprehensive manner.[29] Accurate assessments of biologically statistically significant impacts from noise are, in most instances, simply infeasible without great leaps of faith in which scientists and regulators rely on a myriad of assumptions and extrapolations.

Animal reactions are varied and individuals in social populations or groups can react to the same stimuli differently depending upon the social mix and activities of the group. Determining when 17 a specific noise disrupts normal animal behavior is a difficult task. Even more challenging to determine is whether responses are direct or indirect, and whether there is any biological relevance to an individual's fitness, never mind the population at large. The challenge for biologists and acousticians is documenting when a biologically significant behavioral avoidance occurs, and when such avoidance is statistically significant for a marine mammal population. At present, NMFS can do neither. Much of the existing research on avoidance is based on data gathered from non-repeatable observational studies. Observational studies may prove correlation; they do not prove causation. Indeed, "[c]urrent knowledge is insufficient to predict which behavioral responses to anthropogenic sounds will result in significant population consequences for marine mammals."[30] Until, as recommended by NRC in its most recent assessment, scientific research moves beyond observational, correlational data to controlled-exposure, dose-response experiments, decision-makers will lack the necessary statistical information regarding likelihood of acoustic reactions across marine mammal species to noise stimuli as well as any meaningful understanding of whether those reactions are biologically important for the animal. That the overwhelming majority of studies are correlational calls into question the validity of NOAA's current efforts to rewrite the guidelines. More specifically, it calls into question the scientific basis for the proposed alternatives.

[28] National Research Council, Ocean Noise and Marine Mammals (2003) at 83.
[29] National Research Council, Marine Mammal Populations and Ocean Noise: Determining when Noise Causes Biologically Significant Effects (2005) at 2.
[30] National Research Council, Marine Mammal Populations and Ocean Noise: Determining when Noise Causes Biologically Significant Effects (2005) at 10.

NRC has developed a model with which regulators, policymakers, and researches can assess the potential impacts of acoustic disturbances on marine mammals, although the current state of scientific research led NRC to conclude that "we are a decade or more away from having the data and understanding of the transfer functions needed to turn such a conceptual model into a functional, implementable tool."[31] It seems abundantly clear to NMMA that NMFS should shift its focus and rededicate its available resources to collecting the data and conducting the research needed to make NRC's conceptual model a viable management tool.

In any case, the National Research Council and the U.S. Commission on Ocean Policy have emphasized the need to restore balance and common sense to management by assessing risks to marine mammals with an eye toward biologically and statistically significant disturbance. Both NRC and USCOP have recommended statutory changes to the current definitions of 17 "harassment" under the Marine Mammal Protection Act. In 2000, NRC re-emphasized its previous recommendation to focus on biologically significant disturbances, something which it again reiterated in its 2005 report. More than that, however, NRC modified its recommendation to encourage regulators and researchers to focus on "statistically significant and biologically significant changes in behavior."[32] In other words, that sound may result in behavioral changes does not mean these changes are either biologically significant or statistically significant for the mammal population at large. In some cases, as with the manatee population, avoidance of the boat by the animal is a positive reaction, something which is reflected in the existing manatee management regime in Florida.[33] In any case, researchers must increase their understanding of how short-term behavioral changes impact the larger mammal population.

Sound from Recreational Watercraft is not Significant

To the extent that marine acousticians increasingly view ocean noise as a cumulative issue, it is important to point out that existing information is extremely limited with respect to underwater noise emissions from anthropogenic sound sources. While, for example, the underwater sound characteristics of a commercial shipping vessel are known, the total contribution of commercial shipping to the ocean noise budget is not. As it stands, "data regarding noise produced by shipping, seismic surveying, oil and gas production, marine and coastal construction, and other marine activities are either not known or are difficult to analyze because they are maintained by 18 separate organizations."[34] With respect to recreational boating and private vessel traffic, NRC is clear that underwater sound contributions for recreational watercraft "have not been quantified."[35] It has been noted, however, that "pleasure craft do not contribute significantly to the global ocean acoustic environment," although, to be fair, NRC does indicate that some boats could have impacts in specific local marine environments.[36]

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[31] National Research Council, Marine Mammal Populations and Ocean Noise: Determining when Noise Causes Biologically Significant Effects (2005) at 4.
[32] National Research Council, Marine Mammal Populations and Ocean Noise: Determining when Noise Causes Biologically Significant Effects (2005) at 20.
[33] NMMA is aware that the current proposal is not inclusive of manatees.
[34] National Research Council, Ocean Noise and Marine Mammals (2003) at 7.
[35] National Research Council, Ocean Noise and Marine Mammals (2003) at 50.
[36] National Research Council, Ocean Noise and Marine Mammals (2003) at 56-57.

The conclusion by NRC, and what appears to be a general assumption within the regulatory community, that sound from recreational watercraft negatively impacts marine mammals and other wildlife is purely speculative. First, virtually no reliable research on underwater sound levels from recreational boats has been conducted. Calibrated acoustical measurements of spectra and source levels of the myriad of craft are not available. Subsequent propeller noise propagation tests of different boat types in highly site-specific areas have not been conducted. In many of the shallow estuarine and coastal habitats frequented by recreational boaters, the dominant sound spectra produced by recreational watercraft may not propagate or add to ambient noise below the specific frequency cut off limits that are defined by these habitats. Second, a European Commission report indicates that, at present, "no firm criteria for airborne or 18
underwater sound, nor [sic] reliable underwater sound level data are available to evaluate the impact of the use of recreational craft on wildlife."[37] Although some biologists have attempted to evaluate underwater sound emissions from boats, these studies have generally employed flawed methodologies and utilized un-calibrated estimates of source levels in poorly defined sound fields. With respect to recreational watercraft, reliable acoustical data should be obtained with standardized measurement methods that are relevant for the type of craft, its operation, and the specific environment of concern.[38] For personal watercraft (PWC), no calibrated underwater sound level data are available.[39] Since meaningful acoustical data have not been collected, the available studies and inferred negative impacts from sound from recreational boats are baseless. Considerable research remains to be done before any reliable conclusions can be made.[40]

Sound Science is Critical to Sound Exposure Guidelines for Marine Mammals

NMMA supports and encourages additional research related to marine mammals and ocean noise. It is clear that significant knowledge gaps exist and that scientists and policymakers need more information in order to make well-reasoned policy decisions. NMMA applauds NOAA and its partners for the considerable progress they have made in recent years and hopes the Agency recognizes that additional research, both empirical and theoretical, will bolster its ability to protect marine mammals while avoiding onerous and unnecessary restrictions on the regulated community. It is the position of NMMA that all regulatory efforts and federal policy should be guided and informed by sound science, which is capable of withstanding a rigorous peer review by independent experts in accordance with the Office of Management and Budget (OMB) peer review bulletin and which is subject to extensive public scrutiny and review.[41] Should sound 19
science not be immediately available, the Agency should strive to obtain it rather than relying

[37] R.C. Rijkeboer et al, TNO Automotive, "Stocktaking Study on the Current Status and Developments of Technology and Regulations Related to the Environmental Performance of Recreational Marine Engines," prepared for European Commission, Directorate-General Enterprise Directorate E (January 2005) at 74.

[38] The European Commission report also noted that acoustical data from boats should take into consideration the potential uses of the vessel, saying, "the *use* of a recreational craft can be just as important as the *sound emission* of that craft; and even the sound emission of the craft is determined largely by its user" (60). In other words, sound emissions from recreational watercraft are highly subjective and will be difficult to measure with much precision.

[39] Rijkeboer et al (2005) at 8. The European Commission study concluded that "reliable data should be based on a standardized measurement method that is relevant for the type of craft and its use. Such a method is not yet available. For personal watercraft (PWC) no underwater sound level data are known at all."

[40] Rijkeboer et al (2005) at 9.

[41] Office of Management and Budget, Final Information Quality Bulletin for Peer Review, (Dec. 16, 2004).

strictly on a precautionary approach to management, an often imperfect and overly-broad regulatory tool that can function as a disincentive to developing a larger scientific understanding on the natural resource in question. Ultimately, NMMA believes that the application of sound science in regulatory decision making will enhance marine resource management, leading to the most effective—and the most equitable—regulations, should they be deemed necessary. 19

III. Analysis of Alternatives

NMMA appreciates the Agency outlining its proposed alternatives, although we reiterate our earlier claim that sound exposure criteria for each alternative should be specifically outlined for each class of mammals in order for the public to fully understand the potential impacts of the proposed agency action. With respect to the proposed alternatives, NMMA currently prefers to No Action Alternative due to an inability to assess the Action Alternatives in any meaningful way at this time. 20

NMMA Prefers Alternative I

NMMA supports maintaining the status quo until and unless additional research on marine mammals and noise is conducted. NMMA prefers the No Action Alternative primarily because this is the only option we can accurately assess with any degree of certainty. NMMA acknowledges that the current guidelines suffer from a failure to consider duration, frequency, and repetition rate, but unless NMFS provides additional information as has been requested above, NMMA will continue to prefer the No Action Alternative. 21

NMMA Opposes Alternative II

NMMA strongly opposes Alternative II, which would establish a basis for unreasonable restrictions on recreational boating and angling access even in instances when such restrictions would do nothing to protect the targeted species. The selection of ambient conditions to use for these criteria is problematic. Ambient noise extremes can exceed 260 dB re 1 meter from lightning strikes or increase 35 dB with continuous driving rain, both of which can cause TTS. Such extreme variability based on natural environmental conditions begs the question, absurd though it may be: do we regulate the weather?

NMMA sees no basis for a criterion based on human noise sources exceeding the highest average ambient noise level in the area of operation, since such a standard seems to relate neither to a mammal's auditory threshold or the likelihood of biologically significant disturbance, nor does it account for natural, radical fluctuations in ambient noise levels, which clearly demonstrate an individual's ability to cope with variation in noise levels. 22

Even more concerning to NMMA is the classification of a human noise source exceeding the *lowest* possible ambient noise conditions as a Level B harassment. This standard would functionally restrict all human activity in the marine environment, which is clearly not the intent of the law and which would do nothing, in our view, to advance marine resource protection in an equitable way. In addition, we believe this alternative fundamentally conflicts with the multiple use mandates of the National Environmental Policy Act. Alternative II also entails a high degree of unpredictability. The regulated community would be unable to determine whether or not it was in fact disturbing a marine mammal because of the high degree of variability in ambient noise levels, as well as the fact that such a standard has the potential of being radically different depending on the specific marine environment, even if the marine mammal species for which the protection is targeted is the same. The result could be a relatively high threshold for disturbance of a mammal in one marine environment, and, in a different environment, an extremely low threshold for disturbance for the same mammal type. This poses significant challenges to both our ability to determine the impact of these criteria as well as cope with any regulations which may emerge from their eventual application. 22

NMMA Opposes Alternative III

NMMA opposes the use of behavioral avoidance as a standard for determining an acoustic take under the Marine Mammal Protection Act. As has been noted previously, it is unclear whether behavioral avoidance results in biologically significant harm to the animal. The science on avoidance for many marine mammals is equivocal, often with the same individual mammal responding differently to the same noise source (i.e. approaching the source on one occasion, and avoiding it on another).[42] In social groups, even the composition of individuals can lead to differential responses by individuals and the group. Social communities compound the variability in behavior. Moreover, the science which undergirds avoidance is almost completely based on non-repeatable observational studies, about which we have already raised questions. Much of the observational work was conducted without segregating noise from physical presence and some without any meaningful acoustical calibration. NMFS should not pursue criteria based on behavioral avoidance without the benefit of a long-term research study utilizing controlled exposure, dose-response experiments with appropriate acoustical calibration and bathymetric measurements to estimate sound speed profiles, transmission loss, source levels, etc. 23
Studies must have the statistical rigor to demonstrate biologically significant impacts on the mammal population. In addition, avoidance by marine mammals is often a preferable outcome, particularly when such avoidance results in the animal not be struck by a ship or other vessel.

NMMA believes that NMFS has failed to provide adequate justification for its 50 percent avoidance standard within its Notice of Intent, and NMMA is not convinced that the body of scientific research on avoidance is sufficient to justify such a criterion. NMMA also opposes the Level A criterion of TTS onset. Temporary threshold shift, while conceivably an indicator of stress on the animal, does not in itself result in irreversible physical harm. Moreover, TTS onset does not necessarily indicate a "disturbance" of a marine mammal. In any event, NMFS should identify the TTS onset occurrence in each of the marine mammal species for which it is pursuing these new guidelines in order for public stakeholders to adequately assess the impact of this criterion.

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[42] W. John Richardson et al, Marine Mammals and Noise (Academic Press, 1995) at 252, 265; National Research Council, Ocean Noise and Marine Mammals (2003) at 90-95, 102-103; Bioacoustics Research Program, Cornell University Lab of Ornithology, "Effects of Human-made Sound on the Behavior of Whales," at http://birds.cornell.edu/brp/HumanMadeSound.html, Accessed March 11, 2005.

NMMA Opposes Alternatives IV & V

NMMA agrees that noise levels which result in permanent hearing loss (e.g. irreversible cell damage which results in a meaningful change in hearing sensitivity) constitute a disturbance and that well-reasoned efforts should be taken to prevent such an outcome. Nevertheless, NMMA is unclear as to the basis for the 6 dB "safety" factor included in Alternative IV. NMFS should clarify the scientific basis for this criterion. With respect to Level B criterion in Alternative IV identifying disturbance as TTS onset minus 6 dB, NMMA reiterates its comments regarding TTS above. The Alternative V criteria should be expounded upon and discussed for other marine mammal species beyond the Gray Whale. When applied to the Gray Whale, it seems clear that this Alternative would likely have little impact on recreational watercraft, which are unlikely to reach even peak noise levels of 195 dB. Nevertheless, as the criteria are potentially subject to change within different functional hearing groups and for different marine mammals, NMMA would request that NMFS provide sound exposure levels for all other types of marine mammals in its proposed five functional hearing groups. NMMA is also concerned that the criteria outlined in these alternatives fails to account for variability in different marine environments as well as sound propagation characteristics. 24

NMMA Needs More Information to Assess Alternative VI

NMMA acknowledges that this alternative appears to be the most reasonable of the action alternatives, but we would reiterate our request to see the sound exposure thresholds for each of the marine mammals in the five functional hearing groups. In addition, NMMA is concerned that this alternative fails to account for the variables involved in sound propagation in specific marine environments. Although we do not wish to register direct opposition to this alternative, NMMA would prefer to retain the status quo and pursue scientific investigations which are specific to the hearing thresholds of specific marine mammal species, rather than relying on data extrapolations across functional hearing groups and across different marine mammal species. Quite simply, to do otherwise would be premature. 25

IV. Management Challenges Are Numerous

NMMA appreciates NOAA's desire to adopt new "science-based criteria" for establishing an acoustic take under MMPA. Clearly, the ecological impacts of anthropogenic ocean noise are an important management concern for federal regulators charged with protecting marine mammals. Nevertheless, it is NMMA's view that the science is not yet capable of providing clear guidance to decision makers and is insufficient to aid in the development of good public policy. The Marine Mammal Commission (MMC), an independent advisory group established under MMPA, has elucidated the nature of this problem clearly: "Even if the science were more conclusive and available to decision makers, it might not solve the problem of determining what consequences are acceptable (or not), as a matter of public policy."[43] 26

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[43]Suzanne Orenstein, Lee Langstaff, & Linda Manning, Facilitators for the Advisory Committee on Marine Mammals and Athropogenic Sound, "Process Assessment Report for a Dialogue on Impacts of Anthropogenic Noise and Marine Mammals," prepared for the Marine Mammal Commission (Dec. 4, 2003) at 8.

In addition, the definitions of harassment in the MMPA have resulted in much confusion for both regulatory agencies and the regulated community. The lack of clarity surrounding the statutory definitions of harassment means that potentially any activity by recreational boaters and anglers could be construed as harassment. Within the context of recreational boating and boat engine noise, this lack of clarity becomes more acute, particularly in light of some of the alternatives proposed by NMFS in its Notice of Intent. Preparing more specific guidelines which operate under the current definitions does not correct the fundamental lack of clarity in the MMPA. In 2000, the National Research Council determined that the intent of the MMPA was never to regulate activities that result in minor behavioral changes, but rather activities which cause "meaningful disruptions to biologically significant activities," and made recommendations to clarify the MMPA to that end. The U.S. Commission on Ocean Policy has endorsed this recommendation.[44] 27

Currently, however, the MMPA remains vague and subject to considerable interpretation. The U.S. Ocean Commission was forthright in its assessment of the current challenges with MMPA, noting, "NOAA and USFWS have had difficulties implementing the 1994 definition, which has led to public uncertainty with respect to its implications. The lack of clarity means that almost any commercial, recreational, or scientific activity that is noticed by a marine mammal might be defined as harassment. Both agencies assert that the confusion limits their ability to regulate even potentially harmful activities."[45] Given this, the current effort by NOAA to establish new sound exposure level criteria, which could result in greater restrictions on human activities in the marine environment, is of some concern. NMMA supports a well-reasoned effort to provide more clarity and certainty on what constitutes harassment. At the present time, however, such action is premature given the lack of reliable and fully developed scientific knowledge capable of providing adequate justification for any specific regulatory threshold, which will compound, rather than correct, the fundamental lack of clarity inherent in the law.

Indeed, the Marine Mammal Commission has acknowledged "available information is often insufficient to accurately assess how existing sound sources may be affecting, or how new sound sources may affect, marine mammals and other components of marine ecosystems. Uncertainty about the effects of various sound sources confounds management efforts to provide suitable levels of protection for marine mammals and marine ecosystems while avoiding unnecessary constraints on those activities that generate the sound."[46] It is precisely these unnecessary constraints NMMA seeks to avoid. 28

To that end, should NMFS continue to pursue this path, it should make it clear that it is not the intention of these guidelines to be used in the development of broad, far-sweeping closures to access to our nation's aquatic resources. Such a regulatory outcome would be ill advised considering the extreme variability with respect to the potential impacts sound may or may not have on marine mammals in their specific habitats. As has been noted previously, one of the

[44] U.S. Commission on Ocean Policy, An Ocean Blueprint for the 21st Century (2004) at 269. Recommendation 20-6 of the U.S. Commission on Ocean Policy states: "Congress should amend the Marine Mammal Protection Act to revise the definition of harassment to cover only activities that meaningfully disrupt behaviors that are significant to the survival and reproduction of marine mammals."

[45] U.S. Commission on Ocean Policy, An Ocean Blueprint for the 21st Century (2004) at 269.

[46] Marine Mammal Commission, Annual Report to Congress (April 30, 2004) at 95.

only certainties existing research has been able to demonstrate is that any potential environmental impacts associated with anthropogenic noise are contingent on a wide array of contextual factors that do not seem to be sufficiently accounted for in the proposed alternatives. 28

V. Conclusion

NMMA strongly encourages NOAA to acknowledge that available science remains inadequate to justify the current endeavor. To be clear, NMMA supports additional research and scientific inquiry, and the association hopes the Agency elects to undertake such research rather than proceed prematurely with its current proposal. 29

The National Marine Manufacturers Association appreciates the opportunity to provide comment on the Notice of Public Scoping and Intent to Prepare an Environmental Impact Statement on New Criteria for Sound Exposure Threshold Guidelines for Marine Mammals under the Marine Mammal Protection Act and Endangered Species Act. The recreational marine industry and the American boating public have a long history of sound environmental stewardship and NMMA looks forward to a continued relationship with the National Marine Fisheries Service regarding this and other issues.

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Sincerely,

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