United States Department of State

Bureau of Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

10 February 2014

Dr. Braulio Dias
Executive Secretary
Convention on Biological Diversity
World Trade Centre
393 Saint-Jacques Street, Suite 300
Montréal, Québec, Canada H2Y 1N9

Dear Dr. Dias:

In response to CBD Notification 2014-001 - Request for relevant information concerning the objectives of the Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity, the United States would like to provide the following information:

1. The impacts of underwater noise on marine and coastal biodiversity

Sound propagates efficiently in water, more so than all other sensory modalities and, not surprisingly, most marine organisms depend on sound for basic life functions. For example, dolphins use sound to locate food, large whales use sound to communicate with conspecifics across great distances, crabs use sound to find suitable habitat, groupers use sound in elaborate mating displays, and many organisms respond to the cues produced by predators. The addition of anthropogenic noise in the ocean (e.g. ship noise, seismic air guns, pile-driving) masks biological signals (predators, habitat), disrupts behavior (migration, foraging), and, in some cases, causes permanent and temporary hearing loss and increases stress. These behavioral, physiological and ecological changes not only have significant impacts to individual animals, but can have both population and ecosystem level consequences. Although additional research is needed to fill in some of the gaps and understand the impact of noise in the context of all other threats to biodiversity, there is a large body of scientific literature documenting the impacts of underwater noise. We have provided several examples below, organized by effect. Adopting mitigation strategies to reduce unnecessary underwater noise produced by human activities can potentially increase resilience to other stressors that are more difficult to reduce.

2. Practical guidance and toolkits to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, including marine mammals.

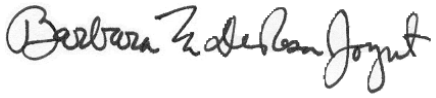
An example and practical guidance of how the U.S. National Park Service (NPS) has sought to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, including marine mammals, comes from Glacier Bay National

Park and Preserve. Cruise ship numbers and operating requirements have been in place for Glacier Bay since 1979 due to concerns that marine traffic might adversely affect endangered humpback whales. Managers now recognize that vessels may directly or indirectly affect a variety of marine and coastal wildlife, flora, air and water quality, wilderness character, and the visitor experience. Legislation that established the NPS and Glacier Bay National Park and Preserve, as well as other laws, oblige the NPS to anticipate and mitigate the potential effects of vessels on park resources and values. Glacier Bay has an ongoing underwater acoustic environment monitoring program to evaluate the impacts of vessel traffic and inform vessel quotas and operating requirements. Additional information is available at http://www.nps.gov/glba/parkmgmt/vessel.htm.

In addition to the information contained above, attached to this letter is a list of articles which are provided as attachments to our e-mail transmission but which are not appended here.

We hope this information is helpful to the workshop participants.

Sincerely,



Barbara M. De Rosa-Joynt
Chief for Biodiversity
U.S. National Focal Point for the
Convention on Biological Diversity
U.S. Department of State
Washington, DC, United States of America

Attachment: list of articles provided by e-mail.

Articles Provided Electronically

Marine Mammals

Aguilar Soto N, Johnson M, Madsen PT, Tyack PL, Bocconcelli A, Fabrizio Borsani J (2006) Does Intense Ship Noise Disrupt Foraging in Deep-Diving Cuvier'S Beaked Whales (Ziphius Cavirostris)? Mar Mammal Sci 22:690–699

Ellison, W. T., et al. (2011). "A New Context-Based Approach to Assess Marine Mammal Behavioral Responses to Anthropogenic Sounds. Conservation Biology

Goldbogen J a, Southall BL, Deruiter SL, Calambokidis J, Friedlaender AS, Hazen EL, Falcone E a, Schorr GS, Douglas A, Moretti DJ, Kyburg C, McKenna MF, Tyack PL (2013) Blue whales respond to simulated mid-frequency military sonar. Proc Biol Sci 280:20130657

Hatch, L. T., et al. (2012). "Quantifying Loss of Acoustic Communication Space for Right Whales in and around a U.S. National Marine Sanctuary. Conservation Biology

Mooney T, Nachtigall P, Vlachos S (2009) Sonar-induced temporary hearing loss in dolphins. Biol Lett 5:565–567

National Oceanic and Atmospheric Administration. 2012. Mapping Cetaceans and Sound: Modern Tools for Ocean Management. Final Symposium Report of a Technical Workshop held May 23-24 in Washington, D.C. 83 pp. <available online at: http://cetsound.noaa.gov/report.html>

National Oceanic and Atmospheric Administration. (2013). Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals Acoustic Threshold Levels for Onset of Permanent and Temporary Threshold Shifts. < available online at: http://www.nmfs.noaa.gov/pr/acoustics/draft_acoustic_guidance_2013.pdf>

NRC (2003). Ocean Noise and Marine Mammals, National Research Council-National Academies Press.

NRC (2005). Marine Mammal Populations and Ocean Noise, National Research Council-National Academies Press.

Rolland, R. M., et al. (2012). "Evidence that ship noise increases stress in right whales." Proceedings of the Royal Society B published online 8 February 2012. 279 2363-2368.

Southall, B. L., et al. (2007). "Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations." Aquatic Mammals 33(4).

Fish

Anderson P a., Berzins IK, Fogarty F, Hamlin HJ, Guillette LJ (2011) Sound, stress, and seahorses: The consequences of a noisy environment to animal health. Aquaculture 311:129–138

Jung CA, Swearer SE (2011) Reactions of temperate reef fish larvae to boat sound. Aquat Conserv Mar Freshw Ecosyst 21:389–396

Popper, A. N. and M. C. Hastings (2009). "The effects of anthropogenic sources of sound on fishes." Journal of Fish Biology 75(3): 455-489.

Slabbekoorn, H., et al. (2010). "A noisy spring: the impact of globally rising underwater sound levels on fish." Trends in Ecology & Evolution 25(7): 419-427.

Fish & Invertebrates

Normandeau Associates, Inc. (2012). Effects of Noise on Fish, Fisheries, and Invertebrates in the U.S. Atlantic and Arctic from Energy Industry Sound-Generating Activities. A Literature Synthesis for the U.S. Dept. of the Interior, Bureau of Ocean Energy Management. Contract # M11PC00031. 153 pp.

Invertebrates

André M, Solé M, Lenoir M, Durfort M, Quero C, Mas A, Lombarte A, Schaar M van der, López-Bejar M, Morell M, Zaugg S, Houégnigan L (2011) Low-frequency sounds induce acoustic trauma in cephalopods. Front Ecol Environ 9:489–493

Morley, E. L., et al. (2014). "The importance of invertebrates when considering the impacts of anthropogenic noise." Proceedings of the Royal Society B: Biological Sciences 281(1776).

Wale, M. A., et al. (2013). "Noise negatively affects foraging and antipredator behaviour in shore crabs." Animal Behaviour 86(1): 111-118.

Turtles

Dow Piniak W. E., Eckert, S. A., Harms, C. A. and Stringer, E. M. (2012). Underwater hearing sensitivity of the leatherback sea turtle (Dermochelys coriacea): Assessing the potential effect of anthropogenic noise. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Herndon, VA. OCS Study BOEM 2012-01156. 35pp.

Terrestrial-marine conservation priorities

Barber, J. R., et al. (2010). "The costs of chronic noise exposure for terrestrial organisms." Trends in Ecology & Evolution **25**(3): 180-189.

Francis, C. D. and J. R. Barber (2013). "A framework for understanding noise impacts on wildlife: an urgent conservation priority." Frontiers in Ecology and the Environment 11(6): 305-313.

Masking Effects:

Clark C, Ellison W, Southall B, Hatch L, Parijs S Van, Frankel a, Ponirakis D (2009) Acoustic masking in marine ecosystems: intuitions, analysis, and implication. Mar Ecol Prog Ser 395:201–222