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House Natural Resources Committee: Subcommittee on Energy and Mineral Resources, and Subcommittee on Insular Affairs, Oceans and Wildlife

"Energy Development on the Outer Continental Shelf and the Future of our Oceans"

Tuesday, 24 March 2009, at 10 a.m.

Thank you Chairman Costa, Chairwoman Bordallo, Ranking Members Lamborn and Brown, and other members of the Committee for holding these hearings and for inviting me to be here today to speak with you.

It is with hope and some foreboding that I provide this testimony.
I want to convey these important messages to you today:

1. Marine animals (e.g., whales, fishes, lobsters & crabs) produce and listen to sound. They depend on sound and a clean acoustic environment to survive.
2. Increasingly, human activities in the ocean are generating sounds that compete with the animals, so much so that many marine habitats are now acoustically urbanized or industrialized. In many areas there is so much acoustic smog and interference from human activities that for all intents and purposes the ocean's acoustic environment is bleached and cluttered with acoustic debris. There is now evidence that for whales, and probably for fish, human noise is both an acute and a chronic problem.
3. We do not understand the full scope of the ocean noise problem as a result of human activities in the marine environment. We do not know the short-term or long-term costs, the small-scale and large-scale impacts, or the cumulative effects from all this added noise combined with other stressors.
4. I believe there are opportunities for finding solutions that are both ecologically responsible and economically viable.

I am one of the world's foremost authorities on the marine acoustic world as it pertains to the large whales; the giants whose voices can be heard across an ocean basin. This is the acoustic world I understand very well. The primary focus of my scientific research is in marine mammal communication, with particular expertise in underwater sound and whale acoustic communication. I study such questions as: How do whales use sound to survive? What are whales saying? What are they listening to? How do human activities impact their chances of survival? Since 1982 I have conducted multiple, highly collaborative scientific research projects to obtain data on acoustic impacts from Navy sonars, oil & gas activity sounds and commercial shipping noise. I have also devoted considerable effort to describing and understanding the spatial and temporal scales over which marine mammals communicate and how human activities are changing their marine acoustic environment. More recently, using my skills as an engineer and a biologist, I have helped build a functional collaboration between industry and scientific institutions, with oversight from multiple federal and state agencies, to implement a marine acoustic

observation network off Boston (http://listenforwhales.org); this automated network allows LNG businesses to operate offshore while protecting whales in a critical habitat.
Communication is a central part of human society. It is woven into the fabric of our lives. We depend on our eyes and ears and voices to communicate. When our communication fails, we suffer the consequences.

Whales are no different. They depend on communication to maintain their social bonds, to make new ones, to exchange messages; to convey information about food, predators, ocean tides, migrations, and mating opportunities – all the basics of life in an ocean world.

If you live in the ocean one very big difference compared to living on land is that in the ocean light does not travel very far, but sound does. Sound in the ocean is the communication medium of necessity, especially if you must send your message to the largest audience possible or if you want to listen for threats. There are no fish that are known to be deaf. There are no marine mammals that are known to be deaf, and there certainly are no whales or dolphins that are known to be deaf.

As a result of human activities, ocean noise levels in some places have increased 100 to 1000 times above what they were 50 to 60 years ago. This noise increase affects some of the quietest places on earth, such as the OCS of Alaska, as a result of seasonal human activities such as O&G explorations. These high noise levels are now significantly reducing the chances for whales to communicate. This problem most likely applies to more than just whales. If time allows during this session I am prepared to present examples of what the ocean sounds like under these different quiet and noisy conditions.

Whales have lost significant portions of their acoustic habitats as a result of increased ocean noise. On a very clear day a blue whale (the largest animal ever to live on this planet) can see out as far as the length of a football field. On a very quiet day that same whale can be heard as far away as we are now from Boston, and on an exceptionally quiet day as far away as we are now from Miami. Those quiet days are now rare. As illustrated here, the area over which a blue whale could have communicated 60 years ago is dramatically smaller today as a result of ocean noise.

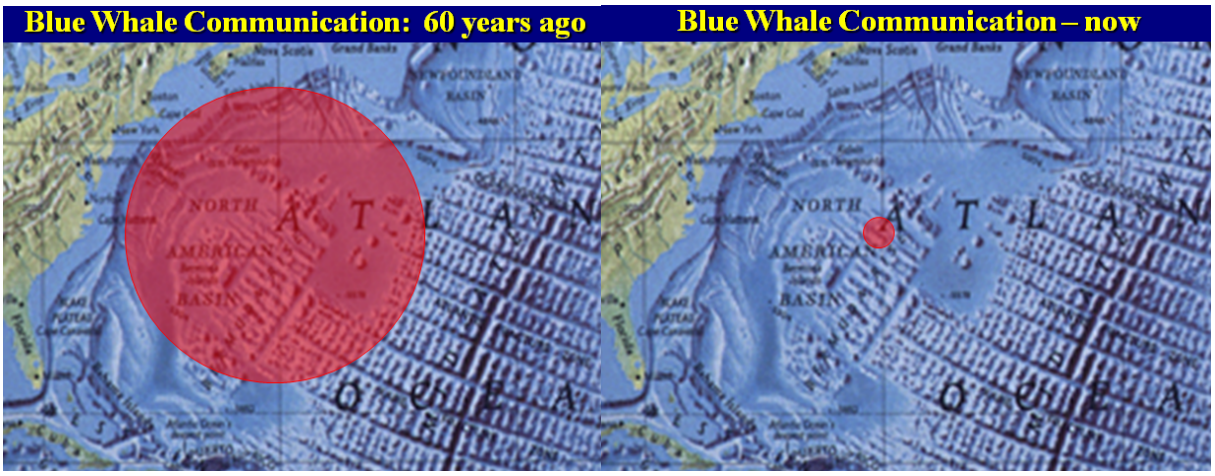

Figure 1. Schematic chart showing in red the area over which blue whales can communicate under quiet noise conditions (left) and under high noise conditions (right) as a result mostly of shipping traffic noise.

The impact of high ocean noise levels on whale communication can now be measured.

As the level of noise rises in the ocean, the ability to communicate falls. Thanks to an immense amount of basic and applied research, conducted or funded mostly by the Navy, we now have a very good idea of how sound travels and behaves in the ocean, so we can accurately and precisely predict how sound spreads through the ocean.

We know that sounds associated with commercial activities, both exploratory and operational, inject large amounts of noise into the ocean. So for example, in many areas along our coastlines the ocean noise level is such that the habitat is now "urbanized" and in some places the noise level is so high that the habitat would qualify as "industrialized". At times, in fact, it is so noisy that if we applied OSHA standards the whales would be required to wear ear protection.

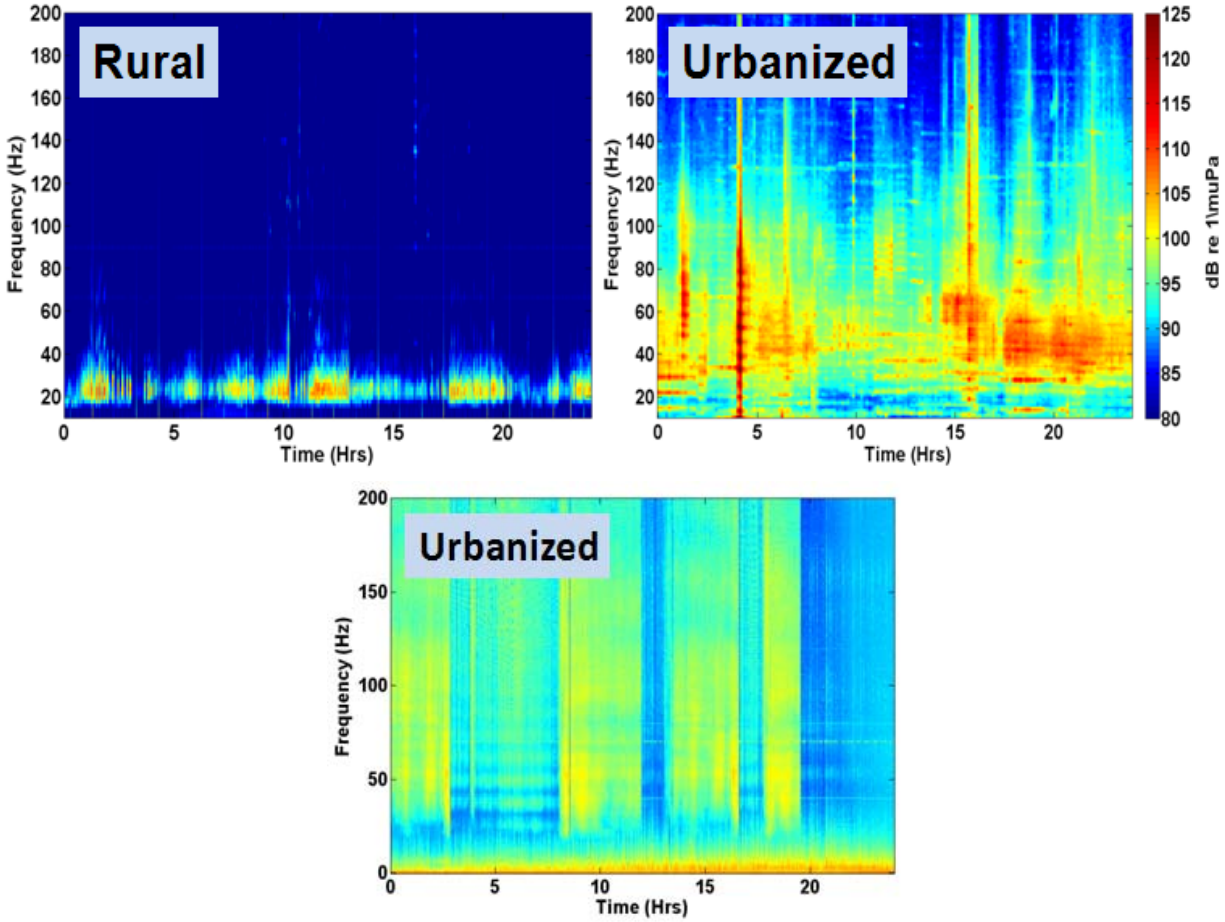

Figure 2. "Voice-print" type displays showing the differences between the acoustic environments in a rural ocean habitat and two urbanized ocean habitats. In the rural environment, the voices of whales are apparent as brightness in a deep blue background of quiet. In the urbanized environment examples, whale voices are lost beneath the intensity of shipping noise (top right) and exploration noise (lower).

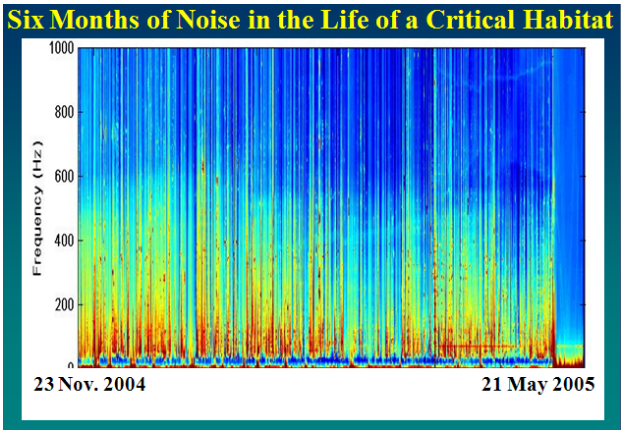

Figure 3. "Voice-print" type display showing the persistent intensity of shipping noise in Cape Cod Bay, MA, over a six month period. Whales were present and calling during this time period, but their voices were lost beneath the overwhelming intensity of shipping noise.

The North Atlantic right whale is one of the rarest whales on this planet. It inhabits the ocean from Maine to Florida. This population has experienced a dramatic loss in its acoustic habitat, and that loss results in a dramatic loss in communication.

We can now quantify how changes in noise from our activities impact the ability of whales to communicate. Thus, for example, in the Stellwagen Bank National Marine Sanctuary off Boston or in nearby Cape Cod Bay, places where whales aggregate to socialize and feed, average noise levels are so high that the whales have lost between 80-90% of their opportunities to communicate. Their society is being constantly interrupted by the noises of ship traffic; 24h a day, 365 days a year. What have the whales done in response to all this noise? First, they raised the pitch of their voices to be twice as high as it was 20 years ago. Second the whales simply stop calling. The result is that the communication system is being constantly broken. This means that the whales can't find mates, and they have trouble finding food. These are not good indicators for survival.

<u>There are things that can and are being done to reduce the impacts of offshore development on whales</u>. Can we responsibly explore and exploit the OCS such that the acoustic world that the whales and other marine animals depend on is respected and protected? Based on past performance, I have serious doubts, but I am an optimist. Furthermore, I have recently been engaged in a project that gives me hope. Through a functional collaboration between industry and scientific institutions, and with oversight from multiple federal and state agencies (e.g., Commerce, Transportation, USACE, USCG and MADMF) we have successfully implemented a marine acoustic observation network off Boston (http://listenforwhales.org); this automated network allows LNG businesses to operate offshore while protecting whales in a critical habitat.

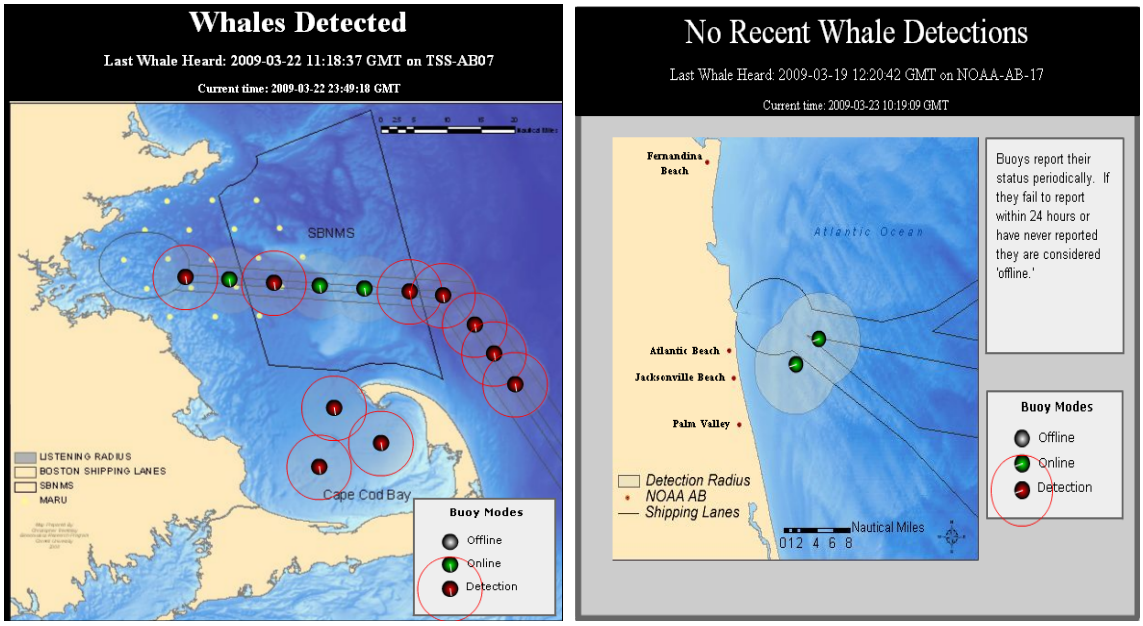

Figure 3. Charts showing the locations of listening buoys that are part of the operational whale detection and reporting network in the Boston shipping lanes and in Cape Cod Bay (left), and as part of a pilot project network straddling the shipping lane off Jacksonville, FL (right).

Before ending, I would like to state for the record my agreement with statements put forth by previous testimonies to this committee, and to add several extensions to those testimonies. These include:

1. The critical need for comprehensive ocean planning,
2. The importance of converting existing and future marine “sanctuaries” into true sanctuaries.
3. The need for a comprehensive review of OCS resources including a comprehensive cost-benefit analysis and objective assessment of long-term risks to ocean ecosystems.
4. The desperate need for increased scientific understandings of marine ecosystems over biologically meaningful scales; spatial, temporal and organism-based.
5. My sincere conclusion that solutions can and will be achieved by working together, doing cutting-edge science, and getting the facts straight so that we collectively make the right decisions.

Thank you very much for this opportunity to testify today on this important issue, and I welcome a constructive discussion toward real solutions.