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December 1, 2004

To: The Marine Mammal Advisory Committee on Noise & Marine Mammals

Source Mitagation and Normal Behavior

The Pew Oceans Report and the US Commission on Ocean Policy Report agree on the following point: The world's oceans are in peril. The two leading causes of this decline are over fishing and pollution.

There has been a substantial rise in ambient noise from human sources. Acute sound sources have been directly linked to marine mammal deaths. We do not know the level or duration of noise that is capable of causing harm. Until this is understood, we must look for ways to reduce the total quantity of sound (both acute and chronic) that we humans are creating in the seas.

During the nine years that I've been studying this problem, I've looked at many different mitigation ideas. From these, I believe there are simple off the shelf technologies that can be adopted by sound generating organizations that are capable of substantial reductions of both acute and chronic noise. The following are examples intended to stimulate further discussion.

Shipping – Sound sources: propeller, engine, depth finders
The Navy has spent billions on stealth technology for ships. In the mid '80s, George Walker sold stealth propeller technology to the Russians. What portion of this technology and engine quieting technology can now be transferred to the shipping industry?

Oil&Gas – Sound sources: Seismic, drilling, production
Most of the continental shelf has now been shot. The data resides in seismic libraries and is for sale. This data can be used to define an area of interest without re-shooting another wide area survey. VLF Electro Magnetic Pulse (EMP) technology has been developed and tested. It has demonstrated a capability equal to or greater than traditional seismic for 'fine-tuning' a given prospect. EMP technology is quiet and should have zero interaction with living organisms.

Navy – Sound sources: same as shipping + ordnance + high powered sonar
Cetacean strandings and deaths have been linked to exposure to Navy mid-frequency (53C) and low frequency sonar (LFAS).

Several years ago, I came across a presentation by Dr. Tom Greene. Working under a DARPA contract Dr. Greene used vertical hydrophone arrays and sophisticated digital signal processing techniques to substantially eliminate noise (wave slap, surface ship propellers, etc). As a result, his team was able to greatly extend the target acquisition range. In a real world experiment in the Santa Barbara shipping channel, this new passive technology allowed identification of a submarine that equaled or exceeded active sonar. While

passive or bi-static technology may not be appropriate in all situations, its use may significantly reduce the overall emissions of active sonars.

Cetacean Normal Behavior

Determining behavior change in cetaceans due to sound exposure is a major problem for us. They live near or below the surface of the water. They tend to be in motion most of the time. They are capable of moving large distances each day. Many species live in remote places and/or in cold water. We know a little about what they eat, where they calve and how many there are. Beyond that we are in the dark. Until we can develop a detailed species specific frame-of-reference, we have no baseline from which we can measure deviations.

Dr. Denise Herzing has been the research director of the Wild Dolphin Project for the last twenty years. She spends five months each year in the water with a single pod of Atlantic Spotted Dolphins (stennella frontalis). Over the life of the project she has recorded thousands of hours of dolphin interaction. While she knows more about 'normal behavior' of a single cetacean species than any other living person, she is the first to admit that WDP is in the beginning stages of understanding the intense and complex nature of dolphin interaction.
www.wilddolphinproject.com

Thank you for your time,

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