

# A Framework for Regulating Marine Noise under the Marine Mammal Protection Act

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## Preface

Scientists began to consider the harms which increasing ocean noise could have on marine life in 1995, when Scripps Institute of Oceanography unveiled its Acoustic Thermometry of Ocean Climate (ATOC) project design. The ATOC experiment was designed to measure global climate change by transmitting low frequency, high intensity, acoustic pulses from offshore Kauai at a depth of 807 meters,<sup>1</sup> and recording how long it took the pulse to reach the receiving station. Since the speed of sound differs depending on the temperature and salinity of water, Scripps scientists believed that the ATOC experiment would enable them to determine whether or not the world's oceans were experiencing a warming pattern. ATOC was designed to emit pulses between 57.5 and 92.5 Hz,<sup>2</sup> a frequency range commonly used by baleen whales.<sup>3</sup> Additionally, ATOC originated its acoustic pulses by setting off a series of air gun explosions. Since ATOC's air guns needed to operate at approximately 195 decibels,<sup>4</sup> the ATOC air guns posed some risk of causing barotrauma in marine life.

The Marine Mammal Research Program is charged with monitoring the behavioral responses of marine mammals exposed to ATOC. There have been two major studies done to determine the effects of ATOC on marine mammals, and both studies have shown very little marine mammal response to the sonar. Dr. Chris Clark did the first study, and reported that there were no short-term effects observed and that no monitored species showed any significant biologically adverse responses to the ATOC project. Furthermore, there was no decrease in the

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<sup>1</sup> Taking of Marine Mammals Incidental to Operation of a Low Frequency Sound Source by the North Pacific Acoustic Laboratory, 65 Fed. Reg. 51,584 (2000).

<sup>2</sup> Id.

<sup>3</sup> RICHARDSON, MARINE MAMMALS AND NOISE 162-164 (Academic Press 1995).

<sup>4</sup> Taking of Marine Mammals Incidental to Operation of a Low Frequency Sound Source by the North Pacific Acoustic Laboratory, 65 Fed. Reg. 51,584 (2000).

number of humpback whales sighted while the ATOC pulses were present.<sup>5</sup> In one ATOC bimonthly report, it was stated that the average distance of all sperm whales was greater when the sound was on.<sup>6</sup> A follow up study on the effects of ATOC was conducted by the National Research Council. The NRC reported that the California source transmission of the ATOC project did not appear to cause any real changes in the distribution of marine mammals.<sup>7</sup>

Despite the MMRP's conclusion that marine mammals failed to exhibit biologically significant behavioral responses to ATOC, there is credible evidence that marine mammals modified their behaviors at considerable distances from the ATOC source. For example, the journal Science reported that sperm whales within a 70 km radius of the ATOC source ceased clicking during transmission, and only resumed vocalizations a few days after the transmissions had ended.<sup>8</sup> Sperm whales are thought to use clicks to "maintain herd integrity."<sup>9</sup> Sperm whales click the most frequently when engaged in diving and foraging behavior.<sup>10</sup> Whether sperm whales are using clicks as echolocation clicks to assist in feeding, or as contact calls to maintain herd integrity,<sup>11</sup> clicks are both a normal behavior for sperm whales and, apparently, a biologically significant one. If clicks are used to maintain herd integrity during foraging, and clicking ceases, the cessation would tend to indicate that either (1) sperm whales are continuing to feed, but there is an increased risk of calf separation (and thereby death) or (2) sperm whales

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<sup>5</sup> Scripps Institute of Oceanography, *Kauai MMRP Pilot Study Complete – Quick Look Report Available* <<http://atoc.ucsd.edu/what'snewpg.html>>

<sup>6</sup> *Sea Noise*, CNN, June 30, 1999, at N1<<http://www.cnn.com/NATURE/9906/30/sea.noise.part1/index.html>>

<sup>7</sup> NATIONAL RESEARCH COUNCIL, *MARINE MAMMALS AND LOW FREQUENCY SOUND* (National Academy Press 2000).

<sup>8</sup> Buck, Eugene, *Acoustic Thermometry of Ocean Climate: Marine Mammal Issues*, 264 *SCIENCE* 339 (1994).

<sup>9</sup> Watkins and Schevill, *Spatial Distribution of Sperm Whales Underwater*, 24(7) *DEEP-SEA RES.* 693 (1977); Watkins and Schevill, *Sperm Whale Codos*, 62(6) *J. ACOUST. SOC. AM.* 1485 (1977);

Watkins et al., *Sperm Whale Acoustic Behaviors in the Southeast Caribbean*, 49 *CETOLOGY* 1 (1985);

Whitehead and Weilgart, *Click Rates from Sperm Whales*, 87(4) *J. ACOUST. SOC. AM.* 1798 (1990).

<sup>10</sup> Whitehead and Weilgart, *Patterns of Visually Observable Behaviour and Vocalization in Groups of Female Sperm Whales*, 118 *BEHAVIOUR* 275 (1991).

<sup>11</sup> Richardson et al., *supra*, at 179.

have ceased foraging behavior in response to the ATOC experiment. Since the ATOC experimental design calls for twenty minute transmissions every four hours, on every fourth day, sperm whales could incur a substantial food deficit, and thereby suffer both decreased longevity and reproductive rates, if they were to cease feeding for multiple days each time they were subjected to an ATOC transmission. At the very least, there is a valid argument that the multiple day cessation of the vocalizations of an endangered species over a 15386 square kilometer area should be considered biologically significant.

Five dead whales have been spotted near ATOC transmitters, but all five bodies were either lost or buried without benefit of a necropsy.<sup>12</sup> The Marine Mammal Research Program, charged with monitoring behavioral changes pursuant to ATOC, lacked the capacity to recover the corpses or to determine whether or not the deaths were caused by ATOC experimentation. The Marine Mammal Research Program was not designed to investigate the causes of death of whales proximate to the ATOC apparatus.<sup>13</sup> Though ATOC transmissions were temporarily suspended by the California Coastal Commission in response to the 1995 whale deaths, NMFS approved the immediate resumption of ATOC transmissions.

The Great Whales Foundation filed litigation against the ATOC project in the California Superior Court (Monterey) in August of 1995, then re-filed suit in October of the same year. The

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<sup>12</sup> “On 3 November 1995, a humpback whale beached near Stinson Beach (north of San Francisco), died, and was buried without an autopsy. On 9 November 1995, two dead humpback whales were found floating near the Farallon Islands, close to the ATOC source. The appearance of these dead whales in the vicinity of the ATOC source led to the discovery that Scripps had turned on the sound source at least twelve times between 28 October and 2 November for “engineering tests” during installation, without initiating the elaborate marine mammal research program they had agreed to. The probable time of death for all three whales includes the time period when the ATOC source was in operation.” On 10 November 1997, a few days after the Kauai ATOC source began operation, another dead whale was found “by fishermen off the north shore of Kauai. A dead juvenile sperm whale “washed up on a beach on the northeast shore of Oahu at Malaekahana Beach.” On December 2, 1997. (Hall, Brent, *Two More Dead Whales Associated with ATOC*, WHALES ALIVE!, Vol. II, No. 2, April 1998.)

<sup>13</sup> In testimony before the California Coastal Commission, ATOC representatives stated that the MMRP only studies behavioral changes, and that determinations of the causes of deaths of marine mammals exposed to ATOC is not part of the MMRP design.

GWF suit sought to enjoin ATOC transmissions in California until a supplemental EIS was completed, pursuant to NEPA, and ATOC test-protocol revisions received a comprehensive review. GWF noted that Scripps had revised its statement of ATOC's purpose, and suggested that a supplemental EIS was needed to consider alternatives to ATOC which would address the new program goals. According to the GWF, the "revised" purpose of ATOC is to "study the effect of sound on marine mammals."<sup>14</sup>

The Navy is currently trying to get the two-year permit for the ATOC project extended for five more years. There are some odd things about the ATOC small take permit application. First of all, Scripps has defined the "threshold for risk of harm as a single ping at 190 dB. In establishing the risk of harm threshold at 180 DB, the application states that "a marine mammal would have to receive one ping greater than, or equal to 180 dB in order to be considered receiving a non-serious injury (Level A harassment)."<sup>15</sup> This phraseology is troubling. The Level A harassment under the MMPA applies to all injuries which are not directly lethal, it does not only apply to "non-serious injuries." Secondly, the ATOC experiment is designed to transmit 20-minutes every four hours, on every fourth day, with 20 minutes of continuous transmission, it seems highly unlikely that any marine mammal would be able to swim out of range quickly enough to be exposed to only "one ping." The permit application states that a marine mammal would need to receive "many pings at a received level slightly lower than 180 dB in order to potentially incur a significant biological response (Level B harassment)."<sup>16</sup> There are a couple of problems with this statement. First of all, many pings at slightly less than 180dB would probably be capable of inducing TTS independently. Secondly, prolonged acoustic exposure to decibel

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<sup>14</sup> Hall, Brent, *ATOC Project Delayed (Temporarily) By Dead Whales*, WHALES ALIVE!, Vol. V., No. 1, January 1996. <<http://elfi.com/csi96105.html>>

<sup>15</sup> Taking Marine Mammals Incidental to Operation of a Low Frequency Sound Source by the North Pacific Acoustic Laboratory, 65 Fed. Reg. 51,584 (2000).

levels as low as 120 dB could result in avoidance responses.<sup>17</sup> Most alarming of all, is the evidence that stranding episodes can be induced by received levels between 150 and 160 dB.<sup>18</sup> By suggesting that a received acoustic intensity of 180 dB should be considered the lower threshold capable of inducing “non-serious injuries,” or Level A harassment, Scripps is requesting permission to expose marine mammals to acoustic pollution at least 2,000 times stronger than may lead to stranding events, and to have such exposures be considered, at most, “non-serious injuries.”

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<sup>16</sup> Id.

<sup>17</sup> Richardson *et al.*, supra at 286-7.

<sup>18</sup> Frantzis, supra.

## **Abstract**

This paper examines the ways in which the Marine Mammal Protection Act can be invoked to regulate acoustic emissions into the marine environment. Acoustic pulses can harm marine mammals by rendering traditional nursing and breeding habitats unsuitable, masking whale calls, separating mother-calf pairs, causing numerous behavioral disturbances (the long term and cumulative impacts of which are not known at present) and causing direct marine mammal kills. Marine noise is generated by a variety of industrial, biologic and natural sources. Though shipping is the greatest overall anthropogenic contributor to marine noise, the acoustic pulses emit by underwater explosions, navy sonar, scientific research experiments and oil drilling operations are often the largest contributors to localized instances of high marine noise. Activities generating frequent or high-intensity acoustic pulses could be found in violation of the Marine Mammal Protection Act (MMPA) if a marine mammal were found to have died, suffered injuries, or modified its behaviors in a “biologically significant” manner as a result of an unpermitted acoustic emission. The possibility that the MMPA can be applied to a wide range of noise-generating activities has stimulated the purveyors of off-shore oil rigs, bridges, and scientific experiments to seek incidental-take permits under the statute.

## **The Physiology of Hearing Loss**

Acoustic pulses can result in either physiological trauma or barotrauma to marine mammals. Marine mammals suffer physiological trauma from acoustic waves. Physiological trauma effects the inner ear only. In contrast, marine mammals suffer barotrauma from extremes in over-pressure, and pressure-differentials, such as result from explosions.

### Barotrauma

Explosions can result in barotrauma, or pressure induced trauma, in marine mammals. An explosion results in a sudden increase in pressure, followed shortly by a decrease in pressure. A sequence of bubble oscillations continue until stability is re-attained. Any air cavity wherein vessels and tissue are undergoing this pressure oscillation is vulnerable to suffering barotrauma. Extreme changes in pressure and over-pressure can cause gross structural damage to marine mammals.<sup>19</sup> A blast wave would likely cause a whale to experience a succession of hemorrhages, beginning in the gut, then progressing to the liver, lungs, larynx, and ears. Since ears are the most pressure sensitive organ in whales and dolphins, they are the organs which are most likely to be responsive to a blast wave. The hemorrhaging of cerebral-spinal fluid into a whale's inner ear, an inner-ear blow out and lung banding all suggest that the animal suffered mechanical trauma from extreme changes in pressure such as would result from the acoustic energy released during an explosion or blast. Unfortunately, evidence of barotrauma can only be revealed by performing timely necropsies on marine mammals killed as a result of explosive blast waves. Incidents of blast injuries to marine mammals are likely to go undetected because:

1. bodies are never found, or found after tissue has either repaired itself post-mortem, and
2. non-lethal injuries go undetected.

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<sup>19</sup> Ketten, Darlene, *Estimates of Blast Injury and Acoustic Trauma Zones for Marine Mammals from Underwater Explosions*, SENSORY SYSTEMS OF AQUATIC ANIMALS 398 (1995).

### Physiological trauma

Prolonged exposure to elevated noise levels results in either temporary or permanent hearing loss. A hearing "threshold shift" occurs when an animal's minimum response threshold for a frequency increases. When an animal's minimum response threshold increases, it's sensitivity to sound has decreased below the level of sensitivity common to other members of the same species. Hearing loss centers around the frequencies which the animal had prolonged-elevated exposure to. Sound intensity and duration of exposure determine whether the threshold shift will be temporary or permanent. Short duration acoustic exposure results in discrete, localized cell damage, such as simple stereocilia fatigue. As sound intensity and bandwidth increase, the physiological damage progresses to hair cell loss and, eventually, to widespread lesions characterized by broadening patches of stria, ligament and neuronal degeneration.<sup>20</sup> Damaged hair cells can recover from minor damage, but prolonged or repeated exposures compound the injury. "If the exposure is short, hearing is recovered; if it is long, or has a sudden intense onset and is broadband, hearing can be permanently lost."<sup>21</sup>

### Masking

As we speak, we displace air particles. In reality, sound waves consist of small patches of air in which the pressure is either higher or lower than ambient pressure. As these pulses hit the basilar membrane, it pushes upon receptor cells in the ear, and they vibrate - conveying a message to our brains. We hear pulses at many different frequencies simultaneously.<sup>22</sup> This is

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<sup>20</sup> Liberman, M.C., *Chronic Ultrastructural Changes in Acoustic Trauma*, 26 HEARING RESEARCH 65 (1987); Ketten, *supra* at 397.

<sup>21</sup> Ketten, *supra* at 397.

<sup>22</sup> We project how marine mammals hear from knowledge of human hearing.

why we can listen to music, and hear a string bass, a drum, a violin and a flute at the same time. However, humans cannot receive and decipher multiple signals within the same frequency bandwidth at the same time. If similar frequencies are received, it becomes difficult to distinguish signals. Thus, it is more likely that we will understand an alto's lyrics if he is accompanied by a violin than if he is accompanied by a cello. A signal can become inaudible if another signal, at a similar frequency, is being received at a similar, or higher, amplitude. When a signal is inaudible or incomprehensible due to acoustic interference from other sources, it is "masked."

In order to be audible, a whale's calls must exceed the ambient noise in similar frequencies by a quantity called the *Critical Ratio* (CR). The CR for submerged odontocetes increases with frequency. An odontocete might be incapable of hearing a low frequency call (under 1kHz) unless the call was received at an intensity at least 20dB greater than the ambient acoustic intensity in the same frequency spectrum. Likewise, odontocetes have demonstrated incapacity to hear sounds in the 1kHz-10kHz range unless the sound was received at 20-30 dB above ambient. For frequencies of 10-100kHz, odontocetes may only hear sounds which are 30-40 dB louder than ambient, or 1,000-10,000 times louder than the ambient sound level.<sup>23</sup> Currently, there is no evidence of masking in baleen whales.<sup>24</sup> As ambient sound levels increase, whales will either need to increase the volume at which they call to one another, or their calls will go unheard. Some marine mammals have been observed to increase call-intensity to compensate for higher levels of ambient noise,<sup>25</sup> but these animals' ability and willingness to "raise their voices" to accommodate for background noise is probably not indefinite.

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<sup>23</sup> Richardson, *et al.*, supra at 228.

<sup>24</sup> Id. at 238.

<sup>25</sup> Scheifele, Peter, *Sustainable Seas Expedition, Mission Log, Stellwagen Bank, Sounds in the Sanctuary and Sea*, NATIONAL UNDERSEA RESEARCH CENTER (2000)  
<[http://sustainableseas.noaa.gov/missions/stellwagen1/background/sea\\_sounds.html](http://sustainableseas.noaa.gov/missions/stellwagen1/background/sea_sounds.html)>

Measurable decreases in fish reproductivity, egg viability, and growth rates which accompany 20-30 dB increases in ambient noise levels.<sup>26</sup> Decreased fish productivity could be resulting from masking, physiological damage, or some other, as yet unknown, mechanism. Recent evidence suggests that at least some species of fish emit sounds coincident with mating and feeding activities, so the possibility that masking can lead to decreases in the reproductive and growth rates of fish should not be discounted. The decreased reproductivity of fish exposed to increases in ambient noise levels might mirror the experience of odontocetes. We know that increases in ambient noise can mask an odontocete's calls, thereby impairing the whale's ability to find a mate. Whereas the long gestation periods, and relatively low whale reproductive rates would make it difficult to experimentally determine the likely effects of masking on a whale population over time, the fact that some species of fish, shrimp and sea turtles have all exhibited significantly decreased reproductive and growth rates in the presence of relatively modest increases in ambient noise intensity provides reason to believe that increases in ambient noise levels could have significant effects on the overall population levels of marine mammals.

Masking only results in an injury to a whale in-so-far as it interferes with the whale's behavioral patterns. For instance, if masking causes a mother-calf pair to become separated, it will most likely result in the death of the calf. However, even when masking causes the mother-calf pair to alter their migratory route away from an acoustic source (in order to stay together) that pair has been adversely affected because their migration will take more time, and require more energy, than it would have had they not been diverted.<sup>27</sup> Likewise, the masking of mating calls may either prevent mating from occurring or it may simply delay the mating. Delaying

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<sup>26</sup> Banner and Hyatt, *Effects of noise on Eggs and Larvae of Two Estuarine Fishes*, 102 TRANS. AMER. FISH SOC. 134 (1973).; Hastings *et al.*, *Effects of Low-Frequency Underwater Sound on Hair Cells of the Inner Ear and Lateral Line of the Teleost Fish *Astronotus ocellatus**, 99 J. OF THE ACOU. SOC. OF AM. 1764 (1996)

mating could cause some injury if, for example, it were the end of mating season or if the female whale's fertility were otherwise optimal at the time of the masking. It is difficult to quantify the harms of masking to marine mammals. It would be pure conjecture to guess how many whales could have been conceived, and mating calls been received; and it would be nearly as difficult to quantify the impact of migratory deviation on a whale's overall chances of successfully completing its migration.

The protective Congressional standard is needed to ensure the recovery of marine mammal populations and to protect marine ecosystems, per the goals of the MMPA. Though interrupting one mating behavior might not seem significant to the reviewing court, such an activity could clearly be “significant” if it thwarted what would otherwise have been a successful impregnation of an animal from a severely endangered species, such as the Northern Right Whale. Since a court could never find the significance of an interrupted mating ritual to be anything other than “pure speculation,” a legal standard which required that disruptions of behavioral patterns be “significant” would be under protective of marine mammals. No single mating disruption could be proven “significant,” though the pattern of interrupting mating activities would be likely to have statistical significance. Until the effects of masking on marine mammal populations are better understood, increasing levels of ambient noise should be of concern to the wildlife agencies. In the face of scientific uncertainty, a precautionary approach to ambient noise, which seeks to prevent the further escalation of ambient noise levels in biologically-useful frequencies, is warranted.

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<sup>27</sup> This assumes that whales follow the most direct migratory route with deviations attributable to meeting biological needs (such as following abundant plankton concentrations slightly off course, or swimming in sheltered waters).

## **The Dominant Anthropogenic Sources of Marine Noise**

### Low Frequency Active Sonar

Until recently, the U.S. Navy used passive sonar to listen for enemy submarines.

However, as submarines became quieter, they became increasingly difficult to detect by passive means. In the 1980's, the U.S. Navy began developing Low Frequency Active Sonar technology.

When the sonar waves are deflected by solid objects in the water, the Navy is alerted to the potential presence of another ship or submarine.<sup>28</sup> The Navy's Draft Environmental Impact Statement specifies 240dB as the planned source intensity of the LFAS system in full operation.

At a 8kHz source frequency, the acoustic intensity would only attenuate to 213 dB at 20 miles from the source.<sup>29</sup> According to the Marine Mammal Commission, "If the LFAS system were made available for worldwide use as proposed, all species and populations of marine mammals...could possibly be affected."<sup>30</sup> The Marine Mammal Commission further warned that the effects of LFAS on marine mammals could include:

- trauma-induced death
- hearing loss
- disruption of biologically significant behavioral patterns such as feeding, nursing and communication
- habitat abandonment
- increased stress
- changes in prey distribution and abundance
- and decreases in marine mammal reproduction and survival rates<sup>31</sup>

Military sonar use has already been tied to numerous mass stranding episodes across the globe.

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<sup>28</sup> Active sonar is questionable from a strategic standpoint. While active sonar does make it possible for the U.S. Navy to detect quieter submarines, it also notifies these enemy submarines as to the position of the U.S. Navy vessel as soon as the acoustic pulse is transmit. Thus, the LFAS technology would, effectively, notify the enemy of the U.S. Navy's position before it assisted the U.S. Navy in locating the enemy.

<sup>29</sup> Comments on US Navy's Response to Request to Stop LFAS, Cetacean Freedom Network (8 June 2000).

<sup>30</sup> Marine Mammal Commission, ANNUAL REPORT TO CONGRESS (1997).

<sup>31</sup> Marine Mammal Commission, ANNUAL REPORT TO CONGRESS (1997).

Reported strandings potentially associated with military sonar use:

<u>Date</u>	<u>Number</u>	<u>Species</u>	<u>Location</u>	<u>Status</u>	<u>Military</u>
February 1985	12	Goosebeak	Canary Islands	Live	Yes <sup>32</sup>
February 1985	1	Gervais' Beaked	Canary Islands	Dead	Yes
November 1988	2	Pygmy Sperm	Canary Islands	Alive	Yes
November 1988	1	Bottlenosed Whale	Canary Islands	Alive	Yes
October 1989	mass	Mixed Species	Canary Islands	Alive	Yes
May 1996	12	Cuvier's Beaked	Kyparissiakos Gulf	Alive	Yes <sup>33</sup>
May 1996	1 (found late)	"	Kyparissiakos Gulf	Dead	Yes
January 1998	1	Goosebeak	Vieques S. Coast	Dead	Yes
July 1998	5	Goosebeak	Puerto Rico-NW Coast	Alive	Yes
March 2000	mass	Whales & Dolphins	Bahamas	Mixed	Yes
May 2000	1	Goosebeak	Caribbean	Dead	Yes <sup>34</sup>

There is some disagreement about the kind of sonar that the Navy was using in the Bahamas in March, 2000. The Navy claims that they were using sonobouys (low power active sonar) of a type which had been in operation for decades, and claims that the sonobouys "put out the same energy level as many fish finders."<sup>35</sup> However, this statement contradicts the Navy's planned transmission levels, as reflected by their Overseas Environmental Assessment (OEA) for LWAD-001. The OEA for LWAD 00-1 called for acoustic pulses to be transmit an intensity of 200 dB at 6,600 to 9,500 cycles/second. Fish finders use a much higher frequency range.

Fish finders generally emit high frequency acoustic pulses 50-200 kHz at 190 dB into shallow water bodies. Since high frequency sound attenuates quickly, and since shallow water bodies absorb acoustic energy more rapidly than does the open ocean, the acoustic effects of fishing are likely to be limited in geographic scope. Even if the energy levels of the Navy's

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<sup>32</sup> Information on the Canary Island strandings comes from: Simmonds et al., *Whales and the Military*, 351 NATURE 448 (1991).

According to the article, Canary Island locals have only been aware of visible military maneuvers occurring off shore three times since 1985. On each of these occasions live mass strandings occurred.

<sup>33</sup> Information on the Kyparissiakos Gulf Coast strandings comes from: Frantzis, *supra*. Dr. Frantzis concluded that there was a 99.9% probability that the Kyparissiakos Gulf Coast strandings were caused by LFAS testing.

<sup>34</sup> Information on Caribbean and Bahamian strandings comes from various U.S. Newspaper sources.

See also: *Comments on U.S. Navy's Response to Request to Stop Low Frequency Active SONAR* NEWSLETTER OF THE OCEANIA Project (8 June 2000) <http://www.oceania.org.au/soundnet/jun00/low.html>.

LWAD tests had been identical to the energy levels of fish finders, this would not indicate that the Navy's tests were "safe." Fish finders operate with extremely short duty cycles, and concentrate the acoustic pulse into a narrow beam which radiates downward. This means that a fish finder would only expose a marine mammal to an acoustic pulse if the marine mammal were swimming directly underneath the fishing vessel, and the duration of the exposure would likely be fairly short. In contrast, the Navy's active sonar is designed to radiate omni-directionally so as to detect distant submarines. The duty cycle of the Navy's sonar is comparably long, increasing exposure time. Furthermore, LFAS (including sonobuoys) utilize low frequencies, so the acoustic pulse will maintain integrity over long distances. In contrast, fish finders generally operated between 50 and 200 kHz, so their acoustic energy rapidly attenuates in water.<sup>36</sup> Thus, the Navy's LFAS tests are likely to expose a much larger water body, for a longer period of time, to a much greater acoustic intensity than is emitted by a fish finder.

The intended operational intensity of the LFAS system is more than 5,000 times "louder" than any active sonar tested to date.<sup>37</sup> At a 8kHz source frequency, the acoustic intensity of current LFAS testing is probably only attenuating to 150 dB, 10-25 kilometers from the source.<sup>38</sup> The 150 dB threshold is significant because Dr. Frantzis and the NATO panel concluded that the Mediterranean strandings occurred among whales exposed to 150-160 dB-received from a NATO LFAS source.<sup>39</sup> At 240 dB, the Navy's LFAS would have a source intensity 100 million to 1 billion times greater than the received intensity linked to the LFAS-induced strandings in the Mediterranean. At a 240 dB source level, LFAS will probably only attenuate to 213 dB, 33.3 km

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<sup>35</sup> Navy's Draft Environmental Impact Statement for LFAS (July 1999)

<sup>36</sup> *Comments on U.S. Navy's Response to Request to Stop Low Frequency Active SONAR* NEWSLETTER OF THE OCEANIA Project (8 June 2000) <http://www.oceania.org.au/soundnet/jun00/low.html>.

<sup>37</sup> In its DEIS, the U.S. Navy listed its planned LFAS source transmittal level as 240 dB. Richardson, 148; Weilgart, Lindy, ATOC and LFA Sonar: Undersea Noise Pollution and the Limitations of Science (18 January 1997) (presentation to the Whales Alive Conference in Maui).

from the source,<sup>40</sup> subjecting a 2093 square kilometer area to sufficient acoustic energy to induce mass strandings in marine mammals. At 240 dB, LFAS will have an acoustic intensity 100,000 times higher than ATOC, and ATOC has also been linked to stranding events. Even the scientists who conducted the LFAS tests have said that “it will be difficult to extrapolate from these results to predict responses at higher exposure levels,”<sup>41</sup> yet the Navy’s DEIS concludes that LFAS will be safe at a 240dB source frequency.<sup>42</sup>

### Under Water Explosives

Underwater explosions are the strongest anthropogenic point sources of sound in our oceans. The peak pressure of a small, 0.5 kg explosive charge is 267 dB re 1 uPa.<sup>43</sup> Explosions result in both an initial shock wave, which could result in barotrauma to marine mammals, and an acoustic wave, which could result in physiological trauma.

For decades, the Navy has been using underwater explosives to test their anti-submarine warfare technology. The Navy’s use of underwater explosives off the Florida Keys became a cause of concern to environmentalists in the late 1980’s and early 1990’s when environmentalists began to worry about the effects of underwater explosives on marine mammals.<sup>44</sup> The Navy was conducting tests using explosives ranging from 50-1200 pounds. The Navy continues to engage in underwater explosives detonations and shock testing.<sup>45</sup> Coastal construction is the most common domestic use of explosives in the marine environment.

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<sup>38</sup> Id.

<sup>39</sup> Frantzis, supra. (The Navy’s 1999 DEIS fails to mention the Mediterranean strandings.)

<sup>40</sup> *Comments on U.S. Navy’s Response to Request to Stop Low Frequency Active SONAR* NEWSLETTER OF THE OCEANIA Project (8 June 2000) <http://www.oceania.org.au/soundnet/jun00/low.html>.

<sup>41</sup> Id., citing Quicklook’s Executive Summary, pg. vi.

<sup>42</sup> Navy’s Draft Environmental Impact Statement for LFAS (July 1999).

<sup>43</sup> Richardson *et al.*, supra at 155.

<sup>44</sup> Baker, Beth, *Testing the Waters*, COMMON CAUSE MAGAZINE, Jan/Feb 1991, at 22.

<sup>45</sup> *See*: Taking Marine Mammals Incidental to Naval Activities, 65 Fed. Reg. 77,546 (2000).

## Shipping

Boats and ships are major contributors to the ambient noise levels in both the open-ocean and in coastal areas.<sup>46</sup> Since propeller cavitation and singing are the dominant sources of vessel noise, the contribution of shipping to the overall level of marine noise has undoubtedly increased as global shipping fleets have transferred from wind power to petroleum. The frequency of ship noise is largely determined by propeller rotation rates. Since larger ships typically have slower rotation rates than smaller vessels, larger ships typically emit lower frequency sound. In medium and larger vessels, broadband emissions peak at 50-150 Hz, with tones dominating to 50 Hz. Whales call in frequencies as low as 10 Hz.<sup>47</sup> Since the intensity of sound increases with hull size, ships with larger hulls emit higher intensity sounds than smaller vessels. As the kilometers traversed by large ships increase, the contribution of shipping to low frequency ambient noise will also increase.

Scientists in both Alaska and Hawaii have observed humpback whales attempting to move away from vessels, altering breathing and diving patterns, and displaying antagonistic behavior in response to vessels. Baker et al. (1983) reported instances of humpback whales engaged in:

- (1) "horizontal avoidance"<sup>48</sup> of vessels 2000 to 4000 m away
- (2) "vertical avoidance"<sup>49</sup> of vessels from 0-2000m away

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<sup>46</sup> Richardson *et al.*, *supra* at 110, 428.

<sup>47</sup> *Id.* at 162-4.

<sup>48</sup> "Horizontal Avoidance" refers to cases in which whales swim faster, and dive less frequently, in the presence of an acoustic source

<sup>49</sup> "Vertical Avoidance" refers to cases in which whales spend more time submerged in the presence of an acoustic source

Other responses observed included trumpeting,<sup>50</sup> breaching,<sup>51</sup> lobtailing, and flipper slapping. These responses may signify that the humpbacks were disturbed by the acoustic activity.<sup>52</sup> The biological significance energetic costs of shipping to whales is uncertain.<sup>53</sup>

#### Dredging, Drilling, and Exploration

Like shipping, dredging and drilling activities can be significant contributors of low frequency sound in near shore regions. Since low frequency sound attenuates quickly in shallow water, the effects of near-shore dredging, drilling and shipping activities are likely to be highly localized.<sup>54</sup> In the area of oil drilling and exploration, there are many different sources of sound that we must be concerned about when we are looking at the overall effect these types of activities have on marine mammals. In searching for oil, seismic surveys are done with air guns, ships travel to offshore drilling platforms to bring supplies and transport oil, and drilling occurs nearly continuously.

In a set of experiments conducted off the west coast of the United States, gray whale responses to playbacks of offshore oil exploration and production noises were monitored. 3500 whales were monitored throughout the course of the experiment. The whales began to demonstrate avoidance responses at 110dB (received). Additionally, at 130dB, more than 80% of the migrating gray whales demonstrated some type of avoidance response.<sup>55</sup> However, in 13 different experiments, feeding humpback whales off the coast of southeastern Alaska showed no

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<sup>50</sup> Watkins, *Air-borne Sounds of the Humpback Whale*, 48(4) J. MAMMAL. 573 (1967).

<sup>51</sup> Whitehead, *Patterns of Visually Observable Behavior and Vocalizations in Groups of Female Sperm Whales*, 118 BEHAVIOUR 275 (1985).

<sup>52</sup> Baker *et al.*, *Conservation Update/Humpback Whales of Glacier Bay, Alaska*, 22 J. AM. CETAC. SOC. 13 (1988).

<sup>53</sup> Id.

<sup>54</sup> Richardson *et al.*, supra at 123-7.

<sup>55</sup> <<http://www.wdcs.org/dan/publishi.../6B7D8FD1BAB453F4802568FF004B9189?opendocumentn>>.

pattern of avoidance to the playback of oil drilling, production platform and aircraft sounds.<sup>56</sup>

The different results of these experiments highlight both the behavioral differences between whale species and also that whales have different behavioral responses to similar acoustic stimulants, depending on what activity they are engaged in.

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<sup>56</sup> Malme *et al.*, *Behavioral responses of Marine Mammals to Seismic Discharges*, N.S. TECH. REP. 5 (1985).

## **The Noise Level is Increasing in the Earth's Oceans**

Sound which can not be traced to a specific *source* comes to constitute part of the *ambient noise* in the ocean. All sounds which can be discretely detected also contribute to the level of ambient noise in the ocean. Wind, ship traffic, earthquakes, explosions, sea ice cracking, biologics, and precipitation all contribute to the *ambient noise*, or background noise, in the ocean. Unless a sound is of a higher intensity than the ambient noise at similar frequencies, the sound will be masked by the ambient noise. Increases in ambient noise will decrease the distance at which discrete sound can be perceived. Thus, an increase in the level of ambient noise will decrease the distances at which marine species can call to one another. Since whales engage in calling behavior in order to initiate mating and to maintain pod or mother-calf cohesion during feeding and migration, whales might need to either travel closer together or deviate around areas of high ambient noise in order to maintain group cohesion. Even with their excellent directional hearing, whales would probably be unable to detect regions of lower ambient sound because ambient noise is non-directional. Since some species of fish experience decreased reproduction and growth rates in areas of high ambient noise, increases in ambient noise could result in decreasing prey availability for marine mammals. Additionally, masking could decrease the reproduction and survival rates of marine mammals by masking mating calls, causing calves to become separated from their mothers, and constricting the pod's ability to forage over large areas, while remaining in contact.

Anthropogenic contributions to marine noise are increasing along with increased ocean use. Between 1960 and 1994, the average population density of the U.S. shoreline (excluding Alaska) increased by approximately 46%.<sup>57</sup> The increasing population density in coastal areas is

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<sup>57</sup> NOAA, *The Crowding of Our Shoreline*, PRESSURES ON COASTAL ENVIRONMENTS – POPULATION: DISTRIBUTION, DENSITY AND GROWTH (2000); <[http://state-of-coast.noaa.gov/bulletins/html/pop\\_01/national.html](http://state-of-coast.noaa.gov/bulletins/html/pop_01/national.html)>

accompanied by an increased incidence of coastal construction, low-flying aircraft, high speed ferry boats, and personal pleasure craft. Additionally, the size of cargo ships is increasing. Since sound intensity increases with hull size, increases in hull size should correspond to increased decibel levels in the ocean. Though there has been insufficient long-term monitoring of ocean noise to definitively state that the noise level of the earth's oceans is increasing, the expected increases in oceanic noise have been documented in some cases. The increases in ambient noise levels in the St. Lawrence are particularly worrisome, as beluga whales spend their entire lives within the 100 mile long impacted channel.

## **The Marine Mammal Protection Act**

### Introduction

The Marine Mammal Protection Act<sup>58</sup> was passed in order to protect marine mammals from injury and harassment, and to promote the overall health and stability of marine ecosystems. Since marine mammals' reliance on low-frequency sound to communicate, navigate, and avoid danger is well known, the MMPA is an obvious statutory choice for those interested in reducing the incidence and severity of acoustically-induced injuries in the marine environment. Marine mammals are present all along the US coast line, the MMPA would provide FWS and NMFS with jurisdiction to regulate acoustic activities throughout U.S. coastal waters. This section will explore the ways in which the MMPA could be employed to regulate acoustic activities in the marine environment.

### The Basics

The Marine Mammal Protection Act was passed in order to promote the overall health and stability of marine ecosystems. The secondary purposes of the MMPA include protecting individual marine mammals and maintaining discrete marine mammal populations at the optimum sustainable levels. In order to accomplish the goals of the MMPA, congress placed a moratorium on taking, or attempting to take, marine mammals by harassing, capturing, killing or hunting them without a permit.<sup>59</sup> Every "take" of a marine mammal without an MMPA permit, or beyond the terms and conditions set forth in a permit or Letter of Authorization (LOA), is subject

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<sup>58</sup> Marine Mammal Protection Act 16 U.S.C. 1361 *et seq.* (As amended through 1994).

<sup>59</sup> 16 U.S.C. 1371(a); 16 U.S.C. 1362 (13)

to civil penalties up to \$10,000.<sup>60</sup> “Take” has been interpreted to include “the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal.”<sup>61</sup>

When the MMPA was initially drafted, the Commerce Department objected that the proposed definition of “taking” was over-broad, and suggested that the term “harassment” be omitted.<sup>62</sup> Congress, clearly intending the scope of the MMPA to extend beyond situations where marine mammals were captured, killed or hunted, chose to include the “harassment” of marine mammals as a form of “take” subject to the prohibitions and permitting regulations of the MMPA.

Before the 1994 Amendments, however, courts interpreted the MMPA’s harassment prohibition to only apply to situations where marine mammals were disturbed in a manner which would have “serious and sustained” effects upon “natural routines”<sup>63</sup> Courts arrived at this definition of harassment by noting that “sustained and severe” nature of harm necessary to constitute a “taking” under the MMPA’s prohibitions on “capturing, killing or hunting” protected animals.<sup>64</sup> Under the Hayashi standard, the regulators would need to prove that an action not only disturbed a marine mammal (as demonstrated by behavioral modification), but that the

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<sup>60</sup> 16 U.S.C. 1375 (Additionally, knowing violations of the MMPA, “or of any permit regulation issued there under,” are subject to a \$20,000 fine, one year’s incarceration, or both.)

<sup>61</sup> 50 C.F.R. § 216.3

<sup>62</sup> 1972 U.S.C.C.A.N. at 4170

<sup>63</sup> See generally United States v. Hayashi, 22 F.3d 859 (9<sup>th</sup> Cir. 1993)

<sup>64</sup> In the 1993 Hayashi decision, the Ninth Circuit Court of Appeals held that a fisherman only “harassed” marine mammals when his actions resulted in a “sustained and severe disruption in normal marine mammal behavior.” Employing this test, the Hayashi court reasoned that firing warning shots behind the porpoise to discourage it from eating the bait did not disrupt porpoise behavior in a “serious and sustained” manner because the shots were not disturbing or molesting the porpoises in a manner which was likely to lead to their extinction or depletion. Therefore, the Hayashi majority reasoned that the warning shots were not likely to harm the interests which Congress passed the MMPA to protect--namely, the protection of marine mammals which were “in danger or extinction or depletion as a result of man’s activities.” (MMPA § 2(1), Pub.L. No. 92-522, 86 Stat. 1027 (1972) (findings and declaration of policy), cited in United States v.

disturbance was going to have a substantial and adverse long-term effect on that individual's ability to survive in the wild.<sup>65</sup> Though the logic of this position was highly appealing to individuals whose activities cause occasional, but seemingly insignificant and harmless, behavioral modifications among marine mammals, the Hayashi standard is not the law of the land.

The 1994 Amendments to the MMPA created two separate categories of harassment. Level A harassment includes "any act, pursuit, torment, or annoyance" with "the potential to injure a marine mammal or marine mammal stock in the wild."<sup>66</sup> Level B harassment includes "any act, pursuit, torment or annoyance" with "the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."<sup>67</sup>

Instead of requiring proof that an action resulted in a "sustained significant disruption" of the "normal routines" of a marine mammal before that action could be successfully prosecuted, or otherwise regulated, under the MMPA, Congress chose to prohibit all activities which would disturb the behavioral patterns of any marine mammal, unless one of the limited exceptions applied and a "take" permit was obtained. Congressional refusal to remove "harassment" from the "take" definition (pursuant to the suggestion of the Secretary of Commerce), or to limit "harassment takes" to situations where the behavioral disruption was "sustained and significant" (commensurate with the Hayashi rule), reflect the precautionary approach of the MMPA.

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Hayashi, 22 F.3d 859, 864 (9<sup>th</sup> Cir. 1993).) See also Tepley v. NOAA, 908 F.Supp. 708 (N.D. Cal. 1995).

<sup>65</sup> The court announced that an MMPA take by "harassment" can only result from actions which have a "direct, serious disruption of a marine mammal's customary pursuits."(United States v. Hayashi, 22 F.3d 859, 863 (9<sup>th</sup> Cir. 1993).) (at 863)

<sup>66</sup> 16 U.S.C. 1362(18)(A)(i); 16 U.S.C. 1362 (18)(B)

<sup>67</sup> 16 U.S.C. 1362(18)(A)(ii); 16 U.S.C. 1362 (18)(C)

However, in its 11 October 2000 Small Take Permit for Oil and Gas Exploration Drilling in the Beaufort Sea,<sup>68</sup> NMFS stated that it “does not consider a taking to have occurred simply because an animal hears a noise or has a minor startle reaction to the noise.” will only find that a behavioral response constitutes a taking if the behavioral response is biologically significant.<sup>69</sup> In the Beaufort Sea Small Take Permit, NMFS defined a “biologically significant behavioral response” as one that “affects a biologically important behavior, such as survival, breeding, feeding and migration.”<sup>70</sup> In prosecuting takings, NMFS is particularly concerned with behavioral modifications which have the “potential to impact the reproductive success” of the affected marine mammal.<sup>71</sup>

The NMFS standard is more protective of marine mammals than Hayashi because the NMFS definition extends take liability to actions affecting reproduction rates and longevity. However, both the NMFS and Hayashi approaches are attempts to protect marine mammals from activities likely to result in biologically significant harms, without extending MMPA liability to any activity that could cause even slight modifications in a marine mammals behavior.

### Behavioral Responses

The Secretary of Commerce, acting through NMFS, could permit an acoustic activity which results in biologically significant behavioral response if the Secretary finds that the behavioral response “is not reasonably likely to adversely affect the species or stock through effects on annual rates of recruitment or survival.”<sup>72</sup> If an acoustically-induced behavioral

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<sup>68</sup> Oil and Gas Exploration Drilling Activities in the Beaufort Sea, 65 Fed. Reg. 60,407 (2000).

<sup>69</sup> Id.

<sup>70</sup> Id.

<sup>71</sup> Id.

<sup>72</sup> 50 C.F.R. 216.103

modification (e.g. Level B harassment) affects a “biologically important behavior, such as survival, breeding, feeding and migration” in a manner which is likely to have an adverse effect on the species or stock’s “annual rates or recruitment or survival”, the Secretary of Commerce can only permit the activity if he finds that the acoustic activity is not having more than a “negligible impact” on the affected species or stock.

#### The Significance of Level B Harassment

A Letter of Authorization (LOA) can be granted to authorize takes by “harassment,” but not by hunting, capturing, or killing. Oddly, harassment takes of species regulated by NMFS must now have “biological significance,”<sup>73</sup> or some adverse impact on the animal’s longevity and reproductive capacity.<sup>74</sup> Acoustic activities cause whales to become trapped in a near shore habitat, displaced from their traditional habitat, or killed via the effects of masking, would be considered “harassment” takes, because the potentially lethal future harm would be a result of acoustically-induced behavioral modifications, rather than being a direct result of the acoustic activity. The availability of Letters of Authorization for harassment takes only seems to be leading permit applicants to understate the harmful nature of harassment takes. In a recent permit application for ATOC, scientists from Scripps Institute of Oceanography referred to Level A harassment as a situation in which only “non-serious” injuries were occurring.<sup>75</sup> Considering that all injuries which fail to be directly lethal can only be considered takes by harassment, it is dismissive to term Level A harassment takes as “non-serious.” Furthermore, in it’s proposed rules governing the Taking of Marine Mammals Incidental to Naval Activities, NMFS

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<sup>73</sup> Taking Marine Mammals Incidental to Construction and Operation of Offshore Oil & Gas Facilities in the Beaufort Sea, 65 Fed. Reg. 34, 014 at 34, 036 (2000).

<sup>74</sup> 50 C.F.R. 216.103

<sup>75</sup> ATOC Permit Application, 65 Fed. Reg. 51,584 (2000).

announces it's intention to always consider TTS as a form of Level B harassment henceforth.

<sup>76</sup>Temporary threshold shifts are usually defined as situations where some level of tissue damage has occurred, and are only “temporary” so long as re-exposure to TTS level stimuli does not unduly interfere with recovery and exacerbate tissue damage. Defining TTS as a form of Level B harassment exempts a broad category of physiological injuries from the MMPA take prohibition, because it authorizes actors to damage the tissues of marine mammals so long as a biologically significant behavioral response can not be causally traced to the injury. The physical damage of TTS on a marine mammal is not of a wholly different nature from the physical damage which propeller injuries might induce. In both cases, the animal would have heightened vulnerability to further injury during the recovery period. Though TTS would only constitute a life threatening condition to the extent that it caused the affected individual to modify his/her behavioral pattern's , these modifications are likely to be under-detected. For instance, a life threatening behavioral modification could be something as undetectable as failure to move out of the path of an on-coming ship, either because the ship's propeller noise was undetected or because the whale's directional hearing had been somehow impaired.

Since prolonged exposure to acoustic energy can induce TTS “without any behavioral response,”<sup>77</sup> acoustic activities inducing TTS might not be actionable if the recently proposed TTS rule is adopted, and activities causing TTS are only considered harmful if “biologically significant” behavioral modifications can be causally linked to the received pulse.<sup>78</sup>

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<sup>76</sup> Taking Marine Mammals Incidental to Naval Activities, 65 Fed. Reg. 77,546 (2000).

<sup>77</sup> NATIONAL RESEARCH COUNCIL, MARINE MAMMALS AND LOW-FREQUENCY SOUND 67 (National Academy Press 2000).

<sup>78</sup> Taking Marine Mammals Incidental to Naval Activities, 65 Fed. Reg. 77,546 (2000).

### Regulations and Permits

The Secretary may allow takings by waiving the moratorium on take, adopting suitable regulations, and issuing permits when such takings are "in accord with sound principles of resource protection and conservation as provided in the (MMPA's) purposes and policies." The Secretary can only authorize takes, under the MMPA, on the basis of "the best scientific evidence available... having due regard to the distribution, abundance, breeding habits, and times and lines of migratory movements of such marine mammals."<sup>79</sup> The Secretary could only authorize acoustically "taking" a depleted marine mammal if the scientific research exception, survival of the species, or ITP exception applies.<sup>80</sup>

LOAs are valid for up to one year, and only provide authority to take marine mammals by harassment. Small take permits can authorize takes by any means for a maximum period of 5 years. To receive either a letter of authorization or a small take permit, a U.S. citizen must demonstrate to the Secretary that the contemplated activity will only have a negligible impact on the affected species or stock,<sup>81</sup> and "will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence purposes."<sup>82</sup> Small take permits and letters of authorization must prescribe the permissible methods of taking the marine mammal such that there is the "least practicable impact" on the species or stock and on its habitat.<sup>83</sup> Small take permits and letters of authorization can only be issued if the authorized takes will result in "no unmitigable adverse impact on the availability of the species or stock for taking for subsistence uses."<sup>84</sup> Small take permits and LOAs are subject to monitoring and reporting

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<sup>79</sup> 16 U.S.C. 1371(a)(3)(A)

<sup>80</sup> 16 U.S.C. 1371(a)(3)(B)

<sup>81</sup> 16 U.S.C. 1371(a)(5)(D)(i)(I)

<sup>82</sup> 16 U.S.C. 1371(a)(5)(D)(i)(II); 1371(a)(5)(B)(ii)

<sup>83</sup> 16 U.S.C. 1371(a)(5)(D)(ii)(I)

<sup>84</sup> 16 U.S.C. 1371(a)(5)(D)(ii)(II)

requirements, suspension, and revocation.<sup>85</sup> All permits and letters of authorization are subject to notice and comment requirements.<sup>86</sup> Permit applicants, and parties opposing a permit, may obtain judicial review of the permit's terms and conditions, or of a permit denial.

Scientists may take marine mammals by Level B harassment if they abide by general regulations governing such takes and if they apply for a LOA at least 60 days prior to commencing their research. The application for a LOA must specify the "(i)species or stock which may be harassed, (ii) the geographic location of the research, (iii) the period of time over which the research will be conducted, (iv) the purpose of the research..., and (v) the methods to be used to conduct the research." In its current form, the scientific research exception only allows the Secretary to issue scientific research permits to lethally take a marine mammal if the applicant "demonstrates that a nonlethal method of conducting the research is not feasible."<sup>87</sup> Even then, the Secretary shall not issue a permit for research which involves the lethal taking of a marine mammal from a species or stock that is depleted, unless the Secretary determines that the results of such research will directly benefit that species or stock, or that such research fulfills a critically important research need."

#### Negligible Impact Determinations

The MMPA does not authorize the Secretary to issue a take permit which would non-negligibly impact a marine mammal species or population. NMFS has defined "negligible impact" as "...an impact resulting from the specified activity that cannot be reasonably expected

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<sup>85</sup> 16 U.S.C. 1371(a)(5)(D)(ii)(III); 16 U.S.C. 1371(a)(5)(B)(i)

<sup>86</sup> 16 U.S.C. 1371(a)(5)(C)(i)

<sup>87</sup> 16 U.S.C. 1371

to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."<sup>88</sup> <sup>89</sup>

Prior to the 1994 Amendments, courts held that the Secretary can neither permit takes causing the species to fall below the optimal sustainable population level,<sup>90</sup> nor can he permit even a small mortal take of depleted animals.<sup>91</sup> Though the 1994 Amendments modified these rules as applied to takes incidental to fishing, the Secretary still lacks authority to permit lethal takes of depleted species, or of a species or population stock which would become depleted as a result of the proposed activity.

In order for acoustic pollution to be likely to have no "adverse effect" on a marine mammal species or stock's "annual rates of recruitment or survival", the takings must be a certainty, not a mere "remote possibility."<sup>92</sup> If a marine mammal were to hear an anthropogenically generated noise, but to react to the sound in a seemingly biologically insignificant manner which was at the lower limits of statistical detection (say by slightly altering its breathing patterns), then the acoustic activity would probably be considered to only pose at most a "remote possibility" of affecting the species or stock's annual rates of recruitment or

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<sup>88</sup> 50 C.F.R. 216.103

<sup>89</sup> Logically, it would make sense for this rule to apply non-lethal, as well as lethal, takes. Under that interpretation, the rule could be seen to prohibit any takings with long term effects on an individual animal or on a protected species. Under The Bay's Legal Fund interpretation of the "no negligible impact" rule, the party contesting an agency action as violative of the MMPA would retain the burden of proving that the proposed activity is likely to result in a taking of a protected species. Since our present lack of scientific knowledge makes it difficult to determine whether or not an activity is harming a marine mammal, most MMPA cases are decided against the party with the burden of proof. (The Bay's Legal Fund v. Browner, 828 F.Supp. 102 (D. Mass. 1993).)

<sup>90</sup> Committee for Humane Legislation v. Richardson, 414 F.Supp/ 297, 312 (D.Ct. D.C. 1976).

<sup>91</sup> Kokechick Fishermen's Ass'n v. Secretary of Commerce, 839 F.2d 795, 802 (D.C. Cir. 1988).

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<sup>92</sup> The Bay's Legal Fund v. Browner, 828 F.Supp. 102, 114 (D. Mass. 1993).

survival. If whales ceased calling at the lower limits of statistical detection, there would be a definite risk that the break in calling could result in the death of a calf<sup>93</sup> or in decreased birth rates.<sup>94</sup> It would be difficult to prospectively show that a cessation in calling would definitely have “biologically significant” repercussions, but there would be more than a “remote possibility” that an activity which lead to the cessation of calling would have biological significance. The likelihood of call-disruption having a non-negligible impact can be assessed on the basis of the animals present in the impacted area and the activities they are engaged in. Mother-calf separations are most likely to be problematic in nurseries and along migratory routes, and the interruption of mating calls is likely to be most problematic during mating season. NMFS could reasonably determine that one acoustic source would constitute a non-negligible impact on a marine mammal stock due to the age, gender balance, and activities engaged in by the exposed population, whereas NMFS might reasonably find the same acoustic source would have a negligible impact in a different season or location.

Negligible impact findings are highly context-specific. For instance, in Beaufort Sea permit for takings incidental to Oil and Gas Exploration and Drilling, NMFS concluded that even permanent abandonment of breathing holes by ringed seals is “biologically insignificant.” NMFS found the abandonment of breathing holes to be biologically insignificant because the lack of rookeries, mating grounds and concentrated feeding grounds within the area implied that the abandonment of breathing holes would be unlikely to affect mating, access to critical feeding areas, or the pups’ survival rate.<sup>95</sup> Biological significance might well have been found if the

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<sup>93</sup> Mothers and calves maintain contact by calling. A young calf would be incapable of survival if separated from the herd.

<sup>94</sup> Whales call in order to attract mates. A reduction in, or masking of, calling during mating season could easily prevent or delay mating, and thereby reduce the species or stock’s birth rate.

<sup>95</sup> Oil and Gas Exploration Drilling Activities in the Beaufort Sea, 65 Fed. Reg. 60,407 (2000).

abandoned breathing holes were located in a rookery, where pups would potentially die as a result of abandonment.

A “negligible impact” determination may be consistent with lethally taking a member of an endangered or threatened species or stock (listed under the Endangered Species Act of 1973).<sup>96</sup> Where Congress believed allowing some lethal takings of members of depleted and endangered species was necessary in order to preserve the U.S. fishing industry, Congress amended the MMPA. Commercial fishing enterprises can be authorized to take marine mammals that are members of species or stocks listed under the ESA by “incidental mortality and serious injury” if the Secretary determines that such takes will have a “negligible impact on such species or stock.”<sup>97</sup> Though it is difficult to see how a lethal take of depleted, threatened and endangered animals could be considered to have no “adverse effect” on the species or stock’s reproduction or mortality rates, the 1994 commercial fisheries amendment only makes sense if the Secretary has the ability to determine that a lethal take of a member of an endangered species will only have a “negligible impact” on that species. It is unlikely that Congress would have intended to overturn the longstanding Kokechich interpretation of “negligible impact,” as applies to the MMPA generally, by the structure of the fisheries exception. Without an express Congressional re-definition of “negligible impact” we should presume that lethal takes of animals from depleted, threatened and endangered species or population stocks are still considered “non-negligible impacts” outside of the commercial fisheries context.

Even if lethal takes of depleted, threatened and endangered species or stocks can be considered “negligible impacts” in the wake of the 1994 amendments, it should still be beyond the Secretary’s power to permit takings which might result in a rate of mortality beyond the

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<sup>96</sup> 16 U.S.C. 1531 et seq.

<sup>97</sup> 16 U.S.C. 1371(a)(5)(E)

established potential biological removal (PBR) rate for the species or stock. When there are fewer takings than the PBR during a period, the species is being rebuilt. When the PBR for a species is exceeded, the species is being further depleted. Surely the Secretary could not consider lethal takes which caused a depleted, threatened or endangered marine mammal species or stock to become further depleted to be lacking an “adverse effect”<sup>98</sup> on the species or stock’s “annual rates of recruitment or survival.”<sup>99</sup>

In the 2000 Draft SAR for N. Atlantic and Gulf of Mexico marine mammal stocks, NMFS lists the PBR for ten species of marine mammals as N/A, and it lists the PBR for three additional species of marine mammals as less than one animal/year. Among endangered marine mammals, the PBR’s are as follow:

Endangered Species	Stock Area	Population		Total Annual Mortality
		Minimum	PBR	
Northern Atlantic Right Whale	WNAS	291	0.0	1.4
Blue Whale	WNAS	308	0.6	0.0
Fin Whale	WNAS	1,803	3.6	0.8
Sperm Whale	NAS	3,400	6.8	0.0
Humpback Whale	WNAS	10,019	32.6	3.7
Sei Whale	NSS	N/A	N/A	0.0 <sup>100</sup>

In addition, the Pygmy Killer Whale of the Western North Atlantic Stock is estimated to have a minimum population size of 6 individuals, and has a PBR set at 0.1, though it currently lacks either endangered, or even strategic stock, status.

Whereas any lethal takings of endangered species would be to the “disadvantage of the species” because they would slow the species’ rate of recovery, only takings in excess of the PBR would result in the further decline of the species’ or stock’s population from one period to the next. From this information, NMFS would, arguably, be acting within its statutory authority

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<sup>98</sup> 50 C.F.R. 216.103

<sup>99</sup> Id.

to permit lethal takes of up to 28.9 Humpback Whales from the Western North Atlantic Stock, but could not permit a single lethal take of either a Northern Atlantic Right Whale or a Blue Whale from the Western North Atlantic Stock. If the potential biological removal for any species or stock is exceeded, the population of that species or stock should decline. This would thwart the MMPA's and ESA's goals of rebuilding depleted species and population stocks to the optimum sustainable population levels.<sup>101</sup> In a biological sense, and lethal taking of a marine mammal which has a population below the maximum sustainable population for the habitat will "adversely" affect the species or stock's annual rates of survival. Where there is a depleted, threatened or endangered marine mammal species or stock, NMFS is under a duty to enact regulations to help rebuild that species or stock to its optimal sustainable population. If the PBR is exceeded for a stock, then it will become further depleted, and the stock's ability to make a timely recovery to its OSP level will, unquestionably, be adversely affected.<sup>102</sup> The Secretary could not have issued a permit to the U.S. Navy to lethally take endangered humpback whales off Hawaii, or to Cuvier's Beaked Whales off the Bahamas, in the course of testing the new Low Frequency Active Sonar Technology. Since the potential biological removal rate for Cuvier's Beaked Whales in the Northern Gulf of Mexico Stock is listed as 0.2 whales/year, the lethal taking of a single Cuvier's Beaked Whale from that stock could not be authorized by the NMFS.<sup>103</sup>

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<sup>100</sup> National Marine Fisheries Service, *Stock Assessment Report - N. Atlantic and Gulf of Mexico* (Draft 2000) <<http://www.wh.who.edu/psb/draftsar2000.pdf>>.

<sup>101</sup> The OSP is equated to 60% of the carrying capacity of the habitat for the species.

<sup>102</sup> Find some good citations, and elaborate, if possible.

<sup>103</sup> The Cuvier's Beaked Whale is not currently listed as "depleted" but, rather, its status is unknown. However, the burden would be on the party seeking to attain an incidental take permit to demonstrate that Cuvier's Beaked Whale was not "depleted," and that it would not become "depleted" as a result of the proposed activity, in order to gain a permit. NMFS would be well within its authority to deny the navy a permit to lethally take a Cuvier's Beaked Whale

### Regulatory Authority

In order to regulate an acoustic activity under the MMPA, the agency must be able to demonstrate, by the “best scientific evidence available,”<sup>104</sup> that the proposed activity is likely to injure, modify the behavioral patterns of, or degrade the habitat of a marine mammal or marine mammal population. The Secretary may establish a maximum allowable annual take of a marine species or population; establish take quotas on the basis of age, size or sex; delineate geographic and/or seasonal take prohibitions; and other restrictions.<sup>105</sup>

The Secretary’s authority to promulgate regulations relies upon a threshold finding that the regulations are “necessary and appropriate” to ensure that takings are not “to the disadvantage of” marine mammal species and population stocks.<sup>106</sup> This seemingly limits the Secretary’s regulatory authority to situations where he could reasonably conclude on the record that a marine mammal species or population stock would be “disadvantaged” if acoustic activities were allowed to occur or continue unregulated.

In Humane Legislation, the court interpreted the “disadvantage test” to mean that the Secretary could not promulgate regulations which authorize taking members of depleted species or stocks of marine mammals, or takings which would cause a species or stock to become depleted.<sup>107</sup> Thus, regulations promulgated under the MMPA must be likely to ensure that

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due to insufficient scientific evidence to support an agency finding that the lethal take would only have a “negligible impact” on the species.

<sup>104</sup> 16 U.S.C. 1373(a).

<sup>105</sup> 16 U.S.C. 1373(c).

<sup>106</sup> 16 U.S.C. 1373(a).

<sup>107</sup> In the Humane Legislation case, the court held that NMFS could not issue a general permit to the tuna industry to take dolphins via purse-seine fishing, because the permit could disadvantage the species by causing dolphin populations to fall below the OSP level. When dolphin populations did fall below the OSP level in the early 1980’s, the court held that the MMPA prohibited NMFS from issuing any more general permits allowing dolphin takes. An obvious repercussion of this decision would have been the shut down of the entire U.S. tuna industry. Congress stepped in and specified the terms under which the fishery could continue operation directly under the MMPA. Then came Kokechick Fishermen’s Ass’n v. Secretary of Commerce, where the court held that NMFS could not issue either a general or a small take permit allowing lethal takes of any number of individuals from a depleted species or population stock. The U.S. Congress became aware that the Kokechick decision would bring an end to the U.S.

depleted species are not faced with biologically significant takings which would either cause the annual rate of recruitment to fall, or would cause the annual rate of mortality to increase.

The Secretary has authority to regulate activities that threaten to reduce reproductive rates below the level needed to maintain a species or population stock's non-depleted status. For example, the Secretary has authority to regulate acoustic activities which are likely to mask mating calls. The Secretary also has authority to regulate activities that he believes will, if unregulated, increase marine mammal mortality rates such that a marine mammal species or population stock becomes depleted or further depleted. Thus, the Secretary also has the authority to regulate increases in ambient noise which are likely to deplete prey abundance significantly enough to render the habitat incapable of sustaining non-depleted marine mammal population levels,<sup>108</sup> and acoustic activities which impair the navigational ability of marine mammals, thereby leading to net entanglements, ship strikes, and strandings.

However, the Secretary maintains discretion in promulgating regulations. The highly discretionary nature of the Secretary's authority under the MMPA makes the Secretary's

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fishing industry. The 1994 Amendments to the MMPA include Congressional standards for allowing incidental takes of depleted marine mammals pursuant to commercial fishing activities. The 1994 Amendments require NMFS to develop "take reduction plans" to reduce the incidental taking of strategic stocks as near the zero mortality goal as possible. However, the 1994 Amendments do not allow levels of marine mammal takes which will have more than a "negligible impact" on the species or stock.

*See also:* 16 U.S.C. 1361.

Section 1361 provides two different legal grounds upon which the Secretary could base a finding that the continued lack of regulation of a particular activity could "disadvantage" a marine mammal species or population:

- (1) If the best scientific evidence available convinced the Secretary that the proposed activity would undermine the health and stability of the marine ecosystem, or
- (2) If the Secretary believes, on the basis of the best scientific evidence available, that the proposed activity would cause any marine mammal species or population stock to fall below 60% of its maximum sustainable population level.

<sup>108</sup> A marine mammal species or stock is considered "depleted" under the MMPA if the population has declined to 60% of the Optimal Sustainable Population for the habitat, as defined by NMFS or FWS, or if the species or stock is listed as either threatened or endangered under the Endangered Species Act.

regulations vulnerable to court challenges.<sup>109</sup> Unless Congress has directly spoken to the matter in question, the agency's construction of the MMPA's intent should be upheld so long as it is "reasonable and permissible."<sup>110</sup> It is appropriate for Congress to delegate wide discretion to pass regulations to protect living marine resources and their habitats to NMFS and FWS, due to the agencies' special expertise in marine resource management, the highly technical nature of the issues involved. The rapidity of changes in our knowledge of the functioning of marine ecosystems, of the activities which can pose a risk to individual marine animals and to ecosystem stability, and of the significance of various marine mammal behaviors necessitates that the agencies charged with protecting the marine environment have broad discretion to devise and alter complex regulatory strategies. As the original act and subsequent Congressional revisions demonstrate, Congress intends the MMPA to be enforced in a precautionary manner.<sup>111</sup> Where agency enforcement actions have failed under the MMPA because the reviewing courts were unconvinced that the requisite level of injury had been attained,<sup>112</sup> Congress has gone back to further clarify the broad scope of the statute.<sup>113</sup> Where NMFS has issued under protective regulations, those regulations have been invalidated, despite the high social cost of shutting down the tuna fishery.<sup>114</sup> In the absence of specific statutory authority, a regulation based on a reasonable and permissible construction of a statute should be upheld.<sup>115</sup> Federal agencies receive great deference when "interpreting their own regulations."<sup>116</sup>

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<sup>109</sup> Andrew Turner, *The Regulatory Reach of Living Marine Resource Statutes: A Moving Target in Uncharted Waters*, 30 ELR 11006, 11007 (2000).

<sup>110</sup> Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837, 842-3 (1984).

<sup>111</sup> 16 U.S.C. 1361

<sup>112</sup> See generally: Tepley v. National Oceanic Atmospheric Admin., 908 F.Supp. 708 (N.D. Cal. 1995); United States v. Hayashi, 5 F.3d 1278 (9<sup>th</sup> Cir. 1993).

<sup>113</sup> See MMPA 1994 Amendments

<sup>114</sup> See Earth Island Inst. V. Mosbacher, 929 F.2d 1449 (9<sup>th</sup> Cir. 1991) (Holding that the MMPA mandated a tuna embargo on foreign fisheries which killed dolphins at rates impermissible under the terms of the MMPA.)

<sup>115</sup> Chevron, U.S.A., Inc. v. Natural Resources Defense Council, 467 U.S. 837, 842-3 (1984).

<sup>116</sup> See Udall v. Tallman, 380 U.S. 1 (1965).

### Enforcement

For the most part, the MMPA's take prohibition is enforced when actors approach governmental authorities for authorization to conduct an activity. Whether the necessary authorization is sought under the Rivers and Harbors Act, the Ocean Drilling Act, under the FAA, no permit can be issued that will, by its issuance, lead to a violation of the MMPA. However, NMFS and FWS are largely responsible for interpreting what violates the MMPA. One reason the wildlife agencies seem to act primarily through rulemaking, rather than through independent identification and prosecution of MMPA violators, is that the APA standard of review for informal rulemaking is arbitrary and capricious, abuse of discretion and not in accordance with the law, whereas the standard of review for a formal adjudication<sup>117</sup> is substantial evidence.<sup>118</sup>

### Substantial Evidence and Behavioral Modification

Given the speculative nature of marine mammal behavioral science at present, it might be difficult for NMFS or FWS to prosecute a Level B Harassment claim under the substantial evidence standard. In Tepley v. NOAA, the court held that the National Marine Fisheries Service had failed to prove, via “substantial evidence” that underwater filming and petting of pilot whales constituted harassment under the MMPA. According to the Tepley court, “it would be a quite difficult endeavor for any trier of fact to determine what significance should be attributed to the actions of the whales... Such ‘anthropomorphic rationalization’ cannot be the basis for the severe penalty that was imposed here; yet the ALJ’s findings centered on his evaluation of the

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<sup>117</sup> Formal adjudication includes the determinations of an ALJ that a taking has occurred.

<sup>118</sup> 5 U.S.C. 706

‘whales’ annoyance at humans [sic] presence.’<sup>119</sup> In contrast, in Strong v. United States, the Secretary’s rule prohibiting feeding marine mammals in the wild was upheld as a form of harassment. The court upheld the regulations as a “reasonable” interpretation of the meaning of “take” within the MMPA under part two of the Chevron test.<sup>120</sup>

#### Prosecutorial Discretion

NMFS and FWS have broad discretion in deciding whether to bring MMPA taking actions for acoustic takings, whether to require mitigation measures to prevent acoustic injuries, or to require significant monitoring to collect additional information about behavioral modifications which might result from acoustic activities. Citizens can bring suit to challenge permitting decisions by government officials, but they lack standing to seek injunctions against private or governmental entities for “taking” animals under the MMPA.<sup>121</sup> Only persons designated by the Secretary of Commerce may enforce the provisions of the MMPA against private actors.<sup>122</sup> In reality, the fisheries service does not have a sufficient budget to bring takings claims against all of those who violate the MMPA in insignificant ways. It is reasonable to believe that fisheries will bring “harassment” claims against those whose disturbances of marine mammals strike them as likely to result in significant alterations of marine mammal behavior. Though it is likely that NMFS and FWS will only bring actions against those who are significantly disturbing marine mammals, it would be difficult for NMFS to successfully prosecute a “take by Level B harassment” claim due to the NMFS or FWS to prove the

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<sup>119</sup> Tepley v. National Oceanic Atmospheric Admin., 908 F.Supp. 708, 712-713 (N.D. Cal. 1995).

<sup>120</sup> In Strong v. Secretary of Commerce, the court also found substantial evidence to suggest that habitual feeding could reduce the ability of wild animals to independently locate prey. (Strong v. Secretary of Commerce, 5 F.3d 905 (5<sup>th</sup> Cir. 1993).

<sup>121</sup> Strahan v. Coxe, 127 F.3d 155, 160 (5<sup>th</sup> Cir. 1997).

“biological significance” of a taking. Though the National Research Council has repeatedly asked FSW and NMFS to regulatorily define harassment takes in terms of their adverse effects on marine life,<sup>123</sup> NMFS was wise to state it’s policy of considering “biological significance” a threshold to finding a Level B harassment take in a permit notification rather than in a rulemaking. NMFS would find it difficult to successfully prosecute a “take by Level B harassment” claim if it was required to prove the “biological significance” of the behavioral modification by substantial evidence.

Given our limited understanding of marine mammal behavior, it is currently very difficult to prove that a behavioral disturbance will be "significant" via substantial evidence. We do not have a very good base line for the behaviors of many marine species at present. Ironically, we have far less information on the behavioral patterns of endangered species than we do on the behaviors of relatively common marine species, such as gray whales. This is a logical result, as scientists can not exhaustively study the behaviors of endangered species if they cannot find them or monitor them without harassing the animals in the process. For most endangered marine species, we have no understanding of how different vocalizations correlate to different behaviors, what normal dive times or intervals are for endangered whales, or how significant such a disruption to a breathing patterns would be. Our current understanding of marine mammal behaviors is still based on a good deal of speculation. Even when a scientist claims that a behavioral reaction is significant and likely to lead to decreased longevity or reproductivity in the

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<sup>122</sup> 16 U.S.C. 1377

<sup>123</sup> NATIONAL RESEARCH COUNCIL, MARINE MAMMALS AND LOW-FREQUENCY SOUND 67 (National Academy Press 2000).

affected animal, a court could find that the scientist's opinion based on "pure speculation," rather than "substantial evidence."<sup>124</sup>

Congress may have adopted an expansive notion of "harassment" actionable under the MMPA due to the lack of concrete scientific evidence demonstrating the significance, and long term implications of, observable marine mammal behaviors. NMFS may have difficulty enforcing the Level B Harassment prohibition not that it has undertaken the burden of proving that the behavioral modifications are "biologically significant."

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<sup>124</sup> See Tepley, supra. (Finding expert's opinion that a whale's behavior (biting a swimmer and dragging her 30 feet underwater) indicated "annoyance at the humans' presence" based on "pure speculation" because "the whale's responses could have been playful or...the result of agitation.")

## **The National Environmental Policy Act**

The National Environmental Policy Act<sup>125</sup> was passed in 1969 to raise the profile of environmental issues in governmental planning.<sup>126</sup> NEPA requires agencies to complete either an environmental assessment (EA) or an environmental impact statement (EIS) prior to any major federal action.<sup>127</sup> If the agency concludes, on the basis of the EA, that the proposed activity will have no significant impact on the human or natural environment, then it can authorize the activity. The NEPA process is often the mechanism through which potential environmental problems come to the attention of the permit-issuing agencies.

Though, at present, our knowledge of what constitute “normal” behaviors for marine mammals is limited, science has progressed to the point where acoustic impacts should be considered by a federal agency in the NEPA process. NEPA is purely procedural and, standing alone, provides no assurances that marine species will be protected from acoustic injuries. The NEPA process does, however, provide an opportunity for the environmental community, and governmental groups, to raise concerns about the acoustic properties of proposed activities. Once the issue is raised, the agency must either address it, or explain satisfactorily why the issue does not need to be addressed.<sup>128</sup>

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<sup>125</sup> National Environmental Policy Act, 42 U.S.C.A. 4321-4370d (1969)

<sup>126</sup> 42 U.S.C. 4321

<sup>127</sup> 42 U.S.C.A. 4332

<sup>128</sup> Administrative Procedure Act, 5 U.S.C. Sec. 706

## Conclusion

Many activities are only recognized to pose environmental risks after the harm has occurred. The harmful effects of DDT, stratospheric ozone depletion, ground-level ozone increases, clear-cutting and over-fishing were not foreseen. It is difficult to predict the impacts of anthropogenic increases to marine noise to any degree of scientific certainty. If marine noise is disrupting whale breeding patterns, forcing whales into a migratory energy deficit, or decreasing fish egg viability, the short run "harms" could be difficult to detect and quantify, but the long-term viability of species such as the extremely endangered Northern Right Whale could be severely compromised.

NMFS and FWS have the power to engage in rulemaking procedures which limit the amount of marine noise generated by any given activity as is "necessary and appropriate" to ensure that the affected marine mammal population or stock is not "disadvantaged." Though there is no clear threshold for when an acoustic transmission would "disadvantage" a protected species, the MMPA would unquestionably be triggered if the acoustic activity were to result in the marine mammal's stock population falling below the "Optimum Sustainable Population" level.<sup>129</sup>

The MMPA also provides authority to the wildlife agencies to levy penalties after marine mammals have been "taken." However, there are very few instances of MMPA enforcement. Usually the MMPA's take prohibitions are enforced when people seek federal permits to conduct otherwise lawful activities. Since no federal permit can authorize an activity violative of another federal statute, NMFS and FWS have the opportunity to require permit applicants to adopt mitigation, monitoring and reporting measures as a precondition of project approval.

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<sup>129</sup> 16 U.S.C. 1373.

Additionally, NMFS and FWS review applications for letters of authorization and small take permits from a variety of actors who are simply attempting to avoid incurring MMPA take liability in the future. The following is an assessment of NMFS' strengths and weaknesses in protecting marine mammals from acoustically-induced injuries under the MMPA.

#### The Acoustic Thermometry of Ocean Climate Project

The availability of the Scientific Research Permit goes a long way towards explaining why Scripps has been so interested in having all of its takings classified as takings by "Level B Harassment." Scientific Research permits allow scientists to take marine mammals by Level B harassment if they abide by some general regulations. These permits are issued as Letters of Authorization and can be obtained, almost as a matter of course, upon application. The Scripps scientists would be incapable of obtaining authorization to lethally take any marine mammal from a depleted species stock, because they would have difficulty demonstrating either that the research directly benefits the affected species or stock or that it "fulfills a critically important research need." The ATOC project has not generated any meaningful information on global climate change. ATOC's hypothesis, that changes in the speed at which sound travels between two distant sources in the ocean would help chart the course of global warming, was fundamentally flawed. Since sound waves bend to travel in regions where the water temperature and salinity are most conducive to sound propagation, and since the ocean circulates in belts of differing water temperatures, the acoustic pulses transmit from the Kauai source do not travel a known distance to get to the receiver site. Thus, ATOC's data is incapable of reflecting changing water temperatures over time.

NMFS should take a close look at the ATOC permit application to determine (1) whether ATOC is likely to take marine mammals by Level A harassment,<sup>130</sup> (2) whether ATOC lethally takes marine mammals, and (3) whether the ATOC experiment, in its current form, really fulfills a critically important research need. If the current purpose of the ATOC project really is to research how marine mammals respond to sound, the ATOC project could not get a letter of authorization or small take permit outside of the terms of the scientific research exception. The harassment of marine mammals is the current goal of ATOC, not an incidental taking which results from an otherwise lawful activity.

#### Low Frequency Active Sonar

NMFS' failure to protect marine mammals against injuries acoustically-induced by the Navy's Low Frequency Active Sonar systems highlights several of the MMPA's weaknesses. NMFS' failure to actively monitor acoustic activities in the ocean, or to publish information explaining how acoustic exposure can harm marine mammals, contributed to the Navy's ability to conduct numerous LFAS tests without first obtaining a permit or completing an EIS. NMFS's stated willingness to accept the Navy's EIS as it's own is unacceptable, considering the numerous and severe weaknesses of the Navy's DEIS. Unless the Navy's DEIS is significantly revised before becoming finalized, it seems unlikely that the Navy's EIS will survive a NEPA challenge. The DEIS ignores the very information which is clearly the "best scientific evidence

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<sup>130</sup> Several dead whales have been discovered proximate to ATOC transmitters, though necropsies have not been performed and the species involved (dominantly humpback whales) appear unlikely to strand as a result of acoustic exposure. The strandings associated with sonar use have occurred among small odontocetes and beaked whales, humpback whales are large mysticetes. However, the humpbacks could have suffered physiological injuries from ATOC which prevented them from avoiding oncoming ships. Additionally, one juvenile pygmy sperm whale was found dead near an ATOC source. Juvenile odontocetes are the most likely to strand in response to intense acoustic stimuli.

available”<sup>131</sup> in favor of reliance upon the record of fish finders, which is highly distinguishable evidence at best.<sup>132</sup> Lastly, it must be noted that the Navy’s extrapolation that a LFAS acoustic intensity more than 5,000 times as great as any intensity tested to date is even considered suspect by the scientists who initially monitored LFAS transmissions for the Navy.<sup>133</sup>

Since NMFS is demonstrating extreme reluctance to challenge either the Navy’s science or it’s ability to conduct LFAS tests, access to a “citizen suit” provision is crucial in the LFAS context. Citizens lack standing to sue the Navy for its unpermitted takings of marine mammals under the MMPA. Citizens will be able to challenge any MMPA permits which NMFS might issue to the Navy to authorize LFAS use. If NMFS continues to endorse the Navy’s DEIS, and eventually bases a LFAS permit on it, the best basis for challenging the permit appears to be NMFS’ likely failure to base such a permit on the “best scientific evidence available,” as is required by the MMPA. Another basis for challenging a LFAS permit would be to argue that NMFS is prevented by the terms of the MMPA from authorizing lethal takes of endangered, threatened or depleted species outside of the commercial fishing context. Unless the Navy could demonstrate, via the “best scientific evidence available,” that the global operation of LFAS at 240 dB would not result in either directly or indirectly kill, or lower the reproductivity of, depleted, threatened or endangered species or stocks, NMFS’s decision to issue an MMPA take authorization to the US Navy for global LFAS use should be vulnerable to a citizen suit

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<sup>131</sup> The Navy’s DEIS failed to mention Dr. Frantzis’ determination that 150-160 dB of LFAS exposure was had a 99.9% probability of having induced a mass stranding in the Mediterranean in 1996.

<sup>132</sup> The Navy’s conclusion that LFAS operation at 240 dB will not have more than a negligible impact on any marine species or stock is largely derived from the fact that fish finders, operating at a maximum source intensity of 190dB, and in higher frequencies than LFAS, have not resulted in any noted injuries to marine mammals. The Navy’s reliance on fish finder safety is problematic. Fish finders emit acoustic energy in a unidirectional narrow beam, substantially reducing the likelihood that a marine mammal would be exposed for a prolonged period. In contrast, LFAS transmits acoustic energy omni-directionally, heightening the likelihood of exposure and decreasing the likelihood that a marine mammal could rapidly vacate the affected area.

<sup>133</sup> Cetacean Freedom Network, *Comments on U.S. Navy’s Response to Request to Stop LFAS* (8 June 2000), citing Quicklook’s Executive Summary, Navy DEIS for LFAS vi (July 1999).

challenge. Since the global operation of LFAS would threaten to decrease the survival and reproduction rates of all marine mammals, even of those with potential biological removal rates less than one, a court might well find it outside the Secretary's statutory authority to either permit lethal takes (either directly through baurotrauma or indirectly through navigational interference or mother-calf separation) or reproductive interference (by masking mating calls, causing whales to cease calling, or causing potential mates to experience auditory threshold shifts) among species and stocks with extremely low rates of potential biological removal.

### Explosives

The proposed Incidental Harassment Authorization for takes of marine mammals by explosives testing at Eglin Air Force Base reflects MMPA mitigation and monitoring requirements at their finest. The Navy applied for a small take permit to take marine mammals by lethal and non-lethal injury, and harassment, due to the acoustic effects of undersea explosives detonation. Prior to the mitigation measures, the Navy anticipated that the mortality level associated with these detonations would be "significantly higher than 1 percent."<sup>134</sup> In the proposed IHA, NMFS wrote that "mitigation is expected to obviate *any* potential for injury or harassment to marine mammals."<sup>135</sup> NMFS proposed to issue Incidental Harassment Authorization only, believing that the mitigation measures required will sufficiently obviate the risk of lethal, injurious and harassment takes so that the proposed explosive testing will have no more than a negligible impact on any marine mammal species or stock in the area.

The mitigation measures imposed include safety zones and aerial monitoring (30 minutes prior to detonation to ensure that no marine mammals are in the area). No tests are to be

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<sup>134</sup> Navy DEIS, 1998 (*cited in* Explosives Testing at Eglin Air Force Base, FL, 65 Fed. Reg. 63,059 (2000)).

<sup>135</sup> Explosives Testing at Eglin Air Force Base, FL, 65 Fed. Reg. 63,059 (2000). (my emphasis)

conducted if either marine mammals or sea turtles<sup>136</sup> are sighted within the safety zone during aerial monitoring. Additionally, testing can not be conducted unless the sea state is calm enough to allow visibility to a depth of 18'. Since aerial monitoring under these conditions is likely to detect marine mammals in the safety zone, the mitigation measures imposed by NMFS should adequately protect marine mammals from acoustic injuries so long as NMFS has adequately calculated the safety zone. However, these mitigation measures are uniquely capable of detecting marine mammals in environmental conditions such as those surrounding the Eglin Air Force Base. The effectiveness of aerial monitoring is seriously reduced as turbidity increases, white caps form, and the color of marine sediment darkens. Though the sea state requirements imposed in the Eglin IHA proposal mitigation measures are appropriate off the Florida coast, many other U.S. jurisdictions could not realistically hope to attain such stellar visibility. Thus, the value of pre-test aerial monitoring in reducing marine mammal takes is highly location-specific.

A total of 20 marine mammals, from two different species were considered “likely to be affected” by the underwater explosive detonations at Eglin. Neither of the potentially exposed species or population stocks is considered depleted, threatened or endangered.

### Shipping

Shipping is both regulated by the International Maritime Organization and by the laws of coastal states. Vessel construction, design, manning and equipment standards are established by the IMO so that vessels will not be unnecessarily restricted from innocent passage between jurisdictions. The IMO is the appropriate body in which to issue design specifications, such as requiring propeller shrouding, as a method of decreasing marine noise. States can not pass

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<sup>136</sup> listed under the ESA

regulations containing construction, design, manning or equipment standards for foreign vessels beyond the accepted international standard.

The United States could require all vessels within their territorial sea and EEZ to abide by speed reduction and routing regulations, so as to reduce or prevent noise pollution generally and, specifically, in sensitive marine areas. The United States could also mandate that all ships under US flag maintain monitors to keep a lookout for marine mammals and install propeller shrouds, but these standards would not apply to foreign vessels in US waters. The United States could also require all vessels to shop ship maintenance records, demonstrating that the timing of the vessel's propellers had been recently checked, and that misalignment was not resulting in unnecessary increases in marine noise generated. These measures could be required under the MMPA pursuant to a rulemaking.

#### Offshore Oil Drilling

Companies can apply for letters of authorization or small take permits to take marine mammals incidental to offshore oil drilling, platform construction and operation activities. NMFS appears to be doing a respectable job of considering acoustic harms in promulgating regulations for off shore oil drilling and exploration facilities. In the Beaufort Sea case, NMFS granted BP Exploration a small take permit to take marine mammals incidental to construction, ice-cutting, offshore trenching, pile driving, helicopter and vessel operation, drilling, and camp operations during the exploration, construction and operation of an off-shore oil drilling facility.

NMFS projected that these acoustic activities could cause marine mammals to modify their behaviors and could mask important signals. Some of the anticipated behavioral modifications, including the displacement of female seals from seal structures and the

corresponding potential for pup abandonment and death, seem to have biological significance. Furthermore, the acoustic emissions are anticipated to mask calls of biological importance to bowhead whales, and to cause these whales to engage in avoidance behaviors.<sup>137</sup> The final rule also states that fish might be displaced, but that the displacement would be “unlikely to have an impact on marine mammal feeding, except on a very local scale.”<sup>138</sup>

Extensive mitigation, monitoring and reporting measures were imposed to ensure the safety of marine mammals. BPXA was required to begin construction while seals were not being actively used for birthing, and to use dogs to help locate and avoid seal structures. NMFS established a safety zone at 180 dB, required that this area be monitored during daylight hours., and mandated that all acoustic activities cease if any marine mammal is observed in the safety zone until such time as the animal leaves the safety zone. NMFS also required that BPXA to cease drilling operations “during the bowhead whale migration during the first year of drilling activity.”<sup>139</sup> NMFS imposed both visual and acoustic monitoring requirements.<sup>140</sup> NMFS concluded that it’s mitigation measures were sufficient to avoid marine mammal injury, death, TTS and PTS.<sup>141</sup>

The first concern with these mitigation measures is the provision which allows BPXA to continue drilling operations during the migration of an acoustically-sensitive marine species, in the second thru fifth years of drilling activity. Since NMFS only established the safety zone at 180 dB received, this provision subjects bowhead whales to sufficient levels of acoustic energy

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<sup>137</sup> Taking Marine Mammals Incidental to Construction and Operation of Offshore Oil and Gas Facilities in the Beaufort Sea, 65 Fed. Reg. 34,014, 34,035 (2000). (Note, bowhead whales are listed as “endangered” under the Endangered Species Act.)

<sup>138</sup> *Id.* at 34,039.

<sup>139</sup> *Id.* at 34,039-40.

<sup>140</sup> *Id.* at 34,040.

<sup>141</sup> *Id.* at 34,041.

to trigger avoidance reactions throughout a wide geographic area.<sup>142</sup> When whales acoustic activity causes whales to avoid an area, they expend energy which they may need in order to complete the migration successfully. This condition of the final rule is unlikely to fail under judicial review, but it is bothersome because of the ease at which NMFS could have extended their “no drilling during migration” prohibition from year one throughout the life of the permit.

NMFS states that “no rookeries, areas of concentrated mating or feeding, or other areas of special significance for marine mammals occur within or near the planned area of operations.”<sup>143</sup> This statement is perplexing, considering the agency’s recognition that seal structures existed in the area intended for road construction, and were used for birthing and raising pups. The mitigation measures to protect these seals state that BPXA should avoid destroying the seal structures “if practicable.”<sup>144</sup> Thus, the small take permit allows BPXA to destroy, and force the abandonment of, a seal rookery. This action is compatible with a “negligible impact” determination so long as ringed seals are not depleted, threatened or endangered. However, NMFS could have been more protective of the seals had it drafted guidelines for when it would and would not be considered “practicable” to avoid destroying a seal structure.

### **Appropriations to the National Marine Fisheries Service**

NMFS appears to have an extremely tight budget, and likely lacks the capacity to either fund extensive research into the environmental hazards posed by every project seeking an MMPA permit or to aggressively prosecute persons who take marine mammals without a permit. If Congress wants the MMPA to adequately protect marine mammals and the ecosystems which they are components of, it must provide NMFS with sufficient funding to conduct meaningful

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<sup>142</sup> NMFS estimated the radii at which 115 dB, or greater, would be received at 3.2 km. (*Id.* at 34,036.)

<sup>143</sup> *Id.* at 34,041.

independent evaluation of the impacts which the proposed acoustic emissions could have on the marine environment.

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<sup>144</sup> Id. at 34,039-40.