Federal Register

Tuesday,
July 16, 2002

# Part II

# Department of Commerce

## National Oceanic and Atmospheric Administration

## 50 CFR Part 216

## Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active Sonar; Final Rule

**DEPARTMENT OF COMMERCE**

**National Oceanic and Atmospheric Administration**

**50 CFR Part 216**

**[Docket No. 990927266–2137–03; I.D. 072699A]**

**RIN 0648–AM62**

# Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active Sonar

**AGENCY:** National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

**ACTION:** Final rule.

**SUMMARY:** NMFS, upon application from the U.S. Navy, is issuing regulations to govern the unintentional takings of small numbers of marine mammals incidental to Navy operation of the Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) Sonar. Issuance of regulations, and Letters of Authorization under these regulations, governing unintentional incidental takes of marine mammals in connection with particular activities is required by the Marine Mammal Protection Act (MMPA) when the Secretary of Commerce (Secretary), after notice and opportunity for comment, finds, as here, that such takes will have a negligible impact on the species and stocks of marine mammals and will not have an unmitigable adverse impact on the availability of them for subsistence uses. These regulations do not authorize the Navy's operation of SURTASS LFA sonar as such authorization is not within the jurisdiction of the Secretary. Rather, these regulations authorize the unintentional incidental take of marine mammals in connection with this activity and prescribe methods of taking and other means of effecting the least practicable adverse impact on marine mammal species and their habitat, and on the availability of the species for subsistence uses.

**DATES:** Effective from August 15, 2002 through August 15, 2007.

**ADDRESSES:** A copy of the Navy application and a list of references used in this document may be obtained by writing to Donna Wieting, Chief, Marine Mammal Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910–3226 or by telephoning the contact listed here (see **FOR FURTHER INFORMATION CONTACT**). The NMFS' Administrative Record for this action is available for viewing, by appointment during regular business hours, at the above address. Copies of letters, documents and the public hearing record are available, at copy cost, from this address.

Comments regarding the burden-hour estimate or any other aspect of the collection of information requirement contained in this final rule should be sent to the Chief, and to the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB), Attention: NOAA Desk Officer, Washington, DC 20503.

**FOR FURTHER INFORMATION CONTACT:** Kenneth R. Hollingshead (301) 713–2322, ext. 128.

**SUPPLEMENTARY INFORMATION:**

## Background

Section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 *et seq.*) directs the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and regulations are issued.

Permission may be granted for periods of 5 years or less if the Secretary finds that the taking will be small, have a negligible impact on the species or stock(s) of affected marine mammals, and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses, and if regulations are prescribed setting forth the permissible methods of taking and the requirements pertaining to the monitoring and reporting of such taking.

## Summary of Request

On August 12, 1999, NMFS received an application from the U.S. Navy requesting a small take exemption under section 101(a)(5)(A) of the MMPA for the taking of marine mammals incidental to deploying the SURTASS LFA sonar system for training, testing and routine military operations anywhere within the world's oceans (except for Arctic and Antarctic waters) for a period of time not to exceed 5 years. According to the original Navy application, SURTASS LFA sonar would operate a maximum of 4 ship systems in the 10 geographic operating regions in which SURTASS LFA sonar could potentially operate. There would be a maximum of four SURTASS LFA sonar systems with an expected maximum of two systems at sea at any one time.

The purpose of SURTASS LFA sonar is to provide the Navy with a reliable and dependable system for long-range detection of quieter, harder-to-find submarines. Low-frequency (LF) sound travels in seawater more effectively and for greater distances than higher frequency sound used by most other active sonars. According to the Navy, the SURTASS LFA sonar system would meet the Navy's need for improved detection and tracking of new-generation submarines at a longer range. This would maximize the opportunity for U.S. armed forces to safely react to, and defend against, potential submarine threats while remaining a safe distance beyond a submarine's effective weapons range.

### *Description of the Activity*

The SURTASS LFA sonar system is a long-range, LF sonar (between 100 and 500 Hertz) that has both active and passive components. It does not rely on detection of noise generated by the target. The active component of the system is a set of up to 18 LF acoustic transmitting source elements (called projectors) suspended from a cable from underneath a ship. The projectors are devices that transform electrical energy to mechanical energy by setting up vibrations, or pressure disturbances with the water to produce the pulse or ping. The SURTASS LFA sonar acoustic transmission is an omnidirectional (full 360 degrees) beam in the horizontal. The expected water depth of the center of the array is 400 ft (122 m), with a narrow vertical beamwidth that can be steered above or below the horizontal. The source level (SL) of an individual projector in the SURTASS LFA sonar array is approximately 215 dB, and because of the physics involved in beam forming and transmission loss processes, the array can never have a sound pressure level (SPL) higher than the SPL of an individual projector. The expected minimum water depth at which the SURTASS LFA vessel will operate is 200 m (656.2 ft). Normally, the shallowest depth that it can operate is 100 m (328.1 ft).

The typical SURTASS LFA sonar signal is not a constant tone, but rather a transmission of various signal types that vary in frequency and duration (including continuous wave (CW) and frequency-modulated (FM) signals). A complete sequence of sound transmissions is referred to by the Navy as a ''ping'' and can last as short as 6 seconds (sec) to as long as 100 sec, normally with no more than 10 seconds at any single frequency. The time

between pings is typically from 6 to 15 minutes. Average duty cycle (ratio of sound ''on'' time to total time) can be controlled but cannot be greater than 20 percent; typical duty cycle is between 10 and 15 percent.

The passive or listening component of the system is SURTASS, which detects returning echoes from submerged objects, such as submarines, through the use of hydrophones. The hydrophones are mounted on a horizontal array that is towed behind the ship. The SURTASS LFA sonar ship maintains a minimum speed of 3.0 knots (5.6 km/hr; 3.4 mi/hr) in order to keep the array deployed.

The Navy anticipates that a normal SURTASS LFA sonar deployment schedule for a single vessel would involve about 270 days/year at sea (underway). A normal at-sea mission would occur over a 30-day period, made up of two 9-day exercise segments. The remaining 12 days of the at-sea mission would be spent in transit or repositioning the vessel. In an average year there could be a maximum of 9 missions, six of which would involve the employment of SURTASS LFA sonar in the active mode and three of which would employ the SURTASS LFA sonar in the passive mode only. Active sonar operations could be conducted up to 20 hrs during an exercise day, although the system would actually be transmitting for only a maximum of 4 hrs/day (resulting in 432 hrs of active transmission time per year for each SURTASS LFA sonar system in operation based on a maximum duty cycle of 20 percent). Between missions, an estimated 95 days would be spent in port for upkeep and repair.

At present, only one SURTASS LFA sonar system is available for deployment. A second SURTASS LFA sonar system is expected to be available shortly. Delivery of the third and fourth systems have been postponed until after FY 2007. As a result, under the 5-year window of these regulations, NMFS is authorizing marine mammal harassment takings for only 2 SURTASS LFA sonar systems, on average with one vessel operating in the Pacific-Indian Ocean area and one vessel in the Atlantic Ocean-Mediterranean Sea area. With two vessels, there would normally be 6 SURTASS LFA sonar missions in each of these oceanic basins (or equivalent shorter missions totaling no more than 432 hours of transmission/vessel/ year), or a total of 12 active sonar missions per year over the 5-year period of the regulations.

*Description of Acoustic Propagation*

The following is a very basic and generic description of the propagation of LFA sonar signals in the ocean and is provided to facilitate understanding of this action. However, because the actual physics governing the propagation of SURTASS LFA sound signals is extremely complex and dependent on numerous in-situ environmental factors, the following is for illustrative purposes only.

In actual SURTASS LFA sonar operations, the crew of the SURTASS LFA sonar platform will measure oceanic conditions (such as sea water temperature and salinity versus depth) prior to and during transmissions and at least every 12 hours, but more frequently when meteorological or oceanographic conditions change. These technicians will then use U.S. Navy sonar propagation models to predict and/or update sound propagation characteristics. According to the Navy, these extremely sophisticated computer simulations are among the most accurate in the world. The short time periods between actual environmental observations and the subsequent model runs further enhance the accuracy of these predictions. Fundamentally these models are used to determine what path the LF signal will take as it travels through the ocean and how strong the sound signal will be at given range along a particular transmission path.

Accurately determining the speed at which sound travels through the water is critical to predicting the path that sound will take. The speed of sound in seawater varies directly with depth, temperature, and salinity. Thus, an increase in depth or temperature or, to a lesser degree, salinity will increase the speed of sound in seawater. However, the oceans are not homogeneous and the contribution of each of these individual factors is extremely complex and interrelated. The physical characteristics which determine the sound speed change with depth (in the case of temperature and salinity), season, geographic location, and locally, with time of day. After accurately measuring these factors, mathematical formulas or models can be used to generate a plot of sound speed versus water depth. This type of plot is generally referred to as a sound speed profile (SSP). Near the surface, ocean water mixing results in a fairly constant temperature and salinity. In this mixed layer, depth (pressure) dominates the SSP and sound speed *increases* with depth. Below the mixed layer, sea temperature drops rapidly in an area referred to as the thermocline. In this region, temperature dominates the SSP and speed *decreases* with depth. Finally, beneath the thermocline, the temperature becomes fairly uniform and increasing pressure causes the SSP to *increase* with depth.

One way to envision sound traveling though the sea is to think of the sound as ''rays.'' As these rays travel though the sea, their direction of travel changes as a result of speed changes, bending or refracting toward areas of lower speed and away from areas of higher speed. Depending on environmental conditions, refraction can either be toward or away from the surface. Additionally, the rays can be reflected or absorbed when they encounter the surface or the bottom. Under the correct environmental conditions, sound rays can repeatedly be refracted upward and downward and thus become trapped in a duct or ''sound channel.'' Similarly, reflections from the surface or the bottom can combine with refraction to create a duct. In the right circumstances, repeated refraction can result in long-range focusing and defocusing of the sound. Because of the possibility of multiple transmission paths, all of which are dependent on environmental conditions, accurate predictions of how sound travels in water is an extremely complex process.

Some of the more prevalent acoustic propagation paths in the ocean include: acoustic ducting; convergence zone (CZ); bottom interaction; and shallow-water propagation.

*Acoustic Ducting*

There are two types of acoustic ducting: surface ducts and sound channels.

*Surface Ducts*

As previously discussed, the top layer of the ocean is normally well mixed and has relatively constant temperature and salinity. Because of the effect of depth (pressure), surface layers exhibit a slightly positive sound speed gradient (that is, sound speed increases with depth). Thus, sound transmitted within this layer is refracted upward toward the surface. If sufficient energy is subsequently reflected downward from the surface, the sound can become ''trapped'' by a series of repeated upward refractions and downward reflections. Under these conditions, a surface duct, or surface channel is said to exist. Sound trapped in a surface duct can travel for relatively long distances with its maximum range of propagation dependent on the specifics of the SSP, the frequency of the sound, and the reflective characteristics of the surface. As a general rule, surface duct

propagation will improve as the temperature uniformity and depth of the layer increase. For example, transmission is improved when cloudy, windy conditions create a well-mixed surface layer or in high-latitude midwinter conditions where the mixed layer extends to several hundred feet deep.

*Sound Channels*

Variation of sound speed, or velocity, with depth causes sound to travel in curved paths. A sound channel is a region in the water column where sound speed first decreases with depth to a minimum value, and then increases. Above the depth of minimum value, sound is refracted (bent) downward; below the depth of minimum value, sound is refracted upward. Thus, much of the sound starting in the channel is trapped, and any sound entering the channel from outside its boundaries is also trapped. This mode of propagation is called sound channel propagation. This propagation mode experiences the least transmission loss along the path, thus resulting in long-range transmission.

At low and middle latitudes, the deep sound channel axis varies from 1,970 to 3,940 ft (600 to 1,200 m) below the surface. It is deepest in the subtropics and comes to the surface in the high latitudes, where sound propagates in the surface layer. Because propagating sound waves do not interact with either the sea surface or seafloor, sound propagation in sound channels do not attenuate as rapidly as bottom- or surface-interacting paths. The most common sound channels used by SURTASS LFA sonar are convergence zones (CZs).

*Convergence Zones*

CZs are special cases of the sound-channel effect. When the surface layer is narrow or when sound rays are refracted downward, regions are created at or near the ocean surface where sound rays are focused, resulting in concentrated levels of high sounds. The existence of CZs depends on the SSP and the depth of the water. Due to downward refraction at shorter ranges, sound rays leaving the near-surface region are refracted back to the surface because of the positive sound speed gradient produced by the greater pressure at deep ocean depths. These deep-refracted rays often become concentrated at or near the surface at some distance from the sound source through the combined effects of downward and upward refraction, thus causing a CZ. CZs may exist whenever the sound speed at the ocean bottom, or at a specific depth, exceeds the sound speed at the source depth. Depth excess, also called sound speed excess, is the difference between the bottom depth and the limiting, or critical depth.

CZs vary in range from approximately 18 to 36 nm (33 to 67 km), depending upon the SSP. The width of the CZ is a result of complex interrelationships and cannot be correlated with any specific factor. In practice, however, the width of the CZ is usually on the order of 5 to 10 percent of the range (see Figure 1). For optimum tactical performance, CZ propagation of SURTASS LFA signals is desired and expected in open ocean conditions.

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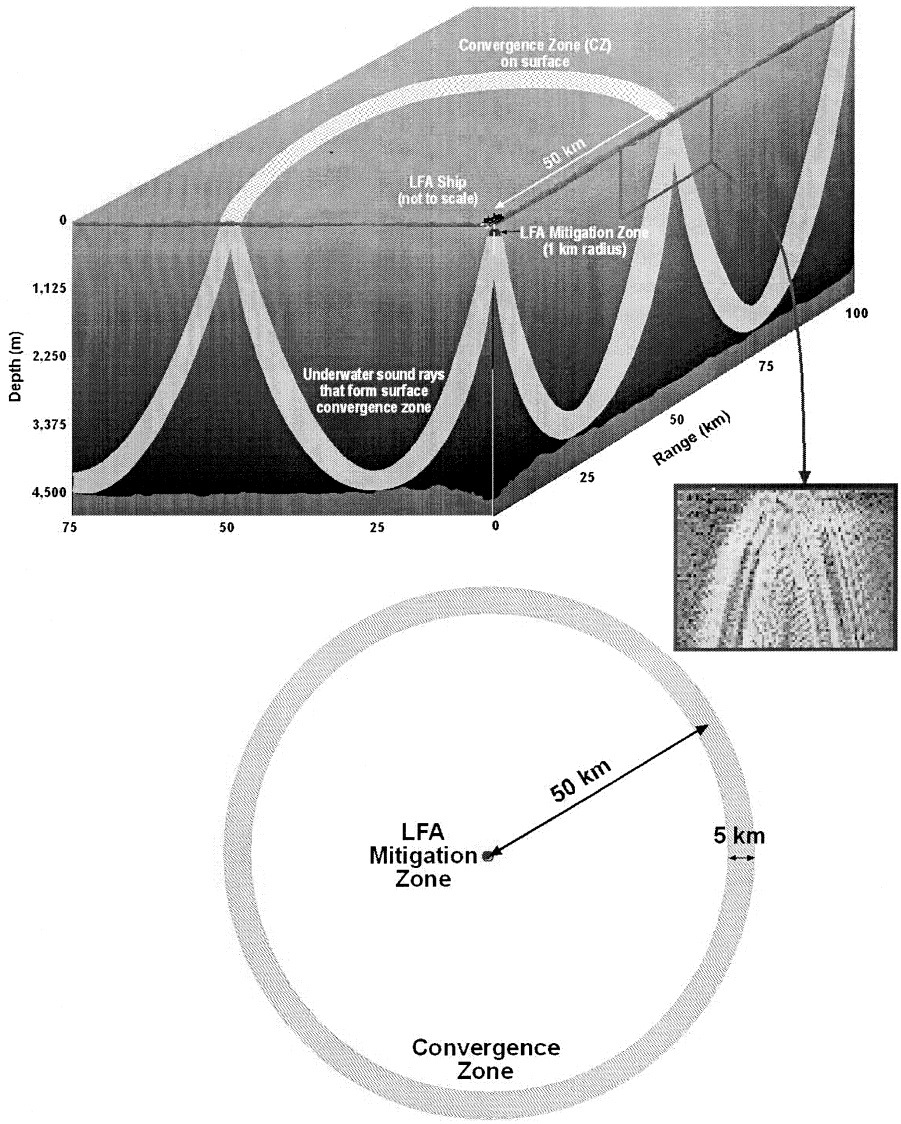


Figure 1. A Schematic of the Propagation of Sound in Convergence Zones.

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*Bottom Interaction*

Reflections from the ocean bottom and refraction within the bottom can extend propagation ranges. For mid- to high-level frequency sonars (greater than 1,000 Hz), only minimal energy enters into the bottom; thus reflection is the predominant mechanism for energy return. However, at low frequencies, such as those used by the SURTASS LFA sonar source, the sound penetrates the ocean floor, and refraction within the seafloor, not reflection, dominates the energy return. Regardless of the actual transmission mode (reflection from the bottom or refraction within the bottom), this interaction is generally referred to as ''bottom-bounce'' transmission.

Major factors affecting bottom-bounce transmission include the sound frequency, water depth, angle of incidence, bottom composition, and bottom roughness. A flat ocean bottom produces the greatest accuracy in estimating range and bearing in the bottom-bounce mode.

For SURTASS LFA sonar transmissions between 100 and 330 Hz, bottom interaction would generally occur in areas of the ocean where depths are between approximately 200 m (average minimum water depth for SURTASS LFA sonar deployment) and 2,000 m (660 and 6,600 ft).

*Shallow Water Propagation*

In shallow water, propagation is usually characterized by multiple reflection paths off the sea floor and sea surface. Thus, most of the water column tends to become ensonified by these overlapping reflection paths. As LFA signals approach the shoreline, they will be affected by shoaling, experiencing high transmission losses through bottom and surface interactions. Therefore, LFA sonar will not be effective in shallow, coastal waters.

In summary, for the SURTASS LFA sonar signal in low- and mid-latitudes, the dominant propagation paths for LFA signals are CZ and bottom interaction (<2000 m (6,600 ft) depth). In high-latitudes, surface ducting provides the best propagation. In most open ocean water, CZ propagation will be most prominent. An example of this propagation path is shown in Figure 1. The SURTASS LFA sonar signals will interact with the bottom, but due to high bottom and surface losses, SURTASS LFA sonar signals will not penetrate coastal waters with appreciable signal strengths.

**Comments and Responses**

On October 22, 1999 (64 FR 57026), NMFS published an Advance Notice of Proposed Rulemaking (ANPR) on the U.S. Navy application and invited interested persons to submit comments, information, and suggestions concerning the application and the structure and content of regulations, if the application was accepted. During the 30-day comment period of that notification, significant comments were received from several organizations and individuals. On March 19, 2001 (66 FR 15375), NMFS published a proposed rule to authorize the U.S. Navy to take small numbers of marine mammals incidental to operation of SURTASS LFA sonar and requested comments, information, and suggestions concerning the request and the regulations proposed to govern the take. The comments provided to NMFS during the ANPR's comment period were addressed in the notice of proposed rulemaking. A copy of the proposed rulemaking document is available at: *http://www.nmfs.noaa.gov/prot__res/PR2/Acoustics__Program/acoustics.html*

While the comment period on the proposed rule was for a period of 45 days, the comment period was extended until May 31, 2001, a period of 73 days (66 FR 26828, May 15, 2001). During that time period, NMFS received several thousand comments from organizations and interested citizens. Most of the comments received were petitions, postcards and form letters, either mailed or faxed to NMFS. Approximately 87 letters contained comments, information, and questions that NMFS determined warranted response in this document. Moreover, these letters reflected the same comments that were contained in the other letters and postcards, but in greater detail. They are available for viewing at the following location: *http://fish.nmfs.noaa.gov/ibrm/OPRComments.lhtml?rulein=2*. For those without access to the Internet, copies of these letters and all comments received by NMFS are available from NMFS at copy cost (see **ADDRESSES**).

In addition to written comments, NMFS held three public hearings to obtain oral and written information from the public on NMFS' proposed rule (66 FR 19414, April 16, 2001). These public hearings were held in Los Angeles, CA on April 26, 2001, Honolulu, HI on April 28, 2001, and Silver Spring, MD on May 3, 2001. A copy of any or all of the hearing records is also available from NMFS at copy cost (see **ADDRESSES**).

In this document, NMFS has (1) provided response to comments (RTCs) on both its proposed rule and the Navy's Final EIS; (2) provided cross-references to the appropriate response in the Navy's Final Overseas Environmental Impact Statement and Environmental Impact Statement for SURTASS LFA Sonar (Final EIS) for comments that were addressed in the Navy's Final EIS; (3) edited some comments for clarity and brevity; and (4) grouped similar comments or chosen one or two comments to represent several similar comments. Some comments may not have been addressed because their meaning or relevance was not clear.

In the following sections, NMFS is responding to comments on the Navy activity whether or not the comment was relevant to the Navy's application or the effect of SURTASS LFA sonar on marine mammals and thereby under the purview of NMFS. This was done to further facilitate understanding of the Navy's proposed action, the alternatives identified by the public to SURTASS LFA sonar, and the potential impact of SURTASS LFA sonar on marine mammals.

*Activity Concerns (AC)*

*Comment AC1:* The Cold War is over. With no threat from the Russians, why is LFA needed?

*Response:* It is the opinion of the Navy that the end of the Cold War doesn't end the need for naval surveillance. On 11 October 2001, in testimony before the Subcommittee on Fisheries Conservation, Wildlife and Oceans of the House Committee on Resources on the MMPA and SURTASS LFA Sonar, Vice-Admiral Dennis V. McGinn, the Deputy Chief of Naval Operations for Warfare Requirements and Programs made the following statement concerning the need for SURTASS LFA sonar:

> The Navy has an immediate, critical need for SURTASS LFA. By law, the Navy's primary mission is to maintain, train and equip combat-ready Naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas. Antisubmarine warfare, or ASW, is a critical part of that mission. The Chief of Naval Operations (CNO) has stated that ASW is essential to sea control and maritime dominance. Many nations throughout the world can employ submarines to deny access to forward regions or to significantly delay the execution of crucial Navy operations. Because of its inherent stealth, lethality, and affordability, the submarine is a powerful threat. In 1998 the Chief of Naval Operations emphasized the importance of ASW in protecting our national security and set the direction for achieving operational primacy in ASW. He stated that the Navy's goal is to

have the best-trained ASW force in the world, with the right set of tools to prevail in any type of conflict, including the kind we are now facing in the Middle East. My goal here today is to show you why I believe one of the primary ASW tools must be SURTASS LFA.

*Comment AC2:* War/heightened tension clause is a major loophole allowing the Navy to operate wherever they want without mitigation. Both the Final EIS and the permitting process should address the use of SURTASS LFA sonar during war, combat, and heightened threat conditions.

*Response:* War, combat, and heightened threat conditions are determined by the Congress or the National Command Authorities (NCA), not the U.S. Navy. Chapter 1 (Purpose and Need) and RTC 1–1.7 of the Final EIS identify the NCA as the President and the Secretary of Defense (or their duly designated alternates or successors), as assisted by the Chairman of the Joint Chiefs of Staff. Since these determinations are not made by the Navy, both the small take application and the Navy's Draft and Final EISs are specifically limited to employment of the SURTASS LFA sonar during training, testing, and routine military operations and will not cover use of the SURTASS LFA system in self-defense, in times of war, combat or heightened threat conditions mentioned by the commenter.

The Final EIS does not include use of SURTASS LFA sonar during these conditions because these operations would be speculative at the EIS stage and outside the Navy's control. Moreover, as noted here, the Council on Environmental Quality (CEQ) regulations, Department of Defense (DOD) Directives and Executive Order (E.O.) 12114 provide specific guidance on what to do in emergencies that are not susceptible to the regular NEPA process.

CEQ Regulations For Implementing the Procedural Provisions of the National Environmental Policy Act under 40 CFR 1506.11 concerning ''Emergencies'' states,

> Where emergency circumstances make it necessary to take action with significant environmental impact without observing the provisions of these regulations, the Federal agency taking the action should consult with the Council about alternative arrangements. Agencies and the Council will limit such arrangements to actions necessary to control the immediate impacts of the emergency.

DOD Directive 6050.1, Environmental Effects in the United States of DOD Actions, implements the above CEQ regulations and provide policy and procedures to DOD officials. This directive defines ''Emergencies'' as they apply to DOD Components to include ''actions that must be taken to promote the national defense or security that cannot be delayed, and actions necessary to protect life or property.''

E.O. 12114 (Environmental Effects Abroad of Major Federal Actions) directs federal agencies to provide informed decision-making for actions that have the potential to significantly harm the environment outside U.S. waters and furthers the purposes of NEPA and other statutes in the global commons. E.O. 12114 Section 2–5 *Exemptions and Considerations* Subsection (a)(iii) states, ''actions taken by or pursuant to the direction of the President or Cabinet officer when national security or interest is involved or when the action occurs in the course of an armed conflict are exempt from the Order.'' Because wartime and heightened threat conditions are provided for by a separate process under CEQ Regulations and are exempted from the requirements of E.O. 12114, consideration of these conditions are outside of the scope of the Final EIS. Therefore, NMFS agrees with the Navy that it is appropriate for these conditions not to be addressed in the Navy's Final EIS.

NMFS is not authorizing the incidental taking of marine mammals during periods of war, combat, and heightened threat conditions in its MMPA application because: (1) The Navy did not request an authorization to cover these conditions, (2) the timing of such events is speculative and outside the control of the U.S. Navy, and (3) because the Navy may not be capable of complying with certain conditions (*e.g.,* area of operations and length of mission, and mitigation and monitoring requirements) contained in the regulations and the Letter of Authorization (LOA). In the rare event that any of these conditions was declared and the Navy's SURTASS LFA sonar assets were included in this condition, an LOA would be placed in abeyance until the war, combat, or heightened threat condition was terminated. Upon its conclusion, NMFS would then reassess the impact on marine mammals using information from the activity area(s) and updated modeling results to determine whether the takings in the future would continue to have no more than a negligible impact on affected marine mammal stocks. For example, additional mitigation might be required to ensure that the stocks affected during the heightened threat condition were not additionally impacted during the period of the regulations' effectiveness.

*Comment AC3:* A lower-powered, shorter-range system should be used. In a discussion of the supercavitation technology and the Russian Skval torpedo, the commenter stated, ''they [the Russians] have also been selling Kilo-Class diesel-electric submarines to nations like North Korea. These submarines are super quiet * * *.''

*Response:* According to the Navy, a lower-powered, and thus shorter-range, system will not meet the Navy's stated need for long-range detection of quiet submarines. The latter statement in the comment reinforces the Final EIS Purpose and Need statement for the development of SURTASS LFA sonar technology and the immediate need to be able to detect these quiet submarines at long range.

*Comment AC4:* One commenter believes that SPAWAR (Space and Naval Warfare Systems Command) in San Diego (TD3105) stated that SURTASS LFA System was apparently successfully used to locate Soviet submarines during the Cold War.

*Response:* The referenced statement by SPAWAR actually stated that the SPAWAR Systems Center focused its efforts on the development of *capabilities* to detect and track Soviet nuclear submarines operating in deep water. It also stated that these efforts (development of capabilities) were successful for several systems, such as SURTASS LFA sonar. SPAWAR did not state that SURTASS LFA sonar was used to *actually* track Soviet submarines during the Cold War.

*Comment AC5:* The Final EIS states that SURTASS LFA sonar is needed to protect ''choke points'' through which international shipping moves. It also states that LFA operations would generally not occur in areas of high human activity such as high shipping density. Also, will LFA be used in the littorals? If so, the EIS claim that near-shore environments will not be the focus of SURTASS LFA appears to be false.

*Response:* According to the Navy, SURTASS LFA sonar is a long-range sonar, it does not have to operate in, or near, ''choke points'' nor close to shore to detect submarines at long range.

SURTASS LFA sonar may support operations that take place in the littoral zone. However, according to the Naval Doctrine Command (1998), littoral zone refers to that area off the coast where naval forces conduct strategic sealift operations, control or interdict sea lines of communication, and project power ashore. The latter objective may entail operations up to approximately 200 nautical miles (nm) (370.4 km) from the coast. However, mitigation measures

prohibit SURTASS LFA sonar from transmitting an SPL greater than 180 dB at a distance of 12 nm (22 km) from any shore.

*Comment AC6:* One commenter has described a scenario in which the enemy deploys numerous decoys, or ''phantom submarines,'' to confuse the SURTASS LFA sonar computer. He also states that merely by transmitting, the LFA vessel will give away its position.

*Response:* As stated in the Final EIS (RTC 1–1.6), the SURTASS LFA sonar vessel cannot remain undetected when transmitting, but it will be protected by naval forces. The use of decoys is a standard countermeasure for undersea warfare, one that has been taken into consideration in the planning and design of sonar systems and tactics.

*Comment AC7:* Use the military intelligence community to address the diesel submarine threat from rogue nations.

*Response:* According to the Navy, the intelligence community does provide the Navy Fleet Commanders-in-Chief with information regarding threat submarines. However, real-time, tactical information is still needed from SURTASS LFA sonar for theater commanders to respond to these threats.

*Comment AC8:* SURTASS LFA sonar is the loudest sound ever produced by man. SURTASS LFA sonar will add tremendously to the problem of ocean noise pollution through the use of very high-energy sound blasting coupled with the long-range underwater effects characteristic of LF sound.

*Response:* The maximum sound exposure an animal could receive from SURTASS LFA sonar is 215 dB. This is not the loudest sound in the oceans from natural or human sources, nor is it the greatest source of sound energy (in lay terms, the total quantity of sound) in the oceans. Each year billions of lightning strikes hit the ocean with source levels of about 260 dB. Earthquakes and other geological events that exceed 230 dB occur about 1,000 times per year in the Pacific Ocean alone, and 10,000 of them occur that exceed 205 dB. Frankel (1994) estimated the source level for singing humpback whales to be between 170 and 175 dB while Au and Andrews (2001) measured their calls off Hawaii at 189 dB; the average call source level for blue whales was calculated by McDonald *et al.* (2001) to be 186 dB. Watkins *et al.* (1987) and Charif *et al.* (2002) found source levels for fin whales up to 186 dB, and MØhl *et al.* (2000) recorded source levels for sperm whale clicks up to 223 dB (rms).

Aside from explosions, the loudest human noise in the oceans is from airgun arrays used in oil and gas exploration. World-wide, there are approximately 150 vessels that conduct these surveys. With source levels of up to 255 dB, and capable of shooting every 10 seconds around the clock, any one of these surveys can put more acoustic energy into the ocean annually than SURTASS LFA sonar. However, the greatest source of sound energy in the oceans caused by humans is from commercial shipping. SURTASS LFA sonar and all other impulsive human noises could be eliminated and noise levels in the oceans would continue to rise because of shipping alone.

*Comment AC9:* Provide LFA source level (SL) and attenuation. Define the difference between actual and effective SL of the LFA array. NMFS personnel do not understand that the effective source level of LFAS really is 240 dB. The cumulative sound produced by the LFA array is not limited to the volume of each speaker.

*Response:* As stated in the Final EIS (RTC 2–1.1 and 2–1.2), the SL of an individual SURTASS LFA source projector is approximately 215 dB. Because the SURTASS LFA array employs more than one source projector, the effective (not actual) SL of the array is a theoretical calculation based on the sound field beam formed by the array at a range of hundreds of meters from the array, where propagation loss has already caused a decrease in received level (RL) of over 40 dB. Therefore, in the proximity of the SURTASS LFA sonar array, the SL approximates that of an individual projector (215 dB), and the sound field of the array is not higher than the SL of an individual projector. For a more detailed explanation see the Final EIS, Appendix B, Subchapter B.3.1.

*Comment AC10:* The Navy stated that LFA intensities under 215 dB will not ''fulfill the purpose.'' Therefore, there is the likelihood that higher levels will be used during actual military operations. Source level of 215 dB is neither necessary nor desirable. Source levels can be reduced by using: (1) longer duration source signals, (2) replacing single array with multiple arrays, and (3) multi-ship arrays.

*Response:* According to the Navy, in order to meet the requirement for long-range detection, 215 dB SL is necessary. There will be no transmission levels of greater than 215 dB for each projector. The three items mentioned by the commenter will not reduce the SLs. These items are already part of ASW operations. First, long duration signals of up to a 100-second duration are used by SURTASS LFA sonar. Second, a new twin line SURTASS passive array is being developed to improve detection and will be used with SURTASS LFA sonar. Finally, multiple-ship receive arrays are used. Passive-only SURTASS vessels can be used to receive the SURTASS LFA signal from vessels with the active (LFA) component installed. See the Final EIS (RTC 1–1.3) for more information.

*Comment AC11:* Passive alternatives to SURTASS LFA sonar (*e.g.*, ADS (Advanced Deployable System), Twin Line SURTASS, Acoustic Rapid Commercial-off-the-shelf Insertion (ARCI) processing, Robust Passive Sonar, ''Acoustic daylight'' technology) were not considered.

*Response:* Passive alternatives to SURTASS LFA sonar are discussed in the Final EIS (RTCs 1–2.1, 1–2.2, and 1–2.3). Effective ASW operations require the ability of Fleet Commanders-in-Chief to balance many variable factors, both tactical and environmental, to provide the acceptable probability of detection of threat submarines. The Navy has investigated and/or developed many technologies with the potential to meet its detection needs. These include both passive and active systems. According to the Navy, no one single technology will provide the solution during all tactical and environmental conditions. As stated in the Final EIS (page 2–2), LFA sonar ''is an augmentation to the passive [SURTASS] detection system, and is planned for use when passive performance is inadequate.'' While in some instances passive sonar can provide the detection required, under most conditions, passive sonar cannot detect quiet targets. Therefore, passive systems alone cannot meet the Navy's requirement to detect quiet, hard-to-find submarines during all conditions, particularly at long ranges.

*Comment AC12:* What are the potential and specific conditions for exceeding 180 dB re: 1 micro Pa (root mean squared (rms)) beyond the 1-km (0.54-nm) mitigation zone? How does that relate to mitigation effectiveness?

*Response:* Under almost all oceanographic conditions, the 180-dB SPL will not be beyond 1 km (0.54 nm) from the array. Even under ducted or CZ conditions, spherical spreading losses will dominate transmission losses within 1 km (0.54 nm). The actual 180 dB SPL will vary from 750 to 1,000 m (0.4–0.5 nm) from the array. This will not influence mitigation effectiveness.

*Comment AC13:* In Comment 2–2.1 (in the Final EIS), the Navy states that ''the restricted areas will not affect SURTASS LFA sonar routine training and testing, as well as the use of the system during military operations.''

However, on page 2–23 this is contradicted because the Navy stated that ''Alternative 2 [unrestricted operations] would provide Fleet operators with * * * maximum submarine detection capability * * *.''

*Response:* Training operations under Alternative 1 in the Navy's EIS will not provide for maximum submarine detection capabilities because of the geographic restrictions. However, Alternative 1 is the Navy's preferred alternative in order to protect marine mammals and as a result a small take authorization under the MMPA was not requested for Alternative 2, which would have a potential for increased marine mammal takes.

*Comment AC14:* Why was the discussion of ''Time Reversed Acoustics'' as applied to LFA Sonar by NATO (North Atlantic Treaty Organization) and SACLANT (Supreme Allied Commander, Atlantic Center) research omitted from the Final EIS?

*Response:* There was no discussion of time reversed acoustics in the Final EIS because: (1) No comments were received concerning this issue on the Draft EIS, and (2) It is not relevant to SURTASS LFA sonar analysis. The article referenced by the commenter is Fink (1999) (Scientific American 283(11): 91–97). The commenter stated, ''This is an article about a Low Frequency Active Sonar application employed by NATO and the SACLANT research being done.'' A review of the article found no reference to SURTASS LFA sonar. The NATO/SACLANT experiment concerned underwater communications.

*Comment AC15:* Individual skippers, untrained in the effects of sound on wildlife, will be allowed to make their own instantaneous assessments based solely on military and political consideration, answerable to none.

*Response:* NMFS disagrees. The U.S. Navy has asserted that it is committed to full compliance with the LOA issued by NMFS for taking marine mammals incidental to operating SURTASS LFA sonar. Under the LOA, shutdown criteria will be followed whenever a marine mammal is detected prior to entering the 180-dB SURTASS LFA mitigation zone.

*Marine Mammal Impact Concerns (MMIC)*

During the public comment period, several issues were raised that related more to interpretation of the MMPA than to a discussion of impacts on marine mammals. The former issues are addressed later in this document (see *MMPA Concerns*).

Selection of Species

*Comment MMIC1:* The impacts on endangered, threatened and depleted species and stocks have not been properly assessed. Specifically mentioned were the migration paths of the female northern (Atlantic) right whale, dugong, and blue and fin whale concentrations in the open ocean.

*Response:* NMFS believes that impacts to threatened, endangered and depleted species and stocks have been addressed and properly assessed in the Draft and Final EISs. In addition, the Navy has completed formal section 7 consultation under the Endangered Species Act (ESA) with NMFS with the issuance of a Biological Opinion. One result of that consultation is that the Spitzbergen stock of bowhead whales may be subject to Level B harassment. As a result, that stock has been added to the list of authorized species under these regulations.

Animals in unspecified migration corridors and open ocean concentrations are adequately protected by the tripartite mitigation protocols. Dugongs are discussed in RTC MMIC2.

*Comment MMIC2:* Dugongs occur more than 12 nm (22.2 km) offshore in Australian waters. The U.S. Fish and Wildlife Service (USFWS) should be consulted.

*Response:* Dugongs are usually found in calm, sheltered, nutrient-rich water less than 5-m (16.4 ft) deep, generally in bays, shallow island and reef areas which are protected against strong winds and heavy seas and which contain extensive sea grass beds. However, they are not confined to inshore waters. There have been sightings near reefs up to 80 km (43.2 nm) offshore in waters up to 37 m (121.4 ft) deep. The average minimum water depth that the SURTASS LFA vessel will operate is 200 m (656.2 ft). The shallowest depth that it can operate is 100 m (328 ft). As a result of sound attention in shallow and shoaling water, dugongs are unlikely to be affected.

The USFWS was consulted. On 18 May 1998, the Department of the Navy, pursuant to section 7 of the ESA, as amended, requested that the USFWS provide a compilation of listed, proposed, and candidate threatened and endangered species under the cognizance of the USFWS covering the ocean regimes in which SURTASS LFA sonar was intended to operate. A copy of this letter was provided in Appendix A of the Final EIS. In addition, the USFWS and the Department of the Interior were provided copies of both the Draft and Final EISs. Because of the offshore nature of SURTASS LFA sonar operations, the Navy determined that endangered or threatened species or the critical habitat of any protected species under the jurisdiction of the USFWS will not be affected.

*Comment MMIC3:* Based on their marked avoidance responses (fleeing up to 80 km (43 nm) from an area where first disturbed) to relatively low levels of LF sounds between 94 and 105 dB (i.e., the 20–1000 Hz band) produced by icebreakers at extraordinarily long ranges, why were white whales (belugas) in Cook Inlet determined not to be affected by LFA sonar operating in the Gulf of Alaska?

*Response:* This was discussed in the Final EIS (RTCs 3–2.10 and 3–2.11). The Cook Inlet beluga stock is located in coastal waters and, therefore, is not within the geographic region that SURTASS LFA sonar would operate. Cook Inlet beluga stocks are also unlikely to be subject to SURTASS LFA sonar signals considering the significant coastal sound attenuation prior to reaching Cook Inlet. This assumption has been verified through modeling, as depicted in Figure B–1 of Technical Report (TR) 2. This stock of belugas, therefore, was excluded from further analysis. More information is provided in the Final EIS Subchapter 3.2.5.1.

Furthermore, NMFS does not believe that the discussion on icebreaking vessel noise provided by the commenter is valid for SURTASS LFA sonar. First, NMFS believes the sounds affecting belugas at great distances were not in the 20–1,000 Hz range, but instead were in the 5-kHz range as cited by Richardson *et al.* (1995, p. 257) from the work by Cosens and Dueck (1993). Those latter authors expand on Richardson *et al.* (1995) by noting that belugas are relatively insensitive to sounds below 1 kHz, thus they are unable to detect LF ship noise beyond a few hundred meters of the source even though the source level is high (e.g., 501 Hz at 110 dB = 0.65 km). Higher frequency components of icebreaking vessel noise should be detectable at greater distances because the source levels are relatively high and detection thresholds (of belugas) at those frequencies are relatively low (Cosens and Dueck, 1993). Second, NMFS believes the commenter has taken Richardson *et al.* (1995) out of context. Richardson *et al.* (1995) did not state ''fleeing up to 80 km from an area where first disturbed at levels between 94 and 105 dB.'' The commenter has combined two separate discussions in Richardson *et al.* (1995). What Richardson *et al.* (1995) stated was that after initially being displaced by relatively low levels of noise from the approaching ship (94

to 105 dB in the 20 to 1000 Hz range), the whales sometimes returned 1 to 2 days later when the icebreaking noise levels were still as high as 120 dB. On page 257, Richardson *et al.* (1995) stated that belugas travel up to 80 km (43.2 nm) from the ship track, and typically remain away for 1 to 2 days. They also indicated that this may be due to the high frequency component. Also, this paragraph in Richardson *et al.* (1995) refers to both belugas and narwhals and references Finley *et al.* (1990) (which concerns both whale species). So, it's unclear whether Richardson *et al.* (1995) was referring to narwhals or belugas.

Concerning the belugas ''fleeing,'' on page 256 Richardson *et al.* (1995) stated, ''Belugas are rather tolerant of the frequent passages by larger ship vessels traveling in consistent directions in summering areas such as the St. Lawrence River, Cook Inlet, and Beaufort Sea. * * * However, belugas often flee from fast and erratic moving small boats.'' Icebreakers are not particularly fast, do not move erratically, and are not small. Also, as noted by Cosens and Dueck (1993), the environmental conditions in Lancaster Sound are likely very different than in other areas, such as Cook Inlet. Belugas in Lancaster Sound are inexperienced with shipping noises. Therefore, NMFS considers that the comparison provided by the commenter is not valid for SURTASS LFA sonar.

*Comment MMIC4:* The EIS completely dismisses organisms that cannot hear in the LF range-humans or toothed whales and dolphins.

*Response:* The Draft and Final EISs do not dismiss organisms that cannot hear in the LF range. In the Final EIS Subchapter 3.2.1, one of the criteria for analysis of potential impacts is that the organism must have organs or tissues with acoustic impedance different from water or be able to sense LF sound. Potential impacts to human divers and odontocetes are extensively discussed and analyzed. It should also be noted that humans and most odontocetes (which includes dolphins) are capable of hearing in the LF range.

*Comment MMIC5:* NMFS dismissed concerns of one commenter that ice seals were excluded from consideration in the Draft EIS.

*Response:* In response to the Marine Mammal Commission (MMC) comment on the Draft EIS, the hooded seal was included in the analysis in the Final EIS and the proposed rule. Also, see Final EIS (RTC 3–2.10).

**Potential Effects**

*Comment MMIC6:* The Navy has dismissed behavioral effects below 180 dB as temporary and thus biologically insignificant.

*Response:* The potential for significant changes in biologically important behavior is considered from 119 to 180 dB as discussed in the Final EIS Subchapter 4.2, specifically 4.2.3.2 and in TR 2.

*Comment MMIC7:* Intense noise can cause strandings at a variety of frequencies and at RLs well below 180 dB; therefore, there is potential for strandings to occur from deployment of LFA. RLs lower than 180 dB re 1 micro Pa (RMS) can be extremely harmful, even lethal. The Grecian and Bahamian stranding events strongly suggest that SPLs far lower than 180 dB from mid-frequency and LF sounds could have lethal effects on several species of beaked whales over relatively large geographic areas. Therefore, the 1-km (0.54-nm) safety zone is inadequate.

*Response:* While NMFS agrees that intensive sounds could result in strandings at various frequencies for those marine mammals whose hearing includes the primary frequencies of the sound source, NMFS does not agree with the statements that strandings would occur at levels significantly less than 180 dB. First, results of the Low Frequency Sound Scientific Research Program (LFS SRP) indicated no significant change in biologically important behavior for exposure to sound levels up to 155 dB; i.*e.*, there were no behavioral reactions indicating that marine mammals were being significantly affected or injured. Even though there is an increased probability of behavioral harassment from 155 to 180 dB, there is no indication that behavioral harassment impacts could cause strandings. It should also be noted that many whales vocalize in this range and are not known to result in strandings. With regard to the potential for injury below 180 dB from possible resonance effects, Cudahy and Ellison (2002) noted that ''each of the *in vivo* (in the living body) and theoretical studies related to potential tissue damage from underwater sound support a damage threshold on the order of 180 to 190 dB.'' This tissue damage could include lung damage and hemorrhaging. Also, it has been hypothesized that LF sound could cause bubble growth from supersaturated gases in the blood (similar to the human diver condition known as the bends). Crum and Mao (1996) stated that received level would have to exceed 190 dB in order for there to be the possibility of significant bubble growth due to supersaturation of gases in the blood (See Final EIS, page 10–137).

Moreover, the Navy's monitoring and mitigation protocols proposed for employment of SURTASS LFA sonar will preclude employment in narrow and deep channels surrounded by land such as those in the Bahamas (22-km/12-nm restriction); and the shut-down criteria for the Navy's high-frequency marine mammal monitoring (HF/M3) sonar has been expanded to include any detection by the HF/M3 sonar that is classified as a marine mammal, which could occur up to 1 km beyond the SURTASS LFA sonar mitigation zone. The stranding of Cuvier's beaked whales in the Mediterranean in 1996 was considered in the SURTASS LFA sonar impact analysis. For details, see the Final EIS pages 3.2–45 to 3.2–47. Both the Greek and Bahamas strandings involved beaked whales. These species are mid-frequency specialists. The only common acoustic source to both events was in the mid-frequency range.

For discussion on whether or not the 1-km (0.54 nm) safety zone is adequate, please see Mitigation Concerns later in this document.

*Comment MMIC8:* The assumption that temporary threshold shift (TTS), even when it lasts for days, does not constitute injury is intrinsically flawed. TTS may lead to increased vulnerability to predation or to confusion, which may lead to stranding and death.

*Response:* TTS is a change in the threshold of hearing (the quietest sound an animal can hear), which could temporarily affect an animal's ability to hear calls, echolocation sounds, and other ambient sounds. As such, it could result in a temporary disruption of behavioral patterns, thereby resulting in Level B harassment under the MMPA. The best research to date indicates that the distortion and dysfunction of sensory tissue observed during TTS are only temporary and fully reversed upon recovery (*i.e.*, occasional TTS produces no permanent tissue damage to the ear, only the temporary nondestructive impairment of tissue that fully recovers). This type of temporary nondestructive impairment, as well as the use of TTS in human damage risk criteria, is the scientific basis for not considering TTS as an injury.

Acousticians are in general agreement that a temporary shift in hearing threshold of up to 40 dB due to moderate exposure times is fully recoverable and does not involve tissue damage or cell loss. Liberman and Dodds (1987) state, ''* * *acute threshold shifts as large as 60 dB are routinely seen in ears in which the

surface morphology of the stereocilia is perfectly normal.'' Stereocilia are the sensory cells responsible for the sensation of hearing. In the chinchilla, no cases of TTS involve the loss of stereocilia, but all cases of PTS do (Ahroon *et al.*, 1996). Cell death clearly qualifies as Level A harassment (injury) under the MMPA. Because there is no cell death with modest (up to 40 dB) TTS, such losses of sensitivity constitute a temporary impairment but not an injury. Since the boundary line between TTS and PTS is not clear, definitive, and predictable for marine mammals, NMFS has adopted the standard that 20 dB of TTS defines the onset of PTS (*i.e.*, a temporary shift of 20 dB in hearing threshold). This intentionally conservative standard is appropriate because all of the research on stereocilia has been done on terrestrial mammals, which may be poor models for marine mammals since marine mammals have evolved to withstand large pressure change differentials during diving. This should not be interpreted to mean that the onset of PTS results from adding 20 dB to the dB level found to cause the onset of TTS in an animal, but instead means that the onset of PTS is the sound exposure in level (dB) and duration that would cause a temporary shift of 20 dB in hearing threshold.

As stated in previous actions (66 FR 22450, May 4, 2001), second level impacts (such as potential predation) due to a marine mammal having a temporary hearing impairment cannot be predicted and are, therefore, speculative and difficult to quantify. In fact, any disruption of behavior (Level B harassment) could, with suppositions, be seen as potentially dangerous and, therefore, considered potentially injurious (Level A harassment) as well. Similarly, all injuries could be seen as being accompanied by some disruption of behavior and therefore, Level B disturbances as well as Level A injuries. Such reasoning blurs the distinctions that the statutory definitions of harassment attempt to make.

NMFS believes that Level B harassment, if of sufficient degree and duration, can be very serious and requires consideration when making impact determinations. For example, moderate TTS does not necessarily mean that the animal cannot hear, only that its threshold of hearing is raised above its normal level. The extent of time that this impairment remains is dependent upon the amount of initial TS, which in turn depends on the strength of the received sound and whether the TTS is in a frequency range that the animal depends on for receiving cues that would benefit survival. It should be noted that increased ambient noise levels, due to biologics, storms, shipping, and tectonic events, may also result in short-term decreases in an animal's ability to hear as well as normal. For example, ambient noise in the Hawaiian Islands Humpback Whale National Marine Sanctuary increases seasonally in conjunction with an increase in humpback whale abundance, with no known impacts to these animals. NMFS scientists believe that marine mammals have likely adopted behavioral responses, such as decreased spatial separation, slower swimming speeds, and interruption of socialization to compensate for increased ambient noise or hearing threshold levels.

A hypothesis that marine mammals would be subject to increased predation presumes that the predators would either not be similarly affected by the resultant SPL or would travel from areas outside the impact zone, indicating recognition between a sonar signal at some distance and potentially debilitated food sources. Moreover, NMFS notes that TTS does not cause confusion or disorientation. Disorientation is caused by vestibular affects to the inner ear, not related to TTS (although an animal having vestibular effects could also suffer from TTS). For example, humans attending certain sport or music events may incur a TTS impairment due to the noise, but are not noted for being disoriented afterwards, unless caused by something other than noise. Therefore, NMFS does not believe the evidence warrants that TTS be considered as an injury.

However, because of the SURTASS LFA sonar mitigation zone and the use of the HF/M3 sonar to locate mammals prior to incurring potential injury, the number of animals that might experience an injury from SURTASS LFA transmissions is considered to be few to none. Therefore, no expected increased vulnerability to predation or confusion by SURTASS LFA sonar is expected. This issue will be discussed later in this document (see RTC MMIC40).

*Comment MMIC9:* There is no evidence that TTS should not occur at SPL of below 180 dB. Caution should be used in citing studies (such as Schlundt *et al.*, 2000) where captive animals were used and the subject animals were not considered to be at the highest risk from LF sound.

*Response:* The two species tested in Schlundt *et al.* (2000), were tested at their best hearing frequencies (i.e., mid-frequency). In fact, neither the tested bottlenose dolphins nor the belugas exhibited TTS after a 1-second exposure to maximum levels of 193 dB at 0.4 kHz (400 Hz), the approximate frequency range of SURTASS LFA sonar. NMFS agrees, however, that TTS may occur below 180 dB, depending in part on the duration of the signal and the frequency sensitivity of the recipient. Schlundt *et al.* (2000) showed that bottlenose dolphins experience onset of masked TTS (defined as 6 dB of shift) from a one-second, 3 to 75 kHz, exposure at approximately 192 dB RL sound. Assuming a 3-dB exchange rate (e.g., the same amount of shift would result from reducing the intensity by 3 dB and doubling the exposure time (Finneran *et al.,* 2000)), these odontocetes could experience TTS (Level B harassment) from a 16-second exposure to a 180-dB sound at their best frequency, a 32-second exposure at 177 dB, and a 100-sec. exposure at 173 dB. Since this approximation is for mid-frequency marine mammal specialists at mid-frequency sound levels, NMFS believes it is probable that LF marine mammal specialists would incur TTS (Level B harassment) at similar levels and duration to LF sounds. However, the typical SURTASS LFA signal is not a constant tone, but rather a transmission of various waveforms that vary in frequency and duration. A complete sequence of sound transmissions last between 6 and 100 seconds, although the duration of each continuous frequency sound transmission is never longer than 10 seconds. Therefore, the SURTASS LFA signal itself, while possibly capable of causing TTS (Level B harassment), is unlikely to result in Level A harassment (injury) in marine mammals at levels below 180 dB.

*Comment MMIC10:* Why does NMFS focus on ''serious injury'', assumed as PTS, whereas the MMC and many other experts have declared that behavioral impacts of biological significance to reproduction and survival cannot be ruled out as results of exposure to LFA well below 180-dB RL? According to NMFS, these impacts cannot be observed over the short term, cannot be mitigated, cannot be quantified as reliable data, and cannot be considered without delaying deployment of LFA. NMFS excludes ''behavioral modifications'' biologically significant to reproduction and survival because they cannot be observed.

*Response:* NMFS and the Navy concur that behavioral impacts of biological significance can occur at SPLs below 180 dB. This is implicit in the calculations for Level B takings conducted using the Acoustic Integration Model (AIM). For Level B incidental harassment takings, NMFS

will determine whether takings by harassment are occurring based on whether there is a significant behavioral change in a biologically important activity, such as feeding, breeding, migration or sheltering. All of these activities are potentially important for reproductive success of a marine mammal population.

However, NMFS and the Navy focus on reducing the level of incidental take by injury, through appropriate mitigation measures (discussed elsewhere in this document), because it believes that injury and mortality can be reduced to the lowest level practicable through various monitoring and mitigation means. In addition, extensive AIM modeling aggregate data results versus probability of risk for all marine mammals modeled at 32 sites worldwide illustrated that the preponderance of all modeled received levels were below 155 dB. This is in the range of exposures in the LFS SRP during which no behavioral impacts of biological significance were observed. Moreover, as detailed elsewhere in this document, NMFS will work with the Navy to undertake a research program to validate impacts on marine mammals and the estimated harassment takes in the area outside the 180-dB isopleth (see RTC MOC25).

*Comment MMIC11:* Just because animals remain in a particular environment with anthropogenic noise sources present does not mean that they are not negatively impacted by it. They may tolerate the interfering and/or fatiguing effects of the noise because it is occurring in an area of particular biological significance.

*Response:* NMFS and the Navy agree that animals exposed to SURTASS LFA sonar signals may continue feeding. Phase I of the LFS SRP demonstrated this for blue and fin whales. Also, California sea lions (at Ballard Locks, Seattle, WA) and seals approaching aquaculture pens that are equipped with acoustic harassment devices will feed even in the presence of intense sound sources. However, the 180-dB safety zone for SURTASS LFA sonar insures that no animals will be exposed above that level regardless of context. The 180-dB limit is conservative because both blue and fin whales are known to produce vocalizations at 186 dB. That is, the SURTASS LFA criterion affords animals protection from SPLs that they may commonly experience from other animals.

The alternative hypothesis is discussed in RTC 4–5.39 of the Final EIS.

*Comment MMIC12:* The LOA application and the Final EIS state, ''Even with a 25 percent reduction in foraging efficiency for all of the 20 days, this would represent only a 5 percent reduction in food intake for that season.'' The commenter believes that a reduction of 5 percent might affect breeding success, or survival.

*Response:* Based on the natural regional and annual variability in chlorophyll concentrations that indicate food production for many marine mammals, particularly the baleen whales, a 5 percent change in food availability falls within very reasonable statistical bounds. While this does not necessarily mean that an animal would not change its foraging range in order to make up for a food deficiency in one area, it does point up the high probability that from year-to-year, marine mammals can be expected to have different levels of food intake. Thus, a one-time 5 percent change in food intake for a single season (provided the animal is not affected in more than that single season) is considered to have a very low probability of exerting any significant change in that animal's survival or breeding success; and certainly will not affect an animal stock in any significant way.

*Comment MMIC13:* No research done on effects of marine mammals feeding, or the species upon which they feed.

*Response:* The LFS SRP conducted research related to marine mammal feeding. The goal of the LFS SRP was to demonstrate avoidance reactions for LF-sensitive species (baleen whales) during critical biological behaviors (foraging/feeding, migrating, breeding). Phase I of the LFS SRP conducted manipulative field experiments to test the effects of LF sound on foraging fin and blue whales off San Nicolas Island, CA. For additional information see Croll *et al.* (2001) and TR 1.

In addition, the potential effects of SURTASS LFA sonar on fish and prey species are covered in the Final EIS Subchapters 4.1.1 and 4.2.7.6. The potential effects on invertebrates are covered in the Final EIS Subchapter 3.2.1.1.

**Non-Auditory Metrics**

*Comment MMIC14:* It is incorrect to pick sensory modality for the only discussion concerning the potential harm to marine mammals from mid- and low-frequency sonar. To support this, Richardson *et al.* (1995) was paraphrased in a misleading way because the authors listed four zones of noise influence in which the fourth and most extreme was the zone of hearing loss, discomfort, or injury that is in the ''area near the noise source * * *.'' In other words, NMFS has inappropriately attempted to lead the discussion toward auditory effects, whereas the authors cited, and objective reviewers clearly recognize, that there are many non-auditory traumas attributable to sound received at high levels. Those listed by the commenter included lung damage and organ system hemorrhage, vestibular dysfunction, and bubble growth in tissue.

*Response:* NMFS does not agree that it has paraphrased Richardson *et al.* (1995) incorrectly. While Richardson *et al.* (1995) listed only four types of noise influence, in recent years, NMFS has defined six categories of noise based on Richardson *et al.* (1995), but updated by Richardson in several small take applications (see for example, BPXA, 1999; Western Geophysical, 1999, 2000; WesternGeco, 2001). This updated information was incorporated into the preamble to the proposed rule. Recently, NMFS has updated small take notices with recognition that there is a potential for non-auditory impacts from loud noises. For example, in the preamble to the final rule for NPAL (66 FR 43442, August 17, 2001) NMFS noted that ''intense acoustic or explosive events may cause trauma to tissues associated with organs vital for hearing, sound production, respiration and other functions. This trauma may include minor to severe hemorrhage.'' This statement has been added into the current document in recognition of the potential for non-auditory impacts from loud noise events.

However, what is relevant in this document and in the Final EIS is whether or not marine mammals will be exposed to SURTASS LFA signals at high enough intensities to cause non-auditory traumas. With the proposed mitigation measures, the Final EIS analysis concluded that the potential impact on any stock of marine mammals from injury is considered negligible, and the effect on the stock of any marine mammal from significant change in a biologically important behavior is considered minimal. These potential effects include non-auditory traumas (tissue damage), which are considered to be injuries.

Since the release of the Final EIS, an investigation by Cudahy and Ellison (2002) noted that the expected threshold for *in vivo* (in the living body) tissue damage (including lung damage and hemorrhaging) for LF sound is on the order of 180 to 190 dB. Vestibular effects themselves, which could affect balance and equilibrium, while not considered to be an injury, could be a manifestation of an injury when caused by an impact such as PTS. However, these effects are based on humans.

Vestibular function was investigated by the Navy during the Diver's Study and the results reported in TR 3. Measurable performance decrements in vestibular function were observed for guinea pigs using 160 dB SPL signals at lung resonance and 190 dB SPL signals at 500 Hz. It should be kept in mind that guinea pigs are not aquatic species and, as such, are not as robust to pressure changes as marine mammals. Finally, as stated in Crum and Mao (1996) and as discussed in the Final EIS (page 10–137), researchers hypothesized that the received level would have to exceed 190 dB in order for there to be the possibility of significant bubble growth due to supersaturation of gases in the blood. Because the above ''non-auditory traumas'' are not expected to result from sound exposure below SPLs of 180-dB and the high detection rate of the HF/M3 sonar assuring required SURTASS LFA sonar shutdown when any marine mammal approaches or enters the 180-dB SURTASS LFA mitigation zone, the risks of these traumas to a marine mammal approach zero.

*Comment MMIC15:* The Navy and NMFS have systematically underestimated the number of animals that may be taken by SURTASS LFA sonar, if deployed, because: (1) Neither the Navy nor NMFS has considered the potential for non-auditory physiological impacts; (2) neither has meaningfully evaluated the potential for stranding; (3) both have underestimated the potential for auditory impacts; (4) both have failed to consider the full range of behavioral impacts and have underestimated the potential for those it has considered; (5) neither has accounted for cumulative and synergistic impacts of multiple active systems or other sound sources operating in the same region; and (6) both have underestimated or have failed to assess impacts on prey species.

*Response:* The number of animals potentially taken has not been underestimated. On the contrary, the analysis contained in the Draft and Final EISs has erred on the side of caution. The analysis is based on criteria for impacts based on the potential effects to baleen whales, which are considered the most sensitive marine mammals to LF sound (Ketten, 2001). These potential effects are then applied equally to all marine mammals that, based on geographic demographics, could be exposed to the SURTASS LFA sonar signal. Most of these animals are not as sensitive to LF sound as the baleen whales. Some may be nearly as sensitive, such as the sperm whale and elephant seal; but more are predominately sensitive to mid- to high-frequency sounds. Other conservative assumptions used in the analysis are presented in the Final EIS Subchapter 1.4.3. Responses to the specific issues are provided here in summary and in detail later in this document:

*Non-auditory physiological impacts:* As mentioned in RTC MMIC20, Cudahy and Ellison (2002) stated that the expected threshold for *in vivo* tissue damage for low frequency sound is on the order of 180 to 190 dB.

*Stranding:* This issue is addressed in detail starting with RTC MMIC22 in this document. In addition, a review of all SURTASS LFA operations with recorded stranding events determined that there have been no strandings associated with SURTASS LFA sonar.

*Auditory impacts:* The potential for auditory impacts as discussed in the Draft and Final EISs is based on scientific research and conservative analyses.

*Behavioral impacts:* The criteria for the potential risk of significant change in biologically important behavior, which are discussed in detail in the Draft and Final EISs, are based on scientific research and conservative analyses. See RTC MMIC10 and MMPAC22a in this document.

*Cumulative impacts:* Cumulative impacts are covered in the Final EIS in Subchapter 4.4. The synergistic impact of multiple active systems is analyzed in the Final EIS Subchapter 4.2.7.4. In addition, SURTASS LFA sonar operations will usually avoid areas with high levels of LF noise/sound (*e.g.,* seismic surveys).

*Prey species:* Prey species are discussed in the Final EIS. Many of these species, such as squid and zooplankton, are not analyzed because they did not meet the screening criteria used in the Draft and Final EISs for determining whether species would be impacted as determined in Croll *et al.* (1999). Fish species are covered in the Final EIS Subchapters 3.2.2 and 4.1.1. Additionally, during the LFS SRP Phase I, prey field studies were conducted. Variations in these fields were within the normal prey field variations expected from typical changes in natural oceanographic conditions (see TR 1 for more information).

Therefore, based on the above information, NMFS concludes that the potential takes of marine mammals from the operation of the SURTASS LFA sonar has more likely been overestimated by the Navy than underestimated.

*Comment MMIC16:* One commenter notes that the LOA application states, ''* * * a marine mammal would have to receive one ping greater than or equal to 180 dB or many pings at a slightly lower RL to possibly incur non-serious injury.'' This, the commenter believes, is inconsistent with discussions elsewhere in the LOA application and the Final EIS and proposed rule. According to those discussions, ''all marine mammals who receive a ping greater than 180 dB are presumed to be injured (that is, seriously injured).'' This is presented as conservative because the mitigation seeks to exclude all marine mammals from the 1 km (0.54 nm) ''serious injury impact zone (corresponding to the 180 dB sound field).'' Therefore, marine mammals will definitely incur serious injury, as a ''conservative'' assumption. Clarify ''serious injury'' well inside of the 180–dB zone and any animal within the 180–dB zone is considered to be injured. The possibility of damage should be at 1 km (0.54 nm), not next to the array.

*Response:* Neither the proposed rule nor the Final EIS use the term ''serious'' injury when referring to the 180–dB criterion. In response to comment 18 in the proposed rule, NMFS stated that for this proposed action, scientists have determined that a single-ping RL of 180 dB can be considered a scientifically precautionary level to prevent the potential onset of injury to marine mammals. Serious injury is discussed in response to comment 20 in the proposed rule. NMFS stated that because serious injury is unlikely to occur unless a marine mammal is well inside of the 180–dB safety zone and close to the SURTASS LFA sonar source, and because the closer a marine mammal is to the SURTASS LFA source the more likely it is to be detected and transmissions suspended, the potential for serious injury is minimal.

The LOA application was based on the Draft EIS while the proposed rule was based on the Final EIS. For this reason the LOA application is inconsistent with the Final EIS and proposed rule because the terms ''non-serious'' and ''serious'' injury were changed from the Draft EIS to the Final EIS as a result of comments received on the Draft EIS. Also see response to comment 11 in the proposed rule document.

*Comment MMIC17:* Many scientists believe that LFA sonar is likely to be more harmful than mid-frequency sonar because it covers greater distances and, therefore, exposes more animals and has longer pings.

*Response:* Comparisons of mid- and low-frequency sonar characteristics do not support this belief. It is true that LF-sonar signals travel farther and usually have longer pulse/ping lengths than MF-sonar signals, under most oceanographic

conditions, which is why the Navy developed the technology. Of importance, however, is the animals' physical susceptibility and behavioral reaction to LF sounds, and that there are far greater numbers of marine mammals sensitive (*i.e.,* auditory—how well they hear) to mid- and high-frequency sound than to LF sound. Most marine mammals hear, vocalize and/or echolocate in the mid- to high-frequency range. In addition, over the past 5 years, the potential effects of LF sonar on marine life has been studied in greater detail than for mid-frequency sonars, meaning there have been more data generated to support the conclusions presented in the Final EIS. NMFS believes that the SURTASS LFA process could be a model of the precautionary approach to introducing novel sound sources into the sea, moving incrementally, conducting research, and developing appropriate mitigation measures.

*Comment MMIC18:* Because LFA signals are best propagated in the deep sound channel, distant whales are likely to hear the source.

*Response:* That is a correct statement provided the whales are actually in the deep sound channel and that there is a sufficient amount of SURTASS LFA sonar energy within the channel for the whales to hear. Also, as discussed later in this document, simply hearing the SURTASS LFA signal does not necessarily indicate that a whale has been harassed or ''taken.''

*Comment MMIC19:* Injury and psychological effects can result in stranding or adverse reaction, such as rapid ascent from depth.

*Response:* The Final EIS offers detailed analysis and discussion to support the conclusion that, given the employment of SURTASS LFA sonar will occur as proposed in the Final EIS (with geographic restrictions and monitoring/mitigation measures), the potential for injury to any marine mammals is considered negligible. See Subchapter 1.4 and Subchapter 4.2 for more details. Also, despite the fact that the measurement of the potential for psychological effects on marine mammals from underwater sound sources in the field is extremely problematic and expensive to collect, it is not unreasonable to consider that the analysis of the potential for behavioral effects can be used as a benchmark. Thus, the Final EIS concludes that if SURTASS LFA sonar is employed with the proposed geographic restrictions and monitoring/mitigation measures, the effect on the stock of any marine mammal from significant change in a biologically important behavior is considered minimal.

Finally, it seems plausible that marine mammals that have evolved in an ambient hydrostatic pressure environment spanning several orders of magnitude ($1{:}10^3$) of dynamic range would be predisposed to have an innately more rugged physiology for handling pressure changes than terrestrial animals (Cudahy and Ellison, 2002). Therefore, no psychological or physiological effects would be anticipated from any rapid ascent from depth.

As mentioned in RTC MMIC15 and later in RTC MMIC27, a review of all SURTASS LFA sonar operations has determined that there have been no strandings associated with SURTASS LFA sonar or any other sonar operating below 450 Hz.

*Comment MMIC20:* LF sonar disrupts the immune system, nervous system, and other body systems and tissues, and causes psychological problems.

*Response:* See previous response regarding psychological effects. Also, there is no reason to suspect that an intermittent noise source, such as SURTASS LFA sonar would have impacts on marine mammal immune, nervous or other body systems. If LF sounds were to have system-level impacts, one would presume that such effects would manifest first in those marine mammals inhabiting noisy areas, such as offshore large ports where large vessels (with LF sounds) occur in large numbers, or the Gulf of Mexico, off Newfoundland or in the North Sea where offshore oil and gas seismic activity predominate almost year-round.

Regarding tissue effects, Cudahy and Ellison (2002) indicate that the potential for *in vivo* tissue damage to marine mammals from exposure to underwater LF sound will occur at a damage threshold on the order of 180 to 190 dB. This includes: (1) Transluminal (hydraulic) damage to tissues at intensities on the order of 190 dB or greater; (2) vascular damage thresholds from cavitation at intensities in the 240–dB regime; (3) tissue shear damage at intensities on the order of 190 dB or greater; and (4) tissue damage in air-filled spaces at intensities above 180 dB.

Therefore, unless an animal is within the 180–dB SURTASS LFA sonar mitigation zone, NMFS believes that present scientific information indicates that there should be no physical damage to marine mammal body systems or tissues at an SPL less than 180 dB. Because of the mitigation measures, the potential taking of a marine mammal within the 180–dB mitigation zone is considered minimal. For additional information see Final EIS (RTC 3–2.2, 4–5.14, and 4–6.21).

*Comment MMIC21:* Injury and aversion could extend to at least the first CZ (33 to 65 km (17.8 to 35.1 nm)).

*Response:* For discussion on CZs, refer to the discussion earlier in this document (see *Description of Acoustic Propagation*). As discussed in response to earlier comments, unless an animal is within the 180–dB SURTASS LFA sonar mitigation zone, the best scientific information available to NMFS indicates that there should be no physical damage (or injury) to marine mammal body systems or tissues at SPLs below 180 dB. Because the first CZ (as shown in Figure 1) is well beyond the 1-km (0.54 nm) radius of the 180–dB SURTASS LFA mitigation zone, no injury should occur at the first CZ or beyond.

The Navy concluded in the Final EIS analysis that significant changes in biologically important behaviors, which could include aversion, may occur, although effects to marine mammal stocks are considered to be negligible.

*Strandings*

*Comment MMIC22:* Because none of the previously identified beaked whales in the Bahamas have been seen since the stranding, they may have all been killed or displaced.

*Response:* Worldwide, the numbers and behavior of beaked whales are poorly known because the animals tend to be shy and avoid survey vessels. The beaked whale population of the Northeast and Northwest Providence Channels of the Bahamas is known somewhat better than in the rest of the Caribbean because resident biologists have been studying it for some time. While one of these biologists stated that the animals are no longer in the area of the March 2000 stranding event, and NMFS has no reason to doubt this statement, the statement that these whales all died from the sonar is an assertion that is not based on data. These whales could have moved to a different foraging area. Without data, one cannot fairly attribute disappearances to any particular cause. These data would not be difficult to obtain. However, one cannot presume that because one type of sonar is implicated in taking one type of whale, another sonar system will have a similar effect. Therefore, the above comment is noted as a comment ancillary to the action under consideration here.

*Comment MMIC23:* The Navy stated that because of the offshore nature of SURTASS LFA sonar operations, it does not believe that there is a potential for LFA sonar to result in marine mammal stranding incidents. Is this because the

operations are a long distance from coastlines (and strandings are unlikely to come ashore), or because the LFA sonar will not cause strandings?

*Response:* NMFS does not consider strandings to occur only when an animal comes ashore. Any marine mammal injured, dead, or dying comes under the NMFS stranding program and is investigated to the fullest extent possible. However, based on the operational parameters of the SURTASS LFA sonar, there is no reason to believe that there is a potential for the SURTASS LFA sonar to cause injuries or strandings. In addition, because of the fact that SURTASS LFA sonar operations will not occur closer than 12 nm (22 km) from any coastline and because the mitigation measures (passive acoustic, visual observations, and a new high frequency sonar designated HF/M3) used will be above 95 percent effective in detecting most marine mammals prior to entry into the 180–dB SURTASS LFA sonar mitigation zone, injury and/or strandings are highly unlikely.

*Comment MMIC24a:* Active sonar can kill/traumatize whales. Examples are strandings (Greece, Bahamas, 6 additional strandings, etc.). LFA sonar will cause the extinction of beaked whales and the entire world population of marine mammals. The Navy has ignored a number of mass strandings connected with naval maneuvers involving one form or another of active sonar. Discuss the well-documented stranding of four beaked whales on 3 different Caribbean islands on October 1999, which were correlated with loud sounds in the water. The Canadian LFA system (Towed Integrated Active-Passive Sonar (TIAPS)) has been implicated in the stranding of three Blainville's beaked whales in March 1998 at Rum Cay in the Bahamas. The NATO LFA system (Towed Vertically Directive Source (TVDS)) has been implicated in at least two stranding events in the Mediterranean: (1) Thirteen mammals in Kyparissiakos Gulf in Greece on May 12 and 13, 1996 and (2) nine mammals in the western Peloponnesus approaches on October 1997. These strandings demonstrate that whales can be injured by LF sonar. Why was there a failure to consider the strandings that followed NATO use of low-frequency sonar in the Mediterranean in 1996?

*Response:* Sonars differ in their operating characteristics, and marine mammal species differ greatly in the sounds to which they are susceptible. This is often overlooked by the public. The scientific investigation regarding the Bahamian beaked whale stranding found that the tactical mid-range frequency sonars that were in use aboard U.S. Navy and allied ships during the March 15–16, 2000, Bahamas sonar exercise were the most plausible source of acoustic or impulse trauma to six beaked whales (DOC and SECNAV, 2001). Tissues from these animals are being intensively studied for the mechanism that caused death. DOC and SECNAV (2001) noted, ''SURTASS LFA, another Navy sonar, had no involvement in this event.''

A review of the Smithsonian stranding database shows that there have been seven other instances of beaked whale strandings involving more than one species. One of these activities involved ordnance, two were not identified with military activities, and four were concurrent with military maneuvers (Potter, 2000). Except for the Bahamas stranding, no tissues were collected, and the type of military maneuvers and time and distance separating them from the strandings are not known. Without this information science can never prove whether sonar did or did not cause these deaths. These events point out the pressing need for proper scientific study of marine mammals around many sonar operations, including those of SURTASS LFA sonar.

Investigations indicate that SURTASS LFA sonar has not been known to cause a stranding; and because it uses extensive mitigation measures (passive acoustic, visual observers, and the HF/M3 sonar) that make an injury and therefore a stranding unlikely. No mitigation was used with any of the other events just discussed.

The stranding of Cuvier's beaked whales in the Mediterranean in 1996 was considered in the SURTASS LFA sonar impact analysis. For details, see the Final EIS pages 3.2–45 to 3.2–47.

On October 3, 1999, 4 beaked whales (*Ziphius cavirostris*) stranded in the U.S. Virgin Islands. The Navy had exercises ongoing in the offshore waters and also had live-fire exercises in nearshore waters during the time period when the beaked whales stranded. The offshore exercises, but not inshore exercises involved sonar. Although SURTASS LFA sonar was not involved in these exercises, the Navy has not formally confirmed whether mid-frequency sonars may have caused these four whales to strand in the Caribbean.

Information on the stranding in March 1998 at Rum Cay is provided in the following RTC.

*Comment MMIC24b:* One commenter stated that TIAPS, the Canadian LFA system, has been implicated in the stranding of three Blainville's beaked whales in March 1998 at Rum Cay in the Bahamas. He also stated that a large balaenopterid (cf. *Balaenoptera physalus*) stranded alive under mysterious circumstances on Eleuthera Island in the Bahamas on March 3, 2000, following a TIAPS exercise in the area on February 2000.

*Response:* TIAPS is an independent Research and Development project being conducted by the Defense Research and Development Canada, an agency of the Department of National Defense and there is no frequency overlap between TIAPS and SURTASS LFA sonar (TIAPS is approximately 1 kHz). To respond to this comment, the Navy contacted the Project Manager/TIAPS at the Canadian Defense Research Establishment Atlantic. The project manager stated that he cooperated with the commenter and his associates in regard to his investigation of both strandings. Concerning the three beaked whale strandings in March 1998 it is apparent that TIAPS Q244 was completed in Exuma Sound well before the time the whales stranded. NMFS, of course, is interested in receiving any information regarding this stranding for its stranding database.

In regard to the March 2000 stranding of a fin whale, because that stranding occurred 18 days after the TIAPS exercise, there does not appear to be a connection between TIAPS trials and the March 2000 strandings in the Bahamas.

*Comment MMIC25:* Historical records of beaked whale strandings, compiled by the Smithsonian Institution's Marine Mammal Program in the wake of the Bahamas event, suggest a very high correlation between naval activities and both individual beaked whale strandings and multi-species strandings involving beaked whales. The correlation of all the known mixed species mass strandings involving beaked whales with nearby naval maneuvers (International Whaling Commission (IWC, 2001)) most certainly provides evidence for causation. Further investigations by the Navy into military activities and cetacean stranding is warranted.

*Response:* As mentioned in RTC MMIC24a, Potter (2000) indicates that there have been seven mixed species mass strandings involving beaked whales. Although four of the seven mixed-species mass strandings are associated in time with some type of military maneuvers, none appears to be related to LF sonar.

Simmonds and Lopez-Jurado (1991) stated that between 1982 and 1989 there were 22 strandings of cetaceans in the Canary Islands, with only three being

related in time to military activity. Simmonds and Lopez-Jurado (1991) reported in their text that ''Local people have only been aware of such military maneuvers three times since 1985; on each occasion mass live strandings have occurred.'' These authors indicate that military maneuvers were documented in 1985, 1988 and 1989. However, they report a mass stranding in the Canary Islands in 1986, and there is no mention of military activity in either their report or the Smithsonian database. Furthermore, there is another mixed species mass stranding involving beaked whales noted in the Smithsonian database that occurred in the Canary Islands in 1987, which is also not associated with military activity. One of the mass strandings, from 1974, had an animal with bullet holes found in the body.

Only one of these seven multiple species strandings is known to have occurred concurrent with naval activities and the use of active mid-frequency sonar, the Bahamas stranding in March 2000. There was a single species, mass stranding of Cuvier's beaked whales in the Kyparissiakos Gulf in Greece concurrent with the testing of a NATO sonar, whose lowest frequency is 450 Hz, but which also transmits in the 2.6 kHz to 3.4 kHz range. See the Final EIS Subchapter 3.2.5.1 for a more information on these beaked whale strandings.

Summarizing, the information available on marine mammal strandings is, at best, incomplete and inconsistent. Since NMFS does not know how many sonar operations occurred during this time period without marine mammal injuries or strandings, it believes that the data do not necessarily suggest a high correlation between naval activities and beaked whale strandings, nor do they provide evidence of causation; especially for LF sonar.

However, NMFS has not dismissed this information and will coordinate information contained in the annual LOA report, principally time and location of every SURTASS LFA sonar operation, with stranding data that NMFS receives from its stranding coordinators in order to determine whether any links might exist between them.

*Comment MMIC26:* Based on calculations of the probability of the number of coincidences between strandings and military activities, under the null hypothesis, it is very unlikely that the stranding events of beaked whales were unrelated to military operations unless military operations are very common.

*Response:* The commenter's application of a binomial probability experiment methodology to these data may not be statistically appropriate. NMFS notes that the ''rate'' of military activity is undefined and unquantified. Also, the stranding data are most probably skewed, in that the distribution of stranding network effort, and naval activity are both non-random and are most likely correlated, since generally countries with an advanced economy and military can afford stranding network efforts and attract military attention.

*Comment MMIC27:* Because Dr. Tyack's analysis discussed in Final EIS (RTC 4–4.21) is not presented in detail, the response is ''arbitrary and capricious.'' Provide a comparison of Dr. Tyack's analysis to that of Dr. Whitehead in his May 4, 2001, comments on the proposed rule. One commenter disputes the NMFS statement that ''there is no evidence linking SURTASS LFA sonar transmissions to any stranding events * * *'' because of the beaked whale stranding on the Grecian coast in 1996.

*Response:* The Grecian stranding in 1996 was not caused by SURTASS LFA sonar because that sonar was not operating in that area. Both the Greek and Bahamas strandings involved beaked whales. These species are mid-frequency specialists. The only common acoustic source to both events was in the mid-frequency range. There were no low frequency sonar sources involved in the Bahamas stranding (DOC and SECNAV, 2001). Therefore, the evidence does not support the LF component as having a causal relationship to the stranding of beaked whales in Greece. Because tissue damage is not expected to occur from sound exposure below SPLs of 180 dB (Cudahy and Ellison, 2002) and the SURTASS LFA sonar operational protocols require shutdown when any marine mammal approaches and before entering the safety (LFA sonar mitigation) zone, the risk of injury to a marine mammal is negligible. It should be noted that there were no mitigation protocols during either the 1996 or 2000 naval operations, although NMFS understands that the Navy has instituted mitigation measures since the March 2000 event to avoid future stranding incidents (DOC and SECNAV, 2001).

Dr. Peter Tyack of the Woods Hole Oceanographic Institution (Woods Hole) attempted to conduct a correlation analysis of marine mammal strandings and past SURTASS LFA sonar operations. There was no evidence of any correlation; thus, no report was generated. The latter analysis in the comment was discussed in the previous RTC in this document.

*Comment MMIC28:* There is now a weight of evidence (Bahamas stranding event) that beaked whales are at far greater risk from these operations (naval sonar operations) than the four species of mysticetes studied in the LFS SRP; thus, the commenters suggest that NMFS should revise its ''negligible impact determination'' accordingly.

*Response:* The Navy's LFS SRP was designed to study those marine mammals most susceptible to LF sound, sperm and large baleen whales. Beaked whales are mid-frequency specialists, not LF specialists, which was the reason for not including them in the LFS SRP. Moreover, because of their unknown habitats and rare sightings, there is great difficulty in attempting to study these species (see RTC MMIC22). Results from the interim report on the Bahamas strandings (DoC and SECNAV, 2001) cannot be extrapolated to estimate potential risk to these animals from SURTASS LFA sonar because of the differences in frequency regimes (100–500 Hz vs. 3,000–4,000 Hz). Furthermore, as mentioned previously, DOC and SECNAV (2001) state, ''SURTASS LFA, another Navy sonar, had no involvement in this (beaked whale stranding) event.'' However, on July 25, 2001, NMFS issued a modification to a scientific research permit held by Dr. Peter Tyack to undertake studies on beaked whales. In addition, NMFS is recommending research on beaked whales be funded under the SURTASS LFA long-term monitoring (LTM) program.

In the interim, because NMFS does not expect tissue damage to occur from sound exposure below SPLs of 180 dB and because of the high detection rate of the HF/M3 sonar and other monitoring requirements ensuring SURTASS LFA sonar shutdown when any marine mammal (including any beaked whales) approaches or enters the 180–dB LFA mitigation zone, the risk of injury to a marine mammal is near zero. Moreover, the monitoring and mitigation protocols proposed for employment of SURTASS LFA will preclude employment in narrow and deep channels surrounded by land such as those in the Bahamas (22-km/12-nm restriction).

Regarding its negligible impact determination, until scientific evidence is forthcoming on stock discreteness of the Bahamian population of beaked whales, NMFS must conclude that, while locally significant, it is highly unlikely that stock or species level impacts occurred to the beaked whales as a result of the Bahamas incident.

Similarly, it is unlikely that SURTASS LFA sonar operations (which would not operate in areas similar to the Bahamas incident) would cause stock level impacts. Therefore, as indicated later in this document, NMFS believes that SURTASS LFA sonar operations are unlikely to have more than a negligible impact on affected species or stocks of marine mammals.

*Comment MMIC29:* There is no evidence to support the Navy's position in the Final EIS that the difference in frequency of the sonar in the Bahamas stranding event makes LFA particularly safe or that beaked whales are the only species vulnerable to strandings. The Bahamas incident demonstrates that such impacts are possible and are of concern for LFA sonar.

*Response:* Please see previous RTCs regarding the potential for strandings to be caused by SURTASS LFA sonar.

*Comment MMIC30:* NMFS should await the final report on the Bahamas stranding investigation before issuing a small take permit to the Navy.

*Response:* The interim report on the Bahamas stranding event was released to the public in December 2001 (DOC and SECNAV, 2001). The final report will not be completed until final necropsy analyses have been completed. However, because the analyses regarding the cause of the beaked whale stranding event needed by NMFS to make its determinations on the Navy's small take application are in the interim report, NMFS does not need to delay decision-making until the final report is completed and released to the public.

*Comment MMIC31:* One commenter stated, ''* * * in the Navy's treatment of the Bahamas strandings (Final EIS at 3.2–47), where it suggested that the lack of observed strandings during the LFS SRP rules out any conclusion that might be made about potential impacts on the basis of that incident (and subsequent investigations).''

*Response:* There is no discussion in the Final EIS or in TR 1 of the lack of strandings during the LFS SRP. What was stated was that there is no evidence that beaked whales are more sensitive to LF sound than the baleen whales studied during the LFS SRP. However, as noted by the commenter, there was a ''lack of observed strandings'' during all three phases of the LFS SRP. For additional information on events potentially related to LFS SRP Phase III, see the Final EIS (RTC 4–5.25). The Navy did not, as suggested by the commenter, use this lack of strandings as proof of absence of harm.

*Comment MMIC32:* Was the Bahamas stranding the results of the Navy's testing of super-cavitation torpedoes?

*Response:* It was not. Readers interested in super-cavitation torpedoes are directed to Ashley. 2001. Scientific American 285(5).

*Resonance*

*Comment MMIC33:* Resonance effects in air/gas cavities or spaces can cause injury (tissue damage) or mortality to marine mammals, such as the Greece and Bahamas beaked whale strandings. Air space resonance produced by LFA sonar could cause tissue damage to the lungs of many cetaceans and can inflict injury at frequencies to which creatures are not acoustically sensitive. The resonance would be substantially larger than the displacement associated with mid-frequency sonar. Can the LFA source stimulate resonance sufficient to cause injury to marine mammals? Ten seconds could be enough to induce resonance. Most underwater acousticians would have considered the tactical sonar to be less likely than LFA sonar to cause the bubble resonance phenomena due to the relatively short duration and high sweep rates typical of tactical sonar compared to LFA. One organization received 18 comments on resonance applicability to LFA.

*Response:* The concept that resonance will increase stress on tissue to the point of damage is in reality two separate concepts: resonance and tissue damage. Cudahy and Ellison (2002) state that resonance does not equal damage and damage is not always linked to resonance. So the issue is not resonance in air/gas cavities, but tissue damage, whether it is caused by resonance or by other means. As discussed in detail under RTC MMIC20, the potential for *in vivo* tissue damage to marine mammals from exposure to underwater LF sound will not occur at a level less than 180 to 190 dB (Cudahy and Ellison, 2002). Please refer to RTC MMIC20 for more information.

Therefore, unless an animal is within the 180-dB SURTASS LFA sonar mitigation zone, there should be no physical damage to body systems or tissues. Because of the mitigation measures, the potential impact to any marine mammal stock from injury is considered negligible. Whether or not SURTASS LFA sonar is more or less likely than a mid-frequency, shorter pulse, sonar to cause resonance is not relevant to the impact analysis in this case because marine mammals are very unlikely to be exposed to injurious levels (above 180 dB RL). Likewise, whether or not 10 seconds could be enough to produce resonance is also not relevant in this case for the same reason.

*Comment MMIC34:* More studies are required on lung volume resonance in marine mammals which require more detailed studies to model lung responses over a range of volumes and diving depths. The Navy has the capability and resources to conduct a thorough review and modeling of all this data, including, for example, full finite element analysis of the ears and air spaces of the Cetacea and other marine mammals to LFA sonar sounds to access the potential for tissue damage, hearing loss, and death. It is unclear what frequency ranges cause resonance in each species and over what dive depths. Calculated resonance frequencies for marine animals fall within the LFA frequency range. Cranial air space resonance of beaked whales is known to be about the center frequency of LFA, so resonance should be expected. One commenter listed several anatomical considerations concerning airspaces that may be vulnerable to LFA-frequency-induced resonance. These included the lungs and others, such as sinuses. Calculations show that resonance would occur in a bottlenose dolphin lung at 100 Hz at 34 m (111.5 ft) depth to 500 Hz at 500 m (1640 ft) depth and a beaked whale at 100 Hz at 151 m (495 ft) depth to 500 Hz at 1,042 m (3419 ft) depth.

*Response:* There is abundant anatomical evidence that marine mammals have adapted to dramatic fluctuations in pressure. For example, marine mammal lungs are reinforced with more extensive connective tissues than their terrestrial relatives. These extensive connective tissues, combined with the probable collapse of the alveoli at the depths at which significant SURTASS LFA signals can be heard, make it very unlikely that significant lung resonance effects could be realized. Alveolar collapse is not the only change in the lungs. The trachea can also collapse because cartilage armor rings are often incomplete. Air that does not escape the alveoli is quickly absorbed during diving due to the high partial pressure of the gas (Berta and Sumich, 1999). Complete lung collapse occurs at depths of 25 to 50 m (82 to 164 ft) for Weddell seals (Falke et al., 1985), 75 m (246 ft) for the bottlenose dolphin (Ridgway and Howard, 1979), and probably occurs in the first 50 to 100 m (164 to 328 ft) for most marine mammals (Berta and Sumich, 1999). Also as determined by Cudahy and Ellison (2002), tissue damage is not expected to occur in marine mammals below 180 dB RL.

Based on these reasons, NMFS does not believe that additional research is necessary on the potential for resonance effects in marine mammals due to LF sound prior to SURTASS LFA sonar

operations being authorized to incidentally harass marine mammals, but such research should occur simultaneously with SURTASS LFA sonar operations (i.e., small take authorization holders are required through statements by Congress to conduct appropriate research to address impacts and ways to mitigate those impacts). Moreover, NMFS understands that such research is already underway (e.g., finite element modeling is being conducted on beaked whale skulls collected at the 2000 Bahamas stranding, and studies of tissue and air-space resonance in the head are being conducted by two independent research teams) and additional research may be conducted by the Navy, the National Science Foundation or the National Institutes of Health in the future.

*Comment MMIC35:* One commenter submitted a paper titled ''Air-space Resonance and Other Mechanisms Which May Cause Tissue Damage in Cetaceans'' as an attachment to his comments. This paper postulates that: (1) Air space resonance could cause damage to some of the large sinus cavities of cetaceans and that LFA sonar could cause lung damage due to resonance, (2) LFA sonar could cause resonance in the lungs and sinuses and a resonance at the same frequency of the tympanic bone of the middle ear, (3) LFA sonar could induce panic and subsequent problems with equalization, (4) LFA sonar could possibly cause bubble growth in blood vessels, and (5) LFA sonar signals are of long enough duration to cause resonance.

*Response:* Resonance does occur in natural systems. However, an analysis subsequent to the Final EIS by Cudahy and Ellison (2002) of the potential for resonance from SURTASS LFA signals to cause injury does not support the conclusions in the commenter's paper. The issue is not resonance, but tissue damage. The potential for *in vivo* tissue damage to marine mammals from exposure to underwater LF sound will occur at a damage threshold on the order of 180 to 190 dB (Cudahy and Ellison, 2002) (see RTC MMIC20). The maximum SPL of 160 dB proposed by the commenter is based on a degree of tuning, or Q value, of 10. (**Note:** The Q of a system denotes how sharply the system responds at resonance). In other words, Q designates how much higher a system's resonance frequency response is compared to its response at non-resonance frequencies. If Q is high, the peak in frequency response is high; whereas, if Q is small, the frequency response peak is shallow (Prout and Bienvenue, 1990). Critical issues to consider in examining resonance effects are the tuning of the resonance and the damping due to contiguous body structures. The Q value that has been measured *in vivo* in the lungs (of pigs and humans) is a Q from 3 to 5 (Martin *et al.*, 2000). There are no data to support the use of a Q value of 10 as a good estimate of the degree of tuning in cetacean air-filled spaces. In general, the internal organs of mammals are very highly damped. Examining fishes, extensive measurements of the Q of swim bladders at resonance (covering a wide range of species and sizes) support an *in vivo* range of Q from 1.0 to 6.1 (Love, 1978). Thus, an educated estimate of the Q for other gas-filled structures, which are much less free to move than the lung, would generally be very small, even less than the ($1<Q<6$) range encompassing both lung and fish swim bladder measured results (Cudahy and Ellison, 2002). Therefore, resonance calculations based on a Q value of 10 are incorrect.

For reasons mentioned in RTC MMIC34, there is abundant anatomical evidence that marine mammals have adapted to dramatic fluctuations in pressure. Please refer to that RTC for further response. In addition, the nasal air sacs are too small to be relevant to LFA transmissions. Furthermore, these nasal diverticuli are clearly involved in sound production (Heyning and Mead, 1990). The pressure fluctuations that accompany the emission of echolocation clicks or communicative sounds must be substantial, so these tissues should also be relatively resistant to damage from external sound sources.

It is likely that marine mammals, which have evolved in an ambient hydrostatic pressure environment spanning several orders of magnitude ($1:10^3$), would be pre-disposed to have an innately rugged physiology for handling pressure changes. Therefore, it is unlikely that they would experience equalization problems. Crum and Mao (1996) stated, ''For SPL's below about 190 dB, however, except under relatively extreme conditions of supersaturation, significant bubble growth is unexpected.'' This is covered in the Final EIS RTC 4–9.4.

In summary, resonance can occur in marine animals, but this resonance does not necessarily lead to injury. Scientific data noted above demonstrate that in order for LF sound to cause injury, the SPL must be above 180 dB. Due to the 180–dB SURTASS LFA sonar safety zone and the additional 1-km buffer zone, the probability of any marine mammal being exposed to received levels at or above 180 dB, with or without resonance, approaches zero. Therefore, the above evidence does not support the claims by the commenter that LFA sonar signals will cause air space resonance, tissue damage or injury to marine mammals.

*Comment MMIC36:* One commenter stated, ''We would like to have had the time to see if there are co-resonances, in which, for example, a lung at resonance becomes a sound source of its own. If the Q of the system is 10, then the re-radiation of the lung is actually $10 \times$ the incoming sound pressure that sent it into resonance. Therefore, the lung becomes an acoustic amplifier. Then, in calculating the effects of LFAS, one must consider any resonant cavity to be a sound source LOUDER than the original LFAS signal, just multiply by Q.''

*Response:* From a purely physiological standpoint, it could be hypothesized that the lung could possibly become an acoustic amplifier. However, there are no data to support a Q of 10 as a good estimate of the degree of tuning in an air-filled space; and in general, the internal organs of mammals are highly damped (Cudahy and Ellison, 2002). These authors cite data for a range of Q from 1 to 6 encompassing both lungs and fish swimbladders. Further, human and pig data collected *in vivo* indicate that at the resonant frequency of the lung, tissue damage occurs above 180 dB SPL (see TR 3 and Cudahy and Ellison, 2002). Since the data were collected at resonance, any amplification would have been included in the response of the lung to the sound, regardless of the Q value.

*Comment MMIC37:* The Final EIS analysis did not consider Minnaet's and Andreeva/Barham's equations that relate bubble size to resonance frequency and show that there are air cavity volumes of all sizes that may resonate in marine animals.

*Response:* The consideration of Minnaet's and Andreeva/Barham's equations relating to resonance are not relevant to the analysis in the Final EIS because the best supportive evidence as documented indicates that below 180 dB RL SURTASS LFA signals would not cause injury. For additional information, see the Final EIS Subchapter 1.4.2 and RTC MMIC35. Because of mitigation protocols, the probability of a marine mammal being undetected within the 180–dB SURTASS LFA mitigation zone during transmission approaches zero. The subsequent analysis, mentioned previously, by Cudahy and Ellison (2002) on the potential for resonance from LFA signals to cause injury supports this conclusion.

*Comment MMIC38:* One commenter stated, ''Further, not all marine life

damage can be attributed to air cavity resonance alone. Damage to hearing apparatus of marine mammals such as uncovered by Dr. Darlene Ketten from Woods Hole illustrates my point. The entry to the brain and on to the hearing apparatus was through a nerve foramen from a sinus cavity. The air cavity of the sinus will not vibrate as a bubble because the bony sinus cavity presents a different acoustical impedance to the sonar. The whole of the lung/bronchial tubes/trachea/sinus/air-volume complex must be considered. Modeling of this complex air volume may be possible by considering the lung to vibrate like a bubble and the remaining part act as a Helmholtz resonator. A coupled resonant system such as this can explain the punch through at the nerve foramen site which is soft compared to the bony sinus cavity thus concentrating the displacement on the soft foramen site into the brain where Ketten observed the bloody mass and hearing apparatus trauma.''

*Response:* This comment is an untested hypothesis presented as to a possible coupled resonance mechanism for the injury to the Blainville's beaked whale that stranded during the Bahamas standing event in March 2000. As noted in DOC/SECNAV (2001), the necropsy found a unilateral temporal subarachnoid hemorrhage with blood clots bilaterally in the lateral ventricles. In simpler terms, there was a blood trail in at least one animal that could be traced to a hemorrhage in a discrete region of a fluid space around the temporal regions and within the ventricle of the brain. There was no conclusion drawn by the interim report stating that this was, or could have been, caused by coupled resonance causing the ''punch through'' at the nerve foramen site into the brain. In fact the report stated, ''The actual mechanisms by which these sonar sounds could have caused animals to strand, or their tissues to be damaged, have not yet been revealed, but research is underway.''

The commenter discusses the lungs/bronchial tubes/trachea/sinus (air sac) complex. He also comments upon the sinuses surrounding the middle ear. The tympano-periotic structure has a neural connection to the brain, and it was along this neural pathway that he stated Dr. Ketten reported damage in the Bahamas stranding animals. However, there is no connection between the respiratory and auditory systems. Any resonance that may occur in the respiratory system has no physical connection to the bulla and brain. In fact, the bulla appears to be acoustically isolated by ligaments and the peri-tympanic sinuses to prevent any bony sound conduction to the ear (Ketten, 1997), emphasizing the auditory pathway from the pan bone in the lower jaw. Therefore, the connection between any possible resonance (coupled or not) in the respiratory system and the bulla/brain is unlikely.

Finally, the SPL threshold for the potential for *in vivo* tissue damage due to exposure to underwater sound, including resonance effects, is on the order of 180 to 190 dB (Cudahy and Ellison, 2002). In conclusion, the above hypothesis does not appear to be valid.

*Additional Marine Mammal Impact Concerns*

*Comment MMIC39:* Can LFA reduce the resolution power (capability) of echo-locating by marine mammals? For example, will a dolphin's ability to distinguish heads from tails on a coin be affected?

*Response:* No. Dolphin echolocation utilizes high frequency sound and SURTASS LFA sonar is low frequency. Therefore, SURTASS LFA sonar will not affect the resolution capability of echo-locating marine mammals.

*Comment MMIC40a:* One organization believes that potential non-detectable and unmonitored effects of SURTASS LFA sonar include increases in miscarriage rates, increased vulnerability to other anthropogenic threats (such as entanglement in fishing gear or susceptibility to ship strikes), decreases in feeding rate, changes in lactation rates, increased stress, changes in navigational abilities, potential hearing loss, etc. Even the Navy concedes that incidental takes consisting of short-term behavioral modifications will occur outside the 180–dB isopleth. Since these effects are typically undetectable, it will be impossible to assess or monitor these effects. As a result, the commenter does not believe that NMFS can make a finding of negligible impact.

*Response:* This comment combines impacts that could potentially occur due to an injury to hearing and those that are short-term behavioral effects due to the SURTASS LFA sonar sounds. In order for injury-related effects to potentially occur, the HF/M3 sonar would need to be ineffective at locating marine mammals. This, as noted elsewhere in this document is unlikely (see Mitigation Concerns). Moreover, in order for a marine mammal to be injured, the HF/M3 sonar would need to have missed the animal through the several acoustic sweeps that it would make prior to the animal getting close enough to the projectors to be injured. Potential behavioral effects, which are the principal means of taking being authorized by this action, have been discussed throughout this document and the Navy's Final EIS. NMFS' determination of negligible impact is discussed later in this document.

*Comment MMIC40b:* There is no way to know what becomes of stressed or confused animals in offshore waters due to noise pollution. The cause of entanglements, ship collisions, and other such incidents cannot be predicted or recognized.

*Response:* There is no scientific information to support a hypothesis that sound from SURTASS LFA sonar will increase stress or confusion in marine mammals. Because of the relatively short duty cycle, the water depth of the CZ ray path, the movement of marine mammals in relationship to the SURTASS LFA sonar ship, and the effectiveness of the tripartite mitigation program, few marine mammals are likely to be affected. In order to receive more than one ''ping,'' during a normal 8-hr vessel leg, an animal would need to match the ship in speed and course direction between pings. Also, entanglement in fishing gear, collisions with ships, or strandings appear to result from vestibular effects to the inner ear associated with explosives or being very close to a loud, underwater noise. However, while there is no indication that this would result from being within the 180 dB safety zone for SURTASS LFA sonar, in the effects analysis of the Final EIS, the Navy presumes that 100 percent of the marine mammals within the 180 dB zone would receive an injury even though animals may not actually be injured.

*Comment MMIC41:* The assumption in the Final EIS analysis that animals are only subject to acoustic stress during LFAS operations is not correct. An animal knowing that the presence of the SURTASS LFA vessel indicates a periodic, unpredictable, annoying noise source, which interferes with their behavior, causes stress.

*Response:* This assumption presumes that marine mammals will associate a visual cue (the SURTASS LFA sonar vessel) with a noise (presumably an annoying noise). This is unlikely unless the marine mammal can associate a cause and effect between the two cues based on earlier experience. Although this has been known to occur in certain situations (*e.g.,* the eastern tropical Pacific yellowfin tuna purse seine fishery), the short mission length and the likelihood of subsequent encounters make this scenario unlikely in the case of SURTASS LFA sonar. In addition, the results of the LFS SRP did not detect any prolonged behavioral responses

after the cessation of transmissions or any behavioral responses to the mere presence of the *R/V Cory Chouest.*

*Comment MMIC42:* One commenter stated, ''Observations of sea otters made near the playback site during LFS SRP tests off California in January, 1998 found that sea otter foraging success was reduced by 11 percent and dive time increased by 11 perecent when LFA sound source was on (Quicklook, Phase II). This decrease in food-getting efficiency and increase in dive time could have biologically significant effects on a population.''

*Response:* The commenter's quote is incomplete. Benech (1998) summarizes observations of sea otters made near the playback site during January 1998. The following is a quote from her conclusions as presented in the Quicklook Report of Phase II and in TR 1:

> Sea otter densities, foraging behavior, and activity patterns remained normal through the course of the acoustic testing period. The only possible atypical behavior that was linked to the offshore acoustic tests was that of forage dive duration and success. The [foraging] success rate was reduced by 11% and dive time increased by a similar amount when all dives during acoustic testing were pooled. Success did not diminish with increasing [sound] duration or [source level] decibels. This difference in forage diving success, although detectable, was not statistically significant within a 95% level of confidence, however there is at least an 80% probability that this reduction in success was not a random event.

It must be noted that these conclusions are based on only two sightings: On January 14, 1998 and January 22, 1998. The sightings were near the playback site(s), which were between 2 and 4 km (1.1 and 2.2 nm) offshore. During regular SURTASS LFA sonar operations, the vessel will be outside of 12 nm (22 km) from the shore. Therefore, based on the statement by the investigator that the sea otter densities, foraging behavior, and activity patterns remained normal through the course of the acoustic testing period, and that the difference in forage diving success, although detectable, was not statistically significant, and based on the coastal nature of sea otters, there is a minimal chance of any biologically significant effects on the sea otter population.

*Comment MMIC43:* NMFS and the Navy have not conducted studies as to the potential impacts of SURTASS LFA sonar on pinnipeds, dolphins, other toothed whale, sea otters, fish, cephalopods, and other vulnerable marine species.

*Response:* As stated in the Draft and Final EISs, studies were conducted on the four species of large whales to serve as indicators for species considered to be equally or less sensitive to LF sound, which included pinnipeds and odontocetes. Sea otters were studied during the LFS SRP Phase II as discussed previously. For additional details, see Final EIS RTC 4–5.2. There are discussions and analyses of potential impacts on fish, sharks and sea turtles in the Final EIS in Subchapters 3.2.1.2, 3.2.2, 3.2.3, 4.1.1, 4.1.2, and 4.3.1. Cephalopods were eliminated because of poor sensitivity to LF sound, with hearing thresholds in the LF range estimated to be 146 to 150 dB. For additional information, see Subchapter 3.2.1.1 in the Draft and Final EISs.

*Comment MMIC44:* One commenter believes that new empirical experiments must be done to assess the implications for the oceans as a whole and the creatures that live in them, and the effects on the ecosystem performance, productivity, biodiversity, extinction rates, and numerous other factors. New data yet to be addressed by the Navy and NMFS includes: self-awareness of cetacea; cultural transmission; language and communications skills; tool use; lifespan of some 200 years; ability to heal human diseases and conditions; increased brain size, increased IQ, more intelligent than humans, brain more evolved than humans; and cetacea are a sovereign people/nation. The permit application must be rejected pending proper analysis and research incorporating new data showing clearly that LFAS is safe for our planet.

*Response:* The information provided by the commenter that is relevant to the Navy's responsibility under the National Environmental Policy Act (NEPA) and/or NMFS' responsibility under the MMPA has been addressed in the appropriate documents prepared under these statutes. Other issues have not been addressed because they are outside the scope of the analyses required by statute, and NMFS and the Navy do not believe SURTASS LFA sonar will affect those aspects of marine mammal evolution, behavior or social organization identified by the commenter.

*Scientific Information Concerns (SIC)*

Data Gaps

*Comment SIC1:* Science cannot provide adequate data to determine the specific characteristics or level of anthropogenic noise that will cause biologically significant impacts. Data gaps/unknown information: (1) Hearing thresholds, (2) injury thresholds, (3) resonance frequencies and levels for injury, (4) short-term impacts, (5) long-term impacts, (6) cumulative effects, (7) how sound affects marine animals, (8) how whales communicate, (9) abundance and distribution of species and stocks, and (10) reproduction and survival rates.

*Response:* For the SURTASS LFA sonar NEPA analysis, the best available scientific information has been used. Data gaps/unknown information are discussed in the Final EIS (RTCs 1–3.6, 2–3.4, 2–3.7, 2–4.2, 3–8.1, 3–8.3, and 4–4.1). In the Final EIS Subchapter 1.4.2, the Navy discusses scientific data gaps regarding the potential for effects of LF sound on marine life. While recognizing that not all of the questions on the potential for LF sound to affect marine life are answered, and may not be answered in the foreseeable future, the Navy has combined scientific methodology with a conservative approach throughout the Final EIS to protect the marine environment. The Final EIS was developed based on the guidance for how to proceed under situations with incomplete or unavailable information as provided in CEQ NEPA regulations (40 CFR 1502.22). Incomplete and unavailable information were identified and key data gaps were filled through research. The Navy's LFS SRP studies filled in data gaps on the potential effects of LF sound on marine life, and the ongoing monitoring and research programs instituted by the Navy will continue to reduce areas of incomplete information and provide invaluable data that are presently unavailable.

*Comment SIC2:* One commenter stated that the Navy simply lacks sufficient scientific data to draw any firm conclusions, so it relies upon assumptions and guesses. The example cited was that ''although there is no direct data on auditory thresholds for any mysticete species anatomical evidence strongly suggests that their inner ears are well adapted for LF hearing.'' Therefore the precautionary approach should be followed. Making assumptions based on incomplete data is not precautionary.

*Response:* The Navy approach was conservative, in that, with the lack of physical data on the hearing thresholds of mysticete whales, it was assumed that they were sensitive to LF sounds and evaluated as such. The same assumption was made for all potentially affected marine mammals, regardless of their sensitivity to LF sound. For a more detailed discussion on the conservative procedures and assumptions in the research and modeling, see Final EIS Subchapter 1.4.3.

NMFS believes that the SURTASS LFA process could be a model of the

precautionary approach to introducing novel sound sources into the sea, moving incrementally, conducting and continuing research, developing appropriate mitigation measures, and monitoring impacts to test the validity of both the model and the assumptions.

*Comment SIC3:* Species most likely to be affected are pelagic cetaceans, yet there are no reasonable audiograms for these species. There is a lack of information on beaked whales. If acoustic sensitivity is unknown, it is impossible to estimate the potential for injury impacts to stocks.

*Response:* While it is true that there are no audiograms for large cetaceans and a general lack of data on beaked whales and other pelagic species, that does not mean that estimates of the potential impacts under NEPA and MMPA cannot be performed. CEQ's NEPA regulations (40 CFR 1502.22) provide guidance for how to proceed under situations with incomplete or unavailable information. The auditory thresholds utilized in the analysis were based on the best available information. Figure 1–4 in the Final EIS illustrates the assumption that mysticetes have the best LF hearing of all marine mammals. To further ensure the validity of the estimates, the analysis relied on conservative procedures and assumptions in research and modeling as detailed in the Final EIS Subchapter 1.4.3.

*LFS SRP*

*Comment SIC4:* The information provided on the LFS SRP often is not sufficient for the reader to understand or judge the merits of Navy and NMFS conclusions based on their results. The Final EIS describes on pages 4.2–26 to 4.2–29 previous studies that suggest significant behavioral responses to underwater sounds. The Final EIS seems to ignore that evidence in forming its conclusions about potential behavioral effects. For example the Final EIS includes: (1) A summary statement by Richardson *et al.* (1995) that indicates that marine mammals may have a limited tolerance for continuous underwater sound levels at or above 120 dB, (2) a description of significant gray whale responses to continuous sounds about 120 dB, (3) a description of behavioral responses of belugas to icebreaker noise at 27 nm (50 km), and (4) a description of avoidance responses of bowhead whales to drill ship noise at RLs of 110 to 132 dB. Therefore, those data, combined with the LFS SRP, demonstrate some potential for significant behavioral responses of marine mammals to LF sound. Available information on the LFS SRP is not sufficient to assess the significance of these changes and more investigations are required.

*Response:* The specific studies referenced in the Final EIS on pages 4.2–26 to 4.2–29 were not ignored. In fact, Malme *et al.* (1983, 1984) demonstrated that gray whales exhibited statistically significant responses to four different playbacks typical of industrial noise from oil production (drillship, semisubmersible, drilling platform, and production platform) at RLs of approximately 120 dB. This study was replicated in Phase II of the LFS SRP using SURTASS LFA sonar stimuli. However, the Phase II research demonstrated that it may be invalid to apply the inshore (2 km (1.1 nm) from shore) response model (when 50 percent of the whales avoided SURTASS LFA sonar stimuli at RL of 141 ±3 dB) to sources that are farther offshore (4 km (2.2 nm)). With the source level of the offshore source adjusted so that the whales' received level was 140 dB (same as when the source was inshore within the migration corridor), the whales did not alter their migration paths. For additional information see the Final EIS page 4.2–26. For the SURTASS LFA sonar, the offshore model is more appropriate because the SURTASS LFA vessel will not operate within 12 nm (22 km) of the coast.

The other two studies referenced discussed the reactions of two arctic species (bowheads and belugas) in response to noise from icebreakers. Bowheads and belugas inhabit waters frequented by ice and may require a low ambient noise level in order to navigate successfully through the ice, to locate leads and polynyas, and avoid ice keels. SURTASS LFA sonar is not authorized to take marine mammals in this type of environment. Please refer to RTC MMIC3 for more information on beluga whales.

The commenter's statement that Richardson *et al.* (1995), ''indicates that marine mammals may have a limited tolerance for continuous underwater sound levels at or above 120 dB'' was taken out of context. It was precisely this premise that the LFS SRP was designed to test for LF sonar signals. The Final EIS Subchapter 4.2.4.1 page 4.2–26 actually states: ''Prior to the LFS SRP, the best information regarding whale responses to continuous, LF, anthropogenic noise was summarized by Richardson *et al.* (1995b): ''Some marine mammals tolerate, at least for a few hours, continuous sound at received levels above 120 dB re 1 μPa. However, others exhibit avoidance when the noise level reaches ~120 dB * * *. It is doubtful that many marine mammals would remain for long in areas where received levels of continuous underwater noise are 140+ dB at frequencies to which the animals are most sensitive.''

On page 4.2–29 the Final EIS concluded:

In summary, the scientific objective of the LFS SRP was to conduct independent field research in the form of controlled experimental tests of how baleen whales responded to SURTASS LFA sonar signals. Taken together, the three phases of the LFS SRP do not support the hypothesis that most baleen whales exposed to RLs near 140 dB would exhibit significant disturbance of behavior and avoid the area. These experiments, which exposed baleen whales to RLs ranging from 120 to about 155 dB, detected only minor, short-term behavioral responses. Short-term behavioral responses do not necessarily constitute significant changes in biologically important behaviors. The fact that none of the LFS SRP observations revealed a significant change in a biologically important behavior helped determine an upper bound for risk. The LFS SRP results cannot, however, be used to prove that there is zero risk at these levels. Accordingly, the risk continuum presented below assumes that risk is small, but not zero, at the RLs achieved during the LFS SRP. The risk continuum modeled a smooth increase in risk that culminates in a 95 percent level of risk of significant change in a biologically important behavior at 180 dB. In this region, the risk continuum is unsupported by observations. However, the AIM simulation results indicate that a small fraction of any marine mammal stock would be exposed to sound levels exceeding 155 dB (see Appendix D and Figures 1–5a through 1–5c).

NMFS concurs with the Navy that sufficient information was provided on the LFS SRP in the Final EIS and TR 1, which was incorporated by reference into the Final EIS in accordance with 40 CFR 1500.21. TR 1 was available to the public upon request.

*Comment SIC5:* The Final EIS states that ''* * * SRP selected the most plausible and likely impacts to address, in particular, significant change in a biologically important behavior. They observed none * * *. Other less plausible and unlikely effects were not addressed.'' According to the LFS SRP there were biologically significant behaviors.

*Response:* NMFS and the Navy do not agree that there were biologically significant behavioral changes during the LFS SRP. The independent scientists who designed and conducted the LFS SRP determined that these experiments, which exposed baleen whales to RLs ranging from 120 to about 155 dB, detected only minor, short-term behavioral responses (Final EIS at page 4.2–29). See RTC MMIC10 for further discussion.

*Comment SIC6:* The LFS SRP was insufficient because only 4 baleen whales were studied. A limited study of four species of whales could not provide a basis for conclusions about impacts of LFA on all marine mammals. Species studied were not representative species, for example the gray whale is inshore and LFA will operate offshore in pelagic waters. The information collected to date is not representative of the effects of LFS on all cetaceans. Marine mammals have at least four basic types of ears; therefore, the Navy cannot lump all whales into the same category (baleens).

*Response:* It is impossible to conduct studies of all marine mammal species within a reasonable period of time. Accordingly, four mysticete species (blue, fin, gray, and humpback whales) were selected because: (1) They are considered most likely among all marine mammals to have the best hearing in the SURTASS LFA sonar frequency band (i.e., they would be the most likely species affected if there was an impact from LFA sonar), (2) most have protected status under the ESA, and (3) there is prior evidence of some avoidance responses to LF sounds. Their responses to LF sound signals during the LFS SRP were to serve as indicators for the responses of other potentially LF-sensitive species, which were presumed to be less vulnerable to SURTASS LFA sonar signals. Whether or not the gray whale is an inshore or pelagic animal is not germane to whether it is a representative species for the LFS SRP. It is representative because it met the three criteria for selection listed above.

The Navy's analysis did not ''lump'' all whales into the same category. The rationale for using representative species to study the potential effects of LF sound on marine animals emerged from an extensive review in several workshops by a broad group of interested parties: academic scientists, federal regulators, and representatives of environmental and animal welfare groups. The outcome of these discussions concluded that baleen whales (mysticetes) would be the focus of the three phases of the LFS SRP and indicator species for other marine mammals in the analysis of underwater acoustic impacts because they met the selection criteria. Because the results were then utilized in the impact analysis of less LF-sensitive marine mammals, NMFS believes the approach was conservative and scientifically sound, and the potential impacts to odontocetes and pinnipeds were overestimated, not underestimated. For additional information, see the Final EIS (RTCs 4–5.1 and 4–5.2).

*Comment SIC7:* The LFS SRP was insufficient because it remains to be proven whether it is something about the inshore environment that causes whales to show a greater reaction to noise, or something about the composition of whales that migrate inshore.

*Response:* While the results from such research would be informative, it would not be relevant to the deployment of the SURTASS LFA sonar because SURTASS LFA sonar will not operate inside of 12 nm (22 km) of any coastline.

*Comment SIC8:* The LFS SRP was insufficient because it did not study: (1) The species most likely to be affected (commenter did not state what species to which he was referring), (2) sperm and beaked whales, and (3) dolphins that can make LF sounds.

*Response:* Recognizing that it would not be possible to conduct studies of all marine mammal species within a reasonable period of time, the LFS SRP was designed to study the marine mammal species considered to be the most sensitive to LF sound, the baleen whales. Phase III was designed to allow playback experiments with sperm whales, but no animals were encountered before or during the offshore portions of the cruise schedule. Beaked whales and dolphins were not considered for the LFS SRP because: (1) They are believed to be more sensitive to mid- and high-frequency sound, rather than LF sound, like SURTASS LFA sonar; and (2) they are not listed as threatened or endangered under the ESA, thereby not meeting the selection criteria described in RTC SIC6. However, research on additional marine mammal species will be undertaken in the near future as explained in RTC MOC25 in this document.

*Comment SIC9:* The LFS SRP was insufficient because research was not conducted at power levels of actual operations. Animals not subjected to 180–dB RL.

*Response:* NMFS and the Navy do not believe it desirable nor necessary for this action, let alone humane, to test animals at or above levels that might result in injury simply to develop an injury risk continuum (at or above 180 dB). All marine mammals exposed to RL at or above 180 dB are considered for the analysis and for monitoring/reporting purposes to be injured and activities are mitigated to protect marine mammals at that level.

As noted in the Final EIS (RTC 4–5.21), in some of the LFS SRP Phase I experiments (studying the responses of feeding blue and fin whales), the SURTASS LFA source was transmitting at operational power levels. Even under these circumstances very few animals were exposed at received levels as high as 155 dB. The research was specifically designed so as NOT to expose animals to higher received levels. These research results confirmed what is predicted from the AIM that a very small percentage of animals will be close enough to the SURTASS LFA sonar to experience levels above 155 dB. See the Final EIS Figures 1–5a through 5c, Subchapter 4.2.4.3 and Appendix D. The Navy has stated that it would not seek a scientific research permit to perform field tests at higher RLs to animals in the wild. Moreover, injury cannot be studied in the wild. Any such experiments should be undertaken under controlled laboratory conditions, with animals in a more controlled setting. Finally, the Navy believes it has adequate data to assess what the potential for impacts would be for RLs greater than 180 dB RL for the LF sounds from SURTASS LFA sonar, without the need to try to actually expose animals to that RL.

*Comment SIC10:* The LFS SRP was insufficient because sound levels utilized were only 120 to 150 dB, far lower than the 180 dB deemed acceptable by the Navy. The LFS SRP did not assess potential behavioral responses to signals in the range of 150 or 155 to 180 dB. One cannot extrapolate results above 155 dB. Seventy percent of humpback whales stopped singing at 140 dB; blue whales stopped vocalizing and many stopped feeding; gray whales altered their migration routes. Why are these behavioral effects not considered ''significant''?

*Response:* The scientific objective of the LFS SRP was to conduct independent field research in the form of controlled experimental tests of how baleen whales responded to SURTASS LFA sonar signals. These experiments, which exposed baleen whales to RLs ranging from 120 to about 155 dB, detected only minor, short-term behavioral responses. Short-term behavioral responses do not necessarily constitute significant changes in biologically important behaviors. Study results in TR 1 indicate that 6 cases of humpback song cessation were considered possible responses to SURTASS LFA sonar transmissions. However, the estimated maximum RLs for these animals were 121.5 dB, 123 dB, 129 dB, 133 dB, 145 dB and 150.5 dB (not 70 percent at 140 dB as the commenter states). The fact that none of the LFS SRP observations revealed a significant change in a biologically

important behavior helped determine an upper bound for risk. The LFS SRP results cannot, however, be used to prove that there is zero risk at these levels.

Accordingly, the risk continuum assumes that risk is small, but not zero, at the RLs achieved during the LFS SRP. The risk continuum modeled a smooth increase in risk that culminates in a 95 percent level of risk of significant change in a biologically important behavior at 180 dB. In this region, the risk continuum is unsupported by observations. However, because the AIM simulation results indicate that only a small fraction of any marine mammal stock would be exposed to sound levels exceeding 155 dB (See the Final EIS Figures 1–5a through 1–5c, Subchapter 4.2.4.3, and Appendix D) and because the LFA sonar duty cycle is low (60–100 sec ping with 6–15 minute ''off'' periods) with missions lasting no more than 30 days (normally with two 9-day transmission periods/ mission), significant impacts to marine mammals are not expected. For example, stress is usually a long-term process, but the low duty cycle for SURTASS LFA sonar makes stress seem highly unlikely.

That stated, research on the behavioral reactions of whales to sound levels that were not tested during the LFS SRP, specifically between 155 and 180 dB, has been identified by NMFS as an important component for continuing research under an LOA (see RTC MOC25).

*Comment SIC11:* The LFS SRP was insufficient because limited sample size in LFS SRP should not be construed as indicating a lack of impact.

*Response:* The Navy did not expect that these data would provide the definitive, final answer on this issue. Nevertheless, these data, combined with existing data, provide a reasonable basis for informed decision-making regarding the proposed action. For additional information, see the Final EIS (RTCs 4–5.10 and 4–5.23).

*Comment SIC12:* The LFS SRP was insufficient because the LFS SRP was limited in the temporal and spatial parameters observed (short-term effects only). No long-term effects studied. It is not clear that short-term behavioral responses are good indicators of the potential long-term effects. Significant changes in biologically important behaviors do not necessarily manifest themselves in short-term, visible behavioral responses; *i.e.,* these significant changes can go undetected. No long-term data on changes in reproduction rates or other long-term behavior.

*Response:* The LFS SRP was one of the largest scientific field studies on the potential impact of underwater sound on marine mammals to date, and consisted of four baleen whale indicator species and three phases, each in a different geographical location. Many scientific metrics were part of the LFS SRP, including aerial surveys, Sound Surveillance System (SOSUS) data collection, observation vessel sightings, and shore-based visual observations, which yielded large experimental datasets, collected in the wild. All of these provided information relating to more than just the potential for short-term biological behavioral effects. The scientific investigators observed some short-term behavior responses and some longer-term responses during the longer Phases I and III of the research, which approached the time period of a full SURTASS LFA sonar mission. The Navy and the independent scientists involved in the LFS SRP believe that the data from the LFS SRP, when combined with other data, provide an adequate basis for the analysis contained in the Draft and Final EISs. NMFS concurs. In addition, short-term studies can address the potential for impacts on behaviors that relate to demographic parameters such as birth rate, growth rate and death rate. For example, the LFS SRP addressed feeding rates, which relate to birth and growth rates. Finally, research on the long-term behavioral reactions of whales to LFA sounds has been identified by NMFS as an important component of a continuing research program under an LOA (see RTC MOC25).

*Comment SIC13:* The LFS SRP was insufficient because it did not study physiological and psychological stress. Also, it did not study non-acoustic responses.

*Response:* The LFS SRP field research studies complement Office of Naval Research (ONR) and Chief of Naval Operations (CNO)-sponsored laboratory studies on TTS, physiological stress, and soft tissue damage. The focus of the LFS SRP was on the potential for baleen whale behavioral reactions to LF sound in the wild. Methods to investigate physiological reactions (e.g., TTS, PTS, stress) to underwater LF sound have only recently been accomplished on captive small toothed whales and seals, and are not yet available for free-ranging large whales.

*Comment SIC14:* The LFS SRP was insufficient because humpback whales left the area in Phase III. This is supported by TR 1, Figure D–21.

*Response:* There was no statistically significant difference in the overall distribution of the number of animals during Phase III of the LFS SRP. For information regarding the sufficiency of the LFS SRP, see the Final EIS Subchapters 1.4.2, 4.2.4, and 4.2.4.3, and Final EIS (RTCs 4–5.1, 4–5.2, 4–5.6, 4–5.8, 4–5.10, 4–5.12, 4–5.14, and 4–5.21). Further, NMFS believes that the Navy has provided sufficient information to make its findings under the MMPA.

As a requirement of this regulatory action and the LOA, the Navy will conduct research in areas where information on the potential effects of SURTASS LFA sonar operations on the marine environment is incomplete. Potential topics for proposed research include responses of sperm and beaked whales to SURTASS LFA signals, behavioral responses of whales to sound levels not tested (specifically between 155 and 180 dB), and long-term and cumulative effects on marine mammal stocks (also see RTC MOC25).

*Comment SIC15:* The full results of the LFS SRP were not considered. All peer-reviewed data should be made available, including full results of the LFS SRP, and for all species concerned.

*Response:* All pertinent results from the LFS SRP were considered in the EIS analysis and in this rulemaking process. LFS SRP data are available to the public in TR 1. The LFS SRP was one of the largest studies on the effects of anthropogenic sound on marine mammals to date. Analysis of the LFS SRP data is continuing. However, there is no evidence in the data that indicates that deployment of the SURTASS LFA system with the mitigation protocols will have any significant effect on marine mammal stocks. Any future results from LFS SRP data analysis will be analyzed by NMFS and the Navy during this authorization period.

*Comment SIC16:* Much of the data from the LFS SRP, even that which has been analyzed, is still not fully interpreted. For example, based on Miller *et al.* (2000), it is assumed that male humpback whales consider LFA signals to be competition from other male singers.

*Response:* Miller *et al.* (2000) analyzed songs from six individuals, from whom they had complete song (i.e., a complete song cycle) recordings for periods before, during, and after the LFA transmissions. They found that song length increased during SURTASS LFA transmissions by an average of 29 percent, and returned to baseline length following the playback. Miller *et al.* (2000) suggested that song lengths were increased to compensate for acoustic interference. That interference is simply the presence of potentially masking noise—not the presence of a competing male. The response of singers to the

nearby presence of other singers is stronger, and includes the singer swimming toward and interacting with the other nearby singer(s) (Darling and Bérubé, 2001). These response components, typical of intra-sexual competition, were not observed in Miller *et al.* (2000), supporting their suggestion that the increase in song length is in response to the presence of noise in the bandwidth of the signal, not the presence of a competing male.

*Comment SIC17:* The results of the LFS SRP have not been published and have yet to survive the peer review process.

*Response:* This comment was addressed in the Final EIS (RTCs 4–5.18 and 4–5.19). To date one article and one paper regarding the results of the LFS SRP have been published: Miller *et al.* (2000), and Croll *et al.* (2001).

*Comment SIC18:* The Final EIS (RTC 4–5.27) states that many prior studies (prior to LFS SRP) were reviewed in the development of the marine mammal monitoring mitigation, yet no reference is made to these prior studies in the Final EIS.

*Response:* RTC 4–5.27 states that the Final EIS reviewed the results of prior studies. This information was utilized not only in determining the research strategies for the LFS SRP as noted in the Final EIS Subchapter 4.2.4.1, but also in the analyses performed and documented in the Final EIS. Marine mammal monitoring mitigation was developed as a result of this process; and, therefore, it included the review of literature utilized in the Final EIS for these purposes. A list of references can be found in the Final EIS (pages 13–1 to 13–54).

*Comment SIC19:* The National Research Council (NRC) stated that critical exposure levels cannot be extrapolated from a few species. However, this is what the Final EIS does based on testing on 4 mysticetes.

*Response:* It is impossible to conduct studies on all marine mammal species within a reasonable period of time. Accordingly, four mysticete species (blue, fin, gray, and humpback whales) were selected based on the criteria described under RTC SIC8. Their responses to LF sound signals during the LFS SRP were to serve as indicators for the responses of other potentially LF-sensitive species, which were presumed to be less vulnerable to SURTASS LFA sonar signals. For additional information see Final EIS (RTC 4–5.1).

*LFS SRP Phases I and II*

*Comment SIC20:* During the LFS SRP Phase I, the sample size was too small for statistical evaluation of an apparent drop in vocalization rate by fin and blue whales and the no impact findings may have been an artifact of the small sample size.

*Response:* NMFS and the Navy did not expect that these data would provide a definitive answer on this issue. Nevertheless, these data, combined with existing data, provide a reasonable basis for informed decision-making regarding the proposed action. For additional information, see the Final EIS (RTCs 4–5.10, 4–5.23, and 4–5.44).

*Comment SIC21:* Gray whales cannot be used as indicator species as supported by the Navy's statement in Final EIS (RTC 4–4.18) where it stated, ''Gray whales inhabit a unique environment, and all research conducted to date indicates that their behavior does not generalize to other species.''

*Response:* The statement was taken out of context. The term ''their behavior'' referred only to avoidance by gray whales of sound that was in their migratory path. The LFS SRP results showed that gray whales do not respond to 155 dB RL, generated outside of their migratory path. The gray whale research in Phase II of the LFS SRP was done with a different objective than Phases I and III.

*LFS SRP Phase III*

*Comment SIC22:* There is a very real question as to whether the results of the LFS SRP Phase III are statistically significant.

*Response:* The LFS SRP was intended to collect field research data regarding the responses of selected species of cetaceans to LF sound and, in that respect, the independent scientist principal investigators and the Navy strongly believe it was successful. The Navy did not expect that these data would provide the definitive, final answer on this issue. Nevertheless, these data, combined with existing data, provide a reasonable basis for informed decision-making regarding the proposed action. Phase III included a total of 33 playback experiments with 17 being conducted during focal follows. Singers continued to sing throughout seven of the 17 playbacks. There were six cases of song cessation that were considered possible responses to playback. During the testing period there were 191 hours of control and almost 33 hours of playback observations.

*Comment SIC23:* One commenter stated that a scientist hired by the Navy to conduct the LFS SRP cautioned in the Executive Summary of the Hawaii Quicklook Report that ''it will be difficult to extrapolate from these tests (with received levels below 155 dB and usually below 140 dB) to predict responses at higher exposure levels.'' Yet the Navy did not heed the advice of the LFS SRP scientist because they extrapolated in the Final EIS to conclude that there is no significant risk below 180-dB levels.

*Response:* The actual quote from the Quicklook of Phase III dated August 31, 1998, states, ''Responses did not scale consistently to received level, and it will be difficult to extrapolate from these results to predict responses at higher exposure levels.'' This was addressed in the Final EIS (RTC 4–5.1). The analysis presented in the Final EIS does not extrapolate from 150 dB to 180 dB. The selection of the 180-dB criterion was not related to results from the LFS SRP. The Navy accepts that risk is high at 180 dB RL, and assumes that risk of a significant change in a biologically important behavior is low below 150 dB RL because of the relatively modest responses observed during the LFS SRP.

The risk continuum is a biologically reasonable formula for reconciling the LFS SRP data with the conventional assumption of high risk at 180 dB RL. The fact that responses did not consistently scale with RL confirms the risk continuum assumption that not all individuals will react identically when exposed to the same level of SURTASS LFA sonar signals. It should be noted that the risk continuum function corresponds to a dose-response function in a typical pharmacological risk assessment. The Navy's analyses estimated the risk posed by SURTASS LFA sonar by treating the risk of biologically significant behavior to received levels (SPLs in decibels) using probability distribution functions. The results of these analyses appear as continuous functions that are analogous to dose-response curves used in toxicology: at one end of these curves, low received levels (''low dose'') would not be expected to elicit a response in the species; at the other end of these curves, high received levels (''high dose'') would be expected to elicit much more serious responses. These types of data analyses are accepted as the best practice in disciplines ranging from epidemiology, toxicology, and pharmacology.

*Comment SIC24:* One commenter disagrees with the Navy's interpretation that changes in singing behavior from the LFS SRP results in a minor, non-significant change. Because song is related to mating behavior, any change is likely to be significant to the limited gene pool of the endangered humpback whale.

*Response:* TR 1 concerning Phase III (humpback whales) stated, ''Many of the whale subjects continued to sing and interact during the playback. Some behavioral responses of focal whales were observed during playback * * * Most of the whales that did respond resumed activities normal for the breeding area within less than an hour.'' The independent scientists conducting Phase III of the LFS SRP did not conclude that these alterations of behavior were widespread. Therefore, NMFS believes that it is unlikely that a SURTASS LFA sonar vessel, transmitting at no more than a 20-percent duty cycle and moving constantly, thereby resulting in only short term noise interference for an individual animal; and operating at various locations in a yearly period would have a significant (or widespread) impact to this biologically important behavior, including those for humpback whales. This conclusion is supported by the Final EIS analysis.

*Comment SIC25:* The actual range of RLs during Phase III that coincided with cessation of singing was 103.5 to 142.3 dB, not 120 to 150 dB.

*Response:* Table D–15 in TR 1 presents the RLs of the 17 singers followed by the observation vessel. The range of RLs for singers that stopped singing was 121.5 to 150.5 dB. The RLs for singers that did not stop singing was 122.8 to 149.9 dB.

*Comment SIC26:* There is no discussion of the reports of whales leaving the test area (Phase III) in the Final EIS. ''Omission of this information cannot be other than deliberate.''

*Response:* The Final EIS addresses this issue in RTC 4–5.10. Humpback whales typically commence their migration from Hawaiian waters in early March. Thus, the decrease in whale numbers in March is consistent with the typical departure schedule for humpback whales.

*Comment SIC27:* Data imply that there were more whales off the Kona coast on March 8 than on March 1 (Mobley survey), thus supporting the possibility that SURTASS LFA testing drove humpback whales out of one of their favorite breeding and birthing areas. Such effects are biologically significant.

*Response:* In a court declaration on March 19, 1998 (See Final EIS Appendix C Tab G), Dr. Mobley recounted a higher sighting rate of 0.21 whales per minute for March 1, 1998, versus 0.29 whales per minute for March 8, 1998, for the area off the Kona, or west side, of Hawaii. The declaration did not specify the location in any more detail, nor did it indicate the size of the survey area. However, a larger data set taken over a much longer time period than one week is needed before conclusions can be drawn. Dr. Mobley also stated in his declaration that for the same area there were more than twice the whales than in 1995. It should be noted that the results from the LFS SRP Phase III show a different result. Sightings made from the observation vessel showed an observation rate of 1.5 humpback whales per hour on March 1, 1998 and 3.0 humpback whales per hour on March 8, 1998. Therefore, the scientific data are scientifically inconclusive that the LFS SRP Phase III drove humpback whales out of the area off the Big Island.

*Comment SIC28:* The Mobley 1998 survey did not include Keahole Point, nor were there any surveys before the testing.

*Response:* Mobley *et al.* (1999) indicate that the tracklines used during the 1998 survey included the Kona coast and the west side of Hawaii, which includes Keahole Point.

*Comment SIC29:* As reported by a whale watching activity in Hawaii, the season after the LFS SRP Phase III (1998–99) showed a dramatic drop in numbers of humpbacks in Kona waters as compared to the previous year. The whale watching industry in the remaining areas of the Hawaiian Islands reported numbers at least equal, or as in the case of Kauai, much greater. The Navy did not do follow up research in the area the following year.

*Response:* The Navy funded statewide research surveys in 1998 and 2000 for Hawaiian waters that included the Kona Coast. Preliminary results indicate that there were fewer whales around the Big Island relative to other areas: however, the sea state conditions for the Big Island were worse in 2000 relative to 1998 (J. Mobley, pers comm). The mean values were a Beaufort sea state of 3.24 for the 2000 survey and 2.82 for the 1998 survey. Buckland *et al.* (1993) found that sea state greatly affects the probability of detection of marine mammals. Based on previous surveys (1993–1998), Mobley *et al.* (1999) found that the probability of detecting a whale at the surface dropped significantly beyond a Beaufort sea state of 3. Moreover, the overall trend since 1993 is for increasing numbers of humpback whales visiting the Hawaiian Islands.

*Comment SIC30:* Did Phase III of the LFS SRP cause the decline of spinner dolphin population on Hawaiian waters? Reports by independent naturalists, whaleboat captains and fishermen of stillbirths by spinner and spotted dolphins after the LFS SRP Phase III have not been studied by the Navy.

*Response:* NMFS has not received any scientifically supportable evidence of the decline of spinner/spotted dolphin populations in Hawaiian waters, nor information on still births. Forney *et al.* (2000) and Caretta *et al.* (2001) do not support a hypothesis that there has been a population decline.

*Comment SIC31:* The Final EIS did not include reports of abnormal behavior by marine animals off Hawaii during the tests (schooling hammerhead sharks, whales swimming at high speeds, dolphins behaving as if threatened).

*Response:* The reports of the abnormal behavior by marine animals during the LFS SRP Phase III are included in the Final EIS in Appendix C Tabs A, B, and E. In court declarations both Dr. Mobley (Final EIS Appendix C Tab G) and E. Nitta (Final EIS Appendix C Tab H) stated that none of these behaviors were unusual for the Hawaiian waters. In his court declaration (Final EIS Appendix C Tab F) Dr. Fristrup stated that the reported calf breaching activity fell within the range of breaching activity observed during the control period (when the sound source was off). The reported lone humpback whale calf breaching off Hawaii during the LFS SRP Phase III was discussed in the Final EIS (RTC 4–5.25). Reported ''acute behavioral responses'' during the LFS SRP Phase III are discussed in the Final EIS (RTC 4–5.46).

*Comment SIC32:* The Final EIS does not meet the minimal standards in dealing with the Chris Reid complaint during Phase III of the LFS SRP. The declaration filed by Dr. Kurt Fristrup in Appendix C of the EIS does not include Ms. Reid's revised date of 10 March 1998. The EIS does not contain the second Fristrup response, which states that a person at Ms. Reid's location would have experienced a received level of 125 dB.

*Response:* The Navy has conducted a comprehensive and thorough scientifically based research program on the potential effects of LF sound on human divers. Medical doctors and clinical researchers have carried out extensive computer modeling and testing of human and animal subjects. (All testing was done within the guidelines for the protection of human subjects and standard ethical procedures for animal experiments.) The study concluded that the maximum tested sound level of 157 dB did not cause damage to internal or external tissues, or the vital bodily functions and processes in human subjects. Based on the data obtained from these studies, the

Navy Bureau of Medicine incorporated a wide safety margin and established a very conservative limit of 145 dB for LF received sound level for recreational and commercial divers. The mitigation measures provided in the Final EIS will ensure that no diver will be exposed to levels of sound above 145 dB.

The commenter has misinterpreted Dr. Fristrup's statement in his second declaration. Dr. Fristrup stated, ''Given our source level and range to Keahole Pt., the conservative estimate of received level would be 125 dB. This is equivalent to the received level of song from a singing humpback whale at 400 m distance.'' Also this is 20 dB below the maximum allowable level that the Navy has determined to be the accepted LFS exposure level (145 dB) to recreational and commercial divers, or 100 times less intense. See Final EIS RTC 4–5.26 and Appendix C for additional information.

*LFS SRP Conclusions*

*Comment SIC33:* LFS SRP demonstrated that exposure up to 155 dB (and often lower than 155 dB) causes small but measurable (and statistically significant) behavioral responses (Ref: Croll *et al* (2001), and Miller *et al.* (2000)). Scientific data from the LFS SRP does not justify the Navy's statement that levels below 150 dB are less than 2.5 percent likely to lead to a ''significant change in biologically important behavior'' because roughly one quarter of the singers in Phase III stopped singing in response to the LFA signal as low as 130 dB.

*Response:* The LFS SRP, which exposed baleen whales to RLs ranging from 120 to about 155 dB, detected only minor, short-term behavioral responses. Short-term behavioral responses do not necessarily constitute significant change in biologically important behaviors. Most of the singers resumed their songs when the SURTASS LFA signal was terminated. Therefore, the use of 2.5 percent for potential significant change in biologically important behavior at levels below 150 dB is warranted. This is addressed in the Final EIS (RTC 4–5.10 and 4–6.19) and Subchapters 1.4.2, 4.2.4, and 4.2.5.

*Comment SIC34:* NMFS should direct the Navy to conduct further scientific testing on a broader range of species and at higher RLs before an LOA is issued.

*Response:* The Navy has instituted a long term research program that will address NMFS-identified research issues potentially including responses of sperm and beaked whales to SURTASS LFA signals, behavioral responses of whales to sound levels not tested (specifically between 155 and 180 dB), and long-term and cumulative effects on marine mammal stocks. These research issues are described in RTC MOC25. However, it is not necessary to delay this rulemaking until more information is available since the Navy has provided sufficient information in its Final EIS for NMFS to make the findings required by the MMPA. These findings are discussed later in this document.

*Comment SIC35:* The results of the LFS SRP cannot be used, regardless of the findings, to show absence of harm at sound levels up to 180 dB. The Navy predicted a ''small take'' on the basis that a received level of 180 dB would be relatively safe. This was not based on direct tests.

*Response:* The LFS SRP was not designed to demonstrate the absence of harm at sound levels up to 180 dB, nor was this criterion based on direct tests. See Final EIS (RTC 4–5.9) for more details. ''Small takes'' were not based on the 180–dB received level, but on SPLs between 119 and 215 dB.

*Comment SIC36:* There was an inappropriate comparison of the results of the Acoustic Thermometry of Ocean Climate (ATOC) project impact on humpback and sperm whales to LFA. Commenter stated that the Final EIS willing to use data from ATOC to conclude that there is an absence of responsiveness to LF broadcasts. However, when ATOC caused whale deaths, the Final EIS stated that ATOC and LFA had different acoustic patterns.

*Response:* As discussed in the Final EIS (RTC 4–4.20), there is no evidence that ATOC transmissions resulted in the death of any whale.

*Impact Criteria/Risk Continuum*

*Comment SIC37:* The LFS SRP cannot be used to determine the ''risk continuum.''

*Response:* As explained in the Final EIS, the risk continuum was not determined exclusively by the results of the LFS SRP. See Subchapters 1.4.2.2 and 4.2.4.3 for more details.

*Comment SIC38:* The discussion on pages 54–56 of the LOA application (regarding the 180–dB criterion) differs from information found in the Navy Final EIS; neither is convincing. In the application, the Navy speculated that cetaceans that hear best at low frequencies would have higher thresholds than cetaceans that hear best at high frequencies because ambient noise levels are higher for LF. These levels cannot be used to speculate because ambient noise levels have been increasing in recent times and because noise levels in the past history are unknown.

*Response:* The LOA application is based on information contained in the Draft EIS, while the proposed rule relies on information contained in the Final EIS. NMFS believes that the Navy's Final EIS combined with the empirical data collected during the LFS SRP and other data provide a reasonable basis for informed decision-making.

Figure 1–4 of the Final EIS provides information on hearing thresholds of marine mammals indicating that mysticete auditory thresholds at their best hearing frequencies are estimated to be about 60 to 90 dB while the thresholds for odontocetes at their best hearing thresholds are about 30 to 40 dB. Additional information can be found in Subchapter 1.4 of the Final EIS. However, NMFS believes that the commenter has misinterpreted the statement in the Navy's application. Archaic ambient LF noise levels are presumed to have been lower than ambient noise of today, due in major part to increases in worldwide shipping, but offset somewhat by archaic volcanic activity. To estimate the threshold for hearing of LF marine mammal specialists (i.e., the large whales), the Navy and NMFS used the best science available on this issue by adopting threshold levels cited in Ketten (1998). Use of this information, while somewhat speculative, remains the best science available until such time as NMFS and the Navy are successful in measuring threshold levels for marine mammals under MMPA scientific research permit 931–1597–00 (dated May 22, 2001).

*Comment SIC39:* Because the LFS SRP was conducted at a maximum level of 160 dB, this implies that the Navy agreed with many researchers that there is a potential physical threat to marine mammals over 160 dB.

*Response:* Based on early comments from the MMC and others stating that there may be insufficient information available for the assessment of the potential environmental impacts to conduct a proper NEPA review, the Navy convened a scientific working group of government and non-government scientists to provide advice on needed research. The Navy, based on inputs from the scientific group, developed and implemented the three-phase LFS SRP (see Final EIS Subchapter 4.2.4). The goals, as set by the scientific group, were to determine short-term behavioral impacts to those marine mammals presumed to have the greatest sensitivity to LF sound, the baleen whales. The maximum level of 160 dB was set by the scientific working group and the independent scientists, who planned and executed the LFS

SRP, not the Navy. However, as indicated by research (Schlundt *et al.* (2000), Cudahy and Ellison (2002), and Crum and Mao (1996)), the choice of 160 dB should not be interpreted to mean that injury occurs at an SPL of 160 dB.

*Comment SIC40:* One commenter stated that on page 52 the LOA application mentioned that Richardson *et al.* (1995) conjectured that prolonged exposure to 120 dB might cause PTS in odontocete species at their most sensitive frequency. This acoustic behavior of odontocetes cannot be used to predict the acoustic behavior of all whales because their hearing is above LFA transmissions frequencies.

*Response:* The statement in the Navy application notes that the 120 dB level corresponds to the level of uninterrupted sound conjectured by Richardson et al. (1995) that might lead to PTS in the most sensitive odontocete species at their most sensitive frequency, *if exposure were sustained for a very long time.* Recent research does not fully support the commenter's conjecture. Schlundt *et al.* (2000) showed that bottlenose dolphins experience onset of masked TTS (defined as 6 dB of shift) from a one-second, 3–75 kHz, exposure at approximately 192 dB RL sound. Assuming a 3–dB exchange rate (e.g., the same amount of shift that would result from reducing the intensity by 3 dB and doubling the exposure time (Finneran *et al.,* 2000), these odontocetes could experience TTS from a 16-second exposure to a 180–dB sound at their best frequency, a 32-second exposure at 177 dB, etc. Since this approximation is for mid-frequency marine mammal specialists at mid-frequency sound levels, NMFS believes that low frequency marine mammal specialists should incur TTS at similar levels and duration when exposed to low frequency sounds. However, the typical SURTASS LFA signal is not a constant tone, but rather a transmission of various waveforms that vary in frequency and duration. A complete sequence of sound transmissions lasts between 6 and 100 seconds, although the duration of each continuous frequency sound transmission is normally 10 seconds or less. Therefore, the SURTASS LFA signal itself is unlikely to result in either PTS or TTS in marine mammals.

*Comment SIC41:* The composite pinniped audiogram (Final EIS Figure 1–4) is misleading. It is oversimplified and ignorant of published audiometric data. There is a substantial difference between phocids and otariids.

*Response:* The composite audiograms shown in Figure 1–4 use measured and estimated marine mammal hearing data to illustrate that mysticetes have the best LF hearing of all marine mammals. As stated in the Final EIS Subchapter 1.4.2.1 and within Figure 1–4, the thresholds shown for pinnipeds are a composite of measured *lowest* thresholds for multiple species from Richardson *et al.* (1995). It is recognized that there is a substantial difference between phocids and otariids concerning hearing, however, this does not change the conclusion in the Final EIS that there are no marine mammals with more sensitive LF hearing than mysticetes.

*Comment SIC42:* The assumption that the potential for masking effects is negligible because of narrow bandwidth and maximum 10-second duration is incorrect. Also, if we assume that there is no noise other than LFA sonar, it still would not be adequate for a whale to experience no masking 80 percent of the time, if during the other 20 percent of the time a predator is masked, resulting in the whale's death.

*Response:* The potential impacts for masking by the SURTASS LFA sonar are assessed in the Final EIS Subchapter 4.2.7.7. In summary, masking effects are not expected to be severe because the SURTASS LFA sonar bandwidth is very limited (approximately 30 Hz), the signals do not remain at the same frequency for more than 10 seconds, and the duty cycle is limited (system off at least 80 percent of the time). For example, Dahlheim *et al.* (1984) determined that gray whales in the San Ignacio Lagoon, Baja California shifted the frequencies of their vocalizations away from the predominant noise producers in the lagoon to overcome masking effects. This was also addressed by Richardson *et al.* (1995) who noted in particular that marine mammals, like terrestrial animals, have evolved adaptations to reduce masking of sounds that are important to them. Therefore, it is very likely that, if necessary, marine mammals can adapt by shifting their vocalizations away from the narrow SURTASS LFA frequency band. The probability of an intermittent sound of interest to a marine mammal continuously overlapping the SURTASS LFA signal (with its 6- to 100-sec. transmission period every 6 to 15 minutes) for any period of time is small. A continuous sound, such as noise from a ship, cannot be masked by the intermittent SURTASS LFA transmission.

*Comment SIC43:* The attempt to apply a single noise exposure standard for all marine mammals is a gross oversimplification of an exceedingly complex and poorly understood suite of issues.

*Response:* NMFS and the Navy concur that the effects of anthropogenic sound on marine mammals is exceedingly complex and there is a lack of information on many, if not most, species. The complexity and length of the Final EIS is testimony to this. Because of this, very conservative assumptions were used for all of the Navy's analyses. These assumptions are detailed in the Final EIS Subchapter 1.4.3.

The exposure standard used in the Final EIS analysis for all potentially affected marine mammals is appropriate because of its extremely conservative bias. Foremost of these is that all marine mammals were evaluated as if they were equally as sensitive to LF sound as the baleen whales.

*180–dB Criterion*

*Comment SIC44:* There are two separate justifications presented for the utilization of the 180–dB criterion for the onset of injury, or threshold shift, one in the proposed rule based on the Draft EIS and the other in the Final EIS. Notwithstanding this, each of these analyses tends to underestimate the potential for auditory impacts. Factors include: (1) Reliance on the Ridgway TTS study; (2) inaccurate use of the HESS (High-Energy Seismic Survey) Workshop and NMFS' Acoustic Criteria Workshop; and (3) reliance on human audiology to determine threshold shift based on ''equivalent quiet.'' Finally, the Navy's theory is inconsistent with the little empirical data that exists on marine mammals (pinnipeds). The extrapolation of human hearing loss data to create models for estimating potential injury to marine mammals may be unfounded. The adoption of a 180–dB SPL as safe for all marine mammals is unsupported by science and actual events (e.g., the beaked whales strandings in Greece and the Bahamas).

*Response:* The determination of the 180–dB criterion for injury was developed from a combination of several scientific studies and analytical calculations including: (1) Marine mammal hearing thresholds, (2) human hearing loss studies, (3) comparison of fish hearing loss studies, and (4) TTS studies. This was noted in both the Draft and Final EISs. The HESS and NMFS workshops concluded that the 180–dB SPL is the point above which some potentially serious problems in the hearing capability of marine mammals could start to occur. Detailed information on this subject is provided

in the Final EIS Subchapter 1.4.2.1. A subsequent analysis by Cudahy and Ellison (2002) of the potential for resonance from SURTASS LFA signals to cause injury supports this conclusion.

While there is limited empirical evidence at this time (beyond Schlundt *et al.,* 2000) on any injury criterion, the 180 dB level makes common sense, given that Frankel (1994) estimated the source level for singing humpback whales to be between 170 and 175 dB while Au and Andrews (2001) measured their calls off Hawaii at 189 dB; the average call source level for blue whales was calculated by McDonald *et al.* (2001) to be 186 dB; Watkins *et al.* (1987) and Charif *et al.* (2002) found source levels for fin whales up to 186 dB; and Mohl *et al.* (2000) recorded source levels for sperm whale clicks up to 223 dB. If marine mammals vocalize at these levels, it is realistic to believe that these species have also evolved mechanisms to protect themselves and conspecifics from high SPL vocalizations.

*Comment SIC45:* One commenter asked that NMFS ''prove that the experts agreed that 180 dB was an appropriate threshold of mitigation for the LFA source, based on scientific evidence of biologically important impacts rather than Navy needs or mitigation potentials.'' Provide certification that the 180–dB criterion is specifically supported by the following workshops: HESS, ONR Workshop on the Effects of Man-Made Noise on Marine Mammals, and NMFS Workshop on Acoustic Criteria. The 180–dB criterion is not accepted by the vast majority of competent non-U.S. Navy supported scientists.

*Response:* A panel of nine experts in the fields of marine biology and acoustics sponsored by Southern California's HESS Team convened at Pepperdine University in June, 1997 to develop marine mammal exposure criteria (Knastner, 1998). The consensus of the combined experts was that they were

> ''apprehensive'' about levels above 180 dB re 1 μPa (rms) with respect to overt behavioral, physiological, and hearing effects on marine mammals in general. Therefore, the 180–dB radius, as initially defined by transmission loss model and verified on-site, is recommended as the safety zone distance to be used for all seismic surveys within the southern California study area.

Those scientists and experts from Cornell University, University of California San Diego, University of Maryland, Woods Hole, NOAA, ONR, and Naval Submarine Medical Research Laboratory who assisted in the preparation of the Draft and Final EISs support the 180–dB criteria. The Final EIS states, ''For the purposes of the SURTASS LFA sonar analyses presented in this OEIS/EIS, all marine animals exposed to RLs ≥180 dB are evaluated as if they are injured'' (See Final EIS page 1–34, also See Final EIS pages 14–1 to 14–4 and RTC 4–4.9).

However, NMFS has advised caution with any widespread use of the 180–dB standard for other than impulsive noise. Because SURTASS LFA is not an impulsive noise, the Navy conservatively presumed that any marine mammal exposed to SURTASS LFA sonar received levels of ≥180 dB are evaluated as if they are injured for the purposes of their analysis and operational mitigation.

*Comment SIC46:* NMFS' mandate is to ensure that ''the taking will have negligible impact on the affected species and stocks of marine mammals, will be at the lowest level practicable, and will not have an immitigable adverse impact of the availability of the species or stock(s) for subsistence use.'' Why does NMFS believe that an RL of 180 dB is an adequate threshold of LFA mitigation to satisfy this mandate? Unless and until the Navy and NMFS can provide an empirically based rationale for choosing 180 dB as the upper limit for acoustic harassment and non-serious injury, rather than any other value between 150 and 180 dB, the 120–dB criterion currently in use should not be abandoned. The LFS SRP does not justify revision of the general criterion from 120 to 180 dB. The use of a level lower than 180 dB as the injury level is appropriate. There is no scientific basis for the 180–dB standard as the upper limit of harassment.

*Response:* The comment fails to distinguish between an SPL that has been used previously to indicate the onset of Level B harassment for non-impulse (intermittent) noise (i.e., 120 dB) and the level that NMFS and others have adopted as a precautionary level to prevent injury for an impulsive sound (i.e., 180 dB). Research conducted by Malme *et al.* (1983, 1984) showed that gray whales demonstrated statistically significant responses to four different playbacks typical of industrial (intermittent/continuous) noise from oil production (drillship, semisubmersible, drilling platform, and production platform) at RLs of approximately 120 dB. Therefore, this level was the basement level established by NMFS previously for all non-impulsive noise that indicated marine mammals could potentially be harassed at those received levels. For industrial-type (non-impulsive, intermittent and continuous) noise sources, unless noise levels can be mitigated to below this level at the marine mammal, a small take authorization may be necessary in order to remain in compliance with the MMPA's prohibition on taking by harassment. Since the Navy determined that SURTASS LFA sonar operations could result in marine mammals being exposed to SPLs greater than 120 dB, it applied for an authorization under the MMPA for incidental taking. Based on the LFS SRP results, 119 dB was adopted by the Navy as the B parameter (or basement value) for risk to have a significant biological response on the part of the marine mammal. This is explained in more detail in the Final EIS (Subchapters 4–2.3 and 4–2.5.1). Also explained in the Final EIS (Subchapter 1.4.2.1) and in this document are the reasons for determining that 180 dB is a conservative estimate for assessing the onset for injury.

Once the determination is made that a taking will have no more than a negligible impact on affected marine mammal stocks (as is done in this document), the MMPA requires NMFS to prescribe regulations ''setting forth* * * means for effecting the least practicable adverse impact on such species or stocks.* * *'' These ''means'' are called mitigation measures by NMFS and have been set out in 50 CFR 216.184 and include the establishment of the 180–dB sound field (i.e., SURTASS LFA mitigation zone) wherein the Navy will not transmit whenever a marine mammal is within that zone. This 180–dB sound field has been determined to be the lowest SPL that is practicable to prevent injury to marine mammals. The HF/M3 sonar is effective up to 2 km (1.1 nm), no practical alternative mitigation measures have been identified that would be superior to the HF/M3, and NMFS and the Navy have shown elsewhere in this document that injury to marine mammals would not occur at lower SPLs. As a result, NMFS has determined that the Navy has mitigated harassment takings to the greatest extent practicable.

Please see RTC SIC44 on why the 180 dB level is a realistic application based upon existing knowledge. In summary, if marine mammals vocalize at high SPLs, it is realistic to believe that these species have also evolved mechanisms to protect themselves and conspecifics from high SPL vocalizations.

*Comment SIC47:* One commenter stated that a RL of 180 dB as the appropriate threshold of mitigation for the LFA source is not substantiated, and is not scientifically or legally defensible. The commenter stated that the Navy's designation of the 180–dB zone of

influence is arbitrary and capricious and that the Navy uses the 180–dB sound field to significantly limit the scope of mitigation.

*Response:* Please see RTC SIC46 regarding the establishment of a 180–dB safety zone and the scientific basis for this determination. In addition, the 180–dB determination is supported by two government-sponsored workshops. The 180–dB criterion was not arbitrarily selected based on the fact that the monitoring mitigation methods are only effective to 1 km (0.54 nm), but on the need to minimize the potential for injury. Depending on conditions, visual monitoring can be effective up to 3 nm (5.5 km). Passive acoustic monitoring does not provide range, but will effectively locate the bearing of vocalizing animals at greater distances. Finally, the HF/M3 sonar is effective up to 2 km (1.1 nm)(See the Final EIS Figure 2–5).

*Comment SIC48:* Based on the stranding in Greece and the results of the LFS SRP (gray whales changing their migration route), it appears that the risk continuum underestimates the decibel level of risk for change in biologically important behavior.

*Response:* There are no scientific data relating the strandings in Greece to sonar received levels below 180 dB. The LFS SRP, which included gray whales changing their migration route close to shore, exposed baleen whales to RLs ranging from 120 to about 155 dB. This research detected only minor, short-term behavioral responses. Short-term behavioral responses do not necessarily constitute significant changes in biologically important behaviors. The fact that none of the LFS SRP observations revealed a significant change in a biologically important behavior helped determine an upper bound for risk. Also, AIM simulation results demonstrate that a very small portion of any marine mammal stock would be exposed to sound levels exceeding 155 dB. Therefore, the risk continuum does not underestimate the level of risk for change in biologically important behavior. For additional information, see Final EIS Figures 1–5a through 1–5c, Subchapter 4.2.4.3, RTC 4–6.2, and Appendix D.

*Comment SIC49:* In the Final EIS the use of extrapolated data from human auditory standards to justify the 180–dB criterion is inappropriate. Also it is not only highly unlikely that the equivalent quiet (EQ) value for marine mammals in water would be the same as that for humans in air, but the empirical data from Kastak *et al.* (1999) indicate that it is not the same. EQ calculations should be at least 10 dB lower than the 140 dB given in the Final EIS.

*Response:* In accordance with best scientific practice, the Final EIS Subchapter 1.4.2.1 (Estimating the Potential for Injury to Marine Mammals) studied and analyzed all extant and viable hearing data. These went into the Final EIS discussions on marine mammal hearing thresholds, human hearing loss studies, selection of the 180–dB criterion, extrapolation to marine mammals, comparison to fish hearing studies, and TTS. Where extrapolation and estimation were necessary, internationally recognized scientific subject matter experts in marine biology, marine mammalogy and underwater acoustics were called on to develop this part of the Final EIS.

EQ values extrapolated from human measurements were compared with Kastak *et al.*'s (1999) mean values of onset of TTS for the harbor seal (137 dB), sea lion (150 dB) and elephant seal (148 dB) for 20-minute periods of octave band noise (OBN) in the 100–2,000 Hz frequency regime. The resultant EQ values (adjusted for 8-hour exposure as in Kastak *et al.*'s (1999) 20 minutes) were 125 dB for the harbor seal, 138 dB for the sea lion, and 136 dB for the elephant seal, yielding an average EQ of 133 dB. Applying the SURTASS LFA sonar 100-second EQ differential level of 54 dB to these values results in single-ping safe exposure levels of 179, 193, and 191 dB, respectively, for the three species tested by Kastak *et al.* (1999). Therefore, a 100-second duration for SURTASS LFA sonar of 180 dB can be considered appropriate and, based on Kastak *et al.* (1999) sea lion and elephant seal data, should be conservative for these species at least. See the Final EIS pp. 1–24 to 1–27 for more details.

Ketten (2001) has stated that marine mammal ears physically resemble land mammal ears, and since many forms of hearing loss are based on physical structure, it is therefore likely hearing damage occurs by similar mechanism in both land and marine mammal ears.

*Comment SIC50:* The Navy ''reverse engineered'' the presentation of risk to obtain a mitigation level of 180 dB at 1 km (0.54 nm) thus limiting the scope of mitigation. Because 1 km (0.54 nm) can be most effectively monitored visually and with passive acoustics, 180–dB level was therefore chosen. One commenter's hypothesis is that significant biological behaviors take place at RLs far below the level assumed in the EIS and that mitigation of those impacts is probably impossible.

*Response:* The 180–dB criterion was not selected based on the fact that the monitoring mitigation methods are only effective to 1 km (0.54 nm). Refer to RTC SIC44 for the 180–dB selection criteria. Depending on conditions, visual monitoring can be effective for greater than 1 km (0.54 nm) and under good conditions can extend to 5.5 km (3 nm). Passive acoustic monitoring does not provide range, but will effectively locate the bearing of vocalizing animals at greater distances than either of the other two methods. Finally, the HF/M3 sonar is effective up to 2 km (1.1 nm) (See the Final EIS Figure 2–5). For additional information see the Final EIS (RTC 4–6.5 and 5–1.14).

*Comment SIC51:* SURTASS LFA sonar operators need to monitor exposure to animals at levels of 160 dB and above for continuous, or quasi-continuous (longer than the integration time of mammalian ears), noise with an absolute never-exceed value of 170 dB in order to reasonably expect to have no physiological damage.

*Response:* There is no scientific evidence of what a ''never exceed'' value should be for marine mammals. Essentially, the commenter noted this by stating ''longer duration signals should be assigned a lower limit, perhaps in the region of 170 dB.'' The justification for the Navy's use of the 180–dB criterion for potential injury to marine mammals is discussed in several previous RTCs. For information on monitoring capability for the SURTASS LFA sonar system, see Monitoring Concerns later in this document.

*Comment SIC52:* If human divers can only safely absorb SURTASS LFA sonar under 145 dB as proposed in the Final EIS, why is it likely that whales can escape injury at much higher levels (up to 180 dB)?

*Response:* As noted in Final EIS (RTC 4–6.21), the two levels are based on different criteria. The 145–dB criterion for divers is based on psychological aversion (as behavioral response), and the marine mammal criterion is based on potential injury.

*Comment SIC53:* According to the Navy, it did not deem it necessary to develop an ''injury continuum'' because of the low number of marine mammals that could potentially experience high RL. This assumption should be validated with detailed research.

*Response:* NMFS and the Navy do not believe it desirable or necessary, let alone humane, to test animals at or above levels of potential injury in order to develop an injury risk continuum (above 180 dB). All marine mammals exposed to RLs at or above 180 dB are considered for the analysis and for monitoring/ reporting purposes to be injured and SURTASS LFA sonar is

mitigated to prevent any injury. In other words the injury risk is 1.0, which is a very conservative assumption, because not all marine mammals exposed to 180 dB and higher RLs will actually be injured.

*Risk Continuum*

*Comment SIC54:* The Navy and NMFS have concluded that RLs of LF sound below 180 dB are unlikely to cause either TTS or significant disruption of feeding, breeding, or other biologically important behaviors. No data are provided or experiments performed to support the conclusion that exposure levels below 180 dB will not cause significant disruption of any biologically important behavior. The conclusion that 180 dB is relatively safe for marine mammals deviates from accepted literature and is not based on empirical data, but on extrapolation above 155 dB.

*Response:* The scientific objective of the LFS SRP was to conduct independent field research in the form of controlled experimental tests of how baleen whales responded to SURTASS LFA sonar signals. Taken together, the three phases of the LFS SRP do not support the hypothesis that most baleen whales exposed to RLs near 140 dB would exhibit disturbance of behavior and avoid the area (Richardson *et al.*, 1995). These experiments, which exposed baleen whales to RLs ranging from 120 to about 155 dB, detected only minor, short-term behavioral responses. Short-term behavioral responses do not necessarily constitute significant changes in biologically important behaviors. The fact that none of the LFS SRP observations revealed a significant change in a biologically important behavior helped determine an upper bound for risk. The LFS SRP results, however, cannot be used to prove that there is zero risk at these levels. Accordingly, the risk continuum assumes that risk is small, but not zero, at the RLs achieved during the LFS SRP. The risk continuum modeled a smooth increase in risk that culminates in a 95 percent level of risk of significant change in a biologically important behavior at 180 dB. In this region, the risk continuum is unsupported by observations. However, the AIM simulation results indicate that only a small fraction of any marine mammal stock would be exposed to sound levels exceeding 155 dB (See the Final EIS Figures 1–5a through 1–5c, Subchapter 4.2.4.3, and Appendix D).

Comparisons of research and analyses of TTS to the 180–dB criterion are discussed in the Final EIS Subchapter 1.4.2.1. Research on the behavioral reactions of whales to sound levels that were not tested during the LFS SRP, specifically between 155 and 180 dB, has been identified by NMFS as a potential topic for the follow-on research under the LOA.

*Comment SIC55:* Based on the risk continuum 95 percent of marine mammals at RL of 180 dB are at risk. Also all marine mammals exposed to ≥ 180 dB are evaluated as if they were injured. Therefore, if most are at risk at 180 dB, then some are at risk at levels below 180 dB.

*Response:* The risk continuum and the 95 percent value refer to ''significant changes in biologically important behavior'' while the ≥ 180 dB value of RL is the risk of the onset of injury. The Final EIS did consider exposures below 180 dB as posing a risk of injury, but determined that the 180–dB criterion for injury is appropriate as detailed in previous responses. A subsequent analysis by Cudahy and Ellison (2002) of the potential for resonance and tissue damage from LFA signals to cause injury supports this conclusion.

*Comment SIC56:* One commenter stated that the risk continuum is accepted by NMFS as one of the hypothetical assumptions in the Final EIS to support the 180–dB criteria. This commenter also stated that the risk continuum means that 50 percent of all animals exposed to 165 dB are injured.

*Response:* The commenter has misinterpreted the basis for the risk continuum as being a measure of injury. It is not a measure of injury; it is a measure of the potential risk of significant change in a biologically important behavior. This is explained in the Final EIS Subchapter 4.2.3.

*Comment SIC57:* At 66 FR 15386, first column, third paragraph in the proposed rule document, it states, ''Because the LFS SRP failed to document any extended biologically significant response at maximum RLs up to 150 dB, the Navy determined that there was a 2.5 percent value of a risk of an animal incurring a disruption of biologically important behavior at an SPL of 150 dB, a 50-percent risk at 165 dB, and a 95-percent risk at 180 dB.'' However, NMFS provides no indication of what is meant by ''extended biologically significant behavior'' and how does this term conform to the statutory definition of harassment?

*Response:* In the 1999 application, the Navy stated, ''The value of A used (10) (i.e., A = 10) was consistent with the LFS SRP results, which failed to document any extended, biologically significant response at maximum RLs up to 150 dB.'' (As defined in the Final EIS Subchapter 4.2.5.2, the A parameter controls how rapidly risk transitions from low to high values with increasing SPL). The term ''extended'' related to the results of the LFS SRP and meant that none of the biologically significant behaviors observed during the LFS SRP persisted for any period of time and all subjects returned to normal activities within tens of minutes of cessation of playbacks. Additional details on the risk continuum can be found in the Final EIS Subchapter 4.2.5.

However, NMFS believes that the term ''extended'' as used in the Navy application is a higher threshold than harassment, which refers to a reaction that is behaviorally significant on the part of the animal in the course of that animal's conducting a biologically important activity, such as breeding, feeding, or migrating. Therefore, the term ''extended'' is not used in this document or in the Navy's Final EIS. In this context, it is the impact of the activity on the animal, more than the duration of the disturbance, that is critical. NMFS clarifies that, for small take authorizations (as opposed to intentional takings), a Level B harassment taking occurs if the marine mammal has a significant behavioral response in a biologically important behavior or activity. For further discussion on this issue, please refer to RTC MMPAC13.

*Other Studies*

*Comment SIC58:* The analysis relied too heavily on Ridgway *et al.* (1997), which may not be a good model for the onset of TTS due to SURTASS LFA operations (not 1 second signal). The results of Ridgway *et al.* (1997) were based on exposure to sounds of different frequencies (3, 20, and 75 kHz) from those generated by SURTASS LFA sonar (0.1 to 0.5 kHz).

*Response:* Ridgway *et al.* (1997) and Schlundt *et al.* (2000) data can be used to extrapolate responses to the SURTASS LFA sonar signals, using established methods of adjusting for differences in signal duration. This was explained in detail in the Final EIS Subchapter 1.4.2.1.

Ridgway *et al.* (1997) was expanded, peer reviewed, and published as Schlundt *et al.* (2000). These results are applicable to the LFA frequency range. As stated in the Final EIS on page 1–27,

Schlundt *et al.* (2000) documented temporary shifts in underwater hearing thresholds in trained bottlenose dolphins (*Tursiops truncatus*) and white whales (*Delphinapterus leucas*) after exposure to intense one-second duration tones at 400 Hz, and 3, 10, 20, and 75 kHz. Of primary importance to this deliberation are the LF-band tones at 400 Hz. At this frequency, the researchers were

unable to induce TTS in any animal at levels up to 193 dB re 1 micro Pa, which was the maximum level achievable with the equipment being used.

*Comment SIC59:* One organization commented that NMFS' reliance on the Navy's TTS studies in San Diego, which suggest that TTS occurs in bottlenose dolphins exposed to a single, 1-second pure tone occur at levels above 190 dB, is unwarranted because: (1) High ambient noise levels exist in San Diego Bay (i.e., the research used masking thresholds of some 20–40 dB above acoustic sensitivity; a technique that has long been known to audiologists to result in less observable threshold shifts and thus weaker damage risk criteria); (2) Extrapolation from two species of odontocetes to other species is unjustified; and (3) Extrapolation from 1-second pure tone pulses to the broadband 100-second pulse of LFA is unjustified.

*Response:* (1) As stated in Schlundt *et al.* (2000), masking noise was used to provide a leveling effect in the presence of variable ambient noise in San Diego Bay, and this masking noise may have caused larger shifts than may have been seen without the masking noise. The scientific evidence from the audiologists (unidentified by the commenter, but assumed to be those referenced in Schlundt *et al.*, 2000) does support the theory concerning less observable threshold shifts for humans (Parker *et al.*, 1976; Humes, 1980). Recent research reported by Finneran *et al.* (2001) at the 2001 Meeting of the Acoustical Society of America in Ft. Lauderdale, FL does not support this theory for marine mammals. That study tested two dolphins in a low noise environment (tank) for 3 and 4.5 kHz with a 1-second pure tone. Subjects demonstrated behavioral changes at 190 dB. Preliminary results indicate no TTS at 4.5 kHz for either subject at received SPLs of 200 dB. The results of Schlundt *et al.* (2000) are applicable because (1) they are supported by recent scientific research and (2) marine mammals live in a noisy environment, one that closely resembles the environmental conditions of the study.

(2) Utilizing the results of this study for other species based on two species is justified. The use of indicator species, and extrapolation of results, is an accepted scientific practice, especially if the results are applied in a conservative manner. First, for the 400-Hz signal, no TTS was observed at the highest level of exposure (193 dB). Second, the onset of TTS is not considered by NMFS to be injury (although the Navy has considered any SPL above 180 dB to be a conservative level for determining injury). Therefore, PTS (or injury) would occur above 193 dB. Third, the injury criterion for SURTASS LFA sonar was not based solely on this study (see the Final EIS Subchapter 1.4). Finally, for the purposes of the SURTASS LFA sonar EIS analysis and the proposed mitigation protocols, the level for potential injury was set at 180 dB—a conservative level.

(3) The extrapolation from a 1-second pure tone to a broadband 100-second ping is discussed in previous RTCs. In addition, LF shipping noise is broadband, SURTASS LFA is not. SURTASS LFA sonar bandwidth is very limited (approximately 30 Hz), and the signals do not remain at the same frequency for more than 10 seconds.

*Comment SIC60:* In a 5-year report submitted to NMFS in March 1998, the Ocean Mammal Institute (OMI) concluded that when boat engines reach an RL of 120 dB whales swim two to three times faster than around quieter boats. This corroborates the large body of literature indicating that whales avoid sounds at about 115–120 dB.

*Response:* This concern was discussed in the Final EIS (RTC 4–4.25). In a summary posted on the OMI website, researchers reported that humpback whales changed their behavior when approached by boats with 200 hp engines, which produced RLs of 120 dB at 100 m (328.1 ft) at 2,000 Hz. A review of the actual report submitted to NMFS shows that the report does not support the claim made in the comment. Furthermore, Au and Green (2000) concluded,

> * * * the whales appeared to swim fastest in response to the loudest boat. However, it is difficult to know exactly what a pod of humpback whales reacts to. The mere presence of a boat moving into their vicinity could cause serious reactions. Besides the levels of the underwater sounds and the complexity of the sound, the size and shape of a boat may also be important factors.

At close ranges sound intensity and spectral content change rapidly, providing clues to the whales that something is approaching rapidly, thus eliciting an avoidance response, which is not necessarily based on sound level. The OMI website supported this when it stated, ''Data analysis showed that the loudness of the boat's engine and the rate of change in noise level significantly affected the whales' swimming speed.'' It also stated, ''Other researchers have noted that whales appear to respond to rate of change in noise level.'' In other words, it is just as likely that the whales got out of the way because the boat was rapidly approaching them, rather than the level of sound from the engine. A review of the report showed no scientific research control for the speed and course of the approaching boat relative to the whales. Despite the conclusions in Green (1998) and Au and Green (2000), the OMI website presented only one of several potential conclusions when it stated, ''These studies show that whales'' swimming speed and amount of time underwater is affected by the noise level of boats that approach them.''

LFA will not present a rapid ''rate of change'' to marine mammals because of the boat's slow speed of approximately 3 knots. Additionally, the frequency of the engine noise used to elicit responses from the whales in the Au and Green (2000) study was substantially higher than that of the SURTASS LFA sonar's signal. Therefore, the results from the 5-year report concerning humpback whale reactions to boat engine noise submitted to NMFS by OMI (Green, 1998) and later published (Au and Green, 2000) are not directly comparable to the scientific analyses in the Final EIS.

*Comment SIC61:* Evidence suggests the potential for serious physical and behavioral effects at exposure levels below 180 dB and widely accepted research demonstrates biological disturbance at far lower levels (115–120 dB).

*Response:* In order to determine the potential impacts that exposure to LF sound from SURTASS LFA sonar operations could have on marine mammals (below 180 dB), biological risk standards were defined with associated parameters of exposure. Based on the MMPA (Final EIS Subchapter 1.3.3.1), the potential for biological risk was defined as the probability for injury or behavioral harassment of marine mammals. In this analysis, behavioral harassment is assumed to be a significant change in a biologically important behavior, which is consistent with the NRC's characterization (NRC, 2000). The potential for biological risk is a function of an animal's exposure to a sound that would potentially cause hearing, behavioral, psychological or physiological effects. The risk continuum was developed as a measure of the biological risk for behavioral response. The measurement parameters for determining exposure were RL in decibels, length of the signal (ping), and number of pings received. Simple disturbance does not constitute injury or biologically significant behavior modifications.

*Comment SIC62:* When evaluating the TTS study by Schlundt *et al.* (2000), the Navy downplays individual variability where the small sample size clearly

weakens the general application of the results.

*Response:* Schlundt *et al.* (2000) is only one of several papers and research cited in the discussion of TTS in the Final EIS. See the Final EIS Subchapter 1.4.2.

*Comment SIC63:* On page 45, the LOA Request states, ''Marine mammal biologists and marine bioacousticians agreed that, based on the best available data, including results from the LFS SRP, and best scientific judgment, the SURTASS LFA biological risk standards for marine mammals (particularly mysticetes—baleen whales) used for this study are those discussed below.'' One commenter notes that a significant number of marine mammal biologists and marine bioacousticians do not agree with this.

*Response:* The SURTASS LFA sonar EIS analysis, based on both scientific research and literature reviews, utilized a risk function methodology to assess the biologically significant behavior of marine mammals. This process was developed by leading experts in the fields of acoustics, bioacoustics and marine biology, and was reviewed by NMFS. Because this methodology is novel, academic discussion is both anticipated and desired. The NRC has proposed the use of risk function (concerning the definition of Level B harassment under the MMPA). NRC (2000) stated, ''the ultimate long-term goal should be a risk function involving intensity and duration of exposure (see Miller, 1974) for each species, but our current lack of knowledge impedes this goal.''

*Comment SIC64:* Why was TR 3 (Summary Report on the Bioeffects of Low Frequency Waterborne Noise) missing from the Final EIS?

*Response:* As explained in Final EIS (RTC 1–3.11), none of the three TRs were missing from the Final EIS. As stated in the Final EIS on page xii, the TRs are incorporated by reference in accordance with 40 CFR 1500.21 and are available upon request. A copy of TR 3 was provided to the commenter on August 24, 1999, during the comment period for the Draft EIS.

*Impact Analysis/Modeling*

*Comment SIC65:* The conversion of dB (air) to dB (water) is 26 dB, not 60 dB.

*Response:* Sound levels in air are not the same as sound levels in water. In order to compare sound (or acoustic) intensity in air against that in water, one must consider the difference in reference standards (26 dB) and the difference in impedance between air and water (35.5 dB), a 61.5–dB difference. To produce equivalent acoustic pressure level for air, 61.5 dB must be subtracted from the sound intensity in water. In other words, 100 dB in air would be equivalent to 161.5 dB in water. See Final EIS (RTC B–1.1) and Appendix B Subchapter B.3.2 for more information.

*PE/AIM Simulations*

*Comment SIC66:* It appears from the data provided in the Navy's Final EIS that the Navy's researchers ran their modeling program an insufficient number of hours. Whereas LFA would transmit a proposed 72 hours during each tour of duty, the LFA model seems to have been run only 32 hours—the product of a 60-second ''ping'' repeated every 15 minutes for 20 days (Compare Final EIS at 2–8 with Final EIS at 4.2–22, 4.2–38). The difference between these two figures becomes more salient when tours of duty are multiplied, to reflect the proposed deployment. In sum, it would appear that, by this single error alone, the Navy has underestimated the overall impact of its system by a factor as great as 2.25, at least some of which would be reflected in additional numbers of animals ''taken.'' Some part of this multiplier would also be reflected in higher equivalent received levels for animals exposed a multiple of times—a concern for NMFS in calculating negligible impact.

*Response:* The modeling program (AIM) was run with a sufficient number of hours to accurately reflect historical and expected SURTASS LFA operations. Page 4.2–22 of the Final EIS erroneously stated that a 20-percent duty cycle was used in the AIM calculations. AIM modeling was independent of duty cycle and signal duration, as they are embedded in the risk function upper limit calculation. The AIM modeling was based on a maximum received pressure level per transmission basis, independent of the duration of an individual ping. The transmit pressure level used to calculate the received level at the animal was the absolute maximum of all the individual elements in a given transmission. Subchapter 1.4.2.1 addresses how signal duration is accounted for in the selection of the 180 dB upper limit of the risk function, and explains why a 100-second duration criterion for SURTASS LFA sonar of 180 dB is appropriate and conservative. Typical durations for a transmission vary between 6 and 100 seconds, but the peak received pressure level at an individual animal is unaffected by this duration. Thus, the AIM modeling was based on two fundamental quantities: (1) The peak received pressure level at an animal's location, and (2) the number of pings received. Processing AIM results using the risk continuum (Subchapter 4.2.6.3) incorporated signal duration (rooted in the risk function). Therefore, varying the duration of a given transmission (and thus the duty cycle) is not directly related to the number of transmissions, nor the number of takes for a given operation, but has been accounted for in post-AIM analysis. Thus, even though page 4.2–22 of the Final EIS was in error, the AIM model runs presented in the Final EIS are correct. The take estimates presented in the Final EIS Tables 4.2–10 through 4.2–12 are not underestimated, but are valid, as explained in the Final EIS, and conservative (see Subchapters 1.4.3, and 4.2.7.5).

Furthermore, the Navy will rerun the models at least once prior to operating in a specific geographic region in order to derive new take estimates. The Navy will provide this information to NMFS that will reflect estimates for those areas requested for upcoming SURTASS LFA operations, in accordance with the annual LOA.

*Comment SIC67:* The accuracy and reliability of the input data are missing from these sophisticated models.

*Response:* The reliability and accuracy of the modeling input parameters were reviewed and cross-checked with marine biology experts. For more details, see the Final EIS (RTCs 4–3.13 and 4–3.14).

*Comment SIC68:* Calculations (Draft EIS/Final EIS) are based on the assumption that marine mammal species and stocks are uniformly or randomly distributed. Considerable evidence exists to indicate that this distribution is neither uniform nor random, but determined by biological and physical oceanographic features and could lead to an underestimate of effects.

*Response:* According to the Navy, it agrees that the distribution of marine mammals in the wild is neither uniform nor random. This was an integral part of the acoustic modeling. For each model site, the area was divided into sections or grids (See Appendix A of TR 2). Each section was assigned an animal weight or density for each of the modeled species. Within each of these sections, the distribution was random. Species distributions for each of the 31 sites are provided in Appendix C of TR 2.

*Comment SIC69:* The Navy should rerun its AIM simulations using varying estimates for its monitoring program to simulate more realistic conditions. Take calculations should be adjusted so as

not to include monitoring detection of species.

*Response:* This has already been done. Under Alternative 1, modeling was used to analyze each site and species both without and with monitoring mitigation. See Final EIS Table 4.2–10. The AIM simulations utilized conservative values for monitoring mitigation effectiveness. The modeling did not place a high reliance on visual and passive acoustic monitoring. The effectiveness of the HF/M3 sonar was limited to a conservative value of 50 percent. The combined efficiency of monitoring by all three methods used in the modeling was 66 percent. Based on testing of the HF/M3 sonar, its efficiency for a 10-m (32.8-ft) whale at 1,000 m (3280.8 ft) is over 95 percent. If the ''take'' numbers were recalculated, as suggested, the percentages of potentially affected marine mammals would decrease, not increase. For more information, see the Final EIS Subchapters 2.3.2.2 and 4.2.7.1.

*Comment SIC70:* The SACLANTCEN report states that Cuvier's beaked whale specific sounds are not known, yet the Final EIS claims that passive acoustic devices have a 25 percent probability of detecting them.

*Response:* The Final EIS Subchapter 4.2.7.1 at 4.2–49 stated: ''The *USS SEAWOLF* Shock Testing EIS (Navy, 1998) proposed using a broadband passive detection system. With this system, the *USS SEAWOLF* EIS assumed the following estimates for passive acoustic detection (1.0 = 100 percent):

Sperm whales and *Stenella* dolphins: $ME_{passive} = 0.75$

Other odontocetes except Cuvier's beaked whales: $ME_{passive} = 0.50$

Baleen whales and Cuvier's beaked whale: $ME_{passive} = 0.25$

Because the SURTASS passive array has limited bandwidth, the lowest (conservative) value of 0.25 was used for $ME_{passive}$.''

Moreover, it should be noted that the fact that Cuvier's beaked whale species sounds are not known does not imply that they do not vocalize. It only implies that their sounds cannot necessarily be distinguished from other vocalizing cetaceans. However, the Navy's passive detection monitoring is not species-specific. The detection of *any* sounds identified to be from a marine mammal will require adherence to the mitigation protocols in accordance with Chapter 5 of the Final EIS.

*Comment SIC71:* How were ship movements during the modeled exercise factored into the calculation?

*Response:* The AIM simulation can calculate the projected sound field from the SURTASS LFA source in either stationary or moving mode. For the calculations in the Draft and Final EISs, the source vessel was moving at 3 knots with the ship track being a triangle, eight hours per leg (3 legs per day) with mission durations of 20 days/24 hours per day, as noted in the Draft and Final EIS Table 4.2–6 and TR 2 Table 3–2.

*Comment SIC72:* The swim speed, interval of course change, angle of course change, dive times, distribution, abundance, and density inputs to AIM are not site-specific.

*Response:* Swim speed, interval of course change, and angle of course change are the same for all species at all sites. However, diving regime (depth ranges and percent of time) are based on individual species. Population densities are determined for each site by species by season. These data are provided in the Final EIS Subchapter 4.2.2.2 and TR 2.

*Comment SIC73:* Beaked whales were not included in the Draft EIS or any modeling scenarios (sites).

*Response:* The Draft and Final EISs (Table 4.2–4) included beaked whales at 22 of the 31 modeled sites.

*Comment SIC74:* The PE model did not indicate the effects of infrasonic (0.1 to 15 Hz) sound produced by LFA.

*Response:* The SURTASS LFA sonar transmit array is not physically capable of producing infrasonic signals.

*Single Ping Equivalent (SPE)*

*Comment SIC75:* The Navy does not adequately deal with the exposure of marine mammals to repeated LFA signals, which could increase and intensify the resulting impacts.

*Response:* The SPE, as defined in the Final EIS Subchapter 4.2.3.1, is the methodology used during the acoustic modeling of potential impacts to marine animals from exposure to LF sound. This method estimates the total exposure of each individually modeled animal, which was exposed to multiple pings over an extended period of time. This is accomplished by the summation of the intensities for all received pings into an equivalent exposure from one ping, which is always at a higher level than the highest individual ping received.

*Comment SIC76:* There is no scientific justification for the 5 $\log_{10}$ (N) rule for assessing behavioral disturbance risk of multiple exposures. An additive effect of exposure is more appropriately modeled as 10 $\log_{10}$ (N). The Final EIS greatly underestimates the number of marine mammals that will be harassed due to multiple exposures at low levels.

*Response:* The National Institute for Occupational Safety and Health (NIOSH) has recently changed their ''exchange rate''; that is, the drop in an acceptable noise level for increased durations. The former standard was 5 dB, and the current standard is 3 dB. The section on exchange rate concludes with this statement:

> The 3–dB exchange rate is the method most firmly supported by the scientific evidence for assessing hearing impairment as a function of noise level and duration, whether or not an adjustment is used for intermittent exposures. (NIOSH, 1998)

Additionally, at a recent meeting of the Acoustical Society of America, the existing data for TTS in marine mammals were compared for duration and received level. These data also mostly fit along the 3–dB exchange rate.

The 3–dB exchange rate is based on the equal energy assumption and is equivalent to the 10 $\log_{10}$ (duration or N) formulation suggested by the commenter. However, this formulation is based on continuous noise exposure. Interruptions in the noise exposure allow for recovery. Clark *et al.* (1987) found that ''intermittent exposures produced less temporary and permanent hearing loss and less cochlear damage than continuous exposures of equal energy.'' If these TTS results also apply to behavior, it suggests that the intermittent nature of the SURTASS LFA source justifies the 5 $\log_{10}$ (N) formulation.

Furthermore, the existing data on long-term noise exposure in humans show that the effect drops from 10 $\log_{10}$ (duration) to 3.3 $\log_{10}$ (duration) when the total exposure drops to 8 hours. There are also data from impulsive noise exposure that indicate a 5–dB change in threshold is appropriate for a 10-fold change in the number of exposures. This is equivalent to 5 $\log_{10}$ (N).

These data are for TTS, and therefore not directly applicable to behavioral responses. However, the range of known values are 3.3 $\log_{10}$ (N), 5 $\log_{10}$ (N), and 10 $\log_{10}$ (N). Picking the intermediate value may represent the best estimate based on partial knowledge. Picking the extreme value represents the ''worst case'' scenario. It is conservative, but may be less accurate.

Another argument for a value less than 10 $\log_{10}$ (N) is that most animals that are exposed to multiple pings are at a reasonable range from the ship. These animals are moving through the water column, and the acoustic path of the signal for CZ propagation is a relatively narrow band. As the animals move up and down in the water column, they are unlikely to experience multiple sequential loud pings. The model allows

for non-sequential loud pings, even pings separated to be considered additive, which is a conservative approach.

*Comment SIC77:* The SPE approach appears to mask potential effects of repeated exposure at lower levels, such as abandonment of feeding and breeding areas or resonance effects. Treating the effects of a single ping at high levels close to the ship as equivalent to multiple pings at lower levels ignores the impact of multiple pings at lower levels taking place at substantial distances.

*Response:* The SPE approach does not mask potential effects of repeated exposures at lower levels because the number of pings required to equate to 180–dB exposure was modeled in the analysis. This conservative approach demonstrated that the potential impact on any stock of marine mammals from injury is considered negligible, which included consideration of multiple impacts at lower levels that equated to 180–dB exposure.

*Comment SIC78:* Undetected animals could be subject to repeated pings within the 180–dB zone. If an animal is detected within this zone after LFA sonar transmissions have been initiated, it will not be possible to know how long the animal has been subject to high RLs. This animal should be assumed to be injured.

*Response:* As stated in the Final EIS and the application, all marine mammals that receive a SPL of 180 dB, or greater, are conservatively assumed to be injured.

*Cumulative Impacts*

*Comment SIC79:* The Final EIS section on cumulative effects does not provide the necessary analyses to assess the combined effect (all other human-related factors) on marine mammals. The EIS discussion of cumulative impacts does not mention other nations' deployment of LFA systems. Cumulative impacts analysis cannot compare LFA sonar to shipping. One organization is concerned that the multiple deployments of LFA sonar in conjunction with potential deployment of other nation's LF sonar has not been addressed and may have a devastating cumulative effect on marine mammals.

*Response:* Cumulative impacts that are reasonably foreseeable were considered by the Navy in the preparation of the EIS (Subchapter 4.4) and are discussed in the Final EIS Subchapter 4.4 and RTCs 4–10.1, 4–10.3, 4–10.4, and 4–10.6. Operating more than a single SURTASS LFA sonar source within a single ocean basin is unlikely. However, the Navy did analyze the potential impacts from operating two SURTASS LFA sonars within a representative area (Gulf of Oman). This was described in both the Navy's application and in the Navy's Draft and Final EISs. Table 4–14 of the application assesses the percentage of marine mammal stocks within that area that could potentially be affected. Since no more than two SURTASS LFA sonars are expected to be deployed under this action, no further analyses are required. Moreover, NMFS is unaware of the use by other nations of SURTASS LFA sonar, or other systems that use a LF source (*i.e.,* 1 kHz or below), except for the SACLANTCEN (NATO) TVDS system whose frequency ranges are 450 to 700 Hz for the LF component and 2.6 to 3.4 kHz for the mid-frequency component (SACLANTCEN, 1998). The Navy has no plans to operate with this NATO system. Moreover, if the TVDS system is ever used by other nations, use of this single system and the 2 planned SURTASS LFA systems for the period of these regulations would not exceed the number of LF systems analyzed in the Navy's Final EIS. For further discussion on this issue, please refer to RTC MMPAC33.

*Comment SIC80:* The United States will not be able to control the deployment of LFA technology by other nations that may not limit their routine usage to levels safe for marine life.

*Response:* NMFS and the U.S. Navy have no control over activities by other nations. However, while LF sonar technology, in one form or another, may be deployed by other nations, such deployments remain speculative at this time.

*Comment SIC81:* Despite the fact that LFA signals are a minor part of the increasing oceanic ambient noise, the LFA transmissions nevertheless stand out from this increasing hum. Two commenters state that recorded LFA transmissions at 1,000 miles (1609 km) during acoustic studies highlight this.

*Response:* Because of its short duty cycle and limited number of systems to be deployed, SURTASS LFA sonar transmissions will not add measurably to the increasing ambient noise in the oceans, and will not be perceptible in most of the ocean basins in which it is deployed. As to the acoustic studies that reported recording of SURTASS LFA at 1,000 miles (1609 km), there was no indication as to the RL of this signal from the Magellan II project except a comment that the researcher was ''forced to jump up and turn down the speaker.''

In later research he stated that he recorded strong long duration sounds in the 3 kHz range coming from the direction of the *R/V Cory Chouest* at a distance of about 40 mi (64.4 km). Since the SURTASS LFA sonar source can not transmit at mid-frequencies, it was not the SURTASS LFA sonar signal from the *R/V Cory Chouest.*

*Comment SIC82:* The Navy's calculations strongly underestimate the potential impacts of its noise on an animal's lifetime productivity rate.

*Response:* The Navy's Final EIS, Subchapter 4.2.7.5 (Biological Context) addresses the potential for long-term effects, such as loss of part of a breeding season, loss of part of a foraging season, and reduction of individual animals' reproductive success. Since the conclusion reached from the analyses done in conjunction with the development of the Final EIS, including the LFS SRP field research, is that the potential impact on any stock of marine mammals from injury due to SURTASS LFA sonar operations is negligible, the primary potential effect for marine mammals is a significant change in a biologically important behavior. For this to translate into impacts on an animal's lifetime productivity rate, the SURTASS LFA sonar would likely need to be operated in a concentrated breeding area throughout an entire breeding season, or operated in a feeding area for months at a time. System operational plans and restrictions preclude these scenarios: (1) All operations will be outside 12 nm (22 km) of any coastline or offshore island, and far enough away from designated offshore biologically important areas to limit SPLs in those areas to below 180 dB; (2) operations will not occur in places and during times of the year when marine mammals are engaged in critical activities (as frequent system shutdowns due to animal detections would negate the system's operational utility); (3) mission length will not exceed 20 days; and (4) no more than 12 percent of any marine mammal stock may incur Level B harassment during the time period of validity for each LOA (1 year). Therefore, NMFS believes the Navy has not underestimated the potential impacts on the lifetime productivity rates for marine mammals.

*Comment SIC83:* In the Final EIS Subchapter 4.2.7.5 on biological context, the effect of the impact for a 20-day mission over 20 years of breeding seasons per animal were discussed. The model used is incorrect because there was only one mission per animal per 20-year period. Because there are ''at least three missions per year per area'' there will be a greater intersection of missions on breeding seasons over 20 years, not just one.

*Response:* The discussion in Subchapter 4.2.7.5 was not intended to

be a model. For illustration purposes, the intersection of only one mission per animal over a 20-year period is a valid assumption. First, there will be only two SURTASS LFA sonar vessels deployed during the upcoming 5-year period with each one expected to be located in a different ocean basin and, therefore, only a limited number of active sonar operations (normally 12 missions/year). Second, marine mammal breeding is seasonal, thereby further limiting the period when marine mammals could potentially be exposed during this critical period. Moreover, as noted in RTC SIC82, it is reasonable to expect that it is unlikely that any single marine mammal will receive an appreciable sound exposure level from SURTASS LFA sonar that will cause significant changes in biologically important behavior during any single mission. Based on the modeled underwater acoustic RLs (AIM analyses results), presented in the Final EIS Subchapter 4.2 EIS, the data presented in Figures 1–5a through 1–5c in the Final EIS, illustrate that the preponderance of all modeled RLs fall below the 155 dB level. Therefore, even if the Navy should choose to conduct missions within the same year in the same area, for the above reasons NMFS believes that SURTASS LFA sonar would not have reproductive level effects on marine mammals. Finally, as explained in detail later in this document (see RTC MMPAC23), NMFS will review the Navy's LOA application to ensure that the Navy has planned active SURTASS LFA sonar missions to avoid, to the extent practical, those critical areas and times of the year when marine mammals are concentrated to carry out important biological activities.

*Non-Marine Mammal Impact Concerns (NMMIC)*

*Comment NMMIC1:* The EIS did not include sea snakes because they primarily inhabit inshore waters.

*Response:* Because sea snakes primarily inhabit shallow areas where SURTASS LFA sounds will attenuate to low levels and because sea snakes have little to no sensitivity to LF sound either from hearing or non-auditory effects, it was appropriate for the Navy to eliminate them from further consideration in the Final EIS.

*Comment NMMIC2:* The potential effects cannot be predicted and/or were not considered in the analysis for fish, diving birds, invertebrates, plankton, and other non-mammalian species (such as transatmospheric life forms). Soft tissue damage in fish was not considered. No studies done for fish, plankton, and sea turtles. What is the effect of LFA sonar on the marine mammal food chain, such as zooplankton and fish?

*Response:* The potential effects of SURTASS LFA sonar on fish and prey species are covered in the Final EIS Subchapters 4.1.1 and 4.2.7.6; sea turtles are covered in the Final EIS Subchapter 4.1.2; invertebrates are covered in the Final EIS Subchapter 3.2.1.1; plankton are addressed in the Final EIS Subchapter 3.2.1; and diving birds are discussed in the Final EIS Subchapter 3.2.1.2. As previously stated, the SPL threshold for the potential for *in vivo* tissue damage due to exposure to underwater sound is on the order of 180 to 190 dB. Because the potential for injury to marine mammals, sea turtles, and fish stocks was set at a SPL of 180 dB, the Navy did consider tissue damage for these species. The Final EIS did include life forms that exist both in the atmosphere and the ocean, including pinnipeds, sea turtles, diving sea birds, and humans. As suggested by the commenter, information on other ''transatmospheric'' life forms is available at http://www.roswellrods.com

*Comment NMMIC3:* Subchapter 4.1.1.1 of the Final EIS incorrectly states that large pelagic fish (such as tuna) spend most of their time near the surface.

*Response:* The Final EIS concluded that a negligible portion of any fish stock will be present within the 180-dB sound field and thus the potential for injury to fishes is limited. Therefore, even if pelagic fish do not spend most of their time near the surface, it will not change the determinations made in the Final EIS.

*Comment NMMIC4:* The analysis of the potential impact to fish in the Final EIS is limited. There is no discussion at all of the potential impacts on fish eggs. The commenter then goes on to state, ''There is no basis for assuming that the only injurious effects on fish or fish eggs will take place at 180 dB or higher.''

*Response:* The effects on fish and fish eggs are discussed in the Final EIS subchapters 3.2.2, 3.3.1, 4.1.1, 4.3.1, and RTC 3–2.5, 4–1.6, 4–1.7, and 4–1.10.

*Comment NMMIC5:* The Navy's conclusions on non-significant impact on fish, sharks and sea turtles and their habitats are based on a number of assumptions and not on empirical evidence. The Navy gives only a cursory look at the potential impact to fish.

*Response:* Subject matter experts provided the analyses of impacts on fish, sharks, and sea turtles. Much of their analyses are based on peer-reviewed research, as noted here. Where assumptions were necessary because of lack of scientific data, they were made by the subject matter experts and were conservative. There are extensive discussions on fish, sharks and sea turtles in the Final EIS in Subchapters 3.2.1.2, 3.2.2, 3.2.3, 4.1.1, 4.1.2, and 4.3.1. The conclusions are based on the research of numerous recognized scientists. Examples of cited research include Bartol *et al.* (1999), Cox *et al.* (1986a), Cox *et al.* (1986b), Cox *et al.* (1987), Enger (1981), Hastings *et al.* (1996), Klimley and Beavers (1998), Lombarte and Popper (1994), Popper and Clarke (1976), Ridgway *et al.* (1969), Rogers and Cox (1988), Sand and Hawkins (1973), and Ye (1996).

*Comment NMMIC6:* In Comment 4–5.38, Dr. Popper, a coauthor in Hastings *et al.* (1996), stated that there indeed was delayed sensory damage that was not an artifact of the sacrificing schedule.

*Response:* Dr. Popper co-authored and reviewed the sections of the Final EIS concerning potential impacts to fish (See Final EIS page 14–2). The possible inconsistency noted in the comment, however, is not relevant because the study exposed the oscar (*Astronotus ocellatus*) to a 300-Hz, 180-dB signal for a minimum of 1 hour. The LFA signal's maximum length is 100 seconds with no more than 10 seconds at any single frequency. Therefore, at this time there is no reason to presume that the limited damage found in Hastings *et al.* (1996) would occur with the much shorter LFA signal. Based partially on the reference, the Final EIS conservatively concluded that it is reasonable to consider hearing loss or injury to fishes from SURTASS LFA sonar transmissions to be limited to the region ≥ 180 dB. However, no more than a negligible portion of any fish stock would be present within the 180-dB sound field at any given time.

*Comment NMMIC7:* The Navy has dismissed the potential impact to fish, turtles, and humans from resonance of cavities and swim bladders. In Final EIS (RTC 3–2.5), it is not evident why larger fish will not be affected by LFA. In the Final EIS (Subchapter 4.1.1.1) concerning non-auditory injury to fish stocks, the Navy stated, ''Therefore, it is not expected that resonance of the swim bladder would play a significant role in response to LF sound (ARPA, 1995).'' This reference is for the ATOC system, which has a frequency of 75 Hz. This does not correspond to the frequency to be used by SURTASS LFA sonar of 100 to 500 Hz. Therefore, the Final EIS conclusions are not correct.

*Response:* The potential for impacts due to resonance of cavities and swim bladders was discussed in the Final EIS

(RTCs 3–2.5, 4–4.15, and 4–6.24). RTC 3–2.5 stated that fish are not expected to be significantly affected by resonance because the SURTASS LFA signal is lower in frequency than the resonance for most fish. However, it did recognize that the resonance frequencies for some of the larger fish may be in the range of SURTASS LFA. For example, the cod has a resonant frequency of 400 to 560 Hz. However, in order to provide additional protection to marine mammals from potential injury, the Navy has agreed to apply interim operational restrictions that include a maximum frequency of 330 Hz. This will provide additional protection for fish as well.

The SPL threshold for the potential for *in vivo* tissue damage due to exposure to underwater sound is on the order of 180 to 190 dB (Cudahy and Ellison, 2002). Because the potential for injury to marine mammals, sea turtle, and fish was established by the Navy at an SPL of 180 dB, and because the permissible exposure level for humans was set even lower at 145 dB (a value based on aversion reactions, not injury), resonance from LFA sonar is even less likely to impact humans.

The frequency of ATOC is lower than that of SURTASS LFA, and therefore the citing of the ATOC EIS may have been inappropriate. However, the conclusion remains the same.

*Comment NMMIC8:* It is a matter of concern that the Final EIS makes no attempt to calculate and/or discuss that swimbladders (of fish) vibrate with the greatest amplitude at stimulation frequencies close to the base frequency and at frequencies corresponding to the 2nd and 3rd harmonic.

*Response:* Resonance of fish swim bladders is discussed in the Final EIS Subchapter 4.1.1.1 and RTC 3–2.5. See Final EIS (RTC 4–6.42) for discussion on harmonics. A subsequent analysis by Cudahy and Ellison (2002) of the potential for resonance from SURTASS LFA signals to cause injury supports this conclusion that tissue damage will not occur at SPLs below 180 dB.

*Other Concerns (OC)*

*Comment OC1:* What is the impact on the whale watching industry?

*Response:* SURTASS LFA sonar operations are not expected to have any impacts on the whale watching industry. For further information, see the Final EIS Subchapters 3.3.2.3 and 4.3.2.1.

*Comment OC2:* In RTC 4–9.18 of the Final EIS concerning swimmers and snorkelers at or near the surface, were surface ducts taken into account?

*Response:* Yes.

*Comment OC3:* Divers, swimmers and children in the water are at risk from LFA sonar.

*Response:* Humans in the water are not at risk from SURTASS LFA sonar transmissions. The Navy sponsored research to study the potential effects of LF sound on humans in the water. Based on this research, in conjunction with guidelines developed from psychological aversion testing, the Navy concluded that LF sound levels at or below 145 dB would not have an adverse effect on recreational or commercial divers. See the Final EIS Subchapters 1.4.1 and 4.3.2.1 for additional details. As discussed in the Final EIS Subchapter 5.1.2, SURTASS LFA sonar operations would be constrained in the vicinity of known recreational and commercial dive sites to ensure that the sound field at such sites does not exceed 145 dB.

Normally, swimming and snorkeling occur in areas that extend from the surface to depths not greater than 2 m (6.5 ft). Applying acoustic theory and detailed measurements to these depths, there would be substantial sound transmission losses occurring in the top layer of water (about 1.8 m (6 ft)) where swimmers would most likely be found. Sound fields in this layer of water would be about 20 dB less than the sound fields in adjacent deeper water. This is discussed in the Final EIS Subchapter 4.3.2. It is unlikely that a swimmer or snorkeler will ever hear the LFA signal.

*Comment OC4:* What is the impact to coastal communities via coastal sound absorption? What is the impact to shore communities from invasion by animals (sea otters and pinnipeds), which are being driven out of the water to escape noise? Mitigation will not work—because LF waves penetrate into the shoreline.

*Response:* The SURTASS LFA sonar signal should not be confused with LF-radio waves used in communication or biologics (e.g., the Sausalito humm). They do not operate similarly. Because SURTASS LFA sonar transmissions will be restricted to SPLs below 180 dB at a distance of 12 nm (22.2 km) from shore and 145 dB within known dive sites, due to significant sound attenuation and absorption characteristics in shoaling and shallow water, there will be no impacts to onshore human coastal communities. Similarly, significant sound attenuation in shoaling waters would preclude the offshore sounds from SURTASS LFA sonar from affecting coastal marine mammals. This was illustrated during Phase II of the LFS–SRP when the SURTASS LFA sonar source was offshore California.

*Habitat Concerns*

*Comment HC1:* One organization believes that the Navy is unaware of the effect that the LFA sonar system will have on cetaceans' prey, as indicated in section 4.7.6 of the application. Such uncertainties of the effects the sonar system will have on cetaceans indicate the Navy does not know if the system will have no effect or fatal effects on cetaceans; therefore, it should not be permitted to conduct (operate) the LFA sonar system.

*Response:* Section 4.7.6 of the Navy application does not state that the Navy is unaware of the impacts of the system on prey species. It states that the potential for indirect effects (including prey availability) for marine mammals is very low. Information on the potential impacts to fish species can be found in the Navy Final EIS, Subchapter 4.1.1. Most benthic and pelagic invertebrate species that are marine mammal prey species are unlikely to be affected by LFA sonar since they do not have organs or tissues susceptible to acoustic sound.

*Mitigation Concerns (MIC)*

Geographic Restrictions

*Comment MIC1:* It is not clear that the 12-nm limit (180–dB restriction) would result in the least practicable adverse impact on marine mammals in these areas. If SURTASS LFA sonar is a long-range system, it is not clear why the Navy would need to operate at distances as close as 12 nm (22 km) from shore since presumably LFA sonar has ocean-basin detection capabilities. As a means to have the least practicable effect on marine mammals, it should be restricted to waters further offshore than 12 nm (22 km).

*Response:* The geographic restriction is for the SURTASS LFA sound field of 180 dB, not the location of the vessel. While the U.S. Navy plans to operate mainly in waters significantly greater than 12 nm (22 km) offshore, it should not be precluded from operating in waters near 12 nm (22 km) from shore, provided the SPL does not exceed 180–dB at a distance of 12 nm (22 km) from any coastline. For this reason, NMFS has not implemented the recommended restriction on SURTASS LFA sonar operations. However, because SURTASS LFA sonar transmissions will be restricted to SPLs below 145 dB within known dive sites, the LFA vessel will remain at distances greater than 12 nm (22 km) from shore in most situations.

*Comment MIC2:* Prior to each exercise, the marine mammal safety zone will be measured to determine the distance from the source to the 180–dB isopleth. Because oceanographic

conditions will change over the course of an exercise (up to 20 days), it is unlikely that these characteristics will remain constant. What specific model will the Navy use to determine SPLs for monitoring mitigation? Why does RTC 2–1.4 (in the Final EIS) state that the 180–dB mitigation zone was determined using standard spherical spreading formula?

*Response:* Please refer to RTC AC12 on distances to the 180–dB isopleth. It is understood that oceanographic conditions change over time and the Navy has provided provisions for this in the SPL monitoring protocols. Subchapters S.4.9, 2.3.2.1, and 5.1.3 of the Final EIS state that the SURTASS LFA sonar sound field will be estimated prior to and *during* operations using near-real-time environmental data and underwater acoustic prediction models. Subchapter 5.1.3 in both the Draft and Final EISs state that these sound fields will be updated every 12 hours, or more frequently, when meteorological or oceanographic conditions change.

These models are similar to the Parabolic Equation (PE) Model (Version 3.4), which was used in the Final EIS to predict transmission loss of the SURTASS LFA signal under various environmental conditions. For more information see the Final EIS Subchapter 4.2.2.1.

Within 1 km (0.54 nm) of the array, transmission loss is dominated by spherical spreading; therefore, the use of the standard spherical spreading formula is warranted. This is accounted for in the PE model used.

*Comment MIC3:* The Navy cannot predict the SPLs for the LFA mitigation zones and geographic restrictions at any depth and range in real time during operational deployment because of the complexity of oceanographic conditions and ''[s]ound transmission channeling is not predictable in the Navy's over-simplified theoretical models.''

*Response:* The Navy predicts SPLs for a complete range of underwater acoustic regimes (such as deep-water convergence zone, surface duct, and bottom interaction (see *Description of Acoustic Propagation* in this document)) in extremely complex oceanographic conditions, utilizing a number of very sophisticated models, with the most current environmental data available, as part of all ASW operations. This information is discussed in the Final EIS Subchapters 2.3.2.1, 4.2.2.1, and 5.1.3 and in TR 2 (Acoustic Modeling). Additionally, the acoustic modeling in the Final EIS used the PE Model (Version 3.4). This is only one of the acoustic models integrated into the SURTASS LFA sonar processing system that utilize the most up-to-date environmental data available. Oceanographic conditions (such as temperature and salinity verses depth, and sound speed) are updated with real-time data at least every 12 hours. According to the Navy, there were and will be no ''over-simplified theoretical models'' used either in the Final EIS analysis or during at sea operations.

*Comment MIC4:* The Navy should continuously monitor the 180–dB RL and the 1-km (0.54-nm) zone, recording and making available detailed findings of the difference between the two.

*Response:* As discussed in the Final EIS (RTC 5–1.3), SPLs will be calculated using onboard transmission loss models and near real-time environmental data before and during all SURTASS LFA active transmissions. Acoustic models will be updated at least every 12 hours. The range to the 180–dB RL will be mostly dependent upon the SURTASS LFA SL used, and the possibility of it exceeding 1 km (0.54 nm) is remote. However, any anomalous results will be recorded and reported as part of the LTM program in accordance with the LOA.

*Comment MIC5:* One organization is not convinced that research has shown that SURTASS LFA does not pose a threat to humpback whales at 180 dB. Therefore, it believes that the Navy should increase the safety zone to ensure that SURTASS LFA sound levels do not penetrate within 12 nm (22 km) of coastlines at any level.

*Response:* The SURTASS LFA sonar sounds will not exceed 180 dB at a distance of 12 nm (22 km) from any coastline. The selection of the 180–dB criterion is discussed in detail in the Final EIS Subchapter 1.4.2.1. A subsequent analysis by Cudahy and Ellison (2002) of the potential for resonance from SURTASS LFA signals to cause injury supports this conclusion. According to the Office of National Marine Sanctuaries (ONMS) consultation letter to the Navy dated May 15, 2001, ONMS requested that the SPLs generally not exceed 180 dB within the boundaries of National Marine Sanctuaries (NMS) and not exceed 145 dB seasonally for those NMS that are utilized by divers. Specific requirements for each NMS are provided in the referenced letter. To the extent that the recommendations by the ONMS were in regard to the conservation of marine mammals within Sanctuary boundaries, these recommendations have been adopted by NMFS and included as mitigation measures in this rule.

*Offshore Biologically Important Areas (OBIAs)*

*Comment MIC6:* Sound levels must be monitored from within OBIAs and other protected areas. The Navy should install hydrophones at the borders of the LFA mitigation zone to record all acoustic signals above 160 dB to verify the Navy's RL estimates.

*Response:* OBIAs and similar areas discussed under this rulemaking are established to restrict SURTASS LFA sonar SPLs to below 180 dB. As a result, the regulations require the Navy under its LTM program to determine the distance to the 180–dB isopleth during all LFA operations (see RTC MIC4). Since the Navy will not transmit SURTASS LFA sonar signals at an SPL greater than 180 dB inside OBIAs, additional SPL monitoring is not necessary.

*Comment MIC7:* The OBIAs are inadequate. The four OBIAs comprise only a portion of the offshore biological areas of particular importance to marine mammals. NMFS' system for identifying and designating additional OBIAs has ignored available information on marine mammal species collected by NMFS, Navy, and others. It is recommended that if such data were not examined in developing the proposed rule, then that should be carefully examined before proceeding with the final rule. Examples include: (1) NW Hawaiian Islands 50-nm (92.6-km) zone for monk seal foraging, (2) Pioneer Sea Mount, (3) Tanner Bank, (4) Santa Rosa-Cortez Ridge, (5) The (Sable) Gully off Nova Scotia, (6) feeding grounds of non-Bay of Fundy right whales, (7) 200-m (656.2-ft) isobath surrounding Silver and Navidad Banks, to Hispaniola, and enclosing the established migration corridor of the North Atlantic humpback whale population, (8) major upwelling sites, such as off Africa, India, Gulf of Oman, South America, and US and continental shelf and reef-estuary systems, (9) all IWC whale sanctuaries, (10) all U.S. NMS, (11) marine protected areas, (12) Natural World Heritage sites/UNESCO Biosphere Reserves, (13) known migration routes, and (14) Monterey Bay NMS (60-nm (111.1-km) limit for sound emissions). The proposed system for designating OBIAs inappropriately places the burden on the public to show that offshore areas are important for marine mammal breeding, feeding or other biologically important functions.

*Response:* NMFS does not consider it necessary to expand the list of OBIAs prior to its making the required determinations under section 101(a)(5)(A) of the MMPA. While some

of the areas mentioned in the comment would qualify for nomination as an OBIA, a delay in the rulemaking process to implement additional OBIAs is not warranted, especially considering the high level of effectiveness of the tripartite monitoring system. Second, the notice of proposed rulemaking made clear that NMFS could not accept petitions for new OBIAs during this rulemaking since any nominations at that stage would not be available for public review before inclusion or rejection in this final rule. NMFS considers a public review and comment period a necessary step in establishing new OBIAs. Once this final rule is implemented, NMFS will accept petitions for OBIAs in accordance with 50 CFR 216.191 promulgated in this final rule. However, as stated in the preamble to the proposed rule, petitions will not affect authorizations for taking marine mammals within those areas until an OBIA is final (if that is the determination). It should be recognized that NMFS may also nominate areas as OBIAs, but does not believe that it should be the sole proponent for nominating areas and that was the reason for allowing it to be a public process following standard rulemaking practice. Additional discussion on OBIAs can be found elsewhere in this document.

NMFS recommends however, that areas already subject to significant anthropogenic noise such as seismic and shipping, areas within 12 nm (22 km) of any coastline, or otherwise already excluded (Arctic, Antarctic oceans), areas that cannot be geographically described (e.g., ''the unknown numbers of northern right whales in unknown areas of concentration''), and areas designated for non-biological reasons (e.g., the IWC's Indian Ocean Sanctuary) not be nominated. Areas being nominated must include sufficient information to indicate why that area warrants more protection than would be provided through the Navy's visual, passive acoustic and HF/M3 monitoring program and 180–dB shut-down procedures. If petitions are received without sufficient information for NMFS to justify the petition, NMFS will determine whether the nominated area warrants further study. If it does, NMFS will begin a scientific review of the petition.

Depending upon the degree of scientific information provided by the nominator, the number of other petitions also under consideration, and the number of scientifically related issues on marine mammals also under review in NMFS, this process may add an additional year or more to the petition process. For this reason, NMFS recommends not nominating areas that are not known areas of high concentration for marine mammals, especially for breeding, feeding or migrating, that warrant more protection than will be provided under the tripartite monitoring and shut-down protocols.

*Comment MIC8:* The (Sable) Gully has recently been designated by the Department of Fisheries and Ocean, Canada, as a pilot marine protected area. This should be recognized.

*Response:* While the Sable Gully is significant for marine mammals (see Hooker *et al.*, 1999), and may be a good candidate for nomination as an OBIA, NMFS is concerned that continuing oil exploration, including intense seismic surveys, and shipping within the Sable Gully and in nearby waters would limit the Gully's effectiveness for marine mammal protection. It should be recognized that a significant portion of the Gully is already protected as it is within a straight-line projection of the 200-m (656.2-ft) isobath of OBIA1. An application for considering the waters outside the 200-m (656.2-ft) isobath as an OBIA should provide information on why marine mammals would benefit by exclusion of one short-term source of anthropogenic noise (SURTASS LFA sonar), when other sources of anthropogenic noise (commercial shipping, seismic) are more prevalent on a daily and yearly basis. Moreover, NMFS is unaware that any protective measures have been provided for the Gully through regulations under Canada's Oceans Act.

*Comment MIC9:* Special consideration should be given to minimize potential impacts in the areas that have been identified as critically important seasonal feeding areas for the northern right whale within the Gulf of Maine. OBIA1 may not afford adequate protection for the right whales known to frequent areas along the 200-m (656.2-ft) isobath in the Gulf of Maine at certain times of the year. The OBIA should be extended to include the complete range of northern right whale. It must include the unknown summering ranges of females and unknown migration routes. OBIA1 offers little protection for deep-water species, such as the northern bottlenose whale.

*Response:* The NMFS and Navy agree that special consideration should be given to minimizing potential adverse impacts from the operation of the Navy's SURTASS LFA sonar in those areas that have been identified as critically important seasonal feeding areas for the right whale within the Gulf of Maine and surrounding shallow water areas. As stated in the Navy's Final EIS (Subchapter 2.3.2 (Alternative 1; The Preferred Alternative)), OBIA1 encompasses the entire water area inside the 200-meter isobath of the North American east coast. In discussions with the Maine Federal Consistency Coordinator, the Navy confirmed that the seaward limit of OBIA1 connects directly across the narrow entrance to the Gulf of Maine between Browns Bank to the north and Georges Bank to the south. Therefore, the Navy will not operate in the Gulf of Maine. It should be noted that the Navy will observe the geographic restrictions of OBIA1 during all seasons of the year, not just during seasonal feeding. Also OBIA1 was designed to include within its boundaries all North Atlantic right whale critical habitats. Therefore, the Navy will not operate in that part of the range of the northern right whale where populations are concentrated. As previously stated, SURTASS LFA sonar will observe geographic restrictions on operations within the Gully, a known deepwater area for northern bottlenose whales.

Finally, any whales in other deep-water areas, such as offshore migration routes which are normally not areas of high concentration (see RTC MIC11), will be protected through the tripartite monitoring mitigation and the SURTASS LFA shutdown criteria.

*Comment MIC10:* In sensitive areas like humpback breeding areas, as much as 25 percent of the population could reasonably be affected in a critical manner (which is beyond simply harassment). The commenter does not believe that this represents a legitimate attempt to minimize harm due to testing LFA sonar. The distance from marine mammal breeding areas should be at least 200 km (108 nm)(i.e., 140 dB), during the breeding period. NMFS should also identify other biologically important areas and determine the distances that LFA should be allowed to operate in order to keep received levels below 130–140 dB.

*Response:* NMFS does not agree with the commenter that marine mammals will be injured or killed incidental to operating SURTASS LFA sonar with the implementation of the mitigation and monitoring measures that are required by these regulations. Equating receipt of a ping (or multiple pings) to a prediction in a reduction in the gene pool of 25 percent of the males (those that stopped singing), as the commenter has implied in his letter, is not justified. In addition, NMFS believes the commenter has overestimated harassment takings by use of 10 $\log_{10}$

(N), instead of 5 $\log_{10}$ (N), as noted in RTC SIC76. The AIM used in the Navy's Final EIS indicates that approximately 2.5 percent (geographic mitigation only) to 1.9 percent (with geographic mitigation plus monitoring mitigation) of humpback whales off Kauai, HI could be harassed during a mission, not 25 percent as noted by the commenter. This includes multiple pings as noted in detail in the Final EIS.

The commenter advocates that sound levels not exceed 130–140 dB in biologically sensitive areas. In Miller *et al.* (2000), the commenter states ''As the song of these (humpback) whales is associated with reproduction, widespread alterations of their singing behavior might affect demographic parameters, or it could represent a strategy to compensate for interference from the sonar.'' The article stated that the behavioral response must be widespread. However, the independent scientists conducting Phase III of the LFS SRP did not conclude that the alterations of behavior observed in the LFS SRP Phase III were widespread (see RTC SIC 23 and 24). Therefore, NMFS believes that a SURTASS LFA sonar vessel, operating in accordance with the regulations and applicable LOA is not likely to have a significant (or widespread) impact to biologically important behaviors. This would include biologically important behaviors for the Hawaiian humpback whales, which will be additionally protected by the Navy's implementation of the 145–dB diver mitigation measure for Hawaii waters.

Moreover, recognizing the propagation paths for SURTASS LFA sonar described in the preamble of this document and the operational characteristics of SURTASS LFA sonar requiring operation at close to full power in order to be effective, this recommendation fails the ''practicable'' test mandated by the MMPA when NMFS prescribes the means of effecting the least practicable impact on marine mammals.

Areas of critical importance to marine mammals, such as breeding areas, may be nominated as an OBIA under these regulations. Additional information on nominating areas can be found elsewhere in this document. By regulation, OBIAs are limited to SPLs below 180 dB.

The reference to ''testing'' as the proposed action is not totally accurate. As stated in the Final EIS (page 1–1), the Navy's proposed action is the employment of SURTASS LFA sonar with ''employment'' meaning the use of LFA sonar during routine training and testing as well as the use of the system during military operations. Since the Navy must train in the same way it expects to fight in order to be effective, and because the Navy should not be excluded from large portions of the ocean, a recommendation to restrict the LFA sonar to levels of 130–140 dB cannot be accepted.

*Comment MIC11:* One organization believes that impacts could be minimized by offering seasonal protection through known migration paths. Many of these species for which migratory paths are available are listed by the IUCN (International Union for the Conservation of Nature) as endangered or threatened species and should be considered.

*Response:* NMFS believes that known migration paths for marine mammals that have a marine mammal density significantly greater than surrounding waters during a discrete period of time may qualify as an OBIA. NMFS recommends that such areas be the subject of a petition to designate an OBIA. However, to NMFS' knowledge most non-coastal migratory paths for marine mammals extend over broad swaths of the ocean with marine mammal density not much greater than other areas. Since operational restrictions in these broad areas could seriously impact the Navy's ability to carry out its mission if these areas were established as OBIAs (since it would essentially prohibit LFA sonar from operating in extensive areas in the oceans), and since marine mammals (and sea turtles) would be similarly protected from receiving an SPL greater than 180 dB through utilization of the HF/M3 sonar in the vicinity of the SURTASS LFA vessel, based on practicality the establishment of these extensive areas as OBIAs would be unlikely.

*Comment MIC12:* One organization stated, ''the unknowns are so pervasive that * * * the Office of National Marine Sanctuaries has asked the Navy to avoid deploying the LFA within the Monterey Bay National Marine Sanctuary.''

*Response:* In its consultation letter to the Navy dated May 15, 2001, the ONMS requested that the received levels in Monterey Bay NMS not exceed 180 dB throughout the Sanctuary and 145 dB around active marine mammal research projects.

*Comment MIC13:* Provide a geographic presentation to illustrate the physical reach of anthropogenic sounds from the system to the OBIAs.

*Response:* The SPL will be restricted to below 180 dB within the OBIAs. The physical reach of anthropogenic sound from the array to the boundary of the OBIA is shown in the Final EIS Figure 2–4. However, the vast majority of the time the vessel will be at a much greater distance away from the OBIA boundaries and the SPL at the boundary will be correspondingly much less than 180 dB.

*General Mitigation Concerns*

*Comment M1C14:* The proposed mitigation is fundamentally flawed because it only applies to the 1-km (0.54 nm) radius (180-dB zone), which does not include non-auditory effects (below 180 dB) as evidenced by the Greek and Bahamas strandings. The LFA mitigation zone should not exceed 120 dB. Because sound levels greater than 140 dB can be received at ranges of 200 km (108 nm), the 12-nm (22-km) geographic mitigation is ineffective.

*Response:* The selection of the 180-dB criterion and the issue on strandings have been discussed in detail in previous RTCs in this document and in the Final EIS Subchapter 1.4.2.1. An analysis by Cudahy and Ellison (2002), subsequent to the release of the Final EIS, on the potential for resonance from SURTASS LFA signals to cause injury supports the conclusion that injury will not occur at distances greater than the 180-dB sound field. While the MMPA requires that take levels be reduced to the lowest level ''practicable,'' there is no scientific basis to require the Navy to mitigate to an SPL of 120 dB, and not practical to limit the source to such low levels that would prevent a marine mammal from receiving an SPL of 120 dB. Because the Navy's analysis indicated that marine mammals may be harassed incidental to SURTASS LFA sonar operations, and that this harassment could not be mitigated to a zero level, the Navy applied for an incidental take authorization.

*Comment MIC15:* Commenters provided NMFS with a list of suggested mitigation measures that they believed should be incorporated into the rulemaking. These recommendations are addressed here; however, suggested mitigation measures that are actually monitoring or reporting requirements will be addressed in the appropriate sections of this document.

*Comment MIC15a:* The Navy should reduce the maximum allowable RL below 180 dB.

*Response:* As indicated previously, limiting SURTASS LFA sonar to received SPLs below 180 dB is not practical considering the requirement of SURTASS LFA sonar operations to detect targets at significant distances in order to protect fleet assets and the crew members on those assets. Since (1) marine mammals will be protected from injury by the tripartite monitoring

system, (2) as indicated in this document, marine mammals will not be injured at levels below 180 dB, and (3) the Navy has applied for an authorization to harass marine mammals incidental to conducting SURTASS LFA sonar operations, this mitigation measure is not practical and, therefore, is not adopted.

*Comment MIC15b:* LFA sonar should operate only in marine ''desert'' areas.

*Response:* While adoption of this mitigation measure presumably would result in lower marine mammal incidental harassment takes than operating in more nutrient-rich waters, this mitigation measure is not practical since the Navy needs to operate in areas with different water characteristics, as stated in the Navy's NEPA documents. This would not be available to the Navy if it were limited to biologically unproductive areas.

*Comment MIC15c:* The Navy should reduce the source level, duty cycle, and annual transmission hours of LFA sonar.

*Response:* Source levels, duty cycles, and transmission hours are all based on the need to carry out the Navy's mission successfully. Therefore, imposing these suggested mitigation measures is not considered practical.

*Comment MIC15d:* NMFS should consider an extension of the safety zone and pre-operation surveys of the local area of operation.

*Response:* In order to ensure, to the greatest extent practicable, that marine mammals do not receive an SPL equal to, or greater than 180 dB, NMFS has amended the mitigation measures to incorporate an interim operational restriction to include a SURTASS LFA sonar system shutdown within a buffer zone that will extend 1 km (0.54 nm) from the outer limit of the 180-dB safety zone (SURTASS LFA mitigation zone). This may extend up to 2 km (1.1 nm) from the vessel, depending on oceanographic conditions. At this distance, SPLs will be significantly less intense than at 180 dB. Once a marine mammal is detected by the HF/M3 sonar, ramp-up of the HF/M3 sonar will cease or, if transmitting, the SURTASS LFA sonar system signal transmissions will be suspended.

Pre-operation surveys are not practical since the SURTASS LFA sonar vessel normally operates independent from the fleet and too distant from shore to make aerial surveys practical. Observations from the SURTASS LFA vessel prior to operation is a requirement of the monitoring program. If marine mammal abundance is high in the operation area, NMFS expects the Navy to not operate in the area to limit the number of transmission delays due to marine mammal incursions into the safety/buffer zones and will move to another area with lower mammal abundance.

*Comment MIC15e:* The funding of independent research on resonance effects and other impacts that the Navy and NMFS have not considered previously should be undertaken before operations begin.

*Response:* Resonance effects have been discussed in RTCs MMIC33 through MMIC38 and, as noted, do not appear to be a concern at SPLs below 180 dB (Cudahy and Ellison, 2002). NMFS has identified a need for the Navy to research the impacts of resonance on marine mammals. This research is already underway by ONR. However, until such research has been concluded, NMFS has implemented two interim operational restrictions to preclude the potential for injury to marine mammals by resonance effects; these include the previously mentioned establishment of the buffer zone shutdown requirement outside the safety zone and limiting the operating frequency of SURTASS LFA to 330 Hz and below, instead of 100 to 500 Hz as proposed. NMFS has determined that a frequency of 330 Hz, which is the upper-bound of the lowest practicable operating frequency for SURTASS LFA sonar, is the highest frequency that SURTASS LFA sonar will be authorized to operate to take marine mammals by harassment. This latter restriction is supported by the testimony of Dr. Darlene Ketten, an expert on the functional morphology of marine mammal hearing, before the Subcommittee on Fisheries Conservation, Wildlife and Oceans of the House Committee on Resources on October 11, 2001, that the consensus of data is that virtually all marine mammal species are potentially impacted by sound sources with a frequency of 300 Hz or higher. Both measures will ensure, to the greatest extent practicable, that marine mammals are not injured by the SURTASS LFA sonar signal. These protective measures will be retained until scientific documentation can be provided by the Navy which indicates they can be safely modified. This is explained elsewhere in this document.

*Comment MIC15f:* The Navy should replace LFA sonar in whole or in part to the extent practicable with new, advanced passive sonar technologies, which would reduce marine mammal takings incidental to deployment of LFA, or conduct a transparent and thorough alternatives analysis of such technologies before and each year the system is deployed.

*Response:* Please refer to RTC AC11. According to the Navy, research on improving passive sonar capabilities is intrinsic to the Navy since passive sonar would lower the detection ability by the enemy. Therefore, while the Navy would prefer alternative, passive technologies to be available for deployment, both because of the lower impact to marine mammals and its greater stealth ability to detect submarines, currently there are no feasible passive alternative systems available to accomplish the Navy's needs. This is explained in significant detail in Chapter 1 of the Navy's Final EIS. While the suggestion for an annual review of the availability of passive systems for submarine detection is a good one, NMFS doubts that technology would advance quickly enough that annual review would be required. However, NMFS has added a reporting requirement to the regulations requiring an unclassified review of passive technologies in the Navy's final comprehensive report.

*Comment MIC16:* NMFS should extend the geographic restrictions to completely cover the range of the endangered northern right whale.

*Response:* NMFS has established an OBIA for the entire known range for the East Coast population of the North Atlantic right whale. This includes areas in addition to those areas designated as critical habitat for this stock, such as the five areas of high use that were identified in the final recovery plan for right whales (NMFS, 1991; Perry *et al.,* 1999). Insufficient information currently exists on high use areas for the other stocks of North Atlantic right whales to designate these areas for additional mitigation. Once scientists have information on the location and distribution of North Atlantic right whales outside this area, NMFS would consider creating OBIAs to include any high use areas. However, OBIAs will not be based on speculation on the location of animals, as that would require extending OBIAs to vast portions of the North Atlantic and/or North Pacific oceans, which are likely to contain relatively few marine mammals.

*Comment MIC17:* In order to warn marine mammals of impending LFA sonar operations, the Navy should broadcast a distinctive, unnatural, relatively broadband, LF signal (e.g., a time-reversed Orca call) at levels loud enough to be received by whales at 5 to 10 km from the vessel.

*Response:* There is no scientific research available suggesting that time-reversed orca calls would be successful

in deterring marine mammals from the area of the SURTASS LFA sonar. Tests using standard orca signals have produced mixed results with calls being ignored at times and causing a flight reaction at other times. However, broadcasting a ''distinctive, unnatural, relatively broadband LF signal'' that would effectively deter marine mammals presumes that all marine mammal species can hear the LF signal and that there would be a cognitive recognition that the signal means that another loud, and possibly annoying, LF sound might be forthcoming. This is unlikely unless the marine mammal can associate a cause and effect between the two noise sources based on earlier experience. Therefore, until such time as research gives some indication that this mitigation measure would be effective, NMFS will not require the Navy to intentionally harass marine mammals by broadcasting loud LF signals in order to deter marine mammals from an area where they might be exposed to the distinctive, narrowband LF signal of SURTASS LFA sonar.

*Monitoring Concerns (MOC)*

*Comment MOC1:* Additional screening within the 1-km (0.54-nm) zone should be required to record cetacean sightings for a period of hours before and after operations to determine resident cetacean population levels.

*Response:* Requiring the tripartite monitoring system to start up several hours prior to, and continue for several hours after the conclusion of, LFA sonar transmissions is neither warranted nor practical. First, the Navy will be operating for the most part in waters that are not areas known for high concentrations of marine mammals; therefore, few, if any, marine mammals would be within the SURTASS LFA mitigation zone. In addition, increasing the time for transmission of the HF/M3 sonar would not be consistent with the goal of reducing noise in the ocean. NMFS believes that this additional noise is simply not warranted. Also, at this time, use of the SURTASS LFA sonar vessel as a full-time platform of opportunity to assess marine mammal populations is not practical since the marine mammal observers aboard the SURTASS LFA sonar vessels will not have the expertise needed for producing scientifically acceptable line transect population assessments and the SURTASS LFA vessel scheduling will preclude conducting the type of line transect surveys required for adequate population assessments. However, this remains an issue that NMFS would like to revisit in the future.

*Comment MOC2:* Monitoring will continue for a period of no less than 15 minutes after the last SURTASS LFA sonar transmission. Will NMFS make it a condition that if there is observable change in marine mammal behavior that monitoring will continue until such behavior returns to normal?

*Response:* The length of time that the visual observations will continue will be dependent upon visibility, and the speed and direction of both the whale(s) and the SURTASS LFA sonar vessel. Visual observations are required to be continued from a period 30 minutes prior to first transmission of the SURTASS LFA sonar, continue between transmission pings, and continue for at least 15 minutes after completion of the SURTASS LFA sonar transmission exercise. This is a condition contained in the final rule. However, provided conditions remain favorable, observations should continue as long as beneficial observations can be made. Therefore, a modification has been made to these regulations clarifying this point.

*Comment MOC3:* Thirty minutes is inadequate for pre-transmission observations because sperm whales dive for periods in excess of 45 minutes and northern bottlenose whales dive often for 35 to 40 minutes. Thus, it appears that the species at most risk are those likely to go undetected by the monitoring program.

*Response:* Visual observations are mainly intended to alert operators of the HF/M3 sonar that marine mammals are in the vicinity of the SURTASS LFA sonar vessel. However, if a marine mammal is sighted within the safety zone, the observer would immediately notify the appropriate person that the SURTASS LFA sonar should not be powered up or transmissions should be suspended immediately. This is practical because, in clear weather, skilled observers can see distances greater than the HF/M3 sonar is capable of reaching. Also, while whales may dive for up to 45 minutes, it is unlikely that the ship's bridge watch would miss a large whale surfacing from its previous dive if it is within a mile or two of the vessel. The monitoring mitigation does not rely solely on visual observations. The HF/M3 sonar was developed specifically to detect the presence of marine mammals underwater both day and night under all weather conditions. Since it is the HF/M3 sonar that is the principal means for detecting marine mammals within the safety and buffer zones of the SURTASS LFA sonar vessel, it is unnecessary to extend the observer period to 45 minutes.

*Comment MOC4:* Since 20–30 percent of the animals that may be in the safety zone prior to and/or during operations are apparently unlikely to be detected, prevention of serious injuries or mortalities may not be possible. The purported effectiveness of the tripartite approach assumed the HF/M3 sonar (70 percent effective), visual (5 percent effective), and passive acoustic (5 percent effective) monitoring would result in a combined mitigation effectiveness of 80 percent. This methodology is flawed because the detection efficiencies are only additive if they are completely non-redundant.

*Response:* This comment is based on the modeling of potential impacts in the Draft EIS, which utilized a conservative assumption of 70 percent for the effectiveness of the active acoustic monitoring. The Navy changed the methodology of calculating overall monitoring mitigation effectiveness for the Final EIS (see the Final EIS Subchapter 4.2.7.1 for the calculations) based on comments received on the Draft EIS. As this comment is based on reading the Draft EIS, not the Final EIS, it is no longer applicable. This was not an additive calculation.

NMFS believes that the 66-percent effectiveness of the tripartite monitoring system described in the Final EIS significantly underestimates the capability of the monitoring program. For the purposes of the Final EIS analysis, a percentage of 55 percent was utilized based on the probability of detection of a single, small dolphin with a single ping from the HF/M3 sonar. This was a very conservative assumption. Since an animal is likely to receive several pings between the limits of HF/M3 detection (2 km (1.1 nm)) and the 180–dB safety zone, detectability rises above 95 percent prior to an animal entering the 180–dB SURTASS LFA mitigation zone. (see Navy's Final EIS, 2.3.2.2 for details).

In conclusion, due to the high level of marine mammal detectability, the potential for marine mammals to be injured is considered negligible and, moreover, marine mammal mortality is neither expected nor authorized.

*Comment MOC5:* The methods that the Navy will use to monitor for marine mammals within 1 km (0.54 nm) distance are limited in their efficacy. Visual monitoring is limited to daylight and good weather. The proposed rule document and Draft EIS state that tripartite monitoring mitigation is only 80 percent effective. As stated in the Final EIS, during tests of the HF/M3 sonar only 11 of 20 small cetaceans traversing the sonar were detected.

Therefore, 45 percent of them may be exposed to injurious levels.

*Response:* For the purpose of estimating impacts on marine mammals for the Navy application and the NEPA documents, the modeling of potential impacts utilized a conservative assumption of 50 percent for the effectiveness of the active acoustic monitoring and an overall effectiveness of 66 percent with passive acoustic and visual monitoring included. However, recent testing of the HF/M3 sonar, as documented in the Final EIS Subchapter 2.3.2.2, has provided empirical support for the conservative assumption found in this document, demonstrating a probability of single-ping detection within the SURTASS LFA sonar mitigation zone for most marine mammals above 95 percent (See Final EIS Figure 2–5).

As part of the determination of the HF/M3 sonar's probability of detection, a dedicated experiment was conducted to verify the system's ability to detect bottlenose dolphins. The tests were conducted in shallow (300 m (984 ft)), acoustically downward-refracting waters that produced a high-clutter environment significantly higher than expected under more normal conditions (*i.e.,* deeper water, predominantly CZ propagation, lower clutter). Trained dolphins were commanded to dive to moored objects 130 m (426.5 ft) below the surface with the HF/M3 system positioned 400 to 1000 m (1312 to 3281 ft) away. The predicted detection rate for these exercises was estimated at approximately 80 percent (per dolphin dive cycle). Detailed analysis of 20 dolphin dives resulted in 11 dolphin detections. The small experimental sample size used here suggests that the differences in predicted and measured performance are reasonable. It should be emphasized that these tests were conducted under environmental conditions that reduce probabilities of detection significantly in comparison to deep-water scenarios. In addition, search zones will typically be at larger depths than those focused on during these tests, also serving to increase probabilities of detection via advantageous thresholding adjustments to lower clutter fields. It should also be noted that these tests were conducted on single dolphins. In the wild, small pelagic odontocetes are normally found in pods ranging upward in size from 7 to 1,000 individuals. Therefore, the probability of at least one of the animals in the pod being detected in at least one ''ping'' is very high. Once a marine mammal is detected by the HF/M3, the SURTASS LFA sonar shutdown protocols will be implemented. Therefore, it is unlikely that any marine mammals will be injured by SURTASS LFA sonar operations.

*Visual Monitoring*

*Comment MOC6:* The Navy relies heavily on visual monitoring which is inadequate.

*Response:* Subchapter 4.2.7.1 of the Final EIS states that visual monitoring is limited to daylight hours and its effectiveness declines during high sea states. Because of the limitations of both passive acoustic and visual monitoring, the Navy developed the HF/M3 sonar to provide 24-hour, all-weather active acoustic monitoring of an area of approximately 2-km (1.1 nm) radius from the array. In calculating the effectiveness for the various monitoring systems for purposes of the Final EIS, the visual monitoring component of the three-part monitoring system was estimated at 0.09, or 9 percent. At an effectiveness of this level, the Navy cannot be considered to be relying heavily on visual monitoring.

*Comment MOC7:* When visibility is poor (night/bad weather), how will monitoring 30 minutes prior to LFA transmissions be accomplished? What will happen when visibility doesn't allow visual monitoring to start 30 minutes prior to LFA sonar transmissions?

*Response:* The 24-hour, all-weather HF/M3 sonar was developed and will be used specifically to address the low effectiveness of visual monitoring. The HF/M3 monitoring program will be above 95 percent effective in detecting most marine mammals prior to entering the 180–dB mitigation zone.

*Comment MOC8:* Provide details of visual monitoring, such as, qualifications of observer, training, testing/evaluation by NMFS, and effectiveness.

*Response:* Personnel trained in detecting and identifying marine animals will make observations from the SURTASS LFA sonar vessel. At least one observer, qualified by NMFS, will train, test and evaluate other visual observers. Visual observation effectiveness estimates will be provided to NMFS in accordance with LOA reporting requirements.

*Passive Acoustic Monitoring*

*Comment MOC9:* No validation is provided for passive acoustic monitoring in determination of beaked whales in the mitigation zone.

*Response:* The rationale for determining the effectiveness of passive sonar for detecting beaked whales was addressed in the Final EIS Subchapter 4.2.7.1 and in RTC SIC70 in this document.

*Active Acoustic Monitoring*

*Comment MOC10:* Will the report on the testing of the effectiveness of the HF/M3 sonar be made public through the **Federal Register**?

*Response:* The subject report (Ellison and Stein, 2001) is available to the public (*http://www.surtass-lfa-eis.com/Download/ index.htm*). In addition, a paper on this subject was presented at the 2001 Acoustical Society of America meeting (Stein *et al.,* 2001).

*Comment MOC11:* How can the monitoring system detect deep-diving whales (such as sperm and beaked whales) that approach from below the vessel? One organization also stated, ''We also believe that it is a weak argument to state that the closer an animal is to the vessel, the more likely they will be detected. Cetaceans spend the majority of their lives under the water's surface.''

*Response:* Because cetaceans spend much of their time underwater, the HF/M3 sonar was developed, and will be used, to provide continuous, underwater monitoring of the SURTASS LFA mitigation zone. The scenario for a deep-diving whale to go undetected as it approached the vessel from below was taken into consideration in the analysis of the HF/M3 sonar performance (Ellison and Stein, 2001). The probability of detection of a large baleen whale with a single ping within the SURTASS LFA mitigation zone is above 95 percent, except for a small volume directly under the array. This is defined as a down-ward looking conical volume starting at the array to a depth of 140 m (459 ft) with a radius of 300 m (984 ft). Animals, even those diving, will approach the SURTASS LFA sonar vessel laterally because of their movement and the movement of the SURTASS LFA vessel. The HF/M3 sonar scan rate is every 45 to 60 seconds. Animals closing on the SURTASS LFA vessel at 2.5 m/s (5 knots) will remain in the 1-km to 2-km (0.54- to 1.1-nm) annulus surrounding the HF/M3 sonar for approximately 400 seconds, and will, therefore, theoretically be detectable to the sonar no less than 8 times. For an animal to go undetected, it would have to remain in the small volume below the array (defined above) matching course and speed with the vessel. Even though marine mammals can stay submerged for long periods, it is highly unlikely that they would remain in the small volume beneath the SURTASS LFA array for the 400-second (over 6 minutes) period necessary to avoid

being detected. Therefore, animals approaching the mitigation zone from below have an extremely high likelihood of being detected before entering the SURTASS LFA mitigation zone.

*Comment MOC12:* NMFS should develop performance standards for the detection of marine mammals within the 180–dB safety zone and require the Navy to test and demonstrate the capability of the HF/M3 sonar or some other suitable detection system before finalization of the rule making process. Have any relevant studies of the effects of fish-finder type sonar on marine mammals been conducted?

*Response:* The Navy has demonstrated the capability of the HF/M3 sonar (Ellison and Stein, 2001; Stein *et al.,* 2001). These documents are available upon request. Recent testing of the HF/M3 sonar, as documented in the Final EIS Subchapter 2.3.2.2 pages 2–17 to 2–22, has validated the Navy's overly conservative assumption, demonstrating a probability of detection within the SURTASS LFA sonar mitigation zone for most marine mammals above 95 percent (See Final EIS Figure 2–5). This is significantly higher than the 55 percent used in the Final EIS.

Testing on marine mammals has been conducted. Schlundt *et al.* (2000) tested two species of marine mammals for TTS from exposure to 1-second pure tones for 0.4, 3, 10, 20, and 75 kHz. The HF/M3 sonar frequency range is 30 to 40 kHz. In the 20 to 75 kHz band, that study and follow-up testing showed no masked TTS at levels of 193 dB at 75 kHz.

*Comment MOC13:* The Navy provides no estimate of the detectability of sea turtles and, therefore, LFA operations could encounter a significant portion of the population.

*Response:* The Final EIS (RTC 4–2.4) provides a discussion on why SURTASS LFA sonar operations would not encounter a significant portion of any sea turtle population and the Final EIS (Subchapter 4.1.2) indicates, for example, that less than 3 leatherback sea turtles per year per ocean would be affected by SURTASS LFA sonar. However, the calculations in the Final EIS did not consider the diving depth of the leatherback (an average diving depth of 50 to 84 m (164 to 275.6 ft) and a duration of 9 to 15 minutes), nor the water depth of the 180–dB zone (87 to 157 m (285 to 515 ft)). This means that even though they are considered to be continuous divers and can dive to over 200 m (656 ft), their normal dive patterns would only put them in the 180–dB SURTASS LFA mitigation zone for a fraction of the time that was used in the Final EIS calculations. Also it is unlikely that hatchlings would dive to a depth of over 80 m (262 ft) (i.e., the normal depth to the top of the 180–dB sound field), so they are unlikely to get into the 180–dB SURTASS LFA sonar mitigation zone and thereby be harmed.

While no mitigation effort can totally eliminate the possibility of impact on an individual sea turtle, the mitigation procedures, including the new HF/M3 sonar, would be capable of detecting sea turtles before animals were subject to loud LF sounds, thereby reducing the potential impact of SURTASS LFA sonar operations on even these small numbers of sea turtles. Finally, although HF/M3 testing has not been conducted on sea turtles, and an effectiveness percentage has not been provided in the Final EIS, leatherback sea turtles (*i.e.,* the most probable turtle species to be encountered by SURTASS LFA sonar) are about the size of a dolphin (1–2 m in length). Therefore, based on multiple sweeps, the HF/M3 sonar should have a detection effectiveness for leatherback sea turtles similar to that for a small cetacean.

*Comment MOC14:* NMFS states efficiency of the HF/M3 sonar is not certain. The HF/M3 sonar is untested. Therefore, it plans to calculate take based only on geographic restrictions. How can NMFS be certain that negligible impacts on marine mammals are at the lowest practicable levels?

*Response:* The Navy has demonstrated the capability of the HF/M3 sonar (Ellison and Stein, 2001; Stein *et al.,* 2001). These reports are available upon request from NMFS. Recent testing of the HF/M3 sonar, as documented in the Final EIS Subchapter 2.3.2.2, and these reports, has validated the effectiveness of the HF/M3 sonar, demonstrating a single-ping probability of detection within the 180–dB SURTASS LFA mitigation zone for most marine mammals above 95 percent (See Final EIS Figure 2–5). This is substantially greater than the pre-test assumption that the HF/M3 sonar would be 50 percent effective (tripartite monitoring was believed to be 66 percent effective). Since the research on the HF/M3 has been conducted, as suggested in the proposed rule, and as this research has documented the HF/M3 effectiveness at over 95 percent, NMFS has determined that harassment take levels can be assessed taking into account both the geographic mitigation and the monitoring mitigation measures. These take levels can be found in Table 4–10 of the Navy application and Table 4.2–10 of the Final EIS (final column in both tables), but may overestimate the level of impacts since the HF/M3 has been empirically tested and shown to be up to 50 percent more effective than previously estimated. As noted elsewhere in this document, implementation of these mitigation measures, in addition to other mitigation, ensures that the takings by SURTASS LFA sonar will be at the lowest level practicable, without imposing additional measures that might compromise the effectiveness of the Navy's ability to use SURTASS LFA sonar to carry out its mission.

*Comment MOC15:* The commenter states that ''the HF/M3 sonar could use frequencies above 200 kHz to impact odontocetes less.''

*Response:* Because absorption losses are much higher for 200 kHz than at 30 kHz (about 10 times greater), 200-kHz sonar cannot effectively provide the required range of at least 1 km (0.54 nm). Also, except for auditory impacts, there is no evidence to support 200 kHz as causing less impact to odontocetes than 30–40 kHz.

*Comment MOC16:* Did the Navy have a take authorization for the testing of the HF/M3 sonar on dolphins?

*Response:* Testing with artificial targets from October 1998 through May 2000 does not require a permit under the MMPA. The August 2000 tests were conducted with bottlenose dolphins under the Navy's authorized Marine Mammal Program (San Diego, CA), and, therefore, did not require any permits.

*Comment MOC17:* One commenter states that the HF/M3 sonar cannot be compared to a fish-finder because fish-finder sonar is typically focused in a narrow beam below the vessel where it is less likely to disturb marine mammals. One organization believes that it is nonsensical to rely on a monitoring system that is itself harmful to marine mammals as well as unproven in its effectiveness.

*Response:* Fish-finder sonars are generally forward-looking active sonars for spotting fish schools. Fish-finder transducers have horizontal beamwidths from 10 to 46 degrees at ranges on the order of 1 km (0.54 nm). The HF/M3 sonar utilizes four ITC 1032 transducers with 8-degree horizontal and 10-degree vertical beamwidths, which sweep a full 360 degrees in the horizontal every 45 to 60 seconds with a maximum range of approximately 2 km (1.1 nm). The beamwidth for the HF/M3 sonar is comparable to commercial fish finders.

The HF/M3 sonar effectiveness has been discussed previously in this document. There is no scientific evidence that sonars, similar to the HF/M3, which are in common use in the fishing and maritime industries, harm marine life. In addition, a requirement

to ramp-up the HF/M3 ensures that marine mammals and sea turtles are detected by the HF/M3 sonar at the lowest sound level possible. Once a marine mammal or sea turtle is detected, further increases in power are not initiated until the animal is no longer detected. At that time, ramp-up would continue unless that animal, or another, was detected.

*Comment MOC18:* The Navy did not employ the best available mitigation (monitoring) technology because it did not consider the use of Synthetic Aperture/Side Scan Sonar and Range Gated Viewers (laser camera) in lieu of the HF/M3 sonar.

*Response:* According to the Navy, the two technologies listed are not the best available technology for active acoustic monitoring. Synthetic aperture arrays/side scan sonar does not meet the omni-directional requirement for detection of marine animals. As discussed in Table 1–1 of the Final EIS, the use of laser technology in underwater applications is severely limited in range. For example, the AquaLynx underwater-gated viewing laser-camera system has a range measured in tens of meters, not the 2 km (1.1 nm) range of the HF/M3 sonar.

*Ramp-up*

*Comment MOC19:* In response to Comment 30 in the proposed rule regarding ramp-up of the SURTASS LFA sonar, NMFS stated, ''Since the HFM3 sonar will be operating for a minimum of 30 minutes prior to initiation of SURTASS LFA sonar, ramp-up of the SURTASS LFA sonar is not necessary.'' The commenter fails to see how ramp-up of the HF/M3 sonar, which differs in virtually all its characteristics from SURTASS LFA sonar, can serve as a substitute for ramp up of the SURTASS LFA sonar. This commenter is concerned that if NMFS considers that the differing characteristics of the mid-frequency sonars used in the Bahamas make their impact irrelevant to an analysis of the potential impacts of SURTASS LFA sonar, then it is inconsistent to consider the sound characteristics of the HF/M3 sonar to be effective as mitigation for SURTASS LFA sonar. Ramp-up of the HF/M3 sonar might warn away (or attract) HF specialists, but it might have no effect on LF specialists, either to warn or to attract. Another commenter, expressing similar concerns, also believes that the Navy will use the HF/M3 to detect marine mammals and also to repel them with it.

*Response:* For this action, ramp-up of the HF/M3 is designed to protect marine mammals from the potential to incur an injury, not from the potential to incur non-injurious harassment. The concept behind ramp-up of the HF/M3 is to ensure (presuming ramp-up is actually effective), that marine mammals can move out of the HF/M3's 180–dB safety zone (considerably smaller than the SURTASS LFA sonar's 180–dB zone), if it finds the noise annoying, but before it becomes harmful. However, more importantly, ramp-up allows acousticians monitoring the HF/M3 to locate marine mammals first within the HF/M3's 180–dB zone at the lowest SPLs possible and certainly before high SPLs from the HF/M3 sonar are achieved and secondly, once its own safety zone is secured, to ensure that the SURTASS LFA sonar's 180–dB safety zone is free of marine mammals and sea turtles. This use of ramp-up differs from most uses of ramp-up, which rely solely on visual observations and shut-down only if surface observations detect marine mammal presence. The HF/M3 will not be used to repel marine mammals, since once a marine mammal is detected, ramp-up may not proceed until, under minimal SPLs, marine mammals are no longer detected within the 180–dB safety zone. Once the SURTASS LFA sonar's 180–dB zone is determined to be clear of marine mammals, the SURTASS LFA sonar can be turned on without the need for ramp-up. In this case, once the SURTASS LFA sonar's 180–dB zone has been determined to be free of marine mammals, the frequency of the hearing of the marine mammal is not relevant.

In addition to the reason mentioned in this response (marine mammals would receive no greater protection from injury from ramping up than will be provided under the HF/M3 ramp-up), a requirement for ramping-up of the SURTASS LFA sonar is not practical for several reasons. Of importance to NMFS is that ramping up, at a rate similar to that which is used in seismic (about 6 dB/minute), would likely result in several additional minutes of unnecessary LF sounds in the marine environment, creating more noise to ensure, theoretically at least, that marine mammals have more time to leave an area where they might be annoyed by the sounds. This is simply not warranted. Second, operational times in an area would probably increase to account for ramp-up times between ''pings'' (6 to 15 minutes).

*Comment MOC20:* One commenter believes that the difference in power output of the HF/M3 sonar and the LFA sonar means that it is not sufficient to use the HF/M3 device as a ''ramp-up'' in order to warn cetaceans of the impending loud noise. LFA produces such a powerful output that it should be ramped up.

*Response:* As stated in the Final EIS Subchapters 2.1.1 and 2.3.2.2, the source level of a SURTASS LFA projector is 215 dB while the source level for the HF/M3 sonar is 220 dB. The rationale for the ramp-up of the HF/M3 sonar is discussed in the previous RTCs.

*Comment MOC21:* Research is needed on the ramp-up theory to determine if it is useful or harmful to the health of marine mammals. One organization suggests that the Navy conduct research on the ''ramp-up'' theory, in order that it can be better understood whether or not such an activity is useful or harmful to the health of marine mammals. There is no evidence that ramp-up will allow fish and whales to escape.

*Response:* NMFS understands that scientific research on ramp-up effectiveness is planned or actually underway, supported through funding by the Minerals Management Service (MMS).

*Long-Term Monitoring (LTM)*

*Comment MOC22:* Visual and acoustic monitoring is neither designed to, nor will it, mitigate the effects of any taking of marine mammals that occurs. The purpose of monitoring should be to confirm that animals are taken only in the ways and numbers authorized and that there are no non-negligible population level effects.

*Response:* The purpose of the visual and acoustic monitoring is to monitor the location of marine mammals with respect to the SURTASS LFA mitigation and buffer zones to ensure appropriate shutdown to avoid injury to marine mammals by the SURTASS LFA transmissions. While visual and passive acoustics are unlikely to significantly mitigate injurious takings by themselves, based on their ability to cue the operator of the HF/M3 sonar to the presence of marine mammals, the tripartite monitoring program and shutdown protocols are expected to be close to 100 percent effective in avoiding injurious takes. This has been explained previously in this document. However, NMFS concurs that monitoring should be used to collect the necessary data to determine incidental takes. Swartz and Hofman (1991), for example, recognized that some forms of take may occur beyond the field of view of an observer at a particular site and that the monitoring program must be designed accordingly. This monitoring will be conducted by the Navy through long-term research. Moreover, the visual, passive and acoustic monitoring will extend beyond the 180–dB safety

zone, and observers will record interactions and behavioral reactions by marine mammals within the maximum distance possible. For more information see Final EIS Subchapter 5.2.

The assessment of whether any taking of marine mammals occurred within the SURTASS LFA mitigation zone during SURTASS LFA sonar operations will be based upon data from the monitoring mitigation (visual, passive acoustic, active acoustic). Post-operation acoustic modeling will provide estimates of any taking beyond the SURTASS LFA mitigation zone.

*Comment MOC23:* The LTM Program must have a secure budget and a detailed plan for research submitted to NMFS and made available to the public. $1.2M is not enough funding for the LTM Program.

*Response:* The LTM program had been budgeted by the Navy at a level of $1M per year for 5 years, starting with the issuance of the first LOA. For additional information see the Final EIS (RTC 2–4.12).

Vice Admiral Dennis McGinn, Deputy Chief of Naval Operations for Warfare Requirements and Programs testified before the Subcommittee on Fisheries Conservation, Wildlife and Oceans of the House Committee on Resources on 11 October 2001,

> The Navy funds the majority of all marine mammal research in the world. The Navy provided approximately $7M in FY01 for research directly related to assessing and mitigating the effects of noise from Navy activities on the marine environment. The funding plan for FY02 calls for an increase of approximately $2M to $7M, contingent on final budget approval and recent events.

*Comment MOC24:* The LOA should contain a condition that the ONR continue at current levels its research activities into the effects of noise on marine mammals. The LTM Program cannot be accepted as a substitute for performing the research to fill data gaps.

*Response:* The Holder of the LOA for the SURTASS LFA sonar systems will be the CNO, or his duly appointed representative, not ONR. Under the MMPA, NMFS does not have jurisdiction to require a Federal component to commit to certain funding levels, especially one that is determined through the Congressional budget process. Applicants for a small take authorization are required through statements made by Congress when it implemented the small take program under the MMPA to conduct the appropriate research to address impacts and ways to mitigate those impacts. Provided the applicants undertake that research, they are considered to be in compliance with the MMPA. However, as noted previously, Navy funding for marine mammal research is expected to increase, not decrease, in the future. NMFS recommends those interested in marine mammal research being funded by ONR view its web site: *http://www.onr.navy.mil/sci_tech/personnel/cnb_sci/ mammal_bio.htm*

*Comment MOC25:* The LTM Program is inadequate to fill data gaps.

*Response:* It is not the purpose of the LTM Program to fill all of the data gaps, but to address those of the most immediate concern. NMFS is recommending that the Navy conduct the following research relative to LFA sonar over the first 5-year authorization period:

1. Systematically observe SURTASS LFA sonar exercises for injured or disabled marine animals. Past correlations between military operations and the stranding of beaked whale, including the Bahamas event, call for closer observation of all sonar operations.
2. Compare the effectiveness of the three forms of mitigation (visual, passive acoustic, HF/M3 sonar).
3. Conduct research on the behavioral reactions of whales to sound levels that were not tested during the research phase, specifically between 155 dB and 180 dB. This should be done in a research format rather than in actual training operations.
4. Conduct research on the responses of sperm and beaked whales to LF-sonar signals. These species are believed to be less sensitive to LF-sonar sounds than the species studied during the LFS–SRP. However, enough questions exist that these species should be studied during the five-year permit period.
5. Conduct research on the habitat preferences of beaked whales, and plan future SURTASS LFA sonar exercises to avoid such areas. Avoidance is the most effective mitigation measure.
6. Conduct passive acoustic monitoring using bottom mounted hydrophones before, during, and after SURTASS LFA sonar operations for the possible silencing of calls of large whales.
7. Continue research with the HF/M3 mitigation sonar. This is the primary means of mitigation, and its efficacy under a range of conditions must continue to be demonstrated. Receiver-Operator-Characteristic curves should be constructed if possible.
8. To determine potential long term, cumulative effects from SURTASS LFA sonar, select a stock of marine mammals that is expected to be regularly exposed to SURTASS LFA sonar and monitor it for population changes throughout the 5-year period. Alternatively, look for long-term trends in the vocalizations of marine mammals that are exposed to SURTASS LFA signals (see number 6).

*Comment MOC26:* A suitable monitoring and research plan/program should be required (provided, made public, and considered in rulemaking) before initial authorization is issued, and reauthorization should be based on a demonstration of suitable progress under the plan. NMFS should determine, and specify in the final regulation, the operational and other information that will be required to enable the best possible retrospective analyses if changes in demography of any potentially affected marine mammal populations are detected. Minimally, the Navy should maintain records and report dates, times, and locations of each exercise, including the number, duration of and times between transmissions, and all observations of marine mammals made incidentally as well as the product of the required monitoring.

*Response:* The Navy provided its monitoring plan in its application under section 101(a)(5)(A) of the MMPA and in the Final EIS (Subchapter 2.4). That plan was subject to public review and comment during the ANPR (64 FR 57026, October 22, 1999), and proposed rulemaking (66 FR 15375, March 19, 2001) stages. Public comments on monitoring and research plans were addressed in the proposed rule and in this document.

As noted in §§ 216.189(a)(3) and (a)(4) of this document, NMFS will continue to make determinations on the adequacy of the mitigation, monitoring, and reporting prior to each annual renewal of an LOA. NMFS normally maintains the monitoring and reporting requirements in the LOA, not in the regulations, in order to allow flexibility in responding to monitoring and reporting concerns and/or opportunities. This flexibility would not be available under comment-and-response rulemaking because it could take up to a year to implement any modifications to the monitoring plan. NMFS notes however, that an LOA is as legally binding on a holder as the regulations. It should be noted also that this policy is not unique to the SURTASS LFA sonar, but is followed wherever NMFS believes it needs this flexibility. Elsewhere in this document, NMFS provides a detailed description of the required reporting under this authorization request.

*Comment MOC27:* Because impacts between approximately 150 and 180 dB are arguably uncertain, monitoring marine mammal exposure to SPLs between 150 and 180 dB is not only

legally required but scientifically imperative. There is no requirement for this monitoring in the proposed rule.

*Response:* Because it is not feasible to monitor marine mammal behavioral reactions to SURTASS LFA sonar signals from the LFA sonar vessel at the distances that would be expected for SPLs of 150–180 dB, NMFS did not consider this a practical requirement for monitoring under the proposed rule. However, in accordance with the findings of Swartz and Hofman (1991), the scientific value of obtaining this information is important for NMFS to ensure that its determination that the takings would have no more than a negligible impact on affected marine mammal stocks was correct. Therefore, NMFS has made this a key component of the recommended research under the LTM program (see number 3 in RTC MOC25) for the Navy to undertake over the next 5 years. NMFS encourages the Navy to conduct this research at its earliest opportunity.

*Comment MOC28:* How will the Navy provide actual harassment and non-serious injury estimates, verify estimates predicted from modeling, and verify its assumptions that no serious injury or deaths will occur between 120 and 180 dB? Because there is no pre-, during, or post-transmission monitoring on marine mammals experiencing RLs less than 180 dB, the Navy cannot assume that there will be no serious injury or deaths below 180 dB.

*Response:* Please see RTC MOC22 regarding the possibility of injury below 180 dB. Visual, passive and active acoustic monitoring will provide information on take levels to a range of up to 3 nm (5.6 km) depending upon conditions. This will provide NMFS and the Navy with information on take levels to SPLs as low as approximately 173 dB. Information on takes by harassment at distances greater than 3 nm (5.6 km) are not practical and, therefore, the Navy will conduct research to assess impacts, including injury. For example, in order to verify the Final EIS assumptions concerning potential impacts below 180 dB SPL, NMFS recommends that the Navy conduct research on the reactions of whales to sound levels that were not tested during the LFS SRP, specifically between 155 and 180 dB as part of its research under the LTM program. This follows the findings of Swartz and Hofman (1991) that determined that it is acceptable to substitute research on impacts to marine mammals in lieu of site-specific monitoring when site-specific monitoring is not feasible or practicable. However, until the results from this research are available, information discussed in detail in this document provides NMFS with sufficient information to determine that no injury to marine mammals is likely to occur at distances beyond the range of the tripartite monitoring.

Cudahy and Ellison (2001) stated that the expected threshold for *in vivo* tissue damage for low frequency sound is on the order of 180 to 190 dB and Richardson *et al.* (1995) speculated that for 10 elongated sonar pulses, the auditory damage risk criteria for marine mammals (based on human studies) might be 183 to 213 dB.

Second, in order to avoid tissue damage at 180 dB, NMFS has incorporated a marine mammal buffer zone 1 km (0.54 nm) beyond the SURTASS LFA mitigation zone (180-dB sound field). This interim operational restriction requires the SURTASS LFA sonar to suspend transmissions immediately whenever a marine mammal is detected by the HF/M3 sonar. Depending upon the size of the animal, this may be as far as 2 km (1.1 nm) from the SURTASS LFA source. This should not be interpreted to mean that marine mammals are considered to be injured at that distance, only that this measure became practical for reducing potential impacts on marine mammals once the HF/M3 tests were conducted indicating its operational efficacy at these greater distances. In addition, NMFS is imposing an interim operational restriction on the frequency of the SURTASS LFA sonar sound to 330 Hz and below. This is based on statements made by Ketten (2001) before Congress on October 11, 2001 (see RTC MIC15e). Both measures will ensure, to the greatest extent practicable, that marine mammals are not injured by the SURTASS LFA sonar signal. These protective measures will be retained until scientific documentation can be provided which indicates they can be modified while still providing sufficient protection for marine mammals.

*Comment MOC29:* Is the LTM Program only to assess what occurs within the 180-dB zone, noting when an animal enters and the system is shut down? How will behavioral effects be monitored?

*Response:* The LTM Program is made up of two parts. First is the necessary input data for NMFS-directed reports under the LOA, which has been elaborated upon in the Final EIS (Subchapter 2.4) and elsewhere in these RTCs. The second part involves long-term independent scientific research efforts on topics recommended by NMFS. The assessment of whether any taking of marine mammals occurred within the SURTASS LFA mitigation zone during SURTASS LFA operations will be based upon data from the monitoring mitigation (visual, passive acoustic, active acoustic). Data analysis from the LTM and post-operation acoustic modeling will provide estimates of any taking beyond the SURTASS LFA mitigation zone.

*Comment MOC30:* Commenters suggested that the following elements should be included in the monitoring and reporting program:

*Comment MOC30a:* Augment the proposed passive acoustic monitoring program to determine whether there are differences in the nature or frequency of marine mammal vocalizations following SURTASS LFS sonar transmissions that may be indicative of behavioral disruptions beyond the proposed 180-dB safety zone.

*Response:* It is not practical from a technical (SURTASS is tuned to detect the signal characteristics of submarines, not marine mammals), logistical, or financial standpoint to conduct this work from the SURTASS LFA sonar vessel. However, it has been shown that this can be accomplished using the Navy's SOSUS seafloor hydrophone arrays. Thus, the Navy will consider this recommendation as part of their research program. There is good potential for partnering with NOAA's Pacific Marine Environmental Laboratory to address the basis of this comment in the northeastern Pacific during future SURTASS LFA operations.

*Comment MOC30b:* Routinely examine observational data collected during SURTASS LFA sonar exercises to help identify additional marine mammal concentration areas that should be designated as OBIAs.

*Response:* NMFS will review the reports to determine whether areas in which SURTASS LFA sonar exercises have numerous shutdowns due to marine mammal incursions into the monitoring zone would qualify as a future OBIA candidate. The public will be able to review the annual report for the same reason.

*Comment MOC30c:* Design and conduct a series of direct experiments to document how representative species and age-sex classes of marine mammals respond to different types and levels of LF sounds.

*Response:* While this recommendation is beyond the scope for required ship-board monitoring of the SURTASS LFA sonar because it must be conducted independently by scientists operating under a scientific research permit issued under section 104 of the MMPA, NMFS is recommending the Navy conduct research during this

authorization period on those species most likely to be impacted from SURTASS LFA sonar, such as sperm and beaked whales.

*Comment MOC30d:* Undertake an analysis to determine the changes in the size, range, and productivity of potentially affected species and stocks that could be detected by the survey programs currently being conducted by NMFS, the Navy, MMS and others, and then take such steps as necessary to coordinate and augment the programs to provide the capability for detecting biologically significant changes in representative species and stocks.

*Response:* At this time, this analysis cannot be conducted because NMFS is not aware of how to assess a cause-and-effect relationship for a short-term noise effect when population level effects to marine mammals from ship noise and collisions, fishery takes and increasing contaminant levels cannot be accurately determined. NMFS believes that as we gain new information from appropriate research we can determine cumulative impacts from all anthropogenic causes, not just one type of sound that is unlikely to be repeated again in the near term. For example, the impacts from anthropogenic noise from the several thousand vessels entering and leaving Los Angeles Harbor, Boston Harbor, or Honolulu Harbor annually should be incorporated into a cumulative impact assessment to determine if SURTASS LFA sonar sound is presumed to be cumulatively affecting marine mammals in those areas.

*Comment MOC30e:* Maintain a running record of events (detections) occurring before, concurrent, and after LFA sonar deployment.

*Response:* SURTASS LFA sonar monitoring will begin 30 minutes prior to start-up, continue between transmission pings, and continue for at least 15 minutes after completion of the SURTASS LFA sonar transmission exercise. During this time period all detections and behavioral observations by the tripartite monitoring program will be recorded.

*Comment MOC30f:* Passive and active (HF and LF) acoustics should be recorded for later analysis; passive recordings can be analyzed outside the 180-dB contour for vocalizing animals at distances on the order of 50 km (27 nm).

*Response:* The passive and active sonar systems will monitor for marine mammals and make recordings. These classified recordings will be available for analysis by scientists with proper security clearances. These data must be requested by these scientists prior to an exercise. However, this will not supersede LOA reporting requirements.

*Comment MOC30g:* The HF/M3 sonar recordings can be used to analyze animal movements relative to the LFA array.

*Response:* To the extent possible, considering the mitigation measure to ensure that the HF/M3 sonar SPL is at the lowest level practicable at the tracked animal, this recommendation will be implemented.

*Comment MOC30h:* The long-term monitoring plan should include monitoring and assessment of both annual assessments of the previous year's data, as well as long-term, retrospective analysis of cumulative SURTASS LFA sonar effects (such as population productivity, distribution, and stranding incident rates).

*Response:* NMFS agrees that an analysis of the results of previous monitoring is needed whenever a SURTASS LFA sonar exercise takes place within an oceanic area that has been exposed to SURTASS LFA sonar signals within the period of these regulations. These analyses would include a review of stranding data for areas wherein SURTASS LFA sonar was operating at the time.

However, since NMFS, using the best scientific information available, has determined that population level effects are unlikely since no marine mammals are expected to be injured or killed, and no marine mammals are likely to be subject to long-term exposures from SURTASS LFA sonar signals, changes in population productivity or distribution are unlikely to occur due to SURTASS LFA sonar operations. NMFS noted previously the scientific problem with assessing a population level cause-and-effect analysis for SURTASS LFA sonar without also accounting for lethal takings due to ship collisions, fishing mortality, and increasing anthropogenic contaminant levels and intentional harvesting. Therefore, NMFS will continue to monitor population level effects through its marine mammal status reviews required by section 117 of the MMPA. This formal review process would, if warranted, analyze the potential impacts from SURTASS LFA sonar and other sources of anthropogenic noise.

*Comment MOC30i:* Possible cumulative effects beyond the requested 5-year authorization should be considered in the development of the monitoring and reporting requirements and included as a condition of any authorization issued. Assessment of short- and long-term effects should be made.

*Response:* NMFS agrees that the cumulative impacts of anthropogenic noise on marine mammals should be assessed, but questions whether the SURTASS LFA sonar LTM program (which is monitoring conducted from the SURTASS LFA vessel) would be capable of providing the necessary information to make those determinations. In one year, each of the two SURTASS LFA sonar ships, with each ship located in a different area, would make approximately six active operations totaling 108 days of active sonar operations or approximately 18 days/mission/year. Second, marine mammal breeding is seasonal, thereby further limiting the period when marine mammals could potentially be exposed during this critical period.

To address cumulative impact, NMFS has recommended that the Navy select a marine mammal stock that is expected to be regularly exposed to SURTASS LFA sounds and monitor it for population changes throughout the 5-year period of these regulations, looking for long-term trends in vocalization patterns. NMFS would also like to work with interested scientists to design a research proposal (research monitoring that is not conducted during standard operations) that could address this concern in a manner that would be scientifically acceptable, humane to the affected marine mammals, and to determine the funding priority for this research in competition with the research proposed by NMFS (described previously).

The LTM program, including research under the LTM, which has a budget of $1M for each of the 5 years, will be described in the LOA. Because of variable factors (such as locations of operations, times of year), priorities of research areas, coordination with other research projects, and funding, it is premature to determine exact research elements at this time.

*Comment MOC31:* The LFA sonar should be used to monitor the position of baleen whales. This can be compared to the detections by the HF/M3 sonar.

*Response:* According to the Navy, the SURTASS LFA sonar is designed and acoustically tuned to detect and track submarines, not marine mammals. As the target strength of marine mammals is much less than that of a submarine, the ability to detect a whale is greatly diminished. In addition, the longer pulse lengths of SURTASS LFA signals mean there would be longer times when the receiver is blind due to the signal being transmitted. Also, as explained in the Final EIS, LF signals attenuate greatly in the near-surface zone, where many of the marine mammals usually

reside. Larger animals can be detected by the HF/M3 sonar at up to 2 km (1.1 nm), with probabilities of detection for most marine mammals above 95 percent (Ellison and Stein, 2001) and can be tracked within the 1 km (0.54 nm) buffer zone and 180-dB SURTASS LFA mitigation zone, where SURTASS LFA transmissions would be required to be suspended if a marine mammal was detected. Therefore, the use of the SURTASS LFA array both to track baleen whales and as a comparative test for the accuracy of the HF/M3 sonar is not technically feasible. It is also not necessary because the HF/M3 system has already been successfully tested.

*Comment MOC32:* The Navy should use independent or NMFS observers with appropriate security clearance on board SURTASS LFA sonar vessels.

*Response:* Security clearance requirements for personnel onboard SURTASS LFA sonar vessels make this recommendation impractical. Considering the normally rapid turnover of marine mammal observers (as observed in the marine mammal/fishery observer program), the high cost to conduct security clearances, and the several months required for Department of Defense security clearances, NMFS believes that this recommendation is not practical as it is unlikely to be capable of operating efficiently. The alternative that has been accepted by NMFS for this action is for the Navy to hire one or more qualified marine mammal biologists, highly experienced in marine mammal observation techniques, to train appropriate Naval personnel, or Naval civilian personnel, for conducting these observations. The requirements for training and limitations on length of marine mammal watches will be contained in the LOAs and will be similar to LOA requirements for other activities. However, this does not preclude NMFS employees trained in marine mammal observations and holding proper security clearances from participating in cruises to assess the performance of the observer monitoring program.

*Reporting Concerns (RPTC)*

*Comment RPTC1:* Data on marine mammals seen in and outside the proposed 180-dB safety zone and any overt responses to the sonar transmissions may provide valuable information validating or invalidating the assumptions upon which the proposed negligible effects determination is based. There is no apparent reason why such raw data should be classified or should not be provided to NMFS within a few days or weeks after conclusion of each LFA sonar training exercise conducted during the one-year periods of incidental taking authorizations.

*Response:* NMFS agrees that more timely reporting requirements are needed to ensure that the incidental takings of marine mammals by SURTASS LFA sonar are within reasonable limits established by these regulations. As a result, NMFS has amended the regulations to require the Navy to submit information to NMFS on a quarterly basis with the report including all active-mode missions that have been completed 30 days or more prior to the date of the deadline for the report. This is the standard period of time provided for all small take authorizations. However, this period of time is insufficient to allow the Navy to declassify information that might compromise national security; as a result the quarterly reports will be classified and the information will not be publically available until the annual report. The Navy estimates that there will be approximately 6 such exercises per vessel in a normal year. Therefore, NMFS will receive four quarterly (classified) reports annually from each of the two vessels. In the interim, NMFS will use these quarterly reports to monitor the SURTASS LFA sonar activity to ensure compliance with the terms and conditions of the LOA and regulations.

A draft, unclassified, annual report will contain an analysis of impacts from the individual missions, which will not be possible under the time limitation governing quarterly reports. However, because an annual comprehensive analysis report must be submitted 90 days prior to expiration of an LOA, the number of missions being reported under the first year of these regulations will be limited to those that can be be analyzed within that time period.

*Comment RPTC2:* Two commenters inquire whether the monitoring reports required by the LOA will be available to the public through publication in the **Federal Register**.

*Response:* Within 30 days of receipt by NMFS, all annual reports under this action will be available to the public. Notice of availability will be published in the **Federal Register**. However, due to high costs for publication, NMFS does not plan to publish the annual reports themselves in the **Federal Register**.

*Comment RPTC3:* Section 216.186 should be amended to require that the Navy provide the report required under the LOA to potentially affected states. Sharing this information may assist the states and others in the ongoing monitoring and assessment of impacts from the deployment of the proposed SURTASS LFA sonar.

*Response:* See RPTC1 for response. NMFS does not believe that requiring the Navy to submit these reports to interested states is warranted since the Navy has met the Coastal Zone Management Act (CZMA) consistency requirements with respect to all coastal states (with the exception of California) that could be potentially affected by LFA (22 states) and territories. However, states can make arrangements with the Navy or NMFS for annual reports for activities taking place in federal waters or an interested state's waters.

*Marine Mammal Stranding Reports*

*Comment RPTC4:* The Navy states that it will coordinate with principal marine mammal stranding networks to correlate analysis of any whale strandings with SURTASS LFA sonar operations and with reports to NMFS. What would this coordination entail? Is this reporting in connection with the LTM Program that would be annual?

*Response:* As mentioned previously, the LTM reporting requirement will be quarterly, as well as annually. NMFS believes that this more timely reporting is needed to ensure that the incidental takings of marine mammals by SURTASS LFA sonar are within the limits established by these regulations. In regard to coordinating the stranding network, the NMFS National Stranding Coordinator and the small take exemption program work closely with each other whenever a stranding occurs. Marine mammal strandings are required to be reported to the National Stranding Coordinator. NMFS makes every effort to determine the cause of strandings. If the cause of a stranding may be acoustical, part of this effort will be to determine the location of the SURTASS LFA sonar vessel in relation to the stranding event. If there is a potential relationship, NMFS will coordinate with the Navy to investigate the event. Because necropsies from stranding specimens take significant time to complete (if fresh tissues are obtained), any results from the investigation will be taken into consideration at the earliest opportunity. Summary reports on strandings are usually made available upon completion either through the NMFS' web site or in the MMPA Annual Report. If a stranding is acoustically related (such as the Bahamas beaked whale stranding), the results of the investigation are likely to be published as a NOAA Technical Memorandum.

However, if a direct causal relationship between the stranding event and SURTASS LFA sonar is

determined, the LOA may be suspended, modified or revoked in compliance with the requirements of the MMPA, these regulations, and the terms and conditions of the LOA.

*Comment RPTC5:* Reliance on stranding networks to detect impacts on pelagic animals will not work. It is likely that in the offshore environment LFA operations could cause multiple whale deaths, but this would not likely be observed as coastal strandings. The Navy cannot monitor marine mammals that receive serious injury, die, and sink.

*Response:* As indicated throughout this document, serious injury or mortality is unlikely to occur given the high capability of the tripartite monitoring system to detect marine mammals prior to an animal incurring an injury. While NMFS does not expect stranding data to be an important resource for determining impacts to marine mammals from SURTASS LFA sonar, it is one source of information that NMFS will use in its analysis of impacts from SURTASS LFA sonar.

*Comment RPTC6:* Following LFA exercises, real-time information should be provided for a period of some days to appropriate stranding coordinators, and the Navy should be responsible for coastline surveys for stranded and distressed marine mammals, especially in areas where networks are not well developed.

*Response:* Considering the offshore nature of SURTASS LFA sonar and the evidence that it is highly unlikely that marine mammals will be injured by SURTASS LFA sonar, real-time data is neither warranted, nor practical. For these same reasons, NMFS believes that requiring the Navy to conduct shoreline surveys is not warranted. If a marine mammal stranding occurs that appears to be acoustically related, NMFS will coordinate information from the Navy, principally time and location of each SURTASS LFA sonar vessel, with stranding data from NMFS' stranding coordinators to determine whether a link might exist between the two events.

*Comment RPTC7:* Protocols should be prepared for the eventuality that any marine mammal becomes injured.

*Response:* The marine mammal reporting requirements will require the Navy to report all marine mammals located inside the 180-dB safety zone as an ''injury,'' recognizing that not all of these marine mammals will be injured. However, if a marine mammal shows acute behavioral reactions indicative of an injury, the LOA will require the Navy to follow its protocol for ship strikes and report the incident to NMFS as soon as possible. NMFS will review each incident to determine the necessary action. Additional protocols to assist injured marine mammals are neither warranted (because of the unlikely occurrence of an injury) nor practical (considering the distance from shore, the single-vessel nature of SURTASS LFA operations, the lack of veterinary experience in a typical crew, and high freeboard of the typical SURTASS LFA sonar vessel precluding easy access to a marine mammal).

*Comment RPTC8:* Establish an extramural, independent board of scientists, regulators, representatives of environmental non-governmental organization (NGOs) and citizen representatives to review monitoring data and relevant research and to make recommendations to NMFS as well as to the Navy for reducing the system's impacts.

*Response:* As explained in more detail in RTC37 in the proposed rule, NMFS does not believe that a formal board is necessary for reviewing monitoring and research reports. Interested individuals could meet as NGOs and independently or jointly comment to NMFS, based on annual reports, or petition NMFS under the Administrative Procedure Act (APA) to amend regulations based on their interpretation of the reports.

*Miscellaneous (Mitigation, Monitoring and Reporting) Concerns (MC)*

*Comment MC1:* What is the Navy's mitigation procedure when operating off beaches where humans swim?

*Response:* Humans in the water are not at risk from SURTASS LFA sonar transmissions. The Navy sponsored research to study the potential effects of LF sound on humans in the water. Based on this research, in conjunction with guidelines developed from psychological aversion testing, the Navy concluded that LF sound levels at or below 145 dB would not have an adverse effect on recreational or commercial divers. See the Final EIS Subchapters 1.4.1 and 4.3.2.1 for additional details. As discussed in the Final EIS Subchapter 5.1.2, SURTASS LFA sonar operations would be constrained in the vicinity of known recreational and commercial dive sites to ensure that the sound field at such sites does not exceed 145 dB. Other than for very short periods of time, swimming and snorkeling occur in areas that extend from the surface to depths not greater than 2 m (6.5 ft). Applying acoustic theory and detailed measurements to these depths, there would be substantial sound transmission losses occurring in the top layer of water (about 1.8 m [6 ft]) where swimmers would most likely be found. Sound fields in this layer of water would be about 20 dB less than the sound fields in adjacent deeper water. Because of this acoustic attenuation and the restriction that SURTASS LFA sound fields will not exceed 145 dB in known diving areas, participants in activities that may involve submersion below the ocean's surface, such as swimming, surfing, and snorkeling, would not be significantly impacted by exposure to LF sounds transmitted from the SURTASS LFA sonar. This topic was discussed in the Final EIS Subchapter 4.3.2.1 and Chapter 5.

*MMPA Concerns*

Scope

*Comment MMPAC1:* One organization states that the Navy has failed to meet the legal standard of the MMPA, as determined in *Kokechik Fishermen's Association* v. *Secretary of Commerce,* 839 F.2d 795 (D.C. Circ. 1988). They note that the Court stated that the Secretary has no authority to disregard incidental takings of certain species or stocks without first determining whether or not the population of each species was the optimum sustainable population (OSP) level, even if the impact is negligible, before issuing a permit that authorizes the take of another species or stock. According to this commenter this meant that NMFS could not issue general permits in the absence of definitive findings that the take of all marine mammals expected to occur in a particular fishery would pass the ''will not disadvantage the species'' and ''consistency with MMPA policies'' tests of section 103 of the MMPA. The proposed issuance of an LOA for the SURTASS LFA system is a similar situation. Here NMFS is proposing to allow the incidental take of some species of known status and information at the same time as it would authorize the take of other species for which, due to a lack of information, it can not truly make a negligible impact finding. They oppose this action because they believe that it is contrary to both the court's findings and the MMPA requirements.

*Response:* The decision in *Kokechik Fishermen's Association* v. *Secretary of Commerce,* 839 F.2d 795 (D.C. Circ. 1988), does not apply to this case because it is factually and legally distinguishable. The incidental take permit challenged in Kokechik was for commercial fishing operations, governed by section 101(a)(2) of the MMPA, whereas the incidental authorization that is the subject of this final rule is for an activity other than commercial fishing. As such, it is

governed by section 101(a)(5). Unlike incidental take permits for commercial fishing, incidental take permits for activities other than commercial fishing are expressly exempt from the requirements of section 103. (See § 101(a)(5)(C)(ii).) The determinations required under section 101(a)(5)(A) of the MMPA are discussed in this document.

*Comment MMPAC2:* One organization notes that section 101(a)(3)(A) of the MMPA requires the Secretary to make his decision ''with due regard to the distribution, abundance, breeding habits, and times and lines of migratory movements of such marine mammals.'' They state that the Navy's application specifies that ''no two individuals will react to SURTASS LFA sonar exposure in the same way'' indicating that regardless of any scientific research conducted it may detrimentally affect one mammal, but not another and thus will have at best unpredictable effects on cetacean populations.

*Response:* The comment refers to the requirements of section 101(a)(3)(A) governing waiver of the moratorium in section 101(a). Small take authorizations under section 101(a)(5) of the MMPA are not a ''waiver''; therefore, section 101(a)(3)(A) is not applicable to this action. Section 101(a)(5)(A) sets forth the particular criteria and procedures that apply to the authorization of incidental takes of marine mammals pursuant to an otherwise lawful activity other than commercial fishing. See also *Animal Protection Institute of America* v. *Mosbacher,* 799 F. Supp. 173 (D.D.C. 1992), in which the court determined that the Secretary of Commerce, in issuing a permit under section 101(a)(1), was not required to follow the more elaborate administrative proceedings required for issuance of a waiver under section 101(a)(3)(A) of the MMPA.

Second, the quoted statement from the Navy's application was taken out of context. The full text is:

> It is important to recall that risk varies with both level and duration. In terms of biological risk, it is important to note that individuals will vary in their pre-exposure hearing sensitivity, in their actual PTS responses, and in the severity of the consequent biological effects (survivorship and reproduction). No two individuals will react to SURTASS LFA sonar exposure in the same way. The risk continuum estimates that 95 percent of the marine mammals exposed to a single ping at 180 dB could suffer a risk of non-injurious harassment. Based on the above discussion, this is a conservative estimate.

Furthermore, the application did not imply that SURTASS LFA sonar exposure will have, at best, unpredictable effects on cetacean populations. What the application stated was that the risk continuum was developed to account for the variability of reactions among individuals and that the values utilized to determine significant modification to biologically important behavior were conservative.

Finally, NMFS is charged by section 101(a)(5) of the MMPA to make the appropriate determinations based on whether impacts are negligible at the species and stock level, not at the level of the individual animal. This, NMFS has done.

*Comment MMPAC3:* One organization notes that section 101(a)(3)(A) of the MMPA requires NMFS' decision ''in accord with sound principles of resource protection and conservation as provided in the purpose and policies of this Act.'' In that regard, the Navy application specifies that ''[t]he percentage of animals that pass unseen is difficult to determine * * *'' This is not in accord with sound principles of resource protection.

*Response:* See RTC MMPAC 2. However, the quoted statement from the Navy application was taken out of context. The subject of discussion there was the limitation of a visual marine mammal monitoring system that applies to all maritime activities, from marine mammal population assessment surveys to implementing effective shutdown criteria for anthropogenic noise sources. It noted however, that because of the slow speed of the SURTASS LFA sonar vessel, the effective marine mammal survey strip width should be greater than possible for standard biological surveys allowing a greater percentage of animals to be seen than that of typical marine mammal assessment surveys. In that regard, the Navy has proposed, and NMFS has adopted, the tripartite monitoring system that will ensure, to the greatest extent practicable, that marine mammals will be detected prior to incurring an injury. No other maritime activity currently employs this level of mitigation.

*Comment MMPAC4:* This organization notes that under section 103(b)(1–4) of the MMPA, the Secretary is required to consider the effects harassment will have on the population levels, domestic and international treaty agreements, marine ecosystem health and the conservation of fishery resources. Also, under section 103(c)(2) of the MMPA, permit restrictions apply to the size, sex or age of the animal, and, section 104(b)(2)(A) requires that the issued permit specify the number and kind of animal. It is not possible to determine the size, sex, or age of the cetacean being harassed; thus making it impossible to determine the effect of LFA sonar on cetacean populations.

*Response:* See RTC MMPAC 2. Authorizations, such as the subject of this final rule, for small takes of marine mammals incidental to otherwise lawful activities (other than commercial fishing) under section 101(a)(5)(A) are not subject to the requirements of section 103 or 104 of the MMPA. See § 101(a)(5)(C)(ii) of the MMPA.

Even so, this action has been determined to be in compliance with all domestic laws and international treaties for which the United States is a signatory. For further information, please refer to Chapter 6 and RTC 6–1.5 of the Navy's Final EIS. Since takings by SURTASS LFA sonar will not result in the death or serious injury of marine mammals, age, sex, and size parameters are not necessary for assessing impacts on populations; all segments of the population are assumed to be affected equally. These regulations, however, specify the number (by percentage) and kind (by species) of marine mammals that might potentially be affected.

*Comment MMPAC5:* Commenters believe that, under the MMPA, NMFS must give more weight to the interests of marine mammals than the interests of the Navy. One commenter states that the precautionary principle and the conservative bias incorporated into the MMPA, which require the Federal government to give leeway to wildlife when the effects of a proposed action are unknown. The possible effects of LFA are unknown.

*Response:* In their joint final rule to implement the 1986 amendments to the MMPA and ESA to allow for small takes of depleted species of marine mammals (which includes endangered and threatened species) under section 101(a)(5) of the MMPA (54 FR 40338, September 29, 1989), NMFS and the USFWS addressed how they would make negligible impact determinations under section 101(a)(5) where the potential impacts of an activity are conjectural, speculative, uncertain, or unlikely. Relying on statements in the Congressional Record, the two agencies explained that they would apply a balancing test that weighs the likelihood of occurrence against the severity of the potential impact. NMFS continues to believe that this approach properly implements Congressional intent and has followed this guidance in making its determinations under section 101(a)(5) of the MMPA in this document. The precautionary principle is addressed in RTC MMPAC8.

*Comment MMPAC6:* LFA sonar is global in scope and impact. Therefore, it is illegal for NMFS to use the ''small

take'' exemption for a system of this size, potential damage, and geographic (global) scope and no rational interpretation of the MMPA supports the availability of a small take permit. The system ''self-admittedly'' will cover 80 percent of the world's oceans when fully deployed.

*Response:* The Navy has not stated that the SURTASS LFA system will cover 80 percent of the world's oceans when fully deployed. The total area that would be available for SURTASS LFA sonar to operate includes about 70–75 percent of the world's oceans. However, this in no way equates to affecting 70–75 percent of the world's ocean area. The current authorization is for only two SURTASS LFA sonar vessels—normally one in the Atlantic Ocean/Mediterranean Sea and the other in the Pacific/Indian Ocean. Therefore, SURTASS LFA sonar sound will not simultaneously affect this entire portion of the world's ocean.

The SPL that is capable of potentially causing injury to an animal is within approximately 1 km (0.54 nm) of the ship. For the purposes of analyses using the AIM and the risk continuum, there is a 50 percent risk of significant change in a biologically important behavior for a marine mammal exposed to 165 dB received level. The range from the SURTASS LFA sonar vessel for this received level, which could cause behavioral disruption but not injury, could extend to 25 to 65 km (13.5 to 35.1 nm). The received level at the surface along any straight path away from the ship would not decline logarithmically over distance, as would be expected if the sound spread by spherical spreading alone. The reason is that, for CZ propagation, the sound moves in an undulating path with turning points near the surface and near the bottom. Turning points near the surface, termed caustics, occur approximately every 30 nm. The received level at the surface would be high at the caustics but low in between them because most of the sound energy there would be found at great depth. While the SURTASS LFA sonar ships can operate in much of the world's oceans and their sound can be detected at several hundred miles using sophisticated listening gear, their potential to cause injury or affect behavior is limited to relatively close to the ship. Thus, the impact of SURTASS LFA sonar is not global in scope.

*Comment MMPAC7:* One organization notes that NMFS has never issued a small take exemption, let alone proposed rules, for an activity that is so global in its impact, and so uncertain in its impact. Others criticized the drafting of one set of regulations for a global program as not being in compliance with the MMPA.

*Response:* Provided the activity meets the requirements and criteria established by the MMPA, NMFS does not consider the fact that the Navy needs to be able to deploy the system for training, testing and routine military operations anywhere within the world's oceans (except for Arctic and Antarctic waters) should be the sole reason for denial of a small take authorization. Denial of an authorization is not warranted simply because an activity may be global in its area of operations, so long as the activity is confined to a specified geographic region at any one time. A contrary interpretation of the MMPA would require NMFS to deny future authorizations to other ''global'' activities, such as oil and gas seismic operations, commercial shipping, other military activities, oceanographic research, and future commercial supersonic transportation. All these activities have the potential to cause at least some form of behavioral harassment in marine mammals, and, similar to SURTASS LFA sonar (if there were more than one SURTASS LFA sonar ship at sea at the same time), have the potential to affect several geographic areas at the same time.

Implementing up to 54 sets of regulations, one for each of the designated biogeographic regions (called ''provinces'' in this document), would be unduly costly, unnecessarily cumbersome and potentially lead to fragmentation. Instead, NMFS has made the regulations generic for operation of SURTASS LFA sonar, and the LOAs, which are effective under the generic regulations, specific, to the extent necessary, for the specified province covered. This approach will accommodate the Navy's requirement to operate SURTASS LFA sonar on a global basis during the 5-year period of authorization (but within a specified geographic region during any single exercise) while meeting the MMPA's requirements and allowing NMFS to conduct a broad-scale analysis of the overall program.

*Harm/Injury/Harassment Concerns*

*Comment MMPAC8:* One organization states that since NMFS is moving to adopt the ''precautionary principle,'' the burden of proof is on the Navy to prove that LFA sonar is not harmful.

*Response:* NMFS has adopted the precautionary approach for the management of living marine resources, not the precautionary principle (NMFS, 1999). NMFS believes that the precautionary approach is at the core of the MMPA because the MMPA prohibits the taking of marine mammals unless exempted or permitted. Moreover, because the MMPA also authorizes the taking of marine mammals under section 101(a)(5), provided certain conditions and requirements are met, NMFS applies the precautionary approach through a careful analysis of impacts and implementation of measures that will reduce impacts to marine mammals to the lowest level practicable. As described in this document, NMFS believes that it has applied the precautionary approach to the greatest extent possible for this action through a requirement for a fully effective monitoring and mitigation program that will protect marine mammals to the greatest extent practicable. These mitigation and monitoring programs are discussed elsewhere in this document. In addition, the Navy met its obligation to perform reasonable research into the potential for SURTASS LFA sonar to affect marine animals through the LFS SRP and the diver studies. As required by section 101(a)(5) of the MMPA, the Navy has provided documentation that SURTASS LFA sonar will not have more than a negligible impact on affected marine mammal species and stocks. NMFS believes that the information provided by the Navy is the best scientific information currently available. Where certain information is not complete, NMFS has added additional safeguards to protect marine mammals and required additional research on marine mammals for the Navy to conduct; this is consistent with the precautionary approach. New research will include research on behavioral reactions between 155 and 180 dB, response of sperm and beaked whales to LFA signals; and passive acoustic monitoring on whale-call silencing. For additional information see the Final EIS Subchapter 1.4 and RTC MOC25 in this document.

Finally, it should be recognized that the Navy does not have the burden to prove that LFA is not harmful. Its burden is to establish that the activity meets the requirements of section 101(a)(5)(A) of the MMPA, that is, negligible impact is the standard, not ''no harm.'' It is NMFS position that the Navy has met this burden, and that is why NMFS issued these regulations for the small take authorization.

*Comment MMPAC9:* One commenter states that removing TTS from Level A harassment means that it is also removed from consideration of ''harm.''

*Response:* Under the MMPA, taking means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or

kill any marine mammal. ''Harm'' is in the definition of take under the ESA, but not in the ''take'' definition under the MMPA. ''Harm'' has been used by the Navy in its SURTASS LFA sonar NEPA documents, and elsewhere, in part because of its responsibilities under section 7 of the ESA. TTS is a taking under the definition of harassment, defined under the MMPA as Level B harassment, as explained elsewhere in this document. However, the Navy throughout its documents, has conservatively considered TTS to be ''harm,'' thereby making the commenter's statement inaccurate.

*Comment MMPAC10:* One organization notes that NMFS states that its scientists and other scientists are in general agreement that TTS is not an injury (i.e., Level A harassment) and that only PTS is considered injury. This assertion directly conflicts with the National Research Council's (NRC) recommendation that ''The definition of Level A acoustic harassment should be related to the likelihood that a sound will produce temporary threshold shift (TTS), as well as to the magnitude of the TTS'' (NRC, 2000). Because scientists have noted that a range of only 15 to 20 dB exists between the onset of TTS and the onset of PTS (66 FR 15386), NMFS should both modify the definition of Level A acoustic harassment to include TTS and reduce the intensity of the sound field to something less than 180 dB.

*Response:* The NRC (2000) also stated in the same paragraph as the above quote, ''Animals that experience only low levels of TTS are not going to be injured, suggesting TTS as a conservative standard for prevention of injury.'' This action conforms with this statement by establishing a safety zone at an SPL lower than where TTS would be anticipated to occur.

Without commenters providing scientific data to support the argument that TTS is an injury, NMFS' determination, which is supported by research, provided in response to similar concerns for taking marine mammals incidental to the USS WINSTON S. CHURCHILL (66 FR 22450, May 4, 2001), and the North Pacific Acoustic Laboratory (NPAL) (66 FR 43442, August 17, 2001) remain valid for this action as it is the best science available. Reviewers interested in NMFS' response to this concern should review those documents, in particular RTC MMIC4 and MMPAC5 in the cited NPAL document. In the latter document, NMFS stated that it is precautionary to define the onset of PTS for marine mammals to be 20 dB of TTS. This should not be interpreted to mean that the onset of PTS results when you add 20 dB to the dB level found to cause the onset of TTS in an animal, but instead means that the onset of PTS is the sound exposure level (SEL), in dB, that would cause 20 dB of TTS.

*Comment MMPAC11:* Will NMFS confirm that this rule would establish Level A harassment at the theoretical onset of PTS, which for lack of more data might be construed to be 10–15 dB above 192 dB in bottlenose dolphins and belugas, thus Level A would not be considered before RL of 207 dB?

*Response:* At 192 dB, Schlundt *et al.* (2000) found about 6 dB of TTS, the lowest measurable level for TTS. However, the 15–20 dB (not 10–15 dB) difference, mentioned in the proposed rulemaking document, refers to the difference between the SELs that cause the slightest TTS and the onset of PTS. As explained in more detail in RTC PRC6 in the NPAL final rule (66 FR 43442, August 17, 2001) and in RTC 29 in the final rulemaking document for the USS WINSTON S. CHURCHILL (66 FR 22450, May 4, 2001), experiments on chinchillas have shown that this species experiences full recovery from up to 40 dB of TTS (Ahroon *et al.,* 1996) from impulsive noise. However, in the absence of comparable data for marine mammals, NMFS believes it is precautionary to define the onset of PTS for marine mammals to be 20 dB of TTS. This 20 dB level would be considered conservative for chinchillas, and would likely be conservative for marine mammals. For several reasons, scientists have been reluctant to conduct research on captive marine mammals to determine the SEL that would cause PTS.

*Comment MMPAC12:* A Federal agency notes that the Navy has defined ''harm'' as the onset of TTS, and that this implies ''injury,'' while NMFS believes that TTS is not an injury, but rather an impairment, and therefore constitutes only Level B harassment. This distinction seems ill-founded.

*Response:* The biological basis for considering TTS as only Level B harassment has been discussed or referenced previously in this document. The U.S. Navy released the Draft EIS to the public on July 30, 1999 (64 FR 41420) and NMFS published an ANPR on October 22, 1999 (64 FR 57026). When the Navy was writing the Draft EIS, NMFS considered TTS to be both Level A and Level B harassment (63 FR 66069, December 1, 1998). It was not until the period between the release of the Navy's Draft EIS for the shock trial of the USS WINSTON S. CHURCHILL (64 FR 69267, December 10, 1999) and NMFS' independent evaluation of the Navy's TTS proposal as noted in the CHURCHILL proposed rule on December 12, 2000 (65 FR 77546), that the issue came to general attention. During that time, the issue of TTS being categorized as only Level B harassment was still a proposal by NMFS and open to public comment until January 26, 2001. A final decision on TTS being limited to Level B harassment was not made by NMFS until May 4, 2001 (66 FR 22450). While the Navy was aware of the scientific debate, because the comment period on the Navy's Draft EIS ended on October 28, 1999, and no comments were submitted that directly addressed this issue (comments were focused on the validity of terms such as non-injurious harassment and non-serious injury), the Navy's ability to amend the Final EIS on this issue was limited. Additionally, the Navy's Final EIS was released in January, 2001, well prior to NMFS' final determination that TTS was limited to Level B harassment on May 4, 2001 (66 FR 22450). As a result, the Navy retained the more conservative approach and considers TTS to be Level A harassment. Therefore, while TTS is not an injury biologically, NMFS accepts the Navy's conservative determination to consider TTS as a potential injury for this action and will consider all incidental harassment takings that occur within the 180-dB isopleth, under this action, as Level A harassment.

*Comment MMPAC13:* A number of commenters believe that NMFS has redefined the definition of ''harassment.'' Some are concerned that NMFS' definition of Level B harassment as an action that causes a significant disturbance in a biologically important behavior is not consistent with the MMPA, which states that Level B is the ''potential to disturb marine mammals or marine mammals stocks in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.'' Other commenters are concerned that NMFS and the Navy underestimate the potential for behavioral impacts by narrowing the definition of what behavioral impact is. This new definition narrows the Congressional harassment definition from ''disruption'' to an unclearly defined ''significant disturbance'' and ''behavioral patterns'' to unspecified group of behaviors.

*Response:* First, for those species of marine mammals capable of hearing sounds from the SURTASS LFA sonar signal, simply hearing the acoustic signal without reacting to that noise is not considered by NMFS to be a

disruption of biologically important behavior. Second, as NMFS has noted previously (66 FR 43442, August 17, 2001; 66 FR 22450, May 4, 2001; and 66 FR 9291, February 7, 2001), for small take authorizations, NMFS considers a Level B harassment taking to have occurred if the marine mammal has a significant behavioral response in a biologically important activity. Under an interpretation of ''harassment,'' as broad as some have suggested the MMPA requires, an incidental taking could be presumed to occur for even a single pinniped lifting or turning its head to look at a passing pedestrian, offshore watercraft, aircraft or dolphins riding a boat's bow wave. For those takings that are clearly incidental to an otherwise lawful activity, NMFS believes that such a strict interpretation was not intended by Congress, when it amended the MMPA in 1994 and added a definition for harassment.

The term ''Level B harassment'' is defined in the MMPA as ''any act of pursuit, torment, or annoyance which * * * has 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.'' In this context, a behavioral pattern means a composite of biological traits characteristic of an individual or of a species. Therefore, to disrupt a behavioral pattern, the activity would need to disrupt an animal's normal pattern of biological traits or behavior, not just cause a momentary reaction on the part of a marine mammal. Furthermore, if the only reaction to an activity on the part of the marine mammal is within the normal repertoire of actions that are required to carry out the behavioral pattern for that species of marine mammal, NMFS considers the activity not to have caused an incidental disruption of the behavioral pattern, provided the animal's reaction is not otherwise significant enough to be considered disruptive due to length or severity. For example, if there is a short-term change in breathing rates or a somewhat shortened or lengthened diving sequence that is within the animal's normal range of breathing patterns and diving cycles but there is not a disruption to the animal's overall behavioral pattern (i.e., the changes are not biologically significant), then these responses do not rise to a level requiring a small take authorization or, if under a small take authorization, does not constitute an incidental take. Similarly, bow-riding dolphins are within their normal behavioral patterns and, therefore, are not being ''taken'' for purposes of the MMPA.

Examples of significantly disrupted behavior would be where pinnipeds flee a haulout beach or rookery en masse due to a disturbance, or animals either leave an area of habitation for a period of time, or diverge significantly from their migratory path to avoid either an acoustic or a visual interference. Non-significant behavioral responses would be when only a few pinnipeds leave the haulout or mill-about, but many pinnipeds are alert to the disruption; or when marine mammals make minor course corrections that are not discernable either to observers or directional plotting, and which require statistical manipulation in order to determine that a course correction has taken place. For the action under consideration in this document, it is the behavioral response of marine mammals to the SURTASS LFA sonar signal (such as an overt avoidance behavior, a more than momentary modification or disruption in communication or feeding patterns through masking, or behavioral response due to an impairment to hearing) that is the biological response that is considered to be a taking by Level B harassment.

*Comment MMPAC14:* Commenters believe that NMFS' calculation of species ''take'' is based on a fundamental misinterpretation of law.

*Response:* See RTC MMPAC 13. The risk continuum developed by the Navy for this activity makes the distinction of whether the response is behaviorally significant, and whether the animal is involved in a biologically important activity at the time, through implementation of the ''B,'' ''A,'' and ''K'' parameters, which is based on the best science currently available (please refer to the Navy Final EIS (Subchapters 4.2.3.2 and 4.2.5) for definitions and application). Therefore, the estimates of Level B harassment found in Table 4.2–10 of the Final EIS and Table 4–10 of the Navy's application provides the best scientific estimate for Level B harassment takings in accordance with the definition of ''harassment.''

*Comment MMPAC15:* A Federal agency interprets the proposed rule as establishing TTS as the lower level for harassment, and thus, take. This interpretation could undermine meaningful consideration of behavioral effects that occur at sound levels below those that may result in TTS.

*Response:* The preamble to the proposed rule makes clear that NMFS considers all significant behavioral reactions, not just TTS-related reactions by marine mammals that result from SURTASS LFA sonar, to be a Level B harassment taking under these regulations.

*Comment MMPAC16:* LFS SRP information conducted on humpback whales demonstrates that LFA sonar operations have the potential to disturb the behavior of humpback whales, and, therefore, meet the MMPA's definition of Level B harassment. Navy modeling also demonstrated the potential for level B harassment.

*Response:* Phase III of the LFS SRP did not demonstrate any significant changes to biologically important humpback whale behavior (see TR1). Also, see RTC MMPAC13 on NMFS' response regarding Level B harassment. However, because there is a potential for incidental harassment, the Navy is seeking authorization for the incidental taking of marine mammals under the MMPA.

*Comment MMPAC17:* One organization states that any conclusion based on there being no takings that are significant below RLs of 180 dB may be misleading. LFA sonar should be disallowed until this can be proven. Another commenter states that scientific evidence suggests that a level of about 120 dB is a reasonable assumption for serious impact. However, this would include a very large area and is not ''relatively small.''

*Response:* There is no requirement in section 101(a)(5)(A) of the MMPA that the area be small, only that there be a specified geographic region.

Both the proposed rule document and the Navy's Final EIS address the potential for significant change in biologically important behavior below 180 dB RL. While there have been several studies that have demonstrated responses of marine mammals to exposure levels ranging from detection threshold to 120 dB (See the Final EIS at 4.2–26 and 4.2–27), NMFS is unaware of any scientific research that suggests that a level of 120 dB is a reasonable assumption for ''serious impact.''

*Comment MMPAC18:* The Navy should consider SPL under 150 dB as a more appropriate standard to ensure that the LFA sonar will have a negligible impact on marine mammals and their stocks. This is supported by Tyack (1998) and Tyack and Clark (1998).

*Response:* It is not clear what was meant by ''appropriate standard.'' However, imposing mitigation to the 150 dB isopleth is neither practicable nor necessary. Based on the LFS SRP, at 150 dB only 2.5 percent of the marine mammals exposed to the LFA sonar sound would likely show a significant behavioral response. Effective mitigation to this distance would have eliminated the need for a small take

authorization. Since that is not possible, the Navy applied for a small take authorization, and, to reduce impacts to the lowest level practicable, designed the HF/M3 sonar to protect marine mammals from injury (i.e., down to the 180 dB isopleth). Based on the risk continuum, NMFS considers a Level B harassment taking will occur at levels between 119 dB and 180 dB and takes that number into consideration in making the negligible impact determinations later in this document.

*Small Numbers*

*Comment MMPAC19:* Several commenters believe that fifty percent of the animals within the 165 dB RL zone will be ''biologically affected.'' This hardly constitutes a ''small take,'' and could result in large numbers of marine mammals being harassed or non-seriously injured.

*Response:* The risk continuum states that at a ''single ping equivalent'' SPL of 165 dB the risk of a significant change in a biologically important behavior is 50 percent. Thus, for each animal that is exposed to an SPL of 165 dB, it has a 50-percent chance of having a significant change in a biologically important behavior. This is fully explained in Subchapters 4.2.3 through 4.2.5 of the Navy's Final EIS.

This does not mean that 50 percent of the total marine mammal population or stock is potentially affected biologically under the calculations for the risk continuum, but only that portion of the population that is within the acoustic ray path of SURTASS LFA sonar at those times and locations where the SURTASS LFA sonar ray path intersects the portion of the water column wherein marine mammals may reside. Refer to the discussion on acoustic ducting earlier in this document and to either Figure 1 of this document or Figure B–3 of the Navy's Final EIS for a diagram of the ray path expected in approximately 80 percent of SURTASS LFA sonar transmissions.

*Comment MMPAC20:* One Federal agency believes that NMFS has melded the small numbers criterion and the negligible impact criterion into a single criterion, contrary to Congressional intent. It states that NMFS needs to make separate findings that only small numbers of marine mammals will be taken incidental to the activity in question and that the effects will be negligible.

*Response:* The regulations at 50 CFR 216.103 define ''small numbers'' to mean ''a portion of a marine mammal species or stock whose taking would have a negligible impact on that species or stock.'' That definition was first proposed on March 3, 1982 (47 FR 9027). During the public comment period on the proposed definition, NMFS received and considered a similar comment. NMFS' response (47 FR 21248, May 18, 1982) was as follows:

> In discussing the term ''small numbers,'' the House Report recognizes ''the imprecision of the term but was unable to offer a more precise formulation because the concept is not capable of being expressed in absolute numerical limits. The Committee intends that these provisions be available for persons whose taking of marine mammals is infrequent, unavoidable, or accidental.'' The NMFS does not believe that the term can be expressed as an absolute number or percentage or be defined in any absolute terms. However, NMFS feels that by defining ''small numbers'' to mean a portion of a marine mammal species or stock whose taking would have a negligible impact, an upper limit is placed on the term, and the phrase effectively implements the Congressional intent underlining the new section 101(a)(5) of the MMPA.

NMFS continues to believe that its regulatory definition is consistent with Congressional intent.

*Comment MMPAC21:* Two commenters recommend that NMFS revise its regulatory definition of ''small numbers'' to reflect the language of, and the intent behind, the statutory provision.

*Response:* See RTC MMPAC20. NMFS invites interested persons to submit any information regarding an alternative workable interpretation of the term ''small numbers'' for consideration. This may also be in conjunction with a petition for rulemaking.

*Comment MMPAC22a:* Several commenters believe that the takings do not meet the MMPA's definition of ''small''; and several noted that the abundance of marine mammals within identified species and stocks that may be ''taken'' by LFA exceeds any reasonable interpretation of the statute's ''small number'' provision. Takes are not ''negligible.'' For example, during each year of operation and with all of the mitigation and monitoring that the Navy has proposed, more than 16 percent of the blue whales in the eastern North Atlantic, more than 10 percent of the beaked whales in the Mediterranean Sea, and more than 12 percent of the elephant seals in the eastern North Pacific will be affected.

*Response:* The commenters have focused on three of the four highest modeled levels of take and ignored statements that the AIM accounted for the ''worst case'' analysis, not the situation that will most likely take place by scheduling SURTASS LFA sonar missions to avoid areas and times of increased marine mammal abundance. Also, the commenters have misinterpreted the modeling in the Final EIS, and thus overstate the effects.

The annual percentages shown in the Final EIS Tables 4.2–11 and 4.2–12 were provided as example scenarios if the Navy were to operate 12 annual operations in the sites listed in row two of the tables. These locations were randomly selected; other site selections can be made by readers by taking a similar number (12) of modeled sites from table 4.2–10. This may result in higher or lower estimates depending upon whether the Navy will operate off the west coast of North America or, for example, the North Korea Strait. Thus, using the example from the commenter, 12.4 percent of the elephant seals will be affected only if SURTASS LFA sonar operated in both offshore central California for one mission (10.76-percent impact) and offshore Washington (1.65 percent impact) on another mission. If one mission operated offshore central California (10.76 percent) while a later mission operated offshore San Nicolas Island (7.90 percent impacted), 18.6 percent of the northern elephant seals would be impacted. However, this scenario would occur *only* if both missions took place during the two relatively short periods that northern elephant seals are concentrated in California waters for either molting or breeding. Most of the time much smaller percentages would be affected as the northern elephant seal is widely scattered across the North Pacific Ocean during the remainder of the year.

Second, the ''acoustic modeling sites'' used in the AIM were chosen to represent conditions that would model the highest potential for effects from the use of SURTASS LFA sonar (See Final EIS Subchapter 4.2.1). These ''worst case scenarios'' included areas close to land (where biological densities are higher and where the Navy would not be authorized to take marine mammals at SPLs greater than 180 dB), best sound propagation conditions for the area (which would not always occur), and season of highest marine mammal density (areas the Navy would routinely avoid because of the potential for excessive shutdowns). Moreover, because the Navy will operate no more than two SURTASS LFA sonar vessels during the next five-year period under this authorization, the percentages of marine mammal stocks depicted as examples in Table 4.2–11 and 4.2–12 of the Final EIS are overestimates since they provide an example of take estimates for a hypothetical 12 missions per ocean area, not the now-projected 6 missions per vessel. Given that it is

more likely that SURTASS LFA sonar missions will occur in the open ocean, and that the Navy will rerun AIM when planning missions for new or different areas to avoid certain areas during biologically sensitive seasons, NMFS believes that the estimates of taking by harassment incidental to SURTASS LFA sonar provided in the Final EIS are significantly higher than the more realistic 1 to 2 percent (or less) of affected stocks during a single 20-day mission. The negligible impact determination is discussed in later comments.

*Comment MMPAC22b:* One organization states that although abundance data has not been provided, the magnitude of the numbers involved in such percentages can be grasped considering that there are approximately 40,000 elephant seals in the NMFS' Pacific region, a small sliver of the total area designated here as the ''eastern North Pacific.'' Add to this number the elephant seal numbers projected for each of the other areas, add these to the aggregate numbers for every other marine mammal species, multiply by five (for the number of years of operation authorized by NMFS' rule), and one has the total number of marine mammals that the Navy believes are potentially affected by LFA deployment. Since each animal may be taken a number of times, the number of takes would presumably be even higher.

*Response:* Abundance data for marine mammals, used in the AIM, was provided by the Navy in Table 4.2–4 of the Final EIS. Also, the commenter has misinterpreted the exercise conducted in that part of the Navy's Final EIS and also the definition of ''Eastern North Pacific'' in Table 4.2–11, thereby exaggerating the impacts. Furthermore, the Eastern North Pacific is not a ''small sliver of the Pacific region designated by NMFS,'' but instead represents the entire Eastern North Pacific Ocean and encompasses the entire geographic region inhabited by northern elephant seals. This is apparent by noting that the modeled sites randomly selected for this example (as explained in the Final EIS) were: (1) North Kauai, (2) offshore Washington, (3) Gulf of Alaska, and (4) offshore California. Combining the offshore California (10.76 percent of elephant seals) and offshore Washington (1.65 percent of the elephant seals) site models indicates that 12.4 percent (10.76 + 1.65 percent) of the northern elephant seal population might be harassed, if the Navy conducted two missions in the Eastern North Pacific during the period of time when elephant seals are in abundance in offshore California and in Washington waters. Therefore, only if a SURTASS LFA sonar mission took place offshore California when elephant seals were concentrated in that area would 10.76 percent of that portion of the elephant seal population inhabiting that area be subject to a significant behavioral response. At other times, impacts would be limited to lower levels such as 1 to 2 percent (as noted for offshore Washington).

While it is proper to add the aggregate of other species to the total taking expected, a proper analysis would need to take the aggregate for the normal maximum of six missions per vessel per year. Table 4.2–11 and 4.2–12 have provided representative examples, but for 12 missions, not six, in each ocean basin.

Finally, as explained several times in the Navy's Final EIS, the AIM calculates for the probability of animals receiving multiple pings. Therefore, these are not additive to the results found in Tables 4.2–11 and 4.2–12 as the commenter suggests.

*Comment MMPAC23:* A Federal agency recommends that NMFS estimate the number of marine mammals that potentially could be taken in the course of the proposed 5-year authorization and provide its rationale for concluding that this constitutes a ''small number.'' Another commenter asks what levels NMFS is using to define ''small take.'' They note that on page 15387 the preamble to the proposed rule (66 FR 15375, March 19, 2001) states, ''NMFS believes that the potential effect by SURTASS LFA sonar operations will be limited to only small percentages of the affected stocks of marine mammals * * .'' Define ''small percentage'' and the rationale for considering the Final EIS results to constitute ''small numbers.''

*Response:* The requirement under the MMPA is to determine that the activity is resulting in the take of ''small numbers'' of marine mammals; there is no requirement to define ''small take.'' See RTC MMPAC20 regarding how NMFS applies its definition of ''small numbers'' in 50 CFR § 216.103 under section 101(a)(5)(A) of the MMPA.

The AIM inputs for each species were provided in Table 4.2–4 of the Navy Final EIS and Table 4–4 of the Navy application. These tables provide an estimate of the stock size for each species group and the size of the seasonally resident marine mammals near each AIM site that was used in the modeling. Modeling by the AIM then provides estimates of the percentage of the portion of the marine mammal population(s) that might sustain a biologically significant response to the SURTASS LFA sonar signal. These percentages are provided in Table 4.2–10 in the Final EIS and Table 4–10 of the application and used by NMFS to estimate incidental harassment levels.

While NMFS presently does not know which areas the Navy plans to conduct its missions in the upcoming year, the Navy will be responsible for incorporating this type of analysis for each biogeographic province in which it is planning to conduct missions in order to estimate Level B harassment percentages. This will be done by the Navy in each annual mission intention letter the Navy submits to NMFS using AIM.

*Negligible Impact*

*Comment MMPAC24:* Because of lack of information, the Navy cannot prove ''no impact'' from LFA.

*Response:* The Final EIS and the Navy's application do not state there would be no impact. If there was no impact, an LOA for the incidental taking of marine mammals would not be required.

*Comment MMPAC25:* The Navy's request for a ''small take'' authorization is based on their conclusion that below 180 dB the proposed action will have a negligible effect on the survival and productivity of marine mammals (that is, have no biologically significant effect).

*Response:* That is correct. In the Final EIS at ES–25, the Navy states,

> In summary, under Alternative 1, the potential impact on any stock of marine mammals from injury is considered negligible, and the effect on the stock of any marine mammal from significant change in a biologically important behavior is considered minimal. However, because there is some potential for incidental takes, the Navy is requesting a Letter of Authorization (LOA) from NMFS for the taking of marine mammals incidental to the employment of SURTASS LFA sonar during training, testing and routine military operations under the Marine Mammal Protection Act (MMPA), and is consulting with NMFS under Section 7 of the Endangered Species Act (ESA).

*Comment MMPAC26:* A number of commenters believe that the impact of takings on the species or stocks of marine mammals does not meet the MMPA's definition of ''negligible.''

*Response:* In order to allow a taking under section 101(a)(5) of the MMPA, NMFS must find that the total taking by the activity will have a negligible impact on the species or stock. The Navy, as the party seeking an authorization under this section, has the burden to demonstrate, through the best scientific information available, that only a negligible impact is *reasonably* likely to occur. This, NMFS believes,

the Navy, has met, in part, through the LFS SRP, which is discussed elsewhere in this document.

NMFS defines ''negligible impact'' as the impact resulting from the specified activity that cannot reasonably be expected to, and is not reasonably likely to, adversely affect the species or stock(s) through effects on annual rates of recruitment or survival (50 CFR 216.103). This finding is made in reference to the marine mammal species or stock (as defined in section 3(11) of the MMPA), and not with reference to the effects on individual animals.

If mitigating measures would render the impacts of a specified activity negligible, when it might not otherwise satisfy that requirement, NMFS may make a negligible impact finding subject to such mitigating measures being successfully implemented (53 FR 8473, March 15, 1988; 54 FR 40338, September 29, 1989).

The analysis of any adverse effects to recruitment or survival must be conducted within the framework of the management goal of the MMPA, (*i.e.,* the maintenance or attainment of an OSP level for each population stock of marine mammals (see section 2(2) and 2(6) of the MMPA and 53 FR 8473, March 15, 1988). As a result, since 1989 (54 FR 40338, September 29, 1989), NMFS has, with later minor modification, applied the definition of ''negligible impact'' in the following manner: if a request under section 101(a)(5) of the MMPA involves potential impacts to a ''depleted'' population, then a determination of negligible impact can be made only if the permitted activity is not likely to significantly reduce the increase of that population or prevent it from ultimately achieving its OSP. On the other hand, if a nondepleted population is involved, then a determination of negligible impact can be made only if the permitted activity is not likely to reduce that population below its OSP.

However, this does not mean that an OSP determination is required to make a negligible impact determination, as section 101(a)(5)(C)(ii) clearly exempts issuance of specific regulations from compliance with the formal rulemaking requirements of section 103 of the MMPA. Recognizing the complex and controversial nature of the OSP concept, NMFS has modified this policy so that a determination of negligible impact can be made only if the permitted activity is not likely to significantly reduce the numerical increase of that population or prevent it from ultimately achieving its maximum net productivity level (MNPL)(NMFS, 1995). If a ''nondepleted'' marine mammal population is involved, then a determination of negligible impact can be made only if the permitted activities are not likely to reduce that population below its MNPL (NMFS, 1995). The determination of negligible impact, therefore, even when the taking is limited to incidental harassment, will take into account the status and the particular biological requirements of the species or stock, as well as the effects of the incidental taking on the rate of recruitment (NMFS, 1995). That said, however, NMFS qualified that by stating that ''Qualitative judgments will be made on a case-by-case basis on how the anticipated incidental taking will affect the status and population trends of the species or stocks concerned.''

Many factors are used in making a negligible impact determination, including, but not limited to, the status of the species or stock relative to its MNPL (if known), whether the recruitment rate for the species or stock is increasing, decreasing, stable or unknown, the size and distribution of the population, and existing impacts and environmental conditions.

Finally, the MMPA clearly indicates that some level of adverse effects involving the taking of marine mammals (both depleted and non-depleted) can be authorized as long as the impact is negligible. This guidance has been followed by NMFS in making its determination on whether takings by harassment incidental to SURTASS LFA sonar operations are negligible.

*Comment MMPAC27:* Two commenters stated that NMFS cannot make a negligible impact determination since the population stock sizes and other information on many species is lacking. How can NMFS estimate takes, or impact of takes, when stock size, composition, status, trends, and distribution cannot be defined? It is impossible to determine the size, sex or age of the cetaceans harassed; thus making it impossible to determine the effects of the LFA sonar on the cetacean population.

*Response:* There is no requirement in the MMPA to determine the size, sex or age of impacted marine mammals prior to authorizing an incidental take. While this information is valuable to NMFS scientists when takings involve significant mortality (as in whaling), when takings are limited to incidental harassment that will be limited in both time and scope, this information is not critical. Since takings by SURTASS LFA sonar are not expected to result in the death or injury of marine mammals, age, sex, and size parameters are not necessary for assessing impacts on populations; all segments of the population are assumed to be affected equally.

When information is lacking to define a particular population or stock of marine mammals then impacts are to be assessed with respect to the species as a whole (132 Cong. Rec. S16304–05, October 15, 1986; 54 FR 40338, September 29, 1989). As shown in this document and in the Navy Final EIS, NMFS and the Navy have followed this Congressional instruction when necessary in this action.

*Comment MMPAC28:* Some commenters note that the scientific results are ''speculative'' as they are based on research on only 3 species; there are information gaps on many species.

*Response:* Please refer to the appropriate RTCs in this document regarding data gaps. The Navy's LFS SRP studies filled in data gaps on the potential effects of LF sound on marine life, and the ongoing monitoring and research programs instituted by the Navy will continue to reduce areas of incomplete information and provide invaluable data that are presently unavailable.

Congress (see 132 Cong. Rec. S16304–5, October 15, 1986) noted that

> If the potential effects of a specified activity are conjectural or speculative, a finding of negligible impact may be appropriate. In such a case, the probability of occurrence of impacts must be balanced with the potential severity of harm to the species or stock when determining negligible impact.

When applying this balancing test, NMFS thoroughly evaluates the risks involved and the potential impacts on marine mammal populations (54 FR 40338, September 29, 1989). Determinations are made based on the best available scientific information and later supported or negated through the required monitoring program (NMFS, 1995).

*Comment MMPAC29:* The response to Comment 46 in the preamble to the proposed rule (66 FR 15375, March 19, 2001)) stated: ''NMFS must make its determination under section 101(a)(5)(A) of the MMPA based on the best scientific information available.'' However, NMFS held the non-peer reviewed LFS SRP results in higher regard than published peer-reviewed work (Simmonds and Lopez-Jurado, 1991; Frantzis, 1998; and Balcomb, 2001).

*Response:* While NMFS must make its determinations under the MMPA and ESA based on the best scientific information available, the response to the comment cited here was in regard to the Navy meeting its NEPA requirements, not on the validity of the

data used by NMFS. In that regard, NMFS uses all valid data and information that are available. However, NMFS also notes that Balcomb (2001) is a letter submitted to the Navy, dated February 23, 2001, concerning his untested hypothesis of the cause of the mass stranding of beaked whales in the Bahamas. This letter has not been published or formally peer reviewed. Simmonds and Lopez-Jurado (1991) and Frantzis (1998) were published scientific correspondences based solely on observations. The three phases of the LFS SRP were based on field research, conducted by independent scientists, which was designed simply to test a specific hypothesis. Some of the results have been peer-reviewed prior to publication (Miller *et al.* (2000) and Croll *et al.* (2001)). See RTC 4–5.18 and 4–5.19 of the Final EIS for more information. However, NMFS reviewed all data available to it when making the decisions found in this document.

*Comment MMPAC30:* A Federal agency is concerned about the basis for a negligible impact determination because information available clearly indicates that the potential effects of SURTASS LFA sonar operations cannot be described with certainty. NMFS needs to make separate findings that only small numbers of marine mammals will be taken incidental to the activity *and* (not or) that the effects on the distribution, size, and productivity of the affected species and populations will be negligible. NMFS has not examined all of the ''best information available'' and sufficient gaps in knowledge exist to prevent NMFS from a determination of ''negligible impact.''

*Response:* Please refer to the RTCs MMPAC 27 and 28 regarding appropriate action that NMFS needs to take when making negligible impact determinations when faced with unavailable, uncertain or speculative information. In addition, concerns regarding data gaps and alleged ignored evidence have been addressed previously in this document (see RTCs SIC1 though SIC3 for example). RTC MMPAC29 discusses another set of information. NMFS believes that it has used all relevant information and data in making its determinations under this action. Therefore, NMFS is unaware of what relevant ''best information available'' was not utilized in this action. For the RTCs regarding separate determinations for ''small numbers'' and ''negligible impact,'' please refer to RTC MMPAC20.

*Comment MMPAC31:* The Navy failed to meet the legal standard and adequately demonstrate that the take will have a negligible impact on the affected species and stocks of marine mammals because: (1) Only three of more than 48 proposed affected marine mammals were tested; (2) lack of data on abundance, natural history, geographic distribution, migration routes and calving and breeding grounds; (3) specific numbers by type of taking not provided; (4) all marine mammals potentially taken must be considered; and (5) effects of underwater noise on marine mammals are variable and largely unknown for many species.

*Response:* The information that was necessary for NMFS to agree or disagree with the determinations made by the U.S. Navy that the deployment of SURTASS LFA sonar will have no more than a negligible impact on marine mammals was provided in the Navy's Draft and Final EISs. In particular, the information cited above as lacking can be found in Chapter 3 (specifically refer to Tables 3.2–3 (mysticetes), 3.2–4 (odontocetes), 3.2–5 (otariids) and 3.2–6 (phocids), and Chapter 4 (specifically refer to Tables 4.2–3 (diving behavior), 4.2–4 (distribution, abundance and density) and 4.2–10 (stock percentage affected)). In its Final EIS, the Navy provided estimates of the percentage of marine mammal stocks that might sustain a biologically significant response rather than the number of animals. NMFS concurred in this approach for the Draft and Final EIS because it believes that this is appropriate considering the global nature of SURTASS LFA sonar operations.

In addition, the Final EIS provides a clear explanation of the assumptions made in the AIM and in the Final EIS to account for variability in marine mammal response (both on a species basis and on an individual basis) for all species and stocks of marine mammals. Since the Navy has taken a highly conservative approach at all stages in estimating impacts on marine mammals from LF sounds, complete data on each and every species of marine mammal is not necessary for NMFS to make a negligible impact determination. The fact that the Navy will collect additional data, and conduct more research, over the next 5 years and that NMFS can suspend an authorization if information or data indicates that the takings are having more than a negligible impact, provides assurance that marine mammal species and stocks will not be significantly impacted.

*Lowest Level Practicable*

*Comment MMPAC32:* Several commenters believe that NMFS has not ensured that the taking was at the lowest level practicable.

*Response:* Section 101(a)(5)(A)(ii) of the MMPA requires NMFS to ''prescribe regulations setting forth permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impacts on species or stocks and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance * * *.'' NMFS believes that the mitigation measures and additional interim operational restrictions required by these regulations on the Navy's operation of SURTASS LFA sonar ensures that the takings will be at the lowest level practicable. Mitigation measures include maintaining SURTASS LFA sonar generated sound field below 180-dB at a distance of 12 nm (22 km) miles from any coastline, including islands, OBIAs and other protected areas, designating OBIAs and a process for nominating new OBIAs, establishment of a shutdown protocol to protect marine mammals in the vicinity of the SURTASS LFA source, and the tripartite marine mammal monitoring system ensuring above 95-percent detection capability for marine mammals prior to entry into the 180-dB safety zone. Additional operational restrictions will be included in annual LOAs as an interim requirement pending the results of the Navy's LTM, reporting and research programs. These interim measures include establishment of shut-down criteria of the SURTASS LFA sonar whenever a marine mammal is detected within the 1-km (0.54-nm) buffer zone beyond the SURTASS LFA mitigation zone (180-dB sound field), a requirement not to broadcast the SURTASS LFA sonar signal at a frequency greater than 330 Hz to minimize the possibility of resonance; and planning missions to ensure no greater than 12 percent of any marine mammal stock is incidentally harassed during the period of each LOA's effectiveness (1 year). Additional protection will be afforded marine mammals by the Navy's mandate that SURTASS LFA sonar operations would be constrained in the vicinity of known recreational and commercial dive sites to ensure that the sound field at such sites does not exceed 145 dB.

Mitigation measures suggested by commenters that NMFS believes to be impractical have been addressed in RTCs MIC15 through MIC17 in this document.

*Total Taking*

*Comment MMPAC33:* The multiple deployments of LFA sonar in conjunction with potential deployment

of other nations' LF sonar has not been addressed and may have a devastating cumulative effect on marine mammals.

*Response:* The Navy analyzed the potential impacts from operating two SURTASS LFA sonars within a representative area (Gulf of Oman). This was described in both the Navy's application and in the Navy's Draft and Final EISs. Table 4–14 of the application assesses the percentage of marine mammal stocks within that area that could potentially be affected. Since this take authorization covers the use of no more than two SURTASS LFA sources, no further analyses are required by NMFS.

Moreover, NMFS is unaware of the use by other nations of SURTASS LFA sonar, or other systems that use an LF source (i.e., 1 kHz or below), except for the SACLANTCEN/NATO TVDS system. The cumulative impacts of the use of this system in addition to a single SURTASS LFA sonar system operating in the same ocean basin was analyzed as described in RTC SIC79.

In addition, under section 101(a)(5)(A) of the MMPA, it is NMFS' responsibility to assess the total taking by the specified activity during the specified time period for making a negligible impact assessment (see 50 CFR 216.102(a)), not the total taking by all low frequency noise sources. Finally, cumulative effects that are reasonably foreseeable were considered in the Navy's Final EIS (see Chapter 4.4) and cumulative effects that are reasonably certain to occur have been considered in the consultation for this activity under section 7 of the ESA.

*Other MMPA Concerns*

*Comment MMPAC34:* What are the consequences for LFA sonar transmissions if behavioral changes are observed? At what point is the action considered a ''take''?

*Response:* If a significant behavioral response is observed, NMFS considers a ''taking'' to have occurred. If behavioral changes are observed, observations are noted and reported to NMFS as required by the regulations and LOA. Because Level B harassment takings are authorized by the regulations and LOA, there would not be any short-term consequences, such as suspension of transmissions.

*Comment MMPAC35:* There are numerous other sources of noise in the oceans that have not received the level of scrutiny that this sonar has received (*i.e.,* ocean shipping), and the commenter believes that NMFS is obligated under the MMPA to identify such noise sources to review their potential impact on marine mammals. A coherent noise criteria policy is needed for use in all oceans involving all sources of anthropogenic noise.

*Response:* NMFS recognizes that there are many sources of anthropogenic noise in the ocean, including commercial shipping, recreational boating, offshore seismic, maritime construction, and oceanographic/fishery research. When necessary, NMFS works with those who create noise in the marine environment to ensure that marine mammals are not taken in violation of the MMPA. However, NMFS also recognizes that many sources of maritime noise are by activities that either are not subject to the MMPA (e.g., non-U.S. shipping outside the U.S. EEZ), or do not qualify for authorizations under the MMPA (e.g., non-U.S. shipping within the U.S. Exclusive Economic Zone (EEZ)). For those activities, a new approach may be necessary, either through international bodies, or additional U.S. legislation. In this regard, NMFS expects to complete a draft acoustic policy in the near future and is also planning to convene a workshop on commercial shipping noise and impacts on marine mammals.

*Comment MMPAC36:* Regulations from this issue (SURTASS LFA sonar deployment) will become the standard for ocean noise management in the U.S., and, by default, worldwide. Giving LFA the ''green light'' will completely open up the LF noise band to international commercial, industrial, and military exploitation.

*Response:* Issuance of an LOA to the Navy for this activity will have no effect on activities world-wide that produce low-mid-or high-frequency sounds incidental to conducting its activity. More persistent, anthropogenic noise sources including international commercial shipping (*e.g.,* 6,000 large vessels entering Los Angeles/Long Beach, CA harbor annually), U.S. naval activities, seismic surveys for oil and gas deposits (150 vessels world-wide), international offshore construction, oceanographic research (including mapping ocean and harbor features), and, in certain areas, recreational boating would continue in any case. Positive effects of this activity will be to refine our understanding of appropriate mitigation measures that could be used for other acoustic sources.

*Proposed Rule Concerns*

*Comment MMPAC37:* Several commenters believe that the proposed action has not met the requirement of the MMPA for a ''specific geographical region.'' The MMC states that the rationale for concluding that the 16 areas constitute specific geographic regions is too general—it glosses over biogeographic variation that is essential to understand (1) the distribution and life history features of the many and varied species that may be affected by SURTASS LFA sonar operations and (2) the nature and extent of the resulting effects. A Federal agency believes a more narrow geographic scale would be likely to enhance the assessment of effects. One organization notes that while NMFS has divided the world's oceans into 16 areas, each one enormous in size, the MMPA Legislative History specifically rules out this sweeping approach.

*Response:* NMFS defines ''specified geographical region'' as ''an area within which a specified activity is conducted and which has certain biogeographic characteristics'' (50 CFR 216.103). NMFS agrees that the 16 areas designated in the proposed rule document were not based on biogeographic characteristics as specified in the definition, but were based on other considerations by the U.N. Food and Agricultural Organization. In the proposed rule, NMFS invited additional comments on its preliminary determination. No comments were received that provided information or data on an alternative approach; the only comments received were that the proposed designations did not meet the statements made by Congress when the MMPA was amended in 1981. NMFS has reviewed the proposed specified geographic regions and has determined that a better approach is to adopt the biogeographic characteristics of biomes and provinces designed by Longhurst (1998), but with some modifications that were suggested by Longhurst (1998) in order to ensure that the specified geographic regions were in conformance with the MMPA and NMFS' definition found in 50 CFR 216.103. As revised by this final rule, there will be 15 biomes and 54 specific geographic regions under those 15 biomes, called provinces, in which the Navy may potentially operate. In addition, this rule creates several subprovinces for most of the designated provinces that are in coastal areas. Designations smaller than provinces in the offshore biomes are not biologically justified.

NMFS believes that adoption of the Longhurst approach meets the statutory mandate that the taking by the activity be within a ''specified geographical region'' since a biome is the most likely geographic region to contain the majority of a specific marine mammal stock, especially those that are migratory. While admittedly, the Longhurst schematic was designed for

plankton, it is the best scientific application available for designating specified geographic regions because no biogeographic concept has been designed for marine mammals and, in general, the distribution of marine organisms at higher trophic levels resembles the general geographic patterns of primary productivity, with the largest aggregations concentrated in coastal areas and zones of upwelling (Longhurst, 1998).

What this means for this authorization is that the Navy will be required to notify NMFS annually as to which provinces or subprovinces it intends to operate SURTASS LFA sonar system in the upcoming year, and the extent of take (by harassment) it expects to encounter during a mission. These calculations will be based on new modeling using AIM.

*Comment MMPAC38:* The conditions and effects within the broad geographic regions proposed by NMFS cannot be considered ''substantially the same.'' Congress clearly intended a more precise and smaller scale.

*Response:* In 1982, House Report 97–228 stated:

> The specified geographic region should not be larger than is necessary to accomplish the specified activity, and should be drawn in such a way that the effects on marine mammals in the region are substantially the same. Thus, for example, it would be inappropriate to identify the entire Pacific coast of the North American continent as a specified geographic region, but it may be appropriate to identify particular segments of that coast having similar characteristics, both biological and otherwise, as specified geographical regions.

Therefore, NMFS believes that it has met this Congressional intent by its present designations of 15 biomes and 54 provinces as specified geographic regions. These provinces and biomes effectively delineate the area wherein discrete population units reside thereby allowing NMFS to analyze impacts from SURTASS LFA sonar on a species and/or stock basis.

*Comment MMPAC39:* Several organizations believe that NMFS should establish the specified geographic regions based on physiographic characteristics such as undersea canyons, seamounts and other structures that might attract marine mammals.

*Response:* NMFS does not believe that the MMPA requires NMFS to designate specific, but minor, geographic regions based on physiographic characteristics such as undersea canyons, seamounts and other structures that might attract marine mammals. NMFS believes that this recommendation ignores the Congressional statement, cited in RTC MMPAC38, that specified geographic regions should not be larger than is necessary to accomplish the specified activity. Considering that the second and third, 5 to 10 km-wide (2.7 to 5.4 nm-wide), CZ ''ring'' for LFA sonar sounds can be upwards of 100 km (54 nm) and 150 km (81 nm), respectively from the vessel, small specific geographic regions as recommended would be functionally inappropriate.

*Comment MMPAC40:* A Federal agency recommends that NMFS describe in the final rule the species assemblages, their biogeography, and important life history characteristics of each of the proposed regions in sufficient detail to ascertain whether the effects on the diverse marine mammal assemblages throughout each region would be substantially similar.

*Response:* NMFS does not believe that this recommendation is warranted for this rulemaking document. Detailed information on the life history characteristics of the marine mammal populations in each of the biogeographic areas is presently unavailable, and is likely to be unavailable for decades to come. However, there is no scientific evidence to indicate that marine mammals in one area would react to the noise substantially differently from the same species in another area. Therefore, the best scientific information currently available on a species' life history parameters, that is relevant to the action, has been provided in the Navy's Final EIS (see in particular Subchapter 3.2.4—3.2.6). In addition, this information has been incorporated into the AIM which makes very conservative estimates of impacts on marine mammal species and stocks (see the Final EIS for details). For example, NMFS has no scientific information to indicate that mid- and high-frequency marine mammal hearing specialists would be affected to the same extent as low-frequency hearing specialists by the LF sounds of the SURTASS LFA sonar. However, the Navy has conservatively presumed, for this action, that these species could have a significant behavioral reaction to LF sounds, similar to those species most likely to be affected (*i.e.,* LF-hearing specialists such as the large whales that were studied during the LFS SRP). Therefore, if one considers all species and stocks to be affected (i.e., taken by harassment), there is no need to describe in detail, in this document, all life history parameters of all species within each geographic region.

The Navy, in its application and in both the Draft and Final EIS, provided significant information on each of the 31 areas modeled by the Navy. These modeled areas were provided in Table 4–1 of the application and 4.2–1 in the Final EIS. Additional areas will be modeled when information becomes available and all models will be rerun with the latest information prior to the Navy operating nearby. As mentioned in RTC MMPAC31, information on the biological parameters used in the modeling was provided in the text and numerous tables. Since NMFS has adopted the Navy's Final EIS as its own statement under NEPA as permitted by CEQ regulations (40 CFR 1506.3), it is not necessary to repeat that information here.

*Comment MMPAC41:* The rule should be in keeping with the requirements of section 101(a)(5)(B) of the MMPA, that LFA sonar operations should be suspended in and near (nominated OBIA) areas until it has been determined that such operations will not have more than a negligible impact on those species and stocks of marine mammals within the OBIA.

*Response:* OBIAs are mitigation measures that would reduce the potential level of impact on marine mammals to the lowest level practicable, not areas wherein NMFS has not made negligible impact determinations, or that takings would be more than negligible if the Navy were to operate within those areas. Since NMFS has made the necessary determinations under section 101(a)(5)(A) of the MMPA, designation of an OBIA is simply a mitigation measure designed to reduce marine mammal impacts to the lowest level practicable. However, it is highly unlikely that the Navy would conduct SURTASS LFA sonar operations within areas that might qualify in the future as OBIA areas simply because the abundance of marine mammals would increase the likelihood for SURTASS LFA sonar shutdowns due to marine mammal incursions into the safety zone. The Navy would likely find it preferable to move the SURTASS LFA sonar vessel to an area with a lesser density of marine mammals, than to continue incurring delays or suspensions of sonar transmissions.

Suspending operations in nominated OBIAs could be an incentive for opponents to the Navy SURTASS LFA sonar operations to render the small take authorization ineffective simply by nominating large numbers of areas as potential OBIAs, whether or not they might warrant inclusion as an OBIA. NMFS' process for designating OBIAs will prevent this.

*Comment MMPAC42:* A Federal agency believes that NMFS has not adequately addressed the requirement under the MMPA that a taking not have an unmitigable adverse impact on the availability of stocks of marine mammals for taking for subsistence uses. They note that while the bowhead whale is unlikely to be affected, other species taken by Alaska Natives for subsistence, including beluga whales and several pinniped species, occur within the area where operations could be conducted and are included in the list of species that could be covered by the authorization. They believe LFA sonar could cause localized shifts in the distributions of some stocks, and thus their availability to subsistence hunters.

*Response:* NMFS did not go into detail on this issue in the preamble to the proposed rule, or in this document, because an analysis of impacts on subsistence uses of marine mammals indicated an impact close to zero. In order to have an unmitigable adverse impact on subsistence hunting, an action must result in a reduction in availability of marine mammals to a level insufficient to meet the subsistence needs of Alaskan Arctic communities for marine mammals by: (1) Causing sufficient numbers of the marine mammal population subject to subsistence use to vacate subsistence hunting areas; or (2) directly displacing subsistence users; or (3) erecting physical barriers between the marine mammals and the subsistence hunters. SURTASS LFA sonar will not be deployed in Arctic waters so it will not impact subsistence hunting in the Bering, Chukchi or Beaufort seas. Beluga whale hunting is restricted to a single animal per year which is taken in northern Cook Inlet, Alaska, and therefore unlikely to be subject to SURTASS LFA sonar sounds, considering significant coastal sound attenuation prior to reaching Cook Inlet, in addition to other LF noise from nearby shipping and oil industry activities masking offshore noises. Sea lions and seals are harvested by natives on Kodiak Island and on the south side of the Aleutian Island Chain. These animals are usually shot at haul-outs or in nearshore areas. Therefore, considering the offshore location of SURTASS LFA sonar operations, it is likely that these nearshore animals would not be affected at all by any SURTASS LFA sonar sound.

*Comment MMPAC43:* A Federal agency recommends that NMFS consider ways to include the required information on mitigation, monitoring, and reporting requirements into the rule, rather than into the LOA. They state that the MMPA is clear that at least some of these information requirements are to be addressed in regulations rather than LOAs.

*Response:* The MMPA requires that regulations set forth requirements pertaining to the monitoring and reporting of the taking. These requirements, which were identified in the proposed rule's regulatory text, are found in the regulatory text of this final rule document. Specifically, monitoring requirements include the tripartite monitoring system and the conditions for conducting that monitoring. However, LOAs are issued and authorized under activity-specific regulations, therefore, they carry the same weight under the MMPA as the regulations for ensuring compliance with conditions. If detailed conditions are specified in regulations, modifications to conditions, for example improvements in monitoring and reporting, would require long lead times to implement, considering the lengthy process required for approval of regulations. Having detailed monitoring conditions in regulations would therefore hinder prompt remedial action if NMFS determined that it needed to amend conditions to improve the information being obtained under monitoring and reporting. Delaying the ability to obtain this information for a significant time simply is not warranted. For that reason, the LOA will contain specific conditions and instructions on mitigation, monitoring, and reporting, while the regulations will contain general requirements to comply with the MMPA.

*Comment MMPAC44:* The Navy cannot measure incidental takes over large ocean areas. There is no means to monitor Level B takes. Neither the proposed rule nor the Final EIS provide data or analyses to support the assumption that intermittent and relatively short-term behavioral disruptions will not affect the survival or productivity of individual marine mammals or the populations they comprise. Before issuing the proposed incidental take authorization, NMFS: (1) Needs to provide an adequate rationale to support this assumption, and/or (2) needs to augment the monitoring program to ensure that the information necessary to confirm the validity of this assumption is obtained.

*Response:* While the Navy is unable to directly measure or observe effects on marine mammals at ranges much greater than the 180–dB sound field due to inability to observe much farther from the vessel, such monitoring can be conducted under a research monitoring protocol. This is one of the highest priority research topics to be conducted over the next 5 years. NMFS expects the Navy will undertake a long term study in an area where it expects to conduct missions on a more frequent basis than normal. This will provide the Navy and NMFS with information on long-term trends. Being unable to prove a negative, that is, that there is no long-term impact on marine mammal stocks due to SURTASS LFA sonar, this research is the best alternative available and is supported by the findings of Swartz and Hofman (1991).

Not having direct evidence to date, NMFS must rely on supplemental information to support its findings of negligible impact. For example, In Jasny (1998), the author states:

> A modern-day supertanker cruising at seventeen knots * * * fills the frequency band below 500 Hz with a steady sonic blare, reaching levels of 190 dB or more; mid-sized ships such as tugboats and ferries produce sounds of 160 to 170 decibels in the same range. The cumulative output of all these vessels-container ships and tankers, oceanliners and dayboats, icebreakers and barges-is an incessant noise of near-constant loudness, outdone in the lower register only by the occasional earthquake or storm, or by the chance passing of some closer source.

With a single exception (icebreakers), the author has described southern California waters. With approximately 6,000 large vessels entering the Los Angeles-Long Beach harbors annually, long term effects from general LF noise should be evident at this (and similar) locations long before long-term effects could be detected from a short-term (72 hours out of 720 hours (30-day mission)) single source of low frequency noise operating in up to six different oceanic regions and affecting different marine mammal populations annually. Since marine mammal populations have not indicated survival or productivity difficulties in southern California—on the contrary increasing stock sizes of blue and gray whales and pinnipeds have taken place in that area—NMFS has determined that there will not be a more than negligible impact to those marine mammal stocks that are affected by SURTASS LFA sonar sound.

As mentioned elsewhere, NMFS presumes that animals would be affected by LFA sonar for a maximum of 72 hours out of each 30-day mission (presuming maximum 20-percent duty cycle) and that no marine mammal stock would incur an incidental harassment greater than 10 to 12 percent of that stock's size over the course of each LOA's period of effectiveness (1 year). In addition, the sound characteristics of SURTASS LFA sonar are such that marine mammals outside the sonar ray

path of SURTASS LFA sonar will not be subject to high levels of sounds (outside the sonar ray path, intensity will immediately diminish by 30 dB, or by 1,000 times that inside the ray path). Moreover, for a significant portion of the distance between the edge of the safety zone and when the first or second CZ deflects towards surface waters, the CZ, with its higher SPLs, will be below the area of the water column inhabited by marine mammals. All these facts support NMFS findings that there will not be more than a negligible impact on marine mammal stocks.

*Comment MMPAC45:* A Federal agency notes that in the Preliminary Conclusions of the Proposed Rule (March 19, 2001 (66 FR 15375) page 15389 first column), the term ''* * * mitigation measures to prevent injury * * *'' should be changed to read ''* * * mitigation measures to minimize injury (Level A harassment) * * *''

*Response:* NMFS concurs.

*Comment MMPAC46:* NMFS indicated that it would provide opportunity for public comment for ''substantial modifications'' to LOA requirements before such modifications are made, but provides no indication as to what would be viewed as a ''substantial modification.'' The final rule document should specify the nature of non-substantial modifications that could be made without public comment.

*Response:* This final rule document contains a discussion of the conditions of the LOA including prohibitions, requirements for mitigation, monitoring and reporting. Changes to these conditions would require a public comment period prior to implementation, unless NMFS determines that an emergency exists that poses a significant risk to the well-being of the species/stocks of marine mammals affected (see 50 CFR 216.106(e) and (f)). Non-substantial modifications were identified in the proposed rule and in this final rule. Essentially, non-substantial modifications include: (1) Renewing an LOA for an additional year, (2) listing of planned SURTASS LFA sonar operating areas, or (3) moving the authorized SURTASS LFA sonar system from one ship to another. They would also include amendments to the LOA that NMFS believes would clarify (but not change) the LOA conditions.

*Comment MMPAC47:* A state agency recommends that section 216.187 of the proposed rule should be amended to provide potentially affected states with timely notice of the Navy's application for an approval letter.

*Response:* NMFS does not consider it necessary to have an annual public review for each LOA. NMFS believes that the determinations made in this document provide the necessary findings required under the MMPA. Once these findings have been made, it is unnecessary for NMFS to reconsider them annually during the 5-year authorization process unless new scientific information becomes available that is significantly contrary to the science used by NMFS during this rulemaking. As noted in the regulations, NMFS will notify the public within 30 days of issuance of an LOA. That notification would provide notice if the Navy had requested a taking authorization for an area of concern to a State.

However, a state can petition NMFS for a modification whenever it has documentary evidence that the determinations made by NMFS are no longer valid. NMFS notes that procedures are established under the CZMA to address this issue. NMFS recommends that those coastal states with Federally-approved CZMA programs that have concerns over SURTASS LFA sonar, follow the procedures outlined in the regulations (15 CFR part 930). NMFS notes that for states along the U.S. Eastern Seaboard, the OBIA1 restriction for SURTASS LFA sonar operations inside the 200-m (656.2-ft) isobath limits sound levels inside state waters to levels significantly less than other sources for which states have not imposed restrictions on noise under their CZMA authority as required under 15 CFR part 930. However, the regulations note that a state is required to apply its policies uniformly and consistently and not apply policies differently (e.g., holding a Federal agency to a higher standard than a local government or private citizen) and NMFS will give careful consideration to the CZMA regulations whenever it is in receipt of a petition under this subpart.

*Comment MMPAC48:* Only a 45-day period was provided for the public to comment on the proposed rule and Final EIS. An extension is required to June 17, 2001.

*Response:* The comment period for the proposed rule was extended from the original date of May 3, 2001 to May 31, 2001; a total period of 73 days. The Navy's Final EIS has been available to the public since January 2001.

*Comment MMPAC49:* The LOA and regulations are inadequate to protect the North Atlantic right whale per NMFS' mandate. Right whale ship strike data alone suggest that the LFA vessel could transmit while sailing right over a right whale. They simply do not react to ships and other danger. As the potential for biological removal for this stock under the MMPA is zero, the take by LFA transmissions of even one individual could constitute jeopardy under the ESA. What are the take levels for the North Atlantic right whale?

*Response:* NMFS has completed consultation under section 7 of the ESA. The finding of that consultation was that operation of the SURTASS LFA sonar is not likely to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS. A copy of the Biological Opinion issued as a result of that consultation is available upon request (see **ADDRESSES**). NMFS believes that through establishment of OBIA1, and implementation of the tripartite monitoring and mitigation program, it is very unlikely that North Atlantic right whales will be affected by SURTASS LFA sonar. Figure 2 illustrates the extent of protection offered by OBIA1 in relation to right whale critical habitat. The potential for even a single right whale to be seriously injured is, therefore, exceedingly remote. Considering the number of other activities, such as commercial shipping and oil and gas exploration (off the east coast of Canada), SURTASS LFA sonar operating off the East Coast of the United States would add an insignificant amount of noise to the already high levels of noise along the coast, if it were to operate in the Northwest Atlantic.

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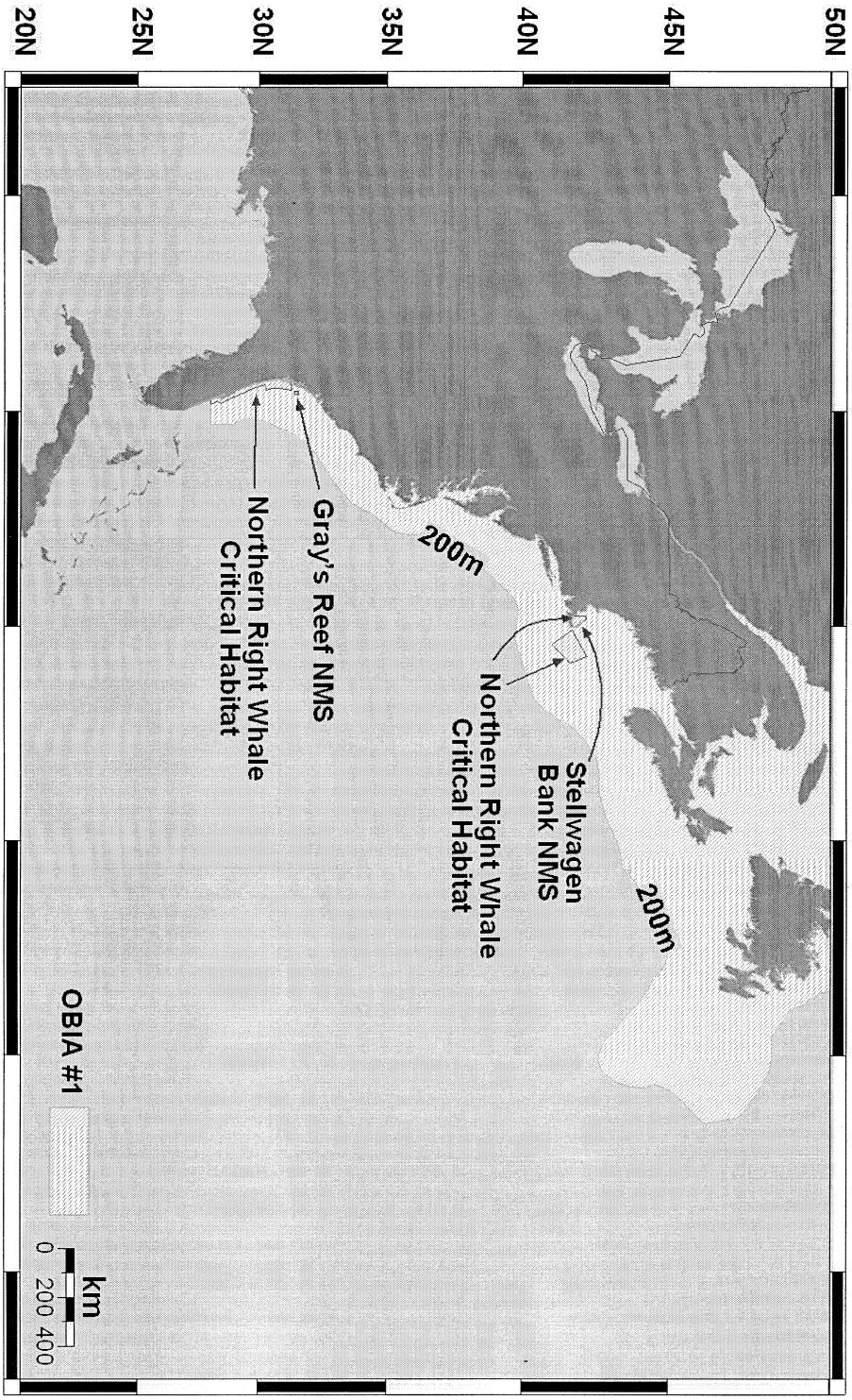


**Offshore Biologically Important Area #1 for SURTASS LFA Sonar Operations**

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The potential for a ship strike by the SURTASS LFA vessel is minimal because it will not operate in right whale critical habitats and migration

corridors and its maximum speed is 3 knots. This is well below the maximum allowable speed of 7 knots for whale watch vessels when within one-half mile of a large whale. When not operating SURTASS LFA sonar, the ship will follow standard procedures for avoiding collisions with whales.

*Comment MMPAC50:* Section 216.191 appears to provide for additional protection through the addition of areas that would be subject to protection under § 216.183(d), but does not expressly provide for ''additional protection'' (e.g., received levels less than 180 db). Section 216.191 should also provide a process for additional protection within areas designated under 216.183(e).

*Response:* Paragraph 216.191 (in 50 CFR) provides a process for nominating areas as OBIAs, not for adding additional mitigation measures either inside or outside existing or nominated OBIAs. To add additional mitigation measures either inside or outside an OBIA, applicants would need to petition NMFS under the APA as described elsewhere in this document. However, NMFS has amended § 216.183(d) to make it more clear that operating SURTASS LFA sonar with sound levels in excess of 180 dB inside a designated OBIA is prohibited.

*Comment MMPAC51:* The deferral of action to identify additional OBIAs for up to 8 to 12 months as part of this rulemaking inappropriately increases the possibility that NMFS will authorize SURTASS LFA sonar operations in biologically important areas thus making a finding of negligible impact questionable. The addition of new areas appears to be contingent on NMFS and Navy approval. What will the status of candidate OBIAs be during this period? Will LFA operations be halted?

*Response:* Please see RTC MMPAC41, especially in regard to making a negligible impact determination. As noted there and in the proposed rulemaking, NMFS is following established rulemaking procedures for designating OBIAs under this action. The establishment of new OBIAs is contingent upon notice-and-comment rulemaking and will not be effective until an amendment to 50 CFR 216.183(e). NMFS will make a preliminary and final determination of establishment of new OBIAs on the best science available. Any interested party or organization, including the Navy, will have the opportunity to comment on any OBIA petition. One criterion to consider will be any national security concerns.

*Comment MMPAC52:* NMFS's proposed procedure for designation of additional OBIAs places the burden of proof on the public to show that offshore areas are important for marine mammals breeding, feeding, or migration. This appears to be contrary to the section 101(a)(5)(B) of the MMPA. Sonar operations should be suspended or prohibited in any area where marine mammals occur in above average densities until it is determined that such operations will not have more than a negligible impact on those species or stocks.

*Response:* NMFS has made a negligible impact determination for the Navy's operation of SURTASS LFA sonar for routine training and testing as well as the use of the system during military operations. OBIAs, on the other hand, are established in order to reduce the potential for taking marine mammals to the lowest level practicable as required by § 101(a)(5)(A)(ii)(I). SURTASS LFA sonar operations will be suspended whenever a marine mammal enters the 180 dB safety zone or is detected within 1 km (0.54 nm) of the 180-dB safety zone, independent of the density of marine mammals in that area. It should be recognized that suspension of sonar transmissions due to marine mammal presence interferes with training or other military operations; therefore, it is unlikely that the Navy would intentionally operate in areas of high marine mammal abundance or remain within such an area if it expected significant shutdowns.

*Comment MMPAC53:* NMFS should describe the procedures to be followed if data become available suggesting that continued operations in an area is having, or may have, more than a negligible impact on marine mammal species or stocks.

*Response:* The procedure is described in 50 CFR 216.106. If, as a result of information obtained through the LTM requirements, new scientific research under the LTM program, or from other credible sources that becomes available, NMFS determines that the taking either in a single province, several provinces, or in a biome is having more than a negligible impact on affected species or stocks, 50 CFR 216.106(e) requires that LOAs will be withdrawn or suspended, after notice and opportunity for public comment. The requirement for notice and opportunity for public review shall not apply if NMFS determines that an emergency exists that poses a significant risk to the well being of the species or stocks of marine mammals concerned.

*LOA Concerns*

*Comment MMPAC53:* Who will be the holder of an LOA?

*Response:* The holder for the LOA for the SURTASS LFA sonar systems will be the Chief of Naval Operations, or his duly appointed representative.

*Comment MMPAC54:* One organization states that the proposed LOA is for incidental taking by harassment and non-serious injury only, which is Level B Harassment. They believe that, because NMFS has stated that some Level A harassment still needs to be considered possible, the Navy would need a Level A harassment permit as well.

*Response:* Separate authorizations are not required under the rulemaking. The Navy has applied for an authorization to take marine mammals by harassment (as that term is defined in the MMPA), which means that marine mammals may be injured (Level A Harassment), but not killed, or they may experience disruptions in behavioral patterns (Level B Harassment). The MMPA does not distinguish between serious and non-serious injury. However, for reasons stated elsewhere in this document, NMFS believes that the potential for any marine mammals to be injured is negligible.

*Public Hearing Concerns*

*Comment MMPAC55:* Commenters expressed concern that Navy proponents were at the same table with the NMFS hearing officer at the proposed rule's public hearing.

*Response:* The NMFS hearing officer at the public hearing explained that responses to public comments and questions would be provided during the hearing if time allowed. Since most questions were expected to be in regard to the SURTASS LFA sonar system and the scientific research program, NMFS believed it would facilitate the hearing process to have the Navy available at the table microphone for reply. No intent should be presumed other than one to facilitate the hearing procedure.

*Comment MMPAC56:* Commenters questioned why the hearing panel consisted of only one person and why others, who would be expected to be in the decision-making for the final rule, were not in attendance.

*Response:* NMFS did not state that it would convene a hearing panel, and planned only to have a hearing officer, mainly to ensure that as many people that wished to testify had the opportunity to do so. Since court reporters were contracted to obtain transcripts of the hearings, and because these transcripts are part of NMFS' Record of Decision on this matter, and may be reviewed by decision-makers, attendance by decision-makers at the hearing was not necessary.

*Comment MMPAC57:* Discuss the validity of the audio demonstration at the public hearing. NMFS tried to stop this acoustic demo at the public hearing.

*Response:* To allow as many people as possible to speak in the allotted hearing time, NMFS limited the time each individual or group had to present their comments. There were no cases during the public hearings in Los Angeles, Honolulu, or Silver Spring where speakers were not allowed to speak or were deterred by NMFS personnel for other reasons. One individual was questioned prior to the Los Angeles hearing when, without introducing himself to the NMFS Hearing Officer, he began to set up speakers and amplification devices. After questioning, and once it was determined that the Federal Government would not be liable for any illnesses resulting from the broadcasts, (illness had been alleged at previous hearings when transmissions were broadcast by the Navy), NMFS allowed the individual to broadcast his demonstration, which was composed of two LF oscillators, one at 250 Hz and the other at 250 to 270 Hz, creating a beat frequency oscillation.

According to the Navy, it is difficult to evaluate the validity of the audio demonstrations presented at the Los Angeles and Silver Spring, MD hearings without specific technical information, which was not provided. It should be noted, however, that these demonstrations were conducted by different people using the same or similar equipment. Both demonstrations reportedly broadcast sound levels in air of 85 dB and 100 dB (re 20 μPa @ 1 m) (actual measurements were not made at the demonstration) which were claimed to be equivalent to the underwater SPL of the SURTASS LFA sonar source at about 10 to 40 mi (16 to 64.4 km). However, according to witnesses to both demonstrations, the levels at the Los Angeles hearing were markedly louder. The validity of the demonstrations is, therefore, unknown.

*Other MMPA Concerns*

*Comment MMPAC 58:* Causing short-term behavioral responses in whales is a violation of the MMPA when applied to whale-watching, as determined by NMFS guidelines, and in the case of Hawaii, regulations.

*Response:* NMFS clarifies that the whale watching industry is not authorized to ''take'' marine mammals, either intentionally or incidentally, therefore, harassment takings are illegal.

*Comment MMPAC59:* There are international implications of SURTASS LFA sonar outside the U.S. EEZ and non-U.S. parties were not given an opportunity to comment. Also, an international panel comprised of political, scientific, and military experts from all countries with maritime interests regarding this type of technology should be convened by NMFS prior to issuing an LOA.

*Response:* NMFS received comments from citizens around the world, during the 75-day rulemaking comment period. However, there is no requirement in U.S. law that requires Federal Government agencies to solicit comments internationally prior to making determinations that affect U.S. actions, especially U.S. military activities. NMFS presumes that if there is sufficient interest in anthropogenic noise sources in the marine environment, appropriate international bodies will convene such a panel.

*Comment MMPAC60:* A Federal agency notes that the proposed rule on page 15376, column 1, paragraph 1 (66 FR 15375, March 19, 2001) indicates that the Navy has applied for an incidental take authorization to operate the SURTASS LFA sonar for a period of time not to exceed 5 years. Presumably, the Navy plans to use the sonar for an indefinite period of time and the 5-year period is the maximum authorization period under the MMPA. This should be made clear. Also, possible cumulative effects beyond the requested 5-year authorization should be considered in the development of monitoring and reporting requirements for any authorization issue.

*Response:* In the Final EIS (RTC 4–10.7), the Navy states that the expected life span of each SURTASS LFA sonar is approximately 20 years. NMFS expects that the Navy will apply for consecutive 5-year authorizations as provided under the MMPA and implementing regulations. This will require the Navy to resubmit a new petition for regulations every 5 years. While NMFS can only legally require the Navy to perform monitoring and research during each of the 5-year authorization periods, as part of any reauthorization process, NMFS will review the required reports and research undertaken during the first 5-year authorization and apply this new information to subsequent rulemaking determinations.

*ESA Concerns (ESAC)*

*Comment ESAC1:* Did ESA section 7 consultation begin on August 1999 or May 1998? The Final EIS stated that consultation began in August 1999. NMFS letter of 27 January 1999 stated that the Navy requested consultation with the NMFS under Section 7 of the ESA in its letter of 18 May 1998.

*Response:* In its letter of 18 May 1998, the Navy requested assistance from NMFS pursuant to Section 7 of the ESA in providing compilations of listed, proposed, and candidate threatened and endangered species under the jurisdiction of the NMFS. This letter initiated informal consultation with the NMFS under section 7 of the ESA. This letter is included in Appendix A of the both the Draft EIS and Final EIS. Formal consultation commenced on October 4, 1999.

*NEPA Concerns (NEPAC)*

*Comment NEPAC1:* Under NEPA regulations the Navy should prepare a Supplemental EIS (SEIS) based on significant new information (letter from Natural Resources Defense Council dated May 31, 2001 and Earth Island Institute letter dated September 27, 2001). This information includes: (1) The potential for non-auditory physiological impacts on marine mammals induced by acoustic resonance of the LFA sonar signal in the bodies of the animals; (2) Dr. Tepley's document which addresses the issue of resonance effects in air spaces within the sinus and middle ear cavity of marine mammals; (3) correlation between naval maneuvers and other mass strandings and multi-species strandings of beaked whales; (4) the ability of present and future passive sonar technologies to meet the long-range detection requirements; and (5) the operation of LFA sonar with other active sonar systems by domestic and foreign navies including LFA sonar currently being developed by other nations.

*Response:* CEQ's regulations governing NEPA require Federal agencies to prepare an SEIS if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts (40 CFR 1502.9(c)(1)). NMFS has reviewed the above information and believes that this information does not constitute significant new information that would require the development of an SEIS in accordance with 40 CFR 1502.9(c)(1)(ii). The rationale for this determination is supported by information provided elsewhere in this document and summarized here.

(1 and 2): As discussed previously in several RTCs in this document, the potential impacts of non-auditory physiological impacts, such as tissue damage potentially caused by resonance, will occur at an SPL of 180 dB or higher (Cudahy and Ellison, 2002). Therefore, because the Draft and Final EISs used 180 dB as the criterion

for the determination for the potential for injury and for the implementation of geographic and monitoring mitigation measures, non-auditory physiological impacts were analyzed in these documents. Because SURTASS LFA sonar will use extensive mitigation measures (passive acoustic, visual observers, and a new HF/M3 sonar), injury is unlikely.

(3) As noted in RTCs MMIC24a and MMIC25, the data show that 5 of 49 beaked whale stranding events that occurred possibly were related to military maneuvers (Potter, 2001). Two of these were definitely not related to sonar activity: (a) April 3, 1974, four Cuvier's beaked whales at Bonaire, Lesser Antilles, in the area where a naval vessel was dumping ammunition which caused an underwater explosion; and (b) December 17–22, 1974, three Cuvier's beaked whales and one striped dolphin stranded in Corsica. The striped dolphin had bullet wounds. Simmonds and Lopez-Jurado (1991) state that between 1982 and 1989 there were 22 strandings of cetaceans in the Canary Islands, with three being related to military activity. Therefore, the data do not necessarily suggest a high correlation between naval activities and beaked whale strandings, nor do they provide evidence of causation. Strandings were discussed in the Final EIS on pages 3.2–45 to 3.2–47.

(4) As stated in the Final EIS at page 2–2, LFA ''is an augmentation to the passive (SURTASS) detection system, and is planned for use when passive performance is inadequate.'' In many instances passive sonar can provide the detection required. However, under certain conditions, such as areas of high ambient (background) noise (*e.g.,* high shipping density), passive sonar cannot detect quiet targets. Therefore, passive systems alone cannot meet the Navy's requirement to detect quiet, hard-to-find submarines during *all* conditions, particularly at long ranges. Additional discussion of passive sonar technologies can be found in the Final EIS (RTCs 1–2.1, 1–2.2, and 1–2.3 and RTC AC11).

(5) As stated in RTC SIC79 and MMPAC33 in this document, neither the Navy nor NMFS is aware of the use by other nations of SURTASS LFA sonar, or other systems that use a LF source (i.e., 1 kHz or below), except for the SACLANTCEN (NATO) TVDS system. While the U.S. Navy does not intend to operate SURTASS LFA sonar with this NATO system, an analysis of cumulative impacts was conducted in the Navy's Final EIS. Please see RTC SIC79 for more information. Since this is not a reasonably foreseeable future action, additional assessments of the potential impacts to the marine environment would, at best, be speculative at this time.

*Comment NEPAC2:* The Final EIS, with its official responses, is inadequate to defend the program as presented by NMFS. NMFS must not rely upon the Final EIS for any management standards or rulemaking for human noise in the oceans. By accepting the Final EIS, NMFS has accepted responsibility for all the Final EIS inadequacies.

*Response:* NMFS believes that the Final EIS document meets the requirements under NEPA and its implementing regulations (40 CFR parts 1500–1508). As a result, NMFS has determined that, in accordance with CEQ regulation at 40 CFR 1506.3(a), the Navy's NEPA statement meets the requirements of the CEQ regulations and has, therefore, adopted the Navy Final EIS as its own NEPA document for this action.

*Comment NEPAC3:* The EIS, especially the modeling, should be peer-reviewed.

*Response:* The EIS, and thus its analyses, have met or exceeded all of the review and comment periods required by law. NMFS notes that there is no requirement under NEPA for an EIS to be peer-reviewed. The Navy's Draft EIS was available for review and comment by all, including independent scientists, the comment period was sufficiently long to allow review by scientists, and a number of scientists provided comments to the Navy and/or NMFS. NMFS considers these public review periods to more than satisfy the commenter's concern that scientists provide input into the Navy's proposal, including the AIM. Moreover, as an alternative model has not been suggested, NMFS adopts the Navy's AIM as the best model available for its determination of negligible impact.

*Comment NEPAC4:* The Final EIS responses to comments demonstrate a range of denials, dismissals, deflections, misstatements, and inaccuracies, with occasionally an objective and factual response. Many comments/questions were ignored. The answers to comments were glib and perfunctory. Examples include Comment 4–4.13, 4–4.14.

*Response:* Because the commenters failed to identify the specific comments/questions that they claim have been ignored (except RTC 4–4.13 and 4–4.14), no response is possible. RTC 4–4.13 and 4–4.14 were based on scientific input from recognized marine biologists and underwater acousticians. NMFS recognizes that there is often disagreement about a response; however, this is different from being non-responsive. RTCs 4–4.13 and 4–4.14 are examples of this difference of opinion.

*Comment NEPAC5:* The comments of the MMC, pertaining to the Navy's SURTASS LFA sonar, and NMFS authority in the matter, are contained in a letter to Joseph Johnson (i.e., NEPA program manager for the SURTASS LFA sonar program) dated October 27, 1999. Their comments, though delivered in a low-key style, are damning in the extreme. See the list from Animal Welfare Institute letter of May 29, 2001 to NMFS, page 2, comments of the MMC pertaining to the Navy's SURTASS LFA Sonar Draft EIS.

*Response:* The MMC's comments on the Draft EIS were addressed by the Navy in the Final EIS Response to Comments. Some of those issues are repeated in this document. NMFS believes the MMC's concerns have been adequately addressed in either the Final EIS or this document.

*Comment NEPAC6:* Whereas the Final EIS was written by the contractor, eager to sell LFA, and the Navy, anxious to use it, the first responsibility of NMFS is the conservation of ocean resources, not military needs.

*Response:* CEQ regulations (40 CFR 1506.5(a)) state, ''Contractors shall execute a disclosure statement prepared by the lead agency, or where appropriate by the cooperating agency, specifying that they have no financial or other interest in the outcome of the project.'' This disclosure statement has been executed. The contractor assisted in the preparation of the EIS; however, Navy representatives made all decisions for the Navy. Marine Acoustics Incorporated, the contractor who provided support to the Navy for the SURTASS LFA sonar NEPA process is not affiliated with the manufacturer of the SURTASS LFA sonar.

Knowing that the Navy's SURTASS LFA sonar had the potential to take marine mammals incidental to its operation, and, that there was consideration being given at the time that an incidental, small take application would be submitted by the Navy, NMFS agreed to be a cooperating agency on the preparation of the EIS to meet its NEPA obligation required because of rulemaking under the MMPA, not the ''military needs'' of the Navy. See Comment 45 in the SURTASS LFA sonar proposed rule for a more detailed discussion.

*Comment NEPAC7:* The Navy has already cut contracts for 23 more LFAS vessels. By limiting the Final EIS to just four test ships while fully intending to use 27 ships or more of the same type, the Navy is guilty of ''segmentation.''

*Response:* According to the Navy, it has no plans, nor have any contracts been awarded, for the construction of 23 additional SURTASS LFA sonar vessels.

*Comment NEPAC8:* Why wasn't the NEPA process commenced in the late 1980s? Why weren't LOAs requested for these tests?

*Response:* Early LF acoustic research testing was not considered a major Federal action significantly affecting the quality of the human environment under NEPA and was not considered to involve the taking of marine mammals under the MMPA. As the program developed and the building blocks of the operational system were put in place, the project moved out of the classified phase and into a mostly unclassified phase, while it became increasingly apparent that SURTASS LFA operations could possibly affect the marine environment. As additional testing was conducted, appropriate analysis under NEPA was conducted and the potential for MMPA impacts assessed. On several occasions, under proper procedures for handling classified material, the Navy consulted with NMFS under section 7 of the ESA on these activities. Also, the Navy prepared Environmental Assessments for the LFS SRP in June, 1997 (Phase I), November, 1997 (Phase II), and February, 1998 (Phase III). Scientific research permits were issued under section 104 of the MMPA for the LFS SRP.

*Comment NEPAC9:* The EIS is inadequate for the following reasons:

*Comment NEPAC9a:* The EIS is less than objective because of the irreversible and irretrievable commitment of hundreds of millions of dollars.

*Response:* Irreversible and irretrievable commitment of funds is addressed in the Final EIS Chapter 9 and RTC 1–3.5. As stated in the Final EIS, money spent to date related to the SURTASS LFA sonar program falls into several different categories. SURTASS LFA sonar itself was the result of a lengthy research and development program that represented a substantial expenditure of funds. In addition, the Navy contracted for refit/construction of vessels that were capable of carrying the equipment for the passive (listening only) component (SURTASS) as well as the active component (LFA). Also, the LFS SRP was expensive, but it contributed significantly and directly to the EIS process. In any event, the monies expended on the SURTASS LFA sonar program do not bind the Navy to deploy the SURTASS LFA sonar as proposed.

*Comment NEPAC9b:* The Navy failed to investigate the use of the system during ''heightened threat conditions.''

*Response:* Use of the system during ''heightened threat conditions'' is addressed in the Final EIS (RTC 1–1.8 and 1–1.9) and in this document (see RTC AC2).

*Comment NEPAC9c:* A failure to consider alternatives to the LFA sonar that might achieve the same purpose with less impact to the environment, such as passive sonar.

*Response:* Alternatives to SURTASS LFA sonar, including passive sonar, are covered in the Final EIS Subchapters 1.1.3 and 1.2.2 and RTCs 1–2.1, 1–2.2, 1–2.3, and 2–3.3a.

*Comment NEPAC9d:* Large data gaps exist.

*Response:* Data gaps are discussed in detail in the Final EIS (RTCs 1–3.6, 2–3.4, 2–3.7, 2–4.2, 3–8.1, 3–8.3, and 4–4.1). In the Final EIS Subchapter 1.4.4, the Navy discusses scientific data gaps regarding the potential for effects of LF sound on marine life. In addition data gap concerns have been addressed in this document.

*Comment NEPAC9e:* The Final EIS relies on the limited LFS SRP.

*Response:* The Final EIS did not rely solely on the results of the LFS SRP. This is discussed in detail in Subchapter 1.4 of the Final EIS.

*Comment NEPAC9f:* The analysis did not consider the increasing stress levels in the oceans.

*Response:* In the Final EIS Subchapter 4.4 potential cumulative impacts are analyzed in the context of recent changes to ambient sound levels in the world's oceans.

*Comment NEPAC9g:* The integrity of the Navy's independent researchers is questioned because the Navy funded their time to do the research. There is a conflict of interest because the Navy funded the research.

*Response:* Recognized experts in the fields of marine biology and bioacoustics independently planned and executed a series of Navy-sponsored scientific field research projects to address the most critical data gaps on the effects of LF sound on the behavioral responses of free-ranging marine mammals. NMFS believes the integrity of the LFS SRP independent researchers is sound.

CEQ regulation 40 CFR 1502.22(a) states that if there is incomplete information relevant to the impact analysis and the choice among alternatives and the cost to obtain it is not exorbitant, the agency (in this case the Navy) shall include this information in the EIS. Because of the concerns of the scientific community and environmental groups, the Navy conducted the LFS SRP and diver's studies despite the cost of over $10M. Finally, the funding of the research by the Navy is authorized by federal regulations.

*Comment NEPAC10:* A conflict of interest exists because two employees of NMFS were involved in the preparation and review of the EIS.

*Response:* See Final EIS RTC 14–1.1 and Comment 45 of NMFS' proposed rule document.

*CZMA Concerns*

*Comment CZMA1:* Why has NMFS failed to consider the Navy's lack of compliance with the CZMA as an issue in preparing the rule?

*Response:* Under the CZMA Federal Consistency Regulations, Federal agencies shall review their proposed activities to determine: (1) That there will be no coastal effects, or (2) that Federal activities which affect any coastal use or resources are undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of state's approved management programs. At the Draft EIS stage, which is the document NMFS had for use when drafting the proposed rule, the Navy submitted that document to 23 states and 5 territories that could potentially be affected by SURTASS LFA sonar operations and had approved CZMA programs. Since that time, the Navy has completed the consistency process for all coastal states that could be potentially affected by LFA (22 states) and territories, with the exception of California. The Navy will apply to California prior to planned exercises in their waters. On August 7, 2001, the Maine Coastal Program requested supplemental coordination based on potential effects of the SURTASS LFA sonar operations on the northern right whale and other resources of Maine's coastal zone prior to the Navy's deployment of the system in the Gulf of Maine. The Navy replied on October 2, 2001 stating that SURTASS LFA sonar would not be operated in the Gulf of Maine or in any critical habitats of the northern right whale. The system would not be operated within the 200-meter (656.2-ft) isobath as per the geographic restrictions of OBIA#1 for the eastern seaboard. Therefore, the Navy determined that supplemental consultation is premature.

*Magnuson-Stevens Fisheries Conservation and Management Act (Magnuson-Stevens Act) Concerns*

*Comment MAC1:* What is the effect of LFA on essential fish habitats (EFH)? A

commenter wants to know why the Navy did not follow the Draft EIS comments of NMFS Office of Protected Resources and Office of Habitat Conservation that the Navy initiate consultation under the Magnuson-Stevens Act, or explain in the Final EIS the basis for their conclusion that the proposed action would not adversely affect EFH.

*Response:* The Navy has determined that the proposed action would have no adverse effects on EFHs (Navy letter, Serial 01C/069 of February 28, 2000) (See the Final EIS, Appendix A (Correspondence)). The potential impacts of the proposed action on fish stocks are discussed in the Final EIS Subchapter 4.1.1 and RTC 4–1.2. The Navy responded to the subject comment by NMFS in the Final EIS (RTC 6–1.4).

*Miscellaneous Concerns (MC)*

*Comment MC1:* The link between funding and the LFA invites investigation. One immediate example is the recent adjustment of funds from NMFS in support of right whales. NMFS has recently changed funding priorities, removing support from the disentanglement program, population studies, and a related scarification project, while allocating a very large sum to at least one other scientist closely related to the LFA.

*Response:* NMFS does not know the identity of the scientist referred to in the comment. Without knowing more, NMFS cannot respond fully to this comment. NMFS funding has been used for a broad spectrum of contract work and internal work on right whales, including the New England Aquarium, Oregon State University, and Woods Hole (including economists). These are for research tasks, specifically for right whale research and recovery actions. Other scientists studying right whales have received funding from the North East Consortium. The Consortium funding is from an independent peer-review, not from NMFS.

*Comment MC2:* NMFS has made several preliminary determinations relating to the LFA based on impracticality, for example, specifically migration corridors. By definition, it will always be impractical to establish management rules or constraints on anthropogenic noise because all solutions will be impractical to someone. Also, one organization would like NMFS to better address protection measures to minimize potential impacts to humpback whales along their migratory corridors.

*Response:* What NMFS stated in the preamble to the proposed rule was that it would be impractical to structure regulations specifying migratory corridors. As indicated in this document, because the tripartite mitigation will be above 95-percent effective, it is unnecessary to prohibit Navy SURTASS LFA sonar operations from wide swaths of ocean simply because it is used by a whale stock that is widely dispersed in space and time within that corridor. There is little information available on open ocean whale migration; for example, the actual migration routes of North Pacific humpback whales are generally unknown. Recent research has shown that between Hawaii and Alaska humpback whales tend to follow a migratory corridor that is within 1 degree of magnetic north (Mate *et al.*, 1998). Furthermore, Norris *et al.* (1999) and Abileah *et al.* (1996) have determined ''loosely defined'' migration corridors are bounded by longitudes 150/155 degrees W. and 160 degrees W. and latitudes 30 degrees N. and 40 degrees N. Migrating humpback whales observed in the Atlantic are usually alone or in small pods of 4 to 5 individuals. Based on this information, it can be estimated that this humpback whale migration route is between approximately 300 to 600 nm (555.6 to 1111.2 km) wide in the Pacific Ocean. Therefore, the density of humpback whales would be expected to be low, and with the proposed mitigation these open ocean migration corridors will not be affected any differently than any other open ocean area.

*Comment MC3:* NOAA and the Woods Hole Oceanographic Institute (WHOI) have LFA technology on their research ships.

*Response:* NMFS does not know the commenter's meaning of ''LFA technology'' however, SURTASS LFA sonar is not onboard NOAA or WHOI vessels. These vessels do, however, have research capabilities using various types of sonar for sea bottom mapping, acoustical measurements of ocean parameters, and living marine resource assessments.

**Affected Marine Mammal Species**

In the Navy Draft and Final EIS analysis and its small take application, the Navy excluded from take consideration those marine mammal species that either do not inhabit the areas in which SURTASS LFA sonar would operate, do not possess sensory mechanisms that allow the mammal to perceive LF sounds, or are not physically affected by LF sounds. Where data were not available or were insufficient for one species, comparable data for a related species were used, if available. Because all species of baleen whales produce LF sounds, and anatomical evidence strongly suggests that their inner ears are well adapted for LF hearing, all balaenopterid species are considered sensitive to LF sound and at risk from exposure to LF sounds. The eleven species of baleen whales that may be affected by SURTASS LFA sonar are blue (*Balaenoptera musculus*), fin (*Balaenoptera physalus*), minke (*Balaenoptera acutorostrata*), Bryde's (*Balaenoptera edeni*), sei (*Balaenoptera borealis*), humpback (*Megaptera novaeangliae*), northern right (*Eubalaena glacialis*), southern right (*Eubalaena australis*), pygmy right (*Capera marginata*), bowhead (*Balaena mysticetus*), and gray (*Eschrichtius robustus*) whales.

The odontocetes (toothed whales) that may be affected because they inhabit the deeper, offshore waters where SURTASS LFA sonar might operate include both the pelagic (oceanic) whales and dolphins and those coastal species that also occur in deep water including harbor porpoise (*Phocoena phocoena*), beluga, *Stenella spp.*, Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), Fraser's dolphin (*Lagenodelphis hosei*), right-whale dolphin (*Lissodelphis spp.*), *Lagenorhynchus spp., Cephalorhynchus spp.,* bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), Dall's porpoise (*Phocoenoides dalli*), melon-headed whale (*Peponocephala spp.*), beaked whales (*Berardius spp., Hyperoodon spp.*, *Mesoplodon spp.*, Cuvier's beaked whale (*Ziphius cavirostris*), Shepard's beaked whale (*Tasmacetus shepherdi*), Longman's beaked whale (*Indopacetus pacificus*), killer whale (*Orcinus orca*), false killer whale (*Pseudorca crassidens*), pygmy killer whale (*Feresa attenuata*), sperm whale (*Physeter macrocephalus*), dwarf and pygmy sperm whales (*Kogia simus* and *K. breviceps*), and short-finned and long-finned pilot whales (*Globicephala macrorhynchus* and *G. melas*).

Potentially affected pinnipeds include hooded seals, harbor seals (*Phoca vitulina*), spotted seal (*P. largha*), ribbon seal (*P. fasciata*), gray seal (*Halichoerus grypus*), elephant seals (*Mirounga angustirostris* and *M. leonina*), Hawaiian monk seals (*Monachus schauinslandi*), Mediterranean monk seals (*Monachus monachus*), northern fur seals (*Callorhinus ursinus*), southern fur seals (*Arctocephalus spp.*), Steller sea lion (*Eumetopias jubatus*), California sea lions (*Zalophus californianus*), Australian sea lions (*Neophoca cinerea*), New Zealand sea lions (*Phocarctos hookeri*), and South American sea lions (*Otaria flavescens*).

A description of affected marine mammal species, their biology, and the criteria used to determine those species that have the potential for taking by harassment are provided and explained in detail in the Navy application and Draft and Final EISs and, although not repeated here, are considered part of the record of decision on this matter. Additional information is available at the following URL: *http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars.html* Please refer to these documents for specific information on marine mammal species.

**Impacts to Marine Mammals**

To understand the effects of LF noise on marine mammals, one must understand the fundamentals of underwater sound and how the SURTASS LFA sonar operates in the marine environment. This description was provided earlier in this document and also by the Navy in Appendix B to the Draft and Final EISs.

The effects of underwater noise on marine mammals are highly variable, and can be categorized as follows (based on Richardson *et al.*, 1995): (1) The noise may be too weak to be heard at the location of the animal (*i.e.* lower than the prevailing ambient noise level, the hearing threshold of the animal at relevant frequencies, or both); (2) the noise may be audible but not strong enough to elicit any overt behavioral response; (3) the noise may elicit behavioral reactions of variable conspicuousness and variable relevance to the well being of the animal; these can range from subtle effects on respiration or other behaviors (detectable only by statistical analysis) to active avoidance reactions; (4) upon repeated exposure, animals may exhibit diminishing responsiveness (habituation), or disturbance effects may persist (the latter is most likely with sounds that are highly variable in characteristics, unpredictable in occurrence, and associated with situations that the animal perceives as a threat); (5) any human-made noise that is strong enough to be heard has the potential to reduce (mask) the ability of marine mammals to hear natural sounds at similar frequencies, including calls from conspecifics, echolocation sounds of odontocetes, and environmental sounds such as surf noise; and (6) very strong sounds have the potential to cause temporary or permanent reduction in hearing sensitivity. In addition, intense acoustic or explosive events may cause trauma to tissues associated with organs vital for hearing, sound production, respiration and other functions. This trauma may include minor to severe hemorrhage.

The analysis of potential impacts on marine mammals from SURTASS LFA sonar was developed by the Navy based on the results of a literature review, the Navy's LFS SRP, and a complex, comprehensive program of underwater acoustical modeling. To assess the potential impact on marine mammals by the SURTASS LFA sonar source operating at a given site, it was necessary for the Navy to predict the sound field that a given marine mammal species could be exposed to over time. This is a multi-part process involving (1) the ability to measure or estimate an animal's location in space and time, (2) the ability to measure or estimate the three-dimensional sound field at these times and locations, (3) the integration of these two data sets to estimate the total acoustic exposure for each animal in the modeled population, (4) converting the resultant cumulative exposures for a modeled population into an estimate of the risk from a significant disturbance of a biologically important behavior, and (5) converting these estimates of behavioral risk into an assessment of risk in terms of the level of potential biological removal.

Next, a relationship for converting the resultant cumulative exposures for a modeled population into an estimate of the risk to the entire population of a significant disruption of a biologically important behavior and of injury was developed. This process assessed risk in relation to RL and repeated exposure. The resultant risk continuum is based on the assumption that the threshold of risk is variable and occurs over a range of conditions rather than at a single threshold. Taken together, the LFS SRP results, the acoustical modeling, and the risk assessment provide an estimate of potential environmental impacts to marine mammals.

The acoustical modeling process was accomplished using the Navy's standard acoustical performance prediction transmission loss model-Parabolic Equation (PE) version 3.4. The results of this model are the primary input to the AIM. AIM was used to estimate marine mammal sound exposures and essentially integrates simulated movements (including dive patterns) of marine mammals, a schedule of SURTASS LFA sonar transmissions, and the predicted sound field for each transmission to estimate acoustic exposure during a hypothetical SURTASS LFA sonar operation. Description of the PE and AIM models, including AIM input parameters for animal movement, diving behavior, and marine mammal distribution, abundance, and density are described in detail in the Navy application and the Final EIS and are not discussed further in this document.

Using the AIM model, the Navy developed 31 acoustic modeling scenarios for the major ocean regions (which are described in the application and Final EIS). Locations were carefully selected by the Navy to represent the highest potential effects for each of the three major ocean acoustic regimes where SURTASS LFA sonar would be employed. These acoustic regimes were: (1) Deep-water convergence zone propagation, (2) near surface duct propagation, and (3) shallow water bottom interaction propagation. These scenarios represent the condition under which, on average, the greatest number of animals could be exposed to the greatest number of pings at the highest RLs and were considered the most severe conditions that could be expected from operation of the SURTASS LFA sonar system. Thus, if SURTASS LFA sonar operations were conducted in an area that was not acoustically modeled, the Navy believes the potential effects would most likely be less than those obtained from the most similar scenario in the analysis. The modeled scenarios were then used by the Navy to estimate the percentages of marine mammal stocks potentially affected.

*Risk Analysis*

To determine the potential impacts that exposure to LF sound from SURTASS LFA sonar operations could have on marine mammals, biological risk standards were defined by the Navy with associated measurement parameters. Based on the MMPA, the potential for biological risk was defined as the probability for injury or behavioral harassment of marine mammals. In this analysis, behavioral harassment is defined as a significant disturbance in a biologically important behavior. The potential for biological risk is a function of an animal's exposure to a sound that would potentially cause hearing, behavioral, psychological or physiological effects. The measurement parameters for determining exposure were RLs in dB, the pulse repetition interval (time between pings), and the number of pings received.

The Navy interprets the results of the LFS SRP to justify use of unlimited exposure to 119 dB during a mission as the lowest value for risk. Below this level, the risk of a biologically significant response from marine mammals approaches zero. It is

important to note that risk varies with both level and number of exposures.

In the Final EIS and small take application, the Navy calculated the risks for take by injury based on the criterion of 180 dB, which, based on Schlundt *et al.* (2000), is a conservative value for the onset of a minor TTS in hearing. Schlundt *et al.*'s (2000) measurement with bottlenose dolphins and belugas at 1-second duration implies that the TTS threshold for a 100-second signal would be approximately 184 dB (Table 1–4, Final EIS). In addition, for the 400-Hz signal, Schlundt *et al.* (2000), found no TTS at 193 dB, the highest level of exposure. As a result, the Navy believes that the 180-dB SPL criterion can be considered conservative. With three levels of mitigation monitoring for detecting marine mammals (described elsewhere in this document), it is unlikely that any marine mammal would get that close before being detected and the SURTASS LFA sonar shut down. However, because the probability is not zero, the Navy has included this scenario in its authorization request.

Because the LFS SRP did not document any extended biologically significant response at maximum RLs up to 150 dB, the Navy determined that there was a 2.5-percent risk of an animal incurring a disruption of biologically important behavior at an SPL of 150 dB, a 50-percent risk at 165 dB, and a 95-percent risk at 180 dB. This analysis of risk is used by the Navy as an alternative to an all-or-nothing use of standard thresholds for the onset of either behavioral change or injury. The subsequent discussion of risk function emphasizes the advantages of using a smoothly varying model of biological risk in relation to sound exposure. These results are analogous to dose-response curves used in toxicology that are accepted as the best practice in disciplines ranging from epidemiology, toxicology, and pharmacology.

An ''injury continuum'' is not necessary because of the very low numbers of individual marine mammals that could potentially experience high received sound levels, and the high level of effectiveness of the monitoring and shutdown protocols. For this action, all marine mammals exposed to an SPL of 180 dB or above are considered to be injured, even though, as demonstrated in this document, a mammal would need to receive an SPL significantly higher than 180 dB in order to be injured.

When SURTASS LFA sonar transmits, there is a boundary which will enclose a volume of water in which received levels equal or exceed 180 dB, and a volume of water outside this boundary which experiences received levels below 180 dB. In this analysis, the 180-dB SPL boundary is emphasized because it represents a single-ping RL that can be considered to be a scientifically conservative estimate for the potential onset of injury. Therefore, the level of risk for marine mammals depends on their location in relation to SURTASS LFA sonar. As mentioned previously, the Navy scientific team established the threshold for risk of the onset of potential injury as a single ping at 180 dB (Navy, 1999b). Under the Navy proposal, a marine mammal would have to receive one ping greater than or equal to 180 dB to potentially incur an injury.

However, NMFS scientists and other scientists are in general agreement that TTS is not an injury (*i.e.,* does not result in tissue damage) but is an impairment to hearing (*i.e.,* results in an increased elevation (*i.e.,* decreased sensitivity) in hearing) that may last for a few minutes to a few days, depending upon the level and duration of exposure. In addition, there is no evidence that TTS would occur in marine mammals at an SPL of 180 dB. In fact, Schlundt *et al.* (2000) indicates that onset TTS for at least some species occurs at significantly higher SPLs. Therefore, in this document, NMFS makes clear that, although TTS is not an injury (*i.e.,* Level A harassment), because PTS is considered an injury (Level A harassment), and because scientists have noted that the onset of PTS for marine mammals may be 15–20 dB of TTS (*i.e.,* the difference between the SELs that cause the slightest TTS and the onset of PTS), TTS is considered by NMFS to be in the upper portion of the Level B harassment zone (near the lower end of the Level A harassment zone). Therefore, onset PTS, not onset TTS, is considered by NMFS to be the lower end of Level A harassment. NMFS believes that establishing TTS at the upper end of the Level B harassment zone is both precautionary and warranted by the science. However, establishing mitigation measures, such as safety zones, as is done here, should be applied whenever a marine mammal has the potential to incur a TTS in hearing in order to prevent an animal incurring a PTS injury.

While the Navy believes that the probability of a marine mammal occurring within the 180–dB sound field at the onset of a transmission is nearly zero because of the tripartite monitoring mitigation program (described later in this document), because the monitoring may not be 100 percent effective at all times and situations, some Level A harassment takings still need to be considered possible.

Before the biological risk standards could be applied to realistic SURTASS LFA sonar operational scenarios, two factors had to be considered by the Navy: (1) How does risk vary with repeated sound exposure? and (2) how does risk vary with RL? The Navy addressed these questions by developing a function that translates the history of repeated exposures (as calculated in the AIM) into an equivalent RL for a single exposure with a comparable risk. This dual-question method is similar to those adopted by previous studies of risk to human hearing (Richardson *et al.,* 1995; Crocker, 1997).

*Effects of Repeated Exposure*

It is intuitive to assume that effects would be greater for repeated exposures than for a single ping. However, because no published data on repeated exposures of LF sound on marine mammals exist, the Navy turned to the most applicable human data. Based on the analysis of Richardson *et al.* (1995) and Kryter (1985), the potential for effects of repeated exposure on marine mammals was modeled on the extensive data available for human subjects. Based on discussion in Richardson *et al.* (1995) and consistent with Crocker (1997) and for reasons explained in RTC SIC76, the Navy determined that the best scientific information available is based on human models and, therefore, the formula $L + 5 \log_{10} (N)$ (where L = ping level in dB and N is the number of pings) defines the single ping equivalent (SPE). This formula then is considered appropriate for assessing the risk to a marine mammal from a significant disturbance of a biologically important behavior from LF sound like SURTASS LFA sonar transmissions.

Since the release of the Final EIS, an investigation by Cudahy and Ellison (2002) noted that the expected threshold for *in vivo* tissue damage (including lung damage and hemorrhaging) for LF sound can be on the order of 180 to 190 dB. Vestibular effects could affect balance and equilibrium, but may not result in injury. However, these effects are based on humans. Measurable performance decrements in vestibular function were observed for guinea pigs using 160 dB SPL signals at lung resonance and 190 dB SPL signals at 500 Hz. It should be kept in mind that guinea pigs are not aquatic species and, as such, are not as robust to pressure changes as marine mammals. Finally, as stated in Crum and Mao (1996) and as discussed in the Final EIS (page 10–

137), researchers hypothesized that the received level would have to exceed 190 dB in order for there to be the possibility of significant bubble growth due to supersaturation of gases in the blood. However, ''non-auditory traumas'' are not expected to occur from sound exposure below SPLs of 180 dB. In light of the high detection rate of the HF/M3 sonar ensuring required SURTASS LFA sonar shutdown when any marine mammal approaches or enters the 180–dB LFA mitigation zone, the risks of these traumas to a marine mammal approach zero.

*Estimation of Potential Effects to Marine Mammal Stocks*

The potential effects on marine mammals from operation of SURTASS LFA sonar will not be the direct removal of animals. Based on AIM modeling results, the primary effects are from the potential for a significant change in biologically important behavior.

To estimate the percentage of marine mammal stocks affected on a yearly basis, the typical annual operating schedule for SURTASS LFA sonar was correlated to the modeled site scenarios. Even though the Navy will not have more than 2 SURTASS LFA systems operating during the next 5 years, its NEPA analysis incorporated four systems with six missions each annually. With two vessels in the Pacific/Indian Ocean area and two vessels in the Atlantic/Mediterranean area, the Navy estimates there could be up to 12 operations in each of these oceanic basin areas. Using a total of 12 operations in each large geographic area (*e.g.,* Eastern North Pacific, Western North Atlantic), the Navy calculated take estimates based on a 20-day exercise (actually under the normal schedule mentioned previously in this document the Navy proposes two 9-day exercises or a total of 18 days, not 20 days of exercise). NMFS concurs with this approach but notes that because only 2 SURTASS LFA sonar vessels will be available through 2007, the Navy's projected incidental harassment levels found in the Final EIS and application are overestimates of potential harassment levels during these regulations. NMFS estimates, therefore, that there would be a total of only 6 active SURTASS LFA sonar missions annually per vessel (or equivalent shorter missions totaling no more than 432 hours of transmission/vessel/year)) during the period of effectiveness of these regulations.

AIM Modeling in Table 4–10 in the application (Table 4.2–10 in the Final EIS) provides estimates of the percentage of stocks potentially affected for single SURTASS LFA sonar operations. Tables 4–12 and 4–13 in the application (Tables 4.2–12 and 4.2–13 in the Final EIS) provide an example of annual total estimates of percentages of marine mammal stocks potentially affected by a total of 24 operations (12 in each of the two ocean basins). As mentioned previously however, this number of operations are unlikely during the effectiveness period of these regulations. It should also be recognized that the scenarios chosen by the Navy are not the only possible combinations of areas where the SURTASS LFA sonar will operate. The potential effects from other scenarios can be estimated by presupposing the areas in which the Navy would conduct SURTASS LFA sonar operations annually in each oceanic basin area, determining from Table 4–10 in the Navy application the percentage of each stock that may potentially be affected, and adding those percentages together for each affected stock. Using updated modeling where appropriate, this is what the Navy will do annually for each LOA requested.

Also, the Navy will rerun AIM when planning missions for new or different areas and, if necessary, modify annual LOA authorization requests with an analysis of take estimates prior to any mission in a new/different area. For this document however, NMFS is adopting the Navy estimates shown in Final EIS Tables 4–12 and 4–13 as the best scientific information currently available. Thus, even though there will be a total of only two systems deployed under this rulemaking, by using these two tables, or by choosing a different combination of potential geographic areas for SURTASS LFA sonar operations derived from Final EIS Table 4–10, any potential scenario of operations can be addressed using the two systems (i.e., each in different oceanic areas, both in same oceanic area, etc.).

As stated previously however, given that it is more likely that SURTASS LFA sonar missions will occur in the open ocean rather than the modeled sites, and that the Navy will rerun AIM when planning missions for new or different areas to avoid certain areas during biologically sensitive seasons, NMFS believes that the estimates of taking by harassment incidental to SURTASS LFA sonar provided in the Final EIS are significantly higher than the more realistic 1 to 2 percent (or less) of affected stocks during a single 30-day mission. Short-term incidental harassment levels between 1 and 12 percent and below are considered by NMFS to comply with the MMPA as Level B harassment at this level is unlikely to result in significant effects on any species' or stock's reproduction or survival. Therefore, in order for incidental takings by SURTASS LFA sonar under this regulation to be negligible, takings by SURTASS LFA sonar operations during the effective time period (1 year) of any LOA issued for such Navy operations must not exceed 12 percent of any marine mammal stock (2 percent × six 30-day missions = 12 percent). However, this 12 percent level should not be interpreted to mean that the Navy will take up to 12 percent of all affected marine mammal stocks. In most cases, with carefully planned SURTASS LFA sonar missions (*e.g.,* to avoid certain biogeographic provinces during seasons of increased marine mammal abundance), the total annual Level B takes are expected to be significantly less than this level. Therefore, NMFS believes that the potential effect by SURTASS LFA sonar operations will be limited to only small numbers of the affected stocks of marine mammals that will have no more than a negligible impact on affected species and stocks of marine mammals. Moreover, the potential effect will be limited to incidental harassment that will not adversely affect the stock through annual rates of recruitment or survival.

**Mitigation for Marine Mammals**

This document adopts, with modification, the Navy proposal to use visual, passive acoustic, and active acoustic monitoring of the area surrounding the SURTASS LFA sonar array to prevent the incidental injury of marine mammals that might enter the 180-dB SURTASS LFA mitigation zone. The three monitoring systems are described in the following section of this document. If a marine mammal (or ESA-listed sea turtle) is detected within the 180-dB SURTASS LFA sonar mitigation zone, SURTASS LFA sonar transmissions will be immediately delayed or suspended. Transmissions may commence/resume 15 minutes after the marine mammal/sea turtle has left the area of the 180-dB sound field or there is no further detection of the animal within the 180-dB sound field. The protocol established by the Navy for implementing this temporary shut-down is described in the application (pages 10–11). However, NMFS has concluded that the 180-dB safety zone needs to be augmented to ensure to the greatest extent practicable that marine mammals are not subject to potential injury. In that regard, as an added safety measure, NMFS has established an interim ''buffer zone'' extending an additional 1 km (0.54 nm) beyond the 180-dB LFA

mitigation zone. Therefore, as soon as a marine mammal (or ESA-listed sea turtle) is detected by the HF/M3 sonar, the SURTASS LFA sonar will either be turned off or not turned on. This is a feasible mitigation measure since recent testing of the HF/M3 sonar indicates effective levels of detection up to 2 km (1.1 nm). At 2 km (1.1 nm), the SPL from the SURTASS LFA sonar will be approximately 173 dB. SURTASS LFA sonar operators would be required to estimate SPLs prior to and during each operation to provide the information necessary to modify the operation, including delay or suspension of transmissions, in order not to exceed the mitigation sound field criteria.

NMFS recognizes that there are areas of insufficient knowledge that must be accounted for when estimating the potential effects on marine mammals (e.g., the impacts of resonance on marine mammals, where research is already underway). NMFS also believes the present level of understanding is adequate to place reasonable bounds on potential impacts and provide a logical basis for the decision that safe and proper employment of SURTASS LFA sonar can be managed.

The Navy proposed that the SURTASS LFA sonar operations would be conducted to ensure that the sound field does not exceed 180 dB (i.e., the zone of potential for injury to marine mammals) at a distance of 12 nm (22 km) from any coastline, including islands, nor in OBIAs that are outside the 12-nm (22-km) zone during the biologically important season(s) for that particular area. The 12-nm (22-km) restriction includes almost all marine-related critical habitats and National Marine Sanctuaries (NMSs). However, some parts of NMSs, that are recognized to be important for marine mammals, are outside 12 nm (22 km). For purposes of this rulemaking, and because of their importance for marine mammals, NOAA's Office of National Marine Sanctuaries (ONMS) has recommended the following protective measures for operating SURTASS LFA sonar: (1) For the Monterey Bay NMS, received levels should not exceed 180 dB throughout the NMS; (2) in the Gulf of the Farallones and Cordell Bank NMSs, received levels should not exceed 180 dB, including those areas of the NMSs that extend beyond 12 nm (22 km); (3) for the Olympic Coast NMS, received levels in the NMS should not exceed 180 dB in the area from shore to 23 nm (37.4 km) in the months of December, January, March, and May of each year; and (4) for the Hawaiian Islands Humpback Whale NMS (HIHWNMS), received levels should not exceed 180 dB from December through May of each year. However, some of these NMSs, and others not listed here, will have additional mitigation for marine mammals because they are also human dive sites. As such, SPLs will not exceed more than 145 dB in those areas. Other than HIHWNMS, which is fully protected because of the addition of Penguin Bank as an OBIA under this action, the remaining three areas are limited to receiving an SPL no greater than 180 dB in order to protect marine mammals in those areas.

In addition to establishing a safety zone at 180 dB to protect marine mammals and other noise sensitive marine animals, the Navy will establish a safety zone for human divers at 145 dB re 1 μPa(rms) around all known human commercial and recreational diving sites. Although this geographic restriction is intended to protect human divers, it will also reduce the LF sound levels received by marine mammals that are located in the vicinity of known dive sites.

The Navy has proposed establishing OBIAs for marine mammal protection in its Draft and Final EISs. These areas are defined as those areas of the world's oceans where marine mammals congregate in high densities to carry out biologically important activities such as feeding, migration, breeding, and calving. The U.S. Navy has proposed three sites as OBIAs for SURTASS LFA sonar under these regulations. These areas are: (1) The North American East Coast between 28° N. and 50° N. from west of 40° W. to the 200-m (656-ft) isobath year-round; (2) the Antarctic Convergence Zone, from 30° E. to 80° E to 45° S., from 80° E. to 150° E. to 55° S., from 150° E. to 50° W. to 60° S., from 50° W to 30° E. to 55° S. from October through March; and (3) the Costa Rica Dome, centered at 9° N. and 88° W., year-round. Also, an area included in this document, at the request of NOAA's National Ocean Service, is Penguin Bank off the Island of Kauai, Hawaii, inside the HIHWNMS. In addition, NMFS has established a system for expanding the list of OBIAs. The establishment of OBIAs is not intended to apply to other Navy activities and sonar operations, but has been established in this rule as a mitigation measure to reduce incidental takings by SURTASS LFA sonar.

**Monitoring**

In order to minimize risks to potentially affected marine mammals that may be present in waters surrounding SURTASS LFA sonar, the Navy will: (1) Conduct visual monitoring from the ship's bridge during daylight hours, (2) use passive SURTASS LFA sonar to listen for vocalizing marine mammals; and (3) use high frequency active sonar (i.e., similar to a commercial fish finder) to monitor/locate/track marine mammals in relation to the SURTASS LFA sonar vessel and the sound field produced by the SURTASS LFA sonar source array.

Through observation, acoustic tracking and establishment of shut-down criteria, the Navy will ensure, to the greatest extent practicable, that no marine mammals approach the SURTASS LFA sonar source closely enough to be subjected to potentially harmful sound levels (inside the 180-dB sound field; approximately 1 km (0.54 nm) from the source). The Navy estimates that the probability of detecting a marine mammal approaching the 180-dB sound field of the source array by at least one of these monitoring methods is above 95 percent. However, an effectiveness of 66 percent has been used in the Final EIS take calculations. The Navy's assumption incorporates the 50-percent effectiveness of the HF/M3 sonar (although testing the HF/M3 sonar indicates that it is over 95 percent effective), and an additional conservative 9-percent contribution for visual and 25 percent for passive monitoring. In general, the Navy believes that small, solitary marine mammals would be the most difficult to detect, while large whales and dolphin schools would be much easier to detect.

NMFS has reviewed this Navy proposal and believes that the proposal can be modified to provide additional protection for marine mammals. Because the HF/M3 has the capability to detect marine mammals, and track them, to a distance of 2 km (1.1 nm) from the source, NMFS is requiring the Navy to delay or suspend transmissions whenever a marine mammal is detected by the HF/M3 within the SURTASS LFA safety zone and the 1-km (0.54 nm) buffer zone. Also, NMFS is requiring the Navy to delay transmissions whenever a marine mammal has the potential to receive a calculated SPL of 180 dB within the zone of detectability. This will require, however, both that the marine mammal remains within the zone of detectability between ''pings'' while the vessel is underway, and that the Navy continue to monitor the SURTASS LFA sonar mitigation and buffer zones between successive pings. Because the time between SURTASS LFA sonar ''pings'' is 6–15 minutes, and the Navy has already committed to visual and acoustic monitoring for no less than 30 minutes prior to a ''ping,'' monitoring will continue during the

interim period and tracking of marine mammals will continue.

**Reporting**

During routine operations of SURTASS LFA sonar, technical and environmental data will be collected and recorded. These would include data from visual and acoustic monitoring, ocean environmental measurements, and technical operational inputs.

The LTM Program reporting requirements are two-fold. First, a mission report will be provided to NMFS on a quarterly basis with the report including all active-mode missions that have been completed 30 days or more prior to the date of the deadline for the report. This is the standard period of time provided for all small take authorizations. Second, the Navy will submit an annual report no later than 90 days prior to expiration of an LOA. These reports are summarized here.

*Quarterly Report*—On a quarterly basis, the Navy will provide NMFS with a report that includes all active-mode missions that have been completed 30 days or more prior to the date of the deadline for the report. Specifically, these data will include dates/times of exercises, dates/times of LFA transmissions, locations of vessel, LOA area(s), marine mammal observations (see below for specifics), and records of all delays or suspensions of operations. Marine mammal observations will include animal type and/or species, number of animals sighted, date and time of observations, type of detection (visual, passive acoustic, HF/M3 sonar), bearing from vessel, range from vessel, abnormal behavior (if any), and remarks/narrative (as necessary). Because this period of time is insufficient to allow the Navy to declassify information that might compromise national security, quarterly reports will be classified and the information will not be publically available until the annual report. The Navy will declassify the quarterly information based on national security concerns and provide it in its annual, unclassified report. In the interim, NMFS will use these quarterly reports to monitor the SURTASS LFA sonar activity to ensure compliance with the terms and conditions of the LOA and regulations.

*Annual Report*—The annual report will provide NMFS with an unclassified summary of the year's quarterly reports and will include the Navy's assessment of whether any taking occurred within the SURTASS LFA mitigation and buffer zones and estimates of the percentage of marine mammal stocks affected by SURTASS LFA sonar operations, using predictive modeling based on operating locations, dates/times of operations, system characteristics, oceanographic environmental conditions, and animal demographics.

The annual report will also include: (1) Analysis of the effectiveness of the mitigation measures with recommendations for improvements where applicable; (2) assessment of any long-term effects from SURTASS LFA sonar operations; and (3) any discernible or estimated cumulative impacts from SURTASS LFA sonar operations.

A notice of availability of the annual report(s) will be published in the **Federal Register** within 30 days of receipt of the annual report.

*Comprehensive Report*

The Navy is required by these regulations to provide NMFS and the public with a final comprehensive report analyzing the impacts of SURTASS LFA sonar on marine mammal stocks. This report will include an in-depth analysis of all monitoring and research conducted during the 5-year period of these regulations, a scientific assessment of cumulative impacts on marine mammal stocks, and an analysis on the advancement of alternative (passive) technologies as a replacement for LFA sonar. This report will be a key document for NMFS' review and assessment of impacts for any renewal of these regulations.

**Research**

The Navy will, through a LTM program, provide annual assessments of the potential cumulative impact of SURTASS LFA sonar operations on marine mammals, fund research on impacts of LF sounds on marine mammals, conduct monitoring and reporting to increase knowledge of the species, and coordinate with others on additional research opportunities and activities. This would include cumulative impact analyses of the annually tabulated injuries (if any) and harassments over the next 5 years. The purpose of the LTM program will be to continue scientific data collection once SURTASS LFA sonar is deployed.

While NMFS believes that research conducted to date is sufficient to assess impacts on marine mammals, it believes that it would be prudent to continue research over the course of the period of effectiveness of these regulations. Accordingly, NMFS recommends that the Navy conduct the following research regarding SURTASS LFA sonar over the first 5-year authorization period:

1. Systematically observe SURTASS LFA sonar training exercises for injured or disabled marine animals. Past correlations between military operations and the stranding of beaked whales, including the Bahamas event, call for closer observation of all sonar operations.
2. Compare the effectiveness of the three forms of mitigation (visual, passive acoustic, HF/M3 sonar).
3. Conduct research on the behavioral reactions of whales to sound levels that were not tested during the research phase, specifically between 155 dB and 180 dB. This should be done in a research format rather than in actual training operations.
4. Conduct research on the responses of sperm and beaked whales to LF-sonar signals. These species are believed to be less sensitive to LF-sonar sounds than the species studied prior to the LFS–SRP. However, enough questions exist that these species should be studied during the five-year permit period.
5. Conduct research on the habitat preferences of beaked whales, and plan future SURTASS LFA training exercises to avoid such areas. Avoidance is the most effective mitigation measure.
6. Conduct passive acoustic monitoring using bottom-mounted hydrophones before, during, and after SURTASS LFA sonar operations for the possible silencing of calls of large whales.
7. Continue research with the HF/M3 mitigation sonar. This is the primary means of mitigation, and its efficacy must continue to be demonstrated. ROC curves should be constructed if possible.
8. To determine potential long term, cumulative effects from SURTASS LFA sonar, select a stock of marine mammals that is expected to be regularly exposed to SURTASS LFA sonar and monitor it for population changes throughout the 5-year period. Alternatively, look for long-term trends in the vocalizations of marine mammals that are exposed to SURTASS LFA signals (see item number 6).

**LOA Conditions**

The regulations have been designed to allow many of the mitigation, monitoring and reporting requirements to be detailed in the LOA, rather than in these regulations. This will provide NMFS the ability to change these protective measures in a prompt manner to changing conditions. While public comment will be provided for substantial modifications to LOA requirements before they are made effective (see RTC MMPAC46), modifications can be implemented in a

shorter period of time if contained in LOAs than would be possible if rulemaking were required for each modification. The public would be provided a comparable length of time for commenting on proposed LOA modifications (except when NMFS determines that an emergency exists that impacts on the health and welfare of the marine mammal), whether or not those requirements were contained in regulations. However, for security reasons, locations and times for certain operations may need to be classified and would not be provided to the public in advance.

In the past, NMFS has promulgated regulations for small take authorizations that did not clearly describe LOA conditions. For this activity the following conditions will be in the LOA (in addition to, or in clarification of, those found in these regulations):

(1) Prior to each exercise, the distance from the SURTASS LFA sonar source to the 180-dB isopleth will be determined. That distance will be the established safety zone for that exercise; and

(2) Until research on the effects of resonance and tissue damage on marine mammals from underwater noise has been conducted, NMFS has included two interim operational restrictions to preclude the potential for injury to marine mammals by resonance effects: (a) Establishment of a 1-km (0.5-nm) HF/M3 buffer shutdown zone outside the 180-dB zone and (b) limiting the operating frequency of SURTASS LFA to 330 Hz and below.

These interim operational restrictions will be part of all LOAs issued under this rulemaking and a 30-day public comment period will occur before either one is removed. In order to lift the restriction, the Navy would need to provide empirical and/or documentary evidence that resonance and/or tissue damage from SURTASS LFA sonar transmissions is unlikely to occur in marine mammals at levels less than 190 dB.

**Designation of Biologically Important Marine Mammal Areas**

This final rule establishes a system for the public to petition NMFS to consider adding an area to the list of biologically important areas for marine mammals. NMFS emphasizes that, in order for designation, an area must be of particular importance for marine mammals as an area for primary feeding, breeding, or migration, and not simply an area occupied by marine mammals. The proposed area should also not be within a previously designated OBIA or other 180-dB exclusion area. In order for NMFS to begin the rulemaking process for designating areas of biological importance for marine mammals, proponents must petition NMFS and submit the information described in § 216.191(a). If NMFS makes a preliminary determination that the area is biologically important for marine mammals, NMFS will propose rulemaking to add the recommended area to the list of previously designated areas. Through notice in the **Federal Register**, NMFS will invite information, suggestions, and comments on the proposal for a period of time not less than 45 days from the date of publication in the **Federal Register**. After review of the comments and information, NMFS will make a final decision on whether to add the recommended area to the list found in § 216.183(d). NMFS will either issue a final rulemaking on the proposal or provide notice in the **Federal Register** of its determination. Proposals for designation of areas will not affect the status of LOAs while the rulemaking is in process. NMFS anticipates that the time between nominating an area and publication of a final determination is likely to take 8–12 months.

**Determinations**

At present, only two SURTASS LFA sonar systems are available for deployment. According to the Navy, delivery of the third and fourth systems have been postponed until after FY 2007. As a result, under the 5-year window of these regulations, NMFS is authorizing marine mammal harassment takings for only 2 SURTASS LFA sonar systems. An authorization for additional SURTASS LFA sonar systems would require an amendment to these regulations.

With the normal scenario of one vessel operating in the Pacific-Indian Ocean area and one vessel in the Atlantic Ocean-Mediterranean Sea area, there could be up to 9 operations in each of these oceanic areas per year, normally six 30-day active missions using SURTASS LFA sonar (or equivalent shorter missions totaling no more than 432 hours of transmission/vessel/year), and three 30-day passive missions using only SURTASS sonar. The remaining 95 days would probably be spent in port. During a normal 30-day mission, it is estimated there would be two 9-day exercise periods, with up to 20 hours of sonar operations during an exercise day. Based on a 20-percent maximum duty cycle, the system would actually be transmitting for a maximum of 4 hours per day, resulting in 72 hours per 30-day mission and 432 hours per year of active transmission for each system. (There are 8,760 hours in a standard year).

Based on the scientific analyses detailed in the Navy application and further supported by information and data contained in the Navy's Final EIS for SURTASS LFA sonar operations and previously in this document, NMFS concurs with the Navy that the incidental taking of marine mammals resulting from SURTASS LFA sonar operations would result in the take of only small numbers of marine mammals, have no more than a negligible impact on the affected marine mammal stocks or habitats and not have an unmitigable adverse impact on Arctic subsistence uses of marine mammals. This determination is supported by the highly effective mitigation measures and interim operating restrictions implemented for all SURTASS LFA sonar operations and the LTM program, including the research to be conducted therein. This includes geographic operation restrictions, mitigation measures to minimize injury to any marine mammals, monitoring and reporting impacts to marine mammals and supplemental research that will result in increased knowledge of marine mammal species, and the potential impacts of LF sound on these species. In addition to ONR-funded marine mammal research (approximately $7M), the Navy intends to spend $1 million annually to fund the LTM program. These latter measures offer the means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing the incidental taking of marine mammals from anthropogenic underwater sound, and evaluating the possible long-term effects from exposing marine mammals to anthropogenic underwater sound.

In summary, the following factors support NMFS' determination that the takings by harassment as a result of the Navy's use of SURTASS LFA sonar would have no more than a negligible impact on any species or stock of marine mammal: (1) The findings of the scientific research program on LF sounds on marine mammals indicated no significant change in biologically important behavior from exposure to sound levels up to 155 dB; (2) the small number of SURTASS LFA sonar systems that would be operating world-wide; (3) the relatively low duty cycle, short mission periods and offshore nature of the SURTASS LFA sonar (where there is lower marine mammal abundance); (4) for convergence zone (CZ) propagation, the characteristics of the acoustic sound path, which deflect the sound below the water depth inhabited by marine

mammals for approximately 75 percent of the distance between the source and the first CZ and between the first CZ and the second CZ (approximately 45 km); (5) that the vessel must be underway while transmitting (in order to keep the receiver array deployed), limiting the duration of exposure for marine mammals to those few minutes when the SURTASS LFA sound energy is moving through that part of the water column inhabited by marine mammals; (6) for CZ propagation, the narrow width of the CZ ray path and up to a 1,000-fold decrease in the intensity of the sound immediately outside the ray path, further limiting exposure to marine mammals; and (7) implementation of the mitigation measures and interim operating restrictions that make it unlikely for a marine mammal to be undetected within the 180-dB sound field (and thereby potentially injured) during sonar transmissions. These measures all indicate that while marine mammals will potentially be affected by the SURTASS LFA sonar sounds, these impacts will be short-term and will not affect the survival or reproductive potential for marine mammals on a species or stock basis.

**Substantial Changes to the Proposed Rule**

The following modifications have been made to the proposed rule.

A paragraph has been added limiting these regulations to a maximum of two SURTASS LFA sonar systems.

The 16 geographic regions have been replaced with a new biogeographic system with 15 biomes and 54 provinces under the 15 biomes.

A paragraph has been added to note that if petitions for OBIAs are received without sufficient information for NMFS to justify proceeding with the petition, NMFS will determine whether the nominated area warrants further study. If it does, NMFS will begin a scientific review of the petition.

A paragraph has been added to prohibit SPLs from exceeding 180 dB within those portions of the Monterey Bay NMS and the Gulf of the Farallones and Cordell Bank NMSs that extend beyond 12 nm (22 km); also, at the Olympic Coast NMS received levels in the NMS should not exceed 180 dB in the area from shore to 23 nm (37.4 km) offshore in the months of December, January, March, and May of each year.

A modification has been made to § 216.183(e) to extend the East Coast OBIA south to 28° N. in order to include the entire southeastern United States critical habitat for the northern right whale.

For consistency, certain protective measures that were listed under § 216.183 *Prohibitions* have been relocated to § 216.184 *Mitigation.* In new § 216.184, § 216.184(d) has been revised to (1) clarify that operating the SURTASS LFA sonar source at an SPL greater than 180 dB at a distance of 12 nm (22 km) from any coastline is not authorized, and (2) correct the coordinates for the center of the Penguin Bank OBIA.

A sentence has been added establishing a ''buffer zone'' extending an additional 1 km (0.5 nm) beyond the 180-dB safety zone. As soon as a marine mammal (or sea turtle) is detected by the HF/M3 sonar within the buffer zone, the LFA sonar will either be turned off or not turned on.

A sentence has been added requiring the HF/M3 to cease ramp-up once a marine mammal is detected by the HF/M3.

A modification has been made to require monitoring to continue either for 15 minutes after the last transmission of an exercise, or until marine mammal behavior has returned to normal (based upon the observer's determination), whichever is later. If aberrant marine mammal behavior has not been observed before, during, or after the last series of transmissions, observations do not need to continue after 15 minutes.

A paragraph has been added requiring quarterly mission reports with the report including all active-mode SURTASS LFA sonar missions that have been completed 30 days or more prior to the date of the deadline for the report.

A sentence has been added to § 216.186(c) requiring an analysis of passive sonar systems (not previously analyzed) and an assessment of whether any system is feasible as an alternative to SURTASS LFA sonar to be provided at least 240 days prior to expiration of these regulations.

The proposed definition of ''single-ping equivalent'' has not been implemented and the term ''single-ping equivalent'' or ''SPE'' has been replaced by the term ''SPL.'' This change is warranted because the implementation of a 1-km (0.54-nm) buffer zone wherein SURTASS LFA sonar transmissions will be delayed or suspended for marine mammals makes the tracking of marine mammals between ''pings'' unnecessary.

Paragraph 216.185(c) has been amended by limiting the authority to board U.S. Naval vessels to Federal agencies with jurisdiction, such as NMFS, USFWS and the Coast Guard. As the SURTASS LFA sonar vessel will remain outside 12 nm (22 km) of U.S. coastal waters, state and local agencies do not have jurisdiction to board these vessels, unless under an existing cooperative enforcement agreement with NMFS.

As a result of consultation under section 7 of the ESA, paragraph 216.180(b) has been amended to include the Spitzbergen stock of bowhead whales.

**NEPA**

On July 30, 1999 (64 FR 41420), the Environmental Protection Agency (EPA) announced receipt of a Draft EIS from the U.S. Navy on the deployment of SURTASS LFA sonar. The public comment period on the Draft EIS ended on October 28, 1999. On February 2, 2001 (65 FR 8788), EPA announced receipt of a Final EIS from the U.S. Navy on the deployment of SURTASS LFA sonar. NMFS is a cooperating agency, as defined by the Council on Environmental Quality (40 CFR 1501.6), in the preparation of these documents. NMFS has reviewed the Navy's Final EIS and does not have any significant concerns with the findings contained therein. As a result, NMFS hereby adopts the Navy Final EIS as its own as provided by 40 CFR 1506.3 and finds that it is unnecessary to either prepare its own NEPA documentation on the issuance of these regulations nor to recirculate the Navy Final EIS for additional comments. The Navy's Final EIS is available at: *http://www.surtass-lfa-eis.com.*

**ESA**

On October 4, 1999, the Navy submitted a Biological Assessment to NMFS to initiate consultation under section 7 of the ESA. NMFS concluded consultation with the Navy on this action on May 30, 2002. The conclusion of that consultation was that operation of the SURTASS LFA sonar system for testing, training and military operations and the issuance by NMFS of a small take authorization for this activity are not likely to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS. A copy of the Biological Opinion issued as a result of that consultation is available at: *http://www.nmfs.noaa.gov/prot_res/overview/publicat.html.*

**Classification**

This action has been determined to be significant for purposes of Executive Order 12866. NMFS has determined that this final rule will provide NMFS and the public, through the Navy's monitoring and research program, with information on the SURTASS LFA sonar system's effect on the marine environment, especially on marine

mammals. Without an authorization under the MMPA, NMFS and the public are unlikely to receive this information. NMFS believes that obtaining this information is extremely important because SURTASS LFA sonar is not the only LF noise source in the world's oceans, and the scientific findings resulting from monitoring and research is likely to be directly applicable to other activities. In addition, this final rule, and LOAs issued thereunder, would impose appropriate mitigation measures for protecting marine mammals, sea turtles and other marine life. Without these regulations and LOAs, mitigation measures could not be required of the U.S. Navy. The cost to the Navy to implement the mitigation and monitoring measures cannot be fully determined at this time but these costs would be incurred through implementation of the LTM program that will be required under this final rule. NMFS believes that this cost would be approximately $ 1 million annually.

The Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration that this action would not have a significant economic impact on a substantial number of small entities. As a result no regulatory flexibility analysis was prepared. The factual basis for the certification was published in the proposed rule. No comments were received regarding the economic impacts of this action.

Notwithstanding any other provision of law, no person is required to respond to nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act (PRA) unless that collection of information displays a currently valid OMB control number. This final rule contains collection-of-information requirements subject to the provisions of the PRA. These requirements have been approved by OMB under control number 0648–0151, and include applications for LOAs, and reports. Other information requirements in the final rule are not subject to the PRA since they apply only to a single entity and therefore are not contained in a rule of general applicability.

The reporting burden for the approved collections-of-information is estimated to be approximately 120 hours for the annual applications for an LOA, and a total of 120 hours for the quarterly and annual reports. These estimates include the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection-of-information. Send comments regarding these burden estimates, or any other aspect of this data collection, including suggestions for reducing the burden, to NMFS and OMB (see **ADDRESSES**).

**List of Subjects in 50 CFR Part 216**

Exports, Fish, Imports, Indians, Labeling, Marine mammals, Penalties, Reporting and recordkeeping requirements, Seafood, Transportation.

Dated: July 1, 2002.

**Rebecca Lent,**

*Deputy Assistant Administrator for Fisheries, National Marine Fisheries Service.*

For reasons set forth in the preamble, 50 CFR part 216 is amended as follows:

## PART 216—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

1. The authority citation for part 216 continues to read as follows:

**Authority:** 16 U.S.C. 1361 *et seq.*, unless otherwise noted.

2. Subpart Q is added to part 216 to read as follows:

### Subpart Q—Taking of Marine Mammals Incidental to Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar

Sec.

216.180 Specified activity and specified geographical region.
216.181 Effective dates.
216.182 Permissible methods of taking.
216.183 Prohibitions.
216.184 Mitigation.
216.185 Requirements for monitoring.
216.186 Requirements for reporting.
216.187 Applications for Letters of Authorization.
216.188 Letters of Authorization.
216.189 Renewal of Letters of Authorization.
216.190 Modifications to Letters of Authorization.
216.191 Designation of Biologically Important Marine Mammal Areas.

## Subpart Q—Taking of Marine Mammals Incidental to Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar

### § 216.180 Specified activity and specified geographical region.

Regulations in this subpart apply only to the incidental taking of those marine mammal species specified in paragraph (b) of this section by the U.S. Navy, Department of Defense, while engaged in the operation of no more than two SURTASS LFA sonar systems conducting active sonar operations, in areas specified in paragraph (a) of this section. The authorized activities, as specified in a Letter of Authorization issued under §§ 216.106 and 216.188, include the transmission of low frequency sounds from the SURTASS LFA sonar and the transmission of high frequency sounds from the mitigation sonar described in § 216.185 during training, testing, and routine military operations of SURTASS LFA sonar.

(a) With the exception of those areas specified in § 216.183(d), the incidental taking by harassment may be authorized in the following areas as specified in a Letter of Authorization:

(1) Atlantic Polar Biome:

(i) Boreal Polar Province (1/BPLR)(i.e., LFA sonar 180-dB exclusion zone);

(ii) Atlantic Arctic Province (2/ARCT);

(iii) Atlantic Subarctic Province (3/SARC);

(2) North Atlantic Coastal Biome:

(i) Northeast Atlantic Shelves Province (11/NECS),

(A) North/Irish Sea Subprovince,

(B) English Channel Subprovince,

(C) Southern Outer Shelf Subprovince,

(D) Northern Outer Shelf Subprovince, and

(E) Baltic Subprovince; and

(ii) Northwest Atlantic Shelves Province (15/NWCS),

(A) Newfoundland/Nova Scotia Shelf Subprovince,

(B) Gulf of St. Lawrence Coastal Subprovince,

(C) Gulf of Maine/Bay of Fundy Coastal Subprovince,

(D) Georges Bank/New York Bight Coastal Subprovince,

(E) Middle Atlantic Bight Coastal Subprovince,

(F) South Atlantic Bight Coastal Subprovince;

(3) South Atlantic Coastal Biome:

(i) Benguela Current Coastal Province (22/BENG);

(ii) Brazil Current Coastal Province (20/BRAZ);

(iii) Eastern (Canary) Coastal Province (12/CNRY);

(iv) Southwest Atlantic Shelves Province (21/FKLD);

(v) Guianas Coastal Province (14/GUIA);

(vi) Guinea Current Coastal Province (13/GUIN),

(A) Guiana Coastal Subprovince, and

(B) Central African Coastal Subprovince;

(4) Atlantic Westerly Winds Biome:

(i) Gulf Stream Province (5/GFST);

(ii) North Atlantic Drift Province (4/NADR);

(iii) North Atlantic Subtropical Gyral East Province (18/NASTE); and

(iv) North Atlantic Subtropical Gyral West Province (6/NASTW);
(5) Atlantic Trade Wind Biome:
(i) Caribbean Province (17/CARB);
(A) Gulf of Mexico Subprovince;
(B) Caribbean Sea Subprovince;
(ii) Eastern Tropical Atlantic Province (9/ETRA);
(iii) North Atlantic Tropical Gyral Province (7/NATR);
(iv) South Atlantic Gyral Province (10/SATL);
(v) Western Tropical Atlantic Province (8/WTRA);
(6) Mediterranean/Black Sea Biome:
(i) Mediterranean Sea Province (16A/MEDI);
(ii) Black Sea Province (16B/BLSE);
(7) Indian Ocean Coastal Biome:
(i) Australia/Indonesia Coastal Province (37/AUSW);
(ii) Eastern India Coastal Province (35/INDE);
(iii) Northwestern Arabian Upwelling Province (34/ARAB);
(iv) Eastern Africa Coastal Province (32/EAFR);
(v) Western India Coastal Province (36/INDW);
(vi) Red Sea, Persian Gulf Province (33/REDS);
(8) Indian Ocean Trade Wind Biome:
(i) Indian South Subtropical Gyre Province (31/ISSG);
(ii) Indian Monsoon Gyres Province (30/MONS);
(9) North Pacific Coastal Biome:
(i) Alaska Downwelling Coastal Province (65/ALSK),
(A) Canadian/Alaskan Coastal Subprovince,
(B) Aleutian Stream Coastal Subprovince,
(ii) California Current Province (66/CALC),
(A) Oregon-British Columbia Coastal Subprovince,
(B) Point Conception/Cape Mendicino Coastal Subprovince,
(C) Southern California Bight Subprovince, and
(D) Baja California Subprovince;
(iii) Central American Coastal Province (67/CAMR);
(iv) China Sea Coastal Province (69/CHIN);
(10) South Pacific Coastal Biome:
(i) East Australian Coastal Province (71/AUSE);
(ii) Humboldt Current Coastal Province (68/HUMB);
(A) Chilean Coastal Subprovince and
(B) Peruvian Coastal Subprovince;
(iii) New Zealand Coastal Province (72/NEWZ);
(iv) Sunda/Arafura Shelves Province (70/SUND);
(11) Pacific Polar Biome:
(i) North Pacific Epicontinental Sea Province (50/BERS);
(A) Bering Sea Subprovince;
(B) Okhotsk Sea Subprovince;
(ii) Reserved;
(12) Pacific Trade Wind Biome:
(i) Archipelagic Deep Basins Province (64/ARCH);
(ii) North Pacific Tropical Gyre West Province (56/NPTGW);
(iii) North Pacific Tropical Gyre East Province (60/NPTGE);
(iv) Pacific Equatorial Divergence Province (62/PEQD);
(v) North Pacific Equatorial Countercurrent Province (61/PNEC);
(vi) South Pacific Subtropical Gyre Province (59/SPGS);
(vii) Western Pacific Warm Pool Province (63/WARM);
(13) Pacific Westerly Winds Biome:
(i) Kuroshio Current Province (53/KURO);
(ii) North Pacific Transition Zone Province (54/NPPF);
(iii) Pacific Subarctic Gyres (East) Province (51/PSAGE);
(iv) Pacific Subarctic Gyres (West) Province (52/PSAGW);
(14) Antarctic Westerly Winds Biome:
(i) Subantarctic Water Ring Province (81/SANT),
(A) Atlantic Subantarctic Ring Subprovince;
(B) Indian Ocean Subantarctic Ring Subprovince;
(C) Pacific Ocean Subantarctic Water Ring Subprovince;
(ii) Subtropical Convergence Province (80/SSTC),
(A) Atlantic South Subtropical Convergence Subprovince;
(B) Indian Ocean South Subtropical Convergence Subprovince;
(C) Pacific Ocean South Subtropical Convergence Subprovince;
(iii) Tasman Sea Province (58/TASM);
(15) Antarctic Polar Biome:
(SURTASS LFA sonar exclusion zone);
(i) Antarctic Province (82/ANTA)
(ii) Austral Polar Province (83/APLR).

(b) The incidental take by Level A and Level B harassment of marine mammals under the activity identified in this section is limited to the following species and species groups:

(1) Mysticete whales—blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), humpback whale (*Megaptera novaeangliae*), northern right whale (*Eubalaena glacialis*), southern right whale (*Eubalaena australis*), pygmy right whale (*Capera marginata*), bowhead whale (*Balaena mysticetus*), and gray whales (*Eschrichtius robustus*).

(2) Odontocete whales—Risso's dolphin (*Grampus griseus*), rough-toothed dolphin (*Steno bredanensis*), Fraser's dolphin (*Lagenodelphis hosei*), right-whale dolphin (*Lissodelphis spp.*), bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), beluga whale (*Delphinapterus leucas*), *Stenella spp. Lagenorhynchus spp.*, *Cephalorhynchus spp.* melon-headed whale (*Peponocephala spp.*), beaked whales (*Berardius spp.*, *Hyperoodon spp.*, *Mesoplodon spp.*), Cuvier's beaked whale (*Ziphius cavirostris*), Shepard's beaked whale (*Tasmacetus shepherdi*), Longman's beaked whale (*Indopacetus pacificus*), killer whale (*Orcinus orca*), false killer whale (*Pseudorca crassidens*), pygmy killer whale (*Feresa attenuata*), sperm whale (*Physeter macrocephalus*), dwarf and pygmy sperm whales (*Kogia simus* and *K. breviceps*), and short-finned and long-finned pilot whales (*Globicephala macrorhynchus* and *G. melas*).

(3) Pinnipeds—harbor seals (*Phoca vitulina*), spotted seals (*P. largha*), ribbon seals (*P. fasciata*), gray seals (*Halichoerus grypus*), hooded seal (*Cystophora cristata*), elephant seals (*Mirounga angustirostris* and *M. leonina*). Hawaiian monk seals (*Monachus schauinslandi*), Mediterranean monk seals (*Monachus monachus*), northern fur seals (*Callorhinus ursinus*); southern fur seals (*Arctocephalus spp.*), Steller sea lions (*Eumetopias jubatus*), California sea lions (*Zalophus californianus*), Australian sea lions (*Neophoca cinerea*), New Zealand sea lions (*Phocarctos hookeri*), and South American sea lions (*Otaria flavescens*).

### § 216.181 Effective dates.

Regulations in this subpart are effective from August 15, 2002 through August 15, 2007.

### § 216.182 Permissible methods of taking.

(a) Under Letters of Authorization issued pursuant to §§ 216.106 and 216.188, the Holder of the Letter of Authorization may incidentally, but not intentionally, take marine mammals by Level A and Level B harassment within the areas described in § 216.180(a), provided the activity is in compliance with all terms, conditions, and requirements of these regulations and the appropriate Letter of Authorization.

(b) The activities identified in § 216.180 must be conducted in a manner that minimizes, to the greatest extent practicable, any adverse impacts on marine mammals, their habitat, and

the availability of marine mammals for subsistence uses.

**§ 216.183 Prohibitions.**

Notwithstanding takings authorized by § 216.180 and by a Letter of Authorization issued under §§ 216.106 and 216.188, no person in connection with the activities described in § 216.180 shall:

(a) Take any marine mammal not specified in § 216.180(b);

(b) Take any marine mammal specified in § 216.180(b) other than by incidental, unintentional Level A and Level B harassment;

(c) Take any marine mammal by receiving a sound pressure level greater than 180 dB while operating under a Letter of Authorization in any geographic area for which a Letter of Authorization has not been issued;

(d) Take a marine mammal specified in § 216.180(b) if such taking results in more than a negligible impact on the species or stocks of such marine mammal; or

(e) Violate, or fail to comply with, the terms, conditions, and requirements of the regulations in this subpart or any Letter of Authorization issued under §§ 216.106 and 216.188.

**§ 216.184 Mitigation.**

The activity identified in § 216.180(a) must be conducted in a manner that minimizes, to the greatest extent practicable, adverse impacts on marine mammals and their habitats. When conducting operations identified in § 216.180, the mitigation measures described in this section and in any Letter of Authorization issued under §§ 216.106 and 216.188 must be implemented.

(a) Through monitoring described under § 216.185, the Holder of a Letter of Authorization will ensure, to the greatest extent practicable, that no marine mammal is subjected to a sound pressure level of 180 dB or greater.

(b) If a marine mammal is detected within the area subjected to sound pressure levels of 180 dB or greater (safety zone) or within the 1 km (0.5 nm) (buffer) zone extending beyond the 180-dB safety zone, SURTASS LFA sonar transmissions will be immediately delayed or suspended. Transmissions will not resume earlier than 15 minutes after:

(1) All marine mammals have left the area of the safety and buffer zones; and

(2) There is no further detection of any marine mammal within the safety and buffer zones as determined by the visual and/or passive or active acoustic monitoring described in § 216.185.

(c) The high-frequency marine mammal monitoring sonar (HF/M3) described in § 216.185 will be ramped-up slowly to operating levels over a period of no less than 5 minutes:

(1) At least 30 minutes prior to any SURTASS LFA sonar transmissions;

(2) Prior to any SURTASS LFA sonar calibrations or testings that are not part of regular SURTASS LFA sonar transmissions described in paragraph (c)(1) of this section; and

(3) Anytime after the HF/M3 source has been powered down for more than 2 minutes.

(d) The HF/M3 source will not increase its sound pressure level once a marine mammal is detected; ramp-up may proceed once marine mammals are no longer detected.

(e) The Holder of a Letter of Authorization will not operate the SURTASS LFA sonar while under a Letter of Authorization, such that the SURTASS LFA sonar sound field exceeds 180 dB (re 1 μPa(rms)):

(1) At a distance of 12 nautical miles (nm) (22 kilometers (km)) from any coastline, including offshore islands;

(2) Within any offshore area that has been designated as biologically important for marine mammals under § 216.183(f), during the biologically important season for that particular area;

(3) Within the offshore boundaries that extend beyond 12 nm (22 km) of the following National Marine Sanctuaries:

(i) Monterey Bay,

(ii) Gulf of the Farallones, and

(iii) Cordell Bank;

(4) Within 23 nm (37.4 km) during the months of December, January, March, and May of each year in the Olympic Coast National Marine Sanctuary.

(f) The following areas have been designated by NMFS as offshore areas of critical biological importance for marine mammals (by season if appropriate):

| Name of area | Location of area | Months of importance |
|---|---|---|
| (1) 200-m isobath North American East Coast | From 28° N. to 50° N. west of 40° W | Year-Round. |
| (2) Antarctic Convergence Zone | 30° E. to 80° E to 45° S. 80° E. to 150° E. to 55° S. 150° E. to 50° W. to 60° S. 50° W to 30° E. to 50° S. | October 1 through March 31. |
| (3) Costa Rica Dome | Centered at 9° N. and 88° W | Year-Round. |
| (4) Penguin Bank | Centered at 21° N. and 157° 30′W | November 1 through May 1. |

**§ 216.185 Requirements for monitoring.**

(a) In order to mitigate the taking of marine mammals by SURTASS LFA sonar to the greatest extent practicable, the Holder of a Letter of Authorization issued pursuant to §§ 216.106 and 216.188 must:

(1) Conduct visual monitoring from the ship's bridge during all daylight hours;

(2) Use low frequency passive SURTASS LFA sonar to listen for vocalizing marine mammals; and

(3) Use the HF/M3 sonar to locate and track marine mammals in relation to the SURTASS LFA sonar vessel and the sound field produced by the SURTASS LFA sonar source array.

(b) Monitoring under paragraph (a) of this section must:

(1) Commence at least 30 minutes before the first SURTASS LFA sonar transmission;

(2) Continue between transmission pings; and

(3) Continue either for at least 15 minutes after completion of the SURTASS LFA sonar transmission exercise, or, if marine mammals are exhibiting unusual behavioral patterns, for a period of time until behavior patterns return to normal or conditions prevent continued observations;

(c) Holders of Letters of Authorization for activities described in § 216.180 are required to cooperate with the National Marine Fisheries Service and any other federal agency for monitoring the impacts of the activity on marine mammals.

(d) Holders of Letters of Authorization must designate qualified on-site individuals to conduct the mitigation, monitoring and reporting activities specified in the Letter of Authorization.

(e) Holders of Letters of Authorization must conduct all monitoring and research required under the Letter of Authorization.

**§ 216.186 Requirements for reporting.**

(a) The Holder of the Letter of Authorization must submit quarterly mission reports to the Director, Office of Protected Resources, NMFS, no later than 30 days after the end of each

quarter beginning on the date of effectiveness of a Letter of Authorization or as specified in the appropriate Letter of Authorization. Each quarterly mission report will include all active-mode missions completed during that quarter. At a minimum, each classified mission report must contain the following information:

(1) Dates, times, and location of the vessel during the mission;

(2) Information on sonar transmissions as detailed in the Letter of Authorization; and

(3) Results of the marine mammal monitoring program specified in the Letter of Authorization.

(b) The Holder of a Letter of Authorization must submit an annual report to the Director, Office of Protected Resources, NMFS, no later than 90 days prior to expiration of a Letter of Authorization. This report must contain all the information required by the Letter of Authorization.

(c) A final comprehensive report must be submitted to the Director, Office of Protected Resources, NMFS at least 240 days prior to expiration of these regulations. In addition to containing all the information required by any final year Letter of Authorization, this report must contain an analysis of new passive technologies and an assessment of whether such a system is feasible as an alternative to SURTASS LFA sonar.

**§ 216.187 Applications for Letters of Authorization.**

(a) To incidentally take marine mammals pursuant to these regulations, the U.S. Navy authority conducting the activity identified in § 216.180 must apply for and obtain a Letter of Authorization in accordance with § 216.106.

(b) The application for an initial or a renewal of a Letter of Authorization must be submitted to the Director, Office of Protected Resources, NMFS, at least 60 days before the date that either the vessel is scheduled to begin conducting SURTASS LFA sonar operations or the previous Letter of Authorization is scheduled to expire.

(c) All applications for a Letter of Authorization must include the following information:

(1) The date(s), duration, and the specified geographical region where the vessel's activity will occur;

(2) The species and/or stock(s) of marine mammals likely to be found within each specified geographical region;

(3) The type of incidental taking authorization requested (i.e., take by Level A and/or Level B harassment);

(4) The estimated percentage of marine mammal species/stocks potentially affected in each specified geographic region for the 12-month period of effectiveness of the Letter of Authorization; and

(5) The means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and the level of taking or impacts on marine mammal populations.

(d) The National Marine Fisheries Service will review an application for a Letter of Authorization in accordance with § 216.104(b) and, if adequate and complete, issue a Letter of Authorization.

**§ 216.188 Letters of Authorization.**

(a) A Letter of Authorization, unless suspended or revoked will be valid for a period of time not to exceed one year, but may be renewed annually subject to annual renewal conditions in § 216.189.

(b) Each Letter of Authorization will set forth:

(1) Permissible methods of incidental taking;

(2) Authorized geographic areas for incidental takings;

(3) Means of effecting the least practicable adverse impact on the species of marine mammals authorized for taking, their habitat, and the availability of the species for subsistence uses; and

(4) Requirements for monitoring and reporting incidental takes.

(c) Issuance of each Letter of Authorization will be based on a determination that the number of marine mammals taken by the activity will be small, that the total number of marine mammals taken by the activity specified in § 216.180 as a whole will have no more than a negligible impact on the species or stock of affected marine mammal(s), and that the total taking will not have an unmitigable adverse impact on the availability of species or stocks of marine mammals for taking for subsistence uses.

(d) Notice of issuance or denial of an application for a Letter of Authorization will be published in the **Federal Register** within 30 days of a determination.

**§ 216.189 Renewal of Letters of Authorization.**

(a) A Letter of Authorization issued under § 216.106 and § 216.188 for the activity identified in § 216.180 will be renewed annually upon:

(1) Notification to NMFS that the activity described in the application submitted under § 216.187 will be undertaken and that there will not be a substantial modification to the described work, mitigation or monitoring undertaken during the upcoming season;

(2) Notification to NMFS of the information identified in § 216.187(c), including the planned geographic area(s), and anticipated duration of each SURTASS LFA sonar operation;

(3) Timely receipt of the monitoring reports required under § 216.185, which have been reviewed by NMFS and determined to be acceptable;

(4) A determination by NMFS that the mitigation, monitoring and reporting measures required under §§ 216.184 and 216.185 and the Letter of Authorization were undertaken and will be undertaken during the upcoming annual period of validity of a renewed Letter of Authorization; and

(5) A determination by NMFS that the number of marine mammals taken by the activity continues to be small, that the total number of marine mammals taken by the activity specified in § 216.180, as a whole will have no more than a negligible impact on the species or stock of affected marine mammal(s), and that the total taking will not have an unmitigable adverse impact on the availability of species or stocks of marine mammals for taking for subsistence uses.

(b) If a request for a renewal of a Letter of Authorization issued under §§ 216.106 and 216.188 indicates that a substantial modification to the described work, mitigation or monitoring will occur, or if NMFS proposes a substantial modification to the Letter of Authorization, NMFS will provide a period of 30 days for public review and comment on the proposed modification. Amending the list of areas for upcoming SURTASS LFA sonar operations is not considered a substantial modification to the Letter of Authorization.

(c) A notice of issuance or denial of a renewal of a Letter of Authorization will be published in the **Federal Register** within 30 days of a determination.

**§ 216.190 Modifications to Letters of Authorization.**

(a) Except as provided in paragraph (b) of this section, no substantial modification (including withdrawal or suspension) to a Letter of Authorization issued pursuant to §§ 216.106 and 216.188 and subject to the provisions of this subpart shall be made by NMFS until after notification and an opportunity for public comment has been provided. For purposes of this paragraph, a renewal of a Letter of Authorization under § 216.189, without modification, except for the period of validity and a listing of planned

operating areas, or for moving the authorized SURTASS LFA sonar system from one ship to another, is not considered a substantial modification.

(b) If the National Marine Fisheries Service determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in § 216.180(b), a Letter of Authorization issued pursuant to §§ 216.106 and 216.188 may be substantially modified without prior notice and opportunity for public comment. Notification will be published in the **Federal Register** within 30 days subsequent to the action.

**§ 216.191 Designation of Biologically Important Marine Mammal Areas.**

(a) Biologically important areas for marine mammals may be nominated under this paragraph by the National Marine Fisheries Service or by the public.

(b) In order for the National Marine Fisheries Service to designate offshore areas of biological importance for marine mammals under this rule, proponents must petition NMFS by requesting an area be added to the list of biologically important areas in § 216.184(f) and submitting the following information:

(1) Geographic region proposed for consideration (including geographic boundaries);

(2) A list of marine mammals within the proposed geographic region;

(3) Whether the proposal is for year-round designation or seasonal, and if seasonal, months of years for proposed designation;

(4) Detailed information on the biology of marine mammals within the area, including estimated population size, distribution, density, status, and the principal biological activity during the proposed period of designation sufficient for NMFS to make a preliminary determination that the area is biologically important for marine mammals; and

(5) Detailed information on the area with regard to its importance for either primary feeding, breeding, or migration for those species of marine mammals that have the potential to be affected by low frequency sounds;

(c) Areas within 12 nm (22 km) of any coastline, including offshore islands, or within non-operating areas for SURTASS LFA sonar are not eligible for consideration;

(d) If a petition is received without sufficient information for the National Marine Fisheries Service to proceed, NMFS will determine whether the nominated area warrants further study. If so, NMFS will begin a scientific review of the area.

(e)(1) If through a petition or independently, NMFS makes a preliminary determination that an area is biologically important for marine mammals and is not located within a previously designated area, NMFS will propose to add the area to § 216.184(f) and provide a public comment period of at least 45 days from the date of publication in the **Federal Register**.

(2) The National Marine Fisheries Service will publish its final determination in the **Federal Register**.

[FR Doc. 02–16853 Filed 7–15–02; 8:45 am]

BILLING CODE 3810–FF–P