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National Environmental Policy Act
Section 102(2)(C)
and
Executive Order 12114

EXECUTIVE SUMMARY
FINAL
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT/SUPPLEMENTAL OVERSEAS ENVIRONMENTAL IMPACT STATEMENT FOR SURVEILLANCE TOWED ARRAY SENSOR SYSTEM LOW FREQUENCY ACTIVE (SURTASS LFA) SONAR

June 2012

Abstract

This Final Supplemental Environmental Impact Statement/Supplemental Overseas Environmental Impact Statement (FSEIS/SOEIS) evaluates the potential environmental impacts of employing the Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) sonar. It has been prepared by the Department of the Navy in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA) and Presidential Executive Order (EO) 12114 (Environmental Effects Abroad of Major Federal Actions). The Navy currently plans to operate up to four SURTASS LFA sonar systems for routine training, testing and military operations. Based on current U.S. Navy national security and operational requirements, routine training, testing and military operations using these sonar systems could occur in the Pacific, Atlantic and Indian Oceans, and the Mediterranean Sea. Vessels equipped with, or to be equipped with, SURTASS LFA sonar systems are the USNS IMPECCABLE (T-AGOS 23) and USNS VICTORIOUS (T-AGOS 19) class ocean surveillance vessels. In addition to the No Action Alternative, the FSEIS/SOEIS analyzed two additional alternatives. The analysis of these three alternatives is intended to address concerns of the U.S. District Court for the Northern District of California in its 6 February 2008 opinion and order in relation to compliance with NEPA and the Marine Mammal Protection Act (MMPA); as well as to fulfill the Navy's responsibilities under NEPA with regard to providing additional information related to the proposed action. The FSEIS/SOEIS considers mitigation measures, including the practicability of greater coastal standoff range where the continental shelf extends further than the current coastal standoff range of 22 kilometers (12 nautical miles), the designation of additional offshore biologically important areas, and further analysis of potential cumulative impacts with concurrent use of SURTASS LFA sonar with other active sonar sources

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EXECUTIVE SUMMARY

This Final Supplemental Environmental Impact Statement/Supplemental Overseas Environmental Impact Statement (FSEIS/SOEIS) for Surveillance Towed Array Sensor System (SURTASS) Low Frequency Active (LFA) sonar systems[1] provides supplemental analyses to the Final Overseas Environmental Impact Statement/Environmental Impact Statement (FOEIS/EIS) for SURTASS LFA Sonar (DoN, 2001) and the Final Supplemental Environmental Impact Statement (FSEIS) for SURTASS LFA Sonar (DoN, 2007a), which were filed with the United States (U.S.) Environmental Protection Agency in January 2001 and April 2007, respectively. This second supplemental analysis has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] §4321 et seq.)[2]; the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] §§1500-1508); Navy Procedures for Implementing NEPA (32 CFR §775); and Executive Order (EO) 12114, Environmental Effects Abroad of Major Federal Actions[3].

REFERENCES TO UNDERWATER SOUND LEVELS

- **References to underwater sound pressure level (SPL) in this SEIS/SOEIS are values given in decibels (dB), and are assumed to be standardized at 1 microPascal at 1 m (dB re 1 µPa @ 1 m [rms]) for source level (SL) and dB re 1 µPa (rms) for received level (RL), unless otherwise stated (Urick, 1983; ANSI, 2006).**
- **In this SEIS/SOEIS, underwater sound exposure level (SEL) is a measure of energy, specifically the squared instantaneous pressure integrated over time and expressed as an equivalent one-second in duration signal, unless otherwise stated; the appropriate units for SEL are dB re 1 µPa²-sec (Urick, 1983; ANSI, 2006; Southall et al., 2007).**
- **The term "Single Ping Equivalent" (SPE) (as defined in Chapter 4 and Appendix C of this SEIS/SOEIS) is an intermediate calculation for input to the risk continuum used in this document. SPE accounts for the energy of all the LFA acoustic transmissions that a modeled animal receives during an entire LFA mission (modeled for operations from 7 to 20 days). Calculating the potential risk from SURTASS LFA is a complex process and the reader is referred to Appendix C for details. As discussed in Appendix C, SPE is a function of SPL, not SEL. SPE levels will be expressed as "dB SPE" in this document, as they have been in the SURTASS LFA sonar FOEIS/FEIS and FSEIS documents (DoN, 2001; 2007a).**

To meet long-range submarine detection capabilities necessary to provide U.S. forces with the time to react to and defend against potential undersea threats, the Navy developed the SURTASS LFA sonar system.

1 In this FSEIS/SOEIS, "SURTASS LFA sonar systems" refers to both the LFA and compact LFA (CLFA) systems, each having similar acoustic operating characteristics.

2 The provisions of NEPA apply to major federal actions that occur or have effects in the U.S., its territories, or possessions.

3 The provisions of EO 12114 apply to major federal actions that occur or have effects outside of U.S. territories (the U.S., its territories, and possessions).

The Federal actions considered are:

- The employment by the U.S. Navy of up to four SURTASS LFA sonar systems for routine training, testing, and military operations[4] in the oceanic areas (Figure ES-1) occurring in the Pacific, Atlantic, and Indian Oceans, and the Mediterranean Sea.
- The interrelated actions of NMFS' issuance of five-year regulations and subsequent letters of authorization (LOAs) under Section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA) for the incidental, but not intentional, taking of marine mammals during routine training, testing, and military opertations using SURTASS LFA sonar, following NMFS' regulatory process for issuing such regulations and LOAs.

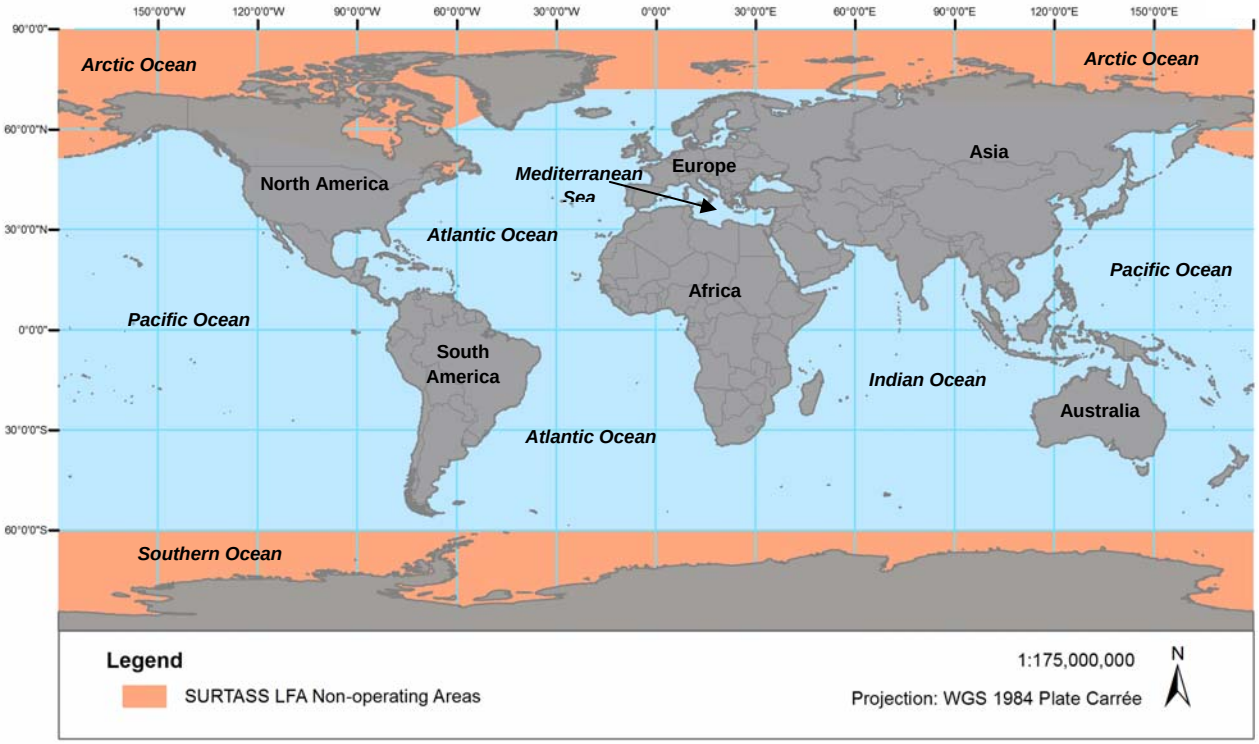

Figure ES-1. Potential areas of operation for SURTASS LFA sonar.

To reduce potential adverse effects on the marine environment, the Navy will use a suite of mitigation measures including: 1) visual, passive acoustic, and active acoustic monitoring; 2) delay/shutdown protocols for LFA transmissions; 3) geographic restrictions to prevent 180-decibel (dB) sound pressure level (SPL) or greater within 22 kilometers (km) (12 nautical miles [nmi]) of land, and in offshore biologically important areas (OBIA) during biologically important seasons: and 4) geographic restrictions to prevent greater than 145-dB SPL at known recreational and commercial dive sites. Mission planning for annual LOA applications will include the identification of marine areas based on updated scientific data and information for SURTASS LFA sonar routine testing, training, and military operations that contribute

4 The phrase "military operations" does not include use of SURTASS LFA sonar in armed conflict, or direct combat support operations or use of SURTASS LFA sonar during periods of heightened threat conditions, as determined by the National Command Authorities.

to the least practicable adverse impacts on marine mammals while meeting National Security requirements.

The purpose of the SURTASS LFA sonar FSEIS/SOEIS is to:

- Address concerns of the U.S. District Court for the Northern District of California (herein referred to as the Court) in its 6 February 2008 Opinion and Order in relation to compliance with NEPA and the Marine Mammal Protection Act (MMPA);
- Analyze a range of management alternatives to assist NMFS in carrying out its statutory responsibilities to authorize the incidental take of marine mammals associated with SURTASS LFA sonar operations for the five-year period of 2012 through 2017, if the required statutory determinations can be made; and
- Provide additional information and analyses pertinent to the proposed action.

The Navy is the lead agency, with the National Marine Fisheries Service (NMFS) as the cooperating agency, in accordance with NEPA regulations (40 CFR §1501.6).

In response to the Court ruling on the motion for preliminary injunction, the Deputy Assistant Secretary of the Navy for Environment (DASN(E)), on 14 November 2008, determined that the purposes of NEPA and Executive Order 12114 would be furthered by the preparation of additional supplemental analyses in the form of a new SEIS/SOEIS. On 21 January 2009, the Navy published a Notice of Intent (NOI) to prepare a SEIS/SOEIS for the employment of SURTASS LFA sonar, with NMFS as a cooperating agency (*Federal Register* (FR) (74 (12):3574) (DoN, 2009a). In the NOI, the Navy and NMFS solicited scoping comments on the above topics, to include OBIAs, greater coastal standoff, and cumulative effects. At the end of the 45-day public scoping period, no comments were received.

The initial FOEIS/EIS for SURTASS LFA sonar was completed in January 2001 by the Department of the Navy (DON) with NMFS as a cooperating agency in accordance with the requirements of NEPA and EO 12114. DASN(E) signed the Record of Decision (ROD) on 16 July 2002 (FR 67(141):48145), authorizing the operational employment of SURTASS LFA sonar systems contingent upon issuance by NMFS of LOAs under the MMPA and incidental take statements (ITS) under the ESA for each vessel.

To improve military readiness, the Department of Defense (DoD) asked Congress to amend several provisions of environmental laws as they applied to military training and testing activities. These legislative amendments were provided by Congress as parts of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2003 (Public Law 107-314) and the NDAA for FY 2004 (Public Law 108-136).

The term “military readiness activity” is defined in NDAA for FY 2003 (16 U.S.C. § 703 note) to include all training and operations of the Armed Forces that relate to combat; and the adequate and realistic testing of military equipment, vehicles, weapons and sensors for proper operation and suitability for combat use. NMFS and the Navy have determined that the Navy’s SURTASS LFA sonar testing, training, and military operations that are the subject of NMFS’ Final Rules constitute military readiness activities because those activities comprise “training and operations of the Armed Forces that relate to combat” and constitute “adequate and realistic testing of military equipment, vehicles, weapons and sensors for proper operation and suitability for combat use.”

The provisions of the NDAA that specifically relate to SURTASS LFA sonar concern revisions to the MMPA, as summarized below:

- Overall—Changed the MMPA definition of “harassment,” adjusted the permitting system to better accommodate military readiness activities, and added a national defense exemption[5].

5 SURTASS LFA sonar has never been employed under this national defense exemption.

- Amended definition of "harassment" as it applies to military readiness activities and certain scientific activities conducted on behalf of the Federal government.
- Level A "harassment" defined as any act that injures or has the *significant* potential to injure a marine mammal or marine mammal stock in the wild.
- Level B "harassment" defined as any act that disturbs or is *likely to disturb* a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering *to a point where the patterns are abandoned or significantly altered*.
- Secretary of Defense may invoke a national defense exemption not to exceed two years for DoD activities after conferring with the Secretary of Commerce and the Secretary of Interior, as appropriate.
- NMFS' determination of "least practicable adverse impact on species or stock" must include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.
- Eliminated the "small numbers" and "specified geographic region" requirements from the incidental take permitting process for military readiness activities.

The FSEIS/SOEIS focuses on DASN(E) direction for supplemental analyses, to include:

- Further analysis of potential additional OBIAs in regions of the world where the Navy intends to use SURTASS LFA sonar systems for routine training, testing and military operations;
- Further analysis of whether using a greater coastal standoff range where the continental shelf extends further than the current coastal standoff range (22 km [12 nmi]) is practicable for SURTASS LFA sonar; at least in some locations; and
- Further analysis of potential cumulative impacts with concurrent use of SURTASS LFA sonar with other active sonar sources.

Additional FSEIS/SOEIS analyses include:

- Updating literature reviews, especially for fish, sea turtles, and marine mammals;
- New subchapter on protected habitats, including ESA Critical Habitat, Essential Fish Habitat, and Marine Protected Areas;
- Updated literature review on commercial fisheries, marine mammal strandings, cumulative effects from anthropogenic oceanic noise, cumulative effects on socioeconomic resources; and
- Mitigation measures: changes due to increased number of OBIAs.

Information from these analyses is used to assist the Navy in determining how to employ SURTASS LFA sonar, including the selection of operating areas that the Navy requires for routine training, testing, and military operations in requests for MMPA LOAs submitted to NMFS.

ES.1 PURPOSE AND NEED

The Navy's primary mission is to maintain, train, equip, and operate combat-ready naval forces capable of accomplishing American strategic objectives, deterring maritime aggression, and assuring freedom of navigation in ocean areas. The Secretary of the Navy and Chief of Naval Operations (CNO) have continually validated that Anti-Submarine Warfare (ASW) is a critical part of that mission—a mission that

requires unfettered access to both the high seas and littorals[6]. In order to be prepared for all potential threats, the Navy must maintain ASW core competency through continual training and operations in open-ocean and littoral environments.

The challenges faced by the U.S. Navy today are very different from those faced at the end of the Cold War nearly two decades ago. Since the early 1990s, U.S. Navy ASW strategy has had to shift from a known Soviet adversary to "uncertain potential adversaries" with less well-understood and defined strategies and goals (Benedict, 2005). The wide proliferation of diesel-electric submarines, a Chinese undersea force that is growing in size and tactical capability, and a resurgent Russian submarine service mean that U.S. ASW capability must meet more technologically-capable threats in a wider range of ocean environments (Benedict, 2005; ONI, 2009a and 2009b). Due to the advancement and use of quieting technologies in diesel-electric and nuclear submarines, undersea threats are becoming increasingly difficult to locate using the passive acoustic technologies that were effective during the Cold War. The range at which U.S. ASW assets are able to identify submarine threats is decreasing, and at the same time, improvements in torpedo design are extending the effective weapons range of those same threats (Benedict, 2005).

To meet this long-range submarine detection need, the U.S. Navy has investigated the use of a broad spectrum of acoustic and non-acoustic technologies. These are discussed in Subchapter 1.1.4. Of the technologies evaluated, LFA sonar is the only system capable of meeting the U.S. Navy's long-range ASW detection needs in a variety of weather conditions during the day and night. SURTASS LFA sonar is providing a quantifiable improvement in the Navy's undersea detection capabilities and therefore markedly improving the survivability of U.S. Naval forces in hostile ASW scenarios.

The proposed action meets the need of the U.S. Navy for improved long-range submarine detection capability, which is essential to providing U.S. forces the time necessary to react to and defend against potential undersea threats. It is critical that U.S. forces be able to identify threats while remaining at a safe distance beyond a submarine's effective weapon's range (Davies, 2007).

Sections 101(a)(5)(A) and (D) of the MMPA direct NMFS to allow, upon request, the incidental, but not intentional, taking of marine mammals of a species or population stock by U.S. citizens who engage in a specified military readiness activity if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of proposed authorization is provided to the public for review. Authorization for incidental taking shall be granted if NMFS finds that the taking will have a negligible impact on the affected species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for taking for subsistence uses. NMFS must also prescribe: the permissible methods of taking pursuant to the activity; other means of effecting the "least practicable adverse impact" on the affected species or stock and its habitat and on the availability of such species or stock for subsistence uses; and requirements pertaining to the monitoring and reporting of such take.

NMFS anticipates receipt of applications to take marine mammals incidental to routine training, testing, and military operations using SURTASS LFA sonar pursuant to Section 101(a)(5)(A) of the MMPA. This FSEIS/SOEIS will assist NMFS in its MMPA decision-making process related to projected requests for LOAs in the Atlantic, Pacific, and Indian Oceans, and the Mediterranean Sea for future years. NMFS intends to use this FSEIS/SOEIS as the required NEPA documentation for the issuance of regulations and LOAs for the incidental taking of marine mammals during routine training, testing, and military operations using SURTASS LFA sonar. If necessary, NMFS may tier from this FSEIS/SOEIS to support future SURTASS LFA authorization decisions if such activities fall outside the scope of this FSEIS/SOEIS.

6 See Subchapter 1.1.3 for the definition of "littoral."

ES.2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

SURTASS LFA sonars are long-range systems operating in the LF band (below 1,000 Hz). These systems are composed of both active and passive components (Figure ES-2). SONAR is an acronym for SOund NAvigation and Ranging, and its definition includes any system that uses underwater sound, or acoustics, for observations and communications. Sonar systems are used for many purposes, ranging from commercial off-the-shelf (COTS) "fish finders" to military ASW systems for detection and classification of submarines. There are two basic types of sonar:

- Passive sonar detects the sound created by an object (source) in the water. This is a one-way transmission of sound waves traveling through the water from the source to the receiver and is the same as people hearing sounds that are created by another source and transmitted through the air to the ear.
- Active sonar detects objects by creating a sound pulse, or "ping," that is transmitted through the water and reflects off the target, returning in the form of an echo. This is a two-way transmission (source to reflector to receiver). Some marine mammals locate prey and navigate utilizing this form of echolocation.

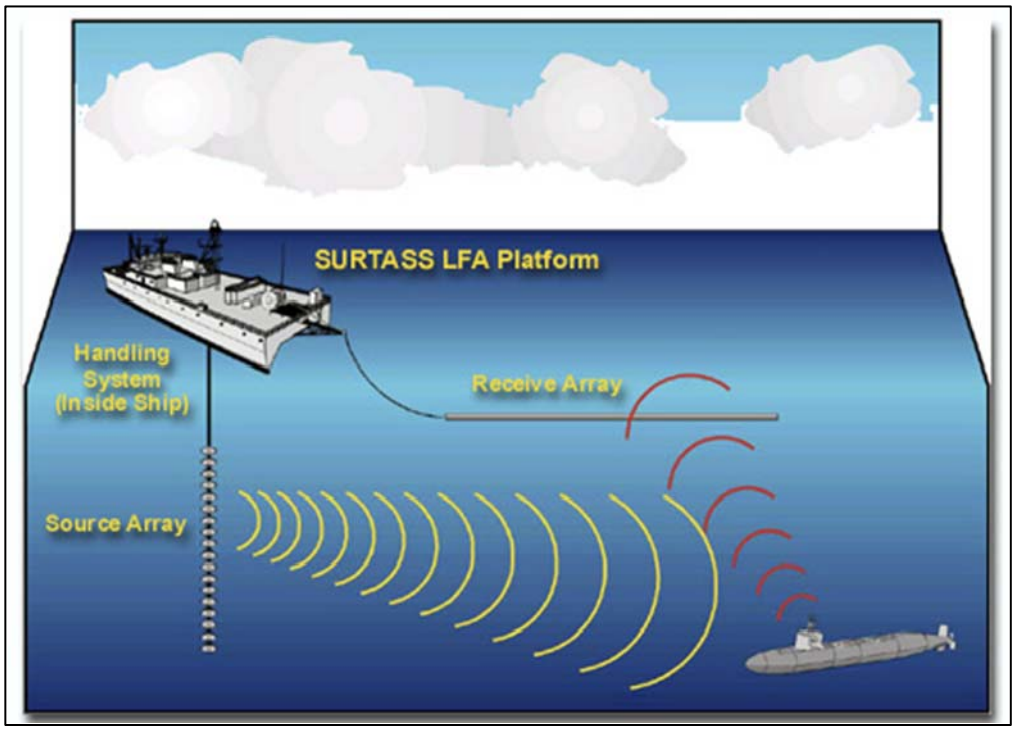

Figure ES-2. SURTASS LFA sonar systems.

ES.2.1 PROPOSED ACTION

The proposed action herein is the U.S. Navy employment of up to four SURTASS LFA sonar systems in the oceanic areas presented in Figure ES-1. Based on current operational requirements, routine training, testing and military operations using these sonar systems could occur in the Pacific, Atlantic, and Indian Oceans, and the Mediterranean Sea.

LFA systems were initially installed on two SURTASS vessels: R/V *Cory Chouest*, which was retired in fiscal year (FY) 2008, and USNS IMPECCABLE (T-AGOS 23). As future undersea warfare requirements continue to transition to littoral ocean regions, the introduction of a compact active system deployable on SURTASS ships was needed. This system upgrade is known as Compact LFA, or CLFA. CLFA consists of smaller, lighter-weight source elements than the current LFA system, and is compact enough to be installed on the VICTORIOUS class platforms (T-AGOS 19). The initial CLFA installation was completed on the USNS ABLE (T-AGOS 20) in 2008 and at-sea-testing commenced in August 2008. CLFA improvements include:

- Operational frequency, within the 100 to 500 Hz range, matched to shallow water environments with little loss of detection performance in deep water environments.
- Improved reliability and ease of deployment.
- Lighter-weight design with mission weight of 64,410 kilograms (kg) (142,000 pounds [lb]) vice 155,129 kg (324,000 lb) mission weight of LFA).

With the R/V *Cory Chouest's* retirement in FY 2008, two systems are currently operational. At present, there is one SURTASS LFA sonar system onboard USNS IMPECCABLE (T-AGOS 23) and one SURTASS CLFA sonar system onboard USNS ABLE (T-AGOS 20). Two additional CLFA systems are planned for the T-AGOS 19 Class. Late in FY 2011, the CLFA system onboard USNS EFFECTIVE (T-AGOS 21) commenced at-sea testing and training. The CLFA system to be installed onboard USNS VICTORIOUS (T-AGOS 19) is scheduled for at-sea testing and training in FY 2012. Therefore, no more than four systems are expected to be in use through FY 2017, and thus this FSEIS/SOEIS considers the employment of up to four systems.

The operational characteristics of CLFA are comparable to the existing LFA system as presented in Subchapter 2.1 of the FOEIS/EIS, FSEIS and this document. Therefore, the potential impacts from CLFA are expected to be similar to, and not greater than, those from the existing SURTASS LFA sonar system. Hence, for this analysis, the term LFA will be used to refer to both the existing LFA system and/or the compact (CLFA) system, unless otherwise specified.

The active component of the existing SURTASS LFA sonar system, LFA, is an active adjunct to the SURTASS passive capability and is planned for use when passive system performance is inadequate. LFA complements SURTASS passive operations by actively acquiring and tracking submarines when they are in quiet operating modes, measuring accurate target range, and re-acquiring lost contacts.

LFA is a set of acoustic transmitting source elements suspended by cable under an ocean surveillance vessel, such as the USNS IMPECCABLE (T-AGOS 23) and the VICTORIOUS Class (T-AGOS 19 Class) (Figure ES-2). These elements, called projectors, are devices that produce the active sound pulse, or ping. The projectors transform electrical energy to mechanical energy that set up vibrations, or pressure disturbances, within the water to produce a ping.

The characteristics and operating features of the active component (LFA) are:

- The source is a vertical line array (VLA) of up to 18 source projectors suspended below the vessel. LFA's transmitted beam is omnidirectional (360 degrees) in the horizontal, with a narrow vertical beamwidth that can be steered above or below the horizontal.
- The source frequency is between 100 and 500 Hz. A variety of signal types can be used, including continuous wave (CW) and frequency-modulated (FM) signals.
- The source level (SL) of an individual source projector of the SURTASS LFA sonar array is approximately 215 dB re 1 µPa at 1 m (rms) or less. As measured by sound pressure level (SPL), the sound field of the array can never be higher than the SL of an individual source projector.

- The typical 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 is referred to as a wavetrain (also known as a ping). These wavetrains last between 6 and 100 seconds with an average length of 60 seconds. Within each wavetrain the duration of each continuous frequency sound transmission is no longer than 10 seconds.
- Average duty cycle (ratio of sound "on" time to total time) is less than 20%. The typical duty cycle, based on historical LFA operational parameters (2003 to 2011), is nominally 7.5 to 10%.
- The time between wavetrain transmissions is typically 6 to 15 minutes.

The passive, or listening, part of the system is SURTASS, which detects returning echoes from submerged objects, such as threat submarines, through the use of hydrophones. These devices transform mechanical energy (received acoustic sound wave) to an electrical signal that can be analyzed by the processing system of the sonar. Advances in passive acoustic technology have led to development of the SURTASS Twin-Line (TL-29A) horizontal line array (HLA), a shallow water variant of the single line SURTASS system. TL-29A consists of a "Y" shaped array with two apertures. The array is approximately $1/5^{th}$ the length of a standard SURTASS array, or approximately 305 m (1,000 ft) long. The TL-29A delivers enhanced capabilities, such as its ability to be towed in shallow water environments in the littoral zones, to provide significant directional noise rejection, and to resolve bearing ambiguities without having to change vessel course.

The passive capability of the USNS IMPECCABLE (T-AGOS 23) was recently upgraded with the installation of the TL-29A array. The three VICTORIOUS class vessels, which are, or will be, equipped with CLFA, will be outfitted with the newer SURTASS TL-29A passive array.

The SURTASS LFA sonar vessel typically maintains a speed of at least 5.6 kilometers per hour (kph) (3 knots [kt]) through the water in order to tow the HLA. The return signals, which are usually below background or ambient noise level, are processed and evaluated to identify and classify potential underwater threats.

An interrelated federal action is the issuance of regulations and LOAs under Section 101(a)(5)(A) of the MMPA, by NMFS, for the incidental taking of marine mammals during SURTASS LFA sonar activities, in the Pacific, Atlantic, and Indian Oceans, and the Mediterranean Sea. If NMFS makes all necessary legal determinations under the MMPA, it will issue regulations. These regulations allow NMFS to: (1) issue LOAs for the incidental take of marine mammals during the Navy's specified activities and timeframes; (2) set forth the permissible methods of taking; (3) set forth other means of effecting the least practicable adverse impact on marine mammal species and their habitat; and (4) set forth requirements pertaining to the monitoring and reporting of the incidental taking.

ES.2.2 ALTERNATIVES

NEPA requires federal agencies to prepare an EIS that discusses the environmental effects of a reasonable range of alternatives (including the No Action Alternative). These alternatives are described in Subchapter 2.6 of this FSEIS/SOEIS. The FOEIS/EIS (DoN, 2001) initially analyzed all potential technologies, both acoustic and non-acoustic, and determined that only active sonar (specifically LFA) would meet the Navy's purpose and need. In addition to the No Action Alternative, analyses in this document are provided for two alternatives. The analyses of these alternatives are intended to take into account the additional analysis contained in this FSEIS/SOEIS on the issue of OBIAs and coastal standoff ranges. Alternatives 1 and 2 also include the same mitigation measures presented in the 2007 FSEIS Subchapters 2.4, 5.1, 5.2, and 5.3, which are incorporated herein by reference.

The alternatives considered in this FSEIS/SOEIS are:

- No Action;

- Alternative 1—Same as the 2007 FSEIS Preferred Alternative; and
- Alternative 2—Alternative 1 with new proposed list of OBIAs (total 21) (the Navy's preferred alternative).

ES.3 AFFECTED ENVIRONMENT

The environments that could potentially be affected by Navy employment of the SURTASS LFA sonar system, include:

- **Marine Environment**, including ambient noise in the oceans, physical environmental factors affecting underwater acoustic propagation, and ocean acoustic regimes;
- **Marine Organisms,** including marine mammals and threatened and endangered species; and
- **Socioeconomic**, including commercial and recreational fisheries, other recreational activities, research and exploration activities, and coastal zone management consistency.

ES.3.1 MARINE ENVIRONMENT

There have been no significant changes to the knowledge or understanding of the marine environment, underwater acoustic propagation, or propagation modeling. The information in Subchapter 3.1 (Marine Environment) in the FOEIS/EIS remains valid, and its contents are incorporated herein by reference.

Anthropogenic sounds that could affect underwater ambient noise levels arise from the following general types of activities in and near the sea, any combination of which can contribute to the total noise at any one place and time. These noises include:

- Transportation (ship-generated noise);
- Dredging;
- Construction;
- Hydrocarbon and mineral exploration and recovery;
- Geophysical (seismic) surveys;
- Sonars;
- Explosions; and
- Ocean science studies.

The dominant source of anthropogenic sound in the sea stems from the propulsion of ships (Tyack, 2008). At the lower frequencies, the dominant source of this noise is the cumulative effect of ships that are too far away to be heard individually, but because of their great number, contribute substantially to the average noise background. Shipping noise centers in the 20 to 200 Hz frequency band, and is increasing yearly (Ross, 2005). Ross (1976) estimated that between 1950 and 1975 shipping had caused a rise of 10 dB SPL in ambient ocean noise levels, and he predicted that the level would increase by another 5 dB SPL by the beginning of the 21st century. Andrew et al. (2002) collected ocean ambient sound data from 1994 to 2001 using a receiver on the continental slope off Point Sur, California. These data were compared to measurements made from 1963 to 1965 by an identical receiver. The data demonstrated an increase in ambient noise over the 33-year period of approximately 10 dB SPL in the frequency range of 20 to 80 Hz, primarily due to commercial shipping. There were also increases as large as 9 dB SPL in the frequency range from 100 Hz up to 400 Hz, for which the cause was less obvious (Andrews et al., 2002). McDonald et al. (2006a) compared data sets from 1964 to 1966, and 2003 to 2004 for continuous measurements west of San Nicolas Island, California and found an increase in ambient noise levels of 10 to 12 dB SPL at 30 to 50 Hz.

When combined with the naturally occurring and other man-made noise in the world's oceans, SURTASS LFA sonar barely contributes a measurable portion of the total acoustic energy. This and LFA's low duty cycle (LFA is transmitting only 7.5 to 10% of the time during the projected maximum 432 hours of operations per vessel annually) support the conclusion that the operation of up to four SURTASS LFA sonar systems will not significantly add to oceanic ambient noise.

ES.3.2 SCIENTIFIC SCREENING OF MARINE ANIMAL SPECIES FOR POTENTIAL SENSITIVITY TO LF SOUND

Marine species must be able to hear underwater LF sound and/or have some organ or tissue capable of changing sound energy into mechanical effects to be affected by LF sound. In order to be affected by LF sound, the organ or tissue must have an acoustic impedance different from water, where impedance is the product of density (kg/m^3 or lb/yd^3) and sound speed (m/sec or ft/sec). Thus, many organisms would be unaffected, even if they were in areas of LF sound, because they do not have an organ or tissue with acoustic impedance different from water. These factors immediately limit the types of organisms that could be adversely affected by LF sound. In other words, to be evaluated for potential impact in this FSEIS/SOEIS, the marine species must: 1) occur within the same ocean region and during the same time of year as the SURTASS LFA sonar operation, 2) possess some sensory mechanism that allows it to perceive the LF sounds, and/or 3) possess tissue with sufficient acoustic impedance mismatch to be affected by LF sounds. Species that did not meet these criteria were excluded from consideration. Species that met the screening selection were fish, sea turtles, and marine mammals.

The process by which a marine species' potential to be affected by SURTASS LFA sonar is discussed in Subchapter 3.2.1 of the FSEIS (DoN, 2007a). Except as noted in Chapter 3 of this FSEIS/SOEIS, there have been no significant changes to the knowledge or understanding relating to species screening. The information in Subchapter 3.2.1 (Species Screening) in the 2007 FSEIS remains valid, and the contents are incorporated herein by reference.

ES.3.3 MARINE ORGANISMS

A thorough review of available literature on fish, sea turtles, and marine mammals was conducted with emphasis on data developed after the completion of the FSEIS in 2007. These data are presented in this FSEIS/SOEIS, Subchapter 3.2. Subchapter 3.2.6 provides a discussion of potential habitats to include critical habitats, essential fish habitates, and marine protected areas.

ES.3.4 SOCIOECONOMIC

As SURTASS LFA sonar operates in open ocean areas it has the potential to interact with other activities taking place in these areas, including: commercial fishing, aboriginal subsistence hunting for cetaceans and pinnipeds, oceanographic research, and recreational activities. Many aquatic activities take place in nearshore or inland water areas where SURTASS LFA sonar is not proposed to operate. Pertinent socioeconomic data are presented in this FSEIS/SOEIS, Subchapter 3.3.

ES.4 IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

The basis for the analysis of potential impacts to marine species presented in this FSEIS/SOEIS is consistent with the 2001 FOEIS/EIS and the 2007 FSEIS and has been updated based on the best available literature, the Long Term Monitoring Program of current SURTASS LFA sonar operations, and continuing research. Further, no new data contradict any of the assumptions or conclusions presented in Chapter 4 of both the FOEIS/EIS and FSEIS; hence, their contents are incorporated herein by reference.

For SURTASS LFA sonar alternatives, potential impacts should be reviewed in the context of the basic operational characteristics of the system:

- A maximum of four systems, with the potential to be deployed in the Pacific-Indian Ocean area and in the Atlantic Ocean-Mediterranean Sea area.

- The USNS IMPECCABLE (T-AGOS 23) is equipped with a SURTASS LFA sonar system. Three additional VICTORIOUS class (T-AGOS 19) platforms have been equipped with or, are scheduled to be outfitted with, compact LFA systems (see Subchapter 2.1). These vessels are, or will be, U.S. Coast Guard-certified for operations. In addition, they will operate in accordance with all applicable Federal and U.S. Navy rules and regulations related to environmental compliance. SURTASS LFA sonar vessel movements are not unusual or extraordinary and are part of routine operations of seagoing vessels. Therefore, there should be no unregulated environmental impacts from the operation of SURTASS LFA sonar vessels.
- At-sea missions would be temporary in nature. Of an estimated maximum 294 underway days per year per vessel, the SURTASS LFA sonar would be operated in the active mode a maximum of 240 days. During these 240 days, active transmissions would occur for a maximum of 432 cumulative hours per year per vessel. Average duty cycle (ratio of sound "on" time to total time) of the SURTASS LFA sonar active transmission mode, based on historical LFA operational parameters since 2003, is nominally 7.5 to 10%. That is, 7.5 to 10% of the time the LFA transmitters could be on; and 90 to 92.5% of the time the LFA transmitters would be off, thus adding no sound into the water. On an annual basis, each SURTASS LFA vessel is limited to transmitting no more than 4.9% of the time (432 hrs/yr or 18 days/yr).

The types of potential effects on marine animals from SURTASS LFA sonar operations can be broken down into several categories:

- **Non-auditory injury**: This includes the potential for resonance of the lungs/organs, tissue damage, and mortality from direct acoustic impacts on tissue, indirect acoustic impact on tissue surrounding a structure, and acoustically mediated bubble growth within tissues from supersaturated dissolved nitrogen gas.
- **Permanent threshold shift (PTS)**: A severe situation occurs when underwater sound intensity is very high or of such long duration that the result is a permanent hearing loss on the part of the listener, which is referred to as PTS. This constitutes Level A "harassment" under the MMPA, as does any other injury to a marine mammal. The intensity and duration of an underwater sound that will cause PTS varies across species and even among individual animals. PTS is a consequence of the death of the sensory hair cells of the auditory epithelia of the ear and a resultant loss of hearing ability in the general vicinity of the frequencies of stimulation (Salvi et al., 1986; Myrberg, 1990; Richardson et al., 1995). PTS results in a permanent elevation in hearing threshold—an unrecoverable reduction in hearing sensitivity (Southall et al., 2007).
- **Temporary threshold shift (TTS)**: Underwater sounds of sufficient loudness can cause a temporary condition known as TTS in which an animal's hearing is impaired for a period of time. After termination of the sound, normal hearing ability returns over a period that may range anywhere from minutes to days, depending on many factors, including the intensity and duration of exposure to the sound. Hair cells may be temporarily affected by exposure to the sound, but they are not permanently damaged or killed. Thus, TTS is not considered an injury (Richardson et al., 1995; Southall et al., 2007), although during a period of TTS, animals may be at some disadvantage in terms of detecting predators or prey.
- **Behavioral change**: Various vertebrate species are affected by the presence of intense underwater sounds in their environment (Salvi et al., 1986; Richardson et al., 1995). Behavioral responses to these sounds vary from subtle changes in surfacing and breathing patterns, to cessation of vocalization, to active avoidance or escape from regions of high sound levels (Wartzok, et al., 2004). For military readiness activities, such as the use of SURTASS LFA sonar, Level B "harassment" under the MMPA is defined as any act that disturbs or is likely to disturb a marine mammal by causing disruption of natural behavioral patterns to a point where the patterns are abandoned or significantly altered. Behaviors include migration, surfacing, nursing, breeding, feeding, and

sheltering. The National Research Council (NRC, 2005) discusses biologically significant behaviors and possible effects. It states that an action or activity becomes biologically significant to an individual animal when it affects the ability of the animal to grow, survive, and reproduce. These are the effects on individuals that can have population-level consequences and affect the viability of the species (NRC, 2005). While sea turtles and fish do not fall under MMPA harassment definitions, like marine mammals, it is possible that loud sounds could disturb the behavior of fish and sea turtles, resulting in similar consequences as for marine mammals.

- **Masking and Impaired Communications**: The presence of intense underwater sounds in the environment can potentially interfere with an animal's ability to hear sounds of relevance to it and reduce acoustic information essential to conspecies communications. This effect, known as "auditory masking," could interfere with the animal's ability to detect biologically-relevant sounds, such as those produced by predators or prey, thus increasing the likelihood of the animal not finding food or being preyed upon.
- **Stress:** The potential for acoustically-induced stress in marine mammals is presented as part of the cumulative effects discussion in Subchapters ES.4.6 and 4.7.1.2.

For the purposes of the SURTASS LFA sonar analyses presented in this FSEIS/SOEIS, all marine animals exposed to underwater sound with ≥180 dB re 1 µPa (rms) SPL received level (RL) are evaluated as if they are injured, which includes non-acoustic injury and permanent hearing loss. Even though actual injury would not occur unless animals were exposed to sound at a level greater than this value (Popper et al., 2007; Southall et al., 2007; Kane et al., 2010), the analysis in this document will continue to define LFA's injury level as ≥180 dB re 1 µPa (rms) RL. This should be viewed as a conservative value, used to maintain consistency in the analytical methodologies previously utilized in SURTASS LFA sonar environmental impact statements (DoN, 2001 and 2007a), in incidental take applications under the MMPA, and in consultations under the ESA.

ES.4.1 POTENTIAL IMPACTS ON FISH SPECIES AND STOCKS

Since the original FOEIS/EIS and the subsequent FSEIS, there have been a number of relevant studies on the potential effects of underwater sound on fish, including sharks, and several other pertinent studies that have come forth. This FSEIS/SOEIS provides summaries of the recent research and updates the analysis of the potential effects of the proposed alternatives based on the following SURTASS LFA sonar operational parameters:

- Small number of SURTASS LFA sonar systems to be deployed;
- Geographic restrictions imposed on system employment;
- Narrow bandwidth of SURTASS LFA sonar active signal (approximately 30 Hz);
- Slowly moving ship, coupled with low system duty cycle, would mean that fish would spend less time in the LFA mitigation zone (180-dB SPL sound field); therefore, with a ship speed of less than 9.3 km/hr (5 kt), the potential for animals being in the sonar transmit beam during the estimated 7.5 to 10% of the time the sonar is actually transmitting is very low; and
- Small size of the LFA mitigation zone (180-dB SPL sound field) relative to fisheries provinces and open ocean areas.

Due to the lack of more definitive data on fish/shark stock distributions in the open ocean, it is not feasible to estimate the percentage of a stock that could be located in a SURTASS LFA sonar operations area at a potentially vulnerable depth during an LFA sound transmission.

There have been several studies on the effects of both Navy sonar and seismic airguns[7] that are relevant to potential effects of SURTASS LFA sonar on Osteichthyes (bony fish). In the most pertinent of these, the Navy funded independent scientists to analyze the effects of SURTASS LFA sonar on fish. Results from this study were originally presented in the FSEIS. The findings from this study have been presented at conferences, peer-reviewed and published in scientific journals (Popper et al., 2005a, 2007; Halvorsen et al., 2006). These results have now been updated with a related study that examined in detail the effects of SURTASS LFA sonar on fish physiology (Kane et al., 2010). Several other studies have assessed the effects of seismic airguns on fish. Thus, while most research before 2001 studied the effects of sounds using pure tones of much longer duration than the SURTASS LFA sonar signals, many of the more recent studies provide insight into the impact of each of these sounds on fish. With the caveat that only a few species have been examined in these studies, the investigations found little or no effect of high intensity sounds on a number of taxonomically and morphologically diverse species of fish; and there was no mortality as a result of sound exposure, even when fish were maintained for days post-exposure.

The Navy-funded study on the effects of SURTASS LFA sonar sounds on three species of fish (rainbow trout, channel catfish, and hybrid sunfish), also examined long-term effects on sensory hair cells of the ear. In all species, even up to 96 hours post-exposure, there were no indications of damage to sensory cells (Popper et al., 2005a, 2007; Halvorsen et al., 2006).

If SURTASS LFA sonar operations occur in proximity to fish stocks, members of some fish species could potentially be affected by LFA sounds. Even then, the impact on fish is likely to be minimal to negligible, since only an inconsequential portion of any fish stock would be present within the 180-dB SPL sound field at any given time. Moreover, recent results from direct studies of the effects of LFA sounds on fish (Popper et al., 2005a, 2007; Halvorsen et al., 2006; Kane et al., 2010) provide evidence that SURTASS LFA sonar sounds at relatively high received levels (up to 193 dB re 1 µPa [rms] SPL) have minimal impact on at least the species of fish that have been studied. Nevertheless, the 180-dB SPL criterion is maintained for the analyses presented in this FSEIS/SOEIS, with emphasis that this value is *highly conservative* and protective of fish.

ES.4.2 POTENTIAL IMPACTS ON SEA TURTLE SPECIES AND STOCKS

The best available sea turtle population estimates (abundances) underestimate the sea turtle populations, as they only represent counts of nesting females and do not account for non-nesting females, males, or juveniles of the species. Few sea turtle density estimates are available worldwide and are usually only for nearshore nesting waters that are not representative of the majority of the open ocean. Nearly all species of sea turtles occur in low numbers over most of their ranges, resulting in distributions in the open ocean that are greatly and widely dispersed. Coupled with low numbers dispersed over enormous areas is the additional complexity of some sea turtle species, such as the leatherback and olive ridley turtles, spending their entire lives dispersed widely in pelagic waters, while the early lifestages of other sea turtle species spend the "lost years" drifting around the central ocean gyres. Due to the lack of more definitive data on sea turtle stock distributions in the open ocean, it is not feasible to estimate the percentage of a stock that could be located in a SURTASS LFA sonar operations area at a potentially vulnerable depth, during an LFA sound transmission.

Data on sea turtle sound production and hearing are very limited. The best available data on sea turtle hearing are presented in Chapter 3 of this document. Further, there are no new data that contradict any of the assumptions or conclusions regarding potential effects to sea turtles in Subchapter 4.2 of the FSEIS

7 Seismic airguns differ from SURTASS LFA sonar in that they generally transmit in the 5 to 20 Hz frequency band and their typical airgun array firing rate is once every 9 to 14 seconds, but for very deep water surveys, the rate could be once every 42 sec. Airgun acoustic signals are typically measured in peak-to-peak pressures, which are generally higher than continuous sound levels from other ship and industrial noise. Broadband SLs of 248 to 255 dB SPL (peak-to-peak) are typical for a full-scale array but can be as high as 259 dB SPL. Airgun onset is generally much more rapid (sharper) than that of sonar.

(DoN, 2007a), which is incorporated herein by reference. Very few studies of the potential effects of underwater sound on sea turtles exist and most of those available examined the effects of sounds of much longer duration or of different types (e.g., seismic airgun) than SURTASS LFA sonar signals. This FSEIS/SOEIS provides summaries of the recent research on underwater sound on sea turtles.

In this FSEIS/SOEIS, the conservative SPL threshold for injury to sea turtles is 180 dB re 1 µPa (rms), which is coincident with the LFA mitigation zone. The LFA mitigation zone covers a volume ensonified to a received level ≧180 dB re 1 µPa (rms) around the SURTASS LFA sonar array, which is centered at a nominal depth of 122 m (400 ft) below the water surface. Based on spherical spreading, the LFA mitigation zone will vary between the approximate ranges of 750 to 1,000 m (2,461 to 3,481 ft) from the source array, over a depth of approximately 87 to 157 m (285 to 515 ft).

The small size of the LFA mitigation zone relative to the enormous area and volume of the ocean, as well as the depth of the mitigation zone are important considerations when evaluating the potential for impacts on sea turtles. Most sea turtle species spend a high percentage of their lives in the upper 100 m (328 ft) of the water column, particularly if they are transiting between foraging and nesting grounds in the open ocean. Sea turtles may be found in the open ocean or oceanic environment not only as adults migrating between nesting and foraging habitats but also during early lifestages (post-hatchlings or juveniles) or as foraging adult leatherback and olive ridley turtles. The distribution of sea turtles in the open ocean is greatly and widely dispersed due to the vast area of oceanic waters worldwide over which sea turtles potentially can occur. Turtle foraging grounds do not encompass all available continental shelf waters but are typically in restricted areas of the productive shelf and inshore estuarine waters. Thus, most frequently, sea turtles would occur in the water column above the LFA mitigation zone and, thus, would not encounter transmissions ≥180 dB re 1 µPa (rms), the threshold at which they are conservatively considered to be injured.

In the shallow, nearshore continental shelf waters where foraging and nesting/breeding turtles would most often occur, SURTASS LFA sonar operations are geographically constrained due to operational depth restrictions and the coastal standoff range (no transmissions above 180 dB re 1 µPa (rms) SPL within 22 km [12 nmi] of any coastlines). Also, visual and acoustic monitoring measures are conducted during active LFA sonar transmissions to further reduce the potential for surface animals potentially diving into the LFA mitigation zone. The position of the HF/M3 sonar system above the top of the LFA sonar array means that a sea turtle would have to swim from the surface through the HF/M3 sonar detection zone to enter into the 180-dB LFA mitigation zone, making an acoustic detection of the animal likely. While visual monitoring is less effective for sea turtles due to their smaller size and low surface profile, visual sightings of sea turtles have occurred during mitigation monitoring of SURTASS LFA sonar and resulted in the suspension of the sonar to ensure safety of the observed turtle (DoN, 2011).

In addition to the water column usage by sea turtles, the geographic restrictions for LFA sonar use, and the mitigation measures that together result in a reduced potential for injury to sea turtles, other operational parameters of the sonar further reduce the already small likelihood for injury to individual sea turtles. These operational parameters include the small number of SURTASS LFA sonar systems to be deployed (no more than four under the requested five-year Rule), the narrow bandwidth of the SURTASS LFA sonar active signal (approximately 30 Hz), the slow speed at which the SURTASS LFA vessels travel (<5 kt), and the low duty cycle of the sonar system (7.5 to 10%). Any masking effects of the sonar would be temporary and not significant.

For these reasons, the potential for SURTASS LFA sonar operations to expose individual sea turtles to injurious sound levels or to cause TTS and/or behavioral changes is considered negligible. Due to the small likelihood for injury to individual sea turtles, the potential impact is not significant to sea turtles on a stock level. Therefore, the operation of SURTASS LFA sonar would not adversely impact sea turtle stocks.

ES.4.3 POTENTIAL IMPACTS ON MARINE MAMMAL SPECIES AND STOCKS

Potential effects on marine mammals from SURTASS LFA sonar operations include: 1) non-auditory injury; 2) permanent loss of hearing; 3) temporary loss of hearing; 4) behavioral change; and 5) masking (including impaired communications). Richardson et al. (1995) provided the most comprehensive review of contemporary knowledge on the sources and effects of underwater anthropogenic sound on marine mammals, and Nowacek et al. (2007) provide a more recent review of the effects of underwater anthropogenic sound on cetaceans. Nowacek et al. (2007) included an update on the documented behavioral, acoustic and some physiological responses of cetaceans to man-made noise. They focused on literature that reported quantitatively on the sound field and some indicator of response. Southall et al. (2007) reported on the results from a panel of acoustic research experts in the behavioral, physiological, and physical disciplines. The panel's purpose was to review the expanding literature on marine mammal hearing, and physiological and behavioral responses to anthropogenic sound, with the objective of proposing exposure criteria for certain effects. More recently, Hatch et al. (2008) and Clark et al. (2009) have addressed the issue of acoustic masking and presented metrics for quantifying the influences of anthropogenic noise sources on whales that communicate in the LF band.

These papers, additional literature reviews, and research indicate that there are no new data that contradict any of the assumptions or conclusions in the FOEIS/EIS and the FSEIS. Thus, the findings presented in the 2001 FOEIS/EIS and the 2007 FSEIS regarding potential effects on marine mammals remain valid and are incorporated by reference herein. This FSEIS/SOEIS provides a summary of the recent literature reviews and the overall potential for effects of SURTASS LFA sonar operations on marine mammals.

The potential effects from SURTASS LFA sonar operations on any stock of marine mammals from injury (non-auditory or permanent loss of hearing) are considered negligible, and the potential effects on the stock of any marine mammal from temporary loss of hearing or behavioral change (significant change in a biologically important behavior) are considered minimal. Any auditory masking in marine mammals due to LFA sonar signal transmissions is not expected to be severe and would be temporary. The likelihood of LFA sonar transmissions causing marine mammals to strand is negligible.

ES.4.4 RISK ASSESSMENT APPROACH FOR SURTASS LFA SONAR OPERATIONS

The goal of the risk assessment is to analyze the proposed action and alternatives for the employment by the U.S. Navy of up to four SURTASS LFA sonar systems for routine training, testing, and military operations in oceanic areas (Figure ES-1). Based on current U.S. national security and operational requirements, routine training, testing and military operations using these sonar systems could occur in the Pacific, Atlantic, and Indian Oceans, and the Mediterranean Sea. These potential operating areas are the same as those assessed in the 2001 FOEIS/EIS and 2007 FSEIS except for additional OBIAs. To reduce adverse effects on the marine environment, areas would be excluded as necessary to prevent 180-dB SPL RL or greater in coastal waters within 22 km (12 nmi) of land and in OBIAs during biologically important seasons; to prevent greater than 145-dB SPL RL at known recreational and commercial dive sites; to prevent exposure of marine mammals and sea turtles to below 180 dB SPL RL within the LFA mitigation zone plus 1-km buffer zone by monitoring for their presence with visual, passive acoustic, and active acoustic mitigation methods, and suspending transmissions when one of these animals enters the zone; planning missions to ensure that the potential annual takes are within limitations required by the Rule and LOAs; and reporting quarterly to NMFS on all SURTASS LFA sonar active operations.

Risk assessments must provide decision-makers and regulators results that demonstrate:

- Under the MMPA, the total taking will have a negligible impact on the marine mammal species or stock(s), and will not have an unmitigable adverse impact on the availability of species or stock(s) for subsistence uses; further, the information can be used to inform the permissible methods of taking and requirements pertaining to the mitigation, monitoring, and reporting of such takings (including

consideration of personnel safety, practicability of implementation, and impact on the effectiveness of military readiness activities); and

- Under the ESA, employment of SURTASS LFA sonar is not likely to jeopardize the continued existence of threatened/endangered marine species or result in the destruction or adverse modification of critical habitat.

Since it was neither reasonable nor practicable to model all areas of the world's oceans in which SURTASS LFA sonar could operate, the initial risk assessment in the 2001 FOEIS/EIS analyzed 31 potential operating sites. This initial analytical process was refined to provide sensitivity and risk analyses sufficient to identify and select potential SURTASS LFA sonar mission areas with minimal marine mammal/animal activity consistent with the Navy's operational readiness requirements. These analyses were used to provide NMFS with reasonable and realistic pre- and post-operational risk estimates for marine mammal stocks in the proposed SURTASS LFA sonar operating areas. This process was documented in the 2007 FSEIS.

The modeling of the 31 sites represented the upper bound of potential effects (both in terms of possible underwater acoustic propagation conditions, and marine mammal population and density) that could be expected from operation of the SURTASS LFA sonar system. The conservative assumptions of the FOEIS/EIS and FSEIS are still valid. Moreover, there are no new data that contradict any of the assumptions or conclusions made in the FOEIS/EIS and FSEIS.

In this FSEIS/SOEIS's supplemental analysis, 19 additional potential SURTASS LFA sonar operating sites have been analyzed. These sites were chosen because they represent, based on today's political climate, areas where SURTASS LFA sonar could potentially conduct testing, training, or military operations during the 5-year period of the next MMPA Rule.

Under the MMPA Rule, the Navy must apply for annual LOAs. In these applications, the Navy projects where it intends to operate for the period of the next annual LOAs, and provides NMFS with reasonable and realistic risk estimates for marine mammal stocks in the proposed SURTASS LFA sonar mission areas. The LOA application analytical process uses a conservative approach by integrating mission planning needs and a cautious assessment of the limited data available on specific marine mammal populations, seasonal habitat, and activity. Because of the use of conservative assumptions, it is likely that the aggregate effect of such assumptions is an overestimation of risk—a prudent approach for environmental conservation when there are data gaps and other sources of uncertainty. The total annual risk for each stock of marine mammal species is estimated by summing a particular species' risk estimates within that stock, across SURTASS LFA sonar mission areas. Each stock, for a given species, is then examined. Based on this approach, the highest total annual estimated risk (upper bound) for marine mammal species' stocks are provided in the LOA applications.

Information on how the density and stock/abundance estimates are derived for the selected SURTASS LFA sonar mission areas is provided in the LOA applications. These data are derived from current, available published source documents, and provide general information for each mission area with species-specific information on the marine mammals that could potentially occur in that area, including estimates for their stock/abundance and density.

Estimates of the percentage of marine mammal stocks affected by SURTASS LFA sonar operations in the 19 potential operating areas, for the seasons specified, have been derived for this document (Tables 4-5 through 4-23). The estimated stock values support the conclusion that estimates of potential effects to marine mammal stocks are below the conditions delineated by NMFS in the LOAs issued under the 2007 Final Rule.

ES.4.4.1 Court's Concerns

The following three areas address the primary concerns of the Court in its 6 February 2008 Opinion and Order, in relation to compliance with NEPA and the MMPA.

Additional Offshore Biologically Important Areas (OBIAs)

Offshore biologically important areas (OBIA) are initially defined in the 2001 SURTASS LFA Sonar FOEIS/EIS as those areas of the world's oceans outside of 22 km (12 nmi) of a coastline where marine animals of concern (those animals listed under the ESA and/or marine mammals) congregate in high densities to carry out biologically important activities. These areas include migration corridors; breeding and calving grounds; and feeding grounds.

NMFS revised the screening criteria for the 2011 DSEIS/SOEIS and the 2011 Proposed Rule to determine an area's eligibility to be considered as a nominee for an OBIA for marine mammals. These OBIA screening criteria are: (1) Areas with: (a) High densities of marine mammals; or (b) Known/defined breeding/calving grounds, foraging grounds, migration routes; or (c) Small, distinct populations of marine mammals with limited distributions; and (2) Areas that are outside of the coastal standoff distance and within potential operational areas for SURTASS LFA (i.e., greater than 22 km (13.6 mi; 12 nmi) from any shoreline and not in polar regions). These OBIA criteria differ from the criteria in the 2001 FOEIS/EIS (as continued in the 2007 SEIS) and the 2007-2012 MMPA Final Rule in two respects. First, under the 2001 FOEIS/EIS, 2007 SEIS, and the 2007 Final Rule, an area could be designated as an OBIA only if it met a conjunctive test of being an area where: (a) marine mammals congregate in high densities, and (b) for a biologically important purpose. Under the new NMFS criteria, high density alone can be sufficient. Second, the new criteria include an additional criterion that, standing alone, could be a basis for designation; i.e., "Small, distinct populations with limited distributions." The analysis of the OBIAs (for marine mammals and the potential for non-marine mammal OBIAs) is presented in Subchapter 4.5 and Appendix D of this document.

As a result of this further analysis, NMFS concluded that there was adequate biological basis to designate 22 SURTASS LFA sonar marine mammal OBIAs. The Navy also reviewed the potential OBIAs to assess personnel safety, practicality of implementation, and impacts on the effectiveness of SURTASS LFA sonar testing, training, and military operations. After reviewing these sites, the Navy proposed 21 of the 22 OBIAs (Table ES-1). The proposed Southern California Bight OBIA was determined by the Navy not to be practicable based upon current naval operations in the Southern California ranges. No other issues were found that would affect the practical implementation of the SURTASS LFA sonar marine mammal OBIA geographic restrictions. These OBIAs, as part of a comprehensive suite of LFA mitigation measures, will further reduce the potential for effects from SURTASS LFA sonar. Consistent with the current 2007 Rule, these LFA marine mammal OBIAs are not intended to apply to other Navy activities and sonar operations.

Practicability of Greater Coastal Standoff Range Where the Continental Shelf Extends Further than Current Coastal Standoff Range (22 km [12 nmi])

The Navy also used the OBIA analysis to consider whether dual criteria to determine the coastal exclusion zones in some locations where the shelf (≤200 m [656 ft] depth) extends farther than the current 22 km (12 nmi) coastal standoff range, is necessary based on the best available scientific information and operational practicability. This analysis was a part of the OBIA analysis (Subchapter 4.5 and Appendix D), because NMFS and the Navy considered the biological importance of coastal areas outside the current 22 km (12 nmi) coastal standoff range as well as their practicability for SURTASS LFA sonar operations. For example, of the initial listing of 73 recommended LFA MM OBIAs by NMFS' expert panelists, 32 were either completely or partially within shelf waters and outside of the coastal standoff range. After analyses and rankings, NMFS and the Navy agreed on the proposed final 21 SURTASS LFA sonar OBIAs for the MMPA proposed rulemaking. Of the 21 OBIAs, 17 included important areas for coastal protection, such as continental shelf/slope areas and similar coastal areas.

Table ES-1. Twenty-one marine mammal OBIAs proposed for SURTASS LFA sonar.

OCEAN BASIN/WATER BODY	OBIA NUMBER	OBIA NAME AND LOCATION
Atlantic Ocean	1	Georges Bank/East of Cape Cod, Massachusetts
	2	Roseway Basin Right Whale Conservation Area/South of Nova Scotia, Canada
	3	Great South Channel, Stellwagen Bank National Marine Sanctuary, and U.S. Gulf of Maine/East of Maine and Massachusetts
	4	Southeastern U.S. Right Whale Seasonal Habitat/East of Georgia and Florida
Pacific Ocean	5	North Pacific Right Whale Critical Habitat/Western Gulf of Alaska[8]
Atlantic Ocean	6	Silver and Navidad Banks/North of Dominican Republic
	7	Coastal Waters of Gabon, Congo, and Equatorial Guinea/Central Western Africa
	8	Patagonian Shelf Break/East of Argentina
	9	Southern Right Whale Seasonal Habitat/Northern Argentina
Pacific Ocean	10	Central California National Marine Sanctuaries/West of Central California
Southern Ocean	11	Antarctic Convergence Zone/Roughly between latitudes 45° and 60°[9]
Pacfic Ocean/Sea of Okhotsk	12	Piltun and Chayvo Offshore Feeding Grounds/East of northern Sakalin Island in southern Sea of Okhotsk
Indian Ocean	13	Coastal Waters off Madagascar/Off eastern Madagascar
	14	Madagascar Plateau and Ridge and Walters Shoal/South of Madagascar
Mediterranean Sea	15	Ligurian-Corsican-Provençal Basin and Western Pelagos Sanctuary/Between France/Italy and Corsica in northern Mediterranean Sea
Pacific Ocean	16	Penguin Bank, Hawaiian Islands Humpback Whale National Marine Sanctuary/West of Molokai, Main Hawaiian Islands
	17	Costa Rica Dome/Offshore west of Costa Rica

8 Does not include the portion of the North Pacific right whale critical habitat designated in the Bering Sea.

9 See Subchapter 4.5 for specific details on boundary.

Table ES-1. Twenty-one marine mammal OBIAs proposed for SURTASS LFA sonar.

OCEAN BASIN/WATER BODY	OBIA NUMBER	OBIA NAME AND LOCATION
	18	Great Barrier Reef Australia north coast—16°S to 21°S/Northeastern Australia in Coral Sea
Indian Ocean	19	Bonney Upwelling/Southern Australia
	20	Northern Bay of Bengal and Swatch-of-No-Ground (SoNG)/Northern Bay of Bengal, south of India and Bangladesh border
Pacific Ocean	21	Olympic Coast and The Prairie, Barkley Canyon, and Nitnat Canyon and offshore of Olympic Peninsula, Washington

Potential Cumulative Impacts with Concurrent Use of SURTASS LFA Sonar with Other Active Sonar Sources

Although the SURTASS LFA and mid-frequency active (MFA) sonars (AN/SQS 53C and AN/SQS 56) are similar in the underlying transmission types, specifically frequency-modulated (FM) sweeps and continuous wave (CW) transmissions, LFA and MFA sonars are dissimilar in other respects (see Table 4-28). In addition to these multiple differences, the duty cycle, (i.e., the amount of time during sonar operations that the sonar is actually transmitting), is different for SURTASS LFA sonar as opposed to MFA sonar. During SURTASS LFA sonar operations, LFA sonar transmits approximately 10% of the time (1 minute out of 10). During MFA sonar operations, MFA sonar transmits approximately 1.7% of the time (1 second out of 60)[10]. This means that for any given period of time that both SURTASS LFA and MFA sonars are operating concurrently, the LFA 60-sec transmission will be overlapped by 1 sec of MFA transmission, or 1.7% of the 60-sec LFA ping (1 sec/60 sec). During the 10-min LFA transmission cycle, the most an animal could be simultaneously exposed from both transmissions is 1 sec for every 600 sec, or about 0.17%[11] of the time that both sonars are operating.

The ocean volumes of Level A harassment RLs for each source are relatively small (1 km [0.54 nmi] radius or less). It is not reasonably foreseeable that SURTASS LFA and MFA sonars would operate simultaneously within ranges less than 9.3 km (5 nmi). Thus, it is not reasonably foreseeable that the Level A harassment volumes of the two sonars could ever overlap during simultaneous transmissions (see Subchapter 4.7.4.1).

The results of two separate analysis methodologies, parametric analysis and underwater acoustic model analysis, were consistent—concurrent MFA/SURTASS LFA sonar operations produce no level B harassment risk greater than that obtained by simply adding the risks from the individual sources. Therefore, two separate analytic approaches have concluded that there is no potential increase in risk for Level B harassment from concurrent MFA/SURTASS LFA sonar operations. Thus, the conclusion in the FSEIS that the potential for this occurring is small, remains valid, and should be considered very conservative.

10 MFA sonar operating characteristics are based on the Navy's AN/SQS 53C sonar. The nominal sonar ping is approximately 1 second every 60 to 90 seconds (Nissen, 2011). For analysis, 1 sec/60 sec was used as it is the most conservative.

11 MFA overlaps 1 sec for every 10 min (600 sec) of LFA duty cycle (1 sec/600 sec = 0.0017 or 0.17%).

ES.4.4.2 Marine Mammal Strandings

The use of SURTASS LFA sonar was not associated with any of the reported 27 mass stranding events or unusual mortality events (UME) that occurred globally between 2006 and early 2010. There is no evidence that SURTASS LFA sonar transmissions resulted in any difference in the stranding rates of marine mammals in Japanese coastal waters adjacent to SURTASS LFA sonar operating areas. As has been reported previously (DoN, 2001 and 2007a) and has been further documented in this FSEIS/SOEIS, the employment of SURTASS LFA sonar is not expected to result in any sonar-induced strandings of marine mammals. Given the large number of natural factors that can result in marine mammal mortality, the high occurrence of marine mammal strandings, and the many years of SURTASS LFA sonar operations without any reported associated stranding events, the likelihood of SURTASS LFA sonar transmissions causing marine mammals to strand is negligible.

ES.4.5 SOCIOECONOMICS

This FSEIS/SOEIS addresses the potential impact to commercial and recreational fisheries, other recreational activities, and research and exploration activities that could result from implementation of the alternatives under consideration.

ES.4.5.1 Commercial and Recreational Fisheries

SURTASS LFA sonar operations are geographically restricted such that SURTASS LFA sonar RLs are less than 180 dB dB re 1 µPa (rms) SPL within 22 km (12 nmi) from coastlines and within OBIAs during biologically important seasons, where fisheries productivity is generally high. SURTASS LFA sonar operations occur in proximity to fish stocks, and members of some fish species could potentially be affected by LF sounds. Even then, the impact on fish is likely to be minimal to negligible since only an inconsequential portion of any fish stock would be present within the 180-dB SPL sound field at any given time. Moreover, recent results from direct studies of the effects of LFA sounds on fish (Popper et al., 2005a, 2007; Halvorsen et al., 2006; Kane et al., 2010) provide evidence that SURTASS LFA sonar sounds at relatively high received levels (up to 193 dB dB re 1 µPa [rms] SPL) have minimal impact on at least the species of fish that were studied. Nevertheless, the 180-dB SPL criterion has been maintained for the analyses presented in this FSEIS/SOEIS, with emphasis that this value is *highly conservative* and protective of fish. Therefore, SURTASS LFA sonar operations are not likely to affect fish populations and, thus, are not likely to affect commercial and recreational fisheries.

ES.4.5.2 Other Recreational Activities

There are no new data that contradict any of the assumptions or conclusions in Subchapter 4.3.2 (Other Recreational Activities) in the 2001 FOEIS/EIS and Subchapter 4.5.2 in the 2007 FSEIS regarding recreational swimming, snorkeling, and diving. Hence, the contents of the FOEIS/EIS and FSEIS subchapters are incorporated herein by reference. Whale watching typically takes place during times of year and in geographic locations where the probability of observing cetaceans are greatest. The probability of occurrence is higher because cetaceans have aggregated in specific areas to participate in some biologically important activity, such as feeding or migrating. Due to the water depth and accessibility, the vast majority of recreational swimming, snorkeling, and diving occurs within 22 km (12 nmi) of shore. Since SURTASS LFA sonar operations are restricted from transmitting ≥180 dB dB re 1 µPa (rms) SPL RL within 22 km (12 nmi) from shore, more than 145 dB dB re 1 µPa (rms) SPL RL near known recreational[12] and commercial dive sites, and in OBIAs during biologically important seasons, there is no reasonably foreseeable likelihood that operation of the sonar will affect recreational diving, swimming, snorkeling, or whale watching.

12 Recreational dive sites are generally defined as coastal areas from the shoreline or island(s) out to the 40-m (130-ft) depth contour, which are frequented by recreational divers; but it is recognized that there are other sites that may be outside this boundary.

ES.4.5.3 Research and Exploration Activities

There are no new data that contradict any of the assumptions or conclusions in Subchapter 4.3.3 in the 2001 FOEIS/EIS and Subchapter 4.5.3 in the 2007 FSEIS regarding research and exploration activities; hence, their contents are incorporated herein by reference. SURTASS LFA sonar operations are highly unlikely to affect oceanographic research that utilize submersibles (remotely operated vehicles [ROVs], autonomous undersea vehicles [AUVs], or manned submersibles) but could potentially affect other types of oceanographic research or oil and gas exploration activities that employ underwater acoustic equipment or instruments such as airguns, hydrophones, and ocean-bottom seismometers. If transmitted near oceanographic or exploration activities using underwater acoustic instrumentation, SURTASS LFA sonar could possibly interfere with the acoustic instruments or saturate the hydrophones. Conversely, research and exploration activities using underwater acoustic instruments or sources could interfere with SURTASS LFA sonar operations. For these reasons, SURTASS LFA sonar will not operate in the vicinity of known oceanographic or oil and gas exploratory operations and, thus, will not have an effect on these activities.

ES.4.6 POTENTIAL CUMULATIVE EFFECTS

The operations of up to four SURTASS LFA sonars are evaluated in this FSEIS/SOEIS for the potential for cumulative effects in the following foreseeable areas:

- Anthropogenic oceanic noise levels;
- Injury and lethal takes from anthropogenic causes;
- Socioeconomics; and
- Cumulative effects from concurrent LFA and MFA sonar operations.

Given the information provided in this FSEIS/SOEIS, the potential for cumulative effects from the operations of up to four SURTASS LFA sonars has been addressed by limitations proposed for employment of the system (i.e., geographical restrictions and monitoring mitigation). Even if considered in combination with other underwater sounds, such as commercial shipping, other operational, research, and exploration activities (e.g., acoustic thermometry, hydrocarbon exploration and production), recreational water activities, commercial and military sonars, and naturally-occurring sounds (e.g., storms, lightning strikes, subsea earthquakes, underwater volcanoes, whale vocalizations, etc.), the proposed four SURTASS LFA sonar systems do not add appreciably to the underwater sounds to which fish, sea turtles and marine mammal stocks are exposed. Because LFA transmissions will not significantly increase anthropogenic oceanic noise and the potential for masking is negligible, cumulative effects related to the potential for inducing stress from the proposed four SURTASS LFA sonar systems are not a reasonably foreseeable significant adverse impact on marine animals. Moreover, SURTASS LFA sonar is not likely tol cause injury or lethal takes of marine mammals or other marine animals. SURTASS LFA sonar operations are not likely to affect commercial and recreational fisheries, or research and exploration activities; and there is no reasonably foreseeable likelihood of affecting recreational diving, swimming, snorkeling, or whale watching. Analysis of the potential impacts from concurrent LFA and MFA sonar operations demonstrates that the overall risks of Level A and Level B impacts are no greater than the risks obtained by simply adding the risks from the individual LFA and MFA sources. Therefore, cumulative effects from the operation of up to four SURTASS LFA sonar systems are not a reasonably foreseeable significant adverse impact on marine animals.

ES.4.7 EVALUATION OF ALTERNATIVES

NEPA requires federal agencies to prepare an EIS that discusses the environmental effects of a reasonable range of alternatives (including the No Action Alternative). Reasonable alternatives are those that will accomplish the purpose and meet the need of the proposed action, and are practical and feasible from a technical and economic standpoint.

This FSEIS/SOEIS is the third environmental impact statement for SURTASS LFA sonar prepared under NEPA and Executive Order 12114. Previous to this document a final environmental impact statement (under NEPA) and final overseas environmental impact statement (under Executive Order 12114) were prepared in 2001 (DoN, 2001) and supplemented in 2007 (DoN, 2007). In these documents, numerous potential alternatives have been analyzed including: acoustic and non-acoustic detection methods such as radar, laser, magnetic, infrared, electronic, electric, hydrodynamic, biological technologies, passive sonar and high- or mid-frequency active sonar; unrestricted SURTASS LFA sonar operations; monitoring and mitigation for fish; the use of small boats and aircraft for pre-operational surveys; and an extended coastal standoff range of 46 km (25 nmi) vice 22 km (12 nmi). The analysis of coastal standoff range of 46 km (25 nmi) did not meet the standard of effecting the least practicable adverse impact on the species or stock under the MMPA (vs using the standard 22 km [12 nmi] coastal standoff) (DoN, 2007a). It has been concluded in the FOEIS/EIS and the FSEIS that none of these potential alternatives met the purpose and need of the proposed action to provide U.S. Naval forces with reliable long-range underwater threat detection and, thus, did not provide adequate reaction time to counter potential threats. Furthermore, they were not considered practical and/or feasible for technical and economic reasons.

The following alternatives were considered in this FSEIS/SOEIS (Table ES-2):

- No Action;
- Alternative 1—Same as the 2007 FSEIS Preferred Alternative; and
- Alternative 2—Alternative 1 with new OBIA list (total 21) (the Preferred Alternative).

Table ES-2. Alternatives considered in this FSEIS/SOEIS for SURTASS LFA sonar operations.

PROPOSED RESTRICTIONS/MONITORING	NO ACTION ALTERNATIVE	ALTERNATIVE 1	ALTERNATIVE 2
Dive Sites	NA[13]	RL not exceed 145 dB SPL	RL not exceed 145 dB SPL
Coastline Restrictions	NA	RL <180 dB SPL within 12 nmi of coast	RL <180 dB SPL within 12 nmi of coast
2007 NMFS Final Rule (NOAA, 2007c) OBIAs (total 10)[14]	NA	Yes	No
Updated OBIAs (total 21)	NA	No	Yes
Visual Monitoring	NA	Yes	Yes
Passive Acoustic Monitoring	NA	Yes	Yes
Active Acoustic Monitoring	NA	Yes	Yes
Reporting	NA	Yes	Yes

13 NA = Not applicable.

14 In the 2007 FSEIS (DoN, 2007a), the Navy's alternatives analyses included 9 OBIAs. During the rulemaking process, NMFS added The Gully as the 10th OBIA,

ES.4.7.1 NO ACTION ALTERNATIVE

Under this alternative, operational deployment of the active component (LFA/CLFA) of SURTASS LFA sonar will not occur. Although the No Action Alternative would avoid all environmental effects of employment of SURTASS LFA sonar, the Navy's stated priority ASW need for long-range underwater threat detection would not be achieved. The implementation of this alternative would allow potentially hostile submarines to clandestinely threaten U.S. Fleet units and land-based targets. Without SURTASS LFA sonar long-range surveillance capability, the reaction times to enemy submarines would be greatly reduced and the effectiveness of close-in, tactical systems to neutralize threats would be seriously, if not fatally, compromised.

Because the Navy would not conduct SURTASS LFA sonar operations, marine mammals present in the Atlantic, Pacific, and Indian Oceans, and the Mediterranean Sea would not be incidentally harassed by the SURTASS LFA sonar. This alternative would eliminate any potential risk to the environment from the proposed activities. In such a case, the Navy would not need nor receive authorization under the MMPA and ESA for incidental takes.

ES.4.7.2 ALTERNATIVE 1

This alternative proposes the employment of SURTASS LFA sonar technology the overall suite of mitigation designed to effect the least practicable impact om marine mammals and their habitat, and the availability for subsistence uses. These comprise: 1) geographic restrictions to include maintaining SURTASS LFA sonar received levels below 180 dB re 1 µPa (rms) within 22 km (12 nmi) of any coastline, 2) geographic restrictions to include maintaining SURTASS LFA sonar received levels below 180 dB re 1 µPa (rms) within ten designated OBIAs (see Table 2-4 of the FSEIS [DoN, 2007a]) and the MMPA Final Rule (NOAA, 2007c) that are located outside of 22 km (12 nmi), 3) SURTASS LFA sonar sound fields will not exceed received levels of 145 dB re 1 µPa (rms) within known recreational and commercial dive sites, and 4) monitoring mitigation includes visual, passive acoustic, and active acoustic (HF/M3 sonar) to prevent injury to marine animals when employing SURTASS LFA sonar by providing methods to detect these animals within the LFA mitigation zone and protocols for the delay/suspend of transmissions accordingly.

Under Alternative 1, as was concluded in the FSEIS, the potential effects on any stock of marine mammals from injury is considered to be negligible, and the effect on the stock of any marine mammal from significant change in a biologically important behavior is considered to be minimal. Any momentary behavioral responses are considered not to be biologically significant effects. Any auditory masking in mysticetes, odontocetes, or pinnipeds is not expected to be severe and would be temporary. Further, the potential effects on any stock of fish or sea turtles from injury is also considered to be negligible, and the effect on the stock of any fish, or sea turtles from significant change in a biologically important behavior is considered to be negligible to minimal. Any auditory masking in fish or sea turtles is expected to be of minimal significance and, if occurring, would be temporary.

Under this alternative, NMFS would incorporate mitigation and monitoring measures and reporting requirements into the MMPA rulemaking and Letters of Authorization.

ES.4.7.3 ALTERNATIVE 2 (THE PREFERRED ALTERNATIVE)

This alternative is the same as Alternative 1 but includes a comprehensive review and recommendation of OBIAs. Under Alternative 2, additional geographic restrictions would be levied on SURTASS LFA sonar operations through the inclusion of more marine mammal OBIAs (Table ES-1). The general summary provided in the above paragraph regarding the potential for injury on any stock of marine mammals, fish, or sea turtles, or significant change in a biologically important behavior of marine mammals, fish, or sea turtles from the operation of SURTASS LFA sonar would also apply to this alternative. Potential effects to marine animals from SURTASS LFA sonar operations under this alternative would be expected to be

slightly decreased when compared to Alternative 1 due to the more limited geographic employment of SURTASS LFA sonar systems.

Under this alternative, NMFS would incorporate mitigation and monitoring measures and reporting requirements into the MMPA rulemaking and Letters of Authorzation.

ES.5 MITIGATION MEASURES

Mitigation, as defined by the Council on Environmental Quality (CEQ), includes measures to minimize impacts by limiting the degree or magnitude of a proposed action and its implementation. In this document, three alternatives for the operation of SURTASS LFA sonar are presented, two of which will meet, to varying degrees, the Navy's purpose and need and reduce potential impacts through the mitigation measures discussed in this document. The mitigation and monitoring measures presented for SURTASS LFA sonar are similar to those in the FSEIS.

The objective of these mitigation measures is to effect the least practicable adverse impact on marine mammal species or stocks and to avoid risk of injury to marine mammals, sea turtles, and human divers. These objectives are met by:

- Ensuring that coastal waters within 22 km (12 nmi) of shore are not exposed to SURTASS LFA sonar signal RLs ≥180 dB re 1 µPa (rms) SPL;
- Designating OBIAs and ensuring that no OBIAs are exposed to SURTASS LFA sonar signal RLs ≥180 dB re 1 µPa (rms) SPL during biologically important seasons;
- Preventing exposure of marine mammals and sea turtles to SURTASS LFA sonar signal RLs below 180 dB re 1 µPa (rms) SPL by monitoring for their presence via three different methods (visual, passive acoustic, and active acoustic monitoring) and suspending/delaying transmissions when one of these animals enters the prescribed LFA mitigation zone plus a 1 km buffer zone; and
- Ensuring that no known recreational or commercial dive sites are subjected to SURTASS LFA sonar signal RLs >145 dB re 1 µPa (rms) SPL.

In the 2007-2012 Final Rule, NMFS required a 1-km (0.54-nmi) buffer zone operational restriction as discussed in Subchapter 2.5.2. In the Proposed Rule for the period 2012 to 2017, NMFS also proposes that the SURTASS LFA sonar sound field does not exceed 180 dB re 1 µPa received level at a distance of 1 km (0.54 nmi) beyond the LFA mitigation zone and 1 km (0.54 nmi) seaward of the outer boundary of any OBIA (NOAA, 2012). The mitigation measures presented in this chapter include this 1-km buffer zone requirement. Strict adherence to these measures will minimize impacts on marine mammal stocks and species, as well as on sea turtle stocks, and recreational/commercial divers.

There are geographic restrictions that apply to the operation of SURTASS LFA sonar as well as three types of mitigation measures that will be applied during the operation of SURTASS LFA sonar (Table ES-3).

ES.6 CONCLUSIONS

Based on the results of the analyses in this FSEIS/SOEIS document and the two previous NEPA EISs, operation of SURTASS LFA sonars, when employed in accordance with the mitigation measures (geographic restrictions and monitoring/reporting) detailed in Chapter 5.0 of this document, support a negligible impact determination.

The results presented in this FSEIS/SOEIS include:

- Potential effects on most if not all individual marine mammals are expected to be limited to Level B harassment. The Navy does not expect those effects to impact rates of recruitment or survival on the associated marine mammal species and stocks.

Table ES-3. Summary of mitigation measures for operation of SURTASS LFA sonar.

MITIGATION MEASURE	CRITERIA	ACTIONS
Geographic Restrictions		
22 km (12 nmi) from coastline	Sound field below 180 dB re 1 µPa (rms) RL, based on SPL modeling	Delay/suspend SURTASS LFA sonar operations if sound field criterion is exceeded
Offshore biologically important areas (OBIA) during biologically important seasons	Sound field below 180 dB re 1 µPa (rms) RL, based on SPL modeling, at 1 km (0.54 nmi) seaward of outer boundaries of OBIAs	Delay/suspend SURTASS LFA sonar operations if sound field criterion is exceeded
Recreational and commercial dive sites	Sound field not to exceed 145 dB re 1 µPa (rms) RL, based on SPL modeling	Delay/suspend SURTASS LFA sonar operations if sound field criterion is exceeded
Monitoring to Prevent Injury to Marine Mammals and Sea Turtles		
Visual Monitoring	Potentially affected species near the vessel but outside of the LFA mitigation zone plus 1-km (0.54-nmi) buffer zone	Notify Military Detachment Officer in Charge (MILDET OIC)
	Potentially affected species sighted inside the LFA mitigation zone plus 1-km (0.54-nmi) buffer zone	Delay/suspend SURTASS LFA sonar operations
Passive Acoustic Monitoring	Potentially affected species' vocalizations detected	Notify MILDET OIC
Active Acoustic Monitoring	Contact detected and determined to have a track that would pass within the LFA mitigation zone plus 1-km (0.54-nmi) buffer zone	Notify MILDET OIC
	Potentially affected species detected inside the LFA mitigation zone plus 1-km (0.54-nmi) buffer zone	Delay/suspend SURTASS LFA sonar operations

- Navy's impact analysis does not anticipate any mortality nor any injury of marine mammals to occur as a result of SURTASS LFA sonar operations, and the potential to cause strandings of marine mammals is negligible. Thus, effects on recruitment or survival are expected to be negligible.
- Potential for injury to sea turtle and fish species or stocks is negligible.
- Potential for non-injurious effects (TTS, masking, modification of biologically important behavior) to marine mammals, sea turtles, and fish is minimal to negligible.
- Cumulative effects are not a reasonably foreseeable adverse impact.

Since the initial LOA was issued for the operation of SURTASS LFA sonar systems in 2002, the percent of Level B incidental takes of marine mammals has consistently been below the amounts authorized in

the LOAs. There have been no reported strandings and no Level A takes incidental to SURTASS LFA sonar operations.

Therefore, this document supports the Navy application under the MMPA for take authorizations incidental to the operation of SURTASS LFA sonar by providing the means of effecting the least practicable adverse impact on the species or stock and its habitat and on the availability of the species or stock for "subsistence" uses. These results will also support interagency consultations, or Section 7 consultations, under the ESA to ensure the operations of SURTASS LFA sonar do not jeopardize the continued existence of a species or destroy or adversely modify critical habitat.

ES.7 PUBLIC PARTICIPATION

Public involvement in the review of the Draft SEIS/SOEIS is stipulated in 40 CFR Part 1503.1 of the CEQ regulations implementing NEPA and in OPNAVINST 5090.1C CH-1. These regulations and guidance provide for active solicitation of public comment via public comment periods and public hearings/meetings.

On January 21, 2009, the Navy, with NMFS as a cooperating agency, published a Notice of Intent (NOI) to prepare a SEIS/SOEIS for the employment of SURTASS LFA sonar in the *Federal Register* (DoN, 2009a). The NOI described the decision of DASN(E) to further the purposes of NEPA, support the issuance of a new Final Rule under the MMPA for the taking of marine mammals incidental to operation of SURTASS LFA sonar systems, and to continue the Navy's commitment to environmental stewardship by preparing an additional supplemental analysis for operation of SURTASS LFA sonar. DASN(E) called for the additional supplemental analysis to focus on potential OBIAs in regions of the world's oceans where SURTASS LFA sonar might be used for routine training, testing, and military operations, as well as the potential for cumulative effects associated with the use of SURTASS LFA sonar with other active sonar systems, and the potential for a greater coastal standoff range, where operationally practicable. In the NOI, the Navy and NMFS solicited scoping comments on the above topics, to include OBIAs, greater coastal standoff ranges, and cumulative effects. At the end of the 45-day public scoping period, no comments had been received (DoN, 2009a).

Commencing with the filing of the DSEIS/SOEIS with the U.S. EPA, copies of the SURTASS LFA Sonar DSEIS/SOEIS were distributed to agencies and officials of the federal, state, and local governments, citizens groups and associations, and other interested parties. The U.S. EPA published a notice of availability (NOA) for the SURTASS LFA sonar Draft SEIS/SOEIS on 19 August 2011 (EIS No. 20110269).

A 60-day public review and comment period on the Draft SEIS/SOEIS commenced when the NOA was published in the *Federal Register* on 19 August 2011 and ended on 17 October 2011. Per the NEPA regulations, no public hearings or meetings were scheduled by the Navy. There were no timely requests by the public for meeting or hearing under the NEPA regulations. There were no requests for an extension of the comment period.

A total of five comment letters/emails on the Draft SEIS/SOEIS were received from three federal agencies, one non-governmental organization, and one individual. Chapter 7 of this FSEIS/SOEIS has been prepared to document the public involvement process and to also present the response to questions and comments raised by the commenters during the public comment period for the DSEIS/SOEIS, as presented in Subchapter 7.3.