



DEPARTMENT OF THE NAVY  
OFFICE OF THE CHIEF OF NAVAL OPERATIONS  
2000 NAVY PENTAGON  
WASHINGTON DC 20350-2000

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MEMORANDUM FOR DISTRIBUTION

From: Chief of Naval Operations

Subj: MID-FREQUENCY ACTIVE SONAR EFFECTS ANALYSIS INTERIM  
POLICY

- Ref:
- (a) Compliance with Environmental Requirements in the Conduct of Naval Exercises or Training at Sea, 28 Dec 2000 (At-Sea Policy)
  - (b) ASN(I&E) ltr of 5 Aug 2005
  - (c) Marine Mammal Protection Act (MMPA), 16 U.S.C. §1361, et seq., as amended by the 2004 National Defense Authorization Act, Pub. L. No. 108-136, 319, 117 Stat.1433
  - (d) Endangered Species Act (ESA), 16 U.S.C. § 1531, et seq.
  - (e) (70 FR 1872) Endangered Fish and Wildlife; Notice of Intent to Prepare an Environmental Impact Statement
  - (f) National Environmental Policy Act (NEPA), 42 U.S.C. § 4321, et seq.
  - (g) Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions"
  - (h) Naval Warfare Publication (NWP) 4-11, "Environmental Protection" (10 Nov 2004)
  - (i) OPNAVINST 5090.1B CH-3, Chapters 2, 19, 22, and Appendix E

Encl: (1) Preliminary Quantitative Effects Analysis

1. Purpose, Background, and Applicability

a. Purpose. To implement, in furtherance of reference (a), a consistent interim policy and internal guidance to Fleet Commanders and other Echelon II commands to assess potential effects of mid-frequency (1 kHz -10 kHz) active sonar use incident to Navy military readiness and scientific research activities pending full implementation of a strategy for assessing potential effects of mid-frequency active sonar use on marine mammals (Interim Policy).

b. Background. As described in reference (b), the Navy has developed a coordinated strategy for assessing the potential

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effects of its use of mid-frequency active sonar on marine mammals. The intent of this strategy is to ensure that the Navy's use of mid-frequency active sonar complies with the requirements of NEPA, Executive Order 12114, the MMPA, and the ESA. Implementation of this strategy has already begun.

(1) The Navy provided its strategy for assessing the potential effects of Navy use of mid-frequency active sonar on marine mammals incident to military readiness and scientific research activities to the Administrator of the National Oceanic and Atmospheric Administration via reference (b). The Under Secretary of Commerce for Oceans and Atmosphere has expressed support for the strategy.

(2) This Interim Policy prescribes internal procedures and methodologies designed to assist the Fleet in ensuring that their activities comply with federal environmental law and regulation in light of recent scientific advancements and regulatory interpretation in determining the effects of Navy active sonar use on protected marine species per references (c) and (d) while moving toward full implementation of the strategy set forth in reference (b). The preliminary methodology in paragraph 2(d) and enclosure (1) for quantitatively assessing exposure effects was developed in consultation with the National Marine Fisheries Service. This Interim Policy is expected to evolve as new scientific information becomes available to inform Navy decision-makers.

(3) In addition, the preliminary quantitative analysis methodology and threshold criteria described in paragraph 2(d) are the subject of ongoing environmental analyses in accordance with references (c), (d), and (f) (e.g., Undersea Warfare Training Range Draft Environmental Impact Statement, and 2006 Supplement to the 2002 Rim of the Pacific Programmatic Environmental Assessment). Consequently, the methodology and threshold criteria will be finalized and revised as necessary as those analyses are completed.

(4) Similarly, reference (e) is a Department of Commerce Notice of Intent to prepare an Environmental Impact Statement on the issuance of criteria to determine what constitutes a "take" under the MMPA as a result of exposure to anthropogenic energy in the marine environment. This Interim Policy, particularly paragraph 2(d), will be revised as necessary following release of a final regulation or regulatory guidance.

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c. Applicability. This Interim Policy applies to Navy military readiness and scientific research activities, or sponsorship of these activities, conducted at sea.<sup>1</sup> This Interim Policy is intended as internal Navy guidance and is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity, against the Navy, its officers or employees, or any other person.

2. Mid-Frequency Active Sonar Effects Assessment Interim Policy

a. Effects Assessment. It is Navy policy to assess the potential effects of mid-frequency active sonar use incident to military readiness and scientific research activities on marine mammals and endangered species in the marine environment pursuant to references (b), (c), (d), (f) and (g). The assessment shall be conducted using the preliminary quantitative analysis methodology and threshold criteria described in paragraph 2(d) and enclosure (1). When appropriate, Navy action proponents shall seek appropriate authorization under reference (c) and consult in accordance with reference (d).

b. Navy will utilize the best available science and data in implementing this Interim Policy. Navy recognizes that the science relating to acoustic effects on marine mammals is developing. Accordingly, Navy will monitor the evolving state of science and amend this Interim Policy as appropriate.

c. No command or individual is authorized to propose altering this Interim Policy's criteria, thresholds, or modeling approaches with any local, state, or Federal regulatory agencies or officials without prior, written consent from OPNAV (N45).

d. Preliminary Quantitative Analysis Criteria and Thresholds. See enclosure (1) for additional details.

(1) The specified MMPA and ESA threshold levels for mid-frequency active sonars are as follows:

(a) MMPA Level A Harassment and ESA Injury. Onset of permanent (auditory) threshold shift (PTS) is the criterion

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<sup>1</sup> Per reference (a), "at sea" for the purposes of this Interim Policy means the area from the U.S. high water mark seaward to the recognized Exclusive Economic Zones (EEZs) or fishing zones of other nations as set out in DoD 2005.1-M, Maritime Claims Reference Manual. Nothing in this Interim Policy, however, is meant to expand the area where any particular legal requirement applies.

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for Level A Harassment and ESA Injury. PTS is the permanent loss of hearing sensitivity. The acoustic threshold for onset PTS for mid-frequency active sonars is stated in terms of total, accumulated energy flux density level and with threshold of 215 dB (re 1 (sq microPa)-sec).

(b) MMPA Level B Harassment and ESA Harassment. Onset of temporary (auditory) threshold shift (TTS) is the criterion for MMPA and ESA Harassment. TTS is the temporary loss of hearing sensitivity, but hearing sensitivity is fully recoverable. The acoustic threshold for onset TTS for mid-frequency active sonars is stated in terms of total, accumulated energy flux density level of 195 dB (re 1 (sq microPa)-sec).

(c) Sub-TTS: MMPA Level B Harassment and ESA Harassment: For other than single-ping exposure actions, Navy will analyze "sub-TTS" behavioral effects in the same manner as TTS and utilize a sub-TTS threshold of 190 dB (re 1 (sq microPa)-sec).

(2) MMPA "take" level. Exceeding the modeled exposure of 0.5 animals presumes a "take" under reference (c) requiring Navy Action Proponents to seek authorization from the appropriate regulatory agency. Navy action proponents may, however, be authorized to apply post-analysis qualitative mitigation or assessment to reach a "no take" determination based on sound biological judgment. This analysis and determination must be coordinated with OPNAV (N45) and fully documented in accordance with references (f) and (g). This coordination must be in writing and be finalized in sufficient time to seek authorization under the MMPA should N45 not concur in the Action Proponent's post-analysis determination.

(3) ESA "may affect" level. For ESA protected marine mammals, if quantitative analysis indicates a modeled exposure exceeds 0.05 protected marine mammals, then there is a presumption that the proposed activity "may affect" the protected marine mammal thus triggering consultation with the appropriate regulatory agency pursuant to reference (d). This presumption may be overcome if, in the opinion of a qualified marine biology expert, factors not fully accounted for in the quantitative analysis (including, but not limited to, mitigation measures or unmodeled aggregation behavior of animals) lead to an informed and legally defensible "no effect" conclusion. Such

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qualitative expert analysis must be coordinated with OPNAV (N45) and documented in accordance with references (f) and (g), and be completed in sufficient time to complete consultation under the ESA if N45 does not concur in the action proponent's conclusion.

(4) Pinnipeds. For pinnipeds (e.g., seals, sea lions), scientific information does not currently support establishing either a threshold or criterion. OPNAV (N45) will continue to examine the available information and issue guidance on pinniped Level A and Level B harassment criteria and thresholds within six months of the promulgation of this Interim Policy. If an Action Proponent requires pinniped criteria and thresholds prior to OPNAV (N45) taking action on establishing those values, they should consult with OPNAV (N45).

(5) Sea Turtles/Finfish. At this time, there is insufficient scientific information with which to quantify the anticipated effects of mid-frequency active sonar on either sea turtles or finfish. Therefore, the anticipated effects of such sonar use associated with military readiness and/or scientific research activities on sea turtles and finfish protected under the ESA shall continue to be based on sound biological judgment. OPNAV (N45) will periodically review the state of available science to ensure the above approach remains scientifically valid, complies with federal law and regulation, and determine what additional research, if any, is warranted.

### 3. Implementation

a. Phased Approach. Per reference (b), the Navy shall implement its coordinated strategy for assessing the potential effects of its use of mid-frequency active sonar on marine mammals through a multi-phased approach. The desired end-state is a comprehensive and accurate assessment of applicable Navy military readiness and scientific research activities, while ensuring both Fleet and other Echelon II Command ability to meet requisite operational, training, acquisition, research, development, testing, and evaluation requirements. This approach maximizes marine resource protection by first focusing Navy efforts and resources on those geographic areas where potential effects to marine mammals and protected species are most likely to occur due to concentrated and repetitive Navy

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mid-frequency active sonar activities. This Interim Policy is subject to change as the Navy advances through the phases of implementing its coordinated strategy.

(1) Phase I:

(a) Fleet Training Activities: Analysis of mid-frequency active sonar use incident to military readiness activities conducted either on Ocean Ranges/Operating Areas or during Major Training Exercises occurring within the U.S. Exclusive Economic Zone (EEZ) (200 nm).

(b) Echelon II Command/PEO Acquisition Activities: Analysis of mid-frequency active sonar use incident to acquisition program activity conducted in, on, or above waters subject to U.S. jurisdiction, within the U.S. EEZ, and on the high seas.

(2) Phase II:

(a) Analysis of Navy military readiness and scientific research activities conducted not otherwise covered by Phase I.

(b) Protective Measures. During all phases of the coordinated strategy, Navy activities introducing mid-frequency active sonar energy into the marine environment shall continue implementing, as appropriate, the protective measures set forth in enclosure 1 of reference (b).

(c) On May 4, 2005 the Under Secretary of the Navy and Vice Chief of Naval Operations finalized the Charter for the Executive Steering Group for Maritime Sustainability (ESG). The ESG will oversee all aspects of implementing this Interim Policy.

4. Roles and Responsibilities

a. OPNAV (N45) shall amend references (h) and (i) to incorporate this Interim Policy and any future revisions.

b. OPNAV (N45) shall, when required, issue implementation guidance updating this Interim Policy, particularly the quantitative analysis protocol in paragraph 2(d) and enclosure

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(1), to reflect the results of pending environmental analyses, future regulatory agency final rulemaking, best available science, application of quantitative effects analysis to additional protected marine resources, improved assessment methodologies, or more effective protective measures. This shall be done in consultation with Navy technical experts, Fleet Commanders, and Echelon II Commands, as appropriate.

c. OPNAV (N45) shall designate a Center of Excellence to review the evolving state of science and information regarding marine species density, the marine environment, and the potential effects of sonar use and other anthropogenic sound on marine resources OPNAV (N45). Appropriate Echelon II Commands will provide oversight of this Center of Excellence through a governing board.

d. OPNAV (N45) shall designate a Center of Excellence to oversee the continued development, upgrading, and maintenance of the acoustic propagation analysis model. OPNAV (N45) shall convene an annual meeting of affected stakeholders to determine which upgrades to the acoustic propagation effects analysis model can be initiated or adopted.

e. OPNAV (N45) shall monitor the progress of the implementation of this Interim Policy and oversee the scheduled phases of the coordinated strategy outlined above, identify difficulties, and make any necessary recommendations to the Chief of Naval Operations (CNO).

f. OPNAV (N45) shall chair an annual meeting to focus on the status of research that may result in modifications of the preliminary quantitative analysis criteria. The meeting will update attendees on status of efforts to implement this Interim Policy as well as ensure all attendees understand the current state of science and coordinate future scientific research efforts. The attendees should include representatives from OPNAV, Office of Naval Research, and Echelon II commands. OPNAV (N45) may approve additional attendees.

g. Echelon II commands shall take all appropriate steps to implement this Interim Policy. Commander Fleet Forces Command (CFFC)/Commander, U.S. Pacific Fleet (CPF) shall develop and submit plans and programming requests to implement this Interim Policy to OPNAV (N45) by 1 May 2006. Other Echelon II commands

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conducting activities subject to this Interim Policy must submit an implementation plan for compliance to OPNAV (N45) no later than 1 May 2006.

h. CFFC/CPF shall, consistent with this Interim Policy, analyze and document mid-frequency active sonar uses incident to military readiness activities and seek appropriate regulatory authorization and/or consultation under references (c) and (d) for all major training exercises commencing on or after 1 January 2007. This provision is not applicable to major training exercise mid-frequency active sonar use otherwise covered by final programmatic authorization/consultation.

i. All Navy Action Proponents preparing environmental planning documentation after the effective date of this Interim Policy either under the cognizance of Secretary of the Navy instruction series 5000.2 or subject to CNO endorsement, shall prepare test activity documents utilizing the quantitative methodology contained in this Interim Policy for assessing the potential effects of mid-frequency active sonar use on marine mammals incident to applicable Navy military readiness and scientific research activities.

j. CFFC/CPF shall ensure that all funded Phase I environmental planning documentation, including necessary permits, authorizations and consultations, is completed no later than September 2009.

k. All other Echelon II commands with oversight or ownership of an Ocean Range shall submit to OPNAV (N45), a detailed Plan of Action and Milestones (POA&M), no later than 1 May 2006, for initiating and completing range or range complex wide environmental planning documentation, including requisite permits, authorizations, and consultations, no later than 1 October 2010.

l. CFFC/CPF and Echelon II commands shall assign staff to serve on oversight boards identified within this Interim Policy.

6. Effective date. This Interim Policy is effective immediately.

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7. My point of contact for this matter is Mr. Ronald Tickle,  
Head, Operational Environmental Readiness and Planning Branch,  
OPNAV (N45), 703-602-2787.



M. G. MULLEN

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## PRELIMINARY QUANTITATIVE EFFECTS ANALYSIS

This enclosure provides general interim guidance for the determination of marine mammal "takes" under the Marine Mammal Protection Act (MMPA) and/or the Endangered Species Act (ESA). It applies to mid-frequency active sonar uses incident to military readiness and scientific research activities and is based on the methodology used for the Undersea Warfare Training Range (USWTR) Environmental Impact Statement (EIS) and the 2006 Supplement to the 2002 Rim of Pacific Environmental Assessment.

In addition, the preliminary quantitative analysis methodology and threshold criteria described below are the subject of ongoing environmental analyses (e.g., Undersea Warfare Training Range Draft Environmental Impact Statement, and 2006 Supplement to the 2002 Rim of the Pacific Programmatic Environmental Assessment). Consequently, the methodology and threshold criteria will be finalized and revised as necessary as these analyses are completed.

The quantitative preliminary risk analysis process shall consist of a systematic approach as outlined below.

1. The assessment will result in "take" estimates, defined as the statistical expected values of the number of animals to be exposed to sound energy above specified threshold levels.

The specified MMPA and ESA threshold levels for mid-frequency active sonars are as follows:

*MMPA Level A Harassment and ESA Injury:* Onset of permanent (auditory) threshold shift (PTS) is the criterion for injury. PTS is the permanent loss of hearing sensitivity. The acoustic threshold for onset PTS for tactical sonars is stated in terms of total, accumulated energy flux density level and with threshold of 215 dB (re 1 (sq microPa)-sec).

*MMPA Level B Harassment and ESA Harassment:* Onset of temporary (auditory) threshold shift (TTS) is the criterion for MMPA and ESA Harassment. TTS is the temporary loss of hearing sensitivity, but hearing sensitivity is fully recoverable. The acoustic threshold for onset TTS for mid-frequency active sonars is stated in terms of total, accumulated energy flux density level of 195 Db (re 1 (sq microPa)-sec). *Sub-TTS: MMPA Level B Harassment and ESA Harassment:* For other than single-ping exposure actions,

Navy will analyze "sub-TTS" behavioral effects in the same manner as TTS and utilize a sub-TTS threshold of 190 dB (re 1 (sq microPa)-sec).

2. Quantitative estimates of expected marine mammal densities, by species, for the time and location of the action shall be employed using the best available scientific data. Where no documented marine mammal density information is available, extrapolation should be made from existing information using sound biological assumptions. Depth distribution, course changes, and speeds of marine mammals are required for cases of slow-moving or stationary sources. Navy action proponents shall seek prior, written, timely approval from OPNAV (N45).

3. Quantitative characterization of the active sonar source properties shall include source motion, source levels, depths, directivity and steering angles, frequency bands, pulse lengths, and repetition rates.

4. Quantitative estimation of the expected total energy accumulated over time by a marine mammal requires estimates of the sound field generated by the sonar source as a function of range, depth, and time. Navy standard sound-transmission models, and associated Navy standard databases will be used, unless there are measured sound-field or environmental data available for the site at hand. The Comprehensive Acoustic Simulation System (CASS)/Gaussian Ray Bundle model (GRAB) and Oceanic and Atmospheric Mastering Library (OAML) databases are the usual standards for tactical sonars.

5. For a source moving at speeds greater than typical animal speeds, the expected accumulated energy at a fixed animal location will be calculated using standard statistical methods. A direct estimate assumes a constant source velocity, fixed animal location, and energy accumulation on a grid. For fixed or slow-moving sources, either fixed or moving animal models may be appropriate.

The results for this step are impact areas (or volumes) within which total energy exceeds the threshold for injury or harassment.

6. For the usual geometry of a moving source, the expected number of "takes" is then found as the product of expected impact area and expected animal density (including depth distribution when important). An analogous estimate is made for fixed or slow sources.

7. Protective measures or mitigation effectiveness will be incorporated as inputs to the statistical analysis. Justification will rely on precedent or documented statistical rationale. Navy action proponents shall seek prior, written, timely approval from OPNAV (N45).

8. Alternatives to the above methodology may be appropriate for some actions, and will be reviewed on a case-by-case basis by OPNAV N45.

9. Tactical sonar risk analysis guidance for MMPA and ESA does not replace existing requirements in the OPNAVINST 5090 series.