

DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

**ON ISSUANCE OF A SCIENTIFIC RESEARCH PERMIT
FOR A BEHAVIORAL RESPONSE STUDY
ON DEEP DIVING ODONTOCETES**

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Lead Agency: USDC National Oceanic and Atmospheric Administration
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Resources

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Abstract: The National Marine Fisheries Service (NMFS), Office of Protected Resources, proposes to issue a major amendment to a scientific research permit for takes of marine mammals in the wild, pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 *et seq.*), and the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.*). The primary objective of the proposed research remains unchanged from the original permit, issued in 2007, which is to collect underpinning data to evaluate the risk of mid-frequency sonars to beaked whales and other toothed whales by making direct measurements of behavioral responses to sound exposure. The action area for the proposed study is also the same as originally permitted: in the Tongue of the Ocean, east of Andros Island, Bahamas. NMFS previously prepared an environmental assessment (EA) under the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*), for issuance of the permit proposed for amendment. Based on the analysis in the 2007 EA, NMFS determined that issuance of the original permit and conduct of the associated research would not have measurable impacts on the physical, social, or economic environment but could result in “level B harassment,” as defined in the MMPA, of marine mammals. The proposed major amendment would extend the duration of the permit, allowing three additional field seasons, and increase the number of marine mammals permitted to be harassed by the research, but would not change the way in which marine mammals, or the human environment, may be affected. This Supplemental EA evaluates the potential impacts to the human environment from issuance of the proposed permit amendment by supplementing the 2007 EA’s assessment of potential impacts on marine mammals, specifically those that may result from the proposed extended duration of the project and increase in number of marine mammals that may be affected.

DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT on Issuance of a Scientific Research
Permit for a Behavioral Response Study on Deep Diving Odontocetes

CHAPTER 1	PURPOSE OF AND NEED FOR ACTION.....	3
1.1	DESCRIPTION OF ACTION	3
1.1.1	<i>Background.....</i>	4
1.1.2	<i>Purpose and Need.....</i>	5
1.1.3	<i>Objectives</i>	6
1.2	OTHER EA/EIS THAT INFLUENCE SCOPE OF THIS SUPPLEMENTAL EA	6
1.3	DECISION AND OTHER AGENCIES INVOLVED IN THIS ANALYSIS	7
1.4	SCOPING SUMMARY	7
1.5	FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS NECESSARY TO IMPLEMENTATION OF THE ACTION	9
CHAPTER 2	ALTERNATIVES INCLUDING THE PROPOSED ACTION	10
2.1	ALTERNATIVE 1 – NO ACTION	10
2.2	ALTERNATIVE 2 – PROPOSED ACTION	10
2.3	ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY	13
CHAPTER 3	AFFECTED ENVIRONMENT	15
3.1	BIOLOGICAL ENVIRONMENT	16
3.2	MARINE MAMMALS	16
CHAPTER 4	ENVIRONMENTAL CONSEQUENCES	18
4.1	EFFECTS OF ALTERNATIVE 1 – NO ACTION	19
4.2	EFFECTS OF ALTERNATIVE 2 – PROPOSED ACTION.....	19
4.3	COMPARISON OF ALTERNATIVES.....	20
4.4	COMPLIANCE WITH ESA	21
4.5	MITIGATION MEASURES.....	21
4.6	UNAVOIDABLE ADVERSE EFFECTS.....	22
4.7	CUMULATIVE EFFECTS	22
LITERATURE CITED		23

CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

The National Environmental Policy Act (NEPA) was enacted in 1969 and is applicable to all “major” federal actions significantly affecting the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted, or approved by a federal agency. NMFS issuance of permits for research represents approval and regulation of activities. While NEPA does not dictate substantive requirements for permits, licenses, etc., it requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in the Council on Environmental Quality’s implementing regulations (40 CFR Parts 1500-1508).

NMFS has, through NOAA Administrative Order (NAO) 216-6, established agency procedures for complying with NEPA and the implementing regulations issued by the Council on Environmental Quality. NAO 216-6 specifies that issuance of scientific research permits under the Marine Mammal Protection Act and Endangered Species Act is among a category of actions that are generally exempted (categorically excluded) from further environmental review, except under extraordinary circumstances. When a proposed action that would otherwise be categorically excluded is the subject of public controversy based on potential environmental consequences, has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon endangered or threatened species or their habitats, preparation of an environmental assessment (EA) or environmental impact statement (EIS) is required.

While issuance of scientific research permits is typically subject to a categorical exclusion, as described in NAO 216-6, NMFS is preparing a Supplemental EA (SEA) for this action to evaluate whether significant environmental impacts could result from issuance of the proposed permit amendment in general, and to provide a more detailed analysis of effects to ESA-listed species in particular. This SEA is prepared in accordance with NEPA, its implementing regulations, and NOAA 216-6.

1.1 Description of Action

In response to receipt of a request from the permit holder, NOAA Office of Science and Technology, (File No. 1121-1900), NMFS proposes to issue a “major amendment” to a scientific research permit that authorizes “takes”¹ by “harassment”² of marine mammals in the wild pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.) and “takes”³ of endangered marine mammals in the wild pursuant to the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 et seq.).

1 Under the MMPA, “take” is defined as “harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect.” [16 U.S.C. 1362(18)(A)]

2 “Harass” is defined by regulation (50 CFR §216.3) as “Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but does not have the potential to injure a marine mammal or marine mammal stock in the wild (Level B harassment).”

3 The ESA defines “take” as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” The term “harm” is further defined by regulations (50 CFR §222.102) as “an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or

NMFS regulations implementing the MMPA define a major amendment to a scientific research permit as one that results in any change to the permit specific conditions regarding: (1) the number and species of marine mammals that are authorized to be taken, imported, exported or otherwise affected; (2) the manner in which these marine mammals may be taken, imported, exported or otherwise affected, if the proposed changes may result in an increased level of take or risk of adverse impact; (3) the locations in which the marine mammals may be taken, from which they may be imported, and to which they may be exported; and (4) the duration of the permit, if the proposed extension would extend the duration of the permit more than 12 months beyond that established in the original permit. [50 CFR 216.39]

The proposed amendment is to extend the duration of the permit, from the current expiration date of January 1, 2009 to January 1, 2011, to allow three additional field seasons during the summer/fall of 2008 through 2010, with additional time allowed for import and export of tissue samples for analysis. Compared to the field work conducted under the original permit, the proposed amendment would permit harassment of greater numbers of marine mammals annually, due to the addition of more playback events within a field season. The applicant does not propose to change any other terms and conditions of the permit, including location of the research or import, or mitigation, monitoring, and reporting requirements established in the original permit.

Changing the expiration date specified in Condition A.1 of the permit from January 2009 to January 2011 constitutes a major amendment because it would extend the duration of the permit more than 12 months beyond that originally established. Authorizing additional field work, including takes of marine mammals by harassment, also constitutes a major amendment because it represents a change in the number of marine mammals that may be taken. The original permit only authorized takes for the 2007 field season: additional field seasons represent additional takes. In addition, the applicant proposes to modify the field activity protocols by conducting a greater number of playbacks than permitted for the 2007 field season. Unlike the 2007 field season, in which playbacks were only directed at animals that had been tagged with scientific instruments that monitor received sound levels and other information, the researchers now propose to also direct playbacks at animals that are not tagged, but which can be visually or acoustically monitored for responses to the playbacks. The maximum received levels for sounds would not exceed those previously permitted.

1.1.1 Background

The scientific research permit that is the subject of the proposed amendment was issued on August 13, 2007, and is valid through December 31, 2008. Notice of permit issuance was published in the *Federal Register* on August 17, 2007 (72 FR 46213). The objective of the permitted activity, as described in the application, was to observe behavioral responses in several deep-diving cetacean species exposed to natural and artificial underwater sounds and quantify exposure conditions associated with various effects. These behavioral response studies focus on beaked whales (*Ziphius cavirostris* and *Mesoplodon* spp.), but the responses of other odontocete

degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering.”

DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT on Issuance of a Scientific Research
Permit for a Behavioral Response Study on Deep Diving Odontocetes

species may also be monitored. The study is conducted in the Tongue of the Ocean (east of Andros Island, Bahamas). The original permit authorized studies on a variety of cetacean species involving temporary attachment of scientific instruments (digital archival recording tags) via suction cup, photo-identification, exposure to controlled levels of natural and anthropogenic underwater sounds, including signals simulating mid-frequency sonar. Animals were monitored visually and through passive acoustic monitoring (via an underwater hydrophone array), as well as through data from the tags, for responses to the sounds. Sloughed skin samples collected from the detached suction cup were authorized to be imported into the U.S. for analysis. The permit was valid for a single field season, in the summer/fall of 2007, with additional time allowed for import of tissue samples.

The permit holder conducted research in the summer and fall of 2007 under Permit No. 1121-1900. Researchers obtained a relatively clear set of behavioral responses by an adult female beaked whale to the controlled playbacks of the mid-frequency active sonar and killer whale sounds. The tags precisely quantified the acoustic exposure associated with the onset of the responses. While the researchers believe they have demonstrated that their experimental paradigm can provide useful information, without apparent harm or undue risk to the animals they noted that this experiment involved only two exposures to a single individual with limited baseline information. Thus, additional results using a similar paradigm are needed. Additionally, the absence of negative control stimuli for the 2007 field season means that the test must be repeated with other stimuli that do not elicit such a response, which would allow researchers to better understand the sound features that elicit responses.

During the 2007 field season the researchers conducted vessel-based and aerial post-playback mitigation and monitoring observations at the start and end of field season, and after both playbacks, to ensure that there were no injured or stranded marine mammals in and around a large area surrounding the location of each playback. None of the animals' responses were outside of the realm of expected behavioral changes, as discussed in the 2007 EA and authorized by the original permit. Further, no distressed, injured, dead, or stranded animals were detected at any time. The researchers feel that the visual and passive acoustic monitoring were effective mitigation measures. Full details regarding the 2007 field work (Phase I of the study) are forthcoming in the annual permit report due by April 1, 2007, pursuant to Condition E.3 of the original permit.

1.1.2 Purpose and Need

The primary purpose of the original permit was to authorize "takes" of marine mammals, including endangered species, for scientific research to evaluate the risk of mid-frequency sonars to beaked whales and other toothed whales by making direct measurements of behavioral responses to sound exposure. The need for issuance of the original permit was related to NMFS' mandates under the MMPA and ESA. Specifically, NMFS has a responsibility to implement both the MMPA and the ESA to protect, conserve, and recover marine mammals and threatened and endangered species under its jurisdiction. The MMPA and ESA prohibit takes of marine mammals and threatened and endangered species, respectively, with only a few very specific exceptions, including for scientific research and enhancement purposes. Permit issuance

criteria require that research activities are consistent with the purposes and polices of these Acts and will not have a significant adverse impact on the species or stock.

The primary purpose of the proposed amendment is to authorize additional “takes” of the same marine mammal species, for the collection of additional data related to achieving the original study objective. The need for the amendment is to revise the permit to extend the duration and allow additional field seasons following the preliminary study conducted in 2007. The proposed amendment is consistent with NMFS’s mandates under the MMPA and ESA.

1.1.3 Objectives

The overall objective of the proposed research under the amended permit remains the same as with the original permit: to determine the acoustic exposures of mid-frequency (MF) sonar sounds that elicit an identifiable behavioral indicator response in beaked whales. This would be done by performing a multi-stimulus behavioral response study (BRS) to assess responses of beaked whales and other deep-diving odontocetes to underwater natural sounds, novel synthetic sounds, and MF sonar sounds. The primary objective of the amendment is to allow additional field work to follow from the preliminary study done in 2007 under the original permit. Another objective of the proposed amendment is to allow playbacks to un-tagged animals. The purpose of conducting playbacks to untagged animals is to increase the sample size of observed behavioral responses to sound exposures, including by conducting playbacks to species that are not easily tagged but otherwise available for behavioral observation at the surface (e.g., dolphins), and under circumstances where animals’ responses during playbacks can be “observed” underwater by monitoring vocalizations using the AUTECH underwater hydrophone array. NMFS determined that issuance of the original permit would contribute to resolving conservation problems for these species. Issuance of the permit amendment would continue to do so.

1.2 Other EA/EIS that Influence Scope of this Supplemental EA

In response to the original application for a scientific research permit submitted by NOAA Office of Science and Technology, (File No. 1121-1900), NMFS prepared an Environmental Assessment (EA) on Issuance of a Scientific Research Permit for a Behavioral Response Study on Deep Diving Odontocetes (NMFS 2007). The EA examined the environmental consequences of two alternatives: No Action (denial of the permit) and the Proposed Action (permit issuance), which included mitigation measures that would be implemented as part of the permitted research.

A Finding of No Significant Impact (FONSI) was signed on August 13, 2007, based on information indicating that the short-term impacts of conducting the study would result in harassment of some individual marine mammals. The harassment was expected to result in changes in the behavior (e.g., to avoid the sounds) of individual animals, but the amount of harassment likely to result from the research was not likely to injure individual marine mammals or jeopardize the continued existence of any ESA-listed species. The number of animals that would be affected by the original permit was small relative to the local population and species abundance, and the most likely response of the affected animals would be short-term alterations in behavior, which were not expected to result in substantial impacts on the stock or species.

NMFS determined that the potential impacts of the proposed action would be limited to the biological environment, and, more specifically, to marine organisms within range of the sounds from playback sources. Invertebrates, fish, sea turtles, and sea birds that may be within the range of the sounds from the playback experiments were not likely to be affected. NMFS also determined that there were not likely to be any measurable impacts from the proposed action on social or economic aspects, nor on the physical environment.

The action area for that 2007 EA was the same geographic area as the proposed action (issuance of a major amendment to the permit) in this supplemental EA. The proposed changes to the permit would not alter the characteristics of the sonar system or conduct of the research, and as such would not change the manner in which the research may affect the environment compared to what was analyzed in the 2007 EA. Thus, the issues within the scope of this supplemental EA are related to the potential impacts on marine organisms, particularly marine mammals that are the focus of the playbacks, of permitting three additional field seasons, and incorporating changes in protocols regarding increasing the number of animals targeted for playbacks within a field season.

1.3 Decision and other Agencies Involved in this Analysis

NMFS must decide whether authorizing the permit amendment would be consistent with the purposes and policies of the MMPA, ESA and their implementing regulations. No other Federal, state or local agencies are involved in the proposed action.

1.4 Scoping Summary

The purpose of scoping is to identify the issues to be addressed and the significant issues related to the proposed action, as well as identify and eliminate from detailed study the issues that are not significant or that have been covered by prior environmental review. An additional purpose of the scoping process is to identify the concerns of the affected public and Federal agencies, states, and Indian tribes. CEQ regulations implementing the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) do not require that a draft EA be made available for public comment as part of the scoping process.

The MMPA and its implementing regulations governing issuance of special exception permits for scientific research (50 C.F.R. §216.33) require that, upon receipt of a valid and complete application for a new permit, and the preparation of any NEPA documentation that has been determined initially to be required, NMFS publish a notice of receipt in the *Federal Register*. The notice summarizes the purpose of the requested permit, includes a statement about whether an EA or EIS was prepared, and invites interested parties to submit written comments concerning the application. The original application and accompanying draft EA were made available for public comment (a notice was published in the *Federal Register* on April 17, 2007 (72 FR 19181, and the documents were posted on the web), and provided to the Marine Mammal Commission (MMC) for review.

Subsequent to the 30-day comment period on the original application, NMFS received comments from the MMC, a member of the scientific community (Linda S. Weilgart, Ph.D.), and the following non-governmental organizations: World Society for the Protection of Animals (WSPA), Cetacean Society International (CSI), Natural Resources Defense Council (NRDC),

DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT on Issuance of a Scientific Research
Permit for a Behavioral Response Study on Deep Diving Odontocetes

and Whale and Dolphin Conservation Society et al (WDCS) (joint comments from WDCS, The Humane Society of the United States, Humane Society International, Animal Welfare Institute, Ocean Mammal Institute, International Fund for Animal Welfare, reEarth-the Bahamas, Advocates for Animal Rights-the Bahamas, Bahamas Humane Society, Animals Require Kindness-Bahamas, and Earthcare). The comment letters are included in Appendix D of the 2007 EA. The comments on the original permit application and draft EA were summarized in the final 2007 EA, and are repeated here as background regarding the scope of this SEA.

The MMC recommended approval of the original permit and stated that it believed the activities for which it recommended approval are consistent with the purposes and policies of the MMPA. The MMC made recommendations regarding mitigation and monitoring of the research activities, and in particular those that might affect calves or cow-calf pairs. Most of the mitigation and monitoring suggested by the MMC could be accomplished through conditions that are currently standard for all MMPA permits issued by NMFS for scientific research on marine mammals. In addition, the permit contained special mitigation conditions related to protecting calves, and females accompanying calves.

Some of the other commenters acknowledged the importance of the research, and all of them expressed some concerns or criticisms of the research protocols proposed in the original application (e.g., regarding uncertainties in the experiment or baseline information, the lack of precise control over the variables, and the conservation benefit of the study). Some organizations recommended preparation of an EIS. The applicant provided substantive responses to these public comments, which supplement the information in the permit application. This supplemental information, in addition to that in the original application, adequately addressed the substantive issues raised by the commenters regarding the research proposed in the original application.

As with original permit applications, NMFS is required to make applications for major amendments to permits available for public comment and review prior to making a decision (50 CFR §216.39 (c)). This draft SEA is being made available for public review and comment concurrent with the application for an amendment. Comments received on the draft SEA will be considered in NMFS final decision on the application.

This Supplemental EA will not evaluate impacts of the proposed action on the physical, social, or economic environment. The proposed permit amendment would not alter the operational characteristics of the sources used for playbacks of the sonar or orca sounds, or the basic operation of the research vessels, and as such would not change the manner in which the playbacks or research vessels may affect the environment compared to what was analyzed in the 2007 EA, in which it was determined that the activities would have no measurable impact on these aspects of the human environment. This Supplemental EA therefore appropriately focuses on potential impacts to the biological environment in general, and especially marine mammals that are the focus of the research, that may result from the proposed extension of the permit for three additional field seasons, and the increased numbers of marine mammals targeted for playbacks.

1.5 Federal Permits, Licenses, and Entitlements Necessary to Implementation of the Action

The federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action in this SEA are the same as those for implementation of the proposed action in the 2007 EA.

The researchers need a permit from NMFS pursuant to section 104 of the MMPA and section 10(a)(1)(A) of the ESA for “takes” of marine mammals and endangered marine mammals, respectively. Because issuance of the permit may adversely affect ESA-listed species, an interagency consultation, pursuant to section 7 of the ESA, is required. The researchers need approval from their institutions’ Animal Care and Use Committees, pursuant to the Animal Welfare Act (7 U.S.C. 2131 – 2156). The researchers need a permit from the Bahamian government to operate in Bahamian waters. Note that the 2007 field work in Bahamian waters was conducted under Bahamian Permit No. 02-07. The researchers need a permit from the U.S. Fish and Wildlife Service for import and export of tissue samples from species listed under the Convention on International Trade in Endangered Species of Wild Fauna.

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated objective, as well as alternatives eliminated from detailed study. This chapter also summarizes the expected outputs and any related mitigation of each alternative. One alternative is the “No Action” alternative where the proposed permit amendment would not be issued. The Proposed Action alternative represents the research modifications proposed in the application submitted for an amendment. No additional alternatives were evaluated in this Supplemental EA.

2.1 Alternative 1 – No Action

Under the “no action” alternative, the proposed major amendment to Scientific Research Permit No. 1121-1900 to extend the duration of the research would not be issued. The permit issued in August 2007 would remain valid as issued through January 1, 2009, but does not allow any field work, only import and export of samples.

2.2 Alternative 2 – Proposed Action

Under the Proposed Action, a major amendment would be issued to Scientific Research Permit No. 1121-1900, as requested by the permit holder. The amendment would, as proposed by the permit holder, modify the expiration date of the permit, and authorize additional field work. The new expiration date would be January 1, 2012. Table 1 summarizes the field activities that would be permitted (column D), and includes the numbers permitted in 2007 (column C) for comparison. The amended permit would also authorize import and export of tissue samples during the entire period for which the permit is valid. Under the amended permit, and with the appropriate CITES permit, samples would be imported from the Bahamas to the United States.

The proposed amendment would include a category of field activity (identified as activity number 5 in Table 1) not included in the original permit: playbacks to animals that do not have scientific instruments attached. In addition to this new activity, the amended permit would authorize takes of greater numbers of marine mammals than were requested or permitted for the 2007 field season.

The purpose of conducting playbacks to untagged animals, which represents an increase in the numbers of marine mammals targeted for playbacks compared to the 2007 field season, is to increase the sample size of observed behavioral responses to sound exposures, including by conducting playbacks to species that are not easily tagged but otherwise available for behavioral observation at the surface (e.g., dolphins), and under circumstances where animals’ responses during playbacks can be “observed” underwater by monitoring vocalizations using the AUTECH underwater hydrophone array.

Table 1: Annual Takes of Marine Mammals in International waters of the Tongue of the Ocean, Bahamas. Note that the “number of animals taken per year” refers to the maximum number of individual animals that may be exposed to an activity within a single field season, where there is a single field season within each permit year.

A. Species	B. Age/Sex	C. Number of animals taken per year	
		Authorized for 2007 field season	Proposed for 2008 - 2010 field seasons
1. Close approach, tag attachment, photo-identification, focal follow, playback			
Sperm whale (<i>Physeter macrocephalus</i>)	any	3	30
Beaked whale (<i>Mesoplodon</i> spp.)	any	3	40
Cuvier’s beaked whale (<i>Ziphius cavirostris</i>)	any	3	40
Short-finned Pilot whale (<i>Globicephala macrorhynchus</i>)	any	3	60
Risso’s dolphin (<i>Grampus griseus</i>)	any	3	30
Melon-headed whale (<i>Peponocephala electra</i>)	any	3	30
2. Close approach, tag attachment (includes unsuccessful attempts), photo-identification, focal follow			
Sperm whale	any	10	30
Beaked whale	any	22	40
Cuvier’s beaked whale	any	22	40
Short-finned Pilot whale	any	20	60
Risso’s dolphin	any	10	30
Melon-headed whale	any	10	30
3. Incidental harassment during close approaches to target animals			
Sperm whale	any	113	450
Beaked whale	any	225	1200
Cuvier’s beaked whale	any	150	800
Short-finned Pilot whale	any	203	900
Risso’s dolphin	any	263	1050
Melon-headed whale	any	299	1500
4. Incidental harassment by exposure to playbacks directed at target animals			
Sperm whale	any	81	54
Beaked whale	any	26	10

DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT on Issuance of a Scientific Research
Permit for a Behavioral Response Study on Deep Diving Odontocetes

A. Species	B. Age/Sex	C. Number of animals taken per year	
		Authorized for 2007 field season	Proposed for 2008 - 2010 field seasons
Cuvier's beaked whale	any	16	6
Short-finned Pilot whale	any	31	12
Risso's dolphin	any	85	126
Melon-headed whale	any	810	464
Humpback whale (<i>Megaptera novaeangliae</i>)	any	3	4
Minke whale (<i>Balaenoptera acutotstrata</i>)	any	6	9
Bryde's whale (<i>B. edeni</i>)	any	6	18
Bottlenose dolphin (<i>Tursiops truncatus</i>) – excluding mid-Atlantic coastal stock	any	18	108
Common dolphin (<i>Delphinus delphis</i> & <i>D. capensis</i>)	any	381	508
Atlantic spotted dolphin (<i>Stenella frontalis</i>)	any	18	108
Pantropical spotted dolphin (<i>S. attenuate</i>)	any	18	108
Striped dolphin (<i>S. coeruleoalba</i>)	any	68	405
Spinner dolphin-long snouted (<i>S. longirostris</i>)	any	246	328
Spinner dolphin-short snouted (<i>S. clymene</i>)	any	96	576
Rough toothed dolphin (<i>Steno bredanensis</i>)	any	21	126
Kogia spp. (<i>K. simus</i> & <i>K. breviceps</i>)	any	6	6
Killer whale (<i>Orcinus orca</i>)	any	11	14
False killer whale (<i>Pseudorca crassidens</i>)	any	44	58
Pygmy killer whale (<i>Feresa attenuate</i>)	any	45	60
Sei whale (<i>B. borealis</i>)	any	0	4
Fin whale (<i>B. physalus</i>)	any	0	18
Blue whale (<i>B. musculus</i>)	any	0	4
Fraser's dolphin (<i>Lagenodelphis hosei</i>)	any	0	190

5. Playback and focal follow, untagged animals

DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT on Issuance of a Scientific Research
Permit for a Behavioral Response Study on Deep Diving Odontocetes

A. Species	B. Age/Sex	C. Number of animals taken per year	
		Authorized for 2007 field season	Proposed for 2008 - 2010 field seasons
Sperm whale	any	0	60
Beaked whale	any	0	100
Cuvier's beaked whale	any	0	60
Short-finned Pilot whale	any	0	400
Risso's dolphin	any	0	140
Melon-headed whale	any	0	500
Bottlenose dolphin	any	0	120
Common dolphin	any	0	2540
Atlantic spotted dolphin	any	0	120
Pantropical spotted dolphin	any	0	120
Striped dolphin	any	0	450
Spinner dolphin-long snouted	any	0	1640
Spinner dolphin-short snouted	any	0	640
Rough toothed dolphin	any	0	140
Killer whale	any	0	35
False killer whale	any	0	145
Pygmy killer whale	any	0	150
Fraser's dolphin	any	0	475

2.3 Alternatives Considered but Eliminated from Detailed Study

No other alternatives were evaluated in this SEA. The 2007 EA considered five alternatives to the proposed action (issue the permit), one of which was no action (do not issue the permit). The other four alternatives considered were: (1) use a different location for conducting the proposed research; (2) conduct the study at a different time of year; (3) do not include the endangered sperm whale as a target species; and (4) limit the age class of animals exposed to exclude calves. These four alternatives were eliminated from detailed study because they were logistically problematic or inconsistent with the study objectives.

The factors considered for variation in these four alternatives are the most reasonable factors to consider for variation in terms of potential impacts. Sometimes changing the location or timing of a proposed action can substantially alter the potential impacts to the human environment, including by avoiding ecologically sensitive geographic areas, or times of year when environmental factors (e.g., oceanographic conditions) may amplify adverse impacts. Similarly, avoiding particularly vulnerable species or age classes could minimize an action's potential adverse impacts to the environment.

As noted in the 2007 EA, these four alternatives were not carried forward for detailed analysis. Other locations were not evaluated, at least for these preliminary studies, because the AUTECH location is unique in having an array of hydrophones with sufficient bandwidth to detect and record the clicks of beaked whales, sperm whales and other target species. Shifting the field

DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT on Issuance of a Scientific Research
Permit for a Behavioral Response Study on Deep Diving Odontocetes

work to a different time of year was not evaluated because of the need to conduct the study during a season when there would presumably be sufficient animals, as well as when the range and other research equipment are available. An alternative that avoids exposure of endangered species, or sub-adult animals, was not evaluated because an important goal of the study is to identify the responses of these animals, some of which are thought to be most sensitive to exposure to mid-frequency sonar.

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter presents baseline information necessary for consideration of the alternatives, and describes the resources that would be affected by the alternatives, as well as environmental components that would affect the alternatives if they were to be implemented. The effects of the alternatives are discussed in Chapter 4.

The action area for the research under the proposed permit amendment is identical to that evaluated in the 2007 EA for issuance of the original permit: international waters of the Tongue of the Ocean, Bahamas. The proposed major amendment would not modify the operational characteristics of the playbacks, or any mitigation measures associated with the conduct of the permitted research. The amendment would allow continuation of the field work initiated in 2007 by permitting field work in 2008 through 2010. Thus, the amendment would not change the manner in which the permitted research may affect the environment, but would extend the duration of potential impacts, and expand the study to include an increased number of marine mammals exposed to the playbacks.

The analysis in the original 2007 EA focused on potential impacts to the biological environment, especially marine mammals. In the original 2007 EA, NMFS determined that issuance of the permit and conduct of the associated research would not have measurable impacts on the physical, social, or economic environment. The original 2007 EA also evaluated the potential impacts on non-target marine organisms, including turtles, seabirds, invertebrates, and teleost and elasmobranch fish. Based on that analysis, NMFS concluded that these non-target species were not likely to be significantly affected by the proposed research given the nature of the sounds and the hearing abilities of these organisms.

Based on the 2007 EA, NMFS determined that issuance of the permit and conduct of the research could result in “harassment,” as defined in the MMPA, of marine mammals by exposure to the sounds. An objective of the proposed research is to determine the sound exposure characteristics that result in disturbance. It is important to recall here that the MMPA definition of harassment includes activities with the potential to disturb marine mammals, in addition to those activities that actually result in disturbance. The 2007 permit and the proposed permit amendment are thus conservative in their allowances for disturbance of marine mammals by including estimated numbers of animals that would be exposed to the sounds (based on species abundance estimates and calculations of sound propagation) and therefore *potentially* disturbed. It is not possible to know whether all animals exposed are actually disturbed, in part because the distance at which NMFS estimates a potential for harassment (based on received levels of the sounds) is too great for visual observations.

This SEA evaluates the potential impacts to the human environment from issuance of the proposed permit amendment by supplementing the original 2007 EA’s assessment of potential impacts on marine mammals, specifically those that may result from the proposed additional field seasons and increased numbers of playback events. Please refer to the 2007 EA for its detailed descriptions and discussions of the social, economic, physical and biological environment. This SEA evaluates whether conditions in the affected environment have changed,

and any related updates are presented below in summarizing information provided in the 2007 EA.

3.1 Biological Environment

In the 2007 EA NMFS identified a wide variety of marine species, in addition to the target species (beaked whales and other cetaceans), that could be found within the action area, including other marine mammals, sea turtles, invertebrates, teleost and elasmobranch fish, and sea birds. Since merely being present within the action area does not necessarily mean a marine organism will be affected by the proposed action, the discussion in the 2007 EA focused not only the distribution and abundance of various species that may be present at the time of the proposed study, but also on whether or not the sounds produced by the sonar would be within the hearing range of that organism. The analysis then predicted whether groups or species or marine organisms that could detect the sounds were likely to be significantly adversely affected by the research.

As a result of the analyses in the 2007 EA, NMFS determined that marine invertebrates, marine fish, sea turtles, and sea birds were not likely to be significantly adversely affected. This conclusion was based primarily on the extremely short duration of time over which sounds from the study would be broadcast, the relatively low power of the source (resulting in relatively low received levels), and that the study would contribute a negligible amount to the acoustic environment of these animals.

3.2 Marine Mammals

In the 2007 EA, NMFS reviewed the status and hearing abilities of marine mammal species that may be present within the action area. NMFS determined which species were likely to be exposed to the sonar playbacks based on information about species' abundance, distribution, and habitat use. NMFS determined how species likely to be exposed would be affected based on information about their hearing and sound production. NMFS determined how animals affected by exposure were likely to react based on information about responses of wildlife to human disturbance in general and anthropogenic sound in particular. NMFS determined how responses of individual animals were likely to affect populations and species based on the likely "fitness" consequences of their responses and the number of individuals affected.

In the 2007 EA NMFS determined that, of those marine mammals that could be exposed to the sonar systems, the effect of exposure was not likely to exceed level B harassment, as defined in the MMPA. In other words, exposure to the sonar playbacks has the potential to disturb the individual marine mammals by causing a disruption of behavioral patterns, but does not have the potential to injure a marine mammal or marine mammal stock.

The proposed permit amendment would not alter any operational characteristics of the sonar systems so marine mammals within the action area are not likely to be exposed, to respond, or be affected in any way not previously analyzed in the 2007 EA. The proposed permit amendment would potentially affect a greater number of marine mammals than the original permit because it would allow three additional years of field work, and would direct playbacks at a larger number of marine mammals.

DRAFT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT on Issuance of a Scientific Research
Permit for a Behavioral Response Study on Deep Diving Odontocetes

Preliminary information from the 2007 field season indicates that the number of marine mammals observed within the action area was much smaller than the numbers permitted for harassment. As noted previously, the permit includes an allowance for potential harassment of marine mammals that may be present, and thus exposed to the research. NMFS believes the numbers requested by the applicant are appropriate given the MMPA definitions of “take” and “harassment.” The permit holder reported no unforeseen responses of or effects to these animals (compared to what was predicted in the original application, evaluated in the 2007 EA, and authorized by the original permit) as a consequence of exposure to the sounds.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter represents the scientific and analytic basis for comparison of the direct, indirect, and cumulative effects of the alternatives. Regulations for implementing the provisions of NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508).

As discussed in the 2007 EA, the most likely avenue for marine mammals to be affected by exposure to the sonar playbacks is via “Level B” harassment related to short-term disruption of behavioral patterns. Recall that the playbacks in the proposed action for this SEA are intended to mimic the characteristics of mid-frequency active sonars, but with a lower source level from a single source that is either stationary or moving very slowly (unlike tactical operations, which can involve multiple vessels transiting quite rapidly). As established in the original 2007 EA, the playbacks for the proposed research are not likely to exceed level B harassment (i.e., are not likely to result in injury or mortality) because the sources used are not capable of producing sounds that could directly injure marine mammals.

In the original 2007 EA, NMFS used a sound pressure level (SPL) metric to estimate the number of marine mammals that might experience such behavioral harassment. Using an SPL threshold approach (i.e., a step function with infinite slope), it was assumed that animals exposed to a received SPL of 160 dB or greater were likely to be harassed, whereas those animals for which the received level was below 160 dB SPL were not likely to be harassed. Thus, the permit authorized “takes” of, and required the permit holder to report as such, all marine mammals sighted within a range from the source vessel during playbacks where the animal received level is predicted to be 160 dB SPL or greater. This 160 dB SPL threshold was consistent with nominal NMFS policy for non-continuous sounds, which has been used in multiple assessments over the past several decades. The 160-dB SPL threshold was originally based on empirical observations of marine mammal responses to sounds produced by seismic airguns (Malme et al., 1983, 1984).

Since completion of the original 2007 EA, NMFS has been working with applicants for incidental harassment authorizations (issued pursuant to section 101 of the MMPA), in particular the U.S. Navy, to evaluate additional methodologies for estimating the probability of marine mammals being behaviorally harassed by exposure to mid-frequency active sonar transmissions. One such methodology being proposed is a “dose-response” or “risk function” in which the probability of marine mammals being behaviorally harassed is a function of the “dose” of the sound to which they are exposed, measured as, for example, the animals’ received level of sound. The derivation and application of the risk function methodology is explained in detail in the Hawaii Range Complex Supplement to the DEIS/OEIS (US Navy, 2008). In this case, the probability of a behavioral response increases as a function of the received sound level and the function has a defined slope (i.e., it is not an absolute step as in the case of the 160 dB SPL threshold).

For the purpose of this SEA, we have continued to use an SPL threshold approach, rather than the proposed risk function methodology, to estimate the number of marine mammals that may

experience behavioral harassment. However, for comparison, the applicant also applied the risk function methodology to estimate numbers for three marine mammal species that are the primary focus of the proposed research: beaked whales, sperm whales, and pilot whales. Based on these calculations, the applicant concluded that the 160 dB SPL step function produced higher take estimates (considerably higher in the case of ESA-listed sperm whales) than application of the risk function model, and is thus more conservative for predicting behavioral takes during the proposed research.

Note that the risk function does not predict the probability of an individual marine mammal responding (e.g., exhibiting a change in behavior), but rather identifies the number of marine mammals exposed to the sound that are likely to respond in a manner considered behavioral harassment. The risk function also does not estimate the number of marine mammals likely to be exposed. That estimate is based on calculations using species' abundance estimates and predicted sound propagation to specified received levels at the animal, as is also the case for the 160 dB threshold approach. The application for the proposed permit amendment discusses how the number of marine mammals likely to be exposed to the playbacks was calculated, and those numbers are based on minimum abundance estimates for the various marine mammal stocks.

4.1 Effects of Alternative 1 – No Action

In this case, the No Action alternative means the proposed field research would not be conducted. Potential environmental impacts from the conduct of the research would be avoided. Data on the behavioral and physiological responses of beaked whales to underwater anthropogenic sounds, including active mid-frequency (MF) sonar sounds, and how these may pose a risk of stranding and/or injury, would not be collected as proposed. This type of data is needed to further inform NMFS efforts to conserve marine mammals while enabling military training activities that are critical to national security.

While this type of data could be gathered by conducting similar studies in other geographic areas, including those not requiring a NMFS permit, the logistics involved in developing a study in a different geographic location would, at this stage, result in a delay in conduct of the study and represent a loss of one or more field seasons. Military activities involving these types of sonar sounds are ongoing, and while the acoustic mechanism of the observed effects on beaked whales from these sonar sounds remains undefined, efforts to improve mitigation measures to minimize impacts on these and other marine mammals would be impeded if the proposed research did not proceed as proposed.

Note that preliminary data from field activities conducted in 2007 indicate that the responses of marine mammals exposed to the sonar sounds were consistent with that predicted and evaluated in the 2007 EA.

4.2 Effects of Alternative 2 – Proposed Action

The proposed permit amendment would authorize conduct of field studies, with associated environmental impacts. However, as the proposed amendment would not affect the operational characteristics of the playback sources, NMFS does not expect marine mammals to be affected

by the research in any way not considered in the original 2007 EA. Thus, a limited number of marine mammals, as specified in the application for the proposed permit amendment, would be exposed to the playbacks, and may respond with short-term changes in behavior.

NMFS established, in the analyses in the original 2007 EA, that the sounds from the playbacks do not contain enough energy to result in tissue damage or other non-auditory injury, even at close proximity to the source. The original 2007 EA considered the potential for hearing loss and discomfort due to exposure to the sonar systems, and determined that received levels will be too low to cause immediate Temporary Threshold Shift (TTS)⁴, and the durations of the exposure periods within an annual field season are too short to yield TTS resulting from prolonged exposure. Conducting three additional field seasons, one per year in 2008 through 2011, under the same operational parameters as the 2007 field season, is also not expected to result in cumulative exposures that would cause TTS.

As discussed in the original 2007 EA, the nature of the likely behavioral responses of individual marine mammals exposed to the research playbacks is not expected to result in population level impacts. The predicted behavioral responses included short-term or temporary changes in swim speed or direction, cessation of vocalizations, and changes in dive profiles. During the 2007 field work, the observed responses of marine mammals during playbacks were within the realm predicted, including observations of animals returning to or resuming pre-playback activities within a brief interval following conclusion of a playback (Boyd, et al., 2007).

Conducting additional field seasons, including with the addition of playbacks to un-tagged animals, would allow researchers to gather additional data on the behavioral effects of mid-frequency active sonars on marine mammals. These data may improve our ability to make informed management decisions regarding human-made sounds in the marine environment, including improvements in mitigation measures to minimize impacts on marine mammals.

4.3 Comparison of Alternatives

Compared with the No Action alternative, which does not allow any field work, the potential for environmental impacts from the proposed action is greater because issuance of the permit amendment would authorize conduct of field studies, with associated environmental impacts. However, in general, the potential for significant adverse impacts on the human environment does not differ between alternatives. Compared to the baseline noise level of the No Action alternative, the proposed research does not represent a substantial increase in exposure to noise. The field season is limited to a single 6-8 week period per year, during which time playbacks are further limited to environmental conditions (e.g., sea state and available daylight) suitable for behavioral observations and by scheduled activities on the AUTEK range.

Compared to the No Action alternative which does not involve any field work, the proposed action would result in behavioral harassment of marine mammals during field seasons. The number of marine mammals harassed is small relative to the sizes of the various species'

⁴ Temporary Threshold Shift (TTS): a brief, transitory increase in an individual animal's hearing threshold in response to exposure to sound.

populations. Further, the duration of the responses is expected to be short-term, and not likely to result in long-term adverse effects on individuals, or lead to population level impacts.

Compared to the No Action alternative, the proposed action would provide a greater sample size of responses to the playbacks, which would allow researchers to better understand the sound features that elicit such responses. This better understanding would facilitate more robust decision making related to regulation of the effects of anthropogenic sounds on marine mammals, including more effective mitigation measures.

4.4 Compliance with ESA

This section summarizes conclusions resulting from consultation as required under section 7 of the ESA. The consultation process will not conclude until after close of the comment period on the application and draft SEA to ensure that no relevant issues or information were overlooked during the initial scoping process summarized in Chapter 1. For the purpose of the consultation, the draft SEA represents NMFS' assessment of the potential biological impacts.

The endangered sperm whale is a target species for the study. Other endangered whales species may be unintentionally exposed to the research playbacks. During consultation for issuance of the original permit it was determined, based on available survey information that humpback whales, sei whales, fin whales, blue whales, and northern right whales are unlikely to be in the area of the proposed research and were therefore unlikely to be adversely affected. The proposed permit amendment would authorize "takes" of endangered sperm whales, humpback whales, sei whales, fin whales, and blue whales associated with this exposure. NMFS has therefore initiated formal consultation for these species.

During consultation for issuance of the original permit it was determined that five species of sea turtle listed as threatened or endangered may be present in the action area, but are unlikely to be adversely affected. The green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricate*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*) are known or expected to occur in the waters of the Bahamas. It was previously concluded that they are unlikely to be encountered during research activities and unlikely to be exposed to playbacks because of the short duration of the study (6-8 weeks) and location of activities in the deep waters of AUTECH. In the event a turtle is present during a playback, it is unlikely to hear the mid-frequency sounds.

No critical habitat has been designated in the action area for any species; therefore, no critical habitat would be affected.

4.5 Mitigation Measures

A number of measures built into the proposed study, as described in the application, are intended to minimize the potential for adverse effects on marine mammals. These mitigation measures would be incorporated as conditions of the permit amendment, as they were incorporated into the original permit. The permit holder reports that the mitigation measures used during the 2007 field season were effective in avoiding level A harassment, and does not propose to change them for the 2008-2011 field seasons. All of the additional mitigation and monitoring measures of the

original permit would remain in effect. The mitigation measures are conservative given that available information does not indicate a potential for injury from the playbacks as described in the proposed action. These mitigation measures would also minimize the potential for “level B” harassment.

4.6 Unavoidable Adverse Effects

The mitigation measures imposed by permit conditions are intended to reduce, to the maximum extent practical, the potential for adverse effects of the research on the targeted species as well as any other species that may be incidentally harassed. However, as discussed above and in the original 2007 EA, the playbacks may cause disturbance to some marine mammals in the zone of audibility and may temporarily interrupt normal activities such as feeding. The effect on the animals is not expected to exceed “level B” harassment, as defined under the MMPA, or to have a significant long-term effect on individuals or the population. In other words, while individual marine mammals may exhibit temporary disturbance or evasive behaviors in response to the activities of researchers, the impact to individual animals is not likely to be significant because the reactions will be short-lived.

4.7 Cumulative Effects

The marine mammals that occur in the proposed study areas are regularly exposed to natural and anthropogenic sounds, as described in the original 2007 EA. A summary of that analysis is presented here to assess the potential for cumulatively significant impacts resulting from the proposed action. As analyzed in the 2007 EA, the cumulative effects of these activities cannot be predicted with certainty. Impacts may be chronic as well as sporadic effects like behavioral changes that can stress the animal and ultimately lead to increased vulnerability to parasites and disease. The net effect of disturbance is dependent on the size and percentage of the population affected, the ecological importance of the disturbed area to the animals, the parameters that influence an animal’s sensitivity to disturbance or the accommodation time in response to prolonged disturbance (Gerarci and St. Aubin 1980).

As presented in the 2007 EA, considering the brief period over which the proposed research would occur (a six to eight week period annually), the limited geographic scope (especially compared to the sizes of the ranges of the species that may be affected), the short acoustic transmissions that would be broadcast, the conservative maximum received levels set, the mitigation measures that would be employed, and that these sound sources are not novel to the environment, the proposed research would contribute a negligible increment over and above the effects of the baseline activities currently occurring in the marine environment where the proposed research would occur. The proposed action of issuing an amendment to the original permit does not change the nature of the sound introduced into the marine environment, the species that may be affected, or effects to species that may occur. Thus, the proposed action does not change the cumulative impacts analysis presented in the 2007 EA.

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