NRDC
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NATURAL RESOURCES DEFENSE COUNCIL

By Regular Mail

October 27, 2008

Naval Facilities Engineering Command Atlantic
Attention: Code EV22LL (USWTR OEIS/EIS Program Manager PM)
6506 Hampton Boulevard
Norfolk, VA 23508
Fax: 804-200-5568

Re: Draft Overseas Environmental Impact Statement/ Environmental Impact Statement for the Undersea Warfare Training Range

Dear Sir or Madam:

On behalf of the Natural Resources Defense Council ("NRDC"), The Humane Society of the United States, International Fund for Animal Welfare, North Carolina Wildlife Federation, Whale and Dolphin Conservation Society, Cetacean Society International, League for Coastal Protection, PenderWatch & Conservancy, North Carolinians for Responsible Use of Sonar, Pamlico Tar River Foundation, Ocean Conservancy, Ocean Futures Society, and Jean-Michel Cousteau, and our millions of members and activists, many thousands of whom reside in potentially affected states, we are writing to submit comments on the Navy's Draft Overseas Environmental Impact Statement / Environmental Impact Statement ("DEIS") for a proposed Undersea Warfare Training Range. See 73 Fed. Reg. 52972 (Sept. 12, 2008).[1]

At the outset we must note that the Navy afforded the public *only 45 days* to submit comments. Because of the sheer size of the USWTR DEIS and the many new issues it raised – including a new preferred site – we requested an extension until January 15, 2009, or a minimum of at least 45 additional days, to submit written comments. See enclosed NRDC extension request letter dated Oct. 6, 2008. Such an extension was particularly warranted in light of the simultaneous release of related documents, including a DEIS for sonar and other naval training exercises off the coast of North Carolina, in the Cherry Point Operating Area as well as a DEIS for the extension of the Keyport Range Complex in Washington. See 73 Fed. Reg. 52969, 53002 (Sept. 12, 2008). The Navy denied our

[1] NRDC is aware that comments are being submitted independently by a substantial number of government agencies, individual scientists, environmental organizations, and the public. All of these comments are hereby incorporated by reference. The comments that follow do not constitute a waiver of any factual or legal issue raised by any of these organizations or individuals and not specifically discussed herein.

extension request via a phone message on Thursday, October 23, 2008, only three days before comments were due. The Navy's denial was arbitrary and capricious, particularly because, in 2005, the Navy appropriately extended its initial two-month comment period an extra month, thus providing a full 90 days for comments. The public, as well as the scientific community, needed a similar extension here to identify, analyze, and comment on this new site and on the Navy's revised analysis. This letter reflects our best effort to meaningfully comment given the extraordinarily short time the Navy has allowed us to respond. For the reasons discussed in detail below, we believe that the DEIS fails to meet the environmental review standards prescribed by the National Environmental Policy Act ("NEPA"), 42 U.S.C. 4321 et seq. Accordingly, if the Navy intends to pursue this project, we believe that the document must be thoroughly revised and reissued.

The proposed Undersea Warfare Training Range ("USWTR") poses significant risks to wildlife and coastal resources without economic or environmental benefit to local communities. The proposed site would become the Atlantic hub for Navy training with mid-frequency active sonar—a technology whose deadly impacts on marine life has in recent years been the subject of widespread scientific recognition and public concern. The Navy's latest DEIS calls for establishing a 500-square-mile sonar testing ground – with over 470 exercises slated for each year – off of Jacksonville, Florida near designated critical habitat for endangered North Atlantic right whales. Notably, the Navy's latest proposal does not fix the errors it made three years ago when it first analyzed a proposed training range off the coast of North Carolina. See Draft Undersea Warfare Training Range Overseas Environmental Impact Statement / Environmental Impact Statement ("2005 DEIS"). 70 Fed. Reg. 62102 (Oct. 28, 2005).

After withdrawing its 2005 DEIS due to overwhelming opposition, the Navy released this latest DEIS only to repeat the same mistakes. For instance, the Navy ignores the literature on behavioral impacts on marine mammals and fails to properly analyze cumulative impacts, such as the impacts of repeated use of mid-frequency sonar on marine wildlife. Nor does it propose to adequately mitigate the harmful effects of sonar. The Navy simply bulldozes forward, disregarding not only the most relevant scientific literature but also the numerous comment letters generated in response to its ill-fated 2005 DEIS (many of the same critiques will be repeated in this letter).

Although the preferred site for the project has changed – it now lies off the coast of Jacksonville, Florida – the Navy neither explains its change of preferred site nor fully analyzes reasonable alternatives. After three years, the Navy only minimally altered its alternatives analysis, proposing the same alternative site off the coast of northeastern Virginia, downgrading its former preferred site off the coast of southeastern North Carolina to an alternative site, and adding one new alternative site off the coast of central South Carolina.

The Navy's preferred site off the Florida coast is particularly problematic because of its impacts on North Atlantic right whales, the critically endangered species that has been the focus of enormous conservation efforts. The coastal waters off of northeastern Florida are the only known calving ground for the North Atlantic right whale. The area is also near

known right whale migratory paths. Although the DEIS acknowledges that right whales are expected to occur in the area, the Navy arbitrarily concludes that no right whales will be injured by the over 470 sonar training exercises per year spanning over 500 square nautical miles.

In addition to adversely affecting the critically endangered North Atlantic right whales, the Navy's training range would also adversely impact other whales, fish, and other wildlife that depend on sound for breeding, feeding, navigating, and avoiding predators—in short, for their survival. Many of the exercises proposed would employ the same sonar systems that have been implicated in mass injuries and mortalities of whales around the globe. The same technology is known to affect marine mammals in countless other ways, inducing panic responses, displacing animals, and disrupting crucial behavior such as foraging. The project would also affect fisheries, damage coral and hard-bottom habitat, and release a variety of hazardous materials into coastal waters. Under these circumstances, the siting of USWTR must be undertaken with particular care, dictated not by assertions of convenience but by recognizing that the protection of the marine environment and safeguarding of our national defense are mutually dependent national interests that can and must be achieved through compliance with our federal environmental laws.

To that end, Congress has dictated through NEPA that, in undertaking such a project, the Navy must employ rigorous standards of environmental review, including a fair and objective description of potential impacts of the range, a comprehensive analysis of all reasonable alternatives, and a thorough delineation of measures to mitigate harm. Unfortunately, the DEIS released by the Navy falls far short of these standards. To cite just a few examples:

- The Navy disregards nearly the entire literature on behavioral impacts on marine mammals, in support of an abstract standard that contradicts the actual evidence of harm.

- It fails to acknowledge risks posed to a wide range of marine species, including one of the most endangered species of whales on Earth—the North Atlantic right whale—whose critical habitat and only known calving grounds border the Navy's preferred site of Florida.

- It provides sparse explanation for why it changed its preferred site from North Carolina to Florida.

- Its alternatives analysis misses the mark by failing to conduct a comparative analysis of environmental impacts and failing to consider operational alternatives that could provide greater environmental protections.

- It presumes, entirely without analysis, that all of its impacts are short-term in nature and that none will have cumulative effects, even though the same populations would repeatedly be affected. Its cumulative impacts analysis is generally deficient, identifying only in a cursory way some of the leading

threats to marine mammals and turtles and then concluding that no significant impacts are anticipated.

- It adopts mitigation that a federal court found to be "woefully inadequate and ineffectual," and fails to prescribe measures that have been used repeatedly by the Navy in the past, used by other navies, or required by the courts. It also fails to explain changes in mitigation measures.

- It claims, against generations of field experience, that marine mammals—even cryptic, deep-diving marine mammals like beaked whales—can effectively be spotted from fast-moving ships and avoided.

The picture that the Navy paints with such an analysis belies common sense. If one is to believe the DEIS—and ignore the overwhelming weight of scientific evidence—then the year-round course of high-intensity acoustic activities contemplated by the Navy would unfold day after day, year after year, without any significant environmental effect.

Nor is the Navy's analysis of alternatives any more credible. For a long-term project like the USWTR, there is no step more crucial to reducing impacts than the careful siting of exercises and the avoidance of concentrations of vulnerable and endangered species and high abundances of marine life to the greatest extent possible. Yet it is clear that the Navy did not factor the environment into its siting decision until long after the candidate and preferred sites were chosen, as evidenced by choosing a preferred alternative site that is not only nearby critical habitat for endangered North Atlantic right whales, but was rejected in its 2005 DEIS. In addition, the Navy fails to consider a variety of other options – some employed by other navies – that would reduce the impacts of the project. What the Navy presents instead is an analysis so narrowly defined – and so predominated by factors of operational convenience – that the marine environment and those who depend on it are left out of the equation altogether.

In sum, the DEIS is fatally flawed by its inconsistency with the weight of scientific evidence and with the standards of environmental review embodied in NEPA. As a matter of science, it lacks objectivity; as a matter of law, it is insupportable, and the hard-line position that it represents has repeatedly been rejected by the courts. We urge the Navy to revise its analysis consistent with federal law, to fully analyze alternatives, and to produce a mitigation plan that truly maximizes environmental protection given the Navy's actual operational needs. We also urge the Navy to make available to the public the data and modeling on which its analysis is based.

BACKGROUND

I. IMPACTS OF MID-FREQUENCY SONAR

Scientists agree, and the publicly available scientific literature confirms, that the intense sound generated by military active sonar can induce a range of adverse effects in whales and other species, from significant behavioral changes to stranding and death. By far the most widely-reported and dramatic of these effects are the mass strandings of beaked whales and other marine mammals that have been associated with military sonar use. Associated strandings have occurred in Greece, during the trial of a NATO sonar system; on the islands of Madeira and Porto Santo, during a NATO event involving subs and surface ships; in the U.S. Virgin Islands, during a training exercise for Navy battle groups; and in the Bahamas, the Canaries, Japan, Hawaii, Alaska, and other spots around the world.[2] On several occasions, bodies have been recovered in time to give evidence of acoustic trauma. In a 2004 symposium at the International Whaling Commission, more than 100 whale biologists concluded that the association between sonar and beaked whale deaths "is very convincing and appears overwhelming."[3] In the United States, an expert report commissioned by the Navy said much the same thing.[4]

Mass mortalities, though an obvious focus of much reporting and concern, are likely only the tip of the iceberg of sonar's harmful effects. Marine mammals are believed to depend on sound to navigate, find food, locate mates, avoid predators, and communicate with each other. Flooding their habitat with man-made, high-intensity noise interferes with these and other functions. In addition to strandings and non-auditory injuries, the harmful effects of high-intensity sonar include:

- temporary or permanent loss of hearing, which impairs an animal's ability to communicate, avoid predators, and detect and capture prey;
- avoidance behavior, which can lead to abandonment of habitat or migratory pathways;
- disruption of biologically important behaviors such as mating, feeding, nursing, or migration, or loss of efficiency in conducting those behaviors;
- aggressive (or agonistic) behavior, which can result in injury;
- masking of biologically meaningful sounds, such as the call of predators or potential mates;

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[2] A summary of the strandings record appears below at section III. C. ("Strandings and Mortalities Associated with Mid-Frequency Sonar").

[3] International Whaling Commission, 2004 Report of the Scientific Committee, Annex K at § 6.4 (2004).

[4] H. Levine, Active Sonar Waveform 1 (2004) (JASON Group Rep. JSR-03-200) (describing evidence of sonar causation as "completely convincing"). The strandings record is further described infra at section II(B)(2)(a).

- chronic stress, which can compromise viability, suppress the immune system, and lower the rate of reproduction;
- habituation, causing animals to remain near damaging levels of sound, or sensitization, exacerbating other behavioral effects; and
- declines in the availability and viability of prey species, such as fish and shrimp.

Over the past 20 years, a substantial literature has emerged documenting the range of effects of ocean noise on marine mammals.[5]

Marine mammals are not the only species affected by undersea noise. Impacts on fish are of increasing concern due to several recent studies demonstrating hearing loss and widespread behavioral disruption in commercial species of fish and to reports, both experimental and anecdotal, of catch rates plummeting in the vicinity of noise sources.[6] Sea turtles, most of which are considered threatened or endangered under federal law, have been shown to engage in escape behavior and to experience heightened stress in response to noise. And noise has been shown in several cases to kill, disable, or disrupt the behavior of invertebrates, many of which possess ear-like structures or other sensory mechanisms that could leave them vulnerable. It is clear that intense sources of noise are capable of affecting a wide class of ocean life.

II. THE PROPOSED RANGE

The proposed Undersea Warfare Training Range would be the site of intensive, year-round exercises employing active sonar and other active acoustic sources. It would effectively transform the waters off the Florida coast into one of the nation's epicenters of sonar use. The Navy envisions an area of about 500 square nautical miles laced with a network of undersea cables and up to 300 "acoustic transducer devices," which are either four-foot domes or 25-foot tethered sensors capable of both transmitting and receiving sounds. DEIS at 2-6 and Fig. 2-1, 2-2 & 2-3. The nodes would then be connected with over 600 square nautical miles of fiber optic undersea cable, both buried and unburied. DEIS at 2-6. About 470 individual training exercises are proposed to occur on the range each year, scheduled without apparent interruption throughout the seasons, and sometimes with more than one exercise occurring in a single day. DEIS at 2-15.

A battery of acoustic sources would be used in these exercises, deployed from surface ships, submarines, aircraft, training targets, and range sources. DEIS at Table 2-11. Among the high-intensity active sonars to be employed are the two systems that caused 16 whales to strand in the Bahamas in 2000 following a Navy exercise, and are believed to

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[5] For a review of research on behavioral and auditory impacts of undersea noise, see, e.g., L.S. Weilgart, The Impacts of Anthropogenic Ocean Noise on Cetaceans and Implications for Management, 85 Canadian Journal of Zoology 1091-1116 (2007); W.J. Richardson, C.R. Greene, Jr., C.I. Malme, and D.H. Thomson, Marine Mammals and Noise (1995); National Research Council, Ocean Noise and Marine Mammals (2003); Whale and Dolphin Conservation Society, Oceans of Noise (2004).

[6] See the discussion below, at section IV of "Impacts on Fish and Fisheries."

have been involved in several other mass mortalities.[7] Those two systems, known as SQS-53 and SQS-56, would emit sound on the proposed range at nominal source levels of 235 dB and 225 dB re 1 μPa respectively. DEIS at 2-13. These source levels, which equal or approach the levels used by the Navy in the Bahamas stranding event, are millions of times more intense than the maximum levels to which those stranded whales are believed to have been exposed.[8] But acoustics are not the only source of impacts. Construction and operation of the range will damage bottom habitat, release hazardous materials into the coastal environment, cause entanglements and ship collisions with marine wildlife, potentially impact sea turtle hatchlings on shore, and impact the critically endangered North Atlantic right whale.[9]

III. NORTH ATLANTIC RIGHT WHALES

The preferred alternative site off the coast of Jacksonville, Florida poses significant risk to highly endangered North Atlantic right whales. The western boundary of the area is only 35 nautical miles east of the easternmost boundary of the Southeast Right Whale Critical Habitat (59 FR 28,805), which extends approximately 15 nautical miles seaward. This Critical Habitat is the only known calving ground for North Atlantic right whales. DEIS at 3.2-61.

Right whales are expected to occur in the area selected for this project. Even the DEIS acknowledges that right whales may occur year round from shore to the continental shelf break in the area, with peak concentrations November through March. DEIS at 3.2-61. In addition, both directed and opportunistic sightings indicate that right whales occur as far to the east as directed surveys have extended and that mothers and calves will be exposed to the activities in the USWTR if sited in this area.

Of particular import, mothers and their newborn calves are the most vulnerable segment of the population. North Atlantic right whales have a low reproductive rate. They can ill-afford to bear any risk of harassment or injury that might occur from the activities themselves or risk of injury or mortality from collisions from the increased vessel activity. NOAA Fisheries has concluded in previous consultations that the "loss of even a single individual right whale may contribute to the extinction of the species," and that "preventing the mortality of one adult female alters the projected outcome." 69 Fed. Reg. 30,858.

The Navy's siting decision ignores this all and will adversely impact the North Atlantic right whale.

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[7] Department of Commerce & Secretary of the Navy, Joint Interim Report: Bahamas Marine Mammal Stranding Event of 15-16 March 2000 at iii, 16, 23 (2001).

[8] Id. at 24, 26; International Whaling Commission, 2004 Report of the Scientific Committee, Annex K at § 6.3.

[9] See discussion at sections III. D. ("Other Impacts on Marine Mammals") and V ("Other Impacts on Marine Wildlife").

THE NAVY'S COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

I. NEPA'S REQUIREMENTS

The National Environmental Policy Act of 1969 ("NEPA") "declares a broad national commitment to protecting and promoting environmental quality." Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 348 (1989). To achieve this critical goal, NEPA requires that each federal agency consider the potential environmental impacts of any "major Federal actions significantly affecting the quality of the human environment" through the preparation of an environmental impact statement ("EIS"). Id.; 42 U.S.C. § 4332. This directive is known as a "set of action-forcing procedures that require that agencies take a 'hard look' at environmental consequences." Robertson, 490 U.S. at 349 (quoting Kleppe v. Sierra Club, 427 U.S. 390, 410, n.21 (1976)).

Central to NEPA is its requirement that, before any federal action that "may significantly degrade some human environmental factor" can be undertaken, agencies must prepare an EIS. Steamboaters v. F.E.R.C., 759 F.2d 1382, 1392 (9th Cir. 1985) (emphasis in original). The requirement to prepare an EIS "serves NEPA's action-forcing purpose in two important respects." Robertson, 490 U.S. at 349. First, "the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts[,]" and second, "the relevant information will be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation of that decision." Id. (emphasis added). As the Supreme Court explained: "NEPA's instruction that all federal agencies comply with the impact statement requirement...'to the fullest extent possible' [cit. omit.] is neither accidental nor hyperbolic. Rather the phrase is a deliberate command that the duty NEPA imposes upon the agencies to consider environmental factors not be shunted aside in the bureaucratic shuffle." Flint Ridge Development Co. v. Scenic Rivers Ass'n, 426 U.S. 776, 787 (1976).

The fundamental purpose of an EIS is to force the decision-maker to take a "hard look" at a particular action – at the agency's need for it, at the environmental consequences it will have, and at more environmentally benign alternatives that may substitute for it – before the decision to proceed is made. 40 C.F.R. §§ 1500.1(b), 1502.1; Baltimore Gas & Electric v. NRDC, 462 U.S. 87, 97 (1983). This "hard look" requires agencies to obtain high quality information and accurate scientific analysis. 40 C.F.R. § 1500.1(b). "General statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided." Klamath-Siskiyou Wilderness Center v. Bureau of Land Management, 387 F.3d 989, 994 (9th Cir. 2004) (quoting Neighbors of Cuddy Mountain v. United States Forest Service, 137 F.3d 1372, 1380 (9th Cir. 1998)). The law is clear that the EIS must be a pre-decisional, objective, rigorous, and neutral document, not a work of advocacy to justify an outcome that has been foreordained.

In nearly every respect, the Navy's DEIS fails to meet the high standards of rigor and objectivity required under NEPA.

II. THE NAVY'S ANALYSIS OF IMPACTS

Fundamental to satisfying NEPA's requirement of fair and objective review, agencies must ensure the "professional integrity, including scientific integrity," of the discussions and analyses that appear in environmental impact statements. 40 C.F.R. § 1502.24. To this end, they must make every attempt to obtain and disclose data necessary to their analysis. The simple assertion that "no information exists" will not suffice; unless the costs of obtaining the information are exorbitant, NEPA requires that it be obtained. See 40 C.F.R. § 1502.22(a). Agencies are further required to identify their methodologies, indicate when necessary information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate indeterminate adverse impacts based upon approaches or methods "generally accepted in the scientific community." 40 C.F.R. §§ 1502.22(2), (4), 1502.24. Such requirements become acutely important in cases where, as here, so much about a program's impacts depend on newly emerging science.

In this case, the Navy's assessment of impacts is consistently undermined by its failure to meet these fundamental responsibilities of scientific integrity, methodology, investigation, and disclosure. As with the Navy's 2005 DEIS, this DEIS disregards a great deal of relevant information adverse to the Navy's interests, uses approaches and methods that are unacceptable in the scientific community, and ignores whole categories of impacts. In short, it leaves the public with an analysis of environmental harm—behavioral, auditory, and physiological—that is at odds with established scientific authority and practice.

A. Thresholds of Injury, Hearing Loss and Behavioral Change

At the core of the Navy's assessment of acoustic impacts are the thresholds it has established for physiological and behavioral effects. There are gross problems with the Navy's thresholds, as discussed below.

1. Permanent Threshold Shift

The Navy fixes its highest threshold of 215 dB re 1 μPa^{2}•s—which it considers the ground floor for direct physical injury—on the amount of energy necessary to induce permanent hearing loss, or "permanent threshold shift," ("PTS") in marine mammals. DEIS at 4.3-25. Beneath this decision lies an assumption that the tissues of the ear are "the most susceptible to physiological effects of underwater sound." DEIS at 4.3-21. The Navy's position is inconsistent with the scientific literature, with the legal standard of review, and with recent court decisions. NRDC v. Winter, 527 F.Supp.2d 1216 (C.D. Cal. 2008), aff'd 518 F.3d 658 (9th Cir. 2008); Ocean Mammal Institute v. Gates, 2008 WL 564664 (D. Hawaii 2008).

(a) Whale Mortality Data

The DEIS disregards data gained from actual whale mortalities. The best available scientific evidence, as reported in the peer-reviewed literature,

indicates that sound levels at the most likely locations of beaked whales beached in the Bahamas strandings run far lower than the Navy's threshold for injury here: approximately 150-160 dB re 1 μPa for 50-150 seconds, over the course of the transit.[10] A further modeling effort, undertaken in part by the Office of Naval Research, suggests that the mean exposure level of beaked whales, given their likely distribution in the Bahamas' Providence Channels and averaging results from various assumptions, may have been lower than 140 dB re 1 μPa.[11] Factoring in duration, then, evidence of actual sonar-related mortalities would compel a maximum energy level threshold for serious injury on the order of 182 dB re 1 μPa^{2}•s, at least for beaked whales. Indeed, to pay at least some deference to the literature, the Navy—under pressure from NMFS—has previously assumed that non-lethal injury would occur in beaked whales exposed above 173 dB re 1 μPa^{2}•s.[12]

(b) Gas Emboli and Bubble Growth

The DEIS flippantly disregards published research on bubble growth in marine mammals, which separately indicates the potential for injury and death at levels far lower than what the Navy proposes. According to the best available scientific evidence, as represented by multiple papers in flagship journals such as *Nature* and *Veterinary Pathology*, gas bubble growth is the causal mechanism most consistent with the observed injuries;[13] in addition, it was singularly and explicitly highlighted as plausible by an expert panel convened by the Marine Mammal Commission, in which the Navy participated.[14] To say

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[10] J. Hildebrand, "Impacts of Anthropogenic Sound," in T.J. Ragen, J.E. Reynolds III, W.F. Perrin, and R.R. Reeves, Conservation beyond Crisis (2005). See also International Whaling Commission, 2004 Report of the Scientific Committee, Annex K at § 6.3.

[11] J. Hildebrand, K. Balcomb, and R. Gisiner, Modeling the Bahamas Beaked Whale Stranding of March 2000 (2004) (presentation given at the third plenary meeting of the U.S. Marine Mammal Commission Advisory Committee on Acoustic Impacts on Marine Mammals, 29 July 2004).

[12] See, e.g., Navy, Joint Task Force Exercises and Composite Training Unit Exercises Final Environmental Assessment/ Overseas Environmental Assessment at 4-44, 4-46 to 4-47 (2007).

[13] See, e.g., A. Fernández, J.F. Edwards, F. Rodríguez, A. Espinosa de los Monteros, P. Herráez, P. Castro, J.R. Jaber, V. Martín, and M. Arbelo, 'Gas and Fat Embolic Syndrome' Involving a Mass Stranding of Beaked Whales (Family Ziphiidae) Exposed to Anthropogenic Sonar Signals, 42 Veterinary Pathology 446 (2005); P.D. Jepson, M. Arbelo, R. Deaville, I.A.P. Patterson, P. Castro, J.R. Baker, E. Degollada, H.M. Ross, P. Herráez, A.M. Pocknell, F. Rodríguez, F.E. Howie, A. Espinosa, R.J. Reid, J.R. Jaber, V. Martín, A.A. Cunningham, and A. Fernández, Gas-Bubble Lesions in Stranded Cetaceans, 425 Nature 575-576 (2003); R.W. Baird, D.L. Webster, D.J. McSweeney, A.D. Ligon, G.S. Schorr, and J. Barlow, Diving Behavior of Cuvier's (Ziphius cavirostris) and Blainville's (Mesoplodon densirostris) Beaked Whales in Hawai'i," 84 Canadian Journal of Zoology 1120-1128 (2006).

[14] T.M. Cox, T.J. Ragen, A.J. Read, E. Vos, R.W. Baird, K. Balcomb, J. Barlow, J. Caldwell, T. Cranford, L. Crum, A. D'Amico, G. D'Spain, A. Fernández, J. Finneran, R. Gentry, W. Gerth, F. Gulland, J. Hildebrand, D. Houser, T. Hullar, P.D. Jepson, D. Ketten, C.D. MacLeod, P. Miller, S. Moore, D. Mountain,

that there is "considerable disagreement among scientists" (DEIS at 4.3-11) and that the evidence supporting bubble growth "is arguable" (DEIS at 4.3-12) misrepresents the available literature and ignores the support the recognition bubble growth has received.[15]

The Navy simply cannot disregard published, peer-reviewed papers and expert panels simply because they are adverse to its interests. To the contrary, the law requires agencies to evaluate all "reasonably foreseeable" impacts, which, by definition, include "impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason." 40 C.F.R. § 1502.22. The scientific literature supporting bubble growth rises far above this standard, and the Navy's failure to incorporate it into its impact model is arbitrary and capricious. Thus, the Navy's refusal to consider these impacts is insupportable under NEPA. 40 C.F.R. §§ 1502.22, 1502.24.

(c) Other Non-Auditory Physiological Impacts

The Navy's numbers do not reflect other non-auditory physiological impacts, such as from chronic exposure during development. This is discussed further in the section below titled "Other Impacts on Marine Mammals."

(d) Faulty Calculation of PTS

The Navy's calculation of PTS (which it equates to the onset on injury) is based on studies of TTS that, as discussed below, have a number of significant limitations.

(e) Reliance on SELs

The Navy's exclusive reliance on sound exposure levels ("SELs") as a unit of analysis is misplaced. DEIS at 4.3-26. It is appropriate for the Navy to set dual thresholds for behavioral effects, one based on SELs and one based on energy flux density levels ("ELs").

2. Temporary Threshold Shift

The DEIS sets its threshold for temporary hearing loss and behavioral effects, or "temporary threshold shift" ("TTS"), at 195 dB re 1 μPa^{2}•s. DEIS at 4.3-25. It bases this threshold primarily on a synthesis of studies on two species of

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D. Palka, P. Ponganis, S. Rommel, T. Rowles, B. Taylor, P. Tyack, D. Wartzok, R. Gisiner, J. Mead, and L. Benner, Understanding the Impacts of Anthropogenic Sound on Beaked Whales, 7 Journal of Cetacean Research & Management 177-87 (2006).

[15] Id.

cetaceans, bottlenose dolphins and beluga whales, conducted by the Navy's SPAWAR laboratory in San Diego and, to a lesser extent, by researchers at the University of Hawaii. DEIS at 4.3-7, 25, 31-32.

(a) Extrapolation of Bottlenose Dolphin and Beluga Data

The Navy's extrapolation of data from bottlenose dolphins and belugas to all cetaceans is not justifiable. Given the close association between acoustic sensitivity and threshold shift, such an approach must presume that belugas and bottlenose dolphins have the best hearing sensitivity in the mid-frequencies of any cetacean. However, harbor porpoises and killer whales are more sensitive over part of the mid-frequency range than are the two species in the SPAWAR and Hawaii studies.[16] Furthermore, the animals in the studies may not represent the full range of variation even within their own species, particularly given their age and situation: the SPAWAR animals, for example, have been housed for years in a noisy bay.[17]

(b) Pinnipeds Excluded from Risk Analysis

The Navy doesn't consider pinniped data because they are said not to normally occur within the range – a serious omission given that a few species are found around the sites that the Navy has proposed.

3. "Risk Function" for Behavioral Effects

In contrast to the 2005 DEIS (which established a threshold of 190 dB re 1 μPa^{2}•s) and the threshold which NMFS insisted the Navy adopt during RIMPAC 2006 and subsequent exercises off California and Hawaii (173 dB re 1 μPa^{2}•s), here the Navy redefines its position by applying a dose-response risk function to measure behavioral effects that begins at 120 dB re 1 μPa and reaches its mean at 165 dB re 1 μPa. DEIS at 4.3-36. Agencies are not entitled to substantial deference under the Administrative Procedure Act when they reverse previously held positions. Some of the more significant problems with the Navy's new position include:

(a) Misuse of Captive Animal Research Data

The Navy again relies on studies of temporary threshold shift in captive animals for its primary source of data. DEIS 4.3-31, 32. Marine mammal scientists have long recognized the deficiencies of using captive subjects in behavioral experiments, and to blindly rely on this material, to the exclusion of copious data on animals in the wild, is not supportable by any standard of scientific

[16] Richardson et al., Marine Mammals and Noise at 209.

[17] M.L.H. Cook, Behavioral and Auditory Evoked Potential (AEP) Hearing Measurements in Odontocete Cetaceans (2006) (Ph.D. thesis).

inquiry. Cf. 40 C.F.R. § 1502.22. The problem is exacerbated further by the fact that the subjects in question, roughly two belugas and five bottlenose dolphins, are highly trained animals that have been working in the Navy's research program in the SPAWAR complex for years.[18] Indeed, the disruptions observed by Navy scientists, which included pronounced, aggressive behavior ("attacking" the source) and avoidance of feeding areas associated with the exposure, occurred during a research protocol that the animals had been rigorously trained to complete.[19] The SPAWAR studies have several other major deficiencies that NMFS, among others, has repeatedly pointed out. In relying so heavily on them, the Navy has once again ignored the comments of numerous marine mammal behaviorists regarding the Navy's 2005 DEIS, which had sharply criticized the Navy for putting any serious stock in them.[20]

(b) Misuse of Haro Strait Data

The Navy appears to have misused data garnered from the Haro Strait incident—one of only three data sets it considers—by including only those levels of sound received by the "J" pod of killer whales when the USS Shoup was at its closest approach. DEIS at 4.3-33. These numbers represent the maximum level at which the pod was harassed; in fact, the whales were reported to have broken off their foraging and to have engaged in significant avoidance behavior at far greater distances from the ship, where received levels would have been orders of magnitude lower.[21] Not surprisingly, then, the Navy's results are inconsistent with other studies of the effects of various noise sources, including mid-frequency sonar, on killer whales. We must insist that the Navy provide the public with its propagation analysis for the Haro Strait event, and also describe precisely how this data set, along with results from the SPAWAR and Nowacek et al. studies, were factored into its development of the behavioral risk function.

(c) Failure to Include Data from the Hanalei Bay Incident

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[18] See, e.g., S.H. Ridgway, D.A. Carder, R.R. Smith, T. Kamolnick, C.E. Schlundt, and W.R. Elsberry, Behavioral Responses and Temporary Shift in Masked Hearing Threshold of Bottlenose Dolphins, Tursiops truncates, to 1-Second Tones of 141 to 201 dB re 1 μPa (1997) (SPAWAR Tech. Rep. 1751, Rev. 1).

[19] C.E. Schlundt, J.J. Finneran, D.A. Carder, and S.H. Ridgway, Temporary Shift in Masked Hearing Thresholds of Bottlenose Dolphins, Tursiops truncates, and White Whales, Delphinapterus leucas, after Exposure to Intense Tones, 107 Journal of the Acoustical Society of America 3496, 3504 (2000).

[20] See comments from M. Johnson, D. Mann, D. Nowacek, N. Soto, P. Tyack, P. Madsen, M. Wahlberg, and B. Møhl, received by the Navy on the Undersea Warfare Training Range DEIS. These comments, and those of the fishermen cited below, are hereby incorporated into this letter. See also Letter from Rodney F. Weiher, NOAA, to Keith Jenkins, Naval Facilities Engineering Command Atlantic (Jan. 30, 2006); Memo, A.R. document 51, NRDC v. Winter, CV 06-4131 FMC (JCx) (undated NOAA memorandum).

[21] See,. e.g., NMFS, Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington—5 May 2003 at 4-6 (2005).

The Navy fails to include data from the July 2004 Hanalei Bay event, in which 150-200 melon-headed whales were embayed for more than 24 hours during the Navy's Rim of the Pacific exercise. According to the Navy's analysis, predicted mean received levels (from mid-frequency sonar) inside and at the mouth of Hanalei Bay ranged from 137.9 dB to 149.2 dB.[22] The Navy has from the beginning denied any connection between its major international exercise and the mass stranding. DEIS at D-26. However, the Navy's specious reasoning is at odds with the stranding behavior observed during the event and with NMFS' report on the matter, which ruled out every other known potential factor and concluded that sonar was the "plausible if not likely" cause.[23] The Navy's failure to incorporate these numbers into its methodology as another data set is not remotely justifiable.

(d) Failure to Account for Social Ecology

Any risk function must take account of the social ecology of some marine mammal species. For species that travel in tight-knit groups, an effect on certain individuals can adversely influence the behavior of the whole. (Pilot whales, for example, are prone to mass strand for precisely this reason; the plight of the 200 melon-headed whales in Hanalei Bay, and of the "J" pod of killer whales in Haro Strait, may be pertinent examples.) Should those individuals fall on the more sensitive end of the spectrum, the entire group or pod can suffer significant harm at levels below what the Navy would take as the mean. In developing its "K" parameter, the Navy must take account of such potential indirect effects. 40 C.F.R. § 1502.16(b).

(e) Reliance on SPLs

The Navy's exclusive reliance on sound pressure levels ("SPLs") in setting a behavioral threshold is misplaced. The discussion in the DEIS speaks repeatedly of uncertainty in defining the risk function and recapitulates, in its summary of the earlier methodology, the benefits implicit in the use of a criterion that takes duration into account. It is therefore appropriate for the Navy to set dual thresholds for behavioral effects, one based on SPLs and one based on energy flux density levels ("ELs").

(f) Failure to Assess Long-Term Impacts

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[22] Navy, 2006 Supplement to the 2002 Rim of the Pacific (RIMPAC) Programmatic Environmental Assessment D-1 to D-2 (May 2006).

[23] B.L. Southall, R. Braun, F.M.D. Gulland, A.D. Heard, R.W. Baird, S.M. Wilkin, and T.K. Rowles, Hawaiian Melon-Headed Whale (Peponacephala electra) Mass Stranding Event of July 3-4, 2004 (2006) (NOAA Tech. Memo. NMFS-OPR-31).

> As noted below in the discussion of Cumulative Impacts, the Navy's threshold is applied in such a way as to preclude any assessment of long-term behavioral impacts on marine mammals. It does not account, to any degree, for the problem of repetition: the way that apparently insignificant impacts, such as subtle changes in dive times or vocalization patterns, can become significant if experienced repeatedly or over time.[24]

By placing great weight on the SPAWAR data, excluding other relevant data, misusing the Haro Strait and right whale data, and failing to assess social ecology and long term effects, the Navy has produced a risk function that is belied by the existing record.[25] Given the high sensitivity in the Navy's model, standards that more accurately reflect existing data would produce take numbers far in excess of those calculated here. For all these reasons, the thresholds utilized by the Navy in this DEIS are fundamentally inconsistent with the scientific literature on acoustic impacts and with marine mammal science in general. Indeed, using these thresholds to support a final EIS would violate NEPA.

B. Modeling of Acoustic Impacts

The Navy bases its calculation of marine mammal impacts on a series of models that determine received levels of sound within a limited distance of a sonar array and then estimate the number of animals that would therefore suffer injury or disruption. It is difficult to fully gauge the accuracy and rigor of these models with the limited information that the DEIS provides; but even from the description presented here, it is clear that they are deeply flawed. Among the non-conservative assumptions that are implicit in the model:

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[24] The importance of this problem for marine mammal conservation is reflected in a recent NRC report, which calls for models that, inter alia, translate such subtle changes into disruptions in key activities like feeding and breeding that are significant for individual animals. National Research Council. Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects 35-68 (2005).

[25] See, e.g., id.; R.A. Kastelein, H.T. Rippe, N. Vaughan, N.M. Schooneman, W.C. Verboom, and D. de Haan, The Effects of Acoustic Alarms on the Behavior of Harbor Porpoises in a Floating Pen, 16 Marine Mammal Science 46 (2000); P.F. Olesiuk, L.M. Nichol, M.J. Sowden, and J.K.B. Ford, Effect of the Sound Generated by an Acoustic Harassment Device on the Relative Abundance of Harbor Porpoises in Retreat Passage, British Columbia, 18 Marine Mammal Science 843 (2002); NMFS, Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington, 5 May 2003 at 10 (2005); D.P. Nowacek, M.P. Johnson, and P.L. Tyack, North Atlantic Right Whales (Eubalaena glacialis) Ignore Ships but Respond to Alerting Stimuli, 271 Proceedings of the Royal Society of London, Part B: Biological Sciences 227 (2004); Statements of D. Bain, K. Balcomb, and R. Osborne (May 28, 2003) (taken by NMFS enforcement on Haro Strait incident); Letter from D. Bain to California Coastal Commission (Jan. 9, 2007); E.C.M. Parsons, I. Birks, P.G.H. Evans, J.C.D. Gordon, J.H. Shrimpton, and S. Pooley, The Possible Impacts of Military Activity on Cetaceans in West Scotland, 14 European Research on Cetaceans 185-190 (2000); P. Kvadsheim, F. Benders, P. Miller, L. Doksaeter, F. Knudsen, P. Tyack, N. Nordlund, F.-P. Lam, F. Samarra, L. Kleivane, and O.R. Godø, Herring (Sild), Killer Whales (Spekkhogger) and Sonar—the 3S-2006 Cruise Report with Preliminary Results (2007).

(1) As discussed above, the thresholds established for injury and behavioral effects are inconsistent with the available data and are based, in part, on assumptions not acceptable within the field;

(2) The Navy does not properly account for reasonably foreseeable reverberation effects (as in the Haro Strait stranding incident, see section III. C. below),[26] giving no indication that its modeling sufficiently represents areas in which the risk of reverberation is greatest;

(3) The model fails to consider the possible synergistic effects of using multiple sources, such as ship-based sonars, in the same exercise, which can significantly alter the sound field. It also fails to consider the combined effects of multiple exercises, which, as NMFS indicates, may have played a role in the 2004 Hanalei Bay strandings;[27]

(4) In assuming animals are evenly distributed, the model fails to consider the magnifying effects of social structure, whereby impacts on a single animal within a pod, herd, or other unit may affect the entire group;[28] and

(5) The model, in assuming that every whale encountered during subsequent exercises is essentially a new whale, does not address cumulative impacts on the breeding, feeding, and other activities of species and stocks.

To comply with NEPA, the Navy must revise its flawed modeling systems and make them available to the public.

III. IMPACTS ON MARINE MAMMALS

The Navy's analysis of marine mammal distribution, habitat abundance, population structure and ecology contains false, misleading or outdated assumptions that tend to both underestimate impacts on species and to impede consideration of reasonable alternatives and mitigation measures.

A. Impacts on North Atlantic Right Whales

The DEIS has acknowledged the fragile status of North Atlantic right whales (DEIS at 3.2-58); it recognizes that potential risks to this species are of greatest concern at all sites, but particularly at the preferred Site A off the coast of Florida. We have focused comments on this species; though we have concerns with less critical risks to other species as well.

1. Insufficiency of Information on Right Whale Habitat and Distribution

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[26] NMFS, Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington, 5 May 2003 (2005).

[27] Southall et al., Hawaii Melon-Headed Whale at 31, 45.

[28] The effects of this deficiency are substantially increased by the Navy's use of a risk function, rather than an absolute threshold, to estimate Level B harassment.

Navy citations regarding right whale habitat use and distribution vary from very recent to completely outdated, but in many cases the Navy cites outdated sources for the key information necessary to defining potential risks. For example, citations for timing of the right whale migratory route are from the 1980's (see, e.g., Winn, et al. 1986) as are assertions of areas and times of greatest aggregation in feeding areas (e.g., Hamilton and Mayo 1990). While there is no argument that more right whales are in the southeast in the winter than summer and that they migrate along the mid-Atlantic coast, information on timing of movements and the extent of habitat use outside of the times and areas of greatest concentration are not fully discussed in the DEIS. For example, although the Navy has relied on a citation to Winn (1986) for information on the timing of migration (DEIS at 3.2-61), there are more recent analyses available. This includes work done by the University of North Carolina,[29] the University of Delaware,[30] and sightings contained in the SAS database of the Northeast Region of NMFS.[31] Further, archives maintained by the Right Whale Consortium, and annual presentations of survey work to the Southeast Implementation Team and the Right Whale Consortium annual meeting, provide ample evidence of a wider distribution than is credited in the DEIS. If these sources have been consulted, it is not clear from the citations to various "DoN" reports prepared by Geo-Marine and unavailable for review.

The discussion in DEIS Chapter 3 of the occurrence of right whales in Site A uses no citation for distribution more recent than 1993, other than a mention of a single sighting in Florida in July (Garrison et al. 2007). Systematic surveys and studies showing distribution well beyond the boundary of the designated critical habitat have not been cited.[32] With regard to the implied barrier presented by the Gulf Stream, the DEIS shows that the fluctuations in the flow of the Gulf Stream easily allow for the distribution of right whale mothers and calves inside the proposed USWTR site. See DEIS at Figure 3.1-5). However, it omits citing literature indicating that sightings have extended as far east as survey craft have ventured and there are data indicating use of the waters off Florida to distances equivalent to that of Site A. One right whale was tracked to approximately 118 km off the Florida shoreline in December 2005 via a satellite tag that was placed on

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[29] Taylor et al., Right Whale Sightings in the Mid-Atlantic and Southeast Atlantic Bight from 2001-2007, North Atlantic Right Whale Consortium Annual Meeting Abstracts and Sighting Summaries, presented at New Bedford Whaling Museum (November 7-8, 2007).

[30] Firestone et al., 2007 Statistical Modeling of North Atlantic right whale migrations along the mid-Atlantic region of the eastern seaboard of the United States, Biological Conservation, 141(1) at 221-232 (2007).

[31] Wheelock College: Archives of NMFS Sightings Advisory System at http://whale.wheelock.edu/whalenet-stuff/reportsRW_NE/.

[32] See, e.g., Kahn, C. and Taylor, C., 2007 Monitoring North Atlantic Right Whales off the Coasts of South Carolina and Northern Georgia 2006-2007, North Atlantic Right Whale Consortium Annual Meeting Abstracts and Sighting Summaries, presented at New Bedford Whaling Museum (November 7-8, 2007); Naessig, P., Taylor, C.R., and George, C., Results of 2006-2007 Northern Early Warning System Surveys for Right Whales, North Atlantic Right Whale Consortium Annual Meeting Abstracts and Sighting Summaries presented at New Bedford Whaling Museum (November 7-8, 2007).

entangling gear during attempts to disentangle the whale.[33] The DEIS also fails to note that most surveys do not venture offshore to the area proposed for use. In fact, the Navy's own researchers have concluded that uncertainty in predicting right whale occurrence increases with distance from shore because of the paucity of sighting effort beyond the nearshore areas where concentrations are greatest and where vessel collision risk is well known.[34] Nor has the Navy attempted to fill data gaps for this key calving area as it has attempted to do for other proposed sites.

While the Navy has funded survey work in Site C (Onslow Bay, the preferred site for the USWTR in the 2005 DEIS), no monitoring work has taken place in Site A, which is now the preferred site for the USWTR. Instead, NMFS surveys have only taken synoptic looks and do not occur in all seasons.[35] Yet sightings of right whales occur even at times when they would not be expected.[36]

Although there is some discussion of strandings as a source of information for distribution of other species (see, e.g., DEIS at 3.2-79 et seq.), there is little if any reference to databases documenting strandings of right whales, including discovery of ship struck whales that have occurred in or near the various proposed sites for the USWTR.[37] Some of these dead animals have been found in seasons when the DEIS implies they are absent. For example, in July 1991 a right whale calf was found dead in Delaware and in August 1980 a right whale was found dead in Florida.[38] Stranding databases are an important source of information on distribution and mortality risk to large whales. If these were considered in the Navy's citation of its own documents (e.g., DoN 2007c), it is not clear to reviewers. As such, it is not possible to determine that all relevant data sources and the best scientific information were consulted.

Information relating to seasonal distribution and habitat use by right whales in the other proposed sites in South Carolina, North Carolina and Virginia is also cursory at best; sometimes relegated to a single paragraph. See, e.g., DEIS at 3.2-113. The single

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[33] Slay pers. comm., 2008; Right Whale Consortium Data Base, data request 10/22/2008/, plotted R. Kenney, URI.

[34] Hain, J. and Kenney, R., A Review and Update to the Technical Report of December 2002 for the Estimation of Marine Mammal and Sea Turtle Densities in the Cherry Point OPAREA—Specific to the Distribution and Density of the North Atlantic Right Whale, Atlantic Division USN, Engineering Command, Norfolk (2005)

[35] See, e.g., Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007.

[36] Wheelock College: Archives of NMFS Sightings Advisory System at http://whale.wheelock.edu/whalenet-stuff/reportsRW_NE/; Jensen, A.S. and Silber, G.K., Large Whale Ship Strike Database, US Department of Commerce, NOAA Technical Memorandum NMFS-OPR-25 (2003).

[37] Jensen, A.S. and Silber, G.K., Large Whale Ship Strike Database, US Department of Commerce, NOAA Technical Memorandum NMFS-OPR-25 (2003); Cole et al., Mortality and Serious Injury Determiantions for Baleen Whale Stocks Along the Eastern Seaboard of the United States 2000-2004, Northeast Fisheries Science Center Reference Document 06-04 (2006).

[38] Jensen A.S. and Silber, G.K., Large Whale Ship Strike Database, US Department of Commerce, NOAA Technical Memorandum NMFS-OPR-25 (2003).

paragraph discussion of their presence in Site B, off South Carolina, does not acknowledge sightings by winter surveys indicating that this area is more heavily used than accounted for in the DEIS.[39] The DEIS breezily acknowledges only that it is "part of" the migratory corridor and cites a 15-year-old paper by Kraus (1993), which states that they appear to be transient individuals. This is not an accurate depiction. Discussion of the importance of Site B to right whales does not mention documentation of the use of the South Carolina coast by mothers and newborn calves, which resulted in NMFS rulemaking establishing a Restricted Management Area extending at least 35 nm from shore in South Carolina.[40] The NMFS also stated in its rulemaking that South Carolina is used exclusively by some right whales as a calving area.[41] The risk to female right whales and their calves in this area is therefore seriously underestimated.

The DEIS seem singularly reluctant to focus on differential risk to mothers and their calves in Sites A and B. In fact, the loss of as few as two females per year may result in extinction of the species.[42] Further, a female must produce at least 4 calves to replace herself, as the survival of female calves to adulthood is less than 0.5[43] Mothers and calves are uniquely vulnerable to impacts from collisions and noise from ships, helicopters and other components of the USWTR exercises. They are more likely to remain on or near the surface as a result of the limited lung capacity of newborns. Further, records show that females make up a disproportionate number of right whale deaths, with females comprising up to 80 percent of deaths for which sex and size were known.[44]

Naïve calves and their protective mothers may be more vulnerable to disturbance than other segments of the population. Behavioral reactions to noise are generally summarized in Chapter 4 of the DEIS, but we believe that both that chapter and Chapter 3 of the DEIS should devote more attention to the vulnerability of mothers and calves to disturbance of nursing, birthing, resting and travel as a result of vessel noise and overflights by helicopters and fixed wing aircraft, not only in the USWTR site, but also going to and from the area from shore-based facilities. Concern over disturbance by low flying aircraft (less than 150 meters in altitude and 250 meters laterally) prompted NMFS to restrict activities

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[39] Kahn, C. and Taylor, C., 2007 Monitoring North Atlantic Right Whales off the Coasts of South Carolin and Northern Georgia 2006-2007, North Atlantic Right Whale Consortium Annual Meeting Abstracts and Sighting Summaries, presented at New Bedford Whaling Museum (November 7-8, 2007).

[40] 72 Fed. Reg. 34632, 34636-34637, Taking of Marine Mammals Incidental to Commercial Fishing Operations; Atlantic Large Whale Take Reduction Plan Regulations, Final Rule (June 25, 2007).

[41] Ibid.

[42] Fujiwara, M. and Caswell, H., Demography of the Endangered North Atlantic Right Whale, Nature, 414:537-543 (2001); Caswell, et al., Declining survival probability threatens the North Altantic right whale, Proceedings of the Nat. Acad. of Sci., 96:3308-3313 (1999).

[43] 73 Fed. Reg. 60173, Endangered Fish and Wildlife; Final Rule to Implement Speed Restrictions with North Atlantic Right Whales (Oct. 10, 2008).

[44] Ibid.

of this nature when in the vicinity of bowhead whales, which have demonstrated adverse reactions to these craft.[45]

The discussion of right whales at Site C off North Carolina in Onslow Bay acknowledges the minimal sighting effort. DEIS at 3.2-122. Yet the DEIS omits discussion of collisions that occurred in this area and in the vicinity of Site D, including lethal collisions between pregnant females and vessels in February and November 2004.[46] The citation of a previous review by Geo-Marine (DoN 2007 b) does not allow reviewers to determine whether the best available scientific information informed conclusions about distribution and habitat use. We are also aware that the Navy has contracted for monitoring in this site but see no mention of preliminary results.

There may also be greater use of offshore waters than acknowledged. For example, two whales – "Kingfisher" and "Yellowfin" – traveled from the southeast to Maine where they became entangled and then returned within a matter of weeks.[47] It may be that a more direct offshore route was used for their transit, rather than "hugging" the coast. One of these whales was seen free of entangling gear in critical habitat off the southeast Atlantic coast during January 2004 and then six weeks later in the same general area heavily entangled in commercial fishing gear that originated in Maine. Thus, this whale apparently swam a roundtrip of thousands of miles via an unknown track and back within a few weeks.[48] Further, right whales were sighted several times during January 2006 near Cape Lookout, well within the Cherry Point OPAREA and at least one was seen 60 nm east of Cape Lookout.[49] Furthermore, satellite-tagged right whales tend to travel along bank edges, basins, or along the continental shelf and one tagged right whale has been found near a warm core ring from the Gulf Stream.[50] In addition, a right whale was struck by a Navy submarine in February 1995 "off North Carolina."[51] One study, acknowledging that

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[45] 71 Fed. Reg. 11314, 11321, Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Construction and Operation of Offshore Oil and Gas Facilities in the Beaufort Sea, Final Rule (Mar. 7, 2006).

[46] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007; Jensen, A.S. and Silber, G.K., Large Whale Ship Strike Database, US Department of Commerce, NOAA Technical Memorandum NMFS-OPR-25 (2003).

[47] See NMFS unpublished 2008b./c., Preliminary Summary of NMFS Gear Analysis for Entangled Large Whales for the years 1997-2005 (by species), given to the Atlantic Large Whale Take Reduction Team, Baltimore, Maryland (September 2008); Entanglement assessment at http://www.coastalstudies.org/_entanglementupdate/RW031704.html; http://www.coastalstudies.org/_entanglementupdate/RW120604.html; http://www.coastalstudies.org/what-we-do/whale-rescue/kingfisher.html.

[48] Ibid.

[49] Wheelock College: Archives of NMFS Sightings Advisory System, http://whale.wheelock.edu/whalenet-stuff/reportsRW_NE/.

[50] Mate, B., Nieukirk, S. and Kraus, S.D., Satellite-monitored movements of the northern right whale, Journal of Wildlife Management, 61:1393-1405 (1997).

[51] Jensen, A.S. and Silber, G.K., Large Whale Ship Strike Database, US Department of Commerce, NOAA Technical Memorandum NMFS-OPR-25 (2003).

little is known about patterns or cues for migration, found that one of the migratory pathways may be along the shelf break, a feature that cuts through the middle of the Cherry Point OPAREA and directly through Site C.[52]

The Navy's discussion of right whale presence in Site D could be more honestly summarized as "we really don't know." While the discussions of Site B and C acknowledge that right whales are "expected" in the OPAREA, the DEIS simply states that they "may occur in Site D." DEIS at 3.2-131. Yet, because Site D is also along the right whale migratory corridor, it makes no sense that they would be found to the north or south but not in Site D. Further data on collisions with ships demonstrate repeated encounters in this area in fall, winter and even spring.[53] More recent vessel collisions, including one with a pregnant female ("Stumpy") and her near-term calf, have been documented by NMFS near Virginia Beach.[54] And a struck female was found off Ocean City, Maryland, in August 2002.[55] Entanglement-related strandings have also been documented, including the death of a female in March 2005.[56] Even the DEIS acknowledges that there have been sightings in this area, even though the survey effort is limited to non-existent. Thus, the occurrence of sightings, strandings and collisions in and around this area would seem to warrant a more precautionary approach by assuming that right whales would be "expected" here as well.

2. Insufficient Consideration of Impacts to Right Whales

a. Vessel Interactions

Cable will be laid across right whale critical habitat. DEIS at 4.2-20. Discussion of impacts from cable laying is limited to concern over vessel interactions. The adequacy of vessel collision mitigation measures will be addressed elsewhere but other impacts should be addressed, including disruption of behavior consequent to construction noise during cable laying. The DEIS asserts that "potential for harm or harassment is extremely low" because of the limited period during which equipment could come in contact with whales, but the section does not contain a discussion of the season in which the cable installation would occur. We assert that no activities with potential to disrupt calving or nursing should occur during the winter when right whales are in or near Site A giving birth and caring for newborns.

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[52] Kenney, R., Mayo, C. and Winn, H., Migration and foraging strategies at varying spatial scales in western North Atlantic right whales: a review of hypotheses, Journal of Cetacean Resource Management, Special Issue 2 at 251-260 (2001).

[53] Jensen, A.S. and Silber, G.K., Large Whale Ship Strike Database, US Department of Commerce, NOAA Technical Memorandum NMFS-OPR-25 (2003).

[54] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007; Right Whale: Endangered, Reed's Nautical Almanac at http://www.reedsalmanac.com/index.cfm?Fuseaction=ReadPages&PageID=57&PageType=2&ShowDetailPages=Off&ClickedSubPage=57&ShowSubPages=On&ClickedPage=6.

[55] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007.

[56] Ibid.

In addition to discussion of acoustic impacts from activities in the USWTR, the DEIS devotes attention to risk from, and mitigation to reduce, vessel collisions. DEIS at 4.2-28. The DEIS states that, although guidance has been available since 1997, training for Navy personnel and fleet-wide risk reduction were updated in 2002, 2004 and again in 2006. DEIS at 4.2-28 to 4.2-27. In general this includes posting two lookouts, one of whom must have received specific training. DEIS at 4.2-28. This section of the DEIS also enumerates the collision-related deaths of at least eight right whales, including four females, that occurred between 2001 and 2007. DEIS at 4.2-27 to 4.2-28. Yet, the section neglects to mention that the Navy is responsible for lethal whale strikes, including that of a female right whale and her near-term calf in the mid-Atlantic in 2004.[57] Prior to that year, the Navy was responsible for 17 percent of collisions where the vessel could be identified.[58] The DEIS should discuss this and enumerate deaths, reports of actual or suspected collisions, and other incidents involving naval vessels in the Atlantic. This will assist reviewers in assessing the sufficiency of the existing mitigation measures on which the Navy will be relying.

b. Additional Sources of Risk to Right Whales

Assurances that mitigation measures will be sufficient to prevent entanglement in parachutes, plastic bags or other detritus from the use of the USWTR sites (DEIS at 4.2-31) is less than comforting given the caveats outlined above with respect to the paucity of information on marine mammal distribution in most sites and the limited utility of visual sightings to detect the presence of marine mammals.

c. Behavioral Response of Right Whales

The response of marine mammals (including right whales) to noise is summarized in Section 4.3 of the DEIS. The responses discussed include possible flight responses, changes in diving behavior (either remaining at the surface or altering depth and length of dive), and disruption of foraging, breathing rates or travel patterns. But disruption can also include a disruption of social interactions, including effects on mothers and calves, changes in call rates and changes in resting and orientation. The fact that the Navy has obtained a different definition of "harassment" than other potential interactors (DEIS at 4.3-20) does not address the concern that the right whales most likely to be "disturbed" by activities in the USWTR in Site A are mothers and calves, who are the most vulnerable (and one might argue valuable) segment of the population. The differential impact on this key demographic is not addressed. Right whale mothers and their slow-moving offspring can ill-afford interference with migratory routes, disruption of nursing activity as a result of acute or chronic stress, or disruption or masking of social sounds. The DEIS acknowledges that all of these have been documented for a variety of marine mammal species, but little of them has been studied with regard to ESA-listed species, particularly

[57] Morrello, C., Whale's Death brings calls for sea speed limits, Washington Post, December 5, 2005.

[58] Jensen, A.S. and Silber, G.K., Large Whale Ship Strike Database, US Department of Commerce, NOAA Technical Memorandum NMFS-OPR-25 (2003).

with regard to possible effects on mothers and calves.

Furthermore, the Navy's reliance on the results of reports in Richardson (1999) regarding the response of migratory (transient) bowhead whales in Alaska (DEIS at 4.3-65) may not be appropriate because the behavior exhibited by animals during their autumn migration may be quite different from that of mothers and calves who are seasonally resident in and around waters used for calving. The ramifications of a temporary shift of a migratory route for adult bowheads is quite different from the impacts of causing a mother/calf pair to alter resting behavior or move away from a seasonal calving area, particularly if it increases energetic costs to the female who is both nursing and fasting during the winter. In the case of Richardson's study, animals were migrating and thus repeated disturbance of a single individual would be less likely than could be the case for resident animals. Repeated disturbance could cause a shift away from preferred waters that would be more than an ephemeral shift in a migratory route, as is assumed by the Navy. DEIS at 4.3-65. The caveats offered in the DEIS with regard to limits on our understanding of right whale reactions (DEIS at 4.3-30) indicate just how little we know and, we would argue, how much precaution should be built into any program with a potential to harm or disturb mothers and calves. We do not see precaution in choosing Site A for the USWTR if the activities therein will occur during the time when right whales are resident in the Southeast.

B. Impacts on Other Marine Mammals

1. Distribution and Abundance of Marine Mammals

A core element of the DEIS is its assessment of the distribution and abundance of marine mammal species at each of its proposed sites. Careful assessment is essential, not only for meeting the Navy's responsibility under NEPA to objectively describe the environment affected by the range, but also for evaluating the USWTR's impacts on marine mammals and conducting an analysis of alternatives. But the treatment of distribution and abundance in the DEIS is flawed in several respects.

The DEIS does not appear to consult databases maintained by states and private institutions in estimating distribution and density. For example, it fails to reference the Virginia Marine Science Museum and other institutional stranding databases, New England Aquarium's right whale consortium database, various state survey data, etc. As discussed in greater depth below, it also omits citation of NMFS research that bears on stock definitions. In many cases, data cites are to DoN 2007 reports prepared for the Navy by Geo-Marine and unavailable for review to determine sources that were consulted. DEIS at 3.2-57 et seq. Cited primary literature is often decades old. In general, much as was the case for the USWTR 2005 DEIS, there is heavy reliance on CETAP data that are more than 25 years old. When primary literature is cited for Site A as well as for alternative sites for the USWTR, the citations are largely outdated and therefore of questionable accuracy. An example is the discussion of minke whale distribution for Site A and referenced for other sites. Minke whales should be of considerable concern, given that they have been found stranded in other areas of this country subsequent to naval mid-

frequency sonar activities. The Navy citations regarding their presence are only to DoN 2007d and to sources such as Gaskin 1982 and Mitchell 1991. DEIS at 3.2-67. Yet, there are more recent sources of information that, if they were consulted for the DEIS, are obscured by the Navy citing internal reviews whose sources are not known to reviewers. For its stock assessments, NMFS guidance is to disregard data on abundance and distribution that are more than 8 years old.[59] The DEIS' failure to follow this guidance is evident in most of the species accounts in section 3.2.

2. Inadequacies in Species Accounts May Underestimate Exposure to Activities

The DEIS acknowledges forthrightly that survey efforts are incomplete for most species. See, e.g., DEIS at 3.3- 80 (Site A), 123 (Site B), 125 (Site C) and 131 (Site D). Nevertheless the DEIS bases subsequent assessments of exposure and risk on these inadequate assessments, many of which affect sensitive species such as *Mesoplodon* spp. and minke whales. We question the appropriateness of basing estimates of density and projections of risk on admittedly sparse and incomplete survey effort.

Furthermore, for some species, the DEIS omits significant information that bears on the vulnerability of, and disproportionate risk to, some stocks. For example, the discussion of bottlenose dolphins (*Tursiops truncatus*) asserts that "two forms of bottlenose dolphins are recognized in the western North Atlantic Ocean: nearshore (coastal) and offshore." DEIS at 3.2-85. This is true, but incomplete. The discussion of the status of bottlenose dolphins does not mention that the coastal stock is not managed as a single stock, but rather as a complex of multiple stocks, each of which have differing management concerns. Some of these stocks (e.g., the Northern North Carolina management unit) are subject to high levels of fishery-related mortality, while others are not.[60] Seven coastal bottlenose dolphin stocks are delineated by NMFS based on summer distribution from Florida through Virginia, and at least six stocks are identified based on winter distribution. Genetic analysis, photo identification and telemetry work have contributed to our understanding of the need for separate management measures for each of these stocks, each of which has a separate Potential Biological Removal (PBR) level that indicates sustainable levels of anthropogenic mortality or serious injury. To understand the potential impact of USWTR activities on bottlenose dolphins, the Navy *must* discuss these management units separately. Similarly, as discussed below, little if any effort seems to have been made to evaluate available and emerging data on stock separation of short-finned and long-finned pilot whales and their seasonal movements. There is also an effort underway to identify beaked whales (*Mesoplodon* spp.) known to have died subsequent to exercises involving mid-frequency sonar to the species level. The DEIS must rely on the best available information and it does not seem to have done so.

3. Underestimated Impacts on Cetaceans

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[59] Wade, P. and Angliss, R., Report of the GAMMS Workshop, NOAA Tech. Memo, NMFS-OPR-12 (1997).

[60] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007.

Specific concerns regarding impacts on critically endangered North Atlantic right whales are addressed above. We are concerned that for all sites, but particularly for the USWTR preferred alternative Site A, lack of information has biased effects analysis and potential risk has been significantly underestimated. In many cases the DEIS cites as a primary source of information various 2007 reports conducted for the Navy by Geo-Marine but unavailable for review. This makes it difficult to assess whether the best available scientific information has been used. In this case, ongoing changes in survey designs and conduct of surveys, and continually emerging publications, may alter our understanding of stock structure, seasonal habitat use, and general distribution of marine mammals. Understanding the impacts to stocks depends heavily on using newly emerging science and it is not clear that this has been done in the DEIS.

This gap in understanding of habitat use can have tragic consequences. In March 2000, 16 whales from at least three species—including two minke whales---stranded over 150 miles of shoreline along the northern channels of the Bahamas, within 24 hours of Navy ships using mid-frequency sonar in the channels. Post mortem examinations found, in all whales examined, hemorrhaging in and around the ears and other tissues related to sound conduction or production. As such, understanding the distribution of minke whales (and consequent risk to them) is important. Instead, as noted above, risk (or lack thereof) has been calculated for areas where survey coverage is incomplete or entirely lacking.

In addition to beaked whales, which are the focus of greatest concern in most discussions of stranding in Chapter 4 of the DEIS, a number of species occurring in Site A and other sites have been stranded in association with naval activities. These include minke whales (see above), pygmy sperm whales, dwarf sperm whales, pilot whales, sperm whales, and harbor porpoise. We believe that impact to these species is foreseeable and they should be afforded a greater degree of precaution in light of the paucity of information on their distribution and modeling.[61]

4. Density Estimates

For most calculations, the DEIS cites internal documents prepared for the Navy rather than primary literature sources. For example, the DEIS states that "updated density estimate data presented in this draft OEIS/EIS are taken from the NODE report for the Southeast OPAREAs report (DoN 2007e)." DEIS at 3.3-17. Yet this report and its underlying reference material are not part of the DEIS. This section of the DEIS goes on to laud modeling conducted by researchers at "CREEM," who it states can provide relatively fine scale estimates for areas with "limited or no available survey effort." Ibid. The DEIS goes on to state that CREEM creates models based on habitat parameters associated with observations from other surveys with similar spatial or temporal characteristics. Yet the "model-based" density estimates were generated largely on the basis of NMFS survey data

[61] The paucity of information is highlighted by NMFS, which confines its effort solely to the warm months of the year. See Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007.

even though the DEIS admits that survey efforts are incomplete and do not occur in seasons other than summer.

As mentioned above, survey efforts that are incomplete or seasonal are of limited use in understanding risk. Various NMFS take reduction teams, to which our organizations belong, are told that, because surveys generally take place during the summer months, estimates of abundance are of limited utility when considering mitigation of risk from fisheries that take place during the winter. The teams must then request that additional research be prioritized to assess these unaccounted risks in winter—a time when USWTR activities will be taking place but when little is known about distribution. As an example, surveys for pilot whales have been conducted only in the months July, August or September, depending on the year of the survey.[62] Yet both long and short-finned pilot whales (which are "lumped" in the NMFS stock assessment) appear to be seasonally resident in different areas in winter and summer, with long-finned pilot whales evidencing a more southerly distribution in summer than winter based on biopsy sampling from commercial fisheries in the winter.[63] This does not appear to be reflected in DEIS discussions of this vulnerable species.

Similarly, as noted above, there are various management units of coastal bottlenose dolphins, whose range overlaps with some of the USWTR proposed sites. Some of these management units are of greater conservation concern than others as a result of higher rates of fishery interactions, yet the "model" for density and risk is constructed as though they were a single stock and the cumulative impacts discussions do not account for differential risk to these management units. This is highly inappropriate and certainly not risk averse. The Navy has also apparently not attempted to assess risk in any are other Site other than Site C (Onslow Bay), although this monitoring is not specifically cited in the DEIS.

Right whale densities are said to have been generated based on information in the most recent stock assessment reports and unspecified "literature." DEIS at 3.3-18. It further states that for the "Southeast, all analyses for cetaceans were based on sightings data collected through shipboard surveys conducted by NMFS NEFSC and SEFSC between 1998 and 2005." DEIS at 3.3-17. For right whales and all other species that are expected to occur, or "may occur," in Site A, this simply ensures that risk is likely underestimated because no focal research has been conducted by the Navy or NMFS to determine actual species occurrence and distribution.

Although NMFS stock assessment data are used as the basis for most density estimates, the DEIS does not appear to consider other sources of published and "gray" literature that should have been consulted. Even the NMFS stock assessments do not always rely on available sources of information that assist in understanding habitat use. For example, the NMFS stock assessments do not necessarily incorporate information from EWS surveys in

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[62] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007.

[63] Rosel, P., Genetic Analysis of Stock structure of Pilot Whales in the Northwest Atlantic: An Update, Presentation to the Atlantic Pelagic Longline Take Reduction Team Meeting, Baltimore, Maryland (September 8-9, 2008).

the Southeast or from SAS surveys and sightings in the mid-Atlantic and published by the Northeast region.[64]

For a number of species, uniform distribution was assumed when calculating density and risk, with an assurance that this is a conservative approach. DEIS at 4.3-59. Indeed it is not. Marine mammals often concentrate in areas with greater density of prey or more favorable topography or currents for migration. Assuming a uniform distribution will overestimate presence in some areas and dramatically underestimate it in others. In fact, the DEIS acknowledges this, stating "distributions of animals are patchy and more isolated than they appear in the density estimates used." DEIS at 4.3-59. It is for this very reason that impacts may have been either under or overestimated within the USWTR ranges in each OPAREA; a risk that is compounded by the sparse seasonal nature of the survey and distributional data on which the modeling is based.

We understand that the Navy has contracted for, and undertaken, monitoring in Onslow Bay (the Preferred Site Alternative in the 2005 DEIS) but it has not done so for other areas such as Site A (the current preferred site). In choosing a site, making estimates of species presence and distribution and *post hoc* determinations of which animals may be at risk is neither risk averse nor appropriate.

C. Strandings and Mortalities Associated with Mid-Frequency Sonar

Over the last decade, the association between military active sonar and whale mortalities has become a subject of considerable scientific interest and concern. That interest is reflected in the publication of numerous papers in peer-reviewed journals, in reports by inter-governmental bodies such as the IWC's Scientific Committee, and in evidence compiled from a growing number of mortalities associated with sonar. Yet the Navy only glosses over these stranding incidents, concluding, without basis, that "sonar is neither a major threat nor a significant contributor to the overall ocean noise budget." DEIS at D-32.

In March 2000, for example, sixteen whales from at least three species— including two minke whales—stranded over 150 miles of shoreline along the northern channels of the Bahamas. The beachings occurred within 24 hours of Navy ships using mid-frequency sonar (AN/SQS-53C and AN/SQS-56) in those same channels.[65] Post-mortem examinations found, in all whales examined, hemorrhaging in and around the ears and other tissues related to sound conduction or production, such as the larynx and auditory fats, some of which was debilitative and potentially severe.[66] It is now accepted that these mortalities were caused, through an unknown mechanism, by the Navy's use of mid-frequency sonar.

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[64] Wheelock College: Archives of NMFS Sightings Advisory System, http://whale.wheelock.edu/whalenet-stuff/reportsRW_NE/.

[65] Commerce and Navy, Joint Interim Report at iii, 16.

[66] Id.

The Bahamas event is one of numerous mortality events coincident with military activities and active sonar that have now been documented, only some of which the Navy discusses:[67]

> (1) Canary Islands 1985-1991 – Between 1985 and 1989, at least three separate mass strandings of beaked whales occurred in the Canary Islands, as reported in Nature.[68] Thirteen beaked whales of two species were killed in the February 1985 strandings, six whales of three species stranded in November 1988, and some twenty-four whales of three species stranded in October 1989—all while naval vessels were conducting exercises off shore.[69] An additional stranding of Cuvier's beaked whales, also coinciding with a naval exercise, occurred in 1991.[70] It was reported that mass live strandings occurred each time exercises took place in the area.[71]
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> (2) Greece 1996, 1997 – In 1996, twelve Cuvier's beaked whales stranded along 35 kilometers on the west coast of Greece. The strandings were correlated, by an analysis published in Nature, with the test of a low- and mid-frequency active sonar system operated by NATO.[72] A subsequent NATO investigation found the strandings to be closely timed with the movements of the sonar vessel, and ruled out all other physical environmental factors as a cause.[73] The following year saw nine additional Cuvier's beaked whales strand off Greece, again coinciding with naval activity.[74]
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> (3) Virgin Islands 1999 – In October 1999, four beaked whales stranded in the U.S. Virgin Islands as the Navy began an offshore exercise. A wildlife official

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[67] The following is not a complete list, as other relevant events have been reported in Bonaire, Japan, Taiwan, and other locations. See, e.g., R.L. Brownell, Jr., T. Yamada, J.G. Mead, and A.L. van Helden, Mass Strandings of Cuvier's Beaked Whales in Japan: U.S. Naval Acoustic Link? (2004) (IWC SC/56E37); J.Y. Wang and S.-C. Yang, Unusual Cetacean Stranding Events of Taiwan in 2004 and 2005, 8 Journal of Cetacean Research and Management 283-292 (2006); P.J.H. van Bree and I. Kristensen, On the Intriguing Stranding of Four Cuvier's Beaked Whales, Ziphius cavirostris, G. Cuvier, 1823, on the Lesser Antillean Island of Bonaire, 44 Bijdragen tot de Dierkunde 235-238 (1974).

[68] M. Simmonds and L.F. Lopez-Jurado, Whales and the Military, 337 Nature 448 (1991).

[69] Id.

[70] V. Martín, A. Servidio, and S. Garcia, Mass Strandings of Beaked Whales in the Canary Islands, in P.G.H. Evans and L.A. Miller, Proceedings of the Workshop on Active Sonar and Cetaceans 33-36 (2004).

[71] Simmonds and Lopez-Jurado, Whales and the Military, 337 Nature at 448.

[72] A. Frantzis, Does Acoustic Testing Strand Whales? 392 Nature 29 (1998).

[73] See SACLANT Undersea Research Center, Summary Record, La Spezia, Italy, 15-17 June 1998, SACLANTCEN Bioacoustics Panel, SACLANTCEN M-133 (1998).

[74] Id.; A. Frantzis, The First Mass Stranding That Was Associated with the Use of Active Sonar (Kyparissiakos Gulf, Greece, 1996), in P.G.H. Evans and L.A. Miller, Proceedings of the Workshop on Active Sonar and Cetaceans 14-20 (2004).

from the Islands reported the presence of "loud naval sonar."[75] When NMFS asked the Navy for more information about its exercise, the Department's response was to end the consultation that it had begun for the exercise under the Endangered Species Act.[76] In January 1998, according to a NMFS biologist, a beaked whale "stranded suspiciously" at Vieques as naval exercises were set to commence offshore.[77]

(4) Bahamas 2000 – As described above.

(5) Madeira 2000 -- In May 2000, four beaked whales stranded on the beaches of Madeira while several NATO ships were conducting an exercise near shore. Scientists investigating the stranding found that the whales' injuries—including "blood in and around the eyes, kidney lesions, pleural hemorrhage"—and the pattern of their stranding suggest "that a similar pressure event [*i.e.*, similar to that at work in the Bahamas] precipitated or contributed to strandings in both sites."[78]

(6) Canary Islands 2002 – In September 2002, at least fourteen beaked whales from three different species stranded in the Canary Islands. Four additional beaked whales stranded over the next several days.[79] The strandings occurred while a Spanish-led naval exercise that included U.S. Navy vessels and at least one ship equipped with mid-frequency sonar was conducting anti-submarine warfare exercises in the vicinity.[80] The subsequent investigation, as reported in the journals Nature and Veterinary Pathology, revealed a variety of traumas, including emboli and lesions suggestive of decompression sickness.[81]

(7) Washington 2003 – In May 2003, the U.S. Navy vessel USS Shoup was conducting a mid-frequency sonar exercise while passing through Haro Strait, off the coast of Washington. According to one contemporaneous account, "[d]ozens of

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[75] Personal communication of Dr. David Nellis, U.S. Virgin Island Department of Fish and Game, to Eric Hawk, NMFS (Oct. 1999); personal communication from Ken Hollingshead, NMFS, to John Mayer, Marine Acoustics Inc. (March 19, 2002).

[76] Letter from William T. Hogarth, Regional Administrator, NMFS Southeast Regional Office, to RADM J. Kevin Moran, Navy Region Southeast (undated); personal communication from Ken Hollingshead, NMFS, to John Mayer, Marine Acoustics Inc. (March 19, 2002).

[77] Personal communication from Eric Hawk, NMFS, to Ken Hollingshead, NMFS (Feb. 12, 2002).

[78] D.R. Ketten, Beaked Whale Necropsy Findings 22 (2002) (paper submitted to NMFS); L. Freitas, The Stranding of Three Cuvier's Beaked Whales Ziphius Cavirostris in Madeira Archipelago—May 2000, in P.G.H. Evans and L.A. Miller, Proceedings of the Workshop on Active Sonar and Cetaceans 28-32 (2004).

[79] Vidal Martin et al., Mass Strandings of Beaked Whales in the Canary Islands, in Proceedings of the Workshop on Active Sonar and Cetaceans 33 (P.G.H. Evans & L.A. Miller eds., 2004); Fernández et al., 'Gas and Fat Embolic Syndrome', 42 Veterinary Pathology at 446-57.

[80] Fernández et al., 'Gas and Fat Embolic Syndrome', 42 Veterinary Pathology at 446; K.R. Weiss, Whale Deaths Linked to Navy Sonar Tests, L.A. Times, Oct. 1, 2002, at A3.

[81] Fernández et al., 'Gas and Fat Embolic Syndrome', 42 Veterinary Pathology at 446-57; Jepson et al., Gas-Bubble Lesions, 425 Nature at 575-76.

porpoises and killer whales seemed to stampede all at once . . . in response to a loud electronic noise echoing through" the Strait.[82] Several field biologists present at the scene reported observing a pod of endangered orcas bunching near shore and engaging in very abnormal behavior consistent with avoidance, a minke whale "porpoising" away from the sonar ship, and Dall's porpoises fleeing the vessel in large numbers.[83] Eleven harbor porpoises—an abnormally high number given the average stranding rate of six per year—were found beached in the area of the exercise.[84]

(8) Kauai 2004 – During the Navy's conduct of a major training exercise off Hawaii, called RIMPAC 2004, some 150-200 whales from a species that is rarely seen near shore and had never naturally mass-stranded in Hawaii came into Hanalei Bay, on the island of Kaua'i. The whales crowded into the shallow bay waters and milled there for over 28 hours. Though the whales were ultimately assisted into deeper waters by members of a local stranding network, one whale calf was left behind and found dead the next day. NMFS undertook an investigation of the incident and concluded that the Navy's nearby use of sonar in RIMPAC 2004 was the "plausible, if not likely" cause of the stranding.[85]

(9) Canary Islands 2004 – In July 2004, four dead beaked whales were found around the coasts of the Canary Islands, within one week of an NATO exercise. The exercise, Majestic Eagle 2004, was conducted approximately 100 kilometers north of the Canaries. Although the three whale bodies that were necropsied were too decomposed to allow detection of gas embolisms (see below), systematic fat embolisms were found in these animals.[86] The probability that the whales died at sea is extremely high.[87]

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[82] Christopher Dunagan, Navy Sonar Incident Alarms Experts, Bremerton Sun, May 8, 2003.

[83] NMFS, Assessment of Acoustic Exposures at 6, 9.

[84] NMFS, Preliminary Report: Multidisciplinary Investigation of Harbor Porpoises (Phocoena phocoena) Stranded in Washington State from 2 May – 2 June 2003 Coinciding with the Mid-Range Sonar Exercises of the USS Shoup 53-55 (2004) (conclusions unchanged in final report). Unfortunately, according to the report, freezer artifacts and other problems incidental to the preservation of tissue samples made the cause of death in most specimens difficult to determine; but the role of acoustic trauma could not be ruled out. Id.

[85] B.L. Southall, R. Braun, F.M.D. Gulland, A.D. Heard, R.W. Baird, S.M. Wilkin, and T.K. Rowles, Hawaiian Melon-Headed Whale (Peponacephala electra) Mass Stranding Event of July 3-4, 2004 (2006) (NOAA Tech. Memo. NMFS-OPR-31).

[86] A. Espinosa, M. Arbelo, P. Castro, V. Martín, T. Gallardo, and A. Fernández, New Beaked Whale Mass Stranding in Canary Islands Associated with Naval Military Exercises (Majestic Eagle 2004) (2005) (poster presented at the European Cetacean Society Conference, La Rochelle, France, April 2005); A. Fernández, M. Méndez, E. Sierra, A. Godinho, P. Herráez, A. Espinosa de los Monteros, F. Rodríguez, F., and M. Arbelo, M., New Gas and Fat Embolic Pathology in Beaked Whales Stranded in the Canary Islands (2005) (poster presented at the European Cetaecan Society Conference, La Rochelle, France, April 2005).

[87] Id.

(10) North Carolina 2005 – During and just after a U.S. training exercise off North Carolina, at least thirty-seven whales of three different species stranded and died along the Outer Banks, including numerous pilot whales (six of which were pregnant), one newborn minke whale, and two dwarf sperm whales. NMFS investigated the incident and found that the event was highly unusual, being the only mass stranding of offshore species ever to have been reported in the region, and that it shared 'a number of features' with other sonar-related mass stranding events (involving offshore species which stranded alive and were atypically distributed along the shore). NMFS concluded that sonar was a possible cause of the strandings and also ruled out the most common other potential causes, including viral, bacterial, and protozoal infection, direct blunt trauma, and fishery interactions.[88]

(11) Spain 2006 – Four Cuvier's beaked whales stranded on the Almerian coast of southern Spain, with the same suite of bends-like pathologies seen in the whales that stranded in the Canary Islands in 2002 and 2004.[89] A NATO response force was performing exercises within 50 miles at the time of the strandings.

Some preliminary observations can be drawn from these incidents. For example, beaked whales, a group of deep-water species that are seldom seen and may in some cases be extremely rare, seem to be particularly vulnerable to the effects of active sonar. A 2000 review undertaken by the Smithsonian Institution, and reported and expanded by the IWC's Scientific Committee and other bodies, supports this conclusion, finding that every mass stranding on record involving multiple species of beaked whales has occurred with naval activities in the vicinity.[90] Indeed, it is not even certain that some beaked whale species naturally strand in numbers.

But the full magnitude of sonar's effects on these species—or on other marine mammals—is not known. Most of the world lacks networks to identify and investigate stranding events, particularly those that involve individual animals spread out over long stretches of coastline, and therefore the mortalities that have been identified thus far are likely to represent only a subset of a substantially larger problem. For example, most beaked whale casualties (according to NMFS) are bound to go undocumented because of the remote siting of sonar exercises and the small chance that a dead or injured animal would actually strand.[91] It is well understood in terrestrial ecology that dead and dying animals tend to be

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[88] A.A. Hohn, D.S. Rotstein, C.A. Harms, and B.L. Southall, Multispecies Mass Stranding of Pilot Whales (Globicephala macrorhynchus), Minke Whale (Balaenoptera acutorostrata), and Dwarf Sperm Whales (Kogia sima) in North Carolina on 15-16 January 2005 (2006) (NOAA Tech. Memo. NMFS-SEFSC-53).

[89] International Whaling Commission, Report of the Scientific Committee, Annex K at 28 (2006) (IWC/58/Rep1).

[90] Marine Mammal Program of the National Museum of Natural History, Historical Mass Mortalities of Ziphiids 2-4 (Apr. 6, 2000); see also 2 J. Cetacean Res. & Mgmt., Supp., Annex J at § 13.8 (2000) (report of the IWC Scientific Committee, Standing Working Group on Environmental Concerns).

[91] J.V. Carretta, K.A. Forney, M.M. Muto, J. Barlow, J. Baker, and M. Lowry, U.S. Pacific Marine Mammal Stock Assessments: 2006 (2007).

grossly undercounted given their rapid assimilation into the environment, and one would of course expect profound difficulty where offshore marine species are concerned.[92] Along the eastern seaboard and in the Gulf of Mexico, all beaked whale sightings during NMFS shipboard surveys have occurred at considerable distances from shore.[93]

Furthermore, although the physical process linking sonar to strandings is not perfectly understood, the record indicates that debilitating and very possibly lethal injuries are occurring in whales exposed to sonar at sea—only some of which may then strand. As first reported in the journal *Nature*, animals that came ashore during sonar exercises off the Canary Islands, in September 2002, had developed large emboli in their organ tissue and suffered from symptoms resembling those of severe decompression sickness, or "the bends."[94] It has been proposed that the panic led them to surface too rapidly or because it pushed them to dive before they could eliminate the nitrogen accumulated on previous descents, or because the sound itself precipitated the growth of nitrogen bubbles in the blood, which expanded to devastating effect. This finding has since been supported by follow-on papers, by published work in other fields, and by expert reviews.[95] In any case, the evidence is considered "compelling" that acoustic trauma, or injuries resulting from behavioral responses, has in some way led to the deaths of many of these animals.[96]

In this light, the Navy's assessment of the risk of marine mammal injury and mortality is astonishingly poor. The Navy stubbornly refuses to account for the research linking military active sonar and whale mortalities. Briefly citing only some of the stranding events discussed above (DEIS at 3.2-143, D-16), the Navy blithely concludes that "the state of science can not yet determine if a sound source such as mid-frequency sonar alone

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[92] See, e.g., G. Wobeser, Investigation and Management of Disease in Wild Animals 13-15 (1994); P.A. Alison, C.R. Smith, H. Kukert, J.W. Deming, B.A. Bennett, Deep-Water Taphonomy of Vertebrate Carcasses: A Whale Skeleton in the Bathyal Santa Catalina Basin, 17 Paleobiology 78-89 (1991).

[93] G.T. Waring, E. Josephson, C.P. Fairfield, and K. Maze-Foley, eds., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2006 at 232-33, 238, 288, 292, 296 (2007) (NOAA Tech. Memo. NMFS NE 201) (data from NMFS surveys, showing all beaked whales sightings at significant distances from shore).

[94] See P.D. Jepson, M. Arbelo, R. Deaville, I.A.P. Patterson, P. Castro, J.R. Baker, E. Degollada, H.M. Ross, P. Herráez, A.M. Pocknell, F. Rodríguez, F.E. Howie, A. Espinosa, R.J. Reid, J.R. Jaber, V. Martín, A.A. Cunningham, A. Fernández, Gas-Bubble Lesions in Stranded Cetaceans, 425 Nature 575-576 (2003); Fernández et al., 'Gas and Fat Embolic Syndrome', 42 Veterinary Pathology at 415.

[95] Cox et al., Understanding the Impacts. For additional papers, see also the studies referenced at section II(A)(1) ("Permanent Threshold Shift"). Of course it would be a mistake to assume that an animal must suffer bends-like injury or some other sort of acoustic trauma in order to strand. Some may die simply because the noise disorients them, for instance. See, e.g., NMFS, Assessment of Acoustic Exposures at 9-10.

[96] Cox et al., Understanding the Impacts; see also P.G.H. Evans and L.A. Miller, Concluding Remarks, in Proceedings of the Workshop on Active Sonar and Cetaceans 74 (2004); K.C. Balcomb and D.E. Claridge, A Mass Stranding of Cetaceans Caused by Naval Sonar in the Bahamas, 8(2) Bahamas Journal of Science 1 (2001); D.E. Claridge, Fine-Scale Distribution and Habitat Selection of Beaked Whales (2006) (M.Sc. thesis).

causes beaked whale strandings..." DEIS 3.2-143. Such a conclusion simply ignores numerous published, peer-reviewed papers.[97]

There are other problems with the Navy's analysis as well. For instance, the Navy capriciously (1) denies that a "significant likelihood of injury" to ESA-listed species exists during the myriad training activities proposed for USWTR (DEIS at 4.3-60, table 4.3-6); (2) dismisses the potential for sonar to injure whales at sea, grossly mischaracterizing the literature (DEIS D-16 to D-32); (3) fails to consider the potential for strandings and mortalities in other species of cetaceans (DEIS at 4.3-12); and (4) assumes that the Navy's failure to observe mortalities during past sonar training is probative of a lack of mortalities, despite the lack of any remotely adequate monitoring system.

D. Other Impacts on Marine Mammals

The training activities proposed for the USWTR can have impacts that are not limited to the overt physiological and behavioral effects of ocean noise. Unfortunately, the Navy's analysis of most of these other impacts is cursory and inadequate.

(1) The Navy fails to adequately assess the impact of "stress" on marine mammals, a serious problem for animals exposed even to moderate levels of sound for extended periods.[98] As the Navy has previously observed, stress from ocean noise—alone or in combination with other stressors, such as biotoxins—may weaken a cetacean's immune system, making it "more vulnerable to parasites and diseases that normally would not be fatal."[99] Moreover, according to studies on terrestrial mammals, chronic noise can interfere with brain development, increase the risk of myocardial infarctions, depress reproductive rates, cause malformations and other defects in young—all at moderate levels of exposure.[100] Because physiological stress responses are highly conservative across species, it is reasonable to assume that marine mammals would be subject to the same effects,

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[97] See above, footnotes 66 through 88.

[98] See National Research Council, Ocean Noise and Marine Mammals.

[99] Navy, Hawaii Range Complex Draft Environmental Impact Statement/ Overseas Environmental Impact Statement at 5-19 to 5-20 (2007). Additional evidence relevant to the problem of stress in marine mammals is summarized in A.J. Wright, N. Aguilar Soto, A.L. Baldwin, M. Bateson, C.M. Beale, C.Clark, T. Deak, E.F. Edwards, A. Fernández, A. Godinho, L. Hatch, A. Kakuschke, D. Lusseau, D. Martineau, L.M. Romero, L. Weilgart, B. Wintle, G. Notarbartolo di Sciara, and V. Martin, "Do marine mammals experience stress related to anthropogenic noise?", 20 International Journal of Comparative Psychology, 274-316 (2007); see also T.A. Romano, M.J. Keogh, C. Kelly, P. Feng, L. Berk, C.E. Schlundt, D.A. Carder, and J.J. Finneran, Anthropogenic Sound and Marine Mammal Health: Measures of the Nervous and Immune Systems Before and After Intense Sound Exposure, 61 Canadian Journal of Fisheries and Aquatic Sciences 1124, 1130-31 (2004).

[100] See, e.g., E.F. Chang and M.M. Merzenich, Environmental Noise Retards Auditory Cortical Development, 300 Science 498 (2003) (rats); S.N. Willich, K. Wegscheider, M. Stallmann, and T. Keil, Noise Burden and the Risk of Myocardial Infarction, European Heart Journal (2005) (Nov. 24, 2005) (humans); F.H. Harrington and A.M. Veitch, Calving Success of Woodland Caribou Exposed to Low-Level Jet Fighter Overflights, 45 Arctic vol. 213 (1992) (caribou).

particularly—as appears to be the case here—if they are resident animals exposed repeatedly to a variety of stressors in the USWTR area. Yet despite the potential for stress in marine mammals and the significant consequences that can flow from it, the Navy unjustifiably assumes that such effects would be minimal. DEIS 4.3-14.

(2) The Navy fails to consider the risk of ship collisions with large cetaceans, as exacerbated by the use of active acoustics. For example, right whales have been shown to engage in dramatic surfacing behavior, increasing their vulnerability to ship strikes, on exposure to mid-frequency alarms above 133 dB re 1 μPa (SPL)—a level of sound that can occur many tens of miles away from the sonar systems slated for the range.[101] It should be assumed that other large whales (which, as the DEIS repeatedly notes, are already highly susceptible to vessel collisions) are subject to the same hazard.

(3) In the course of its training activities, the Navy would release a host of toxic chemicals into the marine environment that could pose a threat to local wildlife over the life of the range. Nonetheless, while there is some brief discussion of potential impacts on human health and safety, the DEIS generally fails to consider the cumulative impacts of these toxins on marine mammals, from past, current, and proposed training exercises. DEIS 4.8-13. It is not enough for NEPA purposes to claim that "insufficient information is available." DEIS 4.8-13. Unless the costs of obtaining the information are exorbitant, NEPA requires that it be obtained. See 40 C.F.R. § 1502.22(a). Here, careful study is needed into the way toxins might disperse and circulate around the area and how they may affect marine wildlife, particularly the endangered right whale. The Navy's analysis of hazardous materials is therefore inadequate under NEPA.

(4) Finally, the Navy's analysis cannot be limited only to direct effects, i.e., effects that occur at the same time and place as the training exercises that would be authorized. 40 C.F.R. § 1508.8(a). It must also take into account the activity's indirect effects, which, though reasonably foreseeable (as the DEIS acknowledges), may occur later in time or are further removed. 40 C.F.R. § 1508.8(b). This requirement is particularly critical in the present case given the potential of sonar exercises to cause significant long-term impacts not clearly observable in the short or immediate term (a serious problem, as the National Research Council has observed).[102] Thus, for example, the Navy must not only evaluate the potential for mother-calf separation but also the potential for indirect effects—on survivability—that might arise from that transient change. 40 C.F.R. § 1502.16(b).

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[101] Nowacek et al., North Atlantic Right Whales, 271 Proceedings of the Royal Society of London, Part B: Biological Sciences at 227.

[102] "Even transient behavioral changes have the potential to separate mother-offspring pairs and lead to death of the young, although it has been difficult to confirm the death of the young." National Research Council, Ocean Noise and Marine Mammals at 96.

Without further consideration of these impacts, the DEIS does not pass NEPA muster.

IV. IMPACTS ON FISH AND FISHERIES

Though the architecture of their ears may differ, fish are equipped, like all vertebrates, with thousands of sensory hair cells that vibrate with sound; and a number of specialized organs like the abdominal sac, called a "swim bladder," that some species possess can boost hearing. Fish use sound in many of the ways that marine mammals do: to communicate, defend territory, avoid predators, and, in some cases, locate prey.[103]

One series of recent studies showed that passing airguns can severely damage the hair cells of fish (the organs at the root of audition) either by literally ripping them from their base in the ear or by causing them to "explode."[104] Fish, unlike mammals, are thought to regenerate hair cells, but the pink snapper in these studies did not appear to recover within approximately two months after exposure, leading researchers to conclude that the damage was permanent.[105] It is not clear which elements of the sound wave contributed to the injury, or whether repetitive exposures at low amplitudes or a few exposures at higher pressures, or both, were responsible.[106] As with marine mammals, sound has also been shown to induce temporary hearing loss in fish. Even at fairly moderate levels, noise from outboard motor engines is capable of temporarily deafening some species of fish, and other sounds have been shown to affect the short-term hearing of a number of other species, including sunfish and tilapia.[107] For any fish that is dependent on sound for predator avoidance and other key functions, even a temporary loss of hearing (let alone the virtually permanent damage seen in snapper) will substantially diminish its chance of survival.[108]

Hearing loss is not the only effect that ocean noise can have on fish. For years, fisheries in various parts of the world have complained about declines in their catch after intense acoustic activities (including naval exercises) moved into the area, suggesting that noise is

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[103] See, e.g., A.N. Popper, Effects of Anthropogenic Sounds on Fishes, 28(10) Fisheries 26-27 (2003); M.C. Hastings & A.N. Popper, Effects of Sound on Fish 19 (2005) (Report to the California Department of Transportation, Contract No. 43A0139), p., 19; D.A. Croll, Marine Vertebrates and Low Frequency Sound—Technical Report for LFA EIS 1-90 (1999).

[104] R. McCauley, J. Fewtrell, and A.N. Popper, High Intensity Anthropogenic Sound Damages Fish Ears, 113 Journal of the Acoustical Society of America 640 (2003).

[105] Id. at 641 (some fish in the experimental group sacrificed and examined 58 days after exposure).

[106] Id.

[107] A.R. Scholik and H.Y. Yan, Effects of Boat Engine Noise on the Auditory Sensitivity of the Fathead Minnow, Pimephales promelas, 63 Environmental Biology of Fishes 203-09 (2002); A.R. Scholik and H.Y. Yan, The Effects of Noise on the Auditory Sensitivity of the Bluegill Sunfish, Lepomis macrochirus, 133 Comparative Biochemisty and Physiology Part A at 43-52 (2002); M.E. Smith, A.S. Kane, & A.N. Popper, Noise-Induced Stress Response and Hearing Loss in Goldfish (Carassius auratus), 207 Journal of Experimental Biology 427-35 (2003); Popper, Effects of Anthropogenic Sounds at 28.

[108] See Popper, Effects of Anthropogenic Sounds at 29; McCauley et al., High Intensity Anthropogenic Sound Damages Fish Ears, at 641.

seriously altering the behavior of some commercial species.[109] A group of Norwegian scientists attempted to document these declines in a Barents Sea fishery and found that catch rates of haddock and cod (the latter known for its particular sensitivity to low-frequency sound) plummeted in the vicinity of an airgun survey across a 1600-square-mile area, an area three times the size of the proposed USWTR range and larger than the state of Rhode Island; in another experiment, catch rates of rockfish were similarly shown to decline.[110] Drops in catch rates in these experiments range from 40 to 80 percent.[111] A variety of other species, herring, zebrafish, pink snapper, and juvenile Atlantic salmon, have been observed to react to various noise sources with acute alarm.[112]

In their comments on the Navy's 2005 DEIS, several fishermen and groups of fishermen independently reported witnessing sharp declines in catch rates of various species when in the vicinity of Navy exercises.[113] These reports are indicative of behavioral changes, such as a spatial redistribution of fish within the water column, that could affect marine mammal foraging as well as human fisheries. Yet the Navy fails to acknowledge or respond to these concerns in its latest DEIS. In addition, as NMFS has observed, the use of mid-frequency sonar could affect the breeding behavior of certain species, causing them, for example, to cease their spawning choruses, much as certain echolocation signals do.[114] The repetitive use of sonar and other active acoustics could have significant adverse behavioral effects on some species of fish and those who depend on them.

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[109] See "'Noisy' Royal Navy Sonar Blamed for Falling Catches," Western Morning News, Apr. 22, 2002 (sonar off the U.K.); Percy J. Hayne, President of Gulf Nova Scotia Fleet Planning Board, "Coexistence of the Fishery & Petroleum Industries," www.elements.nb.ca/theme/fuels/percy/hayne.htm (accessed May 15, 2005) (airguns off Cape Breton); R.D. McCauley, J. Fewtrell, A.J. Duncan, C. Jenner, M.-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, and K. McCabe, Marine Seismic Surveys: Analysis and Propagation of Air-Gun Signals, and Effects of Air-Gun Exposure on Humpback Whales, Sea Turtles, Fishes, and Squid 185 (2000) (airguns in general).

[110] A. Engås, S. Løkkeborg, E. Ona, and A.V. Soldal, Effects of Seismic Shooting on Local Abundance and Catch Rates of Cod (Gadus morhua) and Haddock (Melanogrammus aeglefinus), 53 Canadian Journal of Fisheries and Aquatic Sciences 2238-49 (1996); J.R. Skalski, W.H. Pearson, and C.I. Malme, Effects of Sound from a Geophysical Survey Device on Catch-Per-Unit-Effort in a Hook-and-Line Fishery for Rockfish (Sebastes spp.), 49 Canadian Journal of Fisheries and Aquatic Sciences 1357-65 (1992). See also S. Løkkeborg and A.V. Soldal, The Influence of Seismic Exploration with Airguns on Cod (Gadus morhua) Behaviour and Catch Rates, 196 ICES Marine Science Symposium 62-67 (1993).

[111] Id.

[112] See J.H.S. Blaxter and R.S. Batty, The Development of Startle Responses in Herring Larvae, 65 Journal of the Marine Biological Association of the U.K. 737-50 (1985); F.R. Knudsen, P.S. Enger, and O. Sand, Awareness Reactions and Avoidance Responses to Sound in Juvenile Atlantic Salmon, Salmo salar L., 40 Journal of Fish Biology 523-34 (1992); McCauley et al., Marine Seismic Surveys at 126-61.

[113] See comments compiled by the Navy and posted on the Undersea Warfare Training Range EIS site, projects.earthtech.com/USWTR (e.g., comments of S. Draughon, S. Fromer, L. and F. Gromadzki, D. Pendergrast, and North Carolina Watermen United).

[114] Letter from Miles M. Croom, NMFS Southeast Regional Office, to Keith Jenkins, Navy (Jan. 31, 2006); see also J.J. Luczkovich, "Potential Impacts of the U.S. Navy's Proposed Undersea Warfare Training Range on Fishes" (2006) (presentation to Navy).

Although high mortalities from noise exposure are seen in developmental stages of fish, the Navy nevertheless concludes that "exposure to many types of loud sounds may have little or no affect on fish." DEIS at 4.3-142. Such a conclusion completely ignores the scientific literature. A number of studies, including one on non-impulsive noise, show that intense sound can kill eggs, larvae, and fry outright or retard their growth in ways that may hinder their survival later.[115] Significant mortality for fish eggs has been shown to occur at distances of 5 meters from an airgun source; mortality rates approaching 50 percent affected yolksac larvae at distances of 2 to 3 meters.[116] Also, larvae in at least some species are known to use sound in selecting and orienting toward settlement sites.[117] Acoustic disruption at that stage of development could have significant consequences.[118] The Navy's claim that these studies "do not lead to any conclusions with how sound would impact survival" is without merit. DEIS at 4.3-145.

In short, the Navy briefly discusses potential effects on fish, but then it capriciously dismisses the potential for significant adverse impacts on fish. The Navy must rigorously analyze the potential for behavioral, auditory, and physiological impacts on fish, including the potential for population-level effects, using models of fish distribution and population structure and conservatively estimating areas of impact from the available literature. 40 C.F.R. § 1502.22. It must also provide appropriate mitigation measures, such as avoidance of spawning grounds and of important habitat for fish species, especially hearing specialists. Notably, as with marine mammals and sea turtles, the Navy does not consider exclusion of important fish habitat in the USWTR area.

Having concluded—without basis—that mid-frequency sonar would have no significant impact on fish and fish habitat (DEIS at 4.3 145-6), the Navy dismisses the notion that fisheries in the area would suffer economic loss (DEIS at 3.4-2 to 28), even though (judging by the comments from fishermen on the 2005 DEIS) its activities appear to have disrupted fishing in the past. But, just as with the North Carolina range, the available evidence underscores the need for a more serious and informed analysis than the DEIS currently provides. The Navy must meaningfully assess the economic consequences of reduced catch rates on commercial and recreational fisheries and on marine mammal foraging in the USWTR area.

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[115] See, e.g., C. Booman, J. Dalen, H. Leivestad, A. Levsen, T. van der Meeren, and K. Toklum, Effecter av luftkanonskyting på egg, larver og yngel (Effects from Airgun Shooting on Eggs, Larvae, and Fry), 3 Fisken og Havet 1-83 (1996) (Norwegian with English summary); J. Dalen and G.M. Knutsen, Scaring Effects on Fish and Harmful Effects on Eggs, Larvae and Fry by Offshore Seismic Explorations, in H.M. Merklinger, Progress in Underwater Acoustics 93-102 (1987); A. Banner and M. Hyatt, Effects of Noise on Eggs and Larvae of Two Estuarine Fishes, 1 Transactions of the American Fisheries Society 134-36 (1973); L.P. Kostyuchenko, Effect of Elastic Waves Generated in Marine Seismic Prospecting on Fish Eggs on the Black Sea, 9 Hydrobiology Journal 45-48 (1973).

[116] Booman et al., Effecter av luftkanonskyting på egg, larver og yngel at 1-83.

[117] S.D. Simpson, M. Meekan, J. Montgomery, R. McCauley, R., and A. Jeffs, Homeward Sound, 308 Science 221 (2005).

[118] Popper, Effects of Anthropogenic Sounds at 27.

V. OTHER IMPACTS ON MARINE WILDLIFE

As discussed above, the Navy's proposed training activities pose risks to marine life other than that associated with ocean noise, such as injury or death from collisions with ships, bioaccumulation of toxins, and stress. These same concerns that apply to marine mammals apply to fish, sea turtles, and other biota as well. The Navy must adequately evaluate impacts and propose mitigation for each category of harm. 40 C.F.R. §§ 1502.14, 1502.16.

In addition, NEPA requires the Navy to assess and mitigate the reasonably foreseeable impacts of its project on marine species. 40 C.F.R. § 1502.22. For some species, however, including several that are listed under the Endangered Species Act, it does not engage in any such analysis; rather, it improperly screens them from evaluation at the outset, so that their exposure to potentially harmful levels of sound (and to some other stressors as well) goes unmodeled. Yet, in each of the following cases, the Navy's rationale for excluding them does not stand up against the scientific record.

(1) Pinnipeds are excluded on the grounds that the four species known to the northwest Atlantic, gray, harbor, harp, and hooded seals, "are not likely to occur at the proposed USWTR sites." DEIS at 3.3-13. In fact, according to NMFS' most recent stock assessments, the harbor seal is occasionally distributed in the Carolinas and can occur as far south as Florida; the harp seal, although concentrated further north, has stranded as far south as North Carolina; and the hooded seal, which tends to range farther and into deeper water than some other pinnipeds, has increasingly been seen between Maine and Florida, indicating perhaps a shift in seasonal distribution or an expansion southward of the species' primary range.[119] Under these circumstances, an assessment of environmental impacts on pinnipeds is required.

(2) Manatees are generally excluded from analysis because they tend to occupy shallow inshore and near-shore habitat and thus would "lie outside the operational range of the USWTR." DEIS at 3.3-13. Consideration is given only to the impacts of cable installation, which, depending on the choice of site, could occur precisely in the seagrass habitat that manatees prefer. DEIS at 4.6-3. Yet the Navy is obliged to consider impacts from other project activities, such as increased vessel traffic, that could take place in manatee habitat. And it must evaluate the potential for acoustic impacts given that manatees are occasionally sighted offshore and that sound from intense mid-frequency sources can travel considerable distances underwater.[120] To this end, at the very least, a propagation analysis should be performed—and disclosed—indicating levels of sound that might be received in the manatee's near-shore habitat under a variety of assumed conditions, such as surface ducting, and topographies. The manatee, like the right whale, is a badly imperiled

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[119] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007 at 201, 205, 220, 222.

[120] See, e.g., Commerce and Navy, Joint Interim Report at 34, 36 (showing propagation of mid-frequency sonar above 160 dB in near-shore environment).

species. According to NMFS, the U.S. Fish and Wildlife Service has "consistently concluded in Section 7 Biological Opinions, pursuant to the Endangered Species Act, that the take of a single manatee would "jeopardize the continued existence" of the species."[121] For the Navy to shirk its analysis of the species before embarking on a project with the potential for significant, long-term impacts, let alone a single "take," is not justifiable.

(3) Sea turtles are excluded from further analysis of acoustic impacts on the grounds that their best hearing range appears to occur below 1 kHz. DEIS at 3.3-12. But having their best acoustic sensitivity in this range does not mean that sea turtles are oblivious to noise at higher frequencies. As the Navy admits, juvenile and adult loggerheads hear sounds all the way up to 1 kHz, suggesting that they continue to detect sounds at higher levels, including potentially the lower end of the intense mid-frequency sources intended for the range. Id. Furthermore, they have been shown to engage in startle and escape behavior – behavior that may involve diving and surfacing – and to experience heightened stress in response to vessel noise, which receives no discussion (neither for sea turtles nor for any other species) in the DEIS.[122] Given these findings, and given that all of the sea turtles on the proposed sites belong to endangered or threatened populations, a more rigorous analysis of potential impacts is necessary.

(4) The DEIS excludes invertebrates from further analysis because, according to the Navy, they lack organs and tissues whose acoustic impedance differs significantly from water (and therefore, presumably, would not be susceptible to injury) and because no data are available showing acoustic capabilities in these species above 1 kHz. DEIS at 3.3-3 to 4. Both claims rest on summary argument that ignores the available record, which, to the contrary, suggests that invertebrates are vulnerable to impacts from acoustic sources. The fact is that marine mammal echolocation has been shown to directly injure invertebrates, raising the question of whether lower-frequency sources can do the same.[123] And the sweeping conclusion in the DEIS that invertebrates are insensitive to noise in the mid-frequencies is baseless. An audiogram is available for only one invertebrate species (the American lobster), which indeed shows relative insensitivity to sounds above several hundred Hertz;[124] but to argue, on this account, that other invertebrates cannot detect mid-frequency sound is rather like claiming that humans cannot not hear well above 10kHz because salmon, another vertebrate species, cannot.

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[121] Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007 at 407.

[122] National Research Council, The Decline of Sea Turtles: Causes and Prevention (1990).

[123] See K. Norris and B. Møhl, Can Odontocetes Debilitate Prey with Sound? 122 The American Naturalist 85 (1983).

[124] G.C. Offutt, Acoustic Stimulus Perception by the American Lobster, Homarus americanus (Decapoda), 26 Experientia 1276 (1970).

It has recently been observed that many species of invertebrates possess mechanosensors that bear resemblance to vertebrate ears, making it "important to examine the effect of anthropogenic sounds on a wider range of marine fauna."[125] Impacts have already been observed in a number of species: giant squid, which twice now have stranded in numbers in the vicinity of airgun surveys; brown shrimp, whose growth and reproduction were retarded from being raised in a noisy environment; and snow crabs, which, in some preliminary research, showed signs of ovary and liver damage on exposure to airgun noise.[126] The proper approach under NEPA is to acknowledge the lack of necessary data and to either obtain it (if the cost of doing so is not exorbitant) or to conduct a risk assessment based on methods generally accepted by the scientific community. 40 C.F.R. § 1502.22.

(5) Seabirds are dismissed from further analysis for reasons that do not bear up to any serious scrutiny. First, the Navy argues, seabirds are excludable because there is no evidence that the species use sound underwater (DEIS at 3.3-15); yet this consideration has no bearing on whether injury, temporary hearing loss, or some types of behavioral disruptions would occur. Second, they are excluded because, in theory, they could "rapidly fly away" to other areas if disturbed (DEIS at 3.3-14); yet the birds' ability to flee does not eliminate the risk of injury and hearing loss, and their abandonment of a feeding area would itself constitute an acoustic impact, the significance of which would depend in part on the duration and degree of displacement. Seabirds occur at the four proposed sites, dive underwater (in some cases to depths of hundreds of feet), and are sensitive to same frequencies used by the Navy's acoustic sources. They must receive further analysis in the EIS, both for the direct impacts they may suffer on exposure to the Navy's sources and for the impacts they may incur indirectly through depletion of prey species and hard bottom habitat. 40 C.F.R. § 1502.16(a), (b).

Without further consideration of these species, the Navy's review is incomplete.

VI. IMPACTS ON WILDLIFE VIEWING INTERESTS

The DEIS does not adequately consider the effects on wildlife-viewing and other wildlife-dependent recreational interests from the proposal's impacts on marine mammals. The DEIS makes no mention of the value lost from the harm to marine mammals that attract a

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[125] A.N. Popper, Effects of Anthropogenic Sounds on Fishes, 28(10) Fisheries 24, 30 (Oct. 2003).

[126] A. Guerra, A.F. Gonzalez and F. Rocha, A Review of Records of Giant Squid in the North-Eastern Atlantic and Severe Injuries in Architeuthis dux Stranded after Acoustic Exploration (2004) (paper presented to the Annual Science Conference of the International Council for the Exploration of the Sea, Vigo, Spain, 22-25 Sept. 2004) (giant squid); J.P. Lagardère, Effect of Noise on Growth and Reproduction of Crangon crangon in Rearing Tanks, 71 Marine Biology 177 (1982) (brown shrimp); Fisheries and Oceans Canada, Potential Impacts of Seismic Energy on Snow Crab (2004) (Maritime Provinces Regional Habitat Status Report 2004/Draft) (snow crab). See also R.D. McCauley, J. Fewtrell, A.J. Duncan, C. Jenner, M.-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, & K. McCabe, Marine Seismic Surveys: Analysis and Propagation of Air-Gun Signals, and Effects of Air-Gun Exposure on Humpback Whales, Sea Turtles, Fishes, and Squid 185 (2000) (squid)

number of our organizational members and members of the public to the potentially affected sites. One of NEPA's explicit purposes is to "assure esthetically and culturally pleasing surroundings," 42 U.S.C. 4331(b)(2), and caselaw makes clear that an agency must adequately consider such recreational impacts in its NEPA analysis. See, e.g., Lujan v. NWF, 497 U.S. 871, 887 (1990) ("no doubt that recreational use and aesthetic enjoyment are among the sorts of interests NEPA were specifically designed to protect"); LaFlamme v. FERC, 852 F.2d 389, 401 (1988) (because "there were substantial questions raised regarding whether the project may significantly affect recreational use in the project area and that FERC failed to explain or discuss or discuss" these impacts, the court concluded that "this record reflects a decision which is neither 'fully informed or well-considered'" and thus the agency's decision not to prepare an EIS was unreasonable).

VII. ALTERNATIVES ANALYSIS

NEPA requires agencies to consider alternatives to their proposed actions. To comply with NEPA, an EIS must "inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1. This alternatives requirement has been described in regulation as "the heart of the environmental impact statement." Id. § 1502.14. The courts describe the alternatives requirement equally emphatically, citing it as the "linchpin" of the EIS. Monroe County Conservation Council v. Volpe, 472 F.2d 693 (2d Cir. 1972). The agency must therefore "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." 40 C.F.R. § 1502.14(a). Consideration of alternatives is required by (and must conform to the independent terms of) both sections 102(2)(C) and 102(2)(E) of NEPA.

The Navy's alternatives analysis misses the mark. The DEIS purports to present five alternatives for full review: four alternative locations for the range (the preferred site off northern Florida; a site off southern South Carolina, a site of North Carolina, and a site of Virginia/Maryland) and the no-action alternative. DEIS at 2-19. There are numerous problems, however, with its approach.

A. Failure to Identify Environmental Impact-Based Alternatives

The Navy claims it "is committed to demonstrating environmental stewardship" while executing its responsibilities under federal law, including NEPA. DEIS at 6-11. However, nothing could be further from the truth. The Navy's alternatives were not selected to "inform decision-makers and the public" of how the Navy could "avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1. Instead, as discussed in the DEIS and below, the Navy chose alternatives based on factors unrelated to the proposed action's environmental impacts.

Further, at no point in the DEIS does the Navy discuss how the alternatives pose different environmental choices for the public and decisionmakers. The DEIS fails entirely to

comply with NEPA's regulations, requiring the Navy to "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among option by the decisionmaker and the public." 40 C.F.R. § 1502.14. Thus, while the alternatives are presented in comparative form, evaluating non-environmental criteria, see, e.g., DEIS 2-39 to 2-49, the Navy fails to sharply define the environmental issues applicable to each alternative and include these differences in its comparison. There is simply no comparison of the risks and benefits of each alternative site showing what is and is not known and what species and habitats would be most at risk from each alternative.

B. Identification of Alternative Sites

The Navy omitted reasonable sites from its analysis. As the DEIS makes clear, the Navy started with a broad array of choices along the East Coast and in the Gulf of Mexico. These choices included the Gulf of Maine; an offshore area stretching from New Jersey to the Chesapeake Bay; an offshore area stretching along almost the entire southeastern coast from North Carolina to Cape Canaveral, Florida; and an area of the Gulf of Mexico stretching from Louisiana to Florida. DEIS at 2-20 to 2-21.

But the DEIS tells the public very little about how it got from this broad swath of area to the Navy's four alternatives. For example, in eliminating all areas between Louisiana and Florida, the DEIS states that two- to three-day ship transit times, "climatological challenges," oil drilling, commercial shipping, and shrimping "render the site undesirable." DEIS at 2-22. Yet the Navy fails to fully define and quantify all of these eliminating criteria and fails to quantify the same or similar criteria for any of the other regions. The DEIS excludes other sites for reasons that are even less defined, *e.g.*, by stating that "[c]andidate sites were identified in these regions and evaluated against the criteria outlined below [where the reference to "criteria outlined" is unclear]." Id.

The information the Navy does include indicates that factors of convenience and cost dominated the decision about which candidate sites to pursue as NEPA alternatives. For example, along the southeast coastline, the DEIS states that "much latitude existed in positioning a USWTR between Cape Canaveral, Florida, and Cape Lookout, North Carolina." Yet, along this nearly 700 miles of coast, the Navy chose three sites, "each offshore of existing military bases," showing that its choice was still dictated by cost considerations and proximity to a "secure federal facility" as noted in the Navy's prior DEIS. 2005 DEIS at 2-17. From among the four final alternatives, the Florida site was selected as the Navy's preferred alternative because of airfield proximity, the geography of the site, convenience of the shore landing site, good weather, commercial shipping and fishing traffic, and proximity to Navy fleet areas. DEIS at 2-40 to 2-41. At no point in the site selection process described in the DEIS are impacts to marine resources considered. DEIS at 2-18 to 2-49.

But not all of the factors of convenience and cost cited in the DEIS seem crucial enough to justify their wholesale dictation of location for the range. The DEIS makes clear, for example, that in selecting the site off Jacksonville as its preference, the Navy relied upon

its speculation that the P-8A aircraft will have a new home at NAS Jacksonville if it "is the selected alternative in the EIS currently underway to identify a home base." DEIS at 2-49. The DEIS finds this important because the "largest anticipated user of USWTR is the aviation community" and "collocating the range facility in the same area as the primary user represents the greatest efficiency in applying limited resources to support training." DEIS at 2-48 to 2-49. Under these circumstances, siting of the USWTR within easy range of some aircraft might work to the convenience of the Navy but is not necessary.[127] The same is true of the Navy's rubric that the range be located near a landing site currently owned by the federal government. DEIS at 2-38.

More importantly, factors of mere convenience and cost alone cannot dictate an agency's choice of alternatives to evaluate in an EIS. An agency must discuss all reasonable alternatives – those that will accomplish the purpose and need of the agency and are practical and feasible – not simply those it finds most convenient. 40 C.F.R. § 1502.14. "The primary purpose of the impact statement is to compel federal agencies to give serious weight to environmental factors in making discretionary choices." I-291 Why? Ass'n v. Burns, 372 F.Supp. 233, 247 (D. Conn. 1974). If an agency is permitted to consider and compare the environmental impacts of its proposed action with only other, equally convenient alternatives – and permitted to omit from such analysis any alternatives that are less convenient, no matter that they might result in significant environmental benefits – this purpose would be thwarted.

As an example in this case, and as noted in our prior comment letter, posit the existence of a location for the sonar range that meets the operational requirements of the Atlantic Fleet with respect to geography and bathymetry, according to the Navy's own analysis. Then assume that the location would be vastly safer for marine life than the three action alternatives presented in the DEIS, perhaps because marine life is less abundant there.[128] Under the analysis used by the Navy to select its four action alternatives, such a location could easily have been omitted simply because it was slightly further from convenient airfields or would require a marginally more expensive transit from the shore. Such a result is not permissible under NEPA; indeed NEPA's EIS requirement is aimed precisely at ensuring that policy-makers and the public are aware of such potential trade-offs and environmental benefits before discretionary decisions are made. Trout Unlimited v. Morton, 509 F.2d 1276, 1282 (9th Cir. 1974).

Carefully siting the range to avoid concentrations of vulnerable and endangered species and high abundances of marine life is the most critical step the Navy can take in reducing the environmental impacts of this range. Because the Navy has failed to undertake an

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[127] Tellingly, airfield proximity was not included along with homeport proximity as a constraining factor in the initial screening for candidate sites. DEIS at 2-20 to 2-21.

[128] The DEIS recognizes, for example, that beaked whales are not consistently distributed along the Atlantic slope. DEIS at 3.2-133 to 3.2-134. This fact suggests that beaked whales, which are the type of whale perhaps most vulnerable to harm from mid-frequency sonar, might be avoided through proper siting. But the Navy has taken no account of such facts in choosing its four action alternatives.

alternatives analysis that allows it to make an informed siting choice, the DEIS is inadequate and must be withdrawn.

C. Other Reasonable Alternatives

Even aside from the omission of reasonable alternative locations, the DEIS fails to consider any alternatives beyond alternative sites. While the question of proper siting is crucial, it is not the only factor that must be considered in identifying other, less harmful ways to fulfill the Navy's purpose. Indeed, it appears that many reasonable alternatives are missing from the Navy's analysis that might fulfill that purpose while reducing harm to marine life and coastal resources. For example:

(1) The DEIS fails to meaningfully analyze whether a mix of simulators and at-sea exercises would accomplish its aims. Instead, it rules out the use of simulators by discussing the reasons why "simulators will not in the foreseeable future *replace* real-world training." DEIS at 2-4 (emphasis added). Yet, while the DEIS discusses the shortcomings of simulators as a *replacement* for training, it fails to analyze whether an increased use of simulators can be part of the mix of its training. This failure is all the more surprising given the Navy's use of target submarine simulators during training exercises. DEIS at 2-1. Its summary treatment of this issue does not sufficiently justify the precise number of exercises that have been proposed: that is, 470 exercises per year, as opposed to 350 or 235. Alternatives that combine greater use of simulators for fewer open-water exercises should have been analyzed, not dismissed out of hand because simulators cannot *replace* real-world training.[129]

(2) The DEIS fails entirely to consider seasonal restrictions on the use of the range. Instead, all three action alternatives propose year-round use of high-intensity sonar, with events "evenly distributed through all four seasons" and without regard to seasonal variations in marine mammal and fish abundance. DEIS at 4.3-49. This is true despite the well-documented seasonal migration of one of the most endangered species, the North Atlantic right whale, along the Virginia and Carolina sites, and despite the proximity of the Florida site to the species' winter calving ground. Studies have shown that right whales engage in dramatic surfacing behavior – increasing their exposure to ship strikes – in response to mid-frequency and low-frequency signals, and that great whales may abandon their own calving or breeding grounds when various types of manmade noise begin to occupy the area.[130] Yet the DEIS fails even to consider the feasibility of avoiding these

[129] The fact that the Navy has crafted its Purpose and Need statement so as to preclude serious consideration of the use of simulators does not relieve the Navy of the obligation to consider this alternative; indeed, the law is precisely to the contrary. The exclusion of reasonable alternatives such as this one fro the scope of the Navy's Purpose and Needs statement renders that statement inadequate. See City of Carmel-by-the-Sea v. United States Dep't of Transp., 123 F.3d 1142, 1155 (9th Cir. 1997).

[130] See, e.g., Nowacek et al., North Atlantic Right Whales, 271 Proceedings of the Royal Society of London, Series B: Biological Sciences at 227-31 (right whales); Weller et al., Influence of Seismic Surveys; Jones et

seasonal migrations, or any other seasonal variation in marine life abundance. This omission is plainly unacceptable.

(3) The DEIS fails to include a range of mitigation measures among its alternatives. Many such measures are employed by other countries in their sonar exercises and even by the U.S. Navy in other contexts, as discussed below at section VIII ("Mitigation Measures"); and there are many others that should be considered. Such measures are reasonable means of reducing harm to marine life and other resources on the proposed range, and their omission from the alternatives analysis renders that analysis inadequate.[131]

(4) The Navy declines to consider a reduction in the level of proposed training in USWTR. Yet the Navy's assumption that sonar exercises must occur at the level proposed may well be an artifact of the Navy's Tactical Training Theater Assessment and Planning Program (TAP) process, which, in requiring separate environmental analysis of existing ranges and operating areas, seems to assume a priori that exercises cannot be reapportioned.

(5) The Navy's statement of purpose and need contains no language that would justify the limited set of alternatives that the Navy considers (or the alternative it ultimately prefers). Yet it is a fundamental requirement of NEPA that agencies preparing an EIS specify their project's "purpose and need" in terms that do exclude full consideration of reasonable alternatives. 40 C.F.R. § 1502.13; City of Carmel-by-the-Sea v. United States Dep't of Transp., 123 F.3d 1142, 1155 (9th Cir. 1997) (citing Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 196 (D.C. Cir. 1991)). "The existence of a viable but unexamined alternative renders an environmental impact statement inadequate," Idaho Conservation League v. Mumma, 956 F.2d 1508, 1519 (9th Cir. 1992), and an EIS errs when it accepts "as a given" parameters that it should have studied and weighed. Simmons v. U.S. Army Corps of Eng'rs, 120 F.3d 664, 667 (7th Cir. 1997).

In sum, the DEIS shortchanges or omits from its analysis reasonable alternatives – with regard to both the siting of the range and other operational choices – that might achieve the Navy's core aim of training its Atlantic Fleet forces in the use of sonar while minimizing environmental harm. These omissions are all the more unreasonable given the long period during which the Navy has worked on this DEIS, which appears to have been in process for 12 years. See 61 Fed. Reg. 22028 (May 13, 1996) (notice of intent to prepare DEIS).

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al., Census of Gray Whale Abundance in San Ignacio Lagoon; Bryant et al., Reoccupation of Laguna Guerrero Negro at 375-386; Richardson et al., Marine Mammals and Noise at 267.

[131] In this respect, the DEIS stands in contrast to a Final EIS published by the Navy analyzing the use of another type of high-intensity active sonar known as SURTASS LFA (or LFA). See Navy, Final Supplemental Environmental Impact Statement for SURTASS LFA Sonar (2007). That Final EIS analyzes five alternatives and includes, within those alternatives, consideration of a variety of mitigation measures for the use of LFA sonar, including seasonal variations, exclusion of sonar use in additional biologically important areas, an extended coastal standoff distance, and shutdown procedures. Id. at 4-68 to 4-81.

For these reasons, we urge the Navy to withdraw its DEIS or to issue a supplemental EIS that adequately informs the public of all reasonable alternatives that would reduce adverse impacts to whales, fish, and other resources. 40 C.F.R. § 1502.1.

VIII. MITIGATION MEASURES

A. General Mitigation

To comply with NEPA, an agency must discuss measures designed to mitigate its project's impact on the environment. See 40 C.F.R. § 1502.14(f). There is a large and growing set of options for the mitigation of noise impacts to marine mammals and other marine life, some of which have been imposed by navies—and by the Navy itself, in other contexts—to limit harm from high-intensity sonar exercises. Yet here the Navy does little more than set forth a cribbed set of measures, falling short even of what other navies have implemented for transient exercises and providing no discussion on a variety of other options.

All of the mitigation that the Navy has proposed for acoustic impacts boils down to the following: a very small safety zone around the sonar vessel, maintained primarily with visual monitoring by onboard lookouts, with aid from non-dedicated aircraft (when in the vicinity) and passive monitoring (through the vessel's generic sonar system). Under the proposed scheme, which is virtually identical to that in the Navy's current national defense exemption under the MMPA, operators would power down the system by 6dB if a marine mammal is detected within 1,000 yards, power it down by 10 dB if the protected species is detected within 500 yards, and shut it down if the animal is detected within 200 yards. DEIS at 6-26. We note that at another location in the DEIS the Navy states that its safety zone will be larger, with a 6 dB power down if a marine mammal is detected within 2,000 yards. DEIS at 6-7. If the Navy has expanded the safety zone, it should explain why there is a difference between this safety zone and the zone proposed for Atlantic Fleet Active Sonar Training, the Southern California Range Complex, the Hawaii Range Complex, etc.

This mitigation scheme disregards the best available science on the significant limits of that technique. Even under ideal conditions, only about 33 percent of right whales already known to occupy an area would be detected visually; only 11 percent of right whales would be detected more than a mile-and-a-half from the platform.[132] Moreover, the species perhaps most vulnerable to sonar-related injuries, beaked whales, are among the most difficult to detect because of their small size and diving behavior. It has been estimated that in anything stronger than a light breeze, only one in fifty beaked whales surfacing in the direct track line of a ship would be sighted; as the distance approaches 1 kilometer, that number drops to zero.[133] The Navy's reliance on visual observation as the

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[132] J.W.W. Hain, S.L. Ellis, R.D. Kenney, and C.K. Slay, Sightability of Right Whales in Coastal Waters of the Southeastern United States with Implications for the Aerial Monitoring Program, in G.W. Garner, S.C. Amstrup, J.L. Laake, B.F.J. Manley, L.L. McDonald, and D.R. Robertson, Marine Mammal Survey and Assessment Methods 191 (1999). Right whales are among the easiest marine mammals to detect.

[133] J. Barlow and R. Gisiner, Mitigating, Monitoring, and Assessing the Effects of Anthropogenic Noise on Beaked Whales, 7 Journal of Cetacean Research and Management 239-249 (2006).

mainstay of its mitigation plan is therefore profoundly misplaced.

Moreover, the Navy's analysis ignores or improperly discounts an array of options that have been considered and imposed by other active sonar users, including avoidance of coastal waters, high-value habitat, and complex topography; the employment of a safety zone more protective than the 1,000-yard power-down and 200-yard shutdown proposed by the Navy; general passive acoustic monitoring for whales; special rules for surface ducting and low-visibility conditions; monitoring and shutdown procedures for sea turtles and large schools of fish; and many others.[134] The Navy's conclusions are all the more remarkable given recent court decisions finding that the Navy can and must do more to reduce harm to protected species from sonar training. NRDC v. Winter, 527 F.Supp.2d 1216 (C.D. Cal. 2008), aff'd 518 F.3d 658 (9th Cir. 2008); Ocean Mammal Institute v. Gates, 546 F.Supp.2d 960 (D. Haw. 2008).

B. Right Whale Mitigation Issues

In addition to the measures noted above, the Navy largely relies on ship-strike measures that it has adopted for near-shore areas of the mid-Atlantic; but, as noted above at section III.A.2. ("Insufficient Consideration of Impacts to Right Whales"), there is a good deal of controversy over the efficacy of these rules. And the proposed measures appear to take no account of the additional risk posed by the use of active acoustics, since right whales have been shown to engage in dramatic surfacing behavior, increasing their vulnerability to ship strikes.[135] The additional measures offered by the Navy for a portion of the Southeast Atlantic from December 1 to March 31, during the right whale calving season, are equally unavailing (DEIS at 6-18 – 6-19). Further, the Navy proposes to send an "annual message" to ships; avoid north-south transits during the calving season; operate at "slow, safe speed that is, the slowest speed consistent with the essential mission, training and operations at which speed the vessel can take proper and effective action to avoid a collision"; and "to the extent practicable and consistent with the mission, training and operations...vessel operations...will be limited to daylight and periods of good visibility." DEIS at 4.2-29 to 4.2-30. The Navy asserts that based on these standard operating procedures, collisions with right whales "are not expected in the area of Site A." DEIS at 4.2-29.

Yet, it is not clear in the DEIS how the Navy defines "good visibility." Daylight and fog-free conditions are not sufficient. Sea state is not mentioned, although it greatly affects the ability to observe whales, with sea states above Beaufort 4 being largely incompatible with

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[134] See, e.g., Royal Australian Navy, "Maritime Activities Environmental Management Plan," Procedure S-1 and Planning Guide 16 (July 8, 2005); NATO Undersea Research Centre, Human Diver and Marine Mammal Risk Mitigation Rules and Procedures (2006) (NURC-SP-2006-008); ICES, Report of the Ad-hoc Group on the Impacts of Sonar on Cetaceans and Fish 33-36 (2005) (ICES CM 2005/ACE:06). The U.S. Navy has also used additional mitigation measures for various exercises in the past.

[135] Nowacek et al., North Atlantic Right Whales, 271 Proceedings of the Royal Society of London, Part B: Biological Sciences at 227.

visual sightings and ability to avoid collisions.[136] The vague language in the mitigation measures prevents reviewers from knowing the slowest speed that would be "consistent with essential mission" and would allow stopping or evasive action. This is a critical point as NMFS has found that collision risk rises dramatically at speeds in excess of 10 knots.[137] The public is also not provided information on the types of situations in which it would not be "practicable and consistent" to operate with good visibility. Because of the vague nature of the mitigation measures and internal caveats such as "consistent with mission" and "to the extent practicable," it is not clear when these measures will be used and if they will be effective. This is particularly true for Site A, which would suffer vessel and aircraft transits to and from shore, both from Florida through critical habitat and from the north and south from other ports. Vessels from these ports would converge on the USWTR site just offshore of critical habitat, in an area where the DEIS acknowledges right whales, including mothers and calves, are expected to occur.

We question the sufficiency of relying on observers to detect right whales. The DEIS asserts that detection probabilities range from 0.19 to 1.0 for aerial and shipboard surveys. DEIS at 4.3-66. The only citations for detection probability are internal Navy documents prepared by Geo-Marine (DoN 2007i, j, and k). Because primary literature is not cited, it is impossible to know whether all relevant sources were consulted. Researchers have challenged the ability of ships to avoid collisions based solely on visual detection. For example, one of the earliest studies concluded that even when surveillance methods are optimized they will only be partially successful in detecting presence or absence of right whales.[138] In fact, within 1.5 nm of ships, only 33 percent of mother/calf pairs present were detected and only 55 percent of those at the surface were seen.[139] This calls into question the value of lookouts in detecting whales in any area, let alone this area, which is close to the only known calving ground for right whales. Other researchers similarly cast doubt on the ability of ship-board observers to detect whales or for vessels to avoid collisions, particularly as the size of the vessel increased or visibility decreased.[140] As noted above, even with heightened awareness of risk to whales, naval vessels have continued to be involved in collisions. Because of the risk to vulnerable and slower-moving right whale mother/calf pairs, we believe that the only truly effective mitigation for Site A is to entirely avoid conducting exercises from November through May, the time of greatest likelihood of right whales in the calving grounds.

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[136] Clyne, H. and Leaper, R., Modelling collisions between whales and ships: Assessing the potential for vessels to take avoiding action in response to sightings of whales, SC/56/BC6 at http://www.nero.noaa.gov/shipstrike/doc/Clyn%201999%20paper.pdf (1999).

[137] 73 Fed. Reg. 60173, 60176, Endangered Fish and Wildlife; Final Rule to Implement Speed Restrictions with North Atlantic Right Whales (Oct. 10, 2008).

[138] Hain, J. and Ellis, S., Sightability of right whales in coastal waters of the southeastern United States with implications for the aerial monitoring program, in Garner et al. (eds), Marine Mammal Survey and Assessment Methods, Balkema, Rotterdam at 191-206 (1999).

[139] Ibid.

[140] Clyne, H. and Leaper, R., Modelling collisions between whales and ships: Assessing the potential for vessels to take avoiding action in response to sightings of whales, SC/56/BC6 at http://www.nero.noaa.gov/shipstrike/doc/Clyn%201999%20paper.pdf (1999)

Furthermore, and of greatest concern, the mitigation measures for Site A will be used only within the boundaries of critical habitat and an additional 5 nm seaward of the designated boundaries of critical habitat. DEIS at 6-18. Frankly, it is shocking that the Navy assumes that risks to right whales cease outside of 5 nm beyond critical habitat. As we note above, sightings have extended to the end of all systematic survey lines and limited telemetry and opportunistic sightings have shown that they roam even farther offshore.[141] The Navy is equating absence of evidence with evidence of absence. For example, the Navy states that right whales are "rarely found" in deeper water. DEIS at 4.3-65. That there are few studies looking for right whales outside the bounds of critical habitat does not mean that right whales are not there and in need of protection within the USWTR and from vessels transiting to and from it. As noted above, we believe that the only realistic mitigation of risk to vulnerable mothers and their calves is to refrain from conducting activities between November and May. However, given the propensity of the species to wander, we believe using another site might be optimally risk averse.

For other sites (B-D), mitigation is limited to posting two observers, avoiding head-on approaches and practicing "increased vigilance with respect to avoidance of vessel-whale interactions along the mid-Atlantic." DEIS at 4.2-30 and 6-17. We believe that use of acoustic detection at the USWTR site, with independent and real-time monitoring, is a mandatory component of detection and risk reduction. Limiting vessel speeds to 10 knots or less is also a critical component in reducing risk and should have been considered.[142] We note again that "increased vigilance" has not prevented naval vessels from colliding with endangered whales before in the mid-Atlantic. Vessel speeds of less than or equal to 10 knots should be a component of mitigation for sites B-D for vessels transiting the migratory corridor within 30 nm from shore, where most sightings of right whales in the mid-Atlantic have been documented. We note that risk reduction measures (including recommended slow safe speed) in the mid-Atlantic do not exist for all months in which right whales may be transiting to and from feeding and calving grounds (DEIS at 6-18), even though data indicate that right whales are moving back and forth in months when no protection would be in place.[143] Other examples of whales wandering north and south unpredictably include "Kingfisher," discussed above in section III.A.1 ("Insufficiency of Information on Right Whale Habitat and Distribution"). Given the short amount of time it took this whale to make a long roundtrip, it is not unreasonable to conclude that the whales swam offshore to take a more direct line of travel between New England and the southeast. Thus, right whale protections should extend throughout the fall and into spring, with no months left unprotected.

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[141] See section III.A.1 re Kingfisher and Yellowfin, supra; Right Whale Consortium Data Base, data request 10/22/2008/, plotted R. Kenney, URI.

[142] See 73 Fed. Reg. 60173, 60176, Endangered Fish and Wildlife; Final Rule to Implement Speed Restrictions with North Atlantic Right Whales (Oct. 10, 2008).

[143] For example, we note again the death of a pregnant female right whale from a collision off North Carolina in November 2004. See Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007.

C. Measures the Navy Should Adopt

The Navy should include the following measures, inter alia:

(1) Establishment of a coastal exclusion zone for acoustics training and testing (as appropriate for USWTR-related events), such as one for major exercises that would minimally run at least 25 nautical miles from the coast, or one that would exclude activities shoreward of the 1,500 meter isobath;

(2) Seasonal avoidance of North Atlantic right whale feeding grounds, calving grounds, and migration corridor;

(3) Avoidance of federal and state marine protected areas, including Gray's Reef National Marine Sanctuary, Monitor National Marine Sanctuary, Guana Tolomato Matanzas Marine Protected Area, Little Talbot Island Marine Protected Area and other Marine Protected Areas and Marine Sanctuaries in the areas considered.

(4) Avoidance of bathymetry likely to be associated with high-value habitat for species of particular concern, including submarine canyons and large seamounts, or bathymetry whose use poses higher risk to marine species;

(5) Avoidance of fronts and other major oceanographic features, such as the Gulf Stream, warm core rings, and other areas with marked differentials in sea surface temperatures, which have the potential to attract offshore concentration of animals, including beaked whales;[144]

(6) Avoidance of areas with higher modeled takes or with high-value habitat for particular species, many of which are indicated in the DEIS (see DEIS section 3.2), and the Navy's predictive habitat modeling undertaken for the Navy's Atlantic Fleet Active Sonar Training (AFAST) DEIS (see AFAST DEIS App. D);

(7) Concentration of exercises to the maximum extent practicable in abyssal waters and in surveyed offshore habitat of low value to species;

(8) Use of sonar and other active acoustic systems at the lowest practicable source level, with clear standards and reporting requirements for different testing and training scenarios;

(9) Expansion of the marine species "safety zone" to a 4km shutdown, reflecting international best practice, or 2 km, reflecting the standard

[144] See, e.g., Waring et al., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2007 at 80 (reporting recent results that suggest "beaked whale abundance may be highest in association with Gulf Stream and warm-core ring features").

prescribed by the California Coastal Commission and adopted in NRDC v. Winter, 527 F.Supp.2d 1216 (C.D. Cal. 2008), aff'd 518 F.3d 658 (9th Cir. 2008);[145]

(10) Suspension of relocation of exercises when beaked whales or significant aggregations of other species, such as melon-headed whales, are detected by any means within the orbit circle of an aerial monitor or near the vicinity of an exercise;

(11) Use of simulated geography (and other work-arounds) to reduce or eliminate chokepoint exercises in near-coastal environments, particularly within canyons and channels, and use of other important habitat;

(12) Avoidance or reduction of training during months with historically significant surface ducting conditions, and use of power-downs during significant surface ducting conditions at other times;

(13) Use of additional power-downs when significant surface ducting conditions coincide with other conditions that elevate risk, such as during exercises involving the use of multiple systems or in beaked whale habitat;

(14) Planning of ship tracks to avoid embayments and provide escape routes for marine animals;

(15) Suspension or postponement of chokepoint exercises during surface ducting conditions and scheduling of such exercises during daylight hours;

(16) Use of dedicated aerial monitors during chokepoint exercises, major exercises, and near-coastal exercises;

(17) Use of dedicated passive acoustic monitoring to detect vocalizing species, through established and portable range instrumentation and the use of hydrophone arrays off instrumented ranges;

(18) Modification of sonobuoys for passive acoustic detection of vocalizing species;

(19) Suspension or reduction of exercises or power-down of sonar outside daylight hours and during periods of low visibility;

(20) Use of aerial surveys and ship-based surveys before, during, and after major exercises;

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[145] California Coastal Commission, Adopted Staff Recommendation on Consistency Determination CD-08606 (2007); Approved Letter from M. Delaplaine, California Coastal Commission, to Rear Adm. Len Hering, Navy (Jan. 11, 2007).

(21) Use of all available range assets for marine mammal monitoring;

(22) Use of third-party monitors for marine mammal detection;

(23) Establishment of long-term research, to be conducted through an independent agent such as the National Fish and Wildlife Foundation, on the distribution, abundance, and population structuring of protected species in the USWTR area, with the goal of supporting adaptive geographic avoidance of high-value habitat;

(24) Application of mitigation prescribed by state regulators, by the courts, by other navies or research centers, or by the U.S. Navy in the past or in other contexts;

(25) Avoidance of fish spawning grounds and of important habitat for fish species potentially vulnerable to significant behavioral change, such as wide-scale displacement within the water column or changes in breeding behavior;

(26) Avoidance of high-value sea turtle habitat;

(27) Evaluating before each major exercise whether reductions in sonar use are possible, given the readiness status of the strike groups involved;

(28) Dedicated research and development of technology to reduce impacts of active acoustic sources on marine mammals;

(29) Establishment of a plan and a timetable for maximizing synthetic training in order to reduce the use of active sonar training;

(30) Prescription of specific mitigation requirements for individual classes (or sub-classes) of testing and training activities, in order to maximize mitigation given varying sets of operational needs; and

(31) Timely, regular reporting to NOAA, state coastal management authorities, and the public to describe and verify use of mitigation measures during testing and training activities.

Consideration of these measures is minimally necessary to satisfy the requirements of NEPA, and we note that similar or additional measures may be required under the Marine Mammal Protection Act, Endangered Species Act, and other statutes.

The mitigation measures offered by the Navy to address other environmental risks fare no better. For example, the Navy's proposal for protecting endangered sea turtles from landside construction is lacking. Though admitting that the endangered turtles nest

seasonally on the beach where construction is planned, DEIS at 6-19, the Navy does not consider avoiding the nesting season but instead simply assures the public that consultation with the U.S. Fish and Wildlife Service will occur before any construction takes place during the nesting season. This assurance fails to provide information on actual protective measures that the public could comment on. The Navy also states that "known sea turtle nesting areas" would be marked and avoided, yet apparently fails to determine if such areas are static. The DEIS's conclusion that these measures are sufficient such that "no additional mitigation measures would be required" is unsupported and unreasonable. DEIS at 6-20.

In addition, the Navy states that "[p]re-construction surveys would be conducted for piping plover nesting activity, and if observed, appropriate avoidance measures would prevent impacts to piping plover." DEIS at 6-20. This statement is wholly inadequate under NEPA as it defers decision making and fact finding without public comment and after the USWTR site selection is finalized. Furthermore, no mitigation is considered, let alone offered, for a variety of impacts that the system may have on the local environment: the damage to hard-bottom habitat from cable construction and from operation of the range; the potential for magnetic disruption of post-nesting sea turtles; the discharge of hazardous material into the sea. See DEIS at 6-1 to 6-27. The Navy must address these issues in any final document.

Finally, we are disappointed that the Navy has selected a preferred site prior to the completion of the baseline analyses of marine mammal abundance at the proposed sites. DEIS at 6-14. As discussed elsewhere in this letter, proper siting to avoid significant marine mammal populations is the most important step the Navy can take to reduce harm to marine life from the proposed range. Yet the Navy has apparently selected its preferred site based on a calculus dominated by factors of convenience, without putting significant effort into finding a site where fewer marine mammals and other species will be harmed. See infra at VII ("Alternatives Analysis"). This DEIS has been in the works since 1996, a prior version with a different preferred alternative was issued in 2005 and subsequently withdrawn, and yet the abundance studies now underway could and should have been completed by now, not after site selection in order to assure a choice that satisfies both the Navy's need for training and proper protection of our marine resources. Looking for marine mammals "in support of [the] USWTR" preferred site upends the goals of NEPA and shows, once again, the nature of this document as a post hoc rationalization of a choice already made.

IX. CUMULATIVE IMPACTS

In order to satisfy NEPA, an EIS must include a "full and fair discussion of significant environmental impacts." 40 C.F.R. § 1502.1. It is not enough, for purposes of this discussion, to consider the proposed action in isolation, divorced from other public and private activities that impinge on the same resource; rather, it is incumbent on the Navy to assess cumulative impacts as well, including the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future significant actions." Id. § 1508.7. A meaningful cumulative

impact analysis must identify (1) the area in which the effects of the proposed project will be felt; (2) the impacts that are expected in that area from the proposed project; (3) other actions—past, present, and proposed, and reasonably foreseeable—that have had or are expected to have impacts in the same area; (4) the impacts or expected impacts from these other actions; and (5) the overall impact that can be expected if the individual impacts are allowed to accumulate. Grand Canyon Trust v. FAA, 290 F.3d 339, 345 (D.C. Cir. 2002) (quotation and citation omitted). The Navy "cannot treat the identified environmental concern in a vacuum." TOMAC v. Norton, 433 F.3d 852, 863 (D.C. Cir. 2006) (quoting Grand Canyon Trust, 290 F.3d at 345).

The Navy's cumulative impact analysis fails to meet these basic requirements. The Navy provides no support for its conclusion that the sum of the various environmental impacts that are enumerated will not be significant; moreover the Navy's analysis cannot provide such support because the Navy fails to explain what the sum of these impacts is expected to be. The Navy capriciously assumes that its thousands of hours of sonar activity will not result in the death of even a single animal. DEIS at 4.8-50. Instead, the Navy anticipates that the sonar activities will primarily result in "non-injurious" behavioral effects. DEIS at S-22, 4.3.88. To reach this conclusion, it simply assumes that all behavioral impacts are short-term in nature and cannot affect individuals or populations through repeated activity – even though the 100,100 annual takes anticipated at its preferred site would affect the same populations. DEIS 4.8-49. The Navy also offers the platitude that mitigation will preclude any potential adverse or long-term impacts on marine mammals and the marine environment. DEIS at 4.8-50. Those conclusions are factually insupportable given the lack of any population analysis or quantitative assessment of long-term effects in the document. It also misapprehends the definition of "cumulative impact," which, according to NEPA regulations, "can result from individually minor but collectively significant actions taking place over a period of time." 40 C.F.R. § 1508.7.

The Navy also concludes that "no significant cumulative impacts are anticipated" for marine mammals and that any potential cumulative effect "will not likely adversely affect sea turtle populations." DEIS at 4.8-50, 53. However, the Navy does not consider cumulative impacts for any species other than marine mammals and turtles. Nor does it attempt to examine any specific marine mammal population affected by the training area. (The result is that the combined effects of the USWTR activities, ship-strikes and fishing entanglements on the North Atlantic right whale, for example, cannot be ascertained.) Nor does the Navy consider the potential for acute synergistic effects from sonar training. Although the DEIS discusses the potential for ship strike in the training area, it does not consider the greater susceptibility to vessel strike of animals that have been temporarily harassed or disoriented by certain USWTR noise sources. The absence of analysis is particularly glaring in light of the 2004 Nowacek et al. study, which indicates that mid-frequency sources provoke surfacing and other behavior in North Atlantic right whales that increases the risk of vessel strike.[146] Nor does the Navy consider the synergistic effects of

[146] Nowacek et al., North Atlantic Right Whales, 271 Proceedings of the Royal Society of London, Part B: Biological Sciences at 227-31.

noise with other stressors in producing or magnifying a stress-response.[147] For these reasons alone, the Navy's conclusion that cumulative and synergistic impacts from USWTR sonar training are insignificant cannot plausibly be supported.

Although the Navy acknowledges that the USTWR area is crowded with human and military activities, many of which introduce noise, chemical pollution, debris, and vessel traffic into the habitat of protected species, it nonetheless concludes that only insignificant cumulative effects are anticipated. DEIS at 4.8-50. The idea that all of these events, when taken as a whole, are having at most "moderate, but recoverable, cumulative effects" (see DEIS at 4.8-50) is, to say the least, implausible.

Given the scope of the proposed action, the deficiencies of the Navy's cumulative impacts assessment represent a critical failure of the DEIS. At a minimum, the Navy must consider cumulative impacts on species other than marine mammals and turtles; evaluate the potential for cumulative impacts on populations that would occur on and near the range; and assess the potential for synergistic adverse effects (such as from noise in combination with ship-strikes).

X. PROJECT DESCRIPTION AND MEANINGFUL PUBLIC DISCLOSURE

Disclosure of the specific activities contemplated by the Navy is essential if the NEPA process is to be a meaningful one. See, e.g., LaFlamme v. F.E.R.C., 852 F.2d 389, 398 (9th Cir. 1988) (noting that NEPA's goal is to facilitate "widespread discussion and consideration of the environmental risks and remedies associated with [a proposed action]").

With regard to noise-producing activities, for example, the Navy must describe source levels, frequency ranges, duty cycles, and other technical parameters relevant to determining potential impacts on marine life. The DEIS provides some of this information, indicating the nominal source levels of SQS-53 and SQS-56 sonar, which are deployed from surface ships. DEIS at 4.3-47 to 48. But it fails to disclose sufficient information about helicopter dipping sonar, active sonobuoys, acoustic device countermeasures, training targets, or range sources that would be used during the exercise. DEIS at 4.3-43 to 48. Even with respect to the two hull-mounted systems, the DEIS refrains from giving any indication of platform speed, pulse length, repetition rate, beam

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[147] A.J. Wright, N. Aguilar Soto, A.L. Baldwin, M. Bateson, C.M. Beale, C.Clark, T. Deak, E.F. Edwards, A. Fernández, A. Godinho, L. Hatch, A. Kakuschke, D. Lusseau, D. Martineau, L.M. Romero, L. Weilgart, B. Wintle, G. Notarbartolo di Sciara, and V. Martin, "Do marine mammals experience stress related to anthropogenic noise?", 20 Inlemational Journal of Comparative Psychology, 274-316 (2007); see also Andrew J. Wright, Natacha Aguilar Soto, Ann L. Baldwin, Melissa Bateson, Colin M. Beale, Charlotte Clark, Terrence Deak, Elizabeth F. Edwards, Antonio Fernández, Ana Godinho, Leila Hatch, Antje Kakuschke, David Lusseau, Daniel Martineau, L. Michael Romero, Linda Weilgart, Brendan Wintle, Giuseppe Notarbartolo-di-Sciara, and Vidal Martin, "Anthropogenic noise as a stressor in animals: a multidisciplinary perspective," 20 International Journal of Comparative Psychology, 250-273 (2007).

widths, or operating depths—that is, most of the data that the Navy presumably used in modeling acoustic impacts. DEIS at C-1 to 15.

The Navy—despite repeated requests—has not released or offered to release CASS/GRAB or any of the other modeling systems or functions it used to develop the biological risk function or calculate acoustic harassment and injury. See, e.g., DEIS at 4.3-52 to 54. These models must be made available to the public, including the independent scientific community, for public comment to be meaningful under NEPA and the Administrative Procedure Act. 40 C.F.R. §§ 1502.9(a), 1503.1(a) (NEPA); 5 U.S.C. § 706(2)(D) (APA). In addition, guidelines adopted under the Data (or Information) Quality Act also require their disclosure. The Office of Management and Budget's guidelines require agencies to provide a "high degree of transparency" precisely "to facilitate reproducibility of such information by qualified third parties" (67 Fed. Reg. 8452, 8460 (Feb. 22, 2002)); and the Defense Department's own data quality guidelines mandate that "influential" scientific material be made reproducible as well. We encourage the Navy to contact us immediately to discuss how to make this critical information available.

XI. SCOPE OF REVIEW

As a threshold issue, we are concerned about the Navy's understanding of its obligations under applicable law. The Navy indicates that its analysis of "extraterritorial" activities, those activities that would take place outside U.S. territorial waters, was prepared under the authority of Executive Order 12114 rather than under NEPA. See DEIS at 1-13. Not only is this position on the scope of review inconsistent with the statute (see, e.g., Environmental Defense Fund v. Massey, 968 F.2d 528 (D.C. Cir. 1994) and NRDC v. Navy, No. CV-01-07781, 2002 WL 32095131 at *9-12 (C.D. Cal. Sept. 19, 2002)), but, insofar as it represents a broader policy, it provides further indication that current operations are likewise out of compliance. Most of the area used for sonar training is sited beyond the 12nm territorial boundary, within the U.S. Exclusive Economic Zone. If, as we expect, activities currently taking place there have not received their due analysis in a prior environmental impact statement, then the Navy is operating in ongoing violation of NEPA.

XII. COMPLIANCE WITH OTHER APPLICABLE LAWS

A number of other statutes and conventions are implicated by the proposed activities. Among those that must be disclosed and addressed during the NEPA process are the following:

(1) The Marine Mammal Protection Act ("MMPA"), 16 U.S.C. § 1361 et seq., which requires the Navy to obtain a permit or other authorization from NMFS or the U.S. Fish and Wildlife Service prior to any "take" of marine mammals. The Navy must apply for an incidental take permit under the MMPA, and NRDC will submit comments regarding the Navy's application to NMFS at the appropriate time.

(2) The Endangered Species Act, 16 U.S.C. § 1531 et seq., which requires the Navy to enter into formal consultation with NMFS or the U.S. Fish and Wildlife Service, and receive a legally valid Incidental Take Permit, prior to its "take" of any endangered or threatened marine mammals or other species, including fish, sea turtles, and birds, or its "adverse modification" of critical habitat. See, e.g., 1536(a)(2); Romero-Barcelo v. Brown, 643 F.2d 835 (1st Cir. 1981), rev'd on other grounds, Weinberger v. Romero-Carcelo, 456 U.S. 304, 313 (1982). The Navy must consult with NMFS over numerous endangered and threatened species including, but not limited to, North Atlantic right whales, humpback whales, sei whales, fin whales, blue whales, sperm whales, manatees, hawksbill sea turtles, leatherback sea turtles, green sea turtles, loggerhead sea turtles, Kemp's ridley sea turtles, piping plovers, wood storks, red-cockaded woodpeckers, Bachman's warblers, shortnose sturgeon, smalltooth swordfish, sea-beach amaranth, Canby's dropwort, pondberry, American chaffseed, and rough-leaved loosestrife.

(3) The Coastal Zone Management Act, and in particular its federal consistency requirements, 16 U.S.C. § 1456(c)(1)(A), which mandate that activities that affect the natural resources of the coastal zone—whether they are located "within or outside the coastal zone"—be carried out "in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs." The Navy must fulfill its CZMA commitments.

(4) The Magnuson-Stevens Fisheries Conservation and Management Act, 16 U.S.C. § 1801 et seq. ("MSA"), which requires federal agencies to "consult with the Secretary [of Commerce] with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken" that "may adversely affect any essential fish habitat" identified under that Act. 16 U.S.C. § 1855 (b)(2). In turn, the MSA defines essential fish habitat as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." 16 U.S.C. § 1802 (10). The preferred alternative site contains such habitat. As discussed at length above, anti-submarine warfare exercises alone have the significant potential to adversely affect at least the waters, and possibly the substrate, on which fish in these areas depend. Under the MSA, a thorough consultation is required.

(5) The Marine Protection, Research and Sanctuaries Act, 33 U.S.C. § 1401 et seq., which requires federal agencies to consult with the Secretary of Commerce if their actions are "likely to destroy, cause the loss of, or injure any sanctuary resource." 16 U.S.C. § 1434(d)(1). Since the Navy's exercises would cause injury and mortality of species, consultation is clearly required if sonar use takes place either within or in the vicinity of the sanctuary or otherwise affects its resources. Since sonar may impact sanctuary resources even when operated outside its bounds, the Navy should indicate how close it presently operates, or foreseeably plans to operate, to such sanctuary and consult with the Secretary of Commerce as required.

In addition, the Sanctuaries Act is intended to "prevent or strictly limit the dumping into ocean waters of any material that would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities" (33 U.S.C. § 1401(b)), and prohibits all persons, including Federal agencies, from dumping materials into ocean waters, except as authorized by the Environmental Protection Agency. 33 U.S.C. §§ 1411, 1412(a). The Navy has not indicated its intent to seek a permit under the statute.

(6) The Migratory Bird Treaty Act, 16 U.S.C. § 703 et seq. ("MBTA"), which makes it illegal for any person, including any agency of the Federal government, "by any means or in any manner, to pursue, hunt, take, capture, [or] kill" any migratory birds except as permitted by regulation. 16 U.S.C. § 703. After the District Court for the D.C. Circuit held that naval training exercises that incidentally take migratory birds without a permit violate the MBTA, (see Center for Biological Diversity v. Pirie, 191 F. Supp. 2d 161 (D.D.C. 2002) (later vacated as moot)), Congress exempted some military readiness activities from the MBTA but also placed a duty on the Defense Department to minimize harms to seabirds. Under the new law, the Secretary of Defense, "shall, in consultation with the Secretary of the Interior, identify measures-- (1) to minimize and mitigate, to the extent practicable, any adverse impacts of authorized military readiness activities on affected species of migratory birds; and (2) to monitor the impacts of such military readiness activities on affected species of migratory birds." Pub.L. 107-314, § 315 (Dec. 2, 2002). As the Navy acknowledges, migratory birds occur within the preferred alternative. The Navy must therefore consult with the Secretary of the Interior regarding measures to minimize and monitor the effects of the proposed range on migratory birds, as required.

(7) Executive Order 13158, which sets forth protections for marine protected areas ("MPAs") nationwide. The Executive Order defines MPAs broadly to include "any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein." E.O. 13158 (May 26, 2000). It then requires that "[e]ach Federal agency whose actions affect the natural or cultural resources that are protected by an MPA shall identify such actions," and that, "[t]o the extent permitted by law and to the maximum extent practicable, each Federal agency, in taking such actions, shall avoid harm to the natural and cultural resources that are protected by an MPA." Id. The Navy must therefore consider and, to the maximum extent practicable, must avoid harm to the resources of all federally- and state-designated marine protected areas.

The proposed activities also implicate the Clean Air Act and Clean Water Act as well as other statutes protecting the public health. The USWTR exercises cannot legally be undertaken absent compliance with these and other laws.

XIII. CONFLICTS WITH FEDERAL, STATE, AND LOCAL LAND-USE PLANNING

NEPA requires agencies to assess possible conflicts that their projects might have with the objectives of federal, regional, state, and local land-use plans, policies, and controls. 40 C.F.R. § 1502.16(c). The Navy's training and testing activities may certainly affect resources in the coastal zone and within other state and local jurisdictions, in conflict with the purpose and intent of those areas. The consistency of Navy operations with these land-use policies must receive more thorough consideration.

XIV. ALTERNATIVES ANALYSIS UNDER SECTION 102(2)(E) OF NEPA

Above and beyond the EIS requirement, NEPA directs agencies to "study, develop, and describe appropriate alternatives" to any project that presents "unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(2)(E). Courts have concluded that this duty is "both independent of, and broader than, the EIS requirement." Bob Marshall Alliance v. Hodel, 852 F.2d 1223, 1229 (9th Cir. 1988), cert. denied, 109 S.Ct. 1340 (1989). Because the Navy's proposal presents "unresolved conflicts" about the proper use of "available resources," the Navy must explicitly address its separate and independent obligations under section 4332(2)(E).

CONCLUSION

For the reasons set forth above, we urge the Navy to withdraw its DEIS and to revise the document to comply with federal law.

Very truly yours,

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Taryn Kiekow
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Encl.: NRDC extension request letter