NATURAL RESOURCES DEFENSE COUNCIL

By Regular Mail

May 14, 2008

Naval Facilities Engineering Command, Southwest
Attention: SOCAL EIS Project Manager (Code REVPO)
1220 Pacific Highway
Building 127
San Diego, CA 92132-5190

Re: Draft Environmental Impact Statement/ Overseas Environmental Impact Statement for the Southern California Range Complex

Dear Sir or Madam:

On behalf of the Natural Resources Defense Council ("NRDC'), The Humane Society of the United States, the International Fund for Animal Welfare, Whale and Dolphin Conservation Society, Cetacean Society International, League for Coastal Protection, the International Ocean Noise Coalition, Ocean Mammal Institute, Seaflow, and Ocean Futures Society and its founder Jean-Michel Cousteau, and on behalf of our millions of members, many thousands of whom reside in California, we are writing to submit comments on the Navy's Draft Environmental Impact Statement/ Overseas Environmental Impact Statement for the Southern California Range Complex ("DEIS"). See 73 Fed. Reg. 18522 (Apr. 4, 2008).[1]

It is important to recognize, at the outset, the context in which this review is being undertaken. The Navy's release of this DEIS comes in the wake of several federal court decisions that have found numerous, critical violations of law in its environmental assessments of active sonar training. See 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, __ F.Supp.2d __, 2008 WL 564664 (D. Hawaii 2008). These violations extend well beyond the Navy's illegal adoption of a Finding of No Significant Impact and its failure to prepare an EIS, but implicate its impact assessment, its alternatives analysis, and its

[1] NRDC is aware that comments may be submitted separately by government agencies, individual scientists, environmental organizations, and the public. All of these comments are hereby incorporated by reference, as are public comments submitted on draft NEPA comments for other Navy ranges and operating areas, including the East Coast Undersea Warfare Training Range, the Hawaii Range Complex, and Atlantic Fleet Active Sonar Training activities. 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.

consideration of ways to mitigate the harmful effects of its exercises. And yet we have not seen any indication, in the Draft EISs already issued for other ranges or in the present document, that the Navy has yet corrected its deeply flawed approach to environmental review. To the contrary, it seems to have fallen back on a hard-line position that is more reflective of certain political dynamics within the Fleets and in Washington than with any operational, legal, or environmental reality.

It is undisputed that sound is a fundamental element of the marine environment. Whales, fish, and other wildlife depend on it for breeding, feeding, navigating, and avoiding predators—in short, for their survival. Many of the exercises proposed for the southern California range would employ the same hull-mounted sonar systems that have been implicated in mass injuries and mortalities of whales around the globe. The same technology is also known to affect marine mammals in countless other ways, such as by inducing panic responses, displacing animals from habitat, and disrupting crucial behavior such as foraging. Impacts on California's coastal environment would be significant. The Navy's "preferred alternative" would more than double the amount of sonar use from surface ships, more than double the number of active sonobuoys deployed on the range, and would increase the use of aerial dipping sonar by a factor of ten over what was annually estimated for SOCAL major exercises in the Navy's prior environmental assessment. That lower level of sonar use has already been determined by a federal court to cause widespread harm and disrupt marine mammals off California at a population level. NRDC v. Winter, 2007 WL 2481037 at *10 (C.D. Cal. 2007), aff'd 518 F.3d 658, 696-97 (9th Cir. 2008).

The vast area encompassed by the SOCAL Range Complex contains some of the richest marine habitat in the world. Under these circumstances, the Navy's exercises must be undertaken with particular care, dictated not by assertions of convenience or of history, but by one fundamental recognition: that 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 planning exercises, 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. The DEIS released by the Navy falls far short of these standards. To cite just a few examples:

- The Navy assumes that no marine mammals would be seriously injured or killed at sea, despite a growing, peer-reviewed, scientific record of injuries and mortalities and several court decisions that have rejected the Navy's claims.[2] It takes this position even though the California coast has been identified by experts as one of

[2] See sections II(A)(1)(a) and (A)(2) below.

the world's "key areas" for beaked whales, a family of species whose dangerous sensitivity to mid-frequency sonar is well known.[3]

● It has manipulated data and thrown out nearly the entire literature on behavioral impacts on marine mammals, in support of an abstract model that contradicts the actual evidence of harm.[4]

● 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 and much of the same habitat would repeatedly be affected, year after year.[5]

● 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.

● It adopts precisely the same mitigation that a federal court has found to be "woefully inadequate and ineffectual" (NRDC v. Winter, 2007 WL 2481037 at *8-9 (C.D. Cal. 2007), aff'd 508 F.3d 885 (9th Cir. 2007)), 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 summarily declines to put even a single square mile of habitat within its 120,000 nm^2 range off limits to sonar training and, indeed, has refused even to evaluate possible geographic alternatives. It takes this position in spite of several contrary court decisions, the determinations of the California Coastal Commission, past Navy practice, and agreement within the scientific community that the avoidance of vulnerable habitat represents one of the most effective means of reducing impacts from mid-frequency sonar.

● It commits itself—without any analysis of alternatives—to build an instrumented range on Cortes and Tanner Banks: an extremely productive offshore area that hosts a globally important population of endangered blue whales, has the highest recorded densities of endangered fin whales and other species in the region, and supports some of the highest catch rates of commercial fisheries in southern California.

● It insists that its proposed activities are consistent to the "maximum extent practicable" with the California Coastal Act and coastal zone management plan (DEIS at 6-5)—notwithstanding previous findings to the contrary by the California Coastal Commission and an adverse ruling before a federal court on precisely this

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[3] C.D. MacLeod and G. Mitchell, Key Areas for Beaked Whales Worldwide, 7 J. Cetacean Res. Manage. 309-22 (2006).

[4] See section II(A)(3) below.

[5] See section II(D) below.

issue. NRDC v. Winter, 2007 WL 2481037 at *8-9 (C.D. Cal. 2007), aff'd 508 F.3d 885 (9th Cir. 2007).

All of this clearly suggests the sort of post hoc decision-making that NEPA was intended by Congress to avoid.

In short, 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, state management agencies, and the published science. We urge the Navy to revise its analysis consistent with federal law 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, as described below.

I. IMPACTS OF HIGH-INTENSITY 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; in the Bahamas, the Canaries, Hawaii, Spain, Alaska, and other spots around the world.[6] 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."[7] In the United States, an expert report commissioned by the Navy said much the same thing.[8]

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:

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

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

[8] 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(A)(2).

- 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;
- 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.[9]

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.[10] 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 NAVY'S COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

Enacted by Congress in 1969, NEPA establishes a national policy to "encourage productive and enjoyable harmony between man and his environment" and "promote efforts which will prevent or eliminate damage to the environment and biosphere and

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[9] 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).

[10] See the discussion below, at section II(C) of "Impacts on Fish and Fisheries."

stimulate the health and welfare of man." 42 U.S.C. § 4321. In order to achieve its broad goals, NEPA mandates that "to the fullest extent possible" the "policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with [NEPA]." 42 U.S.C. § 4332. As the Supreme Court explained,

NEPA's instruction that all federal agencies comply with the impact statement requirement—and with all the requirements of § 102—"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).

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 environmental impact statement. Steamboaters v. F.E.R.C., 759 F.2d 1382, 1392 (9th Cir. 1985) (emphasis in original). 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). 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 established under NEPA.

A. Impacts on Marine Mammals

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 on marine mammals is consistently undermined by its failure to meet these fundamental responsibilities of scientific integrity, methodology, investigation, and disclosure. As with the Navy's 2007

environmental assessment for major SOCAL exercises, the DEIS excludes a great deal of relevant information adverse to the Navy's interests, uses approaches and methods that would not be acceptable to 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.

The Navy's assessment is also out of line with its past analysis for major exercises on the SOCAL range. Although the sonar hours from surface ships alone would more than double—increasing by 213%—under the Navy's preferred alternative, and even though the number of sonobuoy deployments would also double and dipping sonar uses increase ten-fold, the total number of takes would increase by only 33% over what was annually estimated for SOCAL major exercises in the Navy's 2007 environmental assessment.[11] At the same time, the Navy concludes that its preferred alternative would result in fewer than 10% of the injuries formerly calculated to occur during its major SOCAL exercises.[12] These downward estimates do not reflect any new discoveries in the science of marine mammals and noise; rather, they are the consequence of new methodologies that are belied by the record.

1. Thresholds of Injury, Hearing Loss, and Significant Behavioral Change

At the core of the Navy's assessment of acoustic impacts on the training range are the thresholds it has established for physical injury, hearing loss, and significant behavioral harassment, the levels above which meaningful effects on marine mammals are found to occur. There are gross problems with the Navy's thresholds here.

a. Injury Threshold

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 "threshold shift") in marine mammals. DEIS at 3.9-44. Beneath this decision lies an assumption that the tissues of the ear are "the most susceptible to physiological effects of underwater sound" (DEIS at F-158), and, indeed, a few paragraphs are spent in an effort to set aside other types of injury that have been identified or observed. Unfortunately, the Navy's position is inconsistent with the scientific literature, with the legal standard of review, and with recent court decisions. See NRDC v. Winter, 527 F.Supp.2d 1216 (C.D. Cal. 2008), aff'd __ F.3d __, 2008 WL 565680 (9th Cir. 2008); Ocean Mammal Institute v. Gates, 2008 WL 564664 (D. Hawaii 2008).

[11] Compare and DEIS at 3.9-69, 71 and Navy, Joint Task Force Exercises and Composite Training Unit Exercises Environmental Assessment/ Overseas Environmental Assessment 4-78 (2007).

[12] Id.

First, 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.[13] 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.[14] (In another context, where it wishes to dismiss evidence of impacts to hearing at lower levels than its standard allows, the Navy refers to the statistical mean as "'the best unbiased estimator.'" DEIS at F-168.) Factoring in duration, then, evidence of actual sonar-related mortalities would compel a maximum energy level ("EL") threshold for serious injury on the order of 182 dB re 1 $\mu Pa^{2}\bullet s$, 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 $\mu Pa^{2}\bullet s$.[15] The Navy's claim that no beaked whales would suffer injury, let alone serious injury or mortality, because none would be exposed to levels above 215 dB re 1 μPa is simply not tenable.

Second, the DEIS fails to take proper account of published research on bubble growth in marine mammals, which separately indicates the potential for injury and death at levels far lower than 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;[16] in addition, it was singularly and explicitly highlighted as plausible by an expert panel

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[13] 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.

[14] 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).

[15] 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).

[16] 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).

convened by the Marine Mammal Commission, in which the Navy participated.[17] The Navy's argument to the contrary simply misrepresents the available literature. What is more, the default assumption in the DEIS—that whales suffer injury only through the physical act of stranding itself (or through direct tissue injury)—has been soundly rejected in the literature.[18] The Navy's refusal to consider these impacts is insupportable under NEPA. 42 C.F.R. §§ 1502.22, 1502.24.

Third, the numbers do not reflect other non-auditory physiological impacts, as from stress and from chronic exposure during development, which are discussed further among "Other Impacts on Marine Mammals" (below).

Fourth, the Navy's exclusive reliance on energy flux density as its unit of analysis does not take other potentially relevant acoustic characteristics into account. For example, an expert group commissioned by the Office of Naval Research in 2003 to provide recommendations on mitigation suggested that peak power may matter more to beaked whale mortalities than integrated energy.[19] Reflecting this uncertainty, the Navy should establish a dual threshold for marine mammal injury.

Fifth, the Navy's calculation of permanent threshold shift (which it equates to the onset on injury) is based on studies of temporary threshold shift that, as discussed below, have a number of significant limitations.

b. Hearing Loss Threshold

The DEIS sets its threshold for temporary hearing loss, or "threshold shift" ("TTS"), at 195 dB re 1 $\mu Pa^{2\bullet}s$. DEIS at 3.9-44. It bases this threshold primarily on a synthesis of studies on two species of 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 F-161 to F-162.

First, 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

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[17] 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, 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).

[18] Id.

[19] Levine, Active Sonar Waveform at 27.

any cetacean. Yet, as noted below at subsection (c) ("Threshold for Significant Behavioral Change"), 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.[20] 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.[21]

Second, the small size of the data set generated by these studies leads the Navy to some arbitrary interpretations. For example, the Navy effectively excludes the results of one study that found threshold shift originating in a bottlenose dolphin at 190 re 1 $\mu Pa^{2\bullet}s$, which is a full 5 dB re 1 $\mu Pa^{2\bullet}s$ below its proposed standard. DEIS at F-162. The basis for this exclusion is the equal energy hypothesis: if you assume that the threshold for hearing loss decreases by a constant amount as the duration of a sound increases, you can fit a straight line connecting the data points that the studies have produced. Yet where the line falls can remain somewhat arbitrary given the small number of points on the chart. In this case, the Navy relied heavily for its line-drawing on a single data point, from a single subject, lying at a distance from the main data cluster (Nachtigall et al. 2003b). Alternatively, it might have dropped the line about 5 dB lower, which would have brought it closer to a third cluster, made of multiple data points from multiple subjects, and conformed more exactly to the point above which TTS was consistently found in the main cluster. See DEIS at F-162. In other words, the Navy's own graphic indicates that a 190 dB re 1 $\mu Pa^{2\bullet}s$ threshold would have fit its data better than the threshold it established and would have had the advantage of being marginally more conservative given the enormous uncertainties—yet there is no justification in the DEIS for the choice it made. The Navy's assumption of a 195 re 1 $\mu Pa^{2\bullet}s$ EL threshold in the present DEIS, as in all documents that depend on the same methodology, is arbitrary and capricious.

c. Threshold for Significant Behavioral Change

The threshold used in the DEIS differs from the one used by the Navy to estimate marine mammal take during RIMPAC 2006 and during subsequent major exercises off California and Hawaii. In short, instead of using an EL standard of 173 dB re 1 $\mu Pa^{2\bullet}s$, which NMFS had insisted the Navy adopt (and which is itself non-conservative), the Navy rather applies a dose-response function that begins at 120 dB re 1 μPa and reaches its mean at 165 dB re 1 μPa.

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

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

In the Hawaii Range Complex, the only region for which comparative data are directly available, the change from the Navy's current standard is significant. Under the current standard, the RIMPAC 2006 event was expected to result in slightly less than 33,000 behavioral takes of marine mammals; under the proposed one, RIMPAC events conducted with the same number of hours of sonar use would supposedly cause fewer than 6,000 takes.[22] Under the current standard, the conduct of 6 USWEX events was predicted to cause over 30,000 behavioral takes of marine mammals; under the proposed one, annual takes would not exceed 20,000.[23]

The SOCAL Range Complex seems to present a very similar picture. The Navy estimates that existing levels of sonar training in SOCAL would result each year in approximately 83,600 behavioral takes of marine mammals; and yet, on applying the current standard in its 2007 environmental assessment, the Navy found that 80,600 behavioral takes would result each year from major exercises alone—exercises that represent roughly half of all mid-frequency sonar use on the range.[24] In other words, the DEIS would have us accept that a doubling in the amount of modeled sonar use would increase takes by only 3-4 percent. All of these data suggest that the Navy's new take estimates—while still large—represent far less than what it would have predicted had it continued to use the previous EL-based standard of 173 re 1 μPa^{2}•s.

As the Navy should well know, agencies are not entitled to substantial deference under the Administrative Procedure Act when they reverse previously held positions. Among the most significant problems:

First, the Navy again relies on inapposite studies of temporary threshold shift in captive animals for its primary source of data. 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 inquiry. Cf. 42 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.[25] Indeed, the disruptions observed by Navy scientists, which included pronounced, aggressive behavior

[22] Navy, Hawaii Range Complex Draft Supplemental Environmental Impact Statement/ Overseas Environmental Impact Statement at 3-24 (2008).

[23] Id. at 3-36.

[24] DEIS at 3.9-69, 3.9-71; Navy, Joint Task Force Exercises and Composite Training Unit Exercises Environmental Assessment/ Overseas Environmental Assessment 4-46 (2007).

[25] 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).

("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.[26] The SPAWAR studies have several other major deficiencies that NMFS, among others, has repeatedly pointed out; and in relying so heavily on them, the Navy has once again ignored the comments of numerous marine mammal behaviorists on the Navy's USWTR DEIS, which sharply criticize the Navy for putting any serious stock in them.[27]

Second, 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 (see discussion below at section A.2). DEIS at 3.9-51. 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.[28] 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.

Third, 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.[29] The Navy has from the beginning denied any connection between its major international exercise and the mass stranding; but the Navy's specious reasoning is at odds

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[26] 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).

[27] 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).

[28] 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); Declaration of David E. Bain, NRDC v. Winter, CV 07-0335 FMC (FMOx) (C.D. Cal. 2007).

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

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.[30] The Navy's failure to incorporate these numbers into its methodology as another data set is not remotely justifiable.

Fourth, the Navy excludes a substantial body of research on wild animals (and some research on other experimental animals as well, within a behavioral experimental protocol). Perhaps most glaringly, while the related DEIS prepared for the Navy's Atlantic Fleet Active Sonar Training activities appears to acknowledge the strong sensitivity of harbor porpoises by setting an absolute take threshold of 120 dB (SPL)—a sensitivity that, as NMFS has noted, is reflected in numerous wild and captive animal studies—it improperly fails to include any of these studies in its data set.[31] The result is clear bias, for even if one assumes (for argument's sake) that the SPAWAR data has value, the Navy has included a relatively insensitive species in setting its general standard for marine mammals while excluding a relatively sensitive one.

By placing great weight on the SPAWAR data, excluding other relevant data, and misusing the Haro Strait data, the Navy has produced a risk function that is belied by the existing record: one that clearly demonstrates high risk of significant behavioral impacts from mid-frequency sources, including mid-frequency sonar, on a diverse range of wild species (e.g., right whales, minke whales, killer whales, harbor porpoises, Dall's porpoises) at levels below the function curve.[32] Given the high sensitivity in the Navy's model, standards that

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[30] 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).

[31] Navy, Draft Atlantic Fleet Active Sonar Training Environmental Impact Statement/ Overseas Environmental Impact Statement 4-48, 4-50-51 (2008).

[32] 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).

more accurately reflect existing data would produce take numbers far in excess of those calculated here.

Fifth, 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, as described below, 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. 42 C.F.R. § 1502.16(b).

Sixth, 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").

Seventh, 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.[33]

For all these reasons, the thresholds of injury, hearing loss, and significant behavioral change utilized by the Navy in this DEIS are fundamentally inconsistent with the scientific literature on acoustic impacts, and, indeed, with marine mammal science in general, and, if used to support a Record of Decision, would violate NEPA. Please note that a more technical analysis of the Navy's behavioral risk function methodology will be submitted during the present public comment process by Dr. David Bain, and his comments are hereby incorporated by reference.

2. Strandings and Mortalities Associated with Mid-Frequency Sonar

[33] 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).

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.

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.[34] 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.[35] It is now accepted that these mortalities were caused, through an unknown mechanism, by the Navy's use of mid-frequency sonar.

The Bahamas event is one of numerous mortality events coincident with military activities and active sonar that have now been documented:[36]

(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.[37] 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.[38] An additional stranding of Cuvier's beaked whales, also coinciding with a naval exercise, occurred in 1991.[39] It was reported that mass live strandings occurred each time exercises took place in the area.[40]

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

[35] Id.

[36] 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).

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

[38] Id.

[39] 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).

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

(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.[41] 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.[42] The following year saw nine additional Cuvier's beaked whales strand off Greece, again coinciding with naval activity.[43]

(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 from the Islands reported the presence of "loud naval sonar."[44] 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.[45] In January 1998, according to a NMFS biologist, a beaked whale "stranded suspiciously" at Vieques as naval exercises were set to commence offshore.[46]

(4) Bahamas 2000 – As described above.

(5) Madeira 2000 -- In May 2000, three beaked whales stranded on the beaches of Madeira (and one found floating dead in the water) 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."[47]

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

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

[43] 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).

[44] 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).

[45] 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).

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

[47] 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).

(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.[48] 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.[49] 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.[50]

(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 porpoises and killer whales seemed to stampede all at once . . . in response to a loud electronic noise echoing through" the Strait.[51] 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 harbor porpoises fleeing the vessel in large numbers.[52] 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.[53]

(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

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[48] 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.

[49] 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.

[50] 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.

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

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

[53] 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.

sonar in RIMPAC 2004 was the "plausible, if not likely" cause of the stranding.[54]

(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.[55] The probability that the whales died at sea is extremely high.[56]

(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.[57]

(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.[58] A NATO response force was performing exercises within 50 miles at the time of the strandings. DEIS at F-136 to F-137.

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[54] 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).

[55] 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).

[56] Id.

[57] 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).

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

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.[59] 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.[60] It is well understood in terrestrial ecology that dead and dying animals tend to be grossly undercounted given their rapid assimilation into the environment, and one would of course expect profound difficulty where offshore marine species are concerned.[61]

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."[62] 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

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[59] 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).

[60] 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).

[61] 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).

[62] 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.

published work in other fields, and by expert reviews.[63] 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.[64]

In this light, the Navy's assessment of the risk of marine mammal injury and mortality is astonishingly poor. Despite the presence of several beaked whale species, including Cuvier's beaked whales, within the exercise area, the DEIS assumes away the potential for strandings and injuries of beaked whales.

In its analysis, the Navy capriciously (1) denies the potential for beaked whale mortalities during the myriad training and testing activities proposed for the SOCAL range; (2) dismisses the potential for sonar to injure whales at sea, grossly mischaracterizing the literature; (3) fails to consider the potential for strandings and mortalities in other species of cetaceans; (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; and (5) states (without basis) that the "main determinant of causing a stranding appears to be exposure in a narrow channel with no egress" (DEIS at 3.9-63), which the Navy then claims (without basis) could not occur on the SOCAL range. As we have previously noted, NMFS' own analysis is problematic primarily in its conclusions about the injury threshold and in its treatment of the potential for injury at sea (71 Fed. Reg. 20995, 21002), which do not reflect the best available science and violate NEPA. 42 C.F.R. § 1502.22 (requiring agencies to evaluate all "reasonably foreseeable" impacts).

3. 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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[63] Cox et al., Understanding the Impacts. For additional papers, see also the studies referenced at section II(A)(1)(a) ("Injury Threshold"). 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.

[64] 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).

(1) As discussed above, the thresholds established for injury, hearing loss, and significant behavioral change 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 incident),[65] 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, and fails to consider the combined effects of multiple exercises, which, as NMFS indicates, may have played a role in the 2004 Hanalei Bay strandings;[66]

(4) In assuming animals are evenly distributed, the model completely 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; and[67]

(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.

In addition, the Navy's analysis of marine mammal distribution, abundance, population structure, and ecology contains false or misleading assumptions that tend both to underestimate cumulative impacts on California species and to impede consideration of reasonable alternatives and mitigation measures. For example:

(1) Abundance modeling in discrete areas: The DEIS does not account for the frequency of sightings of marine mammal species in certain discrete areas, such as Cortes and Tanner Banks. See DEIS at F-90 to F-105. Blue and fin whales, common and Pacific white-sided dolphins, and California sea lions are frequently seen near and around these features, particularly in the warm-water months. While the DEIS notes the limitations of assuming uniform distribution and generally comments on habitat elements that may attract animals (e.g., greater prey abundance, lower predation), it then ignores the clumping that clearly manifests in the Appendix F figures. Given these actual distribution patterns, seasonal avoidance of these areas could reduce acoustic exposures for many species during exercises, but there is no attempt in the DEIS to address this possibility.

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[65] 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).

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

[67] 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.

(2) Conflation of marine mammal densities: Although the SOCAL range complex comprises some 120,000 nm^2 of ocean, the Navy presents its density (and take) estimates in a single set of charts that conflate marine mammal abundance (and expected impacts) across a diversity of habitat. These results do not meaningfully reflect the Navy's Marine Resources Assessment for the SOCAL Range Complex (as summarized in the Navy's 2007 environmental assessment for major SOCAL exercises), which found significant differences in marine mammal densities across waters of varying depths and between large blocks studied by NMFS' Southwest Fisheries Science Center.[68] For example, the Navy does not appear even to consider densities south of 30ºN, even though the range extends well south of that line and even though densities there are considerably lower, on average, than those to the north. By conflating these data—and by failing to present other data on the habitat preferences of particular species, also contained in its Marine Resources Assessment and summarized in its 2007 environmental assessment—the Navy has not only precluded its own analysis of geographic alternatives, but has prevented the public from understanding a critical element of its decision-making, contrary to NEPA.

(3) Population estimates: The DEIS uses a mix of sources for its population estimates for marine mammal species, including recent publications from Southwest Fisheries Science Center and entries from the U.S. Pacific Stock Assessment Report available at the time the DEIS was being written. We believe the DEIS should use the most conservative population estimate available from any of its sources (which is usually, but not always, the minimum population estimate provided in NMFS' Stock Assessment Reports); but at the very least it should incorporate information from the 2007 Stock Assessment Report (NOAA-TM-NMFS-SWFSC-414), which contains updates on several species whose assessments had not been revised in years. As noted below, it also indicates abundances for several populations that are significantly smaller—and thus imply smaller levels of potential biological removal—than the DEIS suggests.

(4) Blue whales: The DEIS makes several significant errors in its analysis of the blue whale population off southern California—the densest and largest aggregation of endangered blue whales in the world. First, it uses an outdated abundance estimate for the eastern north Pacific population, relying on NMFS' 2006 stock assessments, which assume 550 more animals than are projected by the most recent 2007 stock assessment (1,744 versus 1,186). Second, it assumes that blue whale densities are uniform across the seasons, even though, as it notes elsewhere, the animals are hardly present on the range during the cold-water months. (The error matters, of course, not only for the Navy's estimates of takes, but for its consideration of seasonal mitigation.) Finally, it asserts that eastern north Pacific blue whales have been increasing "during the past two

[68] Navy, Joint Task Force Exercises and Composite Training Unit Exercises Environmental Assessment/ Overseas Environmental Assessment A-13 to A-14 (2007).

decades" while citing only three references, all from the early to mid-1990s; more recent estimates are more equivocal about the abundance trends in this population and, moreover, do not account for recent patterns of mortality and morbidity (as, for example, the pattern of deaths related to vessel collisions off California).

(5) Sei whales: NMFS' 2007 Stock Assessment Report provides a lower abundance estimate for eastern north Pacific sei whales (43 individuals, with a minimum of 27) than the DEIS assumes (56 individuals). Given this very small number, the latest report allows that fewer than one sei whale can be removed each year without compromising the stock's ability to attain or maintain its optimal sustainable population; indeed, given a 2003 ship-strike, the stock assessment clarifies that anthropogenic take has exceeded the level of potential biological removal for the population. The DEIS' use of minke whale data as a proxy for sei whale distribution is almost certainly ill-advised, given *inter alia* the considerable size difference between the species.

(6) Gray whales: The DEIS inappropriately cites an outdated estimate that significantly undercounts the number of animals remaining in the California gray whale population. The estimate it uses, which it mistakenly credits to NMFS' 2006 Stock Assessment Report for the Alaska region (and which has not been adopted by NMFS since 2002), assumes that the gray whale population is about 50% higher than calculated in the latest Alaska report (or 26,635 versus the report's 18,178 animals). We further note that the DEIS does not discuss other "human impacts" on this species—such as the unusual mortality event that occurred in 1999-2000 or the on-going concern with "skinny" and "stinky" whales, as reported out of the Scientific Committee of the International Whaling Commission and summarized in the 2007 Alaska Stock Assessment Report. In all, there remains significant concern over the status and health of this population, which, according to the best available scientific evidence, is substantially smaller than the Navy suggests.

(7) Sperm whales: The DEIS appears to provide no discussion of sperm whales south of 30°N, even though NMFS' recent stock assessments, reflecting work by the Southwest Fisheries Science Center, describe a sperm whale stock off the west coast of Baja California, with a population abundance of 1,640 animals.

(8) Baird's beaked whales: The population estimate cited in the DEIS, which—as with certain other species, is mistakenly credited to NMFS' 2006 Stock Assessment Report for the Pacific Region—runs more than three times higher than the latest abundance figures for Baird's beaked whales (1,005 versus 313 animals). Due to the small number of beaked whales in this stock, NMFS believes that only 2 individuals can be lost through anthropogenic take without compromising its optimal sustainable population.

(9) Sea otters: The information provided in the DEIS on the southern sea otter is extremely outdated. The studies it references date, for the most part, from the mid 1990s or earlier, although much has changed in this population in the decade and a half since. For example, the most recent abundance information provided in the DEIS (running up to 1994) suggests the population is increasing; in fact the population appeared to significantly decrease over the following four years.[69]

4. Other Impacts on Marine Mammals

As the Navy's conceptual impact model suggests, the training and testing activities proposed for the SOCAL Range Complex 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.[70] 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."[71] And one might add, following studies on terrestrial mammals, that 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.[72] Because physiological stress responses are highly conservative across species, it is reasonable to assume that marine mammals would be subject to the same effects, particularly—as appears to be the case here—if they are resident animals exposed repeatedly to a variety of

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[69] See U.S. Fish and Wildlife Service, Final Revised Recovery Plan for the Southern Sea Otter (Enhydra lutris nereis) (2003).

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

[71] 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?" (in press and forthcoming 2008); 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).

[72] 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).

stressors in the SOCAL Range Complex. Yet despite the potential for stress in marine mammals and the significant consequences that can flow from it, the Navy assumes that such effects would be minimal. We note that substantial work on noise-related "stress" in marine mammals is shortly to be published, and we strongly encourage the Navy to revise its DEIS accordingly.

(2) The Navy fails to consider the risk of ship collisions with large cetaceans, as exacerbated by the use of active acoustics. As noted below, 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.[73] 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 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 exercises. Careful study is needed into the way they might disperse and circulate around the islands and how they may affect marine wildlife. The Navy's analysis of hazardous materials is therefore incomplete.

(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 exercises that would be authorized. See id. § 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 at a farther remove. See id. § 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).[74] 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. 42 C.F.R. § 1502.16(b).

B. Impacts on Fish and Fisheries

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

[74] "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.

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.[75]

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."[76] 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.[77] 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.[78] 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.[79] 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.[80]

Nor is hearing loss 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 seriously altering the behavior of some commercial

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[75] 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).

[76] 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).

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

[78] Id.

[79] 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.

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

species.[81] 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.[82] Drops in catch rates in these experiments range from 40 to 80 percent.[83] 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.[84]

In their comments on the Navy's DEIS for the proposed Undersea Warfare Training Range, off North Carolina, several fishermen and groups of fishermen independently reported witnessing sharp declines in catch rates of various species when in the vicinity of Navy exercises.[85] 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. In addition, as NMFS itself 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.[86] 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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[81] 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).

[82] 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).

[83] Id.

[84] 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.

[85] 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).

[86] 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).

Finally, high mortalities from noise exposure are seen in developmental stages of fish. 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.[87] 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.[88] Also, larvae in at least some species are known to use sound in selecting and orienting toward settlement sites.[89] Acoustic disruption at that stage of development could have significant consequences.[90]

The Navy capriciously dismisses the potential for significant adverse impacts on fish. First, while admitting that mid-frequency sonar can cause significant injury at distances of hundreds of feet, and having noted (with reference to Norwegian studies) that "some sonar levels have been shown to be powerful enough to cause injury to particular size classes of juvenile herring from the water's surface to the seafloor" (DEIS at 3.7-66 to 3.7-67), and even though the Navy will be operating at higher source levels than those used in the Norwegian studies (DEIS at 3.7-66), the Navy claims that SOCAL fish populations would not suffer significant impacts. For this conclusion, it notes only that levels of mortality in Norway were considered small relative to natural daily mortality rates (id.)—a conclusion that fails to take into account the Navy's higher source levels, the specific ecology of California fish populations, the potential for cumulative effects, and the differential impacts that activities in spawning areas may have.

Second, while admitting that mid-frequency noise can alter behavior, the DEIS argues that fish are less responsive to mid-frequency than to low- and high-frequency sounds and therefore would not experience significant behavioral impacts from mid-frequency sonar. DEIS at 3.7-67. The Navy cites no studies for this proposition, though it earlier discusses two studies on mid-frequency acoustic deterrent devices, or "pingers": a technology used in some American fisheries to ward harbor porpoises and certain other marine mammals away from gillnets. DEIS at 3.7-54. Not only do the deterrents featured in the two papers operate at a source

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[87] 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).

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

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

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

level literally billions of times less intense (130 dB versus 235 dB re 1 μPa); but, in at least one of the studies, it actually altered the behavior of the fish, drawing them into the gillnet for reasons that are not explored.[91] Further, the Navy dismisses a clearly relevant study of dolphin sounds and their impact on silver perch mating signals—a study that NMFS and state regulators have cited as reason for concern. DEIS at 3.7-55.

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. 42 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 on the SOCAL range, even though it passingly identifies a number of areas with high levels of catch—such as the Tanner and Cortes Banks. DEIS at 3.7-15.

Having concluded—without basis—that mid-frequency sonar would have no significant impact on fish and fish habitat, the Navy dismisses the notion that fisheries in the area would suffer economic loss (DEIS at 3.14-1 to 3.14-9), even though (judging by the comments from fishermen on the Navy's USWTR range) 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 SOCAL Range Complex.[92]

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[91] B.M. Culik, S. Koschinski, N. Tregenza, and G.M. Ellis, Reactions of Harbor Porpoises Phocoena phocoena and Herring Clupea harengus to Acoustic Alarms, 211 Marine Ecology Progress Series 255, 258 (2001).

[92] Sea turtles are also effectively excluded from further analysis of acoustic impacts on the grounds that their best hearing range appears to occur below 1 kHz. DEIS at 3.8-15. But having their best acoustic sensitivity in this range does not mean that sea turtles are oblivious to noise at higher frequencies. Juvenile loggerheads, for example, have their best sensitivity at frequencies 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. S.M. Bartol, J.A. Musick, and M. Lenhardt, Auditory Evoked Potentials of the Loggerhead Sea Turtle (Caretta caretta), 99 Copeia 836 (1999). 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 in the DEIS. National Research Council, The Decline of Sea Turtles: Causes and Prevention (1990). Given these findings, and given that all of the sea turtles on the proposed sites belong to endangered or threatened populations, a more rigorous and conservative analysis of potential acoustic impacts is necessary, and areas of particular importance to sea turtles should be taken into consideration in the Navy's alternatives analysis.

C. Other Impacts on Marine Wildlife

The Navy's current and proposed activities pose risks to marine wildlife beyond ocean noise: injury or death from collisions with ships, bioaccumulation of toxins, and the like. Indeed, many of the same concerns that apply to marine mammals (and are discussed above) apply to fish, sea turtles, and other biota as well. The Navy must adequately evaluate impacts and propose mitigation for each category of harm. 42 C.F.R. §§ 1502.14, 1502.16.

D. 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. Thus, for example, it is necessary to consider the impacts of the proposed exercise alongside those of other activities in the region, including industrial and commercial activities such as fishing, shipping, and coastal development.

As it stands, the Navy says little more than that all of the impacts from its thousands of annual hours of activity would necessarily be "temporary" in nature and therefore would not affect vital rates in individuals or populations. DEIS at 3.9-79, 4-27. The Navy also offers the bromide that mitigation will "minimize" impacts from naval activities and thus, presumably, preclude any significant cumulative effects. DEIS at 4-27. Not only are both statements factually insupportable given the lack of any population analysis or quantitative assessment of long-term effects in the document, the actual results of its mitigation efforts (as captured in its after-action reports for SOCAL major exercises), and the numerous errors in the Navy's thresholds and modeling, discussed above)—but they misapprehend the definition of "cumulative impact," which, according to NEPA's regulations, "can result from individually minor but collectively significant actions taking place over a period of time." 42 C.F.R. § 1508.7.

More particularly, the Navy assumes—capriciously, for the reasons discussed above—that its thousands of hours of sonar activities will not result in the serious injury or death of even a single animal. DEIS at 3.9-74. It simply assumes that all behavioral impacts are short-term in nature and cannot affect individuals or populations through repeated activity—even though the 112,000 annual takes anticipated even under its specious modeling would affect the same California populations (and, indeed, would involve extensive use of many of the same areas, such as the San Clemente Island Range Complex and Tanner and Cortes Banks). And, while it states that behavioral harassment (aside from those caused by masking effects) involves a stress response that may contribute to an animal's allostatic load (DEIS at 3.9-36), it assumes without further analysis that any such impacts would be insignificant. See id.

Nor does the Navy consider the potential for acute synergistic effects from sonar training. For example, although the DEIS discusses the potential for ship strike in the study area, it does not consider the greater susceptibility to vessel strike of animals that have been temporarily harassed or disoriented by certain SOCAL 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.[93] Nor does the Navy consider (for example) the synergistic effects of noise with other stressors in producing or magnifying a stress-response.[94] In short, the Navy's conclusion that cumulative and synergistic impacts from SOCAL sonar training are insignificant cannot plausibly be supported.

All of these failures of analysis are reflected not only in the Navy's unsupported conclusions about the benignity of SOCAL training standing alone, but in its broader conclusions about human activities in California waters. Generally, this chapter makes clear that the range complex is crowded with human activities, many of which introduce noise, chemical pollution, debris, and vessel traffic into the habitat of protected species. The idea that all of these events, when taken as a whole, are having insignificant effects on California populations, and that the Navy's contribution is merely "incremental" (DEIS at 4-27), is, again, unsupported by analysis.

E. Alternatives Analysis

At bottom, 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 requirement has been described in regulation as "the heart of the environmental impact statement." Id. § 1502.14. 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." Id. § 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.

First, the Navy declines to consider a reduction in the level of current training in the SOCAL Range Complex. Yet the Navy's assumption that sonar exercises on the range must increase or continue at their current tempo may well be an artifact of the Navy's Tactical Training Theater Assessment and Planning Program (TAP) process, which, in

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

[94] 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?" (in press and forthcoming 2008); see also other papers published in same volume.

requiring separate environmental analysis of existing ranges and operating areas, seems to assume a priori that exercises cannot be reapportioned or alternative sites found. Moreover, the DEIS fails to analyze meaningfully whether a different mix of simulators and at-sea exercises would accomplish its aims, reducing the number of sonar use hours. Instead, it rules out the increased use of simulators by stating, in a cursory few sentences, that they do not obviate the need for realistic training. But its summary treatment of this issue does not sufficiently justify the precise number of exercises and use hours that have been proposed. Alternatives that combine greater use of simulators with fewer open-water exercises—or that develop a plan to maximize use of synthetic training—should have been analyzed, not dismissed out of hand.

Second, the Navy summarily dismisses geographic and seasonal exclusions from its alternatives analysis. DEIS at 2-15. It does so even though avoiding concentrations of vulnerable and endangered populations and high abundances of marine life is perhaps the most critical step the Navy can take in reducing impacts, and a "hard look" at geographical alternatives is plainly required by NEPA and other laws.[95] Remarkably, the Pacific Fleet, unlike the Atlantic, has not attempted to develop geographic alternatives for sonar training using survey data and habitat modeling, or even to identify important habitat for vulnerable species and higher density areas. Instead, it speaks in deliberately obtuse and general terms about its needs and declines to reserve any part of a 120,000 nm^2 range from sonar training.

Third, even aside from the omission of reasonable alternative locations, the Navy fails to consider alternatives of any other kind. 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, and as discussed at greater length below, 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; and there are many others that should be considered. Such measures are reasonable means of reducing harm to marine life and other resources within the SOCAL Range Complex, and their omission from the alternatives analysis renders that analysis inadequate.

Fourth, 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

[95] E.g., NRDC v. Evans, 279 F.Supp.2d at 1664-66; NRDC v. Navy, 857 F.Supp. at 734; T. Agardi, N.A. Soto, A. Cañadas, M. Engel, A. Frantzis, L. Hatch, E. Hoyt, K. Kaschner, E. LaBrecque, V. Martin, G. Notarbartolo di Sciara, G. Pavan, A. Servido, B. Smith, J.Y. Wang, L. Weilgart, B. Wintle, A.J. Wright, A Global Scientific Workshop on Spatio-Temporal Management of Noise 3 (2007).

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 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 while minimizing environmental harm. These omissions are all the more unreasonable given the long period during which the Navy has worked on this document and its predecessors. For these reasons, we urge the Navy to issue an EIS that adequately informs the public of all reasonable alternatives that would reduce adverse impacts to whales, fish, sea turtles, and other marine resources. 40 C.F.R. § 1502.1.

F. Mitigation Measures

To comply with NEPA, an agency must discuss measures designed to mitigate its project's impact on the environment. See 42 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 (though 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 6 dB if a marine mammal is detected within 1000 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 5-8 to 5-9.

This mitigation scheme disregards the best available science on the significant limits of that technique. Indeed, 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.[96] The

[96] 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).

Navy's reliance on visual observation as the 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 1000-yard power-down and 200-yard shutdown proposed by the Navy; general passive acoustic monitoring for whales; special rules for surfacing ducting and low-visibility conditions; monitoring and shutdown procedures for sea turtles and large schools of fish; and many others.[97] 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 __ F.3d __, 2008 WL 565680 (9th Cir. 2008); Ocean Mammal Institute v. Gates, 2008 WL 564664 (D. Hawaii 2008).

Measures that the Navy should consider include, inter alia:

(1) Establishment of a coastal exclusion zone for acoustics training and testing, 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 1500 meter isobath;

(2) Seasonal avoidance of habitat important to the California population of blue whales and other listed species, as well as the California gray whale migration;

(3) Avoidance of federal and state marine protected areas, including the Channel Islands National Marine Sanctuary;

(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 (such as canyons and inter-island basins);

(5) Avoidance of fronts and other major oceanographic features, such as areas with marked differentials in sea surface temperatures, which have the potential to attract offshore concentrations of animals, including beaked whales (see, e.g., 3.9-95);

(6) Avoidance of areas and seasons with higher modeled takes or with higher densities of particular species, some of which are indicated in the DEIS (see DEIS App. F), the Navy's Marine Resources Assessment for the SOCAL Range Complex,[98] and the Navy's 2007 environmental assessment for major exercises on the range;

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[97] 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.

[98] Naval Facilities Engineering Command, Pacific, Marine Resources Assessment for the Southern California Operating Area (2005).

(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 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;

(9) 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;

(10) Expansion of the marine species "safety zone" to a 4 km shutdown, reflecting international best practice, or 2 km, reflecting the standard prescribed by the California Coastal Commission and adopted in NRDC v. Winter, 527 F.Supp.2d 1216 (C.D. Cal. 2008), aff'd __ F.3d __, 2008 WL 565680 (9th Cir. 2008);[99]

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

(12) Avoidance or reduction of training during months with historical 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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[99] California Coastal Commission, Adopted Staff Recommendation on Consistency Determination CD-086-06 (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 the Southwest Fisheries Science Center, or through an independent agent such as the National Fish and Wildlife Foundation, on the distribution, abundance, and population structuring of protected species on the SOCAL range, with the goal of supporting adaptive geographic avoidance of high-value habitat;

(24) Application of mitigation prescribed by the California Coastal Commission and other 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, and inclusion of sea turtles in other described mitigation measures, including safety zones, for which floating weeds and kelp and algal mats should be taken as proxies for sea turtle presence;

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

(28) Requiring that other nations abide by U.S. mitigation measures when training on the SOCAL range, except where their own measures are more stringent;

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

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

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

(32) 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.

G. 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]").

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 3.9-60. 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. 42 C.F.R. §§ 1502.9(a), 1503.1(a) (NEPA); 5 U.S.C. § 706(2)(D) (APA). And 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.[100] We encourage the Navy to contact us immediately to discuss how to make this critical information available.

H. 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 1-15. 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 in the SOCAL Range Complex—beyond the major exercises already found to have violated NEPA—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.

I. Compliance with Other Applicable Laws

[100] Navy, Ensuring the Quality of Information Disseminated to the Public by the Department of Defense: Policy and Procedural Guidance § 3.2.3.1 (Feb. 10, 2003). The Defense Department defines "influential" to mean "that the Component can reasonably determine that dissemination of the information will have or does have clear and substantial impact on important public policies or important private sector decisions"—which is clearly the case here. See Ensuring the Quality of Information Disseminated to the Public by the Department of Defense: Definitions § 3 (Feb. 10, 2003).

A number of other statutes and conventions are implicated by the proposed activities, considering their marine acoustic impacts alone. 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 blue whales, fin whales, humpback whales, sei whales, sperm whales, Guadalupe fur seals, green sea turtles, leatherback sea turtles, loggerhead sea turtles, Pacific ridley sea turtles, steelhead trout, and brown pelicans, all of which are listed under the Act.

(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." Remarkably, notwithstanding the previous findings of the California Coastal Commission and an adverse ruling before a federal court, NRDC v. Winter, 2007 WL 2481037 at *8-9 (C.D. Cal. 2007), aff'd 508 F.3d 885 (9th Cir. 2007), the Navy has preliminarily determined that the proposed action is consistent to the maximum extent practicable with the California Coastal Act and coastal zone management plan. DEIS at 6-5. Moreover, judging by the description in the DEIS, it remains an open question whether the Navy will include all of its anti-submarine warfare activity in its consistency review, as the law requires. 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 SOCAL Range Complex 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). The Navy indicates that it will not consult with the Channel Islands National Marine Sanctuary, even though the sanctuary falls within the SOCAL study area. DEIS at 6-3. 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. The mere claim that Navy activities are "consistent with the [CINMS] regulations to the maximum extent practicable" (see DEIS at 6-3) does not, of course, obviate consultation. Since sonar may impact sanctuary resources even when operated outside its bounds, the Navy should indicate how close it presently operates, or forseeably plans to operate, to the sanctuary.

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 SOCAL Range Complex. 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, including the Channel Islands National Marine Sanctuary and the other areas potentially affected by activities taking place along the west coast. These include areas implicated by the California Marine Life Protection Act, Cal. Fish & Game C. §§ 2850 et seq., which requires the Navy's conferral with the California Department of Fish & Game.

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

J. 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.

K. 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).

III. CONCLUSION

For the reasons set forth above, we urge the Navy to withdraw its DEIS and to revise the document prior to its recirculation for public comment.

Very truly yours,

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