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14. ABSTRACT

On July 24, 2018, the National Marine Fisheries Service (NMFS) published a final rule concerning the Main Hawaiian Island Insular False Killer Whale critical habitat. The final rule listed four biological and physical features essential for their conservation, i.e. "essential features." However, this paper concerns itself with the fourth: "(anthropogenic) sound levels that would not significantly impair false killer whales' use or occupancy." The introduction of anthropogenic, or human-produced, sound as an essential feature in critical habitat designation pursuant to the Endangered Species Act (ESA) is novel. NMFS was decidedly forward leaning in publishing this rule, to the objection of many interested parties – including the U.S. Navy. Designating anthropogenic sound as an essential feature in critical habitat designations has important legal and political implications for the U.S. Navy. The Navy conducts many military exercises in areas protected by the Endangered Species Act, which includes the Hawaiian Islands. There is an argument that the science NMFS relies on does not fully support this forward leaning rule using anthropogenic sound as an essential feature. However, the Navy has the resources to adapt, overcome and lead the way in compliance. Specifically, the Navy is at the forefront of quiet ship technologies and procedures. By serving as a role model, the Navy could be free to conduct more training operations if the net effect of anthropogenic sound decreases.

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Quiet Please!: Sound as an Essential Feature in Critical Habitat Designation for the Main Hawaiian Islands Insular False Killer Whale

Introduction

According to National Geographic, "a blue whale's tongue can weigh as much as an elephant. Their hearts as much as an automobile."[1] Whales are seemingly robust creatures and have swum the oceans for millions of years.[2] Yet, human activity threatens their very existence. The Federal government has taken action by listing many whale species as endangered or threatened and designating corresponding critical habitats. On July 24, 2018, the National Marine Fisheries Service (NMFS)[3] published a final rule concerning the Main Hawaiian Island Insular False Killer Whale (MHI IFKW)'s critical habitat. The final rule listed four biological and physical features essential for their conservation, i.e. "essential features."[4] However, this paper concerns itself with the fourth: " [anthropogenic] sound levels that would not significantly impair false killer whales' use or occupancy."[5] The introduction of anthropogenic, or human-produced, sound as an essential feature in critical habitat designation pursuant to the Endangered

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[1] *Animals 101: Blue Whales*, NATIONALGEOGRAPHIC.COM, https://www.national geographic.com/animals/mammas/b/blue-whale/ (last visited Nov. 29, 2018).
[2] *The Evolution of Whales*, UNDERSTANDING EVOLUTION, https://evolution.berkeley.edu/ evolibrary/article/evograms_03 (last visited Nov. 29, 2018).
[3] NMFS is an office of the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce. *See About Us*, NOAA FISHERIES: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, https://www.fisheries.noaa.gov/about-us (last visited Nov. 12, 2008).
[4] Endangered and Threatened Wildlife and Plants: Proposed Rulemaking to Designate Critical Habitat for the Main Hawaiian Islands Insular False Killer Whale Distinct Population Segment, 82 Fed. Reg. 51,186, 51,187 (proposed Nov. 3, 2017) (to be codified at 50 C.F.R. Parts 224 and 226) [hereinafter *Proposed Rule*].
[5] Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Main Hawaiian Islands Insular False Killer Whale Distinct Population Segment, 82 Fed. Reg. 35,062 (Jul. 24, 2018) (to be codified at 50 C.F.R. Parts 224 and 226) [hereinafter *Final Rule*].

Species Act (ESA) is novel. NMFS was decidedly forward leaning in publishing this rule, to the objection of many interested parties – including the United States (U.S.) Navy.

Designating anthropogenic sound as an essential feature in critical habitat designations has important legal and political implications for the U.S. Navy. The Navy's Pacific Fleet Headquarters is located on the island of Oahu in Hawaii. The Navy conducts many military exercises in areas protected by the Endangered Species Act, which includes the Hawaiian Islands. There is an argument that the science NMFS relies on does not fully support this forward leaning rule using anthropogenic sound as an essential feature. The Navy specifically referred to a lack of scientific evidence in its comment on the proposed rule.[6] In addition, there are numerous scientific studies that illustrate that scientific evidence is not fully developed concerning the effects of anthropogenic sound on marine mammals. Even though the Navy might be concerned this new rule protecting the MHI IFKW is indicative of future NMFS critical habitat essential feature designations for other marine mammals (thereby having a potential effect on naval operations), the Navy has the resources to adapt, overcome and lead the way in compliance. Specifically, the Navy is at the forefront of quiet ship technologies and procedures. By serving as a role model, and perhaps assisting other navies and U.S. merchant vessels in meeting the same requirements, the Navy could be free to conduct more training operations if the net effect of anthropogenic sound decreases.

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[6] Letter from Rear Admiral Lahti, Department of the Navy, Office of the Chief of Naval Operations to Ms. Susan Pultz, Conservation Planning and Rulemaking Branch, Protected Resources Division, National Marine Fisheries Service (Jan. 2, 2018), *available at* https://www.regulations.gov/docketBrowser?rpp=25&po=0&dct=PS&D=NOAA-NMFS-2017-0093&refD=NOAA-NMFS-2017-0093-0001 [*hereinafter* Navy Comment].

Overview of Endangered Species Act

The Endangered Species Act, passed in 1973, is the primary piece of Congressional legislation that aims to protect endangered and threatened species.[7] The Supreme Court has described this statute as "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation."[8] Its purpose is to conserve ecosystems of endangered and threatened species.[9] The statute directs the Secretary of the Interior to determine whether a species is endangered or threatened using a multiple factor test.[10] Among its many protections, the ESA mandates the Secretary designate a "critical habitat" for the species to the "maximum extent prudent or determinable."[11] It also instructs federal agencies to avoid destruction or modification of such habitats.[12] The ESA defines 'critical habitat' for a threatened or endangered species to mean, "the specific areas within the geographical area occupied by the species…on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection…"[13] The definition also includes those specific areas outside the geographic area the Secretary of Interior or Secretary of Commerce determines are "essential for the conservation of the species."[14] The Secretary concerned shall then designate critical habitat "…on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other

[7] Endangered Species Act (ESA), 16 U.S.C. §§ 1531 *et seq.* (2018).
[8] Tenn. Valley Auth. v. Hill, 437 U.S. 153, 180 (1978).
[9] Endangered Species Act (ESA), 16 U.S.C. § 1531 (2018).
[10] Endangered Species Act (ESA), 16 U.S.C. § 1533 (2018).
[11] *Id*.
[12] Endangered Species Act (ESA), 16 U.S.C. § 1536(a)(2) (2018).
[13] Endangered Species Act (ESA), 16 U.S.C. § 1532(5)(A)(i) (2018).
[14] Endangered Species Act (ESA), 16 U.S.C. § 1532 (5)(A)(ii) (2018).

relevant impacts…"[15] Furthermore, the Secretary is permitted to "…exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat…" – provided that extinction of the protected species does not occur as a result of that exclusion.[16]

The regulations that implement criteria for designating critical habitat, 50 C.F.R. § 424.12, also state that designation of critical habitat cannot be determined when either "data sufficient to perform required analyses are lacking" or "the biological needs of the species are not sufficiently well known to identify any area that meets the definition of 'critical habitat.'"[17] In addition, when identifying endangered or threatened species' critical habitats, the physical and biological features deemed to be essential in preserving such habitats have to be identified with an "appropriate level of specificity using the best scientific data."[18] As discussed further on this paper, critics of NMFS' rule concerning the MHI IFKW critical habitat designation asserted that there was insufficient scientific data to support this essential feature and that there was not enough specificity.

In addition to the requirement to designate a critical habitat once a species is determined to be threatened or endangered, Federal agencies are required to consult with the Secretary of the Interior (or Commerce depending on the action) to ensure that any action taken is "not likely to jeopardize the continued existence" of the species or "result in the destruction or adverse modification of habitat of such species…"[19] The United States Fish and Wildlife Service (FWS) regulations define "destruction or adverse

[15] Endangered Species Act (ESA), 16 U.S.C. § 1533(b)(2) (2018).
[16] *Id*.
[17] 50 C.F.R. § 424.12(a)(2) (2016).
[18] 50 C.F.R. § 424.12(b)(1)(ii) (2016).
[19] Endangered Species Act (ESA), 16 U.S.C. § 1536(a) (2018).

modification" as a "direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species."[20] This process of determining whether a federal agency action will jeopardize the continued existence of threatened or endangered species is referred to as section 7 consultation.[21] Section 7 consultation is required for agency action that could affect designated critical habitats; it is also required whether or not a critical habitat has been designated.[22] This consultation process concludes with the consulting agency issuing a biological opinion, which considers "…the current status of the species, the environmental baseline, the effects of the proposed action, and the cumulative effects of the proposed action" to aid in determining to what extent the action may affect the species or its critical habitat and to ensure no jeopardy.[23]

Even if an action jeopardizes the species or adversely modifies their critical habitat, the jeopardy consultation process provides for exemptions.[24] Such exemptions are granted when: (i) there are no reasonable and prudent alternatives (ii) the benefits of the proposed action outweigh the benefits of the alternative course of action that conserves the species or its critical habitat, and such action is in the public interest; (iii) the action is of regional or national significance; and (iv) the Federal agency did not make any irreversible or irretrievable commitment of resources so that action was inevitable or

[20] 50 C.F.R. § 402.02 (2016).
[21] *Id*. *See also* 50 C.F.R. § 424.12 (2016).
[22] *Id*.
[23] Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv., 378 F3d 1059, 1063 (2004); 50 C.F.R. § 402.14(g)(2) - (3) (2016). *See also* ALISON RIESER ET AL., OCEAN AND COASTAL LAW: CASE AND MATERIALS (4th ed. 2013), 750.
[24] Endangered Species Act (ESA), 16 U.S.C. § 1536(a)(2) (2018).

precluded viable alternatives.[25] An exemption based upon national security is also available if the Secretary of Defense finds the action in question necessary.[26] Finally, the Secretary may permit takings if the takings are incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.[27] Even if granted an exemption, Federal agencies are still required to establish reasonable mitigation and enhancement measures to minimize such adverse effects.[28]

Relevant Cases

Courts have generally deferred to agency regulations and action that expand ESA protections in order to maximize protection of endangered and threatened species. This precedent provides an opening for agencies to be more forward leaning when enacting regulations that provide additional protections for threatened and endangered species. Therefore, court precedent indicates that NMFS' MHI IFKW critical habitat designation will likely be upheld if challenged in court. In a widely cited ESA case, *Tennessee Valley Authority v. Hill*, the U.S. Supreme Court recognized that Congress' intent in passing the ESA "was to halt and reverse the trend towards species extinction, *whatever the cost*" [emphasis added].[29]

Another example of judicial deference to agency interpretation and enforcement of the ESA occurred in 1975, when the Secretary of the Interior passed the regulation found at 50 C.F.R. § 17.3 defining "harm" in "take" to include "significant habitat

[25] Endangered Species Act (ESA), 16 U.S.C. § 1536(d), (h) (2018).
[26] Endangered Species Act (ESA), 16 U.S.C. § 1536(i) (2018).
[27] Endangered Species Act (ESA), 16 U.S.C. §1539(a)(1)(B) (2018).
[28] Endangered Species Act (ESA), 16 U.S.C. § 1536(h) (2018).
[29] Tenn. Valley Auth. v. Hill, 437 U.S. 153, 184 (1978).

modification or degradation whether it actually kills or injures wildlife."[30] Although landowners and logging companies, among other interested parties, challenged the expansion of what constituted "harm," the Supreme Court in *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon et al.* upheld the regulation, stating that definition of "harm" was reasonable "given Congress' clear expression of the ESA's broad purpose to protect endangered and threatened wildlife."[31]

Courts have also stepped in to ensure agencies do more in order to protect endangered and threatened species, specifically in protecting their critical habitats. In *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, the Ninth Circuit determined that the FWS interpretation of "adverse modification" of the spotted owl's critical habitat was too narrow. As previously mentioned, section 7 consultations dictate that the consulting agency ensure that proposed actions are "not likely to jeopardize the continued existence of an endangered species and…will not result in the destruction or adverse modification of the designated critical habitat" of the species.[32] The FWS regulation stated that adverse modification included effects to both the survival and recovery of the species, which meant that the focus could be on recovery *only* if survival was also implicated.[33] To the Court, the "regulatory definition reads the recovery goal

[30] Babbitt v. Sweet Home Chapter of Communities for a Greater Oregon, 515 U.S. 687, 687 (1995). The Respondents in the case claimed that Congress did not intend for "take" to include habitat modification. Per the ESA, it is unlawful to "take" any declared endangered or threatened species within the U.S., the territorial sea of the U.S., or upon the high seas. *See* Endangered Species Act (ESA), 16 U.S.C. § 1531(a)(1) (2018).
[31] Babbitt v. Sweet Home Chapter of Communities for a Greater Oregon, 515 U.S. 687, 700 (1995).
[32] Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv., 378 F3d 1059, 1069 (2004).
[33] *Id*.

out of the adverse modification inquiry…"[34] The Ninth Circuit stated that FWS is required to designate critical habitat essential for recovery – and not just designate critical habitat necessary for a species' survival.[35] Per the Court, "Congress, by its own language, viewed conservation and survival as distinct, though complementary, goals, and the requirement to preserve critical habitat is designed to promote both conservation and survival."[36] FWS was wrong in relying on prior regulations conflating recovery with survival and refusing to designate critical habitat for a large majority of listed species.[37]

Similarly, Courts have stepped in when agencies have refused to designate critical habitat for an endangered or threatened species altogether for non-prudential reasons. *In Sierra Club v. United States Fish & Wildlife Service*, the Fifth Circuit held that FWS' refusal to designate critical habitat for the threatened Gulf sturgeon (because of a belief that designating critical habitat would provide no additional benefit than what was already required under the section 7 jeopardy consultation process) was arbitrary and capricious.[38] Again, the Court asserted that the ESA provides broad protections. The Fifth Circuit asserted the designation of critical habitat includes those areas "essential to conservation," not just those areas essential to recovery and survival.[39] Agencies are required to designate critical habitat to the maximum extent prudent and determinable –

[34] *Id*.
[35] *Id*. at 1069 – 1071.
[36] *Id*. at 1070.
[37] *Id*.
[38] Sierra Club v. U.S. Fish & Wildlife Serv., 245 F3d 434 (2001).
[39] *Id*. at 441 – 443.

and agencies have to articulate a rational basis for their findings that failure to do so was not prudent.[40]

In summary, current regulations and case precedent illustrate that the ESA provides a broad range of protections for threatened and endangered species. Courts generally defer to agencies responsible for protecting endangered and threatened species, except when agencies fail to act; courts have routinely hold agencies and other actors accountable if they are not implementing or following the ESA in the manner intended by Congress. As stated by the Supreme Court in *Tennessee Valley Authority v. Hill*, "the dominant theme pervading all Congressional discussion of the proposed [Endangered Species Act] was the overriding need *to devote whatever effort and resources were necessary* to avoid further diminution of national worldwide wildlife resources."[41] Such precedent provides an opening for agencies to be more forward leaning when enacting regulations that provide additional protections for threatened and endangered species. This forward leaning action is illustrated in the recent regulations passed by NWFS concerning the designation of the MHI IFKW.

MHI IFKW Physical Characteristics and Local Environment Description

On December 28, 2012, the Natural Marine Fisheries Service (NMFS) published a final rule listing the Main Hawaiian Islands insular false killer whale (MHI IFKW) distinct population segment (DPS) as an endangered species under the ESA.[42] There are

[40] *Id*. at 437.
[41] Tenn. Valley Auth. v. Hill, 437 U.S. 153, 177 (1978).
[42] Endangered and Threatened Wildlife and Plants; Endangered Status for the Main Hawaiian Islands (MHI) Insular False Killer Whale (IFKW) Distinct Population Segment (DPS), 77 Fed. Reg. 70,915 (Nov. 28, 2012) (to be codified at 50 C.F.R. Part 224) [hereinafter *Endangered Rule*].

three types of false killer whales found in the vicinity of the Hawaiian Islands, but NMFS only listed the insular population as endangered due to its "…confined range, genetic isolation, social complexities, and small and declining abundance of the MHI insular DPS."[43] Scientific studies concluded that the MHI IFKW DPS consist of a "tight social network" and that they do not interact with the other two types of MHI false killer whales.[44]

The false killer whale (FKW) is an odontocete, or toothed whale, which is one of the two types of cetacean sub-classifications (the other type being baleen whales).[45] FKWs are generally found in warmer, deeper waters and near islands.[46] False killer whales live long lives, mature slowly, and reproduce infrequently.[47] Their social system is matrilineal in nature and studies show that if older females are lost, "…it may take decades to rebuilt the knowledge required to achieve maximum population growth rates."[48]

Of particular importance, false killer whales, like all odontocetes, heavily rely on sound to function and survive in their marine environment.[49] They have "highly complex acoustic sensory systems through which they produce, receive, and interpret sounds to

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[43] *Recovery Outline: Main Hawaiian Islands Insular False Killer Whale Distinct Population Segment*, NOAA FISHERIES, PACIFIC ISLANDS REGIONAL OFFICE PROTECTED RESOURCES, 5 (Sept. 2016), *available at* https://www.fpir.noaa.gov/Library/PRD/False%20 Killer%20Whale/2016.09.12_MHIIFKW_Recovery_Outline.pdf [hereinafter *Recovery Outline*].
[44] *Id.* at 8.
[45] *Proposed Rule*, *supra* note 4, at 51,187.
[46] *Endangered Rule*, *supra* note 42, at 70,171.
[47] *Id*.
[48] *Id*.
[49] *Id*.

support navigation, communication, and foraging."[50] FKWs also use echolocation, or biosonar, to locate objects (including prey) by producing sounds and then interpreting the echoes they receive.[51] In addition, they also communicate with each other by vocalizing and also learn from their environment and other animals by passively listening.[52] NMFS has stated, "Because vocalizations are a primary means of navigation, communication, and foraging, it is important that false killer whales are able to detect, interpret, and utilize acoustic cues within their surrounding environment."[53] Of interest, false killer whales also happen to mass strand more frequently, which is another possible explanation for enacting additional protections for this particular species.[54]

MHI IFKWs live in and restrict their movement to the waters surrounding the eight main Hawaiian Islands.[55] The Hawaiian Islands are part of a submerged mountainous sea chain, which affect the oceanographic and atmospheric processes of the surrounding Pacific Ocean.[56] As a result, there are biological hotspots that concentrate prey in and around the different islands, attracting the MHI IFKWs.[57] These whales circumnavigate the islands, moving quickly throughout the surrounding waters.[58] Although they are found on both sides of the island chain, they concentrate more of their

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[50] *Id*.
[51] *Id*. *See also* John A. Hildebrand, *Anthropogenic and Natural Sources of Ambient Noise in the Ocean*, 395 MAR. ECOL. PROG. SER. 5, 5 (2009).
[52] *Endangered Rule*, *supra* note 42, at 70,171.
[53] *Id*.
[54] L.S. Weilgart, *The Impacts of Anthropogenic Ocean Noise on Cetaceans and Implications for Management*, 85 CAN. J. OF ZOOLOGY 1091, 1095 (2007).
[55] *Proposed Rule*, *supra* note 4, at 51,188-51,189.
[56] *Id*. at 51,188.
[57] *Id*.,
[58] *Id.* at 51,190.

time on the leeward (non-windy) sides of the islands.[59] This behavioral pattern makes the MHI IFKW unique when compared with other insular false killer whales; MHI IFKWs are the only kind known to restrict their movements to the vicinity of an oceanic island group.[60] In addition, high use areas include (on average) areas that are shallower and closer to shore.[61]

Threats to MHI IFKW

A 2015 report estimates that the MHI IFKW population size ranges approximately between 92 and 151 whales.[62] Of this total number, there are approximately 46 adults.[63] Within the total population, studies also indicate there are three distinct social clusters.[64] Because these whales primarily breed within their social cluster, NMFS has pointed out, "The potential for inbreeding depression and loss of social integrity is troubling." [65] Although a complete history of this particular DPS is unknown, studies indicate the overall MHI IFKW population has experienced a historical decline.[66] The current population trend indicates that the MHI IFKW population has declined in the past twenty years at an average rate of 9% per year.[67]

In finalizing its rule designating the MHI IFKW as an endangered species, NMFS identified fifteen significant threats that contribute most to their current and future

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[59] *Id*. at 51,190.
[60] *Endangered Rule*, *supra* note 42, at 70,175.
[61] *Proposed Rule*, *supra* note 4, at 51,188-51,189.
[62] *Id.* at 51,188.
[63] *Recovery Outline*, *supra* note 43, at 9.
[64] *Id*. at 8.
[65] *Id*. at 9.
[66] *Proposed Rule*, *supra* note 4, at 51,188.
[67] *Recovery Outline*, *supra* note 43, at 8.

decline.[68] The two most significant are their small population size (affected mostly by reduced amount of food quality and quantity due to a number of factors not relevant to this discussion) and hooking, entanglement, or acts of prohibited take by fishers.[69] NMFS also identified other natural or manmade factors affecting MHI IFKW continued existence, to include anthropogenic noise.[70] Anthropogenic noise includes sonar and seismic exploration from military, oceanographic, and fishing sonar sources (among others).[71]

The Navy conducts training and testing exercises using sonar off the coast of Hawaii in areas of high use by the MHI IFKWs, specifically in areas north of Molokai and Oahu and south of Oahu.[72] The headquarters for the United States Pacific Fleet (PACFLT) is located in Pearl Harbor, Hawaii.[73] Aside from routine training and testing operations for the ships stationed in Pearl Harbor, the Navy also primarily conducts multiple large-scale training operations in an operating area that surrounds the island chain from Oahu to Kauai.[74] One such large-scale training operation, called the Rim of the Pacific Exercise, is "[a] biennial multinational training exercise in which navies from

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[68] *Endangered Rule*, *supra* note 42, at 70,934.
[69] *Id*. at 70,934-70,935. *See also Recovery Outline*, *supra* note 43, at 11.
[70] *Id*.
[71] *Id*.
[72] *Biological Opinion on U.S. Navy Hawaii-Southern California Training and Testing and the National Marine Fisheries Service's Promulgation of Regulations Pursuant to the Marine Mammal Protection Act for the Navy to "Take" Marine Mammals Incidental to Hawaii-Southern California Training and Testing*, OFFICE OF PROTECTED RESOURCES, NATIONAL MARINE FISHERIES SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE, 452 (Dec. 10, 2018), *available at https://www.fisheries.noaa.gov/resource/document/biological-opinion-us-navy-hawaii-southern-california-training-and-testing* [hereinafter *Biological Opinion*].
[73] *About Us*, COMMANDER, U.S. PACIFIC FLEET, https://www.cpf.navy.mil/about/ (last visited Apr. 14, 2019).
[74] *Biological Opinion*, *supra* note 72, at 57, 76.

Pacific Rim nations and other allies assemble in Pearl Harbor, Hawaii, to conduct training throughout the Hawaiian Islands in a number of warfare areas."[75] Additional major training exercises include one "fleet exercise/sustainment exercise" and three undersea warfare exercises per year.[76] There are also multiple smaller scale "integrated/coordinated" trainings and individual warfare trainings (e.g., Air Warfare, Submarine Warfare, etc.) conducted each year off the coast of Hawaii.[77]

The Navy acknowledges that whales could be exposed to anti-submarine warfare training in these areas. However, because whales typically avoid areas of loud sources of anthropogenic sound and most Navy sonar sources are not stationary, the Navy contends that the likelihood the MHI IFKWs would stay in close proximity to the sonar source for an amount of time that could cause severe or permanent hearing loss is low.[78] Therefore, because the short-term nature of the anticipated responses (primarily short-term hearing loss) and the estimated (infrequent) disruption to individual whales (less than four per individual per year), the Navy believes that their activities do not result in harmful long-term negative effects to MHI IFKWs.[79]

However (even supposing that the Navy is correct in their assessment), short-term anthropogenic sound effects on MHI IFKWs might still be harmful. In their assessment, NMFS stated, "Intense anthropogenic sounds have the potential to interfere with the acoustic sensory system of false killer whales by causing permanent or temporary hearing loss, thereby making the reception of navigation, foraging, or communication signals, or

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[75] *Biological Opinion*, *supra* note 72, at 77.
[76] *Id*. at 77.
[77] *Id*. at 77-78.
[78] *Id*. at 442.
[79] *Id*. at 452.

through disruption of reproductive, foraging, or social behavior."[80] NMFS did not rely on evidence concerning the effect of anthropogenic sound on MHI IFKW specifically,[81] but rather used evidence concerning false killer whales generally in making this assessment. There have been numerous studies conducted on how anthropogenic sound affects marine mammals, specifically whales.

Scientific Evidence Concerning the Effects of Anthropogenic Noise on Marine Mammals

In order to communicate, animals generally use sound. For example, in addition to echolocation clicks, killer whales are extremely vocal and produce whistles, pulsed calls, low-frequency pops, and jaw claps.[82] These sounds are important social signals that help members of a group to recognize each other, stay together, and coordinate behaviors.[83] Because marine mammals largely rely on sound to communicate, the effects of background noise are a major focus of marine mammal acoustic research.[84] Background noise affects successful signal detection and can mask important signals between communicators.[85] "Masking occurs when the ability to detect or recognize a sound of interest is degraded by the presence of another sound."[86] In other words, the

[80] *Endangered Rule*, *supra* note 42, at 70,934-70,935.
[81] No such study exists.
[82] *Communication & Echolocation*, SEAWORLD PARKS & ENTERTAINMENT. https://seaworld.org/en/animal-info/animal-infobooks/killer-whale/communication-and-echolocation (last visited Nov. 29, 2018).
[83] *Id*.
[84] Rebecca A. Dunlop, *Your Attention Please: Increasing Ambient Noise Levels Elicits a Change in Communication Behavior in Humpback Whales (Megaptera Novaeangliae)*, 277 PROCEEDINGS: BIOLOGICAL SCI. 2521, 2522 (2010).
[85] *Id*. at 2521.
[86] Christine Erbe et al., *Communication Masking in Marine Mammals: A Review and Research Strategy*, 103 MARINE POLLUTION BULLETIN 15, 17 (2016).

noise spectrum overlaps with, or masks, their hearing sensitivity frequency range.[87] Therefore, animals have amended their behavior to overcome this challenge of acoustic signal masking.[88] For example, animals might avoid areas with high noise levels.[89] In a study conducted regarding the effects of background noise on humpback whales, the proportion of surface-generated sounds like breaching and 'slapping' increased and the proportion of vocalizations decreased with higher levels of background noise.[90] The results of the study also showed that humpback whales modified their behavior, changing the amount and types of signal used, when higher levels of noise were introduced to their environment.[91]

There are two sources of background noise: natural and anthropogenic. Natural sources of background noise include noise from wind, ice, precipitation, earthquakes, and other animals.[92] Anthropogenic sources include commercial and military shipping, seismic surveys, military sonar, oil exploration, and other industrial activities, such as construction and offshore energy farms.[93] As human activity in the ocean has increased,

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[87] S. Veirs et al., *Ship Noise Extends to Frequencies Used for Echolocation by Endangered Killer Whales*, PEERJ 1, 2 (2016)*, available at* https://peerj.com/articles/1657/.
[88] Dunlop, *supra* note 84, at 2521. *See also* John A. Hildebrand, *Anthropogenic and Natural Sources of Ambient Noise in the Ocean*, 395 MAR. ECOL. PROG. SER. 5, 5 (2009).
[89] Dunlop, *supra* note 84, at 2521
[90] *Id*. at 2527.
[91] *Id*.
[92] Erbe et al., *supra* note 86, at 17.
[93] Jim Cummings, *Regulating Ocean Noise: Entering Unchartered Waters, Introduction to the Special Issue of the Journal of International Wildlife Law and Policy*, 10 J. INT'L WILDLIFE L. & POL'Y 101, 101-102 (2007). *See also* Benjamin A. Harris, *Turn Down the Volume: Improved Federal Regulation of Shipping Noise is Necessary to Protect Marine Mammals*, 35 UCLA J. OF ENVT'L. L. & POL'Y 206, 214 (2017).

so has anthropogenic sound.[94] Anthropogenic sound can cause negative physical, physiological, and behavioral effects in marine ocean mammals, fish, fauna, and other ocean life:

> These impacts can result in a reduction in the abundance of fish species, changes in cetacean behavior and migration routes, and a range of physical injuries in both marine vertebrates and invertebrates. There may be further long-term consequences due to chronic exposure, and sound can also indirectly affect animals through changes in the accessibility of prey, which may also suffer the adverse effects of acoustic pollution.[95]

As previously stated, anthropogenic sound can also interfere with marine mammals' ability to communicate if the noise spectrum overlaps with, or masks, their hearing sensitivity frequency range.[96] Anthropogenic sound frequencies vary between low, medium, and high frequency ranges. Shipping and seismic exploration primarily occupy the low frequency range; most sonar (military and mapping) and small vessel noise primarily occupy the mid-frequency range; and sonar used to locate small objects, as well as marine mammal acoustic deterrent and harassment devices (to keep mammals away from fishing gear or aquaculture facilities) occupy the high-frequency sound range.[97] Lower frequency sounds propagate further in water, whereas medium and higher frequencies do not propagate over long ranges.[98]

Shipping noise arguably contributes the most to ambient, or background, ocean noise. Shipping has raised ambient noise levels ten-to-twenty-fold in heavily trafficked

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[94] Jim Cummings, *Regulating Ocean Noise: Entering Unchartered Waters, Introduction to the Special Issue of the Journal of International Wildlife Law and Policy*, 10 J. INT'L WILDLIFE L. & POL'Y 101, 101 (2007).
[95] Michel Andre et al., *Low-frequency Sounds Induce Acoustic Trauma in Cephalopods*, 9 FRONTIERS IN ECOLOGY AND THE ENV'T 489, 489 (2011).
[96] Veirs et al., *supra* note 87, at 2.
[97] John A. Hildebrand, *Anthropogenic and Natural Sources of Ambient Noise in the Ocean*, 395 MAR. ECOL. PROG. SER. 5, 5-17 (2009).
[98] *Id*. at 5.

areas in the last 50 plus years.[99] As of 2015, there was an estimated 50,000 registered merchant ships (not including passenger or fishing vessels).[100] As a result, shipping noise has contributed significantly to total ambient noise levels having doubled every decade for the past several decades.[101] Due to higher propagation and prevalence, shipping noise is widespread and constant.[102]

There are multiple sources of ship noise. A primary and dominant source is cavitation: ships use large propellers and as the blades rotate in the water to propel the ship forward, the tips of the blades create pressure that produces underwater air bubbles.[103] These bubbles collapse and produce sound.[104] The higher the speed, the more bubbles (and sound) produced.[105] Furthermore, over time, this process erodes the metal on the propellers, resulting in more noise and vibrations.[106] In addition, machinery such as engines, generators, fans, and navigational sonar create sound.[107]

Commercial ship noise arguably affects whales communicating across all frequency spectrums. Commercial ships primarily operate in the low frequency range.[108] Ships operating at these lower frequencies are more likely to affect baleen whales, e.g.,

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[99] Cummings, *supra* note 94, at 101.
[100] Benjamin A. Harris, *Turn Down the Volume: Improved Federal Regulation of Shipping Noise is Necessary to Protect Marine Mammals*, 35 UCLA J. OF ENVT'L. L. & POL'Y, 206, 216 (2017).
[101] *Id*. at 215.
[102] *Id*. at 214-215.
[103] *Id*. at 215. *See also* Hildebrand, *supra* note 97, at 9.
[104] Harris, *supra* note 100, at 215.
[105] Goran Grunditz, *Quieter, More Efficient Propellers*, INGENIA, Dec. 2015, at 38.
[106] *Id*.
[107] Harris, *supra* note 100, at 215.
[108] Brandon L. Southall et al., *Reducing Noise from Large Commercial Ships: Progress and Partnerships*, PROCEEDINGS, Spring 2018, at 59.

humpbacks, which also communicate in the lower frequency spectrum.[109] Even though the toothed whale frequency communication spectrum is thought to be above the peak power frequencies of most commercial ships (odontocetes are thought to communicate in the mid-to-high frequency range), there is scientific evidence that indicates that ship noise frequently extends to higher frequencies.[110] A 2016 study conducted in Washington State looked at the effects of local shipping traffic on the endangered (toothed) southern resident killer whales.[111] The scientists found that commercial ships produced the most damaging noise with ranges in the mid-to-high frequency levels.[112] Likely contributing to this increase in frequency was the fact the data was collected close to the coast and so high frequency sound was not fully absorbed.[113] Studies show that ships also can produce higher frequencies at closer ranges (typically less than one kilometer).[114] One study that found commercial ships producing sound in the mid-to-high frequency range pointed to propeller damage as a possible culprit, which increases radiated noise and decreases overall efficiency of the propulsion system.[115] Of

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[109] Veirs et al., *supra* note 87, at 2.
[110] *Id*. *See also* Hildebrand, *supra* note 97, at 9; Erbe et al., *supra* note 86, at 20; Weilgart, *supra* note 54, at 1094.
[111] Veirs et al., *supra* note 87, at 2. *See also* Story Hinckley Staff, *Ship Noise Linked to Orca Decline: Are Some Boats Safer than Others?*, CHRISTIAN SCIENCE MONITOR (Feb. 3, 2016), http://eds.a.ebscohost.com/eds/detail/detail?vid=0&sid=e5b522a5-32ad-45babe 2380593e05bcbf%40sessionmgr4008&bdata=JnNpdGU9ZWRzLWxpdm U%3d#AN=11 2720837&db=a9h.
[112] Veirs et al., *supra* note 87, at 2.
[113] *Id*.
[114] Brandon L. Southall et al., *Underwater Noise from Large Commercial Ships – International Collaboration for Noise Reduction*, ENCYCLOPEDIA OF MARITIME AND OFFSHORE ENGINEERING 2 (2007), *available at* https://onlinelibrary.wiley.com/doi/pdf/ 10.1002/9781118476406.emoe056 [hereinafter Southall et al., *Underwater Noise*].
[115] Megan F. McKenna at al., *Relationship between Container Ship Underwater Noise Levels and Ship Design, Operational and Oceanographic Conditions*, SCIENTIFIC REPORTS, May 2013, at 8.

significance, scientific literature points to the difficulty of measuring ambient noise generated by shipping in the ocean, resulting in possible errors in collected data.[116]

As mentioned earlier, small boats generally produce sound in the mid-frequency range (but also use high-frequency sonar for echolocation).[117] In particular, whale-watching can result in higher levels of high boat noise due to the prevalence of small boats engaging in this activity.[118] These smaller boats operate at higher frequencies than commercial ships and also at closer ranges. Southern resident killer whales have been found to alter their behavior in the presence of these vessels.[119] In studying the effects of whale-watching boats on killer whales, the study found that vessel speed was the most important predictor of noise levels on whales in the study.[120] The study concluded that reducing boat speed would reduce the killer whales' noise exposure. [121]

Sonar also contributes to ambient noise in the ocean.[122] Military sonar operates across all frequency ranges (low, mid, and high).[123] The U.S. Navy's Surveillance Towed Array Sensor System (SURTASS) low-frequency active sonar is used for broad-scale surveillance.[124] SURTASS is deployed vertically below naval ships under the water line.[125] The U.S. Navy also uses mid-frequency sonars to detect submarines and these sonars are part of the ships' structure, usually as sonar domes on the bows of destroyers,

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[116] Richard M. Heitmeyer et al., *Shipping Noise Predictions: Capabilities and Limitations*, 37 MARINE TECH. SOC'Y J. 54, 54 (2003).
[117] Hildebrand, *supra* note 97, at 16.
[118] *Id*.
[119] Juliana Houghton et al., *The Relationship between Vessel Traffic and Noise Levels Received by Killer Whales (Orcinus Orca)*, PLOS ONE 1, 16 (2015).
[120] *Id*. at 1.
[121] *Id*.
[122] Harris, *supra* note 100, at 214.
[123] Hildebrand, *supra* note 97, at 8.
[124] *Id*.
[125] *Id*.

cruisers, and frigates.[126] More prevalent than SURTASS systems, there are approximately 300 mid-frequency sonars in the world's navies.[127] Civilian and commercial sonars used to map the ocean floor, detect fish, and search and rescue (to name a few) are also in use and produce sound at lower source levels than military sonars.[128] However, there are more of these types of sonar in use due to the large number of commercial and civilian ships.[129]

Sonar has long been viewed as a threat to marine mammals. Not only can sonar affect marine mammals' ability to communicate with each other, there is evidence indicating sonar can deafen and daze certain types of whales, leaving them vulnerable to stranding and shark attack.[130] One study on a captive harbor porpoise recorded the porpoise's behavioral responses to sonar: "They swam further away from the transducer, surfaced more often, swam faster, and breathed more forcefully."[131] In 1999, sixteen beaked whales were found stranded in the Bahamas following U.S. Navy sonar exercises in the area.[132] They were dazed and confused, many bleeding from their ears.[133] Eight of the stranded beaked whales died and autopsies revealed hemorrhaging and other signs of ear trauma.[134] From 1960 to 2007, more than 40 mass strandings of beaked whales have been reported; approximately 28 of these occurred at the same time and place as naval exercises, the use of active sonars, or in the proximity of naval bases, or co-occurred with

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[126] *Id*.
[127] *Id*.
[128] *Id*. at 8-9.
[129] *Id*. at 8.
[130] News Focus, *A Roaring Debate Over Ocean Noise*, 291 SCIENCE 576, 576 (2001).
[131] Erbe et al., *supra* note 86, at 29.
[132] News Focus, *A Roaring Debate Over Ocean Noise*, 291 SCIENCE 576, 577 (2001).
[133] *Id*. at 576-577.
[134] *Id*. *See also* Weilgart, *supra* note 54, at 1096.

other noise sources like seismic surveys.[135] It is no surprise that the U.S. Navy has received a lot of negative attention and been party to many lawsuits involving the effects of military sonar on marine mammals.[136]

Weaknesses in Scientific Studies

There is some difficulty establishing a causal connection between ocean noise and harm to marine mammals. Mainly, there are a varying number of factors that could account for marine mammal behavioral responses to noise. For example, in one study, beaked whales responded similarly to military sonar and killer whales calls (their main predator).[137] In another case, blue whales exhibited anti-predator responses in reaction to sonar noise even though the frequency of the sonar did not overlap with their hearing sensitivity frequency.[138] In the same study, sonar seemed to have no effect on Atlantic herring, even though sonar overlapped with its hearing sensitivity frequency range.[139] "Thus, the frequency and intensity of noise are just a few of the factor driving responses, with temporal and spatial context of the disturbance, prior experience and similarity to relevant biological sounds also playing key roles…"[140]

Similarly, the study regarding the captive harbor porpoise previously mentioned showed the effects of naval sonar on the animal's behavior were reduced when another

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[135] Weilgart, *supra* note 54, at 1096.
[136] *E.g.*, Winter v. NRDC, Inc.*,* 555 U.S. 7 (2008); NRDC. Inc. v. Pritzker, 828 F.3d 1125 (2016); Ocean Mammal Inst. v. Gates, 546 F. Supp. 2d 960 (2008); Conservation Council for Haw. v. Nat'l Marine Fisheries Serv., 97 F. Supp. 3d 1210 (2015); NRDC v. Evans, 232 F. Supp. 2d 1003 (2002); NRDC v. Gutierrez, No. C-07-04771, 2008 U.S. Dist. LEXIS 8744 (N.D. Cal. Feb. 6, 2008).
[137] Graeme Shannon et al., *A Synthesis of Two Decades of Research Documenting the Effects of Noise on Wildlife*, 91 BIOLOGICAL REVIEWS 982, 988 (2016).
[138] *Id*.
[139] *Id*.
[140] *Id*.

source of non-anthropogenic background noise (wind-generated noise at various sea states) was present.[141] In addition, even though adverse reactions to noise have been found in individual cetaceans, for example, there is less known about noise's impacts on the greater cetacean population.[142] As one scientist points out, "Much uncertainty still exists about cetacean hearing, and extrapolations across individual species, age classes, etc., remain controversial."[143] Directly measuring hearing in these animals is difficult: "Hearing capabilities have been directly measures in less than one-third of the ~125 species of living marine mammals, and many of these involve data from very few captive individuals (often one)."[144]

Furthermore, variability in responses to noise makes difficult to establish "safe" noise exposure levels and there is also difficulty in using short-term noise responses as an indication of long-term impacts on a population.[145] In addition, as another scientist points out, there is a gap in long-term research concerning effects of ocean noise in the waters of the continental shelf and, therefore, trends here are unknown – despite the fact this area of the ocean is increasingly subject to regulation.[146] Finally, even though marine

[141] Erbe et al., *supra* note 86, at 29.
[142] Weilgart, *supra* note 54, at 1110.
[143] *Id*.
[144] Brandon L. Southall et al., *Underwater Noise*, *supra* note 114, at 3.
[145] Weilgart, *supra* note 54, at 1110. *See also* Peter L. Tyack, *Implications for Marine Mammals of Large-Scale Changes in the Marine Acoustic Environment*, 89 J. OF MAMMALOGY 549, 549 (2008) (stating that, "There are few studies to guide predictions of when such [behavioral] changes start to lower the fitness of individuals or have negative consequences for the population").
[146] Peter Harris et al., *Monitoring Anthropogenic Ocean Sound from Shipping Using an Acoustic Sensor Network and a Compressive Sensing Approach*, SENSORS 1, 2 (2016).

mammals have coping mechanisms to compensate for increased noise, "…little is known about the maximum range at which they need to communicate."[147]

Therefore, there is an argument that scientific studies have yet to provide enough evidence that gives a clear and thorough understanding of the effect of anthropogenic noise generally, and certain types of anthropogenic noise specifically, on marine mammals. Despite these gaps in scientific research, NMFS forged ahead in using anthropogenic sound as a novel essential feature designating critical habitat for the MHI IFKW.

NMFS Rule Concerning MHI IFKW Critical Habitat Essential Features

Once NMFS designated the MHI IFKW Distinct Populations Segment as endangered in 2012 due to high extinction risk and insufficient conservation efforts, NMFS was then required to designate critical habitat with accompanying essential features in order to assist with conservation efforts.[148] The ESA's implementing regulations define 'conservation' as, "…the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the

[147] Peter L. Tyack, *Implications for Marine Mammals of Large-Scale Changes in the Marine Acoustic Environment*, 89 J. OF MAMMALOGY 549, 549 (2008).
[148] *Endangered Rule*, *supra* note 42. *See also* Letter from Peter O. Thomas, Acting Executive Director, Marine Mammal Commission to Ms. Susan Pultz, Conservation Planning and Rulemaking Branch, Protected Resources Division, National Marine Fisheries Service (Jan. 2, 2018), *available at* https://www.regulations.gov/docketBrowser?rpp=25&po=0&dct=PS&D=NOAA-NMFS-2017-0093&refD=NOAA-NMFS-2017-0093-0001 (drawing attention to the fact that the Natural Resources Defense Council sued NMFS for failure to begin rulemaking designating critical habitat for the MHI IFKW. NMFS entered into a settlement requiring publication of a proposed rule by October 31, 2017).

measures provided pursuant to this Act are no longer necessary."[149] As such, in its proposed rule on critical habitat published in the Federal Register on November 3, 2017, NMFS asserted that one feature (of four) essential to the conservation of MHI IFKWs was a "*habitat free of anthropogenic noise that would significantly impair the value of the IFKWs' use or occupancy*" [emphasis added].[150]

In proposing this essential feature, NMFS cited the fact that false killer whales use sound to navigate, communicate, and detect predators and prey.[151] NMFS relied on the general understanding that anthropogenic sound can affect false killer whales' ability to function normally while performing these tasks.[152] Regarding the effects on MHI IFKW habitat specifically, NFMS stated,

> Long-term changes to habitat use or occupancy can reduce the benefits that the animals receive from that environment (e.g., opportunities to forage or reproduce), thereby reducing the value that habitat provides for conservation. Habitats that support conservation of MHI insular false killer whales allow these whales to employ sound within their environment to support important life history functions.[153]

In its proposed rule, NMFS requested that the public provide any relevant information to assist NMFS in evaluating whether it was appropriate to include lack of anthropogenic sound as an essential feature in designating critical habitat, as well as any scientific data that would aid in determining noise levels that would result in adverse modification or habitat destruction, e.g., inhibiting communication or foraging activities, or causing the abandonment of critical habitat areas.[154] NFMS conceded that if this essential feature

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[149] 50 C.F.R. § 424.02 (2016).
[150] *Proposed Rule*, *supra* note 4, at 51,186.
[151] *Proposed Rule*, *supra* note 4, at 51,192.
[152] *Id*.
[153] *Id*.
[154] *Id*.

was not appropriate, they would update their analysis accordingly.[155] It appears NMFS was not confident that the lack of anthropogenic sound should be an essential feature, especially considering no such language was present in the three other proposed essential feature commentary.

Unsurprisingly, especially considering NMFS' own reticence, this essential feature caused consternation and negative comment from multiple sources, to include government actors and private entities. Their arguments mostly centered on the lack of scientific evidence of the effects of anthropogenic noise on mammals; a concern the essential feature lacked specificity concerning the kinds of actions that might be covered; the fact that anthropogenic noise (or lack thereof) is not a natural feature of the habitat, but rather related to human activity; and since anthropogenic noise was a result of human activity, any effect it might have on the endangered whale's would be assessed during the section 7 jeopardy consultation process.

Commenters stated there was a lack of scientific evidence of the effects of anthropogenic noise on mammals. The U.S. Navy's comment was short, but pointed: NMFS used "sound" as an essential physical feature without sufficient scientific justification.[156] As Admiral Lahti, Director of Energy and Environmental Readiness Division for the Office of the Chief of Naval Operations, wrote, "The Navy is concerned the minimal scientific understanding associated with this feature will result in protracted Section 7 consultations and adversely impact military readiness."[157] Similarly, the Hawaii Department of Land and Natural Resources submitted a public comment urging that

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[155] *Id*.
[156] Navy Comment, *supra* note 6.
[157] *Id*.

NMFS continue to gather additional information about what habitat characteristics contribute to conservation.[158] Specifically, the State of Hawaii pointed out that NMFS provided no analysis of ambient noise levels in MHI IFKW high use areas.[159]

The Western Pacific Regional Fishery Management Council in Hawaii expressed concern that NMFS did not actually identify any specific anthropogenic activities "likely to have substantial negative impacts to habitat features essential to the survival of IFKWs..."[160] The U.S. Navy also felt that the proposed rule did not provide examples of "what would constitute a 'may affect' or 'adverse modification' of this feature."[161] In addition, the Marine Mammal Commission's primary concern was that the critical habitat designation was overly broad, making it more difficult to manage acute threats to the species.[162] The Marine Mammal Commission instead pressed for a more focused and

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[158] Letter from Bruce Anderson, Administrator, State of Hawaii, Department of Land and Natural Resources, to Ms. Susan Pultz, Conservation Planning and Rulemaking Branch, Protected Resources Division, National Marine Fisheries Service (Dec. 21, 2017), *available at* https://www.regulations.gov/docketBrowser?rpp=25&po=0&dct=PS&D=NOAA-NMFS-2017-0093&refD=NOAA-NMFS-2017-0093-0001.

[159] *Id*.

[160] Letter from Kitty M. Simonds, Executive Director, Western Pacific Regional Fishery Management Council, to Ms. Susan Pultz, Conservation Planning and Rulemaking Branch, Protected Resources Division, National Marine Fisheries Service (Dec. 21, 2017), *available at* https://www.regulations.gov/docketBrowser?rpp=25&po=0&dct=PS&D=NOAA-NMFS-2017-0093&refD=NOAA-NMFS-2017-0093-0001. In its proposed rulemaking, NMFS did identify several human activities that would require special management consideration that may threaten the four listed essential features, stating that this list was not exhaustive and rather should be considered in accordance with the section 7 consultation process. However, none of the listed activities specifically addressed the essential feature concerning anthropogenic sound. *See Proposed Rule*, *supra* note 4, at 51,193.

[161] *Navy Comment*, *supra* note 6.

[162] Letter from Peter O. Thomas, Acting Executive Director, Marine Mammal Commission to Ms. Susan Pultz, Conservation Planning and Rulemaking Branch, Protected Resources Division, National Marine Fisheries Service (Jan. 2, 2018), *available at* https://www.regulations.gov/docketBrowser?rpp=25&po=0&dct=PS&D=NOAA NMFS- 2017-0093&refD=NOAA-NMFS-2017-0093-0001.

narrowly defined critical habitat area based on better scientific evidence, to include anthropogenic noise *levels* that do not negatively impact recovery.[163] Finally, the Department of Interior also objected because essential features must be identified at an appropriate level of specificity using the best scientific data, which DOI stated NMFS failed to do.[164]

A comment from the Hawaii Longline Association (HLA), a private organization formed to represent the interests of local commercial longline fisheries, objected to basing an essential feature on the absence of anthropogenic sound because the absence of sound was not a tangible physical or biological feature that could be found in the designated critical habitat area.[165] DOI also asserted the lack of anthropogenic noise, framed as a lack of a potential effect to the species, did not meet the definition of physical and biological features found at 50 C.F.R. 424.12(b)(1)(ii) (i.e., "features that support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, sites, prey…").[166] Furthermore, the Hawaii Department of Land and Natural Resources stated, "Because noise is related to activity and not a feature

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[163] *Id*.

[164] Letter from Janet Whitlock, Regional Environmental Officer, United States Department of Interior, Office of the Secretary, Office of Environmental Policy and Compliance to Ms. Susan Pultz, Conservation Planning and Rulemaking Branch, Protected Resources Division, National Marine Fisheries Service (Jan. 2, 2018), *available at* https://www.regulations.gov/docketBrowser?rpp=25&po=0&dct=PS&D=NOAA-NMFS-2017-0093&refD=NOAA-NMFS-2017-0093-0001. Of note, the Secretary of the Interior delegates to NMFS authority for rulemaking in this area, which was pointed out publicly in DOI's comment. *Id*.

[165] Letter from Ryan P. Steen, Stoel Rives LLP to Ms. Susan Pultz, Conservation Planning and Rulemaking Branch, Protected Resources Division, National Marine Fisheries Service (Jan. 2, 2018), *available at* https://www.regulations.gov/docketBrowser?rpp=25&po=0&dct=PS&D=NOAA-NMFS-2017-0093&refD=NOAA-NMFS-2017-0093-0001.

[166] Letter from Janet Whitlock, *supra* note 164.

of the habitat, we believe that noise should be considered for its potential negative impacts to IFKW, but it should not be an essential feature of the habitat."[167]

Commenters also felt that noise should only be considered through the section 7 jeopardy consultation process, which is a much harder standard to meet than adverse modification if noise becomes part of a species' critical habitat designation**.** "Read literally, the statute [ESA, section 7] bans all actions that would 'adversely modify' critical habitat, no matter how modest the modification."[168] The law firm representing HLA also stated that it would be more appropriate to analyze the presence of sound using section 7 consultation for specific activities because "…any determination by NMFS that sound may adversely affect the Insular DPS would necessarily be predicated on a finding that sound affects the *animals*, not the animals' *habitat*."[169] DOI also wrote that potential effects of anthropogenic sound were more appropriately addressed by the section 7 jeopardy consultation process.[170]

Of particular importance, the HLA comment pointed out that NMFS had previously determined in 2006 that sound would not be an essential feature in killer whale critical habitat designation because sound effects directly affect the species and not its habitat – and the section 7 consultation process identified and mitigated for potentially harmful activities involving anthropogenic sound.[171] NMFS likewise concluded that it lacked sufficient information to include sound as an essential feature in designating killer

[167] Letter from Bruce Anderson, *supra* note 158.
[168] Dale D. Goble et al., WILDLIFE LAW: CASES AND MATERIALS, 1082 (Robert C. Clark et al. eds, 3rd ed. 2017).
[169] Letter from Ryan P. Steen, *supra* note 165.
[170] Letter from Janet Whitlock, *supra* note 164.
[171] Letter from Ryan P. Steen, *supra* note 165.

whale critical habitat.[172] HLA further pointed out that NMFS recognized that sound might affect the North Pacific right whale and the North Atlantic right whale during the rulemaking process, but still did not make the absence of sound as an essential feature in their critical habitat designations. HLA protested NMFS' novel change to its existing policy.[173]

Based on these public comments, NMFS conceded that the presence of noise does not necessarily result in adverse modification of critical habitat.[174] Rather, chronic exposure and persistent noise may impede activity.[175] However, NMFS did not strike this essential feature entirely. NMFS argued that scientific information "…indicates that the introduction of a permanent or chronic noise source can degrade the value of habitat by interfering with the sound-reliant animal's ability to gain benefits from the habitat, impeding reproduction, foraging, or communication…"[176] In their final rule designating critical habitat published on July 24, 2018, NMFS slightly revised this physical and biological feature essential to conservation as, "*Sound levels that would not significantly impair false killer whales' use or occupancy*" [emphasis added].[177] In other words, NMFS attempted to address the concern that the *lack* of anthropogenic sound could not appropriately be designated as an essential feature, but effectively ignored the criticisms stating the effects of anthropogenic sound from human activities were more appropriately addressed by the section 7 jeopardy consultation process. However, the end result was

[172] *Id*.
[173] *Id*.
[174] *Endangered Rule*, *supra* note 42, at 70,915.
[175] *Id*.
[176] *Id*.
[177] *Id*.

not substantively different: anthropogenic sound is a critical habitat essential feature for the MHI IFKWs.

Based on past precedent, even if the U.S. Navy and other interested parties litigated this matter in court, courts seem to be more inclined to favor regulation that aims to proactively protect endangered and threatened species. Although there are arguments that the NMFS regulation designating MHI IFKW critical habitat is too broad, and the science not developed enough in order to fully understand the effect of sound on whales generally and MHI IFKW specifically, it is not surprising that NMFS chose a more protective approach. Although scientists do not know all of the effects of anthropogenic noise on whales, it is clear anthropogenic noise has *some* effect. There is enough of a connection between anthropogenic noise and whale behavioral effects that perhaps warrant additional and forward-leaning protections in critical habitat designation. Of note, this is an example of the precautionary principle in action: "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically."[178] This principle has gained traction in recent years due to a perception that efforts to combat environmental harm are too slow as problems continue to rapidly grow.[179]

Mitigation

Although the U.S. Navy and other entities object to the use of anthropogenic sound as an essential feature when determining critical habitat for the MHI IFKW, there

[178] David Kriebel et al., *The Precautionary Principle in Environmental Science*, 109 ENVTL. HEALTH PERSP. 871, 871 (2001).
[179] *Id*.

are ways to mitigate marine noise that are not burdensome on affected parties. In fact, the U.S. Navy is already at the forefront of quiet ship technology, most notably illustrated by the DD(X) Zumwalt class's use of an electric propulsion system. If commercial ships adopt similar quiet ship processes and technology, and if the Navy continues to develop and use this technology, overall net ambient noise will decrease, thereby mitigating the possible negative effects of military operations.

Propulsion systems are the primary sources of noise from ships (see earlier discussion on cavitation and other sources of ship noise).[180] Therefore, the most effective means of reducing sound is improving ship propulsion system technology. One avenue is changing the design of propellers. Engineers can reduce cavitation effects by changing the angle, curvature, and cross section size of the propeller blades.[181] In addition, "Adding tiny winglets to the end of the propeller blades can also helped tackle tip vortex cavitation. The winglets work much like those that can be seen on the end of modern passenger jet wings….[this] can help to equalize some of the pressure on both sides of the blade tip, reducing the risk of cavitation occurring."[182] Finally, the best way to counteract the effects of cavitation is to reduce the load on the propeller.[183] However, ships still require effective propellers that move the ship as efficiently as possible. The primary goal of propellers is to obtain as much thrust as possible, which propels the ship forward.[184] One way to increase the efficiency of the propeller blades, while still reducing cavitation, is to make the blades larger in size and to increase the number of

[180] Brandon L. Southall et al., *Underwater Noise*, *supra* note 114, at 2.
[181] This is a simplified explanation of the geometry of a screw propeller. *See* Grunditz, *supra* note 105, at 38.
[182] Grunditz, *supra* note 105, at 38.
[183] *Id*. at 40.
[184] *Id*.

blades.[185] Ship designers have found that using a five-bladed design (compared to the more common 2.5 blade propeller) results in a more efficient, and quieter, ship.[186] From the little that is know about the Navy's Ohio-class nuclear powered submarine design, the Navy uses technologically advanced propellers that have seven, thin, highly curved ("skewback") blades.[187]

The Navy has been at the forefront of quiet ship technologies in more than just propeller design. Machinery vibrations are a big factor in ship noise. Dampening vibrations by using noise-insulating material and placing reduction gear machinery on rafting suspended inside the hull contribute to noise reduction on ships and submarines.[188] Anechoic tiles, or rubber tiles, glued on the outside of the submarine also reduce sound.[189] Finally, computer-aided design and the use of 3-D models have contributed to reducing noise by building parts to a high level of detail and specificity, that grinding between parts that fit snugly together is significantly reduced.[190] Computer-aided design also allows for the hull and propeller to be built in a way that is more complimentary to each other, reducing the amount of wake the hull produces – which

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[185] *Id*. at 39.
[186] *Id*.
[187] *Id*. at 39-40. *See also* Kyle Mizokami, *What Makes Submarines So Quiet: The Science of How Subs Elude Their Enemies, Explained,* POPULAR MECHANICS (Aug. 15, 2017), https://www.popularmechanics.com/military/navy-ships/news/a27768/what-makes-submarines-so-quiet/.
[188] Kyle Mizokami, *What Makes Submarines So Quiet: The Science of How Subs Elude Their Enemies, Explained,* POPULAR MECHANICS (Aug. 15, 2017), https://www.popularmechanics.com/military/navy-ships/news/a27768/what-makes-submarines-so-quiet/ [hereinafter Mizokami, *What Makes Submarines So Quiet*].
[189] *Id*. *See also* Kyle Mizokami, *Navy Subs Can't Stop Losing Their Noise-Dampening Skins,* POPULAR MECHANICS (Mar. 7, 2017), https://www.popularmechanics.com/military/weapons/a25578/the-navys-submarines-are-still-shedding-their-rubber-like-skins/.
[190] Mizokami, *What Makes Submarines So Quiet*, *supra* note 188.

also affects cavitation: "By ensuring a steadier flow of water from the hull into the area where the propellers will be operating, and keeping the propeller the optimal distance from the hull, noise and vibration can be reduced while allowing the propeller to generate thrust as efficiently as possible."[191]

Similar to the auto industry, the U.S. Navy and other foreign navies are moving towards using electric propulsion systems on submarines and ships. In an electric propulsion system, typically steam or gas turbines will generate electricity, which powers an electric motor, turning the screw.[192] This eliminates the need for reduction gear, greatly reducing overall ship noise.[193] Electric motors are also smaller and shock-and-vibration proof.[194] There are several types of electric motors that are being researched and developed for possible use on ships.[195] In its newest class of DD(X) destroyers, the U.S. Navy has replaced its gas turbine engines with a quieter permanent magnet motor in order to implement an all-electric propulsion system, which is an all-electric drive with an integrated power system (IPS).[196] The first to use this technology is the USS Zumwalt

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[191] Grunditz, *supra* note 105, at 40.
[192] Mizokami, *What Makes Submarines So Quiet*, *supra* note 188. *See also* Tomas Kellner, *These New Warships Will Be So Quiet, They Can Sneak Up on Submarines*, GE REPORTS (Jan. 8, 2016), https://www.ge.com/reports/mute-vibrations-these-warships-are-so-quiet-they-can-sneak-up-on-submarines/.
[193] Mizokami, *What Makes Submarines So Quiet*, *supra* note 188.
[194] Tomas Kellner, *These New Warships Will Be So Quiet, They Can Sneak Up on Submarines*, GE REPORTS (Jan. 8, 2016), https://www.ge.com/reports/mute-vibrations-these-warships-are-so-quiet-they-can-sneak-up-on-submarines/.
[195] Bobby A. Bassham, An Evaluation of Electric Motors for Ship Propulsion (June 2003) (published Master's thesis, Naval Postgraduate School), https://apps.dtic.mil/dtic/tr/fulltext/u2/a417341.pdf.
[196] Press Release, GE Power Conversion, GE Power Conversion Helps Propel U.S. Navy into the Future with First All-Electric Warship (Apr. 17. 2014), https://www.gepowerconversion.com/press-releases/ge-power-conversion-helps-propel-us-navy-future-first-all-electric-warship. *See also DDG 1000 Zumwalt Class – Multimission Destroyer*,

(DDG 1000).[197] According to General Electric, the company responsible for producing this technology, "The system is capable of propelling the ship, powering the radars and the Integrated Fight Through Power, a zonal electric distribution system, thanks to the 78 megawatts of power generated on the ship."[198]

The U.S. and British navies are also exploring the use of hybrid electric drive technology on ships already in operation in order to reduce fuel and maintenance costs.[199] The ships will use electric motors to propel the ships' main reduction gear at low speeds because traditional gas turbine engines are not as efficient at lower speeds.[200] The Royal Navy implemented this hybrid design in its Type 23 Duke-class frigates and, in 2015, the U.S. Navy announced similar plans for 34 Arleigh Burke-class guided missile destroyers.[201] However, even though the U.S. Navy spent more than $52 million on this initiative, the Department of Defense's 2019 budget cut funding for this program.[202] The technology is currently implemented on just one ship, the USS Truxtun (DDG-103) with

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NAVAL TECH., https://www.naval-technology.com/projects/dd21/ (last visited Dec. 16, 2018, 3:51 PM).

[197] *Id*.

[198] Press Release, GE Power Conversion, GE Power Conversion Helps Propel U.S. Navy into the Future with First All-Electric Warship (Apr. 17. 2014), https://www.gepower conversion.com/press-releases/ge-power-conversion-helps-propel-us-navy-future-first-all-electric-warship.

[199] Kellner, *supra* note 194. *See also* Sam LaGrone, *Navy Set to Install Hybrid Electric Drives in Destroyer Fleet Starting Next Year*, USNI NEWS (Sept. 23, 2015), https://news. usni.org/2015/09/23/navy-set-to-install-hybrid-electric-drives-in-destroyer-fleet-staring-next-year.

[200] Sam LaGrone, *Navy Set to Install Hybrid Electric Drives in Destroyer Fleet Starting Next Year*, USNI NEWS (Sept. 23, 2015), https://news. usni.org/2015/09/23/navy-set-to-install-hybrid-electric-drives-in-destroyer-fleet-staring-next-year.

[201] *Id*.

[202] Tyler Rogoway, *Navy Ditches its Plan to Upgrade 34 Destroyers with Hybrid Electric Drives*, THE DRIVE (Mar. 14, 2018), http://www.thedrive.com/the-war-zone/19237/navy-ditches-its-plan-to-upgrade-34-destroyers-with-hybrid-electric-drives. *See also* LaGrone, *supra* note 200.

no current plans to place hybrid-electric drives on other ships.[203] There seem to be multiple reasons for this decision to cut funding: the U.S. Navy cited other priorities; there is increased chance of ship-wide blackouts due to a heavy load on the two gas-turbine generators in operation (also producing electricity for the electric motor) while the electric motor drives the ship; and fuel savings were less than initially thought.[204] However, the technology remains in place on the USS Truxtun and the Navy will continue to monitor this ship to see if the improved technology pays off over time.[205]

In addition to implementing similar improved technology and engineering features on commercial ships, the commercial ship industry could learn from the U.S. Navy by simply following the Navy's commitment to making sound reduction a high priority(even though this commitment is not for environmental reasons). Best illustrated in the Navy's submarine noise reduction guidelines, a 48-page chapter in the Navy's Joint Fleet Maintenance Manual, the purpose of these guidelines is to reduce submarine noise in order to avoid detection by enemy vessels..[206] The Navy asserts that, "…the primary method of preserving a ship's acoustic advantage is through an aggressive and effective planned and corrective noise reduction maintenance program."[207] The Navy operates multiple acoustic trials and exercises throughout different phases of the ship's operating

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[203] *Id*.
[204] Tyler Rogoway, *Navy Ditches its Plan to Upgrade 34 Destroyers with Hybrid Electric Drives*, THE DRIVE (Mar. 14, 2018), http://www.thedrive.com/the-war-zone/19237/navy-ditches-its-plan-to-upgrade-34-destroyers-with-hybrid-electric-drives.
[205] David B. Larter, U.S. Navy Canceling Program to Gas-Guzzling Destroyers into Hybrids, DEFENSENEWS (Mar. 8, 2018), https://www.defensenews.com/naval/2018/03/08/the-us-navy-is-cancelling-a-program-to-turn-gas-guzzling-destroyers-into-hybrids/.
[206] *Chapter 23: Submarine Noise Reduction*, U.S. NAVY JOINT FLEET MAINTENANCE MANUAL, https://fas.org/nuke/guide/usa/doctrine/navy/jfmm/vol4/III_CH06.htm (last visited Sept 24, 2018).
[207] *Id*.

cycle to measure the radiated noise signature.[208] Any discrepancies or excessive radiated noise coming from the crew's own ship or noticed from another ship have to be logged in an Equipment Status Log and reported immediately up the chain of command with very detailed information, such as the date and time of detection of the noise signature problem and the ship's depth and speed at the time of the detection..[209] Per the manual, one of the most common and preventable sources of noise is sound from improperly secured equipment.[210] The Navy requires that ship personnel go through detailed checklists to ensure that equipment is properly stowed.[211] In addition, there are surveys that assess machinery and hull vibrations, as well as surveys that ensure require inspection of sound damping material.[212] Finally, the Commanding Officer of the submarine is required to assign one of his senior Department Heads as the Noise Reduction Officer, highlighting the importance the Navy places on their noise reduction program.[213]

If commercial ships adopt similar technology, or implement other measures to reduce noise while transiting, the Navy could potentially be free to conduct more operations that might have a negative effect on MHI IFKW critical habitat. Offsetting any environmental harm the Navy might cause could best be achieved through compensatory mitigation measures, as illustrated in the compensatory mitigation measures taken to facilitate wetlands preservation. According to EPA and the U.S. Army Corps of Engineers joint regulations, "compensatory mitigation means the restoration (re-

[208] *Id*.
[209] *Id*.
[210] *Id*.
[211] *Id*.
[212] *Id*.
[213] *Id*.

established or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of wetlands…for the purposes of offsetting unavoidable adverse impacts…"[214] In 2015, one company restored a 23,000 acre wetland area drained for farming and then sold credits to offset wetlands development in other locations.[215] Similarly, if commercial ships were able to reduce their overall noise output, those credits would offset noise produced by naval operations.

Implementing similar new technology and/or noise reduction programs will likely prove cost prohibitive for commercial ships. The Navy could potentially participate in technology and best practices sharing with the commercial ship industry, as quieter commercial ships could benefit the Navy in the long run if overall noise is reduced. A model for such a program is the Defense Research, Development, Test and Evaluation (RDT&E) Information Exchange Program (IEP) the Navy already participates in with foreign ally navies.[216] The purpose of this program is to "…foster a climate conducive to the establishment of international cooperative research and development projects, and to improve the results of research and development...[by encouraging] the exchange of information on RDT&E activities with allied and friendly nations."[217] Per the Department of the Navy's Navy International Programs Office, the goals of this program are to: "build relationships and facilitate closer alliances; marshal U.S. and friendly foreign nations' technological capabilities; enhance the security of the free world;

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[214] *Section 404 of the Clean Water Act: Compensatory Mitigation,* U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/cwa-404/compensatory-mitigation (last visited Dec. 2, 2018).
[215] Michael Doyle, *Endangered Species: Trump Admin Torpedoes Obama-era Mitigation Goal*, E&E NEWS (July 27, 2018), https://www.eenews.net/stories/1060091417.
[216] DEP'T OF DEF., DODI 2015.4, DEFENSE RESEARCH, DEVELOPMENT, TEST AND EVALUATION (RDT&E) INFORMATION EXCHANGE PROGRAM (IEP) (2002).
[217] *Id*.

improve interoperability and standardization, and identify cooperative opportunities."[218] The U.S. Navy's Office of the Judge Advocate General (Code 12), Environmental Law division, is fond of saying, "Environmental law *is* national security law." This is because Navy is subject to environmental laws that affect naval operations on land and sea. The Navy would never share classified technology with commercial ships, but the sharing of unclassified technology and best practices might go a long way in facilitating overall adherence to environmental laws and regulations, which only serves to benefit the Navy from a national security standpoint. Regardless, the commercial ship industry might not be properly incentivized to implement any such changes – unless forced.

If all else fails, the simplest mitigation tool ships have at their disposal is speed reduction.[219] In a previously mentioned study, the authors found a linear relationship between frequency levels and the speed of the ship: reducing speed was shown to reduce ship noise across all frequency bands.[220] In another study, ship cumulative noise was lowest at 8 knots – a 65% reduction in operational speed for the vessels observed in the study.[221] There are other benefits to slowing down: slower speeds reduce collision risks

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[218] *Information and Data Exchanges*, DEP'T OF THE NAVY INT'L PROGRAMS OFFICE, http://www.secnav.navy.mil/nipo/Pages/About/Cooperative%20Programs/Information-and-Data-Exchanges.aspx (last visited Dec. 2, 2018).

[219] In October 2018, the International Marine Organization failed to implement measures enforcing speed restrictions despite climate benefits from reducing fuel use at high speeds. *See* Phil McKenna, *An Ambitious Global Effort to Cut Shipping Emissions Stalls*, INSIDE CLIMATE NEWS (Oct. 26, 2018), https://insideclimatenews.org/news/26102018/shipping-emissions-heavy-fuel-oil-greenhouse-gases-imo-agreement-international-maritime-organization.

[220] Veirs et al., *supra* note 87, at 2. *See also* Story Hinckley Staff, *Ship Noise Linked to Orca Decline: Are Some Boats Safer than Others?*, CHRISTIAN SCIENCE MONITOR (Feb. 3, 2016), http://eds.a.ebscohost.com/eds/detail/detail?vid=0&sid=e5b522a5-32ad-45babe2380593e05bcbf%40sessionmgr4008&bdata=JnNpdGU9ZWRzLWxpdm U%3d#AN=112720837&db=a9h.

[221] Megan F. McKenna et al., *supra* note 115, at 1.

and increase fuel efficiency.[222] NMFS actually implemented regulations in 2008 requiring that vessels 65 feet or more in length reduce speed to 10 knots or less in certain locations and at certain times of the year along the U.S. Atlantic coat in order to protect the North Atlantic right whales from colliding with ships.[223] According to scientific studies, right whales are more prone to death or injury from ship strikes than other whale species.[224] In 2011, studies of right whales off the coast of New England indicated that the reduced speed regulation reduced the risk of fatal ship strikes by 57%.[225] As a result of this success due to the speed restriction, the final rule in 2013 removed the expiration date, or sunset provision, contained in the initial regulation.[226]

In addition, reducing the amount of whale-watching activity might significantly reduce noise effects on whales – especially for MHI IFKW. Whale-watching is a very popular tourist attraction in Hawaii, especially in Maui. A 2000 NOAA report stated that there were 52 vessels offering whale-watching trips during the 1999 whale season, running an average total of 87 trips per day.[227] The total number of whale watchers was

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[222] Veirs et al., *supra* note 87, at 2.

[223] Endangered Fish and Wildlife; Final Rule to Implement Speed Restrictions to Reduce the Threat of Ship Collisions with North Atlantic Right Whales, 73 Fed. Reg. 60,173 (Oct. 10, 2008) (to be codified at 50 C.F.R. Part 224). *See also* Endangered Fish and Wildlife; Final Rule to Remove the Sunset Provision of the Final Rule Implementing Vessel Speed Restrictions to Reduce the Threat of Ship Collisions with North Atlantic Right Whales, 78 Fed. Reg. 73,726 (Dec. 9, 2013) (to be codified at 50 C.F.R. Part 224).

[224] *Id*.

[225] Endangered Fish and Wildlife; Final Rule to Remove the Sunset Provision of the Final Rule Implementing Vessel Speed Restrictions to Reduce the Threat of Ship Collisions with North Atlantic Right Whales, 78 Fed. Reg. 73,726, 73,729 (Dec. 9, 2013) (to be codified at 50 C.F.R. Part 224).

[226] *Id*.

[227] *The Economic Contribution of Whalewatching to Regional Economies: Perspectives from Two National Marine Sanctuaries*, U.S. Dep't of Commerce, NOAA MARINE SANCTUARIES DIV. 8 (July 2000), *available at* https://nmshawaiihumpbackwhale.blob.

approximately 370,000.[228] As previously mentioned, these whale-watching boats use mid-to-high frequency sonars to track down whales. These boats also approach whales at a very close range. Limiting this tourist activity would reduce anthropogenic noise to a considerable degree. However, this mitigation measure is not likely to be supported as this activity provides considerable economic benefits for the state and local communities. NOAA quotes the total economic impact of whale-watching in Hawaii during the 1999 season as $19 to 27 million.[229] In addition, whale-watching supported the equivalent of 280 to 390 full-time jobs.[230] Regardless, if reducing the net noise that can negatively affect the MHI IFKW is of significance importance to NMFS, the Navy, and the local community, this is one avenue that could be explored.

It is unlikely that the Navy will reduce current operations (in both size and geographic scope) in an effort to reduce those operations' impacts on marine mammals. Per the most recent NMFS ESA Section 7 "Biological Opinion on U.S. Navy Hawaii-Southern California Training and Testing," the Navy already substantially mitigates for harmful effects on the MHI IFKW. The Hawaii Range Complex is very large: the Navy conducts training and testing operations in waters encompassing more than 2 million square nautical miles of air and sea space that surround the entirety of the island chain.[231] However, the Navy notes that they primarily operate in an area that is smaller (86,103 square nautical miles of air and sea space), and closer to shore, primarily because of

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core.windows.net/hawaiihumpbackwhale-prod/media/archive/documents/pdfs_science/whalewatch_benefits.pdf.

[228] *Id*.

[229] *Id*.

[230] *Id*. at 9.

[231] *Biological Opinion*, *supra* note 72, at 57.

logistical and safety reasons.[232] Furthermore, in the (geographic) mitigation section of the Biological Opinion, the Navy states that the highest use areas in the island chain for MHI IFKWs are avoided during certain times of the year when most scheduled large-scale military testing operations are not performed (November through April).[233] In addition, the Navy concludes that,

> [W]e do not anticipate these species will experience long duration or repeat exposures within a short period of time due to the species' wide ranging life history and that long duration (i.e., more than one day) Navy activities also occur over large geographic areas (i.e., both the animal and the activity are moving within the action area, most likely not in the same direction). This decreases the likelihood that animals and Navy activities will co-occur for extended periods of time or repetitively over the duration of an activity.[234]

In addition, the Navy engages in procedural mitigation to reduce the effects of sonar on applicable marine mammals, e.g., endangered species.[235] According to the Navy, procedural mitigation involves:

> (1) the use of one or more trained Lookouts [on ships, on aircraft, or onshore] to observe for specific biological resources within a mitigation zone, (2) requirements for Lookouts to immediately communicate sightings of specific biological resources to the appropriate watch station for information dissemination, and (3) requirements for the watch station to implement mitigation (e.g., halt an activity) until certain recommencement conditions have been met…[those] conditions are designed to allow a sighted animal to leave the mitigation zone before an activity or the use of a stressor resumes.[236]

The Navy could potentially further reduce current training operations (in both the number of operations and the geographic scope of the sea space) in an effort to reduce those operations' impacts on the MHI IFKW population, even though the Navy would

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[232] *Id*.
[233] *Id.* at 136, 453.
[234] *Id*. at 453.
[235] *Id*. at 100-101.
[236] *Id*.

argue that reducing the geographic scope of the training area would actually be detrimental because the effects of the operations are essentially diluted when spread over a large geographic area. Another alternative would be to shift the primary training area further away from the island chain away from the high-use areas of the MHI IFKWs. In order to do this, the Navy would have to dedicate more time and money in order to reduce logistical issues that naturally arise when Navy ships and aircraft operate further from shore, e.g., additional refueling at sea operations and dedicated time spent at sea. Finally, in regards to the specific operations the Navy conducts, they could further consider reducing the number of operations conducted (although this is very unlikely because the Navy continuously asserts that these testing and training operations are required for national security).

Perhaps the most practical solution is for the Navy to simply invest significant money, time, and resources into additional scientific studies to confidently determine the actual cause and effect of sonar and other anthropogenic sound sources on marine mammals most affected by Navy operations. The Navy could also provide local scientists financial and logistical support in physically tracking the MHI IFKWs. Considering the MHI IFKWs' small population, and that the whales are segment themselves into three distinct social clusters, knowing where these whales are located at any given time could provide the Navy with real-time updates that could be used in military exercise planning, allowing the Navy to avoid specific areas or halt sonar operations for a specific time period. This would be much more precise than relying on visual lookouts located on ships. By leading the way in sponsoring various scientific

research initiatives, the Navy could potentially avoid costly and time intensive litigation concerning military operations.

Conclusion

In summary, although NMFS was decidedly forward leaning in introducing anthropogenic noise as an essential feature in critical habitat designation for the Main Hawaiian Island Insular False Killer Whale, there are mitigation tools available to reduce anthropogenic noise. The U.S. Navy serves as a role model for commercial and private vessels in its commitment to reducing noise for operational reasons, illustrated by the guidelines the Navy promulgates and the technology it develops and uses. Although the Navy objected to the use of anthropogenic sound as an essential feature because of possible effects on its own operations, if overall ambient noise is reduced through the commercial use of these mitigation tools, the Navy will likely be free to conduct more operations with reduced effects on the MHI IFKW population.