

A CHRONIC PROBLEM:

PRITZKER AND THE NOAA ROADMAP'S DEFICIENCIES

BY

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Anthropogenic noise from sources such as sonar, oil and gas exploration, and commercial shipping pollutes the ocean and causes serious problems for marine mammals, who rely on sound to survive. The National Oceanic and Atmospheric Administration (NOAA) recently addressed the extent of anthropogenic ocean noise pollution (AONP) in its Roadmap that elaborates on the agency's decision to try to address the ocean noise problem using existing statutory authority, such as the Marine Mammal Protection Act (MMPA). The Ninth Circuit Court of Appeals' decision in Natural Resources Defense Council, Inc. v. Pritzker is the most recent decision in a series of cases arising under the MMPA that provides an example of how noise pollution from sonar has been successfully managed under the Act. However, Pritzker simultaneously highlights the limited capacity of the MMPA to regulate noise pollution from other sources. This Chapter explores the problem of anthropogenic ocean noise pollution and discusses its effects on marine mammals. This Chapter discusses the restricted scope of the Pritzker decision, examines the limited capacity of the MMPA to regulate ocean noise pollution, and details the deficiencies of NOAA's Roadmap. Finally, this Chapter concludes with some suggestions for how statutory authority may be expanded to more adequately address ocean noise pollution.

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I. INTRODUCTION

Anthropogenic ocean noise pollution (AONP)¹ has been rising since the industrial revolution, and its rapid growth over the last seventy-five years has led to critical changes in the ocean soundscape.² This dramatic increase in AONP has created wide-ranging threats to marine mammals by causing fundamental behavioral changes,³ including disruptions in normal migration, reproduction, and communication, as well as habitat abandonment.⁴

¹ See JASON GEDAMKE ET AL., NAT'L OCEANIC & ATMOSPHERIC ADMIN., OCEAN NOISE STRATEGY ROADMAP 45 (2016), <https://perma.cc/H4LG-EYGG> [hereinafter ROADMAP] (describing sources of AONP); John A. Hildebrand, *Anthropogenic and Natural Sources of Ambient Noise in the Ocean*, 395 MARINE ECOLOGY PROGRESS SERIES 5, 5–6 (2009) (discussing both natural and anthropogenic sources of ocean noise pollution); Joel R. Reynolds, *Submarines, Sonar, and the Death of Whales: Enforcing the Delicate Balance of Environmental Compliance and National Security in Military Training*, 32 WM. & MARY ENVTL. L. & POL'Y REV. 759, 761 (2008) (explaining that the three leading causes of AONP are military sonar, seismic surveys, and commercial shipping).

² ROADMAP, *supra* note 1, at 63; see *Acoustics—Soundscape*, INT'L ORG. FOR STANDARDIZATION § 2.3, <https://perma.cc/FB8C-VKDG> (last visited Nov. 11, 2017) (defining "soundscape" as the underwater "acoustic environment as perceived or experienced and/or understood by a person or people, in context"); see also ROADMAP, *supra* note 1, at 45 (explaining that "[a] soundscape can be thought of as the aggregate collection of all of the sounds (both natural and anthropogenic) that occur or are received at a particular location making up the total acoustics of a place"). See *generally* ROADMAP, *supra* note 1, at 46.

³ Nat. Res. Def. Council, Inc. v. Pritzker, 828 F.3d 1125, 1130–31 (9th Cir. 2016); ROADMAP, *supra* note 1, at 1.

⁴ MARINE MAMMAL COMM'N, MARINE MAMMALS AND NOISE: A SOUND APPROACH TO RESEARCH AND MANAGEMENT, at i (2007), <https://perma.cc/J7WN-2Y28> [hereinafter FULL SOUND REPORT] (explaining that marine mammals use hearing "for communication, individual recognition, predator avoidance, prey detection and capture, orientation, navigation, mate selection, and

Marine mammals are significantly affected by AONP because these animals rely on hearing and sound in the same way that humans rely on sight⁵—as an essential component of their environment that enables them to navigate their surroundings, communicate with members of their species, find prey, and avoid predators.⁶ One particularly horrific stranding event exemplifies the severe damage AONP can cause. In the Bahamas in 2000, United States Department of the Navy vessels used mid-frequency sonar, which caused seventeen whales from various species to beach themselves, including Cuvier’s beaked whales, minke whales, and a dolphin.⁷ When scientists examined the whales, they found bleeding around the cetaceans’ brain and ears, injuries likely stemming from exposure to loud noise.⁸

Despite AONP’s well-known impacts on marine mammals, Congress has failed to provide agencies with the tools necessary to adequately address the problem. There is currently no statute that specifically addresses AONP.⁹ To date, the National Marine Fisheries Service (NMFS) has used the Marine Mammal Protection Act¹⁰ (MMPA or the Act) to address ocean noise from a limited number of sources, such as Navy sonar used during military preparedness activities.¹¹ Although Congress enacted the MMPA due to concerns that human activity was harming marine mammal populations and that some species were in danger of extinction,¹² the MMPA does not allow NMFS to address AONP comprehensively.¹³

The MMPA’s regulatory framework is limited and does not provide an effective way to protect marine mammals from chronic and cumulative AONP because it only regulates AONP from “specified activit[ies].”¹⁴ The MMPA protects marine mammals and their “essential habitats” from the

mother-offspring bonding”); ROADMAP, *supra* note 1, at 6, 8; Christine Erbe et al., *Communication Masking in Marine Mammals*, MARINE POLLUTION BULL., 15 February 2016, at 15, 17 (“Of all the ways in which noise can affect the lives of marine mammals, auditory masking is perhaps the most pervasive.”); Jon M. Van Dyke et al., *Whales, Submarines, and Active Sonar*, 18 OCEAN YEARBOOK 330, 334, 338 (2004).

⁵ FULL SOUND REPORT, *supra* note 4, at i, 5 (“Sound is energy manifested as a vibration or acoustic wave traveling through a medium such as air or water.”); MICHAEL JASNY ET AL., NAT. RES. DEF. COUNCIL, SOUNDING THE DEPTHS II: THE RISING TOLL OF SONAR, SHIPPING AND INDUSTRIAL OCEAN NOISE ON MARINE LIFE 1–2 (2005), <https://perma.cc/37PV-LEAD>.

⁶ ROADMAP, *supra* note 1, at 45; Erbe et al., *supra* note 4, at 16–17.

⁷ Van Dyke et al., *supra* note 4, at 336–37 (noting “other whales probably sank to the sea floor before they had a chance to strand”).

⁸ *Id.*

⁹ JASNY ET AL., *supra* note 5, at v–vi.

¹⁰ Marine Mammal Protection Act of 1972, 16 U.S.C. §§ 1361–1421h (2012).

¹¹ See *Pritzker*, 828 F.3d 1125, 1130–31 (9th Cir. 2016); *Nat. Res. Def. Council, Inc. v. Evans*, 279 F. Supp. 2d 1129, 1141–42 (N.D. Cal. 2003).

¹² 16 U.S.C. § 1361(1).

¹³ ROADMAP, *supra* note 1, at 13–14 (explaining that existing statutes such as the MMPA and the ESA provide for “analyses [that] are not typically comprehensive on a scale that would adequately address either the long life spans or very large geographic ranges of all the marine species potentially impacted, and they don’t address aggregate or cumulative effects very well”).

¹⁴ See 16 U.S.C. § 1371(a)(5)(A)(i).

injurious effects of human activities¹⁵ through the Act's broad "take" prohibition.¹⁶ The MMPA gives NMFS the authority to permit "incidental" take of "small numbers" of marine mammals by "citizens of the United States" pursuant to "specified activit[ies] . . . within a specific geographical region" so long as the applicant meets certain requirements.¹⁷ To authorize incidental take, NMFS must first find that the total authorized take "will have a negligible impact."¹⁸ And second, NMFS must provide regulations that ensure the "least practicable adverse impact" to marine mammals.¹⁹ By limiting its reach to "specified activit[ies] . . . within a specified geographical region," the MMPA does not provide a basis for regulating aggregated AONP effects from various human activities across many economic sectors.²⁰

The MMPA does have strengths; it successfully regulates acute sources of AONP, like military sonar.²¹ However, its largest downfall is its failure to address noise impacts cumulatively. The MMPA is activity specific.²² Thus, while it may enable NMFS to protect marine mammals from individual acute sources of AONP,²³ such as seismic testing from a single oil and gas project or military sonar,²⁴ it does not provide the tools necessary to protect marine mammals from chronic and cumulative AONP.²⁵ The most recent case

¹⁵ *Id.* § 1361(2) (providing that "efforts should be made to protect essential habitats . . . for each species of marine mammal from the adverse effect of man's actions").

¹⁶ *Id.* §§ 1361(2), 1362(13), 1371 (providing that one purpose of the MMPA is to ensure that marine mammal populations do not fall below "the point at which they cease to be a significant functioning element in the ecosystem").

¹⁷ *Id.* § 1371(a)(5)(A)(i). NMFS is responsible for implementing the MMPA. 50 C.F.R. § 216.8 (2016) (providing that "[NMFS] shall enforce the provisions of the MMPA and may take any actions authorized by the MMPA with respect to enforcement"); *see also* 16 U.S.C. § 1362(12)(A)–(B) (providing that the MMPA gives the Secretary of Commerce and the National Oceanic and Atmospheric Administration (NOAA) authority over most marine mammals).

¹⁸ 16 U.S.C. § 1371(a)(5)(A)(i)(I).

¹⁹ *Id.* § 1371(a)(5)(A)(i)(II)(aa).

²⁰ *Id.* § 1371(a)(5)(A)(i); FULL SOUND REPORT, *supra* note 4, at 35–37 (discussing the limitations and inefficiencies of the MMPA in commercial sectors and in managing cumulative anthropogenic effects).

²¹ *See* ROADMAP, *supra* note 1, at 6, 9.

²² The MMPA is activity specific in that it grants exceptions to its broad take prohibition for a "specified activity." 16 U.S.C. § 1371(a)(5)(A)(i). This means that the MMPA may be used to address AONP from certain specific activities such as sonar from military preparedness activities but that MMPA is limited to such "specified activit[ies]" and may not be used effectively to regulate cumulative or chronic AONP from many varied sources. *See id.*

²³ ROADMAP, *supra* note 1, at 6 (explaining that acute noise pollution is "of rapid onset and shorter duration" and typically comes from a single source as opposed to chronic noise pollution which is "persistent/longer-term," comes from many sources, and can have cumulative effects).

²⁴ *Pritzker*, 828 F.3d 1125, 1130–31 (9th Cir. 2016); *Anthropogenic Sound*, INT'L WHALING COMMISSION, <https://perma.cc/96WS-RVMY> (last visited Nov. 11, 2017).

²⁵ ROADMAP, *supra* note 1, at 6 (explaining that cumulative AONP is "aggregated or cumulative effects of rising noise levels resulting from increased human activities across multiple sectors, industries, and federal agencies"); *see also* FULL SOUND REPORT, *supra* note 4, at iii, 36–37 (describing the challenges associated with uncertain risks, and inadequate monitoring and mitigation measures, as well as inconsistencies in regulations of AONP and

dealing with sonar, marine mammals, and the MMPA is *Natural Resources Defense Council, Inc. v. Pritzker*. In *Pritzker*, the United States Court of Appeals for the Ninth Circuit found that the MMPA required NMFS to take measures to attain the “least practicable adverse impact” standard before allowing any incidental take of marine mammals.²⁶ The court held that NMFS’s determination that the sonar activities would have a negligible impact on marine mammal species was insufficient under the MMPA.²⁷ The court explained that in order to authorize take of marine mammals incident to Navy activities, NMFS must *also* consider mitigation measures to ensure that there will not be a significant impact on marine mammals and that the “least practicable adverse impact” is achieved.²⁸ While *Pritzker* is a victory for marine mammal protection, that victory is limited. The *Pritzker* decision exemplifies how acute AONP has been successfully regulated under the MMPA. But even if the impacts of noise from sonar are reduced, marine mammals are still bombarded with noise from recreational and commercial vessels, oil and gas exploration, offshore construction, and offshore renewable energy sources.²⁹

The National Oceanic and Atmospheric Administration (NOAA) has attempted to address noise more comprehensively in its *Ocean Noise Strategy Roadmap* (Roadmap),³⁰ but even the new Roadmap fails to address some of the chronic sources and cumulative effects of AONP. In the Roadmap, NOAA details that the agency intends to work with current statutory authority, like the MMPA, to more effectively manage AONP.³¹ The Roadmap notes that NOAA may be able to rely on existing provisions in the MMPA such as the Act’s provisions regarding “incidental take authorizations,”³² “general rulemaking authority,”³³ and “conservation plans”³⁴ to address chronic and cumulative AONP. For example, NOAA explained that it could rely on the Act’s “conservation plan” section to potentially incorporate an Endangered Species Act³⁵ (ESA)–like “site-specific

“[i]nsufficient accounting of individually insignificant effects that may be cumulatively significant”).

²⁶ *Pritzker*, 828 F.3d at 1130.

²⁷ *Id.* at 1134, 1142.

²⁸ *Id.* at 1142.

²⁹ ROADMAP, *supra* note 1, at 9; Hildebrand, *supra* note 1, at 10.

³⁰ ROADMAP, *supra* note 1, at 1.

³¹ *Id.* at 6–7 (providing that NOAA intends to use statutory authority besides the MMPA (e.g., the Endangered Species Act, the National Environmental Policy Act, etc.); NAT’L OCEANIC & ATMOSPHERIC ADMIN., SUMMARY OF PUBLIC COMMENTS ON DRAFT NOAA OCEAN NOISE STRATEGY ROADMAP § 3, <https://perma.cc/MZ9E-3397> (last visited Nov. 11, 2017) (explaining that NOAA’s Roadmap focuses on improving “effective implementation of current mandates” rather than “the expansion of current authorities”). It should be noted that NOAA’s efforts under these various statutes are worthy of lengthy consideration, but this Chapter restricts itself to addressing whether the Roadmap’s goals are achievable under the MMPA.

³² ROADMAP, *supra* note 1, at 121; *see* MMPA, 16 U.S.C. § 1371(a)(2) (2012).

³³ ROADMAP, *supra* note 1, at 121; *see* 16 U.S.C. § 1382(a).

³⁴ ROADMAP, *supra* note 1, at 122; *see* 16 U.S.C. § 1383b(b)(2).

³⁵ Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544.

management action”³⁶ provision to help reduce ocean noise.³⁷ NOAA also noted that it could rely on the Act’s provision regarding permits for incidental take of marine mammals in the course of commercial fishing operations to impose mitigation requirements as a part of issuing permits.³⁸ The Roadmap acknowledges the extent of the AONP problem, makes promises to address it, and calls for interagency collaboration.³⁹ Although the Roadmap is promising, it does not include an implementation plan, require specific action within the agency, or detail how the agency will foster interagency cooperation. NOAA’s ability to accomplish the laudable goals described in the Roadmap using existing MMPA statutory authorizations is unlikely. Without a concrete plan for implementation or a commitment to formal rulemaking, the Roadmap’s goals may never come to fruition. The *Pritzker* decision helps ensure that marine mammals receive protection from acute sources of AONP under the MMPA.⁴⁰ However, these sources are only part of the problem. And while the Roadmap deals directly with the issue of AONP and has the potential to offer solutions to the cumulative AONP problem, NOAA is constrained by its need to work only within existing mandates, which likely limits the Roadmap’s efficacy. While *Pritzker* and the Roadmap are steps in the right direction, it is unlikely that either one, without more, will provide comprehensive protection from AONP for marine mammals and their environment.

Part II of this Chapter explores the problem of acute, chronic, and cumulative AONP and its effects on marine mammals and their habitat. Part III discusses the historical regulatory approach to acute noise pollution under the MMPA and explains why this approach is ineffective in solving the larger AONP problem by highlighting the importance of *Pritzker* and explaining the case history of AONP under the MMPA. Part IV analyzes the Roadmap and discusses how NOAA’s decision to work within current mandates on improving effective implementation rather than expanding current authorities or committing to formal rulemaking limits the agency’s approach. The Chapter concludes, in Part V, with some suggestions about how the Roadmap and the existing statutory framework may be expanded to more successfully reduce AONP.

³⁶ *Id.* § 1533(f)(1)(B)(i).

³⁷ ROADMAP, *supra* note 1, at 122.

³⁸ *Id.* (explaining that the MMPA allows “[p]ermits for the incidental taking or importation of marine mammals in the course of commercial fishing operations” but requires that permits “specify . . . any other terms or conditions which the secretary deems appropriate,” and NOAA can “require mitigation of noise impacts during the course of commercial fishing operations as part of granting this permit”).

³⁹ *Id.* at 2–4, 38, 126.

⁴⁰ *See Pritzker*, 828 F.3d 1125, 1141–42 (9th Cir. 2016).

II. ACUTE, CHRONIC, AND CUMULATIVE ANTHROPOGENIC OCEAN NOISE POLLUTION AND ITS EFFECTS ON MARINE MAMMALS

A. Anthropogenic Ocean Noise Pollution

In a similar manner to the way air pollution negatively impacts life on land,⁴¹ AONP severely disrupts marine life and especially the lives of marine mammals, which rely almost exclusively on sound to communicate and navigate in their environment.⁴² According to Christopher Clark,⁴³ an expert in ocean noise, humans are “injecting so much noise [into the sea] that we are effectively acoustically bleaching the world’s oceans.”⁴⁴ AONP comes in two major forms: acute and chronic, both of which adversely impact marine mammals.⁴⁵ Cumulative AONP refers to the impacts and effects of acute and chronic AONP in the aggregate.⁴⁶

AONP’s adverse effects on marine mammals are well documented and no longer a source of scientific debate.⁴⁷ The effects of acute AONP are more dramatic, direct, and immediate than the impacts from chronic AONP.⁴⁸ However, the effects of chronic AONP tend to be longer-term and more wide-ranging.⁴⁹ In tandem, these sources of AONP affect marine mammals briefly in localized areas and chronically over larger areas for longer periods of time, resulting in adverse health impacts and reduced survival.⁵⁰ The next Section details the sources of both acute and chronic AONP and discusses the various effects of AONP on marine mammals.

⁴¹ See *Effects of Air Quality*, U.S. FISH & WILDLIFE SERV., <https://perma.cc/2KQL-6V2C> (last updated June 16, 2015) (describing some of the effects associated with chronic exposure to air pollution, including tissue damage).

⁴² Richard Schiffman, *How Ocean Noise Pollution Wreaks Havoc on Marine Life*, YALE ENV’T 360 (Mar. 31, 2016), <https://perma.cc/JJG4-SPQJ>.

⁴³ Christopher Clark, Ph.D., is a senior scientist at Cornell’s Bioacoustics Research Program and has spent over forty years studying sound and its impacts on wildlife. *Christopher Clark, Ph.D.*, CORNELL LAB, <https://perma.cc/44YU-WCYG> (last visited Nov. 11, 2017); *Sound Experts Take to the Sea*, CORNELL LAB ORNITHOLOGY, <https://perma.cc/V3PG-LYLT> (last visited Nov. 11, 2017) (summarizing Clark’s work starting in 1987).

⁴⁴ Schiffman, *supra* note 42 (interviewing Clark).

⁴⁵ ROADMAP, *supra* note 1, at 6 (explaining that acute refers to “direct . . . (i.e., of rapid onset and shorter duration) physical, physiological, and behavioral impacts that noise exposure can have on marine fauna,” while chronic AONP has “persistent/longer term” impacts on marine mammals).

⁴⁶ *Id.* (explaining that “aggregated or cumulative effects [are the result] of rising noise levels resulting from increased human activities across multiple sectors, industries, and federal agencies”).

⁴⁷ Reynolds, *supra* note 1, at 762.

⁴⁸ Schiffman, *supra* note 42 (explaining that acute sources tend to be “six or seven orders of magnitude louder than [noise from shipping],” which is a major source of chronic AONP).

⁴⁹ ROADMAP, *supra* note 1, at 36 (explaining that NOAA needs “wide-ranging mitigation solutions” for chronic AONP).

⁵⁰ *Id.* at 6, 30.

1. Acute AONP Sources and Their Impacts

Acute AONP emanates from sources such as oil and gas exploration and military sonar.⁵¹ Oil and gas surveys involve massive underwater explosions from seismic airguns, which produce large amounts of noise that carry across entire ocean basins.⁵² The airgun arrays produce so much noise that they are comparable to volcanic eruptions.⁵³ Airguns are used to map oil and gas deposits in the seabed by firing air blasts that reverberate into the water column and penetrate into the ocean floor.⁵⁴ When these air blasts echo back to the ship, the sounds are interpreted and provide information about the location of oil and gas deposits.⁵⁵ Airgun blasts fire rapidly, averaging one blast every ten seconds and continue, in some instances, around the clock for months at a time.⁵⁶ Seismic airgun arrays produce sound frequencies⁵⁷ in the 5–150 hertz (Hz) range and create sound pressure levels up to 259 decibel (dB).⁵⁸ For reference, the sound pressure level of a vacuum cleaner is around 93 dB, and a loud concert is around 133 dB.⁵⁹

Acute AONP is incredibly harmful to marine mammals and can cause hearing damage, physical injuries, and in some instances, even death.⁶⁰ Seismic surveying is a substantial contributor of acute AONP.⁶¹ Although there is an established link between acute noise and seismic surveys, all of the details are not yet available.⁶² The impacts of seismic surveys affect large portions of the ocean.⁶³ Marine mammals tend to entirely avoid these areas

⁵¹ Schiffman, *supra* note 42, at 760.

⁵² *Seismic Airgun Blasting: Overview*, OCEANA, <https://perma.cc/7FHX-RTE6> (last visited Nov. 11, 2017) (explaining that seismic airguns are devices that are towed behind ships and fire loud blasts of compressed air into water); *see also* Hildebrand, *supra* note 1, at 8 (discussing how and to what extent airguns produce sound); L.S. Weilgart, *The Impacts of Anthropogenic Ocean Noise on Cetaceans and Implications for Management*, 85 CAN. J. ZOOLOGY 1091, 1092 (2007) (noting that sound from these surveys can drown out whale calls for tens of thousands of square miles); Schiffman, *supra* note 42 (“[W]hen someone is surveying off northern Brazil, [Clark] can hear that explosion on a small piece of instrumentation . . . 60 miles off the coast of Virginia.”).

⁵³ FULL SOUND REPORT, *supra* note 4, at C-5.

⁵⁴ *Seismic Airgun Blasting: Overview*, *supra* note 52.

⁵⁵ Schiffman, *supra* note 42; *Seismic Airgun Blasting: Overview*, *supra* note 52.

⁵⁶ OCEANA, OFFSHORE OIL & GAS EXPLORATION: SEISMIC AIRGUN BLASTING, <https://perma.cc/7NH3-WEX6> (last visited Nov. 11, 2017); Hildebrand, *supra* note 1, at 8; *Seismic Airgun Blasting: Overview*, *supra* note 52.

⁵⁷ FULL SOUND REPORT, *supra* note 4, at 5 (“Frequency is the rate of vibration in cycles per second (Hertz; Hz) or thousands of cycles per second (kilohertz; kHz). Frequency determines the pitch of the sound: the higher the number of cycles per second, the higher the pitch.”).

⁵⁸ *Id.* at 6 tbl.1.

⁵⁹ *Id.* at 5 (noting the calculations of these sound levels have been “adjusted to a water reference”).

⁶⁰ ROADMAP, *supra* note 1, at 30.

⁶¹ *Id.* at 17 (“Generally, more supporting data exist for frequently conducted activities that produce *acute*, intense, high energy, impulsive sounds, such as . . . *seismic surveys*.” (emphasis added)).

⁶² Schiffman, *supra* note 42 (stating that all of the details on seismic surveys on whales are not available yet).

⁶³ *Id.* (explaining that seismic surveys affect 100,000 square mile areas at a time).

or cease communication efforts when unable to effectively hear each other.⁶⁴ This failure to communicate is important because whales are highly social creatures who rely on sound to find food, navigate in their environment, and find mates;⁶⁵ when whales cease communicating, they miss out on opportunities to feed and reproduce, and have trouble avoiding predators.⁶⁶ Researchers have documented whales in areas impacted by seismic surveys attempting to shield themselves from the sound by hiding behind rocks or swimming into the surf close to shore.⁶⁷

The other notorious producer of acute AONP is active sonar from military training activities.⁶⁸ The Navy relies on various forms of active sonar⁶⁹ to detect modern submarines because it is the best way to locate these vessels, which can operate in near silence.⁷⁰ Active sonar works by emitting surges of sound that bounce off targets and reflect back information about the location and distance of enemy submarines.⁷¹ There are several different kinds of active sonar. The Navy's mid-frequency active sonar (MFAS) produces sound frequencies in the 2–10 kHz range and creates sound pressure levels around 235 dB.⁷² Surveillance Towed Array Sensor System (SURTASS) Low-Frequency Active Sonar produces frequencies in the 100–500 Hz range and also generates sound pressure levels around 235 dB.⁷³ Low-Frequency Active Sonar (LFAS) produces sound pressure levels of 215 dB at the source.⁷⁴ There are areas of the ocean where sonar signals from LFAS converge, and in these areas, sound pressure levels

⁶⁴ *Id.*

⁶⁵ Van Dyke et al., *supra* note 4, at 332 & n.5; *see also* Erbe et al., *supra* note 4, at 16 (explaining that the songs of bowhead whales, humpback whales, and fin whales all play an important role in mating, and detailing how various species use sound to communicate, identify individuals, and navigate in their environment).

⁶⁶ Erbe et al., *supra* note 4, at 16; Schiffman, *supra* note 42.

⁶⁷ *See, e.g.*, Schiffman, *supra* note 42.

⁶⁸ Randall S. Abate, *NEPA, Nat'l Security, and Ocean Noise: The Past, Present, and Future of Regulating the Impact of Navy Sonar on Marine Mammals*, 13 J. INT'L WILDLIFE L. & POL'Y 326, 329–30 (explaining that active sonar, as opposed to passive sonar, has the capacity to receive and transmit sound); Reynolds, *supra* note 1, at 761–62.

⁶⁹ Abate, *supra* note 68, at 330 (describing the three different types of active sonar); Reynolds, *supra* note 1, at 762 (differentiating between mid and low-frequency active sonar).

⁷⁰ *Winter v. Nat. Res. Def. Council, Inc.*, 555 U.S. 7, 12 (2008). Active sonar is used to measure distance with sound. *Ocean Facts, What is Sonar?*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., <https://perma.cc/HJ4P-ZF5Z> (last updated Oct. 10, 2017) (explaining how active sonar transducers emit an acoustic pulse of sound in water and if an object is in the path of the sound pulse, the sound bounces off the object and returns an echo to the transducer); *United States Fleet Forces Command, Sonar*, U.S. NAVY, <https://perma.cc/EGE8-XM5C> (last visited Nov. 11, 2017).

⁷¹ *Winter*, 555 U.S. at 13.

⁷² FULL SOUND REPORT, *supra* note 4, at 6 tbl.1.

⁷³ *Id.*; EUGENE H. BUCK & KORI CALVERT, CONG. RESEARCH SERV., RL33133, ACTIVE MILITARY SONAR AND MARINE MAMMALS: EVENTS AND REFERENCES 2 (2008), <https://perma.cc/YGB4-LMZC>.

⁷⁴ Abate, *supra* note 68, at 330.

can reach up to 240 dB.⁷⁵ In fact, LFAS reaches the same sound pressure level as the Concord jet (150 dB) even after the sonar has traveled more than 400 miles away from the source vessel.⁷⁶

Sonar's effects on marine mammals may be even more profound than seismic surveying's effects. As mentioned above, there are three different types of Navy active sonar: MFAS, LFAS, and SURTASS LFAS.⁷⁷ Scientists have linked MFAS sonar with many whale stranding events around the world,⁷⁸ and LFAS can negatively affect marine mammals for hundreds of miles.⁷⁹ Since 2004, experts have agreed that the link between MFAS and mass strandings is "convincing and overwhelming."⁸⁰ Autopsies performed on marine mammals after mass stranding events show that the animals suffer from damage to their brains, lungs, ears, and internal organs such as the liver and kidneys.⁸¹ It is likely that the impact of sonar use is worse than documented because marine mammals sustain injuries at sea, and large numbers of these animals likely die offshore.⁸² As mentioned above, in one mass stranding event in the Bahamas, seventeen whales from four different species were stranded on a beach as a result of Navy MFAS use.⁸³ After examining the stranded whales, scientists discovered brain and ear hemorrhaging as a result of exposure to extremely loud noises.⁸⁴ LFAS sonar impacts marine mammals differently from MFAS. LFAS is quieter but can travel in the water for longer distances; it also has the effect of masking

⁷⁵ *Id.* (citing Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active Sonar, 67 Fed. Reg. 46,712, 46,712 (July 16, 2002) (to be codified at 50 C.F.R. pt. 216)).

⁷⁶ *Id.* (citing *Evans*, 279 F. Supp. 2d 1129, 1144 (N.D. Cal. 2003)).

⁷⁷ *Id.*

⁷⁸ MMPA, 16 U.S.C. § 1421(h)(3) (2012) (defining "stranding" as "an event in the wild in which—(A) a marine mammal is dead and is—(i) on a beach or shore of the United States; or (ii) in waters under the jurisdiction of the United States . . . or (B) a marine mammal is alive and is—(i) on a beach or shore of the United States and unable to return to the water; (ii) on a beach or shore of the United States and, although able to return to the water, is in need of apparent medical attention; or (iii) in the waters under jurisdiction of the United States . . . but is unable to return to its natural habitat under its own power or without assistance"); Reynolds, *supra* note 1, at 763–68 (detailing stranding events over the years); Van Dyke et al., *supra* note 4, at 335–37 (discussing unusual stranding events linked to sonar use); FULL SOUND REPORT, *supra* note 4, at 1 (discussing a series of stranding events that occurred after exposure to MFAS between 1996 and 2002).

⁷⁹ JASNY ET AL., *supra* note 5, at iv.

⁸⁰ *Id.* at v; Abate, *supra* note 68, at 331 ("The link between . . . mid-frequency sonar and marine mammal mortality has been conclusively established."); see also Reynolds, *supra* note 1, at 762 (explaining that the Navy and the International Whaling Commission "have agreed that the evidence linking mass strandings to mid-frequency sonar is 'convincing' and 'overwhelming'").

⁸¹ Reynolds, *supra* note 1, at 762; see also Van Dyke et al., *supra* note 4, at 331 (describing a 2002 whale beaching incident where autopsies reveal the whales sustained brain injuries "consistent with acoustic impact").

⁸² Abate, *supra* note 68, at 331; Weilgart, *supra* note 52, at 1096 (explaining how it is possible that AONP induced stranding mortalities have been underestimated).

⁸³ Abate, *supra* note 68, at 332; Van Dyke et al., *supra* note 4, at 336.

⁸⁴ Van Dyke et al., *supra* note 4, at 336–37.

important auditory signals used by marine mammals.⁸⁵ Harm to marine mammals from LFAS includes disruption to migration and communication between individuals.⁸⁶

2. Chronic AONP Sources and Their Impacts

While acute AONP is louder and has more severe and immediate effects, chronic AONP tends to be more persistent and has longer-term impacts,⁸⁷ making it a substantial contributor to the cumulative AONP problem.⁸⁸ One major contributor of chronic AONP is the commercial shipping industry.⁸⁹ Commercial and recreation vessels' engines, gears, and propellers inject low-frequency sound into the ocean.⁹⁰ There are now more ships in the ocean than ever before.⁹¹ The Department of Transportation has projected that commercial shipping will not only double between 2000 and 2020, but that shipping vessels will increase in size and speed; this anticipated growth will undoubtedly increase chronic AONP.⁹² The cumulative impact of all this noise—from jet skis to massive container ships—is significant because it contributes to rising ambient ocean noise levels and cumulative AONP.⁹³ For several decades, the background noise present in the ocean has doubled every decade, likely as a result of increased commercial shipping.⁹⁴

Chronic AONP from sources such as commercial shipping has persistent impacts on marine mammals.⁹⁵ The ocean is a low-visibility and

⁸⁵ See *id.* at 337 (“The Navy claims that mid-range sonar can be heard over shorter distances by many marine mammals, while LFAS can travel several hundred miles but is audible to fewer species.”); *Mid- and Low-Frequency Sonar*, U.S. DEP’T JUSTICE, <https://perma.cc/9S7N-JUBY> (last visited Nov. 11, 2017); see also ROADMAP, *supra* note 1, at 97, 99 (discussing how an acoustic signal can be misinterpreted by marine mammals and disrupt normal behaviors).

⁸⁶ See Van Dyke et al., *supra* note 4, at 337–38.

⁸⁷ ROADMAP, *supra* note 1, at 6; see also *supra* notes 48–49 and accompanying text.

⁸⁸ Reynolds, *supra* note 1, at 761, 768–79 (discussing how noise pollution is a threat to the oceans); Schiffman, *supra* note 42 (discussing, for example, the amount of noise generated by large ships).

⁸⁹ Schiffman, *supra* note 42; see also ROADMAP, *supra* note 1, at 9 (noting that in addition to commercial shipping vessels, recreational vessels also contribute to chronic AONP).

⁹⁰ JASNY, *supra* note 5, at iv–v; FULL SOUND REPORT, *supra* note 4, at 6 & tbl.1 (“Ships generate noise primarily by propeller cavitation, propulsion machinery, hydraulic flow over the hull, and flexing of the hull.”); Schiffman, *supra* note 42.

⁹¹ JASNY, *supra* note 5, at v (“Over the last 75 years, the number of merchant ships has tripled, and their cargo capacity (which relates roughly to the amount of sound they produce) has increased steadily.”); Schiffman, *supra* note 42 (“Noise from ship traffic is doubling every decade.”); see also FULL SOUND REPORT, *supra* note 4, at 6 n.2 (explaining that Individual container ships generate sound pressure levels at about 198 dB, while smaller vessels produce sound pressure levels closer to 156 dB).

⁹² FULL SOUND REPORT, *supra* note 4, at 2, 35.

⁹³ JASNY, *supra* note 5, at iv; FULL SOUND REPORT, *supra* note 4, at 11; Hildebrand, *supra* note 1, at 12–13, 16.

⁹⁴ Weilgart, *supra* note 52, at 1092.

⁹⁵ ROADMAP, *supra* note 1, at 30; Hildebrand, *supra* note 1, at 12.

inherently noisy environment.⁹⁶ Many ocean-dwelling species must rely on hearing and sound to be successful.⁹⁷ Like LFAS, shipping noise has the effect of masking acoustic sounds in the ocean.⁹⁸ The substantial increase in low-frequency noise from commercial shipping works to degrade acoustic environments that are essential to marine mammals.⁹⁹ Continued exposure to chronic AONP may result in a prolonged stress response in marine mammals.¹⁰⁰ For example, studies of beluga whales demonstrate that sound levels of more than 220 dB produce increased stress indicators in the mammal's blood, while sound at 153 dB did not produce the same signs of stress.¹⁰¹ These numbers indicate that noise from ships are capable of increasing the stress response of beluga whales. Although information about how this type of long-term stress affects marine mammals is lacking, there is cause for concern.¹⁰²

The cumulative impacts of acute and chronic AONP impact marine mammals in a variety of ways—from affecting behavior to causing physical damage.¹⁰³ Although the cumulative effects of AONP are difficult to ascertain,¹⁰⁴ they have been “causally linked to population decline.”¹⁰⁵ For example, southern resident killer whales in the Puget Sound are vulnerable to disturbances from noise generated by boat traffic, as well as overcrowding from vessels.¹⁰⁶ NMFS identified noise from ships as a likely factor in the southern resident killer whale's population decline, which

⁹⁶ *Sound Check: Ocean Noise*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. (Dec. 1, 2016), <https://perma.cc/3UWR-BGBF>; see also Brendan Cook, *Low Visibility Diving—A Look at Sonar Integration*, DEEP TREKKER (Mar. 10, 2017), <https://perma.cc/6GNB-WM2D>.

⁹⁷ See Van Dyke et al., *supra* note 4, at 334 (explaining that “[a] particular concern has arisen for marine mammals, many of which use sound as their primary sense, to communicate, to navigate, and to detect predators and prey”); see also Schiffman, *supra* note 42.

⁹⁸ ROADMAP, *supra* note 1, at 64–66.

⁹⁹ *Id.* at 63–65; W.T. Ellison et al., *A New Context-Based Approach to Assess Marine Mammal Behavioral Responses to Anthropogenic Sounds*, 26 CONSERVATION BIOLOGY 21, 22 (2011).

¹⁰⁰ Emma Brown, *Marine Life Needs Protection from Noise Pollution*, NATURE (Sept. 11, 2015), <https://perma.cc/SJZ8-DC26>.

¹⁰¹ FULL SOUND REPORT, *supra* note 4, at 13.

¹⁰² See *id.* at ii; Brown, *supra* note 100.

¹⁰³ FULL SOUND REPORT, *supra* note 4, at i; Reynolds, *supra* note 1, at 760–61.

¹⁰⁴ FULL SOUND REPORT, *supra* note 4, at 14 (“Abundance and trends of cetacean populations often are poorly known and difficult to monitor; many populations could decline by half without such loss being detected. Thus, it is difficult to form reliable conclusions about the potential effects of sound or other risk factors on many marine mammal populations.” (citation omitted)); Joe Roman et al., *The Marine Mammal Protection Act at 40: Status, Recovery, and Future of U.S. Marine Mammals*, 1286 ANNALS N.Y. ACAD. SCI. 29, 43 (2013) (explaining that for many species of marine mammals, the cumulative “effects [of disturbance] occur at large temporal and spatial scales that challenge our capacity to monitor”).

¹⁰⁵ Roman et al., *supra* note 104, at 43.

¹⁰⁶ FULL SOUND REPORT, *supra* note 4, at 14, 34–35 (citing Endangered and Threatened Wildlife and Plants: Endangered Status for Southern Resident Killer Whales, 70 Fed. Reg. 69,903 (Nov. 18, 2005) (to be codified at 50 C.F.R. pt. 224)); *Species in the Spotlight: Southern Resident Killer Whale*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, <https://perma.cc/4LRD-5XT7> (last visited Nov. 11, 2017).

ultimately resulted in the population's listing under the ESA.¹⁰⁷ NMFS has since explained that noise presents a serious threat to the now endangered southern resident killer whale.¹⁰⁸ To some extent, the effects of acute AONP from single specified activities have been successfully regulated under the MMPA, but chronic AONP and the cumulative impact of AONP remain largely unaddressed.¹⁰⁹

III. THE MARINE MAMMAL PROTECTION ACT

The MMPA was enacted in 1972 to protect marine mammals and their environment from the detrimental impacts of human activities.¹¹⁰ The purpose of the MMPA is to protect and encourage the development of marine mammals and the marine ecosystem to the greatest extent practicable in light of sound resource management policies.¹¹¹ The MMPA was historically unique in its conservation strategy: the health of marine ecosystems was given the same importance as the health of marine mammal species.¹¹² To effectuate these purposes, the MMPA directs the Services—both NMFS and the United States Fish and Wildlife Service (FWS)—to maintain marine mammal populations at an optimal sustainable population (OSP) level.¹¹³ OSP is a concept that aims to ensure marine ecosystems are

¹⁰⁷ Endangered and Threatened Wildlife and Plants: Endangered Status for Southern Resident Killer Whales, 70 Fed. Reg. at 69,903, 69,911.

¹⁰⁸ *Species in the Spotlight: Southern Resident Killer Whale*, *supra* note 106.

¹⁰⁹ ROADMAP, *supra* note 1, at 12–13; *see* Roman et al., *supra* note 104, at 43 (stating that many industries are not regulated under the MMPA and that even regulated industries do not address cumulative impacts); *see also* Ellison et al., *supra* note 99, at 22 (“Agencies mandated to regulate environmental effects of human activities have long been required to assess and minimize potential adverse effects of noise from certain activities. To date, adverse effects of chronic sound sources (e.g., commercial shipping) at the level of individuals, populations, species’ habitats, or ecosystems have not been incorporated into management decisions.”).

¹¹⁰ Chris Wold, Ocean and Coastal Law 333 (on file with author); *see* MMPA, 16 U.S.C. § 1361(6) (2012) (stating that Congress, in enacting the MMPA, recognizes that marine animals are a valuable resource and should be protected from development); NAT’L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, OFFICE OF PROTECTED RESOURCES AND THE MARINE MAMMAL PROTECTION ACT, <https://perma.cc/2Q24-YY5F> (last visited Nov. 11, 2017) [hereinafter MMPA FACT SHEET] (explaining that the MMPA was enacted as a response to increasing concern about human impact on marine mammals).

¹¹¹ 16 U.S.C. § 1361(6) (explaining that the purpose of the MMPA is to ensure that marine mammals “should be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management and that the primary objective of their management should be to maintain the health and stability of the marine ecosystem”). Another important concept is the idea of potential biological removal (PBR). *See* 16 U.S.C. § 1362(20) (defining “potential biological removal level” as “the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population”).

¹¹² MMPA FACT SHEET, *supra* note 110 (explaining that one of the MMPA’s innovations was that it “[e]stablished the concept of ‘optimum sustainable populations’ (OSP) to ensure healthy ecosystems”).

¹¹³ 16 U.S.C. § 1362(9) (defining OSP to mean “with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the

healthy and stable so that marine mammals may maintain their ecological functions in the ocean environment.¹¹⁴

The MMPA seeks to achieve its goals and help ensure OSP for individual species by, among other things, prohibiting the “take” of marine mammals.¹¹⁵ This broad prohibition against taking includes hunting, harassing, and killing marine mammals.¹¹⁶ The MMPA defines harassment as activities that injure or result in behavioral disruptions.¹¹⁷ The MMPA further categorizes harassment into two categories: “Level A” harassment and “Level B” harassment.¹¹⁸ “Level A harassment involves activities that directly injure or are likely to injure marine mammals” and occurs when marine mammals are exposed to “sound pulses of 180 dB or greater.”¹¹⁹ “Level B harassment involves activities that interfere with normal behavioral patterns of the marine mammals” and “is caused by sound levels below 180 dB”; even sound levels “as low as 120 dB can still cause ‘increasing probability of

species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element”).

¹¹⁴ See Roman et al., *supra* note 104, at 29.

¹¹⁵ 16 U.S.C. § 1372(a)(1) (providing that the take prohibition applies to “any person subject to the jurisdiction of the United States or any vessel or other conveyance subject to the jurisdiction of the United States”).

¹¹⁶ *Id.* § 1362(13) (“The term ‘take’ means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.”).

¹¹⁷ See *id.* § 1362(18)(A) (providing that “the term ‘harassment’ means any act of pursuit, torment, or annoyance which—(i) has the potential to injure a marine mammal or marine mammal stock in the wild; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering”). Harassment is defined slightly different in the context of military activities, which has both Level A and Level B harassment. See *id.* § 1362(18)(B) (providing a definition of harassment in the context of “military readiness activity or scientific research activity”); *id.* § 1362(18)(C)–(D) (distinguishing between Level A and Level B harassment).

¹¹⁸ *Id.* § 1362(18)(C)–(D).

¹¹⁹ *Pritzker*, 828 F.3d 1125, 1131 (9th Cir. 2016). It is important to note that in July of 2016, NMFS issued a new guidance document. NAT’L OCEANIC & ATMOSPHERIC ADMIN., NAT’L MARINE FISHERIES SERV., NMFS-OPR-55, TECHNICAL GUIDANCE FOR ASSESSING THE EFFECTS OF ANTHROPOGENIC SOUND ON MARINE MAMMAL HEARING: UNDERWATER ACOUSTIC THRESHOLDS FOR ONSET OF PERMANENT AND TEMPORARY THRESHOLD SHIFTS (2016). This guidance identifies “acoustic thresholds, at which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for acute, incidental exposure to underwater anthropogenic sound.” *Id.* at 1. Essentially, the guidance document divides marine mammals into several groups based on their hearing ranges and then provides the levels at which each group of marine mammals will experience temporary threshold shifts (TTS) and permanent threshold shifts (PTS). *Id.* TTS and PTS describe changes in hearing sensitivity and mark the level at which marine mammals experience temporary hearing loss (TTS) and permanent hearing loss (PTS). *Id.* at 3–4 tbls.ES2–ES3; see also NAT’L ACAD. OF SCIS., ENG’G & MED., APPROACHES TO UNDERSTANDING THE CUMULATIVE EFFECTS OF STRESSORS ON MARINE MAMMALS 27 (2017) (“These guidelines have separate PTS thresholds for impulsive and nonimpulsive sounds for five categories of marine mammals: low-, mid-, and high-frequency cetaceans; phocids; and otariids. For each marine mammal category two thresholds are given for impulsive sounds: one for peak sound pressure level . . . and one for cumulative sound exposure level . . . accumulated over 24 hours; and one threshold is given for nonimpulsive sounds: the cumulative sound exposure level . . . accumulated over 24 hours.”).

avoidance and other behavioral effects.”¹²⁰ However, there are several exceptions to the take prohibition, including the allowance of taking by Alaskan natives for subsistence purpose and taking for scientific research.¹²¹ In addition to these exceptions, NMFS may issue permits, which allow for the “incidental taking” of marine mammals.¹²²

There are two types of incidental take authorizations: letters of authorization (LOAs) and incidental harassment authorizations (IHAs).¹²³ The primary difference between LOAs and IHAs is that LOAs authorize take resulting from either harassment, serious injury, or mortality for up to five years, while IHAs allow take solely from harassment and only for one year.¹²⁴ In order to issue an incidental take permit in either form, NMFS must determine that the taking would: 1) only be “of small numbers” of marine mammals; 2) not have more than a “negligible impact” on protected marine mammals; and 3) “not have an unmitigable adverse impact on the availability of the species or stock for subsistence uses.”¹²⁵ To issue a LOA, NMFS must also provide regulations for the permitted activity that ensure the activity will have the “least practicable adverse impact” on marine mammals and their environment, and NMFS must impose certain monitoring and reporting requirements.¹²⁶ It is important to note that the MMPA does not contain any provision that requires a cumulative impact assessment prior to the issuance of an incidental take permit.¹²⁷ Although NMFS has issued incidental take permits for a range of activities, including seabird research, cable laying

¹²⁰ *Pritzker*, 828 F.3d at 1131. NMFS’s 2016 guidance does not provide noise thresholds for behavioral response in marine mammals and thus does not affect the determination of Level B harassment. *Technical Acoustic Guidance FAQs*, NAT’L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, <https://perma.cc/H4J9-V5LA> (last updated May 30, 2017). NMFS has noted that it

is continuing [its] examination of the effects of noise on marine mammal behavior and will focus [its] work over the next years on developing guidance regarding the effects of anthropogenic sound on marine mammal behavior. Behavioral response is a complex question that requires additional time to research and address it appropriately.

Id. The applicable Level B harassment thresholds can be found in NOAA’s interim sound threshold guidance and are 160 dB for impulsive noises like impact pile driving and 120 dB for non-pulse noises like drilling. *Interim Sound Threshold Guidance*, NAT’L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, <https://perma.cc/YNR9-EE2F> (last visited Nov. 11, 2017).

¹²¹ See 16 U.S.C. § 1371(a)(1), (b)(1).

¹²² *Id.* § 1374(a); Wold, *supra* note 110, at 337 (explaining that incidental take applies to takings that are “unintentional, but not unexpected”); see also *Incidental Take Authorization Under the MMPA*, NAT’L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, <https://perma.cc/7JLA-9PB3> (last updated Sept. 2, 2016) (explaining that “the MMPA allows, upon request, the incidental take of small numbers of marine mammals by U.S. citizens who engage in a specified activity . . . within a specified geographic region”).

¹²³ FULL SOUND REPORT, *supra* note 4, at 28; *Incidental Take Authorization Under the MMPA*, *supra* note 122.

¹²⁴ *Incidental Take Authorization Under the MMPA*, *supra* note 122.

¹²⁵ 16 U.S.C. § 1371(a)(5)(A)(i); Wold, *supra* note 110, at 338.

¹²⁶ 16 U.S.C. § 1371(a)(5)(A)(i)(II); Wold, *supra* note 110, at 338.

¹²⁷ See Wold, *supra* note 110, at 356.

operations, and light house restoration activities,¹²⁸ the majority of take authorizations permitted annually under the MMPA are for disturbances caused by noise from sources such as Navy sonar.¹²⁹

IV. COURTS' INTERPRETATIONS OF THE MARINE MAMMAL PROTECTION ACT

A. Early Cases

Since the mid-1990s, the MMPA has successfully regulated AONP from certain activities. The first case, *Natural Resources Defense Council, Inc. v. U.S. Department of the Navy*,¹³⁰ arose when the Natural Resources Defense Council (NRDC) challenged NMFS's approval of an incidental take permit for a proposed underwater Navy explosives program known as "ship-shock."¹³¹ The program involved detonating large quantities of explosives near Navy ships to assess whether the vessels can withstand the shock.¹³² The United States District Court for the Central District of California found that NMFS's interpretation¹³³ of the MMPA was contrary to the statute and that NMFS violated the National Environmental Policy Act¹³⁴ (NEPA) by failing to consider alternative sites for the Navy's explosives program.¹³⁵

In the last decade and a half, subsequent plaintiffs have also successfully challenged Navy sonar use under the MMPA, which has helped combat AONP.¹³⁶ The Navy and NMFS consistently argue their

¹²⁸ *Research and Other Activities: Incidental Take Authorizations*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, <https://perma.cc/FNZ9-AE9F> (last updated Nov. 1, 2017) (detailing active authorization for point blue conservation science seabird and pinniped research, an active permit for Quintillion subsea cable laying operations, and the St. George reef light station restoration activities).

¹²⁹ Roman et al., *supra* note 104, at 43 (noting the military's "training, geophysical surveys, offshore construction, and aircraft overflights" authorizations); *Incidental Take Authorization Under the MMPA*, *supra* note 122.

¹³⁰ 857 F. Supp. 734 (C.D. Cal.), *vacated*, No. CV 94-2337-SVW(CTx), 1994 WL 715704 (C.D. Cal. May 6, 1994).

¹³¹ *Id.* at 735-36. In order to ensure that the proposed program would meet the requirements necessary to receive an incidental take permit (namely least practicable adverse impact, negligible impact, etc.) NMFS prepared an Environmental Assessment (EA) under NEPA. *Id.* at 736. Through the EA, NMFS found that the explosives program would have "no significant impact." *Id.*

¹³² *Id.* (noting that the explosives program involved using heavy explosives over a period of five years in an area that was regularly used by marine mammals and was noted for its species diversity).

¹³³ The case revolved around NMFS's interpretation of the MMPA's "least practicable adverse impact" standard. *Id.* at 737. NMFS had interpreted the requirement in such a way that made it unnecessary for the agency to consider alternative sites for the Navy's ship-shock explosive tests. *Id.* at 739-40. The court concluded "that the statute unambiguously establishes that NMFS interpretation is incorrect and that, even if the statute were ambiguous, NMFS interpretation is unreasonable." *Id.* at 738.

¹³⁴ National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-4370h (2012).

¹³⁵ *Nat. Res. Def. Council, Inc.*, 857 F. Supp. at 738-40.

¹³⁶ *See, e.g., Pritzker*, 828 F.3d 1125, 1142 (9th Cir. 2016) (finding NMFS violated the MMPA on multiple claims); *Nat. Res. Def. Council, Inc. v. Gutierrez*, No. C-07-04771 EDL, 2008 WL

interpretations of the MMPA are due deference, but these cases indicate courts are reluctant to give deference when the agency interpretations are inconsistent with the MMPA.¹³⁷ For example, in *Natural Resources Defense Council v. Evans*, NMFS conflated the MMPA's "small numbers" and "negligible impact" requirements in a way that essentially read out of the statute the requirement that incidental takings must be small.¹³⁸ Under NMFS's interpretation, the Navy was permitted to take up to 12% of a marine mammal species in the specified area.¹³⁹ The United States District Court for the Northern District of California instead held that "'small numbers' and 'negligible impact' must be defined so that each term has a separate meaning" and that NMFS's interpretation was "flatly inconsistent with the plain language of the statute and [was] entitled to no deference."¹⁴⁰ The courts have repeatedly played a key role in ensuring that the MMPA protects marine mammals by making sure that NMFS complies with the distinct requirements of the Act.¹⁴¹ Through these important cases, the courts have struck a balance between the Navy's interest in military readiness activities and the need to ensure the protection of marine mammals.¹⁴² Although the MMPA has helped to protect marine mammals from acute AONP from sources such as ship-shock and Navy sonar, the Act has been far less adequate in protecting marine mammals from other sources of AONP.¹⁴³

B. The Pritzker Decision and the Limitations of AONP Regulation Under the MMPA

Most recently, in *Natural Resources Defense Council v. Pritzker*, the Ninth Circuit had the opportunity to consider the impacts of AONP on marine mammals in the context of a NMFS final rule authorizing the Navy's use of SURTASS LFAS for peacetime training purposes.¹⁴⁴ In the context of NMFS's issuance of an incidental take permit for an activity known to cause

360852, at *32 (N.D. Cal. Feb. 6, 2008) (awarding plaintiffs partial preliminary injunction on MMPA claims); *Evans*, 279 F. Supp. 2d 1129, 1147 (N.D. Cal. 2003) (finding NMFS's Final Rule violated the MMPA by "failing to limit the take of marine mammals to a 'specified geographic region'").

¹³⁷ Reynolds, *supra* note 1, at 801–02.

¹³⁸ *Evans*, 279 F. Supp. 2d at 1153.

¹³⁹ *Id.* at 1152.

¹⁴⁰ *Id.* at 1153.

¹⁴¹ Reynolds, *supra* note 1, at 773–82, 801–02 (providing examples of agency actions challenged under the MMPA and other environmental statutes).

¹⁴² *Id.* at 801–02.

¹⁴³ FULL SOUND REPORT, *supra* note 4, at i (stating that the Act's effect "has been limited because of the considerable uncertainty regarding those [sound] effects, inadequate attention to management of certain sound producers, inadequate monitoring and mitigation methods to characterize and avoid or minimize effects, and implementation strategies that have proven to be less than optimal").

¹⁴⁴ *Pritzker*, 828 F.3d 1125, 1131 (9th Cir. 2016). See generally Taking and Importing Marine Mammals: Taking Marine Mammals Incidental to U.S. Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active Sonar, 77 Fed. Reg. 50,290 (Aug. 20, 2012) (to be codified at 50 C.F.R. pt. 218).

devastating impacts to marine mammals, the court shed light on how to interpret the following two aspects of the MMPA's incidental take exception: "negligible impact" and "least practicable adverse impact standard."¹⁴⁵ The *Pritzker* decision exemplifies the MMPA's successful management of acute AONP from single activities and also helps to highlight the limitations of the Act with regard to regulating other types and sources of AONP. In *Pritzker*, the court found that NMFS had acted arbitrarily and capriciously in approving a MMPA incidental take permit for Navy sonar.¹⁴⁶ From a practical standpoint, the court's ruling prevented the Navy from receiving a permit that would have allowed them to subject more than 70% of the world's oceans to harmful levels of AONP.¹⁴⁷

In *Pritzker*, the NRDC and other environmental organizations¹⁴⁸ challenged NMFS's 2012 Final Rule authorizing the "take" of marine mammals under the MMPA resulting from the Navy's use of LFAS during peacetime.¹⁴⁹ As discussed above, LFAS disrupts the hearing abilities of certain marine mammals and can cause these animals to abandon their typical behaviors.¹⁵⁰ The Ninth Circuit reversed the district court's holding and found that the MMPA required NMFS to take measures to attain the "least practicable adverse impact" standard before allowing any incidental take of marine mammals.¹⁵¹ The court held that NMFS's determination that sonar activities would have a negligible impact on marine mammal species was not sufficient under the MMPA.¹⁵² The court further explained that to authorize a take of marine mammals incident to Navy activities, NMFS must also consider mitigation measures to ensure that there will not be a significant impact on marine mammals and that the "least practicable adverse impact" is achieved.¹⁵³ Under the MMPA, NMFS must balance competing interests and assess whether mitigation measures were necessary to meet the "least practicable adverse impact" standard, while also

¹⁴⁵ *Pritzker*, 828 F.3d at 1130.

¹⁴⁶ *Id.* at 1139.

¹⁴⁷ Press Release, Nat. Res. Def. Council, Federal Court: Navy Must Limit Long-Range Sonar Use to Protect Marine Mammal (July 18, 2016), <https://perma.cc/BFU9-2W54>.

¹⁴⁸ Other appellants included the Humane Society of the United States, the Cetacean Society International, and the Ocean Futures Society. *Pritzker*, 828 F.3d at 1125.

¹⁴⁹ *Id.* at 1128, 1131; see Taking and Importing Marine Mammals: Taking Marine Mammals Incidental to U.S. Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active Sonar, 77 Fed. Reg. at 50,291.

¹⁵⁰ See *supra* notes 85–86 and accompanying text; see also Press Release, Nat. Res. Def. Council, *supra* note 147 ("LFA sonar involves an array of 18 loudspeakers lowered several hundred feet from a ship's hull into the ocean. Sound waves generated during one Naval test of the LFA system reached 140 decibels—an intensity more than 100 times greater than the level known to disturb gray whales—more than 300 miles from the source. An independent analysis of some of the Navy's data indicates that, during LFA tests off the coast of California, their signals were clearly audible at sites across the entire North Pacific.").

¹⁵¹ *Pritzker*, 828 F.3d at 1134, 1142. The MMPA requires NMFS to establish "means of effecting the least practicable adverse impact on [marine mammal] species or stock and its habitat." MMPA, 16 U.S.C. § 1371(a)(5)(A)(i)(II)(aa) (2012).

¹⁵² *Pritzker*, 828 F.3d at 1134–35, 1142.

¹⁵³ *Id.* at 1135.

considering whether or not those measures were practicable in light of the Navy's national security concerns.¹⁵⁴

While the Ninth Circuit gives deference to an agency's technical analysis, it does not merely "rubber stamp" agency decisions that run counter to the underlying intention and policy of a statute.¹⁵⁵ The court will set aside a final rule if it is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law."¹⁵⁶

1. "Negligible Impact" and "Least Practicable Adverse Impact"

Even when NMFS determines that an activity will have a negligible impact because it does not significantly threaten marine mammals, the MMPA still requires the agency to adopt mitigation measures to ensure the "least practicable adverse impact."¹⁵⁷ In *Pritzker*, the Ninth Circuit assessed whether the MMPA requires NMFS to take measures to achieve the "least practicable adverse impact" before the agency can authorize incidental take.¹⁵⁸ NRDC argued that NMFS's 2012 Final Rule did not comport with the MMPA's requirements.¹⁵⁹ Defendants contended that the Final Rule complied with the MMPA and argued that once NMFS finds that an activity would have a negligible impact, the agency must allow it.¹⁶⁰ The Ninth Circuit disagreed with the defendants' argument.¹⁶¹ The court looked to the statutory text to discern the requirements of the "least practicable adverse impact" standard and determined that NMFS did not fulfill the requirements.¹⁶² The court reasoned that the statutory text clearly indicates that in order to authorize incidental take, NMFS needs to consider mitigation actions separately.¹⁶³ The court explained that mitigation to ensure the "least practicable adverse impact" is an important and separate requirement and noted that "Congress's mandate that NMFS must find negligible impact 'and' set forth regulations to minimize adverse impact in order to authorize incidental take makes the independent nature of these requirements clear."¹⁶⁴ The court ultimately held that the MMPA requires NMFS to adopt mitigation measures regardless of whether marine mammal populations are significantly threatened.¹⁶⁵ In essence, NMFS must have mitigation measures that protect marine mammals to the "greatest extent practicable in light of military readiness needs."¹⁶⁶ NMFS's claim that its finding of negligible

¹⁵⁴ *Id.* at 1130.

¹⁵⁵ *Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 859 (9th Cir. 2005).

¹⁵⁶ Administrative Procedure Act, 5 U.S.C. § 706(2)(A) (2012).

¹⁵⁷ *Pritzker*, 828 F.3d at 1134.

¹⁵⁸ *Id.* at 1133–34.

¹⁵⁹ *Id.* at 1136.

¹⁶⁰ *Id.* at 1133.

¹⁶¹ *Id.*

¹⁶² *Id.* at 1134–35.

¹⁶³ *Id.* at 1133.

¹⁶⁴ *Id.* (quoting 16 U.S.C. § 1371(a)(5)(A)(i)(I) (2012)).

¹⁶⁵ *Id.* at 1134.

¹⁶⁶ *Id.*

impact was sufficient did not convince the court. The court elaborated that “negligible impact” and “least practicable adverse impact” are two separate standards under the MMPA, and both need to be met before NMFS may issue a permit.¹⁶⁷

The Ninth Circuit indicated that the statutory text dictates that in order to authorize a take, NMFS must find “negligible impact” and must *also* prescribe regulations that ensure the final rule will limit the impact of incidental take to the “lowest level practicable.”¹⁶⁸ The court concluded that under the MMPA, NMFS needed to consider mitigation measures in addition to the Navy’s proposed mitigation measures in order to assess if both were necessary to achieve the “least practicable adverse impact.”¹⁶⁹

Under the MMPA’s “least practicable adverse impact” standard, NMFS must not only consider whether mitigation measures reduce the impact of a specified activity to the “least practicable adverse” level, but the agency must also explain its conclusions.¹⁷⁰ In *Pritzker*, the court addressed what the “least practicable adverse impact standard” entailed. The court explained that “practicable” meant “something . . . capable of being done, or practical and effective.”¹⁷¹ The court reasoned that in the context of the MMPA, the term meant that “a mitigation measure that is practicable in reducing the impact of military readiness activities on marine mammals must be both effective in reducing impact, but also not so restrictive of military activity as to unduly interfere with the government’s legitimate needs for military readiness activities.”¹⁷² This interpretation was consistent with NMFS’s own interpretation of its statutory mandates.¹⁷³ Here, NMFS’s 2012 Final Rule did not explain how the mitigation measures meet the “least practicable adverse impact” standard.¹⁷⁴ The court explained that “[a]n agency acts contrary to the law when it gives mere lip service or verbal commendation of a standard but then fails to abide the standard in its reasoning and decision.”¹⁷⁵ For these reasons, the court held that under the MMPA, “NMFS was required to analyze whether its . . . mitigation measures reduce[d] the effects of LFA[S] to the ‘least practicable adverse impact’” and

¹⁶⁷ *Id.* at 1133–34.

¹⁶⁸ *Id.* at 1134.

¹⁶⁹ *Id.* at 1135.

¹⁷⁰ *Id.* at 1139; *see also* Conservation Council for Haw. v. Nat’l Marine Fisheries Serv., 97 F. Supp. 3d 1210, 1230 (D. Haw. 2015) (“[S]omething more than refusal to consider mitigation measures and an unexplained assertion that further mitigation is not practical is needed.”).

¹⁷¹ *Pritzker*, 828 F.3d at 1134.

¹⁷² *Id.* at 1134–35.

¹⁷³ *Id.* at 1135 (citing Taking and Importing Marine Mammals: Taking Marine Mammals Incidental to U.S. Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active Sonar, 77 Fed. Reg. 50,290, 50,295, 50,303 (Aug. 20, 2012) (to be codified at 50 C.F.R. pt. 218)).

¹⁷⁴ *Id.*

¹⁷⁵ *Id.* (citing *Conner v. Burford*, 848 F.2d 1441, 1453 (9th Cir. 1988)).

that the agency did not do so.¹⁷⁶ NMFS did not explain its reasons for concluding that its 2012 Final Rule's mitigation measures met the standard.¹⁷⁷

2. "Least Practicable Adverse Impact" Requirements

Next, the court analyzed whether NMFS's 2012 Final Rule's mitigation measures met the MMPA's "least practicable adverse impact" requirement and found that they did not.¹⁷⁸ NRDC contended that NMFS's three mitigation measures were not sufficient because, while they did reduce incidental take, they fell short of the "least practicable adverse impact" standard.¹⁷⁹ NRDC's primary concern was with NMFS's mitigation strategy relating to offshore biologically important area (OBIA) designation.¹⁸⁰ During NMFS's 2012 rulemaking process, the agency proposed seventy-three potential OBIA's based on prior OBIA designations, existing protected areas, several books, and the suggestions of senior NMFS scientists.¹⁸¹ In 2010, four NMFS scientists, all "subject matter experts," criticized NMFS's approach in a White Paper, explaining that NMFS should not conclude that areas with no or insufficient data were biologically unimportant.¹⁸² The White Paper went on to caution against assuming that a lack of data meant no cetacean populations were present in or used the areas under consideration.¹⁸³ However, NMFS's OBIA designation criteria did not seriously take into account the recommendations in the White Paper.¹⁸⁴ NRDC argued that NMFS's OBIA designation process was arbitrary and capricious because NMFS did not adequately consider the White Paper's recommendations.¹⁸⁵ NMFS argued that it did consider the opinions in the White Paper but that it chose a different designation strategy that deserves deference from the court.¹⁸⁶

The Ninth Circuit found that NMFS erred because its strategy did not ensure the "least practicable adverse impact."¹⁸⁷ The court explained that NMFS essentially had a choice between over or under-protection and that it

¹⁷⁶ *Id.* at 1135.

¹⁷⁷ *Id.* at 1135–36.

¹⁷⁸ *Id.* at 1135.

¹⁷⁹ *Id.* at 1136.

¹⁸⁰ *Id.* at 1132, 1136–37 ("OBIA's are marine protected areas providing marine mammals with relatively low-noise environments . . ."). OBIA designation has been successfully challenged several times since 2002. *See, e.g., Gutierrez*, No. C-07-04771-EDL, 2008 WL 360852, at *10 (N.D. Cal. Feb. 6, 2008); *Evans*, 279 F. Supp. 2d 1129, 1163 (N.D. Cal. 2003).

¹⁸¹ *Pritzker*, 828 F.3d at 1136 (quoting Taking and Importing Marine Mammals: Taking Marine Mammals Incidental to U.S. Navy Operations of Surveillance Towed Array Sensor System Low Frequency Active Sonar, 77 Fed. Reg. 50,290, 50,300 (Aug. 20, 2012) (to be codified at 50 C.F.R. pt. 218)).

¹⁸² *Id.* at 1136.

¹⁸³ *Id.*

¹⁸⁴ *Id.* at 1137.

¹⁸⁵ *Id.* at 1139–40.

¹⁸⁶ *Id.* at 1137.

¹⁸⁷ *Id.* at 1138.

chose under-protection.¹⁸⁸ The court further explained that NMFS made a policy decision without assessing whether its choice was consistent with the MMPA's "least practicable adverse impact" standard and that NMFS's decision to under-protect marine mammals by making the OBIA default position non-designation was inconsistent with the White Paper's recommendations.¹⁸⁹ Additionally, NMFS did not explain its decision nor did it explain how its process met the "least practicable adverse impact" standard.¹⁹⁰

In sum, the Ninth Circuit found that before NMFS may authorize incidental take of marine mammals from the Navy's use of LFAS, the MMPA requires NMFS to find a negligible impact and ensure that the activity meets the "least practicable adverse impact" standard.¹⁹¹ The court found that NMFS's decision to ignore the concerns of its own scientists and the agency's failure to explain its decision-making process rendered NMFS's decision arbitrary and capricious.¹⁹² Ultimately, the court reversed the district court's grant of summary judgment to defendants and remanded the case.¹⁹³

3. Significance of the Pritzker Decision and What the Case Demonstrates About AONP Regulation

Pritzker demonstrates that the MMPA meaningfully protects marine mammals from acute sources of noise, such as Navy sonar, provided of course that environmentalists challenge NMFS's interpretations of the MMPA and the agency's issuance of incidental take permits. In sonar cases, courts have consistently sided with nongovernmental organizations,¹⁹⁴ and the *Pritzker* decision is no different. There, the court upheld the overarching goals of the MMPA by explicitly stating that protecting marine mammals and their environment is of "paramount importance."¹⁹⁵ The *Pritzker* decision ensures greater protection for marine mammals by clarifying that a "negligible impact" determination is separate from ensuring the "least practicable adverse impact."¹⁹⁶ However, the *Pritzker* decision, coupled with

¹⁸⁸ *Id.*

¹⁸⁹ *Id.*

¹⁹⁰ *Id.* at 1138–39.

¹⁹¹ *Id.* at 1142.

¹⁹² *Id.* at 1139, 1142.

¹⁹³ *Id.* at 1142.

¹⁹⁴ See *Evans*, 279 F. Supp. 2d 1129, 1191 (N.D. Cal. 2003) (granting partial injunction to ensure the Navy took "some additional measures to better protect against harm to marine life"); see also *Gutierrez*, No. C-07-04771 EDL, 2008 WL 360852, at *32 (N.D. Cal. Feb. 6, 2008) (issuing "carefully tailored [injunction] to reduce the risk to marine mammals by restricting LFA sonar's use in some additional areas of the ocean that are especially important habitat but are not currently protected"). In both of these cases the courts granted injunctions to nongovernmental organizations advocating on the side of marine mammals, which led to the parties negotiating outside of court. See Press Release, Nat. Res. Def. Council, *supra* note 147.

¹⁹⁵ *Pritzker*, 828 F.3d at 1141.

¹⁹⁶ See *id.* at 1142.

prior cases involving the MMPA and sonar, demonstrate that the MMPA successfully regulates *only* acute AONP.¹⁹⁷ The MMPA is limited because it only regulates AONP in the context of single activities—i.e., NMFS authorizes “incidental take” permits under the MMPA for specific individual activities.¹⁹⁸

One of the major issues with NMFS permitting is that the agency’s interpretation of the MMPA gives permit applicants discretion to determine the scope of the activity they are applying to have exempted.¹⁹⁹ NMFS’s interpretation is myopic because it means that the agency only looks at the specific activity and determines if that activity, standing alone, meets the requirements to receive a permit.²⁰⁰ This causes problems because NMFS does not evaluate similar activities that impact the same populations of marine mammals or the same geographic regions.²⁰¹ In addition, this interpretation allows permit applicants to divide individual projects in a manner that arguably makes it easier to receive a permit.²⁰² For example, in Cook Inlet, Alaska, an area designated as critical habitat for several marine mammals, including the endangered beluga whale, the Apache Corporation has received permits to conduct airgun surveys.²⁰³ The Apache Corporation is being approved for “successive, year-long authorizations” under the MMPA for its three-to-five-year long project, rather than applying for a permit that would allow “incidental take” for the project in its entirety.²⁰⁴

The MMPA successfully regulates acute AONP but not chronic and cumulative AONP.²⁰⁵ While the MMPA has provided regulation for some acute sources of AONP, there are glaring gaps in AONP regulation under the MMPA.²⁰⁶ For example, the Act does not effectively regulate entire industries such as commercial shipping, which, as previously discussed, substantially contributes to the chronic and cumulative AONP problem.²⁰⁷ The MMPA may not even be practically applicable to the commercial shipping industry.²⁰⁸

¹⁹⁷ See discussion *supra* Part IV.A.

¹⁹⁸ MMPA, 16 U.S.C. § 1374(a)–(b) (2012); ROADMAP, *supra* note 1, at 6, 14.

¹⁹⁹ Roman et al., *supra* note 104, at 43.

²⁰⁰ *Id.*

²⁰¹ *Id.*

²⁰² *Id.*

²⁰³ *Id.* at 38, 43.

²⁰⁴ *Id.* at 43.

²⁰⁵ *Id.*

²⁰⁶ *Id.*

²⁰⁷ See *supra* notes 89–94 and accompanying text; see also FULL SOUND REPORT, *supra* note 4, at iii (discussing the regulatory inconsistencies between the requirements and procedures for obtaining authorizations to take marine mammals); ROADMAP, *supra* note 1, at 77 (“Current U.S. regulation of noise under the Endangered Species Act and Marine Mammal Protection Act does not include impacts associated with chronic noise from shipping. Consequently, new and different types of management may be needed to address low-frequency ocean noise.”).

²⁰⁸ See FULL SOUND REPORT, *supra* note 4, at 35 (“If large sectors of the industry sought authorizations collectively, they might not be able to satisfy the MMPA requirements pertaining to small numbers and geographic specificity. Moreover, demonstrating that their operations have a negligible impact on the affected marine mammal species and stocks also could be difficult. Even if each vessel sought its own authorization, it might not be able to meet the

The other major issue with AONP regulation under the MMPA is that NMFS has not regulated cumulative AONP or addressed its impacts under the Act.²⁰⁹ In NOAA's own words:

While some [MMPA] consultations are programmatic in nature, their analyses are not typically comprehensive on a scale that would adequately address either the long life spans or very large geographic ranges of all of the marine species potentially impacted, and they don't address aggregate or cumulative effects very well. Additionally, even when the importance of a given area is understood, either for its broader acoustic habitat value or because of known value to a specific species or group, places are typically harder to manage through the more project-specific lenses of the ESA and MMPA.²¹⁰

V. NOAA'S ROADMAP: CAN ITS GOALS BE ACCOMPLISHED USING EXISTING STATUTORY AUTHORIZATIONS?

Recognizing the MMPA's inability to address chronic and cumulative impacts of noise, NMFS developed the *Ocean Noise Strategy Roadmap*, the agency's first comprehensive strategy to address all aspects of AONP.²¹¹ The Roadmap is NOAA's ten-year plan to address and reduce the effects of AONP on marine mammals and the ocean environment.²¹² It reflects NOAA's new commitment to tackling the broader AONP issue and indicates NOAA's position on ocean noise: that it needs to be addressed more comprehensively, rather than on a narrow case-by-case basis.²¹³ While the Roadmap is a promising first step towards addressing AONP comprehensively, its limitations suggest that it will not fulfill its goals.

The Roadmap highlights and acknowledges the extent of the AONP problem and lists NOAA's overarching goals regarding AONP.²¹⁴ In the Roadmap, NOAA promises to confront chronic and cumulative AONP and recognizes that the historical approach of regulating only acute AONP is ineffective in solving the larger cumulative AONP problem because it leaves chronic AONP producers largely unregulated.²¹⁵ The Roadmap lays out a series of goals and recommendations intended to help NOAA more

statutory requirements. What is clear, however, is that, because of the sheer number of vessels involved in shipping operations in U.S. waters, use of the existing mechanisms to authorize such taking would overwhelm the resources of the authorizing agencies.”).

²⁰⁹ Roman et al., *supra* note 104, at 43.

²¹⁰ ROADMAP, *supra* note 1, at 14 (emphasis omitted)

²¹¹ *See generally id.*

²¹² *Id.* at 1 (explaining that “[t]he Roadmap highlights a path to expand NOAA’s historical focus on protecting specific species by additionally addressing noise impacts on high value acoustic habitats”).

²¹³ *Id.* (explaining that the Roadmap provides “[a] series of key goals and recommendations . . . that would improve NOAA’s ability to manage both species and the places they inhabit in the context of a changing acoustic environment” and that “[f]undamentally, the Strategy Roadmap serves as an organizing tool to rally the multiple NOAA offices that address ocean noise impacts around a more integrated and comprehensive approach”).

²¹⁴ *Id.* at 2.

²¹⁵ *Id.* at 6, 12, 17.

effectively manage marine mammals and their environment.²¹⁶ NOAA makes certain commitments to reduce AONP by “promoting quieter technologies, making better use of existing laws to minimize disruption of important marine habitat, and restoring the natural soundscape in National Marine Sanctuaries.”²¹⁷ The Roadmap is encouraging because it calls for interagency cooperation and action,²¹⁸ acknowledges the need to address chronic and cumulative AONP instead of just acute AONP,²¹⁹ and calls for more scientific information to fill the gaps in existing knowledge about the extent of AONP and its impacts.²²⁰

Although the Roadmap is a step in the right direction, it does not establish any mandates and merely provides “steps that *could* be taken [by] the agency to achieve the Strategy’s goals for more comprehensive management of noise impacts.”²²¹ NOAA does not establish specific regulations but explains that the Roadmap could be used to inform future decisions and regulations.²²² The Roadmap’s greatest weaknesses are that it lacks both an action plan and a timeline. If NOAA is to achieve the goals detailed in the Roadmap, then the agency first needs a concrete implementation plan and then needs to allocate resources and a budget to accomplish that plan.²²³ NOAA envisions that individual programs within the agency will use concepts and recommendations from the Roadmap to create “program-specific implementation plan[s].”²²⁴ While this vision has the potential to be successful, the adoption of implementation plans would be entirely voluntary. The Roadmap does not require any actions on the part of the agency or the part of any individual NOAA programs, which draws questions as to its ability to affect realistic change on a broader scale.²²⁵

The Roadmap also focuses too narrowly on using the agency’s existing capabilities and authorities more effectively, rather than on expanding existing authority or calling for formal rulemaking.²²⁶ As previously discussed, current regulations under the MMPA only provide for evaluating activity-specific actions on a case-by-case basis, and do not effectively regulate chronic and cumulative impacts of AONP.²²⁷ Put another way,

²¹⁶ *Id.* at 2.

²¹⁷ Press Release, Nat. Res. Def. Council, Obama Administration Sets Goals for Reducing Ocean Noise (June 1, 2016), <https://perma.cc/GJ8K-63BY>.

²¹⁸ ROADMAP, *supra* note 1, at 38, 126.

²¹⁹ *Id.* at 6.

²²⁰ *Id.* at 2.

²²¹ *Id.* at 1 (emphasis added).

²²² *Id.* at 4; Timothy Cama, *Feds Eye Measures to Reduce Ocean Noise*, HILL (June 1, 2016), <https://perma.cc/SZ3R-E6QD>.

²²³ Michael Jasny, *NOAA Announcement on Ocean Noise: A Sea Change If We Want It*, NAT. RESOURCES DEF. COUNCIL (June 1, 2016), <https://perma.cc/L7UR-GKQ6>.

²²⁴ ROADMAP, *supra* note 1, at 19.

²²⁵ *See id.* at 1–4 (making recommendations, suggestions, and “steps that could be taken”).

²²⁶ *Id.* at 7.

²²⁷ *See supra* notes 213–215 and accompanying text. *See generally* Letter from Michael Stocker, Dir., Ocean Conservation Research, et al., to Ocean Noise Strategy Roadmap Authors 3 (July 1, 2016), <https://perma.cc/86YE-X46E> (“NOAA should provide or coordinate funding for more nuanced studies on impacts of chronic noise on marine habitats . . .”).

regulation under the MMPA has primarily occurred through “project-specific consultations and permitting,”²²⁸ as in the *Pritzker* case.²²⁹ Presently, the MMPA is not set up to allow NMFS to comprehensively assess how a specific activity will impact AONP levels in the aggregate.²³⁰

In the Roadmap, NOAA acknowledges that the MMPA permitting analysis does not address AONP on a comprehensive scale and does not address chronic or cumulative AONP “very well.”²³¹ NOAA acknowledges that “[t]raditional approaches to regulating ocean noise issues have necessarily been somewhat constrained by the project-specific and shorter-term focus of the statutes under which NOAA worked.”²³² In the Roadmap, NOAA included an appendix that lists the statutory sections that the agency could use to address AONP.²³³ The appendix lists the MMPA’s incidental take and permitting provisions, which, as previously discussed, have only had limited success regulating acute AONP from specific activities.²³⁴ The cyclical nature of this logic is frustrating because the Roadmap acknowledges that existing authorities are deficient at regulating chronic and cumulative AONP, yet still points to these authorities as a way to address these types of AONP. NOAA recommends that the individual NOAA programs tasked with implementing the MMPA work to “add reference[s] to ocean noise issues . . . where not currently addressed.”²³⁵ More needs to be done. NOAA’s call for NOAA programs and agencies to insert references to AONP is too vague and open-ended to provide direction. NOAA had the opportunity to explicitly lay out how NOAA programs should regulate chronic and cumulative AONP, but the agency did not do so.

Although the MMPA has not been successfully used to tackle chronic and cumulative AONP, NOAA believes that “there is some temporal and spatial flexibility in the traditionally-used statutes to explore broader . . . approaches to analysis and management of chronic large-scale impacts [of AONP].”²³⁶ NOAA states that the tools listed in the appendix will allow NOAA “to coordinate broader-scale strategies across multiple programs . . . provided [NOAA] ha[s] a well-articulated justification and approach.”²³⁷ NOAA does not require the individual NOAA programs to do anything and does not explain how these programs should work references to ocean noise into the statutes.²³⁸ The appendix lists the applicable provisions of the MMPA and quotes the relevant statutory language, but it does not detail how this language could be expanded or interpreted to allow for improved chronic

²²⁸ ROADMAP, *supra* note 1, at 13.

²²⁹ *Pritzker*, 828 F.3d 1125, 1128, 1131 (9th Cir. 2016).

²³⁰ ROADMAP, *supra* note 1, at 13–14.

²³¹ *Id.* at 14.

²³² *Id.* at 20.

²³³ *Id.* at 121–34.

²³⁴ *See supra* notes 205–209 and accompanying text.

²³⁵ ROADMAP, *supra* note 1, at 20.

²³⁶ *Id.*

²³⁷ *Id.*

²³⁸ *Id.*

and cumulative AONP regulation under the MMPA.²³⁹ Aside from NOAA's general rulemaking authority, the MMPA, as currently implemented, likely cannot be used to address chronic and cumulative AONP adequately. For example, the existing incidental take permitting scheme likely cannot regulate commercial shipping, which, as discussed above, is one of the major contributors of chronic AONP and substantially contributes to cumulative AONP.²⁴⁰ While commercial shipping likely does harass marine mammals as defined under the MMPA, "NOAA's thresholds for injury and harassment have not been consistently applied," and to date, commercial shipping has been unregulated.²⁴¹ As previously mentioned, this may be because, if large portions of the commercial shipping industry collectively applied for incidental take authorization, they likely would not be able to meet the MMPA's "small numbers" and "negligible impact" requirements.²⁴² Further, as the Marine Mammal Commission discussed in its 2007 report to Congress, if individual ships applied for incidental take permits, they might not even be able to meet the requirements and would likely overwhelm NMFS's resources with permit applications.²⁴³ In addition, the existing statutory framework is not well equipped to address cumulative AONP.²⁴⁴ This is due to the existing permitting scheme only applying to specified activities within a specific geographic range and not taking into account cumulative effects from various sources.²⁴⁵

While NOAA's vision may pan out, it would require the individual NOAA programs to take action, create implementation plans based on the Roadmap, and generate "well-articulated justification[s] and approach[es]" to change or add to statutory provisions or agency interpretations of those requirements.²⁴⁶ For these reasons, it is unclear whether or not the Roadmap will be able to effect changes in on-the-ground MMPA regulation of AONP. Because the Roadmap's recommendations are not mandatory and it relies on individual NOAA programs to adopt implementation plans, it remains to be seen whether the Roadmap's recommendations will be adopted.²⁴⁷

²³⁹ ROADMAP, *supra* note 1, at 121–23.

²⁴⁰ See *supra* notes 89–94, 207–209 and accompanying text.

²⁴¹ Leila T. Hatch & Kurt M. Fristrup, *No Barrier at the Boundaries: Implementing Regional Frameworks for Noise Management in Protected Natural Areas*, 395 MARINE ECOLOGY PROGRESS SERIES 223, 226 (2009).

²⁴² See *supra* note 208 and accompanying text.

²⁴³ FULL SOUND REPORT, *supra* note 4, at 35; see Hatch & Fristrup, *supra* note 241, at 225 ("Each permit requires several months of processing by NOAA staff . . . to determine the extent of impacts and the mitigation, monitoring, and reporting needed to ensure that the levels of impact to each species are negligible.").

²⁴⁴ See FULL SOUND REPORT, *supra* note 4, at 36–37.

²⁴⁵ *Id.* at 28, 36–37.

²⁴⁶ ROADMAP, *supra* note 1, at 20.

²⁴⁷ See *id.* at 1–2.

VI. SUGGESTIONS

As detailed above, the Roadmap's approach is limited because it does not contain a concrete implementation strategy or a commitment to formal rulemaking, and it restricts itself to work within existing authorities. This Part recommends that the most effective way to regulate chronic and cumulative AONP under the MMPA would be to expand the current authority to bring more chronic AONP producers under MMPA regulation. Working within the constraints of existing authorities, one effective option to reduce chronic AONP in U.S. waters is for NOAA to initiate formal rulemaking to impose a speed limit on commercial shipping vessels in U.S. waters.²⁴⁸

Of the major contributors to AONP, the MMPA's existing regulatory structure is least equipped to tackle AONP from commercial shipping for the reasons discussed above, but also because the MMPA's "small-take" exception applies only to U.S. citizens.²⁴⁹ This presents a substantial jurisdictional issue. Most of the commercial vessels that sail the world's oceans are registered internationally, placing their regulation outside the purview of the MMPA's "small-take" exception.²⁵⁰ As recommended by the Marine Mammal Commission, one way to address this problem would be for Congress to "amend the MMPA to make incidental take authorizations under section 101(a)(5) available to all sound producers operating in U.S. waters, regardless of nationality."²⁵¹ Amending the MMPA in this way would expand the regulatory framework to at least allow NOAA to regulate all sound producers in U.S. waters through the MMPA's permitting scheme. Admittedly, the majority of noise from shipping comes from waters outside of the United States,²⁵² and one of the biggest issues with AONP regulation under the MMPA is that it does not take into account "multi-source impacts that co-occur across longer time frames, large areas, and [involve] multiple activities."²⁵³ While these deficiencies make the regulation of commercial shipping under the MMPA extremely challenging, regulating all vessels in U.S. waters regardless of nationality would be one way to begin regulating a major contributor of chronic AONP under the MMPA, which would in turn help to reduce cumulative AONP.

NOAA should also commit to formal rulemaking and impose speed restrictions on large commercial vessels operating in U.S. waters in areas most important to marine mammals. It would likely be possible for NOAA to

²⁴⁸ See FULL SOUND REPORT, *supra* note 4, at B-21 tbl.1.

²⁴⁹ MMPA, 16 U.S.C. § 1371(a)(5)(A)(i) (2012) (providing that the small-take exception applies only to "citizens of the United States who engage in a specified activity"). The term "U.S. citizens" is defined as "individual U.S. citizens or any corporation or similar entity if it is organized under the laws of the United States U.S. Federal, state and local government agencies shall also constitute citizens of the United States for purposes of this part." 50 C.F.R. § 216.103 (2016).

²⁵⁰ FULL SOUND REPORT, *supra* note 4, at 35; Hatch & Frstrup, *supra* note 241, at 226.

²⁵¹ FULL SOUND REPORT, *supra* note 4, at vi.

²⁵² *Id.* at viii.

²⁵³ ROADMAP, *supra* note 1, at 17.

implement a rule that would serve to reduce chronic and cumulative AONP from the shipping industry. In the past, NOAA has relied on its general rulemaking authority under the MMPA²⁵⁴ and ESA²⁵⁵ to address issues in the shipping industry.²⁵⁶ General rulemaking authority was employed to pass the right whale ship-strike rule, which applied a speed limit to large vessels off the Atlantic coast of the United States in order to reduce incidents of ships striking right whales.²⁵⁷ NOAA created the rule after voluntary measures did not succeed in reducing ship-strike occurrences.²⁵⁸ Similarly, NOAA could use its general rulemaking authority under the MMPA to impose speed restrictions to reduce chronic noise from shipping vessels. Imposing speed restrictions would allow NOAA to do what it can under existing authority to reduce chronic noise from commercial shipping vessels in U.S. waters and would be consistent with the MMPA's policy to protect marine mammals and their environment.

VII. CONCLUSION

The best thing about AONP is that it is a problem that can be solved. As Michael Jasny, the director of the Marine Mammal Protection Project for the NRDC put it: "Once you stop making noise, it goes away."²⁵⁹ Acute, chronic, and cumulative AONP continues to increase, drastically changing the ocean soundscape and negatively impacting the health of marine mammals. As demonstrated by the *Pritzker* decision, to date, only acute sources of AONP have been successfully regulated under the MMPA because the Act's permitting structure is not designed to address chronic and cumulative AONP.

NOAA's recent Roadmap is an important development in ensuring that marine mammals receive adequate protection from the harmful impacts of AONP, but without more, its goals will likely remain merely aspirational. In order to adequately address major contributors of chronic AONP, Congress needs to amend the Act so that the MMPA's permitting scheme can be

²⁵⁴ 16 U.S.C. § 1382(a).

²⁵⁵ *Id.* §§ 1531(b)–(c)(1), 1540(f).

²⁵⁶ ROADMAP, *supra* note 1, at 121, 123, 127; *see Ship Strike Reduction Rule Proves Effective Protecting North Atlantic Right Whales*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES (Dec. 6, 2013), <https://perma.cc/VAX8-JA23> (explaining that in 2008 NOAA implemented its final rule aimed at "reduc[ing] lethal vessel collisions with the highly endangered North Atlantic right whale. [NOAA's rule] requires large ships to travel at speeds of 10 knots or less seasonally, in areas where right whales feed and reproduce, as well as along migratory routes in-between"); *see also* 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, 60,182 (Oct. 10, 2008) (to be codified at 50 C.F.R. pt. 224) (citing the agency's rulemaking authority under the MMPA and ESA in promulgating the regulations).

²⁵⁷ 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. at 60,182–83.

²⁵⁸ *Id.* at 60,174.

²⁵⁹ Tatiana Schlossberg, *A Plan to Give Whales and Other Ocean Life Some Peace and Quiet*, N.Y. TIMES (June 3, 2016), <https://perma.cc/EJ6W-GXT2> (quoting Michael Jasny).

expanded to encompass all ships in U.S. waters, regardless of nationality. This will allow NOAA to regulate chronic AONP producers from the shipping industry under the incidental take permitting scheme. Working within the limitations imposed by existing authorities, NOAA could initiate formal rulemaking to further reduce chronic AONP by imposing speed restrictions on vessels traveling in U.S. waters.