THE CLEAN WATER ACT AND THE OCEAN: AN UNFULFILLED PROMISE

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ABSTRACT

When Congress in 1972 significantly amended the Federal Water Pollution Control Act to create the regulatory programs of what we now know as the Clean Water Act, it set an ambitious goal "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters"—including the ocean that surrounds much of the United States. Nevertheless, while the Act clearly applies to the ocean, in many ways it fails the ocean, and for a variety of reasons. This Essay explores a variety of the Clean Water Act's intersections with the ocean, emphasizing that Congress and the EPA should be updating the Act to better address both the continuing and the emerging water quality challenges that the ocean faces.

INTRODUCTION

In April 2012, the U.S. Environmental Protection Agency ("EPA") released its fourth *National Coastal Condition Report*,[1] concluding that the overall condition of coastal waters was "fair"[2]—an improvement over prior reports that had placed overall coastal water quality somewhere between "fair" and "poor."[3] This overall

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[1] OFF. OF RSCH. & DEV. & OFF. OF WATER, *NATIONAL COASTAL CONDITION REPORT IV*, U.S. ENV'T. PROT. AGENCY, (Apr. 2012), [hereinafter 2012 COASTAL CONDITION REPORT], https://www.epa.gov/sites/default/files/2014-10/documents/0_nccr_4_report_508_bookmarks.pdf (last such report issued as of April 2022) [https://perma.cc/LXX5-TAT4].

[2] *Id.* at ES-3.

[3] OFF. OF RSCH. & DEV. & OFF. OF WATER, *National Coastal Condition Report II*, at ES-2 fig. ES-1 (Dec. 2004), https://www.epa.gov/sites/default/files/2014-10/documents/nccriicomplete.pdf [https://perma.cc/44WK-HBY8].

evaluation, however, represents a national average: while Alaska, Guam, American Samoa, the U.S. Virgin Islands, and the West Coast have "good" coastal water quality, and the waters along the Southeast coast are better than average,[4] waters in the Great Lakes and Gulf of Mexico have "poor" water quality and waters along the northeast coast and Puerto Rico are rated as worse than "fair."[5]

Coastal water quality remains a serious environmental and economic issue for the United States. Marine fish such as tuna, shark, swordfish, and mackerel often contain methylmercury at levels that can endanger human health.[6] Nutrient pollution and warming from climate change are combining to expand harmful algal blooms ("HABs") in both the North Atlantic and North Pacific Oceans, including HABs which cause both paralytic and diarrhetic shellfish poisoning in humans.[7] According to the EPA, in 2020, 5,055 beaches in the United States have a program in place to notify the public when swimming is unsafe because of bacterial contamination—and 30 percent of them issued at least one such warning or advisory; moreover, that number has remained about the same between 2016 and 2020.[8] "Beach advisories and closings can result from a variety of pollution sources: stormwater runoff after rainfall; pet and wildlife waste; waste from boats; leaking septic systems; malfunctions at wastewater treatment plants or broken sewer lines; overflows from sewer systems; or harmful algal blooms."[9] There were a total of 7,562 beach advisories or closings in 2020,[10] suggesting that coastal pollution remains a problem in need of redress.

In 1972, when Congress significantly amended the Federal Water Pollution Control Act to create the regulatory programs of what we now know as the Clean Water Act, it set an ambitious goal

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[4] *Id.*

[5] 2012 COASTAL CONDITION REPORT, *supra* note 1, at ES-5 fig.ES-1.

[6] Mary Jane Brown, *Should You Avoid Fish Because of Mercury?*, HEALTHLINE (Sept. 14, 2018), https://www.healthline.com/nutrition/mercury-content-of-fish [https://perma.cc/J8MW-NF3W].

[7] Christopher J. Gobler et al., *Ocean Warming Since 1982 Has Expanded the Niche of Toxic Algal Blooms in the North Atlantic and North Pacific Oceans*, 114 PROC. NAT'L ACAD. SCI. 4975, 4975, 4979 (2017).

[8] OFF. OF WATER, PA., *EPA's Beach Report: 2020 Swimming Season,* U.S. ENV'T. PROT. AGENCY at 1, 2, & Chart 2 (Aug. 2021) https://www.epa.gov/system/files/documents/2021-08/beach-swimming-season-report-2020.pdf [https://perma.cc/Q3PP-Y2DS].

[9] *Id.* at 2.

[10] *Id.* at 3.

"to restore and maintain the chemical, physical, and biological integrity of the Nation's waters"[11]—including the ocean that surrounds much of the United States.[12] Nevertheless, while the Act clearly applies to the ocean, in many ways it fails the ocean, and for a variety of reasons.

This Essay explores a variety of the Clean Water Act's intersections with the ocean, emphasizing that Congress and the EPA should be updating the Act to better address both the continuing and the emerging water quality challenges the ocean faces. Part I begins with an overview of how the Clean Water Act includes the ocean as part of its jurisdictional waters. The Essay then examines how the Clean Water Act currently copes with four issues. Specifically, Part II examines beach contamination from coastal runoff and sewage, while Part III examines the emerging problem of ocean acidification. Part IV looks at the growing investment in marine aquaculture—particularly deep-water marine aquaculture—and the potential need to update the Act's ocean discharge criteria. Finally, Part V examines the Act's continuing exclusion of much agriculture from water quality regulation, contributing the coastal nutrient pollution and the proliferation of dead zones. This Essay concludes that there remains much that Congress and the EPA could do to "restore and maintain" ocean water quality in the 21st century.

I. APPLICATION OF THE CLEAN WATER ACT TO THE OCEAN

Congress enacted the contemporary version of the Clean Water Act through the Federal Water Pollution Control Act ("FWPCA") Amendments of 1972.[13] The 1972 amendments established an ambitious "national goal that the discharge of pollutants into the navigable waters be eliminated by 1985"[14] and, "wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983" (the so-called fishable/swimmable goal).[15] The 1972 amendments pursued these goals by transforming the

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[11] 33 U.S.C. § 1251(a).

[12] *See* discussion *infra* Part I.

[13] Federal Water Pollution Control Act Amendments of 1974, Pub. L. No. 92-500, 86 Stat. 816.

[14] 33 U.S.C. § 1251(a)(1).

[15] 33 U.S.C. § 1251(a)(2).

FWPCA's previous state-focused approach to water-quality regulation, based almost entirely on ambient water-quality standards, into two proactive federal permitting schemes[16] based primarily on end-of-the-pipe, technology-based effluent limitations for individual dischargers.[17]

The Clean Water Act's central operative provision for individual dischargers, Section 301(a), states that "[e]xcept as in compliance with [the Act], the discharge of any pollutant by any person shall be unlawful."[18] Nearly every word in this prohibition requires further explication. For example, a "person" is "an individual, corporation, partnership, association, State, municipality, commission, political subdivision of a State, or any interstate body."[19] Notably absent from this list is the federal government, but Section 313 of the Act requires federal facilities to comply with the Act's requirements "in the same manner, and to the same extent as any nongovernmental entity . . . ."[20]

More importantly, for applying the Clean Water Act to the ocean,[21] "discharge of a pollutant" "means (A) any addition of any pollutant to *navigable waters* from any point source, or (B) any addition of any pollutant to the waters of the *contiguous zone* or the *ocean* from any point source *other than a vessel or other floating craft*."[22] The Act defines "point source" broadly to include

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[16] 33 U.S.C. §§ 1342, 1344.

[17] For a complete history of the evolution of the FWPCA into the contemporary Clean Water Act, see generally ROBIN K. CRAIG, THE CLEAN WATER ACT AND THE CONSTITUTION: LEGAL STRUCTURE AND THE PUBLIC'S RIGHT TO A CLEAN AND HEALTHY ENVIRONMENT 9–37 (2d ed. 2009).

[18] 33 U.S.C. § 1311(a).

[19] 33 U.S.C. § 1362(5).

[20] 33 U.S.C. § 1323(a). This provision has been subject to repeated litigation, but federal facilities *are* subject to the Act's permit requirement, even if a *state* issues the permit. *See* Pub. L. No. 95-217, §§ 60, 61(a), 91 Stat. 1597, 1598 (Dec. 27, 1977) (amending section 313 to "correct" the Supreme Court's decision that federal facilities enjoyed sovereign immunity from the state National Pollutant Discharge Elimination System (NPDES) permit requirement in *EPA v. California ex rel. State Water Resources Control Board*, 426 U.S. 200, 219–27 (1976)). However, federal facilities still enjoy sovereign immunity from punitive civil penalties assessed pursuant to state-delegated programs. *See generally U.S. Dep't of Energy v. Ohio*, 503 U.S. 607 (1992) (holding that neither the federal facilities provisions nor the citizen suit provisions of either the Clean Water Act nor Resource Conservation and Recovery Act waived the federal government's sovereign immunity from punitive civil penalties imposed under delegated state programs).

[21] For a more complete discussion of all the ways in which the Clean Water Act applies in the ocean, see Robin Kundis Craig, *Coastal Water Quality Protection, in* DONALD C. BAUR, TIM EICHENBERG, GEORGIA HANCOCK SNUSZ, & MICHAEL SUTTON (EDS.), OCEAN & COASTAL L. & POL'Y 235–274 (2nd ed. 2015)

[22] 33 U.S.C. § 1362(12) (emphasis added).

"any discernible, confined, and discrete conveyance."[23] "Pollutant" is also broadly defined to include "dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water."[24] Section 301(a) thus prohibits most human-controlled additions of almost any material into the "navigable waters," the "contiguous zone," and the "ocean," with limited exceptions.

The Act's definition of jurisdictional waters also makes it clear that the Act applies to the ocean. First, the Act's "navigable waters" are "the waters of the United States, including the territorial seas."[25] The territorial seas, in turn, are "the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending a distance of three miles."[26] As a practical matter, the Clean Water Act's "navigable waters" include all the waters that are generally subject to state jurisdiction, including both the inland waters—lakes, rivers, streams, and some wetlands—and the offshore coastal waters given to states by Congress in the Submerged Lands

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[23] 33 U.S.C. § 1362(14). More specifically, "point source" "include[s] but [is] not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture." *Id.*

[24] 33 U.S.C. § 1362(6). However, "[t]he term does not mean (A) 'sewage from vessels or a discharge incidental to the normal operation of a vessel of the Armed Forces' within the meaning of section 1322 of this title; or (B) water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil or gas production and disposed of in a well, if the well-used either to facilitate production or for disposal purposes is approved by authority of the State in which the well is located, and if such State determines that such injection or disposal will not result in the degradation of ground or surface water resources." *Id.*

[25] 33 U.S.C. § 1362(7).

[26] 33 U.S.C. § 1362(8). Note the difference between the "territorial sea" under the Clean Water Act and the "territorial sea" for international purposes.

Act.[27] The coastal border of the territorial sea is the mean high-tide line.[28]

The definition of "navigable waters" has become both statutorily and constitutionally controversial regarding intrastate and isolated wetlands.[29] However, neither the federal government's Commerce Clause authority over the oceans and all waters subject to the ebb and flow of the tide, nor the Clean Water Act's application to these "traditional navigable waters," has ever been seriously contested.[30]

Instead, the more ambiguous ocean zone under the Clean Water Act is the "contiguous zone," which the Act defines as "the entire zone established or to be established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone."[31] This definition references one of the four conventions created through the 1958 United Nations Conference on the Law of the Sea ("UNCLOS I"), which allowed ratifying

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[27] 43 U.S.C. §§ 1301–1356. However, it is worth noting that the Submerged Lands Act allows states to claim more than three miles' jurisdiction offshore, and some states have succeeded in making such claims. When such conflicts arise, the Clean Water Act's three-mile designation for the "territorial sea" controls for Clean Water Act purposes. *Nat. Res. Def. Council, Inc. v. U.S. Env't. Prot. Agency*, 863 F.2d 1420, 1434–36 (9th Cir. 1988) (holding that the Act's definition of "territorial sea" controls despite Florida's claim of jurisdiction over three marine leagues [approximately 10.3 miles] into the Gulf of Mexico).

[28] *United States v. Milner*, 583 F.3d 1174, 1194 (9th Cir. 2009); *see also Leslie Salt Co. v. Froehlke*, 578 F.2d 742, 754–56 (9th Cir. 1978) (rejecting the use of the "mean higher high tide" line).

[29] *See generally, e.g.*, *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121 (1985) (delineating the federal agencies' jurisdiction over wetlands adjacent to more traditionally "navigable" waters); *Solid Waste Agency of N. Cook Cnty. v. U.S. Army Corps of Eng'rs*, 531 U.S. 159 (2001) (refusing to decide the commerce clause limits of the Clean Water Act but implying that the Act cannot extend to isolated, intrastate wetlands); *Rapanos v. United States*, 547 U.S. 715 (2006) (splitting 4-1-4 on the issue of whether the Corps has the authority to regulate wetlands adjacent to tributaries of traditional navigable waters, with five justices agreeing that the "any surface water connection" test was not the correct one for bringing wetlands under federal jurisdiction, but also with five justices agreeing that wetlands with a significant nexus to traditional navigable waters are included within the scope of the Clean Water Act). The U.S. Supreme Court will visit this issue yet again in its 2022–2023 term. *Sackett v. U.S. Env't. Prot. Agency*, 8 F.4th 1075, 1087–93 (9th Cir. 2021), *cert. granted*, 142 S. Ct. 896 (2022).

[30] *See, e.g.*, *United States v. Locke*, 529 U.S. 89, 99 (2000) (emphasizing the strength of the federal government's interest in interstate commerce in the oceans); *United States v. California*, 332 U.S. 19, 36 (1947) (recognizing the United States' "paramount rights in and power over" the ocean and coastal zone); *see also Abreu v. United States*, 468 F.3d 20, 28–29 (1st Cir. 2006) (emphasizing that the Navy had gotten a NPDES permit for its ship-to-ship and ship-to-shore exercises off the coast of Vieques Island, Puerto Rico); *City of San Diego v. Whitman*, 242 F.3d 1097, 1098 (9th Cir. 2001) (noting that the city's discharges of sewage into the ocean require an NPDES permit); *Am. Petroleum Inst. v. U.S. Env't. Prot. Agency*, 858 F.2d 261, 262–63 (5th Cir. 1988) (discussing the NPDES permitting requirements for offshore oil drilling platforms).

[31] 33 U.S.C. § 1362(9).

nations to claim a contiguous zone beyond their territorial seas, extending out to twelve nautical miles.[32] While international developments have since rendered the 1958 zones obsolete for most purposes,[33] Congress has never amended the Clean Water Act's statutory definitions to reflect their newer international law counterparts. Thus, the "contiguous zone" for the Clean Water Act still refers to the zone from three to twelve nautical miles out to sea.[34]

Finally, the "ocean" is "any portion of the high seas beyond the contiguous zone,"[35] which would seem to extend the United States' Clean Water Act around the world. However, accepting the jurisdictional provisions of the third United Nations Convention on the Law of the Sea as customary international law, the United States asserts jurisdiction over a two-hundred-nautical-mile-wide Exclusive Economic Zone ("EEZ")[36] and has claimed a two-hundred-nautical-mile-wide exclusive fishing zone since at least 1976.[37] Notably, neither the Clean Water Act nor agency regulations are clear about the extent of the Act's reach into the

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[32] Convention on the Territorial Sea and the Contiguous Zone art. 24(2), Sept. 10, 1964, 15 U.S.T. 1606, 1612–13, 516 U.N.T.S. 205.

[33] Internationally, by 1973, a year after Congress transformed the prior FWPCA into what we now think of as the Clean Water Act, the third United Nations Conference on the Law of the Sea began work on the third United Nations Convention on the Law of the Sea ("UNCLOS III"), which opened for signature in 1982 and went into effect in 1994. JOSEPH J. KALO, RICHARD G. HILDRETH, ALISON RIESER & DONNA H. CHRISTIE, COASTAL AND OCEAN LAW: CASES AND MATERIALS 384–85 (3d ed. 2007). Under this convention, ratifying nations could claim a twelve-nautical-mile-wide territorial sea and a twenty-four-nautical-mile-wide contiguous zone. *Id.* at 392–94. Domestically, in 1988 the United States claimed a twelve-nautical-mile-wide territorial sea and in 1999 claimed a contiguous zone extending from twelve nautical miles to twenty-four nautical miles out to sea. Territorial Sea of the United States of America, Proclamation No. 5928, 54 Fed. Reg. 777 (Dec. 27, 1988) (President Reagan); Contiguous Zone of the United States, Proclamation No. 7219, 64 Fed. Reg. 48,701 (Aug. 2, 1999) (President Clinton).

[34] Case law on this point is limited, given the relative unimportance to the "contiguous zone" to the Act's regulatory requirements. Nevertheless, see *Nat. Res. Def. Council, Inc. v. U.S. Env't. Prot. Agency*, 656 F.2d 768, 778 & n.6 (D.C. Cir. 1981) (explicitly defining the Act's "contiguous zone" as extending to twelve miles)*; see also* 40 C.F.R. § 220.1(a)(3)(ii) (defining "contiguous zone" as extending beyond the territorial sea out to twelve miles for purposes of ocean dumping).

[35] 33 U.S.C. § 1362(10).

[36] Exclusive Economic Zone of the United States of America, Proclamation No. 5030, 48 Fed. Reg. 10,605 (Mar. 10, 1983) (President Reagan). The 1982 UNCLOS III allows ratifying nations to claim such an EEZ. KALO, HILDRETH, RIESER & CHRISTIE, *supra* note 33, at 341.

[37] *See* Pub. L. No. 94-265, §§ 3(11), 101, 90 Stat. 331 (1976) (establishing this zone as part of the enactment of the Magnuson-Stevens Fishery Conservation and Management Act).

oceans,[38] and hardly any case law has explored the issue.[39] However, given the United States' assertion of jurisdiction over its EEZ, the most logical construction is that federal Clean Water Act jurisdiction currently extends two hundred nautical miles out to sea. Indeed, pursuant to the Clean Water Act, the EPA regulates discharges from ocean-going vessels[40] and deep-water installations, such as offshore oil and gas platforms, indicating that the CWA's jurisdiction does in fact extend that far.[41]

As a practical matter, the Clean Water Act's distinction between the "contiguous zone" and the "ocean" is largely irrelevant because almost all the Act's provisions that apply to one of these zones apply to the other. Instead, the critical regulatory line is three nautical miles out to sea, because the Act's "territorial sea" is part of the "navigable waters" that the Act regulates most comprehensively—while the "contiguous zone" and the "ocean" are not.[42] Moreover, in states with delegated NPDES permitting programs,[43] the EPA assumes permitting authority at three miles out to sea and beyond.[44]

II. HUMAN HEALTH: THE BEACH ACT, COASTAL RUNOFF, AND SEWAGE DISCHARGES

Coastal water quality can quickly become a human health issue. For example, urban storm-water runoff in coastal waters is suspected to cause many beach closures and swimming-related illnesses,[45] and combined sewer overflow events during storms are

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[38] *See, e.g.*, 40 C.F.R. § 125.83 (defining "ocean" to be "marine open coastal waters with a salinity greater than or equal to 30 parts per thousand (by mass)"); *id.* § 125.93.

[39] *But see Port Oswego Auth. v. Grannis*, 881 N.Y.S.2d 283 (N.Y. Sup. Ct. 2009) (upholding the State of New York's imposition of ballast water requirements through the Clean Water Act that extended fifty nautical miles out to sea).

[40] 33 U.S.C. § 1322.

[41] *E.g.*, *Western and Central Gulf of Mexico Offshore Oil & Gas NPDES Program*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/npdes-permits/western-and-central-gulf-mexico-offshore-oil-gas-npdes-program (last viewed Apr. 2, 2022) [https://perma.cc/R2S8-GHCL].

[42] *See, e.g.*, *Nat. Res. Def. Council, Inc. v. U.S. Env't. Prot. Agency*, 863 F.2d 1420, 1434–36 (9th Cir. 1988) (holding that the three-mile line of the territorial sea is the critical line for Section 401 certifications); *Pac. Legal Found. v. Costle*, 586 F.2d 650, 655–56 (9th Cir. 1978) (holding that beyond the three-mile limit of the territorial sea, only the EPA can issue NPDES permits for discharges into the ocean).

[43] 33 U.S.C. § 1342(b).

[44] *Pac. Legal Found.*, 586 F.2d at 655–57, *rev'd on other grounds*, 445 U.S. 198 (1980).

[45] *See, e.g.*, Rachel T. Noble et al., *Storm Effects on Regional Beach Water Quality Along the Southern California Shoreline*, 1 J. WATER & HEALTH 23, 23–24 (2003) ("Land-

known sources of contamination.[46] For example, on October 29, 2012, in the wake of Hurricane Sandy, New Jersey closed its shellfish beds because of pollution-related health concerns,[47] with several remaining closed until April 2013.[48]

This Part examines the Clean Water Act provisions most directly affecting beach contamination and threats to human health and recreation along the coast caused by sewage contamination and coastal runoff.

A. Modification of Point-Source Discharge Requirements from Publicly Owned Treatment Works for Discharges into the Ocean

Within the Clean Water Act's regulatory scheme, water pollution comes from two types of sources: (1) point sources and (2) nonpoint sources.[49] Point-source pollution refers to the readily identifiable discharges of pollutants into the nation's waterways.[50] Land-based point sources that can affect coastal water quality include industrial sources, sewage treatment plants, and municipal stormwater control systems that directly discharge pollutants into coastal waters or into rivers, lakes, and streams, which then travel downstream to coastal waters.[51] In addition,

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based runoff is increasingly being recognized as a source of fecal bacteria and a public health concern at swimming beaches, [and] illness rates more than double when swimming at beaches near urban runoff outlets.").

[46] OFF. OF WATER, *EPA's Beach Report: 2020 Swimming Season* at 2, U.S. ENV'T PROT. AGENCY (Aug. 2021), https://www.epa.gov/system/files/documents/2021-08/beach-swimming-season-report-2020.pdf [https://perma.cc/Y2UQ-CFWZ].

[47] Bob Schuster, *New Jersey Shellfish Bed Closure and Sampling in Response to Superstorm Sandy* at 6–7 N.J. DEP'T ENV'T PROT. (Feb. 6, 2013), https://www.nj.gov/dep/wms/download/schuster_new_jersey_shellfish_bed_closure_and_sampling_02-06-13.pdf [https://perma.cc/ZP5S-58ZS].

[48] Kirk Moore, *Shellfish Industry Slow to Recover from Sandy*, USA TODAY (updated Apr. 2, 2013 9:11 P.M. ET), https://www.nj.gov/dep/wms/download/schuster_new_jersey_shellfish_bed_closure_and_sampling_02-06-13.pdf [https://perma.cc/24DM-N39C].

[49] *Basic Information about Nonpoint Source (NPS) Pollution*, U.S. ENV'T PROT. AGENCY (updated Jul. 8, 2021), https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution [https://perma.cc/MK77-H5FK]. Nonpoint source pollution is any water pollution that does not come from a point source. *See* discussion *supra* note 23 and accompanying text (defining "point source").

[50] *See* 33 U.S.C. § 1362(14) (defining "point source").

[51] Marc Ribaudo, Richard Horan, & Mark Smith, *Economics of Water Quality Protection Chapter 1: Current Water Quality Conditions and Government Programs to Protect Water Quality*, USDA ECON. RSCH. SERV. AER-782, (Nov. 1999), https://www.ers.usda.gov/publications/pub-details/?pubid=41066 [https://perma.cc/6QHM-KTZB].

some ocean-based point sources, such as ships and oil platforms, also discharge pollutants directly into coastal and ocean waters.[52]

Most point source discharges require National Pollutant Discharge Elimination System ("NPDES") permits,[53] and the main source of pollution limitations in these permits are the national EPA-set effluent limitations.[54] Effluent limitations reflect the technology available to specific categories of point sources—on an industry-wide basis—to treat discharges.[55] Sewage treatment plants—more officially known as Publicly Owned Treatment Works ("POTWs")—are one such source category, and their effluent limitations are based on secondary treatment.[56]

However, Congress gave POTWs that discharge directly into the ocean a break. Section 301(h) allows the EPA to modify the standard secondary-treatment-based effluent limitations for POTWs that discharge into marine waters.[57] In order to take advantage of the modified effluent limitations, the POTW must demonstrate to the EPA Administrator that nine statutory requirements are met.[58] In addition, no NPDES permit issued under this provision can allow a POTW to discharge sewage sludge into the marine waters, and the receiving marine or estuarine waters must meet water quality standards before the EPA can

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[52] Nat'l Oceanic Serv., *Point Source*, U.S. DEP'T. OF COM.: NAT'L OCEANIC & ATMOSPHERIC ADMIN., oceanservice-noaa-gov-education-tutorial_pollution-03pointsource-html.pdf (last viewed June 3, 2022) [https://perma.cc/259Z-T8GA].

[53] 33 U.S.C. § 1342.

[54] *See* 33 U.S.C. § 1311(b).

[55] See 33 U.S.C. § 1362(11) (defining "effluent limitation").

[56] *See* 33 U.S.C. § 1311(b)(1)(B).

[57] For purposes of this provision, "the discharge of any pollutant into marine waters" means "a discharge into deep waters of the territorial sea or the waters of the contiguous zone, or into saline estuarine waters where there is strong tidal movement and other hydrological and geological characteristics which the Administrator determines necessary to allow compliance with [water-quality requirements and the Act's fishable/swimmable goal]." 33 U.S.C. § 1311(h). Section 301(h) is thus one of the few provisions of the Clean Water Act that distinguishes between the contiguous zone and the ocean: modifications are expressly allowed for discharges into the territorial sea and contiguous zone but implicitly *not* for discharges into the ocean.

[58] These criteria include the existence of a water-quality standard for the pollutant at issue; noninterference "with the attainment and maintenance of that water quality which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, and allows recreational activities, in and on the water"; and at least primary treatment of the discharge, meaning "treatment by screening, sedimentation, and skimming adequate to remove at least 30 percent of the biological oxygen demand material and of the suspended solids in the treatment works influent, and disinfection, where appropriate." 33 U.S.C. § 1311(h).

approve modification of the standard secondary-treatment-based effluent limitations.[59]

The EPA issued its final regulations for Section 301(h) modifications in August 1994.[60] The deadline for waiver applications, however, was December 29, 1982.[61] The EPA received 208 applications for waivers, 87 of which were either withdrawn or became ineligible, and 76 of which were denied.[62] As of March 2012, 36 communities had obtained waivers from the EPA allowing them to discharge into coastal waters sewage effluent treated to less than secondary treatment standards, with nine others awaiting decisions on their applications.[63]

"The majority of the 301(h) waivers recipients are small POTWs that discharge less than 5 million gallons per day ("MGD")."[64] Twenty-five of the 45 viable applications came from outside the continental United States, including Alaska (nine), U.S. territories (eight), Puerto Rico (six), and Hawaii (two).[65] Within the continental United States, twenty applications came from only four states: California, Maine, Massachusetts, and New Hampshire.[66]

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[59] Specifically "[i]n order for a permit to be issued under this subsection for the discharge of a pollutant into marine waters, such marine waters must exhibit characteristics assuring that water providing dilution does not contain significant amounts of previously discharged effluent from such treatment works. No permit issued under this subsection shall authorize the discharge of any pollutant into saline estuarine waters which at the time of application do not support a balanced indigenous population of shellfish, fish and wildlife, or allow recreation in and on the waters or which exhibit ambient water quality below applicable water quality standards adopted for the protection of public water supplies, shellfish, fish and wildlife or recreational activities or such other standards necessary to assure support and protection of such uses. The prohibition contained in the preceding sentence shall apply without regard to the presence or absence of a causal relationship between such characteristics and the applicant's current or proposed discharge." 33 U.S.C. § 1311(h). *See also generally* Natural Res. Def. Council, Inc. v. U.S. Env't. Prot. Agency, 656 F.2d 768 (D.C. Cir. 1981) (discussing of the section 301(h) exemption).

[60] *See* 59 C.F.R. § 40,642 (Aug. 9, 1994) (The EPA's regulations for effluent limitation modifications under this provision are found at 40 C.F.R., Part 125, Subpart G, comprising 40 C.F.R. §§ 125.56 through 125.68 and an appendix).

[61] *Waivers: Section 301(h) Waivers*, BEACHAPEDIA, https://beachapedia.org/Waivers (last updated Aug. 23, 2015) (relying on the now-disappeared U.S EPA website: *Amendments to Regulations Issued Pursuant to the Clean Water Act Section 301(h) Program*, OFF. OF WATER, U.S. ENV'T. PROT. AGENCY (last updated Mar. 6, 2012)) [https://perma.cc/MH36-SASC].

[62] *Id.*

[63] *Id.*

[64] *Id.*

[65] *Id.*

[66] *Id.*

By March 2021, only 25 POTWs in six coastal states still operated under Section 301(h) waivers.[67] The EPA continues to collect information about these facilities from the facilities themselves and from the relevant state agencies—particularly when these facilities renew their NPDES permits and waiver requests every five years.[68]

Nevertheless, even these few, small coastal POTWs with waivers continue to cause water quality problems that potentially affect both human health and the marine environment.[69] For example, in 2015 the Natural Resources Defense Council protested the proposed renewal of the John M. Asplund Wastewater Treatment Facility in Alaska because of the discharge's alleged impact on Cook Inlet beluga whales.[70]

B. Storm Water Discharges

Stormwater runoff—particularly agricultural and urban stormwater—can adversely affect ocean water quality.[71] For example, 28 percent of pollutants reaching estuaries and 20 percent of pollutants reaching coastal areas come from municipal separate storm sewers ("MS4s") that collect and channel stormwater runoff.[72] Stormwater runoff also carries pathogens, toxics, and nutrients into coastal waters and into the streams and rivers that run to coastal waters.[73]

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[67] Modification of Secondary Treatment Requirements for Discharges into Marine Waters, 86 Fed. Reg. 11,998, 11,999 (Mar. 1, 2021).

[68] *Id.*

[69] Matthew Chalmers, *We Need to Protect Marine Life Before It Disappears*, SENTIENT MEDIA (Mar. 3, 2021) https://sentientmedia.org/marine-life/?msclkid=51474674ba8d11eca46eb2c9f3b15eee [https://perma.cc/8LUY-4EHE].

[70] Letter from Taryn Kiekow Heimer & Guilia Good Stefani, NAT. RES. DEF. COUNCIL, to Dennis J. McLerran, REG'L ADM'R, U.S. ENV'T PROT. AGENCY REGION 10, (June 19, 2015), in https://www.nrdc.org/sites/default/files/wil_15062301a.pdf at 2 [https://perma.cc/4V5F-JRRG].

[71] Matt Rath, *Stormwater Runoff*, CHESAPEAKE BAY PROGRAM, https://www.chesapeakebay.net/issues/stormwater_runoff#:~:text=Stormwater%20runoff%20can%20cause%20a%20number%20of%20environmental,waste%20and%20other%20sources%20into%20rivers%20and%20streams.?msclkid=67aa852aba9011ec858bf9e9e8f223ba (last viewed Apr. 12, 2022) [https://perma.cc/35M9-GKFD].

[72] National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, 55 Fed. Reg. 47,990, 47,991 (Nov. 16, 1990).

[73] Matt Rath, *How Does Stormwater Runoff Affect the Environment?*, AM. OCEANS BLOG, https://www.chesapeakebay.net/issues/stormwater_runoff#:~:text=Stormwater%20runoff%20can%20cause%20a%20number%20of%20environmental,waste%20and%20other%20sources%20into%20rivers%20and%20streams.?msclkid=67aa852aba9011ec858bf9e9e8f223ba (last viewed Apr. 12, 2022, 9: 26 AM) [https://perma.cc/35M9-GKFD].

Nevertheless, until 1987, stormwater was not routinely subject to NPDES permitting.[74] Because stormwater begins as runoff, a form of diffuse and uncollected water pollution, the EPA and the states treated it historically as nonpoint source pollution.[75] However, when cities and counties collect stormwater in storm drains and stormwater systems, or when point sources otherwise collect and channel such stormwater runoff, it becomes point source pollution subject to the Clean Water Act's NPDES permit requirement.[76]

In the Water Quality Act of 1987, Congress amended Section 402 of the Clean Water Act to ensure that all industrial and municipal point sources of stormwater would be subject to NPDES permitting.[77] The amendments announced a moratorium on all NPDES permitting for stormwater discharges until October 1, 1992, subject to five exceptions: (1) stormwater discharges for which NPDES permits had already been issued, (2) industrial stormwater discharges, (3) discharges from MS4s serving populations of 250,000 or more (the large MS4s), (4) discharges from MS4s serving populations of 100,000 to 250,000 (the medium MS4s), and (5) stormwater discharges determined to cause significant pollution and/or violations of the water quality standards.[78]

In November 1990, the EPA issued its Phase I stormwater permitting rules, covering eleven categories of industrial activities and the large and medium MS4s.[79] Under these rules, over 100,000

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[74] *See, e.g.*, *Nat. Res. Def. Council, Inc. v. Train*, 396 F. Supp. 1393, 1396–97 (D.D.C. 1975), *aff'd sub nom Nat. Res. Def. Council, Inc. v. Costle*, 568 F.2d 1369 (D.C. Cir. 1977) (overturning the EPA's 1973 regulations that would exempt storm-water point sources from NPDES permitting); *Kennecott Copper Corp. v. U.S. Env't Prot. Agency*, 612 F.2d 1232, 1243 (10th Cir. 1979) (noting that the EPA lacked authority to require mining companies to collect nonpoint-source storm runoff); *United States v. Frezzo Bros.*, 642 F.2d 59, 61–62 (3d Cir. 1981) (holding that discharges of compost runoff were "not an agricultural point source" that required a permit); *Nat. Res. Def. Council, Inc. v. U.S. Env't Prot. Agency,* 22 F.3d 1125, 1144 (D.C. Cir. 1987) (overturning the EPA's 1984 storm-water regulations).

[75] *See, e.g., Env't Def. Ctr., Inc. v. U.S. Env't Prot. Agency*, 344 F.3d 832, 841 & n.8 (9th Cir. 2003) (comparing urban storm sewers, which "are established point sources subject to NPDES permitting requirements," to "[d]iffuse runoff, such as rainwater that is not channeled through a point source," which "is considered nonpoint source pollution and is not subject to federal regulation" (citing *Oregon Nat. Desert Ass'n v. Dombeck*, 172 F.3d 1092, 1095 (9th Cir. 1998))).

[76] *See id.*

[77] Pub. L. No. 100-4, § 405, 101 Stat. 7, 69 (codified at 33 U.S.C. § 1342(p)).

[78] Pub. L. No. 100-4, § 405, 101 Stat. 7, 69 (codified at 33 U.S.C. § 1342(p)(2) (1988)).

[79] National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, 55 Fed. Reg. 47,990, 47,991 (Nov. 16, 1990).

industrial facilities and approximately 850 municipalities received NPDES stormwater permits.[80] Congress extended the permit moratorium for all other stormwater point sources until October 1, 1994,[81] and the EPA did not issue its final Phase II stormwater regulations until 1999.[82] These Phase II regulations cover small MS4s serving populations of less than 1000,000 and smaller-scale industrial activities, such as construction activities that disturb between one and five acres of land.[83] Many of these point source dischargers operate under general NPDES permits rather than individual permits.[84]

Nevertheless, much of the stormwater that reaches the coast comes in nonpoint source form. "Nonpoint source pollution, or polluted runoff, is thought to be the greatest threat to coastal waters . . . ."[85] Urban stormwater runoff in the coastal zone is "the fastest-growing cause of surface water impairment in the United States."[86] This stormwater carries nutrients and a complex mix of other contaminants—including "heavy metals and hydrocarbons from motor vehicles and commercial land use, as well as pesticides and pharmaceuticals"—into coastal waters.[87] These mixtures can become acutely lethal to coastal species such as coho salmon, but more often operate as longer-term and potentially bioaccumulative stressors to coastal species and ecosystems.[88]

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[80] OFF. OF WATER, EPA 833-R-96-008, OVERVIEW OF THE STORM WATER PROGRAM (1996), https://www3.epa.gov/npdes/pubs/owm0195.pdf [https://perma.cc/CG9M-J4PL].

[81] Water Resources Development Act of 1992, Pub. L. No. 102-580, § 364(1), 106 Stat. 4797, 4862 (1992) (codified as amended at 33 U.S.C. § 1342(p)).

[82] National Pollutant Discharge Elimination System—Regulations for the Revision of the Water Pollution Control Program Addressing Storm Water Discharges, 64 Fed. Reg. 68,722, 68,722 (Dec. 8, 1999).

[83] *See* Overview of the Stormwater Program, *supra* note 80.

[84] *E.g.*, *2022 Construction General Permit (CGP)*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/npdes/2022-construction-general-permit-cgp (last updated Mar. 17, 2022) [https://perma.cc/CWM5-5DQM].

[85] *Coastal Nonpoint Pollution Control Program*, OFFICE FOR COASTAL MANAGEMENT, NAT'L OCEANIC & ATMOSPHERIC ADMIN., https://coast.noaa.gov/czm/pollutioncontrol/ (last updated Apr. 2, 2022) [https://perma.cc/EW3U-AL6C].

[86] Phillip S. Levin, Emily R. Howe, & James C. Robertson, *Impacts of Stormwater on Coastal Ecosystems: The Need to Match the Scales of Management Objectives and Solutions*, 375 PHIL TRANS. ROY. SOC. B 20190460, at 2 (2020), http://dx.doi.org/10.1098/rstb.2019.0460 (citation omitted).

[87] *Id.* at 2–3.

[88] *Id.* at 3.

More importantly for the Clean Water Act, stormwater—whether point source or nonpoint source—poses serious human health risks.[89] In California, for example,

> [a] study conducted by the Santa Monica Bay Restoration Project found that storm water pollution in the ocean leads to increased risk of viral infections, earaches, sinus problems, fever, flu and skin rashes, and viral diseases such as hepatitis for those swimming in the ocean close to storm drain outfalls, especially following a rainstorm when litter and contaminants are flushed into the storm drain system."[90]

C. The Worst of Both Worlds: Combined Sewer Overflows

NPDES permitting of stormwater, as noted, applies to MS4s—municipal *separate* storm sewer systems.[91] These systems keep stormwater separate from raw sewage.[92] In many parts of the country, however, cities still use ***combined*** sewer systems ("CSS"), which "collect[] runoff, domestic sewage, and industrial wastewater into one pipe."[93] In 2014, CSSs "serve[d] around 40 million people in 772 communities nationwide,"[94] down from 746 communities and 9,348 CSO outfalls in 32 states in 2004.[95]

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[89] Stephen J. Gaffield et al., *Public Health Effects of Inadequately Managed Stormwater Runoff*, 93 AM. J. PUB. HEALTH 1527 (Sept. 2003) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448005/?msclkid=8fc1d47eba8e11eca3e78e853ff546e2 [https://perma.cc/8ANG-XXQ5].

[90] *Storm Water Pollution*, CAL. ENV'T PROT. AGENCY & STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/water_issues/programs/outreach/erase_waste/swpollution.shtml (last viewed Apr. 2, 2022) [https://perma.cc/WT8M-VT3G].

[91] National Pollutant Discharge Elimination System, Pub. L. No. 100-4, § 405, 101 Stat. 7, 69 (codified at 33 U.S.C. § 1342(p)).

[92] *See generally* April Ryan, *25 Facts About Stormwater and the MS4 Permit Program*, SHORT ELLIOT HENDRICKSON INC. https://www.sehinc.com/news/25-facts-about-stormwater-MS4-permit-program (last viewed May 17, 2022) [https://perma.cc/GJU2-CHTH].

[93] *Combined Sewer Overflows (CSOs)*, U.S. ENV'T PROT. AGENCY, https://www.waterboards.ca.gov/water_issues/programs/outreach/erase_waste/swpollution.shtml (last updated Nov. 23, 2021) [https://perma.cc/U67D-KXMT].

[94] Mark Dorfman & Angela Haren, *Testing the Waters*, NAT. RES. DEF. COUNCIL, 24th Ed. (June 2014), https://www.nrdc.org/sites/default/files/ttw2014.pdf [https://perma.cc/X3WV-9M78].

[95] *Fact Sheet: Report to Congress on Impacts and Control of Combined Sewer Overflows and Sanitary Sewer Overflows*, U.S. ENV'T PROT. AGENCY, at 1 (2004).

During heavy rainfall events or snowmelt, "[t]he volume of wastewater can sometimes exceed the capacity of the CSS or treatment plant," sending untreated stormwater and raw sewage into nearby waterbodies.[96] Such events are known as Combined Sewer Overflows ("CSOs").[97] In cities with aging infrastructure, CSO events can occur with "as little as [one-tenth] of an inch of rain."[98]

According to the Surfrider Foundation:

> Across the US, Combined Sewer Overflows (CSOs) release 850 billion gallons of diluted sewage into surface waterways every year! Sewage can contain bacteria, viruses & parasites that make people sick with gastro-intestinal symptoms, rashes, skin and eye infections, flu-like symptoms, and worse.[99]

The EPA confirms that "CSOs have contributed to beach closures, shellfish bed closures, contamination of drinking water supplies, and other environmental and public health concerns[.]"[100]

While CSSs have NPDES permits,[101] that regulation is generally insufficient to prevent overflows without significant investment in the infrastructure itself.[102] For example, Portland, Oregon, separated its combined system, largely to protect native and often endangered salmon.[103] This "Big Pipe Project" successfully "reduced combined sewer overflows to the Willamette River by 94 percent and to the Columbia Slough by 99 percent."[104]

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[96] *Combined Sewer Overflows (CSOs)*, *supra* note 93.

[97] *See id.*

[98] Mara Dias, *How Do Combined Sewer Overages (CSOs) Pollute Coastal Watersheds?*, SURFRIDER FOUND. (May 6, 2021), https://www.surfrider.org/coastal-blog/entry/how-do-combined-sewer-overages-csos-pollute-coastal-watersheds#:~:text=Across%20the%20US%2C%20Combined%20Sewer,%2Dlike%20symptoms%2C%20and%20worse [https://perma.cc/8BQ8-WYAM].

[99] *Id.*; *see also Fact Sheet supra* note 95 (reporting 850 billion gallons per year).

[100] *Fact Sheet: Report to Congress on Impacts and Control of Combined Sewer Overflows and Sanitary Sewer Overflows*, U.S. ENV'T. PROT. AGENCY at 2 (2004), https://www.epa.gov/sites/default/files/2015-10/documents/csosso_rtc_factsheet.pdf [https://perma.cc/P9AL-29U9].

[101] *See id.* at 1.

[102] *See id.* at 2.

[103] *See Combined Sewer Overflow Project*, NW. GEOTECH, INC. D.B.A. NW. TESTING, INC., http://www.nwgeotech.com/combined-sewer-overflow-project.html (last viewed May 19, 2022) [https://perma.cc/6FQG-5HDC].

[104] *About the Big Pipe Project*, PORTLAND.GOV, https://www.portland.gov/bes/about-big-pipe, (last viewed Apr. 2, 2022) [https://perma.cc/DMV8-DK4E].

It also took twenty years and $1.4 billion to build,[105] and it contributed to significant increases in residents' utility bills.[106]

D. The BEACH Act

Disease outbreaks in coastal waters, particularly outbreaks of *Pfiesteria* and *Cryptosporidium*, prompted Congress to enact the Beaches Environmental Assessment and Coast Health ("BEACH") Act in 2000.[107] This Act amended Section 303 of the Clean Water Act to force states to use their water quality standards authorities under the Clean Water Act to address disease-causing organisms along the nation's coast.[108]

Under Section 303, states have primary authority to set water quality standards[109] for the waters within their borders. State water -quality standards establish the ambient water quality goals that discharge regulations are supposed to achieve for a particular water body.[110] Designated uses specify the uses that the

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[105] *Id.*

[106] Ryan Frank, *Why do Portland Water Customers Pay so Much? Because of Big, Needed Projects—and Small Ones that Some Question*, THE OREGONIAN https://www.oregonlive.com/portland/2011/01/as_big_construction_projects_d.html (last updated Jan. 16, 2011, 2:00 AM) [https://perma.cc/6GSF-Y7XX].

[107] *See generally* S. REP. NO. 106-366, at 1-2 (2000), https://www.congress.gov/106/crpt/srpt366/CRPT-106srpt366.pdf [https://perma.cc/2APD-9SWV]; *see also* BEACH Act, Pub. L. No. 106-284, § 2, 114 Stat. 870 (Oct. 10, 2000) (codified at 33 U.S.C. § 1313(i)).

[108] Pub. L. No. 106-284, § 2, 114 Stat. 870 (Oct. 10, 2000) (codified at 33 U.S.C. § 1313(i)). Under these new requirements, the EPA establishes water-quality criteria for various ocean-borne pathogens and pathogen indicators, and coastal states then adopt water-quality criteria and water-quality standards for those organisms. 33 U.S.C. § 1313(i)(1)(A). The new pathogen water-quality standards requirement applies to "coastal recreation waters," which are the Great Lakes and any "marine coastal waters (including coastal estuaries)" for which the state's designated uses include "swimming, bathing, surfing, or similar water contact activities." 33 U.S.C. § 1362(21)(A). Thus, application of this requirement depends on the state's designation of uses for its coastal waters.

[109] According to the current Act, "a water quality standard shall consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses. Such standards shall be such as to protect the public health or welfare, enhance the quality of water and serve the purposes of this chapter. Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and also taking into consideration their use and value for navigation." 33 U.S.C. § 1313(c)(2)(A).

[110] For example, California's Water Quality Control System notes that "Water Quality Control Plans establish water quality standards—beneficial uses and water quality objectives—for particular bodies of water and their tributaries." STATE WATER RES. CONTROL BD., CAL. ENV'T PROT. AGENCY, A COMPILATION OF WATER QUALITY GOALS: SELECTING WATER QUALITY GOALS 2, 15 (17th ed. 2016), https://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/docs/wq_goals_text.pdf [https://perma.cc/S277-DTN9]

state wants the body of water to be able to support; water quality criteria specify the levels of water quality necessary to support those designated uses.[111]

The BEACH Act ensured that coastal states' water quality standards addressed water-borne diseases.[112] Specifically, the BEACH Act required that:

> Not later than 42 months after the date of the enactment of this subsection, each State having coastal recreation waters shall adopt and submit to the Administrator water quality criteria and standards for the coastal recreation waters of the State for those pathogens and pathogen indicators for which the Administrator has published criteria under section 304(a).[113]

The amendments define "coastal recreation waters" to be "marine coastal waters . . .that are designated under section 303(c) by a State for use of swimming, bathing, surfing, or similar water contact activities."[114] The Act also provided funding to states for water quality monitoring and for posting signs at beaches where water quality poses a threat to public health.[115]

These pathogen water quality standards can, in turn, affect coastal stormwater and sewage treatment NPDES permits. In a typical NPDES permit, technology-based effluent limitations dictate the majority of the discharge requirements for point sources.[116] However, if the discharge "would interfere with the attainment or maintenance of that water quality in a specific portion of the navigable waters which shall assure protection of public health, public water supplies, agricultural and industrial

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[111] 40 C.F.R. § 131.12(a)(3) (for example, under these provisions and state requirements, California has prohibited the impairment of the natural water quality of thirty-four coastal Areas of Special Biological Significance).

[112] BEACH Act, *supra* note 107.

[113] Beaches Environmental Assessment and Coastal Health Act of 2000, Pub. L. No. 106-284, § 2, 114 Stat. 870 (2000).

[114] 33 U.S.C. § 1362(21)(A)(ii).

[115] *See About the BEACH Act*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/beach-tech/about-beach-act (last viewed May 20, 2022) [https://perma.cc/G3MK-D35X]. *See also Beach Grants*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/beach-tech/beach-grants (last viewed May 20, 2022) [https://perma.cc/6ESM-6SQY].

[116] *See generally Permit Limits – TBELs and WQBELs*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/npdes/permit-limits-tbels-and-wqbels (last viewed May 20, 2022) [https://perma.cc/4A5V-24JG].

uses, and the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water," the NPDES permit must include more stringent water quality-based effluent limitations ("WQBEL") to ensure that these uses are protected.[117] For the ocean, these Section 302 WQBELs are primarily a coastal protection, because they apply only when point source discharges interfere with the water quality of the *navigable waters*.[118] Therefore, the Section 302 requirement applies to point source discharges into inland waters and the territorial sea, but *not* to discharges into the contiguous zone or the ocean.

The BEACH Act and water quality standards have helped in many instances to improve coastal water quality and protect swimmers. For example, in September 2009, the EPA denied Section 301(h) waiver renewal applications for two POTWs in Guam because discharges pursuant to the waiver would not comply with Guam's water quality standards for bacteria.[119] Notably, the EPA's August 2021 report on the 2020 swimming season indicates that most point sources of concern for beach health are under fairly good control: CSO events were responsible for only 1 percent of beach closures and advisories, POTWs and sanitary sewer overflows for 2 percent, and sewer line leaks and septic systems for 3 percent each.[120] Nevertheless, the discussion above makes clear that the BEACH Act has failed to protect coastal swimmers from pathogen-laced pollution. Dry weather runoff and stormwater runoff remain responsible for 5 percent and 23 percent of beach advisories and closures respectively, while the sources of contamination of almost half of those closures are unknown[121]—meaning that the Clean Water Act fails to meaningfully address more than three-quarters of health-threatening pollution at the nation's beaches.

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[117] *See* 33 U.S.C. § 1312(a).

[118] *Id.*

[119] *Fact Sheet on EPA's Decision on the Application for Renewal of a CWA 301(h) Variance for the Northern District Sewage Treatment Plant*, U.S. Env't. Prot. Agency (Sept. 30, 2009), https://www.epa.gov/sites/default/files/2017-09/documents/gu0020141-gwa-northern-district-stp-factsheet-2009-09-30.pdf [https://perma.cc/FM34-UM82].

[120] Off. of Water, *EPA's Beach Report: 2020 Swimming Season* Chart at 3, U.S. ENV'T PROT. AGENCY (Aug. 2021), https://www.epa.gov/system/files/documents/2021-08/beach-swimming-season-report-2020.pdf [https://perma.cc/3BFX-WAJF].

[121] *Id.*

III. WATER QUALITY CRITERIA, OCEAN ACIDIFICATION, AND CLIMATE CHANGE

Climate change poses a challenge for the Clean Water Act generally—but that challenge is significantly increased in the ocean.[122] Climate change has a number of impacts on water, but for most waters subject to the Clean Water Act—fresh and salt—a critical impact is rising temperature.[123] In the ocean, however, heat combines with ocean acidification to alter many of the basic parameters of water quality.[124] The ocean thus provides a particularly acute example of how the Clean Water Act's most basic water quality measures—water quality standards—are not up to the challenges that the ocean faces in the 21st century.

A. Climate Change and Warming Waters

Salmon and trout are iconic species in the Pacific Northwest (Oregon, Washington, Idaho, and parts of Montana and California).[125] As anadromous fish, they begin life in freshwater, migrate out to sea, and then return to freshwater to spawn.[126] Many salmon species and runs have been in decline for several decades for several reasons, not the least of which are the large hydroelectric dams that interrupt major salmon rivers at regular intervals.[127] However, salmon species are cold-water fish, preferring water temperatures even in August (traditionally the warmest month) of between ten degrees Celsius (10°C) and 15°C.[128] Even before climate change, dams warmed salmon streams and rivers to close to these species' tolerance.[129]

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[122] *How is Climate Change Affecting the Ocean?*, MONTEREY BAY AQUARIUM, https://www.montereybayaquarium.org/act-for-the-ocean/climate-change/the-challenge#:~:text=in (last viewed Apr. 15, 2022) [https://perma.cc/4T9F-55HW].

[123] *Climate Change Indicators: Oceans*, ENV'T PROT. AGENCY (May 12, 2021), https://www.epa.gov/climate-indicators/oceans#:~:text=As [https://perma.cc/WCR3-JKDA].

[124] *Ocean Acidification*, SMITHSONIAN (Apr. 2018), https://ocean.si.edu/ocean-life/invertebrates/ocean-acidification [https://perma.cc/2C3R-2PKY].

[125] *Salmon 101: Understanding the Lifeblood of the Pacific Northwest*, OR. WILD (Sept. 1, 2021, 7:46 PM), https://www.oregonwild.org/about/blog/salmon-101-understanding-lifeblood-pacific-northwest [https://perma.cc/L3H2-M5ZR].

[126] Michael H. Schiewe, *Salmon*, SCIENCEDIRECT (2013), https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/anadromous-fish [https://perma.cc/F9QU-95PS].

[127] NATIONAL RESEARCH COUNCIL, MANAGING THE COLUMBIA RIVER: INSTREAM FLOWS, WATER WITHDRAWALS, AND SALMON SURVIVAL 1 (2004).

[128] *Id.* at 64.

[129] *Id.* at 63–64.

Climate change will make life more difficult for the salmon.[130] Indeed, increasing temperatures have already been detected in the Pacific Northwest.[131] Climate change may deliver the death blow—at least in some streams—because spring run Chinook salmon begin to die when water temperatures hit 20°C (68 degrees Fahrenheit (68°F)) and die out completely when weekly average water temperatures reach 72°F.[132]

Heat from climate change is also a problem for the ocean proper.[133] The ocean absorbs much of the excess heat that global warming is producing,[134] significantly reducing the impacts of climate change for those of us who live on land.[135] Indeed, according to the IUCN, without the ocean, the planet would have already experienced global average warming of 36°C instead of the roughly 1°C it currently endures.[136] However, that heat is instead warming the ocean.[137] In 2019, the IPCC concluded that: (1) the ocean has experienced continuous and unabated warming since 1970; (2) the ocean has absorbed more than 90 percent of anthropogenically induced heat in the climate system; (3) the rate of ocean warming has more than doubled since 1993; (4) ocean warming now reaches to depths over more than 2000 meters; and (5) marine heatwaves have doubled in frequency and increased in intensity since 1982.[138]

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[130] James Battin et al., *Projected Impacts of Climate Change on Salmon Habitat Restoration*, PROC. NAT'L ACAD. SCI. ("PNAS") (Apr. 17, 2007), https://www.pnas.org/doi/10.1073/pnas.0701685104 [https://perma.cc/V5N5-RQME].

[131] NATIONAL RESEARCH COUNCIL, *supra* note 127, at 65.

[132] *Id.* at 97–98.

[133] Luann Dahlman & Rebecca Lindsey, *Climate Change: Ocean Heat Content*, CLIMATE.GOV (Jan. 12, 2022), https://www.climate.gov/news-features/understanding-climate/climate-change-ocean-heat-content [https://perma.cc/BX4B-53UJ].

[134] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SPECIAL REPORT ON THE OCEAN AND CRYOSPHERE IN A CHANGING CLIMATE REPORT 335 (2019) [hereinafter 2019 IPCC OCEAN & CRYOSPHERE REPORT].

[135] *Ocean Warming*, INT'L UNION FOR CONSERVATION OF NATURE, https://www.iucn.org/resources/issues-briefs/ocean-warming (last viewed Apr. 15, 2022) [https://perma.cc/C9DA-UX2F].

[136] *Issues Brief: Ocean Warming*, INT'L UNION FOR THE CONSERVATION OF NATURE ("IUCN") at 1 (Nov. 2017), https://www.iucn.org/sites/dev/files/ocean_warming_issues_brief_final.pdf [https://perma.cc/GQ4M-VRW8].

[137] 2019 IPCC OCEAN & CRYOSPHERE REPORT, *supra* note 134, at 9. According to the IUCN, "[m]ore than 93% of the enhanced heating since the 1970s due to the greenhouse effect and other human activities has been absorbed by the ocean, even affecting the deep ocean." D. LAFFOLEY & J.M. BAXTER, EDS., EXPLAINING OCEAN WARMING: CAUSES, SCALE, EFFECTS, AND CONSEQUENCES 17 (International Union for the Conservation of Nature 2016), https://portals.iucn.org/library/node/46254 [https://perma.cc/EML9-E7G7].

[138] LAFFOLEY & BAXTER, *supra* note 137.

As with salmon's freshwater habitat, warming oceans disturb marine ecosystems—with impacts on humans.[139] For example, the relatively gradual background pace of ocean warming affects marine fisheries, particularly in connection with existing overfishing, and this synergy is already creating global climate change winners and (mostly) losers among fishing-dependent communities.[140] Ocean warming "has contributed to an overall decrease in maximum catch potential (*medium confidence*), compounding the impacts from overfishing for some fish stocks (*high confidence*)."[141] These negative impacts tend to be particularly acute in indigenous and other communities highly dependent on fish and seafood.[142]

B. Climate Change's "Evil Twin," Ocean Acidification

The ocean is the world's largest carbon sink, and absorbed carbon dioxide reacts chemically in the ocean to reduce the ocean's pH, a phenomenon known as ocean acidification.[143] According to the IPCC in 2019, "[b]y absorbing more CO_2, the ocean has undergone increasing surface acidification (*virtually certain*)."[144] It concluded that the ocean has been absorbing 20 to 30 percent of anthropogenic carbon dioxide emissions and that global ocean pH has already dropped 0.017 to 0.027 pH units—enough to exceed natural background variability in 95 percent of the ocean.[145]

The pH scale is logarithmic, so these changes mean that the ocean is now at least 30 percent more acidic than it was 200 years ago.[146] Ocean acidification is currently occurring "faster than any

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[139] *Id.* at 58.

[140] *Id.* For more comprehensive discussions of climate change winners and losers, *see generally* J.B. Ruhl, *The Political Economy of Climate Change Winners and Losers*, 97 MINN. L. REV. 206 (Nov. 2012); Robin Kundis Craig, *The Social and Cultural Aspects of Climate Change Winners*, 97 MINN. L. REV. 1416 (April 2013); Victor B. Flatt, *More than Winners and Losers: The Importance of Moving Climate and Environmental Policy Debate to a More Transparent Process*, 97 MINN. L. REV. HEADNOTES 26 (Spring 2013).

[141] 2019 IPCC OCEAN & CRYOSPHERE REPORT, *supra* note 134 at 12.

[142] *Id.* at 16.

[143] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: SYNTHESIS REPORT 41 (2014). For a more complete discussion of ocean acidification as a Clean Water Act problem, *see generally* Robin Kundis Craig, *Dealing with Ocean Acidification: The Problem, the Clean Water Act, and State and Regional Approaches*, 90 WASH. L. REV. 1583 (2015).

[144] 2019 IPCC OCEAN & CRYOSPHERE REPORT, *supra* note 134, at 9.

[145] *Id.*

[146] *What Is Ocean Acidification?*, PMEL CARBON PROGRAM, NOAA, https://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F (last viewed Apr. 15, 2022) [https://perma.cc/6NWA-EESQ].

known change in ocean chemistry in the last 50 million years."[147] Ocean acidification will likely only get worse throughout the 21st century, and "by the end of this century the surface waters of the ocean could have acidity levels nearly 150 percent higher, resulting in a pH that the oceans haven't experienced for more than fifty million years."[148]

Like ocean warming, changes in ocean pH have ecological impacts. Ocean acidification initially interferes with shell-forming in organisms such as clams, oysters, and coral reefs; even small changes in marine pH can affect these organisms.[149] Fish experience a condition known as acidosis that can directly affect their survival.[150] More ominously, the geological record suggests that the ocean is already approaching truly catastrophic acidification levels.[151] The ocean acidified rapidly after the meteor impact at the Cretaceous-Paleogene boundary 66 million years ago, helping to cause the extinction of the dinosaurs—and 75 percent of marine species—with only a 0.25 drop in marine pH.[152] "[T]he resulting ecological collapse in the oceans had long-lasting effects for global carbon cycling and climate."[153]

C. The Need for More Flexibility in the Clean Water Act's "Existing Use" Provisions

In addition to ecological problems, rising ocean temperatures and dropping ocean pH are Clean Water Act problems because they are already causing violations of water quality standards. As noted, the Clean Water Act subjects all waters, including the coastal oceans, to state water quality standards.[154] In addition to designated uses and water quality

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[147] *Ocean Acidification*, SMITHSONIAN, https://ocean.si.edu/ocean-life/invertebrates/ocean-acidification (last viewed June 14, 2022) [https://perma.cc/B754-7H9J].

[148] *What Is Ocean Acidification?*, *supra* note 146.

[149] *Id.*; *Ocean Acidification*, *supra* note 147.

[150] *Ocean Acidification*, *supra* note 147.

[151] *Id.*

[152] Damian Carrington, *Ocean Acidification can Cause Mass Extinctions, Fossils Reveal*, THE GUARDIAN (Oct. 21, 2019, 15:00 EDT), https://www.theguardian.com/environment/2019/oct/21/ocean-acidification-can-cause-mass-extinctions-fossils-reveal [https://perma.cc/KY8Y-K9K5].

[153] Michael J. Henehan et al., *Rapid Ocean Acidification and Protracted Earth System Recovery Followed the End-Cretaceous Chicxulub Impact*, 116 PROC. NAT'L ACAD. SCI. ("PNAS") 22,500, 22,500 (2019).

[154] 33 U.S.C. § 1313(a)–(c).

criteria,[155] water quality standards must also include an antidegradation policy[156]—and it is the antidegradation policy that needs a little more flexibility to allow states to respond to climate change.[157]

Under the EPA's antidegradation regulation, state water quality policies must provide four forms of "antibacksliding" protection for waters within the state.[158] First, "[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."[159] Second, "[w]here the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located."[160] Third, "[w]here high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected."[161] Finally, "[i]n those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act."[162]

Warming and acidifying oceans challenge the "existing use" provisions of the Clean Water Act's antidegradation policy.[163] These provisions require states to maintain and protect both the uses of their coastal ocean that existed in the mid-1970s, including the then-normal ecosystems, "and the level of water quality necessary to protect th[os]e existing uses. . . ."[164] However, climate

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[155] 33 U.S.C. § 1313(c)(2)(A).

[156] 33 U.S.C. § 1313(d)(4)(B).

[157] *See generally* Robin Kundis Craig, *The Clean Water Act, Climate Change, and Energy Production: A Call for Principled Flexibility Regarding "Existing Uses*," 4 GEO. WASH. J. ENERGY & ENVTL. L. 26 (2013).

[158] 40 C.F.R § 131.12.

[159] 40 C.F.R. § 131.12(a)(1).

[160] 40 C.F.R. § 131.12(a)(2).

[161] 40 C.F.R. § 131.12(a)(3).

[162] 40 C.F.R. § 131.12(a)(4).

[163] 40 C.F.R. §131.12(a)(1).

[164] 40 C.F.R. § 130.12(a)(1).

change and ocean acidification increasingly make it impossible for coastal states to maintain the species and ecosystems as they existed in the 1970s.[165] As a result, coastal states will increasingly violate the Clean Water Act's "existing use" provisions.[166] For example, the Center for Biological Diversity has brought several legal actions in Oregon and Washington alleging that ocean acidification is violating state coastal water quality standards.[167]

The EPA's regulations allow for a use attainability analysis that provides states with some flexibility to modify their water quality standards.[168] Thus, states may remove a designated use from their water quality standards if that use is not attainable because:

> (1) Naturally occurring pollutant concentrations prevent the attainment of the use; or
>
> (2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
>
> (3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
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> (4) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

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[165] Denise Chow, *Earth Day at 50*, NBC NEWS (Apr. 22, 2020), https://www.nbcnews.com/science/environment/earth-day-50-why-legacy-1970s-environmental-movement-jeopardy-n1189506 [https://perma.cc/PM8D-G82D].

[166] 40 C.F.R. § 131.12(a)(1) (2011).

[167] *Dealing with Ocean Acidification*, *supra* note 143, at 1614–1625.

[168] 40 C.F.R. § 130.3(g) (2011).

> (5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
>
> (6) Controls more stringent than those required by Sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.[169]

However, states *cannot* use an attainability analysis to eliminate *existing* uses[170]—that is, "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards."[171] The antidegradation policy, similarly, provides no avoidance mechanism for degradation that affects existing uses.[172]

As currently implemented, therefore, the Clean Water Act does not acknowledge that phenomena like climate change and ocean acidification can eliminate uses that existed in 1975 in ways that states cannot correct by better regulating water quality—or, indeed, without the entire world's cooperation in reducing anthropogenic carbon dioxide emissions. The Clean Water Act, in other words, is grounded in an assumption of ecological stationarity,[173] making it a maladaptive vehicle for coastal states that are trying to respond to increasing ocean temperatures and dropping ocean pH.[174]

IV. OCEAN DISCHARGE CRITERIA AND MARINE AQUACULTURE

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[169] 40 C.F.R. § 130.10(g).

[170] 40 C.F.R. § 130.10(g), (h).

[171] 40 C.F.R. § 130.3(e).

[172] *Compare* 40 C.F.R. § 130.12(a)(2) (allowing degradation of "Tier 2" waters on a finding an economic and development necessity) *with* 40 C.F.R. § 130.12(a)(1) (providing no exception for existing uses); *see also* Cook Inletkeeper v. U.S. EPA, 400 Fed. Appx. 239, 241 (9th Cir. 2010) (rejecting "a cursory preliminary finding that any reduction in natural water quality would be in accord with Alaska's antidegradation policy").

[173] P.C.D. Milly et al., *Stationarity Is Dead: Whither Water Management.*?, 319 SCIENCE 573, 573 (2008); Robin Kundis Craig, *"Stationarity Is Dead"—Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 15–16 (2010).

[174] *See generally* Robin Kundis Craig, *The Clean Water Act, Climate Change, and Energy Production: A Call for Principled Flexibility Regarding "Existing Uses"*, 4 GEO. WASH. J. ENERGY & ENV'T L. 26 (Spring 2013) (discussing this same problem in the context of water-related energy production).

A. The Expansion of Marine Aquaculture and the Potential Water Quality Impacts

Marine aquaculture is becoming an increasingly important part of the global food supply, including in the United States. The United Nations Food & Agriculture Organization ("FAO") maintains the most reliable and comprehensive sets of data on how the world supplies itself with aquatic food. Roughly every two years, FAO publishes a *State of the World Fisheries and Aquaculture* report.[175] According to the latest 2020 report, in 2018, the world produced (from all sources, including fishing and freshwater aquaculture) about 179 million tonnes of fish, crustaceans such as crab and lobster, molluscs such as clams and oysters, and other aquatic animals. In total, this seafood was worth $401 billion.[176] Of that total harvest, 156 million tonnes, or over 87 percent, were used for human foods.[177] Notably, aquaculture (both freshwater and marine) supplied 52 million tonnes of the total production (46 percent), $250 billion of the total value (over 62 percent), and 52 percent of the total human food.[178] Therefore, aquaculture is a critical and increasing component of the world's food security and protein supply.[179]

The same is true when looking at marine aquaculture. Wild-capture fisheries in the ocean leveled off in the late 1980s and 1990s[180] and are becoming increasingly unsustainable.[181] In contrast, marine aquaculture industries have been growing rapidly since 1986 to close the gap in global seafood demand.[182] "In 2018, shelled mollusks (17.3 million tonnes) represented 56.3 percent of the production of marine and coastal aquaculture.[183] Finfish (7.3 million tonnes) and crustaceans (5.7 million tonnes), taken together, were responsible for 42.5 percent, while the rest consisted of other aquatic animals,"[184] including sea turtles and

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[175] FAO FISHERIES AND AQUACULTURE, *State of the World Fisheries & Aquaculture*, U.N. FOOD & AGRIC. ORG. (2016), http://www.fao.org/fishery/publications/sofia/en [https://perma.cc/9XSU-Q4SC].

[176] *Id.* at 2.

[177] *Id.*

[178] *Id.*

[179] *Id.* at 24 fig. 10.

[180] *Id.* at 4 fig. 1.

[181] *Id.* at 7.

[182] *Id.* at 4 fig. 1.

[183] *Id.*

[184] *Id.* at 6, 26 & tbl. 6.

marine invertebrates such as sea cucumbers.[185] Although food-animals remain the largest sector of marine aquaculture, in 2018, the world also produced 32.4 million tons of aquacultured algae (kelp/seaweed) worth $13.3 billion.[186]

Several recent developments in federal law promote increased investment in mariculture in the United States—particularly in deeper federal waters extending more than three miles out to sea. For example, pursuant to President Trump's May 2020 Seafood Executive Order,[187] the National Oceanic and Atmospheric Administration ("NOAA") began the process of designating the nation's first Aquaculture Opportunity Areas,[188] which are essentially pre-approved areas of federal ocean waters suitable for marine aquaculture.[189] On August 20, 2020, NOAA named the federal waters off the coast of southern California and in the Gulf of Mexico as the focus of its first two Aquaculture Opportunity Areas. NOAA based these selections "on the already available spatial analysis data and current industry interest in developing sustainable aquaculture operations in the region."[190] As of January 2022, NOAA planned to start the Environmental Impact Assessment for these proposals in the spring or summer of 2022.[191]

For its part, the U.S. Army Corps has used its authorities under both Section 404 of the Clean Water Act[192] and, more

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[185] *Id.* at 21.

[186] *Id.* at 21.

[187] President Donald Trump. Promoting American Seafood Competitiveness and Economic Growth, Exec. Order 13,921, 85 Fed. Reg. 28,471 (May 12, 2020), https://www.federalregister.gov/documents/2020/05/12/2020-10315/promoting-american-seafood-competitiveness-and-economic-growth [hereinafter Seafood Executive Order].

[188] 85 Fed. Reg. at 28,474, §7. The executive order does not specifically define "Aquaculture Opportunity Area."

[189] 85 Fed. Ref. at 28,474, §7(b).

[190] *NOAA Announces Regions for First Two Aquaculture Opportunity Areas under Executive Order on Seafood,* NOAA FISHERIES (Aug. 20, 2020), https://www.fisheries.noaa.gov/feature-story/noaa-announces-regions-first-two-aquaculture-opportunity-areas-under-executive-order [https://perma.cc/WW8K-D3NJ]; *see also An Aquaculture Opportunity Area Atlas for the U.S. Gulf of Mexico*, NAT'L CTRS. FOR COASTAL OCEAN SCI., https://coastalscience.noaa.gov/data_reports/an-aquaculture-opportunity-area-atlas-for-the-u-s-gulf-of-mexico/ (last viewed Apr. 3, 2022) [https://perma.cc/VW6Y-83EX]; *An Aquaculture Opportunity Area Atlas for the Southern California Bight*, NAT'L CTRS. FOR COASTAL OCEAN SCI., https://coastalscience.noaa.gov/data_reports/an-aquaculture-opportunity-area-atlas-for-the-southern-california-bight/ (last viewed Apr. 3, 2022) [https://perma.cc/8AK7-YS4R].

[191] NAT'L OCEANIC & ATMOSPHERIC ADMIN., *Aquaculture Opportunity Area Timeline* 1 (Jan. 2022), https://media.fisheries.noaa.gov/2022-01/aoa-timeline-jan2022.pdf [https://perma.cc/4NFD-PH7V].

[192] 33 U.S.C. § 1344(a).

importantly, Section 10 of the Rivers and Harbors Act of 1899[193] to create general permits for marine aquaculture.[194] All three of the new permits emphasize that they apply only in the ocean, which the Army Corps stressed through the use of "mariculture" rather than "aquaculture."[195] The revised Nation-Wide Permit ("NWP") 48 applies to "Commercial Shellfish Mariculture Activities."[196] New NWP 55 covers "seaweed mariculture activities" but also allows for multispecies aquaculture such as combinations of seaweeds and shellfish.[197] Finally, new NWP 56 covers "finfish mariculture activities"[198] and was the most controversial of the three—as is true for finfish aquaculture generally. All three NWPs reduce the permitting time and costs for qualifying mariculture facilities.[199]

B. The Clean Water Act's Coverage of Mariculture

Section 318 of the Clean Water Act allows for special discharge requirements in NPDES permits for "approved aquaculture projects."[200] "Aquaculture" "refers to . . . the breeding, rearing, and harvesting of plants and animals in all types of water environments including ponds, rivers, lakes, and the ocean."[201] In the coastal zone, Section 318 is particularly relevant to certain kinds of mariculture projects—aquaculture projects in the ocean—that can affect coastal water quality.[202] The EPA and the states implement Section 318 through the normal NPDES permitting process, subject to the special allowances for "aquaculture projects."[203]

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[193] 33 U.S.C. § 403.

[194] 86 Fed. Reg. 2,744 (Jan. 13, 2021).

[195] 85 Fed. Reg. at 57,331.

[196] Reissuance and Modification of Nationwide Permits, 86 Fed. Reg. at 2788.

[197] *Id.*

[198] *Id.*

[199] *Id.* at 2787–88.

[200] 33 U.S.C. § 1328(a).

[201] *What Is Aquaculture?*, NAT'L OCEANIC & ATMOSPHERIC ADMIN. (Aug. 9, 2016), https://www.noaa.gov/stories/what-is-aquaculture [https://perma.cc/9RVU-VRR3].

[202] for a more complete discussion of the relationship between aquaculture, mariculture, the Clean Water Act, and coastal water quality, see generally Robin K. Craig, *The Other Side of Sustainable Aquaculture: Mariculture and Nonpoint Source Pollution*, 9 WASH. U. J.L. & POL'Y 163 (2002); Jeremy Firestone & Robert Barber, *Fish as Pollutants: Limitations of and Crosscurrents in Law, Science, Management, and Policy*, 78 WASH. L. REV. 693 (2003).

[203] *NPDES Aquaculture Permitting*, ENV'T PROT. AGENCY (Feb. 26, 2021), https://www.epa.gov/npdes/npdes-aquaculture-permitting [https://perma.cc/CT9S-LVXC].

"Aquaculture projects" subject to Section 318 are a limited category of aquaculture facility.[204] Specifically, the EPA defines an "aquaculture project" to be "a defined managed water area which uses discharges of pollutants into that designated area for the maintenance or production of harvestable freshwater, estuarine, or marine plants or animals."[205] In other words, aquaculture projects must involve some element of recycling wastes into food.[206] Moreover, in order to get the benefits of Section 318, the aquaculture "crop" must have significant commercial value, and the pollutant discharge must result in increased harvest over what would occur naturally.[207]

Because aquaculture projects involve waste recycling, however, NPDES permitting of these projects is potentially less stringent than NPDES permitting of other kinds of point source discharges, including other kinds of aquaculture.[208] Thus, for example, normal technology-based effluent limitations need not be applied to discharges into an approved "aquaculture project," "except with respect to toxic pollutants."[209] However, aquaculture projects located in the territorial sea, contiguous zone, or ocean still must comply with the ocean discharge criteria (see below).[210]

Nevertheless, aquaculture project permits are a fairly limited aspect of NPDES permitting, and the EPA has expressly concluded that fish farms and fish hatcheries are *not* aquaculture projects.[211] Instead, most aquaculture facilities are treated as "aquatic animal production facilities" ("AAPFs")[212]—that is, aquaculture facilities that do "not use discharges of wastes from a separate industrial or municipal point source for the maintenance, propagation and/or production of harvestable freshwater, marine, or estuarine organisms . . . ."[213] AAPFs are generally located near waters regulated under the Clean Water Act, but they are often treated as nonpoint sources of pollution.[214] However, when fish or

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[204] Aquaculture Projects, 40 C.F.R. § 122.25.

[205] 40 C.F.R. § 122.25(b)(1).

[206] 40 C.F.R. §§ 125.11(a)(1)(i)– (2).

[207] 40 C.F.R. § 125.11(a)(1)(i).

[208] *See generally* Criteria for Issuance of Permits to Aquaculture Projects, 40 C.F.R. §§ 125.10–125.11 (2022).

[209] 40 C.F.R. § 125.10(c).

[210] 40 C.F.R. § 125.11(c).

[211] 65 Fed. Reg. 43,586, 43,649 (July 13, 2000).

[212] 64 Fed. Reg. 46,058, 46,074 (Aug. 23, 1999).

[213] 65 Fed. Reg. 43,586, 43,649 (July 13, 2000).

[214] U.S. Pub. Int. Rsch. Grp. v. Atl. Salmon of Me., 215 F. Supp. 2d 239, 249 (D. Me. 2002).

shellfish are sufficiently concentrated, AAPFs can involve the same kind of intensive waste production as more traditional concentrated animal feeding operations involving cows, pigs, or chickens.

As a result, the EPA regulates concentrated aquatic animal production facilities ("CAAPFs") through the Section 402 NPDES permit program, much as it regulates concentrated animal feeding operations.[215] Indeed, in 2002 the EPA proposed, and in 2004 it finalized, non-numeric effluent limitation guidelines for CAAPFs, including ocean net pen facilities producing 100,000 pounds or more of aquatic animals per year.[216] Approximately 245 aquaculture facilities are subject to the CAAPF permitting requirements.[217]

C. Special Considerations for the Ocean: The Ocean Discharge Criteria

Point sources that "discharge into the territorial sea, the waters of the contiguous zone, or the oceans" must comply with the EPA-set ocean discharge criteria as part of their NPDES permit requirements.[218] Failure to comply with these criteria, or to have them addressed in an NPDES permit, is a violation of the Act.[219] The ocean discharge criteria provide a level of protection in addition to the technology- or water quality-based requirements applicable to discharges into inland waters and are intended to protect the marine environment.[220]

The Section 403(c)(1) guidelines define the allowable "degradation of waters of the territorial seas, the contiguous zone and the oceans"[221] Under the EPA's Section 403 regulations, applicants for NPDES permits who propose to discharge into

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[215] 64 Fed. Reg. 46,058, 46,075 (Aug. 23, 1999). The criteria for CAAPFs are codified at 40 C.F.R. § 122.24 and Appendix C. *See also U.S. Pub. Int. Rsch. Grp.*, 215 F. Supp. 2d at 246–57 (concluding that offshore salmon farms using net pens were point sources and CAAPFs subject to the standard NPDES permit requirement).

[216] 67 Fed. Reg. 57,872, 57,872 (proposed Sept. 12, 2002); 69 Fed. Reg. 51,892, 51,892, 51,910 (Aug. 23, 2004).

[217] *NPDES Aquaculture Permitting*, ENV'T PROT. AGENCY (Feb. 26, 2021), https://www.epa.gov/npdes/npdes-aquaculture-permitting [https://perma.cc/CT9S-LVXC].

[218] 33 U.S.C. § 1343.

[219] *See generally* Adams v. U.S. Envtl. Prot. Agency, 38 F.3d 43 (1st Cir. 1994) (addressing the ocean discharge criteria requirement).

[220] *Clean Water Act Section 403: Ocean Discharge Criteria*, ENV'T PROT. AGENCY (Mar. 2, 2021), https://www.epa.gov/cwa-404/clean-water-act-section-403-ocean-discharge-criteria [https://perma.cc/FYY9-HT4P].

[221] 33 U.S.C. § 1343(c)(1).

coastal or ocean waters must submit complete chemical, biochemical, and ecological analyses of their proposed discharges.[222] Based on these analyses, the EPA then determines whether the discharge will result in an "unreasonable degradation of the marine environment."[223] The EPA assesses "unreasonable degradation of the marine environment" using ten factors.[224] However, if a pollutant discharge complies with the applicable state water quality standards, the EPA will presume no unreasonable degradation of the marine environment "for any specific pollutants or conditions specified . . . in the standard."[225] Conversely, if the discharge will unreasonably degrade the marine environment despite all possible conditions that could be imposed, the NPDES permit application must be denied.[226] Moreover, no NPDES permit for discharges into the territorial sea, the contiguous zone, or the ocean can be issued "where insufficient information exists on any proposed discharge to make a reasonable judgment on any of the guidelines . . . ."[227]

More than 300 facilities, 2,500 oil and gas exploration and production platforms, and 300 seafood processing facilities have been subject to the ocean discharge criteria.[228] For the most part, however, marine aquaculture facilities have tended to escape evaluation under the ocean discharge criteria.[229] Nevertheless, recently the EPA has been taking a closer look. For example, in September 2020, the EPA released its final Ocean Discharge Criteria Evaluation for the Ocean Era net pen finfish aquaculture facility in the federal waters of the Gulf of Mexico, about 45 miles

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[222] 33 U.S.C. § 125.124 (providing that the submission must include an "[a]nalysis of the location where pollutants are sought to be discharged, including the biological community and the physical description of the discharge facility" and an "[e]valuation of the available alternatives to the discharge. . .").

[223] "Unreasonable degradation" includes: (1) "Significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within the area of discharge and surrounding biological communities"; (2) "Threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms"; or (3) "Loss of esthetic, recreational, scientific or economic values which is unreasonable in relation to the benefit derived from the discharge." 33 U.S.C. § 125.123(a), (b), (c), (e).

[224] 33 U.S.C. § 125.122(a).

[225] 33 U.S.C. § 125.122(b).

[226] 33 U.S.C. § 125.123(b).

[227] 33 U.S.C. § 1343(c)(2); 40 C.F.R. § 122.4(h).

[228] 33 U.S.C. § 1343(c)(2); 40 C.F.R. § 122.4(h).

[229] ENV'T L. INST., Emmett Environmental Law & Policy Clinic at Harvard Law School, & The Ocean Foundation, *Fact Sheet: Offshore Aquaculture Regulation Under the Clean Water Act* 2 (2012), https://www.eli.org/sites/default/files/eli-pubs/aquaculture-cwa-factsheet.pdf [https://perma.cc/U8A5-VXN6].

southwest of Sarasota, Florida.[230] "The materials to be discharged under NPDES permit to the Gulf from the proposed project will consist of uneaten fish food pellets and fish wastes."[231] The application of the ocean discharge criteria resulted in several additional limitations in the facility's NPDES permit. For example, the "permit prohibits the discharge of unpelletized wet feeds,"[232] and "[a] discharge limitation will be placed in the NPDES permit to state that fish food and metabolic wastes discharged from the facility shall not cause unreasonable degradation of the environment beneath the facility and/or the surrounding area . . . ."[233]

Nevertheless, the EPA published the existing ocean discharge criteria on October 3, 1980,[234] and has not updated them since. The expansion of a wide variety of types of marine aquaculture in the United States warrants an updated look at these criteria. As the Environmental Law Institute recognized:

> While Section 403 of the CWA directs EPA to prevent undue degradation of ocean waters, the current Ocean Discharge Criteria used to achieve this mandate do not identify the information needed for EPA or the public to determine whether offshore aquaculture meets that standard. Nor does EPA provide specific guidance on how the agency will determine when degradation may be "unreasonable." As a result, the current Criteria are of limited use in developing the information required to understand pollutant discharges from aquaculture facilities and their impacts on the marine environment.[235]

In addition, the revised criteria should distinguish what kinds of aquaculture warrant what levels of concern. For example, aquaculture of native species of kelp and shellfish might help

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[230] U.S. ENV'T PROT. AGENCY, FINAL OCEAN DISCHARGE CRITERIA EVALUATION: OCEAN ERA, INC.—VELELLA EPSILON NET PEN AQUACULTURE FACILITY, NPDES PERMIT NUMBER FL0A00001, at 7 (Sept. 30, 2020), https://yosemite.epa.gov/OA/EAB_WEB_Docket.nsf/Attachments%20By%20ParentFilingId/F54B80B0C022FDB38525864500494A3E/$FILE/Attachment%2018%20-%20Ocean%20Discharge%20Criteria%20Evaluation.pdf.

[231] *Id.* at 13.

[232] *Id.*

[233] *Id.* at 15.

[234] Ocean Discharge Criteria, 40 C.F.R. §§ 125.120–.124.

[235] ENV'T L. INST., *supra* note 229.

water quality, while fed finfish aquaculture of non-native species warrants more regulatory attention.[236]

V. NUTRIENT POLLUTION AND MARINE DEAD ZONES

A. Nutrient Pollution, HABs, and Ocean Dead Zones

Land-based nutrient pollution is a problem for many parts of the ocean. As NASA has noted,

> [t]he flow of nutrients into coastal waters from land-based sources has seen a worldwide increase over the last decades. The resulting change in water quality has many potential impacts on coastal and marine ecosystems. Phosphorus and nitrogen contribute to enhanced algae growth, and subsequent decomposition reduces oxygen availability to benthic sea creatures like fish, shellfish, and crustaceans. Changes to nutrient loadings can also change the phytoplankton species composition and diversity. In extreme cases, eutrophication can lead to hypoxia—oxygen-depleted "dead zones"—and harmful algal blooms.[237]

Most of this nutrient pollution comes from agriculture, and just as fertilizers on land promote the growth of plant crops, they also promote the growth of marine plants, especially microscopic plants known as phytoplankton.[238] The resulting "blooms" of phytoplankton threaten both the ocean's and humans' well-being in several ways.

As one example, major toxin-producing harmful algal blooms ("HABs")—some of which are known as "red tides" and most of which cause fish and shellfish advisories and occasional

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[236] Robin Kundis Craig, *Promoting "Climate Change Plus" Industries Through the Administrative State: The Case of Marine Aquaculture*, 39 YALE J. REG. 749, 527-28, 529, 530-312 (2022).

[237] *Indicators of Coastal Water Quality*, NASA SOCIOECONOMIC DATA & APPLICATIONS CTR., https://sedac.ciesin.columbia.edu/data/collection/icwq (last viewed Apr. 2, 2022) [https://perma.cc/FR56-ELL5].

[238] *Recent Trends: National Changes*, WOODS HOLE OCEANOGRAPHIC INST., https://hab.whoi.edu/maps/regions-us-distribution/regions-us-recent-trends/ (last viewed Apr. 3, 2022) [https://perma.cc/ZZ8X-ZNA7].

human poisoning[239]—occur along all coasts of the United States.[240] A HAB is a bloom of a species of algae phytoplankton that is harmful in some way.[241] With respect to human health, the most important HABs are those that "produce toxins that can kill fish, mammals and birds, and may cause human illness or even death in extreme cases."[242] For example, sea lions in California have died when blooms of certain marine algae produce domoic acid.[243] Public health officials most commonly recognize five HAB-related human illnesses,[244] caused when humans eat contaminated seafood (generally shellfish) and are poisoned by the accumulated toxins.[245] According to the Woods Hole Oceanographic Institute:

> Coastal waters of the United States are subject to most of the major HAB poisoning syndromes and impacts. These include paralytic shellfish poisoning (PSP), neurotoxic shellfish poisoning (NSP), amnesic shellfish poisoning (ASP), ciguatera fish poisoning (CFP), brown tides (BT), cyanoHABs and several other HAB phenomena such as fish kills, loss of submerged vegetation, shellfish mortalities, and widespread marine mammal mortalities.[246]

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[239] *Harmful Algae: What Are Harmful Algal Blooms?*, WOODS HOLE OCEANOGRAPHIC INST., https://hab.whoi.edu (last viewed Apr. 3, 2022) [https://perma.cc/PW5D-HVYV].

[240] *Harmful Algae: Distribution of HABs in the U.S.*, WOODS HOLE OCEANOGRAPHIC INST., https://hab.whoi.edu/maps/regions-us-distribution/ (last viewed Apr. 3, 2022) [https://perma.cc/TJR7-H6WH].

[241] *What is a Harmful Algal Bloom?*, NOAA, https://www.noaa.gov/what-is-harmful-algal-bloom (last updated Apr. 27, 2016) [https://perma.cc/Z7KV-GQXA].

[242] *Id.*

[243] *The Rising Tide of Ocean Plagues: How Humans are Changing the Dynamics of Disease,* EUREKALERT (Feb. 17, 2006), http://www.eurekalert.org/pub_releases/2006-02/s-trt021206.php [https://perma.cc/Z6T3-Z2WK].

[244] Lynn M. Grattan, Sailor Holobaugh, & J. Glenn Morris Jr., *Harmful algal blooms and public health*, 57 HARMFUL ALGAE 2, 3 (2016).

[245] Donald M. Anderson et al., *Marine harmful algal blooms (HABs) in the United States: History, current status and future trends*, 102 HARMFUL ALGAE 101975, at 3 (2021), https://doi.org/10.1016/j.hal.2021.101975 ("The resulting human poisoning syndromes linked to consumption of shellfish have been given the names paralytic, diarrhetic, neurotoxic, amnesic, and azaspiracid shellfish poisoning (PSP, DSP, NSP, ASP, AZP) to describe primary symptoms or the toxins involved. Except for ASP, all are caused by biotoxins synthesized by dinoflagellates; the ASP toxin, domoic acid, is produced predominantly by diatoms within the genus *Pseudo-nitzschia*.").

[246] *Id.*; *see also Recent Trends: National Changes*, WOODS HOLE OCEANOGRAPHIC INST., https://hab.whoi.edu/maps/regions-us-distribution/regions-us-recent-trends/ (last viewed Apr. 3, 2022) [https://perma.cc/AB4B-X2MH] (noting that "[w]hereas 30 years ago the problem was scattered and sporadic, today virtually every state is threatened by harmful or toxic algal species. Few would disagree that the number of harmful blooms, their

While marine pollution is not the sole cause of HABs, many types of HABs have been linked to nutrient pollution, especially land-based agricultural runoff.[247] Moreover, as climate change warms many coastal waters, certain kinds of HABs increase.[248]

Oceanic algal blooms also contribute to hypoxic zones, or "dead zones."[249] As the blooms die off, their decomposition consumes all the oxygen in the water column, leading to hypoxic (low-oxygen) conditions that make large areas of the ocean uninhabitable for marine animals.[250] In the United States, the largest of these so-called "dead zones" occurs seasonally in the northern Gulf of Mexico at the mouth of the Mississippi River and can reach the size of Massachusetts or New Jersey—over 7000 square miles.[251] Dead zones are now common throughout the world's coastal regions.[252] The number of dead zones in the world's seas—including around the United States—has doubled every decade since 1960 as a result of increasing marine pollution, and a 2008 study identified more than 400 dead zones throughout the world.[253] Perhaps most disturbingly, dead zones are missing biomass compared to what would be expected, suggesting that the oxygen deprivation that algal blooms cause can have long-term effects on the region's biodiversity and productivity.[254]

B. Nonpoint Source Nutrient Pollution

The EPA notes that "[h]armful algal blooms are a major environmental problem in all fifty states. Red tides, blue-green algae, and cyanobacteria are examples of harmful algal blooms

economic impacts, the resources affected, and the number of toxins and toxic species have all increased dramatically in recent years in the U.S. and around the world.").

[247] Hans W. Pearl & Jef Huisman, *Blooms Like It Hot*, 320 SCI. 57, 57 (2008); Ahmet E. Kideys, *Fall and Rise of the Black Sea Ecosystem*, 297 SCI. 1482, 1482 (2002); Elizabeth Culotta, *Red Menace in the World's Oceans*, 257 SCI. 1476, 1476 (1992).

[248] Pearl & Huisman, *supra* note 247, at 57–58.

[249] *The Effects: Dead Zones and Harmful Algal Bloom,* ENV'T PROT. AGENCY (Jan. 31, 2022), https://www.epa.gov/nutrientpollution/effects-dead-zones-and-harmful-algal-blooms [https://perma.cc/3R5T-WLWU].

[250] *Id.*

[251] *See* Jennifer Vargas, *Gulf Wildlife 'Dead Zone' Keeps Growing*, DISCOVERY NEWS (May 7, 2010), http://news.discovery.com/animals/gulf-dead-zone-oil-spill.html.

[252] *See* Robert J. Diaz & Rutger Rosenberg, *Spreading Dead Zones and Consequences for Marine Ecosystems,* 321 SCI. 926, 926 (Aug. 15, 2008) ("[D]ead zones have developed in continental seas, such as the Baltic, Kattegat, Black Sea, Gulf of Mexico, and East China Sea, all of which are major fishery areas.").

[253] *Id.* at 926, 928.

[254] *Id.* at 927.

that can have severe impacts on human health, aquatic ecosystems, and the economy."[255] Some of the "increase" in U.S. HABs results from better monitoring by volunteers, but nutrient pollution remains a consistent factor in the increasing number and expanding locations of HAB events,[256] particularly "in certain estuaries, embayments, and sounds. The emerging cyanobacterial problem in the freshwater-to-marine continuum is one example of nutrient pollution-driven enhancement of HAB incidence."[257]

Notably, 78 percent of the United States' continental coastal waters have experienced overgrowth of algae as a result of nutrient pollution.[258] Aquatic nutrient pollution in the United States comes from many sources, including "fertilizer, animal manure, sewage treatment plant discharge, detergents, stormwater runoff, cars, power plants, failing septic tanks, and pet waste.[259] In the Mississippi River Basin, which spans 31 states and ultimately drains into the Gulf of Mexico, nutrients from row crops, large farms, and concentrated animal feeding operations contribute the most nutrient pollution."[260]

Much of the nutrient pollution, however, comes in the form of nonpoint sources. As the EPA has recognized:

> The United States has made tremendous advances in the past 25 years to clean up the aquatic environment by controlling pollution from industries and sewage treatment plants. Unfortunately, we did not do enough to control pollution from diffuse, or nonpoint sources. Today, nonpoint source (NPS) pollution remains the Nation's largest source of water quality problems . . . .[261]

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[255] *Harmful Algal Blooms*, U.S. ENV'T PROT. AGENCY (updated Dec. 19, 2019), https://www.epa.gov/nutrientpollution/harmful-algal-blooms [https://perma.cc/4NH2-P38H].

[256] *Id.* at 27–28 (emphasis added).

[257] *Id.* at 28.

[258] U.S. ENV'T PROT. AGENCY, *The Facts About Nutrient Pollution* 1 (2015), https://www.epa.gov/sites/production/files/2015-03/documents/facts_about_nutrient_pollution_what_is_hypoxia.pdf [https://perma.cc/S6PW-JWK5].

[259] *Id.*

[260] *Id.*

[261] U.S. ENV'T PROT. AGENCY, *Nonpoint Source Pollution: The Nation's Largest Water Quality Problem* 1 (Mar. 1996), https://nepis.epa.gov/Exe/ZyNET.exe/20004PZG.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1995+Thru+1999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&Int

Thus, addressing land-based nonpoint source pollution is the most significant remaining task in improving ocean water quality.

The Clean Water Act does not define "nonpoint source"; instead, by implication, the term refers to any source of water pollution that is not a point source.[262] Before 1987, states addressed nonpoint-source pollution, if at all, only through Section 208 area-wide waste-treatment management plans.[263] While designed primarily to encourage states to plan for the construction of POTWs throughout the state, these Section 208 plans were also supposed to "identify, if appropriate, agriculturally and silviculturally related nonpoint sources of pollution" and "set forth procedures and methods (including land use requirements) to the extent feasible such sources."[264]

Nevertheless, area-wide waste-treatment management plans were largely considered a failure with respect to effectively addressing nonpoint-source pollution, because Section 208 "does not . . . provide clear criteria under which EPA may determine whether a plan's provisions are adequate.[265] Consequently, the content of these plans is largely discretionary with the states," and "there is nothing in the CWA comparable to the Clean Air Act's mandate for federal implementation plans to substitute for such state failings."[266] "As if to punctuate the ineffectiveness of section 208 planning provisions, Congress ceased funding for the grants program in 1981."[267]

The ineffectiveness of Section 208 led Congress to amend the Clean Water Act in 1987, adding Section 319, which establishes the nonpoint-source management program.[268] Under

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[262] *See* 33 U.S.C. § 1288.

[263] 33 U.S.C. § 1288.

[264] 33 U.S.C. § 1288(b)(2)(F).

[265] Douglas R. Williams, *When Voluntary, Incentive-Based Controls Fail: Structuring a Regulatory Response to Agricultural Nonpoint Source Water Pollution*, 9 WASH. U. J.L. & POL'Y 21, 68-69 (2002).

[266] *Id.* at 69.

[267] *Id.* at 69–70 (citations omitted).

[268] Pub. L. No. 100-4, § 316(a), 101 Stat. 52 (Feb. 4, 1987) (codified at 33 U.S.C. § 1329).

this program, states must "identif[y] those navigable waters within the State which, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements" of the Act.[269] States are also required to identify the significant nonpoint sources contributing to the degradation of the listed waters, to describe a process for identifying best management practices and measures to control those sources, and to identify existing state and local controls on such sources.[270]

C. The Clean Water Act's Failure to Adequately Regulate Agriculture

Perpetuating the myth of the small family farm, the Clean Water Act has, since 1972, provided agriculture with several exemptions.[271] For example, the Act explicitly exempts "agricultural stormwater discharges and return flows from irrigated aquaculture" from being point sources,[272] while normal farming activities, farm stock ponds, irrigation ditches, and farms roads are exempt from the Section 404 "dredge and fill" permit program."[273] Meanwhile, water features converted to dry farmland before December 23, 1985, are often exempt from regulation as "prior converted cropland."[274]

Both the EPA and the states have increasingly recognized the importance of agricultural nutrient pollution, and many states have already enacted laws and regulatory programs to address this problem.[275] Similarly, the EPA has used its Clean Water Act's

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[269] 33 U.S.C. § 1329(a)(1)(A).

[270] 33 U.S.C. § 1329(a)(1)(B)–(D).

[271] Robert W. Adler, *Agriculture and Water Quality: A Climate-Integrated Perspective*, 37 VT. L. REV. 847, 850–52 (2013); J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law*, 27 ECOL. L.Q. 263, 265–69 293–305 (2000).

[272] 33 U.S.C. § 1362(14).

[273] 33 U.S.C. § 1344(f)(1).

[274] CONG. RSCH. SERV., *Prior Converted Cropland Under the Clean Water Act* 1–2 (Mar. 14, 2019); U.S. Army Corps of Eng'rs, *Regulatory Guidance Letter 90-07*, at 2–3 (Sept. 26, 1990), https://www.nap.usace.army.mil/Portals/39/docs/regulatory/rgls/rgl90-07.pdf [https://perma.cc/ABC6-PTNU]; *see generally* Roger A. McEowen, *The Prior Converted Cropland Exemption from Clean Water Act Jurisdiction*, AGRIC. L. AND TAX'N BLOG (Sept. 25, 2017), https://lawprofessors.typepad.com/agriculturallaw/2017/09/the-prior-converted-cropland-exception-from-clean-water-act-jurisdiction.html [https://perma.cc/CC2S-WWJG].

[275] Robin Kundis Craig & Terry Schley Noto, *State Nonpoint Source Pollution Control Programs for Agricultural Certainty* 128–29 ENV'T DEF. FUND 2012 (on file with authors).

Total Maximum Daily Load ("TMDL") authorities[276] to create new tools to connect agricultural water pollution—including nutrient pollution—to larger water quality goals. For example, in December 2010, the EPA established the Chesapeake Bay Regional TMDL,[277] directly seeking to improve coastal water quality. This TMDL imposed regional limits on nutrient (nitrogen and phosphorus) and sediment pollution, allocated among ninety-two segments of the tidally-influenced portion of the Chesapeake Bay watershed, affecting water quality programs in Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and the District of Columbia.[278] More recently, the EPA has renewed its interest in water quality trading, which is similarly focused on nutrient pollution from agriculture.[279] In 2019 and 2020, the EPA released a number of new documents to encourage water quality trading[280]—including new partnerships with the U.S. Department of Agriculture specifically aimed at nutrient pollution.[281]

Nevertheless, trading programs are voluntary and most agriculture continues to benefit from the Clean Water Act's exemptions.[282] However, the small family farm is, for the most part, a myth; moreover, regulations could easily protect the few remaining small family farms that exist.[283] Instead, as the U.S. Department of Agriculture recognizes, "Agricultural production in the 21st century . . . is concentrated on a smaller number of large, specialized farms in rural areas where less than a fourth of the U.S. population lives."[284] Thus, agriculture has largely become an industry like any other—and one whose water pollution should be subject to regulation.

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[276] 33 U.S.C. § 1313(d).

[277] Clean Water Act Section 303(d): Notice for the Establishment of the Total Maximum Daily Load (TMDL) for the Chesapeake Bay, 76 Fed. Reg. 549 (Jan. 5, 2011).

[278] *Id.* at 549–50.

[279] *See* EPA, WATER QUALITY TRADING TOOLKIT FOR PERMIT WRITERS B-4 (2005).

[280] *E.g.*, *Updating the Environmental Protection Agency's (EPA) Water Quality Trading Policy to Promote Market-Based Mechanisms for Improving Water Quality*, Memorandum from David P. Ross, Assistant Adm'r, EPA, to Reg'l Administrators (Feb. 6, 2019) https://www.epa.gov/sites/default/files/2019-02/documents/trading-policy-memo-2019.pdf [https://perma.cc/R7UV-QF4C].

[281] OFF. OF WATER, ENV'T PROT. AGENCY, *Next Steps in EPA's Nutrient Engagement* 1 (2019), https://www.epa.gov/sites/default/files/2019-02/documents/next-steps-epa-nutrient-engagement-2019.pdf [https://perma.cc/A9ZN-F3UZ].

[282] Ruhl, *supra* note 271, at 367.

[283] *Id.* at 332–333.

[284] ECON. RSCH. SERV., USDA, *Farming and Farm Income*, https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/farming-and-farm-income/ (last updated May 10, 2021) [https://perma.cc/8WNL-EHQR?type=image]

CONCLUSION

Since the 1972 amendments to the Federal Water Pollution Control Act, the Clean Water Act has made substantial progress in both supplying the nation with sewage treatment and reducing pollution from industrial point sources. However, the holes in and exemptions from federal regulation that have been part of the Act since 1972—nonpoint source pollution, especially stormwater runoff, and agriculture—now represent two of the most substantial threats to ocean water quality, with direct impacts on not only coastal ecosystems but also human health.[285] At the same time, the Act needs reinvigoration to help deal with the new challenges the ocean faces—an expanding aquaculture industry whose individual facilities can have very different impacts on water quality, climate change, and ocean acidification. Both Congress and the EPA should be looking to amend and better tailor the relevant statutory and regulatory provisions so that the Clean Water Act can finally keep its promise "to restore and maintain the physical, chemical, and biological integrity" of the Nation's vast coastal and ocean waters.[286]

[285] *See* Levin Et. Al., *supra* note 86, at 1–3; *see also* NASA, *supra* note 237.
[286] 33 U.S.C. § 1251.