Tue Sep 13 08:47:45 EDT 2022
EPAExecSec <EPAExecSec@epa.gov>
FW: CBD and FOE NOI for failure to finalize vessel discharge standards
To: "CMS.OEX" <cms.oex@epa.gov>

From: Julie Teel Simmonds <jteelsimmonds@biologicaldiversity.org>
Sent: Tuesday, September 13, 2022 8:31 AM
To: Regan, Michael <Regan.Michael@epa.gov>
Cc: Miyoko Sakashita <miyoko@biologicaldiversity.org>; Deborah Ann Sivas <dsivas@stanford.edu>
Subject: CBD and FOE NOI for failure to finalize vessel discharge standards

Dear Administrator Regan,

The Center for Biological Diversity and Friends of the Earth submit the attached notice of intent to sue the EPA under the Clean Water Act. EPA has failed to finalize vessel incidental discharge national standards by the statutorily-mandated deadline of December 4, 2020. These standards are critical to preventing the introduction of harmful organisms, pathogens, and other pollutants into our nation's waters. Please do not hesitate to reach out if you have any questions or wish to discuss this matter.

Sincerely,

Julie Teel Simmonds, Senior Attorney

Center *for* Biological Diversity

Oceans Program

619-990-2999

Sent via certified mail and email

September 13, 2022

The Honorable Michael S. Regan
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20004
Regan.Michael@epa.gov

Re: Notice of Intent to Sue Under the Clean Water Act for Failure to Finalize Vessel Discharge Standards

Dear Administrator Regan:

The Center for Biological Diversity and Friends of the Earth provide you with this notice of their intent to sue you and the U.S. Environmental Protection Agency (collectively, EPA) under the Clean Water Act for EPA's failure to finalize vessel incidental discharge national standards as mandated under the Clean Water Act. 33 U.S.C. §1322(p)(4)(A)(i). Section 505(a)(2) of the Clean Water Act provides that any citizen may commence a civil action where EPA has failed to perform any non-discretionary act or duty. 33 U.S.C. § 1365(a)(2).

Pollution from vessels poses a serious threat to our nation's waters, ecosystems, economy and public health. Overwhelming scientific evidence demonstrates that ballast water discharges, to name just one source of vessel pollution, carry harmful organisms and pathogens that threaten water quality. Invasive species that spread through vessel pollution are responsible for significant ecological and economic damage. These species have devastated commercial and recreational fisheries and caused irreversible environmental harm to coastal and inland waters, including the Great Lakes, Chesapeake Bay, San Francisco Bay, Gulf of Mexico, and Columbia River. Invasive species, such as zebra and quagga mussels and round goby, have displaced native species, impaired recreational uses, fueled algal growth, transformed food webs, and clogged underwater and water supply infrastructure in the U.S., to name just a few of their damaging impacts.

Ballast water discharges also introduce novel and emergent infectious diseases into waterbodies. In the U.S., ballast water is discharged into surface waters that provide drinking water for tens of millions of Americans. In South America in the 1990s, ballast water discharges introduced a pandemic water-borne disease that killed over 10,000 people. EPA's continuing failure to set appropriate ballast water discharge standards thus poses a substantial public health threat, in addition to the more obvious environmental and economic threats from invasive species that have been widely documented.

Because low-wealth communities and communities of color are often served by substandard water and wastewater treatment systems — as we have seen in the drinking water crises in Flint, Michigan and Jackson, Mississippi — there are clear environmental justice implications to EPA's failure to implement the law. As is too often the case, the greatest risks and impacts from government inaction will fall on overburdened communities. Or to put it bluntly, those most likely to get sick or die because of EPA's failure to prevent the introduction of waterborne diseases in ballast discharges are low wealth individuals and people of color.

Standards and regulations to control water pollution from vessels are woefully overdue. Historically, EPA tried to exempt vessels from the Clean Water Act's prohibition on water pollution; however, in 2006, that approach was held unlawful. *See Nw. Envtl. Advocates v. EPA*, 2006 U.S. Dist. LEXIS 69476 (N.D. Cal. 2006); *aff'd in part, appeal dismissed in part*, *Nw. Envtl. Advocates v. EPA,* 537 F.3d 1006, 1027 (9th Cir. 2008).

In 2008, EPA issued a vessel general permit, which was the subject of litigation resulting in settlement and a commitment by EPA to develop more specific standards. In 2013, EPA issued another vessel general permit that did not protect the nation's water from the threats of ballast water discharges. *Final National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges Incidental to the Normal Operation of a Vessel,* 78 Fed. Reg. 21,938 (Apr. 12, 2013). In 2015, in response to a petition for review filed by the Center for Biological Diversity and others, the Second Circuit Court of Appeals held that the 2013 vessel general permit's standards did not meet the best available technology requirements of the Clean Water Act and remanded the permit to EPA. *Nat. Res. Def. Council v EPA,* 808 F.3d 556 (2d Cir. 2015).

On December 4, 2018, Congress passed the Vessel Incidental Discharge Act (VIDA), consolidating laws that regulated vessel discharges to prevent the introduction of harmful organisms, pathogens, and other pollutants. The law includes a nondiscretionary duty for EPA to establish vessel discharge standards, including to control ballast water pollution, by a date certain:

> Not later than 2 years after December 4, 2018, the Administrator, in concurrence with the Secretary (subject to clause (ii)), and in consultation with interested Governors (subject to clause (iii)), shall promulgate Federal standards of performance for marine pollution control devices for each type of discharge incidental to the normal operation of a vessel that is subject to regulation under this subsection.

33. U.S.C. § 1322(p)(4)(a)(i).

Therefore, national standards for incidental vessel discharges, including from ballast water, were due no later than December 4, 2020. The law further requires the Secretary of the department in which the Coast Guard is operating to issue regulations that implement the standards "as soon as practicable, but not later than 2 years, after the date on which the Administrator promulgates any new or revised standard of performance." 33 U.S.C. § 1322(p)(5). Accordingly, Congress intended to have final regulations to implement the vessel discharge standards no later than December 4, 2022.

EPA released a proposed rule under the Vessel Incidental Discharge Act that would establish national standards of performance for marine pollution control devices for vessel discharges on October 26, 2020. *Proposed Rule, Vessel Incidental Discharge National Standards of Performance*, 85 Fed. Reg. 67818 (Oct. 26, 2020). On November 25, 2020, the Center for Biological Diversity and Friends of the Earth submitted comments on the proposed rule (attached). To date, however, EPA has not finalized this rule and is in violation of the agency's non-discretionary duties.

EPA's failure to finalize standards for vessel discharges means that standards remain inadequate, and discharges continue to threaten water quality, aquatic ecosystems, and the nation's health. EPA's delay and inaction frustrates Congress' intent to control pollution from vessels in an effective and timely manner.

We are eager to address this violation and secure a firm commitment from EPA to issue a final rule promptly. If EPA does not act within 60 days to correct this violation of the Clean Water Act, however, we will pursue litigation in federal court to seek injunctive and declaratory relief regarding this violation. If you have any questions, wish to discuss this matter, or feel this notice is in error, please contact the counsel below who represent the Center for Biological Diversity and Friends of the Earth in this matter.

Sincerely,

/s/ Miyoko Sakashita

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cc: Merrick Garland, U.S. Attorney General
U.S. Department of Justice
950 Pennsylvania Ave., NW
Washington, D.C. 20530-0001

ATTACHMENT

(November 25, 2020 Comment Letter)

Center for Biological Diversity • Friends of the Earth • Wishtoyo Foundation

November 25, 2020

Submitted via regulations.gov

Oceans and Coastal Management Branch (4504T)
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20460

Re: Comments on proposed rule under the Vessel Incidental Discharge Act [Docket No. EPA-HQ-OW-2019-0482]

I. Introduction

On behalf of our millions of members and activists, the Center for Biological Diversity, Friends of the Earth, and the Wishtoyo Foundation are writing to urge you to revise the proposed rule under the Vessel Incidental Discharge Act (VIDA). This rule would expose our nation's waters to the spread of invasive aquatic species, as well as numerous additional waste streams, discharged by shipping vessels at a tremendous cost to our environment, coastlines, and endangered species.

For years, U.S. citizens have been paying the skyrocketing bill for damage to our infrastructure and local economies by invasive species—a subsidy to massive shipping corporations. Now this VIDA rule proposes to make citizens responsible for these and future costly invasions while the federal government leaves the door wide open for yet more invasive species. At a time when the nation needs more stringent federal and state protections from the spread of invasive species and water pollution, this rule would abandon the protections of the Clean Water Act and state laws. Aquatic invasive species cause $9 billion in damages annually to our infrastructure for public water supplies, industry, and energy generation systems.[1] These species have devastated commercial and recreational fisheries and caused irreversible environmental harm to coastal and inland waters, including the Great Lakes, Chesapeake Bay, San Francisco Bay, Gulf of Mexico, and the Columbia River.

The 52 billion gallons of ballast water dumped each year into U.S. waters, 28 percent of which originates outside the U.S and Canada,[2] are widely recognized as a major pathway for the introduction and spread of aquatic invasive species. For example, 55-70 percent of 180 known invasions of the Great Lakes were caused by ballast water and in western North America, 10-50 percent of over 250 known invasions were from ballast discharges.[3] Invaders such as the zebra

[1] Pimentel, D., R. Zuniga, and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics. 52: 273-288.
[2] National Academy of Sciences (2011)
[3] Endangered Species Act Section 7 Consultation, Biological and Conference Opinion on the U.S. Environmental Protection Agency's Proposed Vessel General Permit and Small Vessel General Permit,

mussel—which alone costs $6.4 billion (2010$) a year—have upended ecosystems by fueling rampant and sometimes toxic algae growth, collapsing native fisheries, and destroying recreation in the Great Lakes. Once in the U.S., these species continue to move; it took only 10 years for the zebra mussel to spread into the Mississippi, Tennessee, Hudson, and Ohio River basins and since then it has moved into California, Nevada, Colorado, and Utah.

In addition, we are extremely concerned that the proposed rule would significantly reduce enforcement over the shipping industry and its many wastewater discharges. Currently, the Vessels General Permit (VGP)[4] is the only comprehensive federal enforcement mechanism to deal with the millions of gallons of waste- and ballast water that the shipping industry discharges into our oceans, lakes, and coastal waters every year. Unfortunately, the VGP is not sufficient to address the pollution from the shipping industry despite it being better than what existed before its implementation in 2008—which was nothing.

In particular, cruise ships, which carry millions of people through North American waters each year—prior to the COVID-19 pandemic—are of special concern due to the volume of wastewater discharges and the ongoing Clean Water Act violations that the industry continues to commit. While the cruise industry continues to claim it is an environmentally sound industry by touting its voluntary environmental standards, such voluntary programs do little, if anything, to protect U.S. waters from cruise ship dumping. A cruise ship has never been penalized by its corporate owners or trade organizations for violating the self-imposed standards and there is no independent or public auditing to determine whether the cruise lines in fact follow or enforce them. And the cruise industry continues to violate the weak standards we do have in place for shipping operations. In 2016, Carnival Corporation plead guilty to deliberately dumping oil-contaminated waste into the ocean and covering it up. Illegal discharges by the company's various cruise lines resulted in seven felony charges and a $40 million penalty, the largest fine in the history of criminal cases involving deliberate vessel pollution.[5] This case is reminiscent of cases in the late 1990s when the cruise industry was exposed by the U.S. federal government for dumping oily waste and bypassing their treatment systems to save money.

Even with the VGP, the shipping industry continues to pollute and now the EPA proposes to weaken the already hard-to-enforce standards, taking us back to pre-2008 where the industry had free reign to pollute.

The proposed rule should be amended as follows:

- Remove any exemption for the discharge of ballast water pollution from the Clean Water Act.
- Upgrade the standards for ballast water to reflect Best Available Technology.
- Extend the areas where specific discharges (graywater, exhaust gas scrubber effluent and sludges) are banned and include noise and plastics in the regulated waste streams under the rule.

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pg. 228 https://www.yumpu.com/en/document/read/10155974/epas-vessel-general-permit-and-small-vessel-general

[4] https://www.epa.gov/vessels-marinas-and-ports/vessels-vgp

[5] https://foe.org/news/2016-12-princess-cruise-lines-pleads-guilty-to-dumping-oil/

- Include consultation on the rule's impact on threatened and endangered species.
- Restore the ability of states to enact and enforce their own ballast water rules to protect themselves from pollution and invasive species.
- Retain the authority of the Environmental Protection Agency to enforce Clean Water Act ballast water pollution controls and other shipping pollution waste streams (i.e. graywater, oily bilge, exhaust gas scrubber wastewater) and do not hand it over to the Coast Guard – an agency that is not equipped to assume this responsibility.
- Maintain the right of citizens to petition courts if ballast water and other shipping pollution protections are too weak or not enforced.
- Amend the rule to remedy the additional burdens placed on states in applying for No Discharge Zones.

II. Specific standards in the proposed rule must be amended

A. Ballast water & BAT

EPA should adopt the more stringent numeric standard for ballast water. In the proposed rule the EPA appears to have adopted the same numeric standard that was successfully challenged in the Vessels General Permit leaving EPA's rule subject to further challenge. In addition, EPA has allowed the Pacific Region to have a more stringent standard, this is inconsistent rationale that other regions cannot meet the stronger standard applied to the Pacific Region and the Pacific Region standards should be applied everywhere. Finally, nothing in the VIDA exempted the Great Lakes from any ballast water standard, and they must to be included—these laws are supposed to be technology forcing not allowing those antiquated vessels to continue to threaten the Great Lakes with invasive species pollution.

i. Best Available Data

The EPA deems IMO type approval test data used in the Scientific Advisory Board (SAB) process in 2010-2011 as deficient, and therefore unusable for the purpose of a Best Available Technology Economically Achievable (BAT) assessment. However, the EPA provides no evidence that quality assurance/quality control (QA/QC) was inadequate in these tests. Nor does the EPA show or even argue that the data or the data packages for the *relevant* treatment systems—the ones that demonstrated performance better than the proposed standards—have any of the alleged flaws, only that some data and data packages do.

The EPA, instead, has chosen to use US Coast Guard (USCG) type approval test data for its BAT analysis—the only test data that it considers suitable. Unfortunately, the USCG has determined that these test data contain confidential proprietary information and will not release them. Nevertheless, the EPA was able to obtain certain USCG type approval test data from the Ballast Water Equipment Manufacturers Association. These data represent only 11 of the 42 treatment systems for which the USCG has received USCG type approval test data, may not include all the valid test runs for each of the selected treatment systems, and do not include the full results for each test run. The data also do not include any information on test methods or methods of analysis, environmental data, the type of treatment system that was tested, volumes analyzed and detection limits, the completeness of presented data, and QA/QC documentation.

From the data provided it is clear that some of these 11 systems did not meet the IMO/USCG/proposed EPA standards; for others, however, without additional information it is not possible to be certain whether they met the International Maritime Organization (IMO) standards, or if they met more stringent standards.

It should be noted that the parties that selected the information to be provided to the EPA—the manufacturers of treatment systems that were designed to meet the current standards and that had been tested and approved for use in the U.S. under the current standards (a process that can take years)—likely have a significant financial interest in not having those standards change. Any change in the discharge standard would be certain to have a large impact on their businesses. If their treatment systems did not meet the new standard then any stocks they had of built treatment systems would become unsalable, a new system design would need to be developed and engineered, and they would need to begin the process of testing and certification anew (which might be necessary even if their old systems were capable of meeting the new standard). It appears at least possible, therefore, that such financial interests could have influenced the equipment manufacturers' selection of which data to provide to the EPA.

The EPA should use IMO type approval test data in its BAT analysis.[6] As expressly identified by a subset of the SAB, these IMO type approval test data evince that available ballast water management systems (BWMS) can achieve reductions beyond IMO D-2 standards. Three ex-SAB Panel members, in 2017, also published an analysis in a peer-reviewed journal that reviewed the test data for another 51 IMO type approved treatment systems, many of which had met standards much more stringent than the IMO standard including, for one organism group, up to 1,000 times more stringent than the IMO standard.[7] Hence, contemplated ballast water treatment standards should exceed IMO/USCG/EPA proposed standards, in order to be consonant with Clean Water Act directives.

ii. Aligning EPA Ballast Water Treatment Standards with International Standards

While the EPA, of course, may consider international ballast water standards as expressed in the Ballast Water Management Convention[8] and guidelines, the agency is not obligated to harmonize its own standards with international regulations. The Clean Water Act mandates that the best available technology economically achievable be employed for ballast water treatment. If the best available technology attains standards that surpass IMO D-2 standards, then dual U.S./IMO regulatory regimes could arise. Dictates under the U.S. Clean Water Act should not be

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[6] These data usually include the entire set of results for all valid test runs, often incorporating the full test reports and supporting information such as test methods, analytical methods, descriptions of the test platforms, environmental data, engineering data, testing plans, QA/QC documentation, etc., sometimes amounting to hundreds of pages of data and documentation per treatment system. As of October 2019, the IMO recognized 80 BWMS approved as capable of meeting the D–2 standard. 85 Fed. Reg. 67837 (Oct. 26, 2020).

[7] Cohen AN, Dobbs FC, Chapman PM. 2017. Revisiting the basis for US ballast water regulations. Marine Pollution Bulletin 118: 348-353; *see also* Cohen AN. 2017. An Assessment of Ballast Water Treatment to Protect Arctic Waters. A report for Friends of the Earth US. Center for Research on Aquatic Bioinvasions, Richmond, California, USA. MEPC 72/INF.7 by FOEI, 8 Jan. 2018.

[8] Of which the U.S. is not a party. 85 Fed. Reg. 67837 (Oct. 26, 2020).

disregarded in order for the EPA to align its standards with inadequate international requirements; on the contrary, international standard-setting should abide by rigorous scientific evaluation and not cede to political compromise or the pursuit of the lowest common denominator, which has characterized IMO environmental decision-making. Having dual U.S./IMO regimes on the same maritime environmental matters has occurred before (e.g., OPA 90, followed by similar subsequent MARPOL Annex I amendments) and no doubt will happen again. U.S. federal rules should not mimic international maritime environmental standards if they are insufficient—which is the case here. Finally, it is important to remember that the establishment of superior U.S. EPA ballast water standards would not necessitate the installation of two different systems on board ships, but that systems certified to meet heightened U.S. standards would therefore be capable of meeting the IMO standard as well.

B. Graywater

i. The regulation should include a discharge ban out to 3 nautical miles at a minimum

The EPA has shown that properties of graywater are comparable to raw domestic sewage and some elements in graywater had significantly higher concentrations.[9] The nutrients and contaminants in graywater can contribute negatively to ecosystems and human health and there is technology to treat it to higher standards. In addition, many larger ships are able to hold treated graywater for longer periods and should be held to a higher standard in this rule.

Specifically, cruise ships—the largest of which carry more than 8,000 passengers and crew—are floating cities that produce enormous volumes of waste. A large cruise ship on a one week voyage is estimated to generate 210,000 gallons of human sewage, 1 million gallons of gray water (water from sinks, baths, showers, laundry, and galleys), 25,000 gallons of oily bilge water, up to 11,550 gallons of sewage sludge, and more than 130 gallons of hazardous wastes.[10] Much of this waste is dumped directly into the ocean, some treated, some not.

Cruise ship graywater (wastewater from sinks, showers, galleys and laundry) contains contaminants such as detergents, cleaners, oil and grease, metals, pesticides, viruses, fecal coliform, and medical and dental waste, as well as significant concentrations of priority pollutants. EPA's Cruise Ship Discharge Assessment Report states that some cruise ships may send any of the following to the graywater system on some cruise ships *even though some of the waste streams do not fall within the definition of wastewater*: wastewater from bar and pantry sinks, salon and day spa sinks and floor drains, interior deck drains, shop sinks and deck drains in non-engine rooms (e.g., print shops, photo processing shops, dry cleaning areas, and chemical storage areas); refrigerator and air conditioner condensate; wastewater from laundry floor drains in passenger and crew laundries; dry cleaning condensate; wastewater from dishwashers, food

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[9] Environmental Protection Agency, "Graywater Discharges from Vessels" (2011), https://www3.epa.gov/npdes/pubs/vgp_graywater.pdf

[10] Cruise Ship Pollution: Background, Laws and Regulations, and Key Issues RL32450, Congressional Research Service, May 2, 2008, p. CR-2, http://cnie.org/NLE/CRSreports/08Mar/RL32450.pdf and Cruise Ship Discharge Assessment Report, U.S. Environmental Protection Agency, December 29, 2008, http://water.epa.gov/polwaste/vwd/cruise_ship_disch_assess_report.cfm

preparation, galley sinks, floor drains, and the food pulper; wastewater from garbage room floor drains and from sinks in restaurants and cafes; wastewater from whirlpools; and wastewater from medical facility sinks and medical floor drains.[11]

EPA's Cruise Ship Discharge Assessment Report also reported that sampling (by EPA and the Alaska Department of Environmental Conservation's Alaska Cruise Ship Initiative) of untreated graywater found high levels of fecal coliform, total and dissolved metals, volatile and semivolatile organics, and organics.[12] Oil and grease were found in 100 percent of EPA's samples and settleable and suspended solids were found to be substantially higher than discharge standards for land-based treated sewage.[13] Such discharges make their way back towards the shore, impacting a variety of beneficial uses including shellfish harvesting and recreation as well as the ecological uses of estuaries, shores, and bays which frequently serve as nursery habitat for a wide range of marine, estuarine, and anadromous species.

Even allowing for the discharge of *treated* graywater does little to resolve the contamination problem. The current VGP fails to address the fact that many pollutants (i.e. viruses, heavy metals and toxic chemicals) cannot be removed from graywater using either Marine Sanitation Devices or Advanced Wastewater Treatment Systems (AWTS). First, AWTS may not remove all viruses from wastewater.[14] Second AWTS do not remove all pollutants from wastewater, such as metals and other toxic chemicals. Third, it is possible for AWTS to fail when discharging near sensitive areas such as shellfish beds and coral reefs. If EPA is going to allow for the discharge of treated graywater rather than prohibiting its discharge, it must set water quality based limits for the full range of pollutants found in graywater.

With this in mind, the EPA should amend the rule to ban all discharges within 3 NM from shore for vessels (including all passenger vessels) that voyage at least 3 NM from shore and has available graywater storage capacity. For the largest passenger vessels EPA should amend the rule to ban all discharges within 12 NM from shore for vessels that voyage at least 12 NM from shore and has available graywater storage capacity.

C. Exhaust Gas Emission Control Systems

i. EPA should ban the discharge of exhaust gas emission control system washwater and sludges out to 3 nautical miles at a minimum

With the creation of the North American Emission Control Area (ECA)[15] and the implementation of worldwide cleaner fuel standards[16] a significant majority of the large cruise ship fleet and many large non-passenger vessels have chosen to install exhaust gas scrubbers to

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[11] EPA Cruise Ship Discharge Assessment Report, p. 3-2 (emphasis added).
[12] EPA Cruise Ship Report, p. 3-22 & 3-25 to 3-28.
[13] Id.
[14] Assessment of Potential Health Impacts of Virus Discharge from Cruise Ships to Shellfish Growing Areas in Puget Sound, Washington Department of Health, November 2007, p. 1.
[15] https://www.epa.gov/enforcement/marpol-annex-vi
[16] https://www.imo.org/en/MediaCentre/PressBriefings/Pages/34-IMO-2020-sulphur-limit-.aspx

comply with the IMO's mandate.[17] According to a 2019 report from the ICCT[18] approximately 80% of the scrubbers installed on vessels are open-loop scrubbers and 18% are hybrid scrubbers. These scrubbers in open-loop mode emit acidic washwater that is warmer than ambient sea water and contains heavy metals, PAHs, suspended particulate matter, and nitrates, all of which are very harmful to the marine environment.[19] While the IMO has published guidelines that contain continuous discharge limits for pH, PAH, turbidity, nitrates, and temperature for scrubber washwater, no scientific justification is given for these limits. According to a recent report by Stand.Earth, in 2019 the 30 different cruise ships that made 256 ship calls to the Victoria cruise terminal generated 8 billion gallons of toxic scrubber washwater.[20] The problems associated with scrubber discharges have led numerous ports and jurisdictions to ban the use of, or discharge from, exhaust scrubbers.[21]

While we appreciate the inclusion of specific standards for scrubber discharges into the VIDA rule we are requesting that there be a discharge ban for all vessels that travel out to 3 NM and have the holding capacity for scrubber washwater. All scrubber sludges should be landed ashore and not allowed to be discharged within the regulated waters under this rule.

III. Endangered Species Act

A. EPA must consult on the impacts of the proposed rule on threatened and endangered species

The vessel incidental discharge standards threaten species protected under the Endangered Species Act (ESA) and their critical habitat because, among other shortcomings, they are inadequate to prevent the introduction of invasive species. Because the proposed rule may affect threatened and endangered species, EPA must consult under section 7 of the Act and use its authorities to conserve listed species.

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[17] *Marine Log*; Feb. 27, 2017; "Carnival now has scrubbers installed in 60 cruise ships" http://www.marinelog.com/index.php?option=com_k2&view=item&id=25215:carnival-now-has-scrubbers-installed-in-60-cruise-ships&Itemid=257.

[18] Elise Georgeoff, Xiaoli Mao, and Bryan Comer. "A Whale of a Problem: Heavy Fuel Oil, Exhaust Gas Cleaning Systems, and British Columbia's resident killer whales." International Council on Clean Transportation. 2019. Available at https://theicct.org/sites/default/files/publications/HFO_in_killer_whale_habitat_consulting_20200413.pdf

[19] Bryan Comer, Elise Georgeff, and Liudmila Osipova. Air emissions and water pollution discharges from ships with scrubbers. International Council on Clean Transportation. Nov. 24 2020. Available at https://theicct.org/publications/air-water-pollution-scrubbers-2020

[20] https://www.stand.earth/publication/protect-arctic/canadian-shipping/covid-pandemic-results-cleaner-coast

[21] Id. at 5. *No Scrubs: More Ports Declare Ban on EGCS Discharges*, The North of England Protecting and Indemnity Association Ltd., Oct. 14, 2020, https://www.nepia.com/industry-news/no-scrubs-more-ports-declare-ban-on-egcs-discharges-update/

Section 7(a)(2) of the Endangered Species Act requires federal agencies to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the adverse modification of habitat of such species . . . determined . . . to be critical . . . ."[22] To accomplish this goal, agencies must consult with the delegated agency of the Secretary of Commerce (through the National Marine Fisheries Service) or Interior (through the U.S. Fish and Wildlife Service) whenever their actions "may affect" a listed species or its critical habitat.[23] The Services may then impose terms, conditions, and mitigation on any agency action to benefit the listed species or their habitat.

Figure 1. Marine Critical Habitats

EPA's proposed vessel discharge rule may affect numerous threatened and endangered species and their habitats. Species that may be affected include salmon, sea turtles, marine mammals, corals, abalone and seagrass.[24] Below we describe some examples of how ballast water discharges may affect protected species in various regions. The proposed rule will also affect critical habitat, of which there are more than 500,000 square miles of marine waters designated as critical habitat for ESA-listed species. Accordingly, EPA must consult on the impacts of its action of ESA listed species and their critical habitat.

i. Ballast Water Risks to Threatened & Endangered Species

Global shipping poses a significant risk to species listed as threatened or endangered under the ESA: specifically, the introduction of invasive, non-native species.[25] Invasive, non-native species are defined as those that form isolated, self-propagating populations outside their historic range

[22] 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a).
[23] *Id.*
[24] Nat'l Marine Fisheries Serv. 2013. Biological and Conference Opinion on the U.S. Environmental Protection Agency's Proposed Vessel General Permit and Small Vessel General Permit.
[25] Fey, D. et al. 2014. Herring impact report: Herring spawning areas—present and future challenges. The Coastal Union Germany; Fissel, David, William Cross & Kimberly Howland. 2012. An ecological and oceanographic assessment of the Beaufort Sea region: evaluation of the risks associated with ballast water exchange, Canadian Science Advisory Secretariat Research Document 2012/149.

and cause economic, environmental, or human harm.[26] Invasions ripple through ecosystems, affecting ecological processes (*e.g.*, competition, parasitism, trophic structure, nutrient cycling), displacing native species, and causing toxicity and disease.[27] In some cases, they may lead to native species extirpations or extinctions.[28] Because invasive species often lack effective predators, competitors, diseases, and parasites, they can quickly dominate their new environment and become firmly established.[29] Eradication efforts are costly and usually unsuccessful.[30] Prevention of new introductions thus becomes paramount.[31]

Ballast water from commercial ships is the primary vector of aquatic invasive species, accounting for a third of all documented marine invasions.[32] When taking on ballast water in port, vessels uptake entire assemblages of local organisms, from viruses and bacteria, to phytoplankton and zooplankton, to larvae, small fish, and other nekton.[33] These species are then discharged into far-flung ports, on the order of thousands per day.[34] Arthropod, mollusk, annelid, and algal invasive species proliferate along North American coasts and in the Great Lakes.[35] Such introductions have imperiled and will continue to imperil threatened and endangered species throughout U.S. waters, as discussed below.

ii. Pacific and Arctic Region (Alaska): Steller Sea Lion and Ice Seals

Climate change-induced warming in high latitude waters alongside an increase in shipping may facilitate species invasions—including invasions of harmful algal bloom (HAB) species—that threaten the endangered Steller sea lion.[36] Invasions of HAB species (largely dinoflagellates) could prove devastating to myriad marine species including invertebrates, seabirds, fish, and

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[26] Fissel 2012; Fusaro, Abigail et al., A risk assessment of potential Great Lakes aquatic invaders, NOAA Tech. Memorandum GLERL-169.
[27] Fissel 2012.
[28] Gollasch, Stephen et al.. 2020. Target species selection criteria for risk assessment based on exemptions of ballast water management requirements. Ocean & Coastal Mgmt.
[29] Fissel 2012; Fusaro.
[30] Fusaro.
[31] Id.
[32] Fissel 2012; Krantzberg, Gail. 2019. Alien invasive species impacts on large lake ecosystems and their economic value. Earth & Envt'l Sci. Res. & Reviews 2:1; Rey, Anaïs et al. 2019. Environmental DNA metabarcoding: a promising tool for ballast water monitoring, Envt'l Sci. & Tech. 53: 11,849; Rey, Anaïs, Oihane C. Basurko & Naiara Rodríguez-Ezpeleta. 2018. The challenges and promises of genetic approaches for ballast water management. J. Sea Research 133: 134.
[33] Fey 2014; Fissel 2012; Shore, Amanda & Jamie M. Caldwell. 2019, Modes of coral disease transmission: how do diseases spread between individuals and among populations, Marine Biology 166:45.
[34] Fissel 2012.
[35] Fissel 2012.
[36] *See generally* Akmajian, Adrianne M. 2016. Year-round algal toxin exposure in free-ranging sea lions: implications for trophic exposure for declining populations, Master's of Science Thesis, WWU Graduate School Collection 276; Fissel 2012.; Lefebvre, Kathi A. et al. 2016. Prevalence of algal toxins in Alaskan marine mammals foraging in a changing arctic and subarctic environment. Harmful Algae 55:13. Miller, A. Whitman & Gregory M. Ruiz. 2014. Commentary: Arctic shipping and marine invaders. Nature Climate Change 4:413.

marine mammals.[37] Exposure to HAB species may result in ataxia, seizures, reproductive failure, neurological syndromes, comas, and death.[38] Indeed, over the past 20 years, scientists have attributed more than 40% of marine mammal unusual mortality events in the contiguous 48 states to algal toxin exposure.[39]

HAB toxins already are present at waters throughout the state of Alaska at concentrations high enough to be detected in marine mammals including endangered Steller sea lions.[40] The National Marine Fisheries Service (NMFS) has recognized the threat HABs pose to this species. In the recovery plan for the western distinct population segment (DPS) of the Steller sea lion, the National Marine Fisheries Service identifies biotoxins resulting from HABs as an unusual mortality event risk warranting development of a management plan.[41] The agency also has included as a best management practice a prohibition on ballast water discharge in Steller sea lion critical habitat.[42]

Other ballast water species introductions may pose a threat to Steller sea lions as well. For example, in 1999 an invasive comb jellyfish (*Mnemiopsis leidyi*) was released into the Caspian Sea in ballast water.[43] This jellyfish's high rate of consumption of zooplankton reduced fish stocks, which in turn affected prey availability for the endangered Caspian seal (*Pusa caspica*). A similar trophic cascade could prove devastating to the Steller sea lion.

There is similar potential for impacts to threatened bearded and ringed seals from invasive species as the use of Arctic shipping routes increases.[44]

iii. Great Lakes: Entire Ecosystems at Risk

The exemption of the Great Lakes from the ballast water requirements is unacceptable given these water bodies' vulnerability to invasive species. The Great Lakes are "one of the most heavily invaded aquatic ecosystems in the world."[45] (*See* Fig. 1.) Over 180 documented invasive species have arrived in the Great Lakes, some with significant ecosystem effects.[46] Invasive species have altered nutrient and contaminant cycling, affected productivity, transformed food

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[37] Akmajian 2016); Fissel 2012; Sarkar, Santosh Kumar. 2018. Marine Algal Bloom: Characteristics, Causes and Climate Change Impacts; Silber, Gregory K. & Jeffrey D. Adams. 2019. Vessel operations in the Arctic, 2015-2017. Frontiers Marine Sci. 6:573.
[38] Lefebvre 2016.
[39] Id.
[40] Id.
[41] Nat'l Marine Fisheries Serv. 2008. Recovery Plan for the Steller Sea Lion: Eastern and Western Distinct Population Segments (*Eumetopias jubatus*) Revision. *See also* Wiles, Gary J. 2015. State of Washington: Periodic status review for the Steller sea lion (noting that the eastern DPS likewise is adversely affected by harmful algal blooms).
[42] *See* Nat'l Oceanic & Atmospheric Admin. 2017. NOAA Ship Rainier Cold Bay Project (OMAO) RA-17-04.
[43] Goodman, S. & L. Dmitrieva. 2016. Pusa caspica: the IUCN Red List of threatened species 2016.
[44] Miller 2014; Nong, D., Countryman, A. M., Warziniack, T., and Grey, E. K. 2018. Arctic sea routes: potential new pathways for nonindigenous species spread. Arctic 71:4732. d
[45] Fusaro; Krantzberg 2019.
[46] Fusaro; Krantzberg 2019.

webs, and led to reductions in native biodiversity.[47] Species invasions have led to the collapse and replacement of numerous Great Lakes fish species including the lake sturgeon (*Acipenser fulvescens*), deepwater cisco (*Coregonus johannae*), lake trout (*Salvelinus namaycush*), lake whitefish (*Coregonus clupeaformis*), blue pike (*Sander vitreus glaucus*), Atlantic salmon (*Salmo salar*), and lake herring (*Coregonus artedii*).[48]

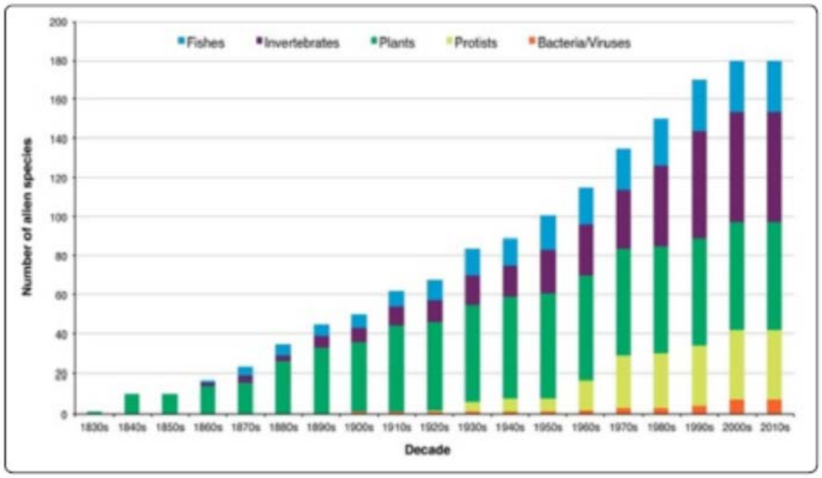

Fig. 2. Cumulative number of aquatic alien species in the Great Lakes by decade. (Figure from Krantzberg (2019).

Ballast water has caused some of the worst Great Lakes species invasions. The most notorious species introduced to the Great Lakes via ballast water was the zebra mussel (Dreissena polymorpha). First detected in Lake Erie in 1988, this mollusk has dramatically altered ecosystem function through extensive algal filtration, which decreases algal abundance and increases water clarity.[49] The highly invasive round goby (*Neogobius melanostomus*) arrived in the Great Lakes in 1990 from ballast water originating in eastern Europe.[50] The round goby directly competes with the northern madtom (*Noturus stigmosus*), a species listed as endangered under the Canada's federal Species At Risk Act (SARA), for benthic habitat space and nocturnal foraging space; it also consumes young-of-the year madtom.[51] The goby also competes for benthic habitat space with another SARA-listed species, the eastern sand darter (*Ammocrypta pellucida*).

The Great Lakes' vulnerability to invasions has led to some forward-thinking research on future impacts to the region. Fusaro *et al.* analyzed the potential for the introduction, establishment, and environmental impact of 67 species likely to invade the Great Lakes.[52] Of those species, two-thirds had some risk of introduction due to ballast water.[53] Species of highest overall risk (that is,

[47] Krantzberg 2019.
[48] Id.
[49] Id.
[50] Balasingham, Katherine D. et al. 2018. Environmental DNA detection of rare and invasive fish species in two Great Lakes tributaries, Molecular Ecology 27:112.
[51] Id.
[52] *See generally* Fusaro *et al.*
[53] Id.

a risk of introduction, establishment, and impact) that have a moderate to high likelihood of introduction via ballast water include three fish (*Alburnus alburnus*, *Perccottus glenii, Rutilus rutilus*) and four invertebrate species (*Apocorophium lacustre*, *Dikerogammarus villosus*, *Fredericella sultana*, *Obesogammarus crassus*).[54] These species would likely cause the following impacts:

Fish Species: If introduced, the common bleak (*Alburnus alburnus*) poses a significant risk to native Great Lakes species.[55] It is a superior competitor characterized by a high reproductive rate, non-specific diet, and broad thermal tolerance.[56] The species frequently outcompetes native species, leading to declines and, in some cases, extinction.[57] Hybridization with other cyprinids also is a concern, as are water quality impacts.[58]

The Chinese sleeper (*Perccottus glenii*) can threaten native species as a trophic competitor and predator.[59] It has been implicated in population declines of native species and can lead to lower fish species richness and diversity.[60] The sleeper also hosts numerous parasites and can serve as a vector of these parasite species into new environments.[61]

Introduced common roach (*Rutilus rutilus*) are known to negatively affect native species through competition.[62] They can also alter trophic dynamics by affecting avian populations (*e.g.*, it has caused declines in tufted duck (*Aythya fuligula*) populations and increased great crested grebe (*Podiceps cristatus*) populations). The roach carries parasites and negatively affects water quality.[63]

Invertebrates: While invertebrates also present a concern, less information is available on the potential environmental impacts of invasive invertebrates. The small-humped amphipod (*Dikerogammarus haemobaphes*) has outcompeted native amphipods in areas where introduced. It also is known to be a vector of gregarine parasites that infect invertebrates.[64]

Once established, the branching bryozoan (*Fredericella sultana*) effectively competes for space in high-nutrient locations.[65] The species is the most common host of the parasite *Tetracapsuloides bryosalmonae,* which causes proliferative kidney disease (PKD) in salmonid fish, an infection that can become systemic in host fishes and cause high mortality rates—up to

[54] Id.
[55] *See generally* Id.
[56] Id.
[57] Id.
[58] Id.
[59] Id.
[60] Id.
[61] Id.
[62] Id.
[63] Id.
[64] Id.
[65] Id.

100% of infected individuals.[66] Given that PKD occurs in warmer waters, climate change will increase disease prevalence.[67]

Introduction of the scud *Obesogammarus crassus* has led to reductions in native species and appears to have contributed to population extinction and community restructuring.[68]

iv. Gulf of Mexico: Pillar Coral

Ballast water may contain pathogens harmful to coral species including the threatened pillar coral (*Dendrogyra cylindrus*).[69] For example, ships entering the Gulf of Mexico have carried white plague disease and white pox disease pathogens.[70] Pillar coral are susceptible to diseases including white plague which, alongside other threats including limited sexual reproduction, asynchronous spawning, low juvenile survival rates, low recruitment, and propensity to fragmentation and bleaching, make it particularly vulnerable.[71] Other listed coral species, such as elkhorn and staghorn corals, are also vulnerable to disease and pollution from vessels.

v. Atlantic: Shortnose Sturgeon

The endangered shortnose sturgeon (*Acipenser brevirostrum*) has been impacted by invasive species introduced by ballast water, including the Asian clam (*Corbicula fluminea*).[72] This mollusk species experienced one of the most rapid expansions of any invasive species in North America and altered trophic dynamics in a way harmful to the sturgeon throughout its range along the Atlantic Coast.[73]

B. EPA must consult with the National Marine Fisheries Service and Fish and Wildlife Service to ensure that its actions do not jeopardize listed species.

In sum, there are numerous threatened and endangered species in each region that the proposed rule may affect. Consultation with the expert wildlife agencies is necessary to ensure that mitigation measures are established that ensure the conservation and recovery of listed species and avoid adverse modification of critical habitat.

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[66] Id.
[67] Id. *See also* Krantzberg 2019 (discussing the relationship between climate change and invasive species in the Great Lakes).
[68] Fusaro.
[69] Shore & Caldwell 2019.
[70] Id.
[71] Bernal-Sotelo, Katherine, Alberto Acosta & Jorge Cortés. 2019. Decadal change in the population of Dendrogyra cylindrus (Scleractina: Meandrinidae) in Old Providence and St. Catalina Islands, Colombian Caribbean, Frontiers in Marine Sci. 5:513; Meyer, Julie L. et al. 2019. Microbial community shifts associated with the ongoing stony coral tissue loss disease outbreak on the Florida Reef Tract, Preprint, available at https://www.biorxiv.org/content/10.1101/626408v1 (2019).
[72] Allen, Uma Sabapathy, CABI Invasive Species Compendium-Corbicula fluminea (Asian clam), available at https://www.cabi.org/isc/datasheet/88200..
[73] Id.

IV. The EPA must include additional waste streams and limits on pollution in its proposed rule

A. EPA must set standards to control noise emitted from vessels

EPA should set enforceable standards for vessel noise emissions. "Ships have become the most ubiquitous and pervasive source of anthropogenic noise in the oceans."[74] Shipping noise is harmful to aquatic life and wildlife habitat. Many animals depend on their acoustic environment for essential life functions such as breeding, feeding, and migrating. Vessel noise pollution masks marine mammal communication, interferes with foraging, displaces animals from preferred habitat, and increases stress and fatigue; and it adversely affects other wildlife as well.

Ship noise is a "discharge incidental to the normal operation of a vessel" and thus EPA has the authority to set standards for noise emissions. VIDA defines "discharge" to include "any spilling, leaking, pumping, pouring, emitting, emptying or dumping;" 33 USC § 1322(a)(9), and includes any "pollutant discharged from the operation of a marine propulsion system, shipboard maneuvering system, crew habitability system, or installed major equipment." 33 USC § 1322(a)(12). Noise is emitted from the propulsion system and major equipment, and thus EPA has the authority and duty to regulate it as a discharge under VIDA. While Congress specifically exempted "an air emission resulting from the operation of a vessel propulsion system, motor driven equipment, or incinerator" from the regulated discharges; it did not similarly exempt noise emissions. Under common statutory canons, since Congress knows how to exempt air emissions and did so here, thus when it chose not to exempt noise emissions it must be deliberate.

EPA should promulgate standards to control vessel noise as it implements VIDA's purpose of establishing "uniform, environmentally sound standards and requirements for the management of discharges incidental to the normal operation of a vessel."[75] The VIDA generally requires that the proposed rules shall not be less stringent than the VGP, and notably it does not preclude science-based standards to control noise emissions from vessels. To fulfill the purpose of the Clean Water Act to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters," 33 U.S.C. § 1251(a), as amended by VIDA, EPA needs to develop environmentally sound standards for noise pollution.

We urge EPA to set a numeric limit on vessel noise emissions, or in the alternative, require best management practices to avoid the harmful impacts of noise pollution on the marine environment.

a. Vessel noise harms marine mammals and impairs wildlife habitat

Anthropogenic noise pollution can mask marine mammal communications at almost all frequencies these mammals use.[76] "Masking" is a "reduction in an animal's ability to detect

[74] Erbe, C. 2019. The Effects of Ship Noise on Marine Mammals—A Review. Front. Mar. Sci., 11:6.
[75] Frank LoBiondo Coast Guard Authorization Act of 2018, Sec. 902.
[76] *See, e.g.*, John Hildebrand. 2006. Impacts of Anthropogenic Sound on Cetaceans, in Marine Mammal Research: Conservation Beyond Crisis (Reynolds, J.E. III et al., eds.); Weilgart, L.S. 2007. The Impacts

relevant sounds in the presence of other sounds."[77] Ambient ship noise can cover important frequencies these animals use for more complex communications.[78] Some species, such as the highly endangered right whale, are especially vulnerable to masking.[79] Ship noise can completely and continuously mask right whale sounds at all frequencies.[80] Masking may affect marine mammal survival and reproduction by decreasing these animals' ability to "[a]ttract mates, [d]efend territories or resources, [e]stablish social relationships, [c]oordinate feeding, [i]nteract with parents, or offspring, [and] [a]void predators or threats."[81]

In addition to masking effects, marine mammals have displayed a suite of stress-related responses from increased ambient and localized noise levels. These include "rapid swimming away from [] ship[s] for distances up to 80 km; changes in surfacing, breathing, and diving patterns; changes in group composition; and changes in vocalizations."[82] For example, researchers documented chronic stress in North Atlantic right whales associated with exposure to low frequency noise from ship traffic, which can cause long-term reductions in fertility and decreased reproductive behavior, increased vulnerability to diseases, and permanent cognitive impairment.[83] Some avoidance responses to localized marine sounds may even lead to individual

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of Anthropogenic Ocean Noise on Cetaceans and Implications for Management. Canadian J. Zoology 85:1091-1116.

[77] Nat'l Res. Council. 2003.Ocean Noise and Marine Mammals, available at http://www.nap.edu/openbook.php?record_id=10564&page=R1.

[78] Id. at 42, 100 ("An even higher level, an understanding threshold" may be necessary for an animal to glean all information from complex signals.")

[79] Clark, C.W. at al. 2009. Acoustic Masking in Marine Ecosystems: Intuitions, Analysis, and Implication, 395 Marine Ecology Progress Series 201, 218-19, available at http://www.int-res.com/articles/theme/m395p201.pdf; Clark, C.W. et al., Acoustic Masking in Marine Ecosystems as a Function of Anthropogenic Sound Sources, at *17, fig. 8, available at https://www.academia.edu/5100506/Acoustic_Masking_in_Marine_Ecosystems_as_a_Function_of_Anthropogenic_Sound_Sources (last visited Oct. 29, 2014).

[80] Id (showing anthropogenic noise masking 100 percent of the frequencies right whales used over the majority of a six-hour study).

[81] Jason Gedamke 2014. Ocean Sound & Ocean Noise: Increasing Knowledge Through Research Partnerships, NOAA 2, available at http://cetsound.noaa.gov/Assets/cetsound/documents/MMC%20Annual%20Meeting%20Intro.pdf; Clark, C.W. et al., Acoustic Masking in Marine Ecosystems as a Function of Anthropogenic Sound Sources, at *3, available at https://www.academia.edu/5100506/Acoustic_Masking_in_Marine_Ecosystems_as_a_Function_of_Anthropogenic_Sound_Sources (last visited Oct. 29, 2014).

[82] NRC 2003.

[83] Rolland, R.M. et al. 2012. Evidence that ship noise increases stress in right whales. Proceedings of the Royal Society B.; Rolland, R.M. et al. 2007. The inner whale: hormones, biotoxins and parasites. In: Kraus S.D. and R.M. Rolland, (eds.). The Urban Whale: North Atlantic Right Whales at the Crossroads.

or mass strandings.[84] Louder anthropogenic sounds may also lead to permanent hearing loss in marine mammals.[85]

Southern Resident killer whales provide another example of how vessel noise emissions extend into the frequencies used by these critically endangered animals. Noise interferes with Southern Resident killer whales' echolocation abilities to hunt salmon.[86] Recent science continues to confirm that vessels interfere with foraging and that killer whales lose valuable foraging time and energy following a vessel interaction.[87] Behavioral responses to vessel noise and interactions include changes in surface behavior, diving and movement, changes in vocal behavior, and reduced foraging.[88] Behavioral changes due to commercial and whale watch vessels are estimated to result in the loss of 3.22 foraging hours for Southern Residents for each day the whales are present.[89] Ferries, tugboats, vehicle carriers, recreational vessels, containers, and bulkers showed high sound level exposure within Southern Resident core areas.[90]

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[84] *Id*. at 132; Southall, B. et al. 2013. Final Report of the Independent Scientific Review Panel Investigating Potential Contributing Factors to a 2008 Mass Stranding of Melon-Headed Whales 3 (Peponocephala electra) in Antsohihy, Madagascar, Int'l Whaling Comm'n 4, available at http://iwc.int/private/downloads/4b0mkc030sg0gogkg8kog4o4w/Madagascar%20ISRP%20FINAL%20REPORT.pdf.

[85] Kastak, D. et al. 2008. Noise-Induced Permanent Threshold Shift in a Harbor Seal, 123 J. Acoustical Soc'y of Am. 123:2986; Kujawa, S.G. & Liberman, M.C, Adding Insult to Injury: Cochlear Nerve Degeneration After "Temporary" Noise-Induced Hearing Loss, 29 J. Neuroscience 14,077.

[86] Veirs, Scott, Val Veirs, and Jason D. Wood. 2016. Ship Noise Extends to Frequencies Used for Echolocation by Endangered Killer Whales. PeerJ 4; *see also* Putland, R. L., Merchant, N. D., Farcas, A., & Radford, C. A. 2018. Vessel noise cuts down communication space for vocalizing fish and marine mammals. Global Change Biology, 24:4, 1708-1721 ("Routine vessel passages cut down communication space by up to 61.5% for bigeyes and 87.4%
for Bryde's whales").

[87] Heise, K., Barrett-Lennard, L., Chapman, R., Dakin, T., Erbe, C., Hannay, D.E., Merchant, N., Pilkington, J., Thornton, S., Tollit, D.J. and Vagle, S., 2017. Proposed metrics for the management of underwater noise for southern resident killer whales. Coastal Ocean Report Series, p.31; NMFS. 2019. West Coast Region, Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales, Draft Biological Report (to accompany the Proposed Rule) (Sept. 2019) [Biological Report].

[88] Holt, M. 2017. Noise levels received by endangered killer whales Orcinus orca before and after implementation of vessel regulations. Endangered Species Research 34:15; Holt, M.M., Hanson, M.B., Emmons, C.K., Haas, D.K., Giles, D.A. and Hogan, J.T. 2019. Sounds associated with foraging and prey capture in individual fish-eating killer whales, *Orcinus orca*. The Journal of the Acoustical Society of America, 146(5), pp.3475-3486.

[89] Tollit, D. 2017. Estimating the effects of noise from commercial vessel and whale watch boats on Southern Resident Killer Whales; https://www.portvancouver.com/wp-content/uploads/2017/01/2017-07-ECHO-Program-Estimating-the-effects-of-noise-from-commercial-vessels-and-whale-watch-boats-on-SRKW.pdf.

[90] Cominelli, S., Devillers, R., Yurk, H., MacGillivray, A., McWhinnie, L. and Canessa, R., 2018. Noise exposure from commercial shipping for the southern resident killer whale population. Marine pollution bulletin, 136, pp.177-200.

Endangered Cook Inlet beluga whales are also displaced by vessel noise.[91] Due to the importance of quiet areas for the whales' survival and recovery, the Fisheries Service designated "[w]aters with in-water noise below levels resulting in the abandonment of critical habitat areas by Cook Inlet beluga whales" as one of five physical or biological features essential to the conservation of this species.[92]

Kaplan and Solomon (2016) estimate that commercial shipping noise could increase by 87-102% by 2030 due to the combined effects of an increase in the volume of goods shipped, an increase in larger and noisier ships, and an increase in distance goods are shipped.[93] Oil tankers noise specifically is projected to increase by 11%.[94] This increasing noise in the acoustic marine environment is a growing conservation concern for marine life.[95]

The greatest source of human-caused marine noise by far is ship propeller cavitation—the sound poorly designed propellers make as they spin through the water.[96] Cavitation accounts for as much as 85 percent of human caused noise in the world's oceans.[97] Cavitation may also increase due to hull designs that create non-homogenous wake fields behind ships.[98] And even well-designed propellers and hulls may begin to cavitate if they are not regularly cleaned and smoothed.[99] Another significant source of anthropogenic marine noise is on-board machinery, especially diesel engines.[100] Other onboard machines may also cause vibrations that migrate underwater.[101] Finally, ship noise increases at higher speeds, as this increases the degree and volume of cavitation and onboard machine sounds.[102]

i. Recommended noise emission standards and best management practices

There are already standards for noise emissions in use by certification bodies that should be considered guidance for this rulemaking. Additionally, mitigation measures and the technology to implement them exist now and can be implemented to ensure aquatic life and habitat

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[91] Small, R.J. et al. 2017. Potential for spatial displacement of Cook Inlet beluga whales by anthropogenic noise in critical habitat. Endang. Species Res. 32:43-57.
[92] Endangered and Threatened Species: Designation of Critical Habitat for Cook Inlet Beluga Whale; Final
Rule, 76 Fed. Reg. 20,180, 20,203 (Apr. 11, 2011).
[93] Id.
[94] Id.
[95] Southall, B. et al. 2018. Reducing noise from large commercial ships. Proceedings of the Marine Safety and Security Council.75:58.
[96] Cox, J. J., 2014. Evolving Noise Reduction Requirements in the Marine Environment, Marine Mammal Comm'n: Congressional Briefing on Ocean Noise at 12 (2014), available at http://www.mmc.gov/special_events/capitalhill_briefing/cox_capitalhill_briefing_0914.pdf; International Maritime Organization (IMO) 2014. Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life
[97] Cox 2014.
[98] IMO 2014.
[99] *Id.* at 5.
[100] *Id. at 4.*
[101] *Id.*
[102] *Id.at 5.*

protections from underwater noise emissions. Current science shows that the water quality impacts could be ameliorated by establishing numeric standards, technology standards, and best management practices.

a. Set numeric standards for noise emissions

International certification bodies have established standards for noise emissions from vessels and standards for monitoring underwater vessel noise. For example, the DNV GL has established criteria for ships to obtain a "SILENT" certification classified by the type of vessel.[103] For example, the SILENT-E classification sets a numeric standard in 1/3 octave bands shown below.

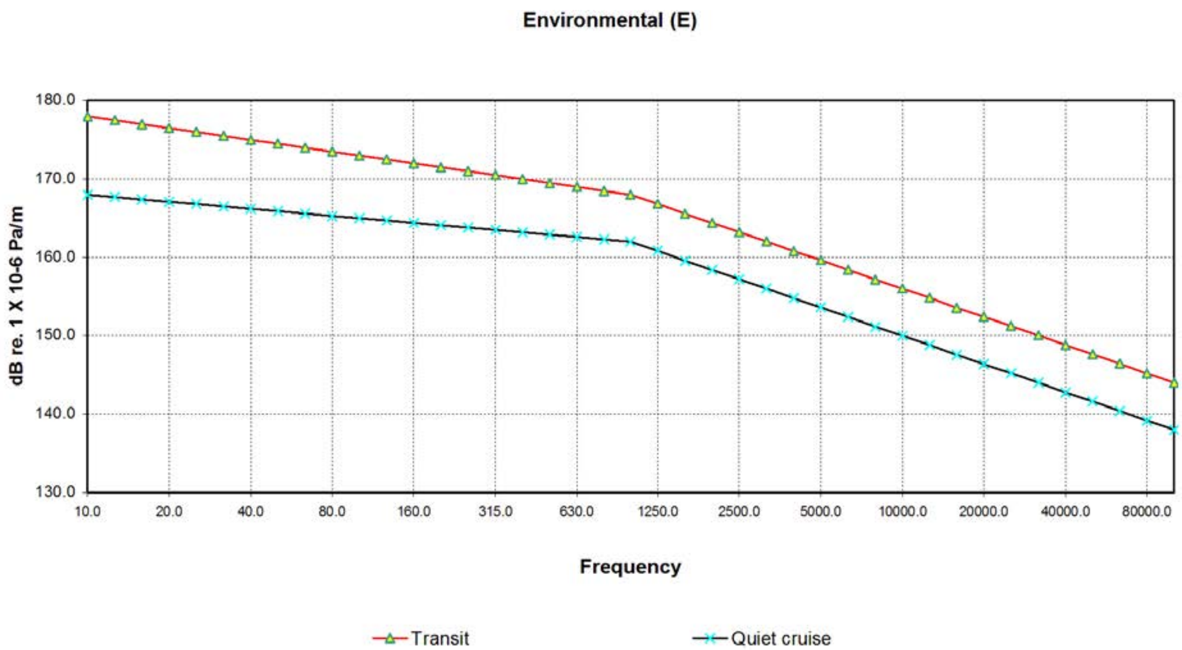

Fig. 3. DNV GL numeric noise emission standard for SILENT-E classification of vessels.

These criteria are technologically feasible and have been "designed and tested towards technically realistic requirements." [104] Indeed, modern cruise ships can meet the noise criteria, "*Celebrity Eclipse* didn't actually require any modifications in order to receive DNV GL's SILENT-E notation."[105] Green Marine, a voluntary environmental certification program for the North American marine industry, recently established underwater noise standards for member shipping companies.[106]

[103] DNV GL. 2017. Rules for Classification: Ships, Part 6, Chapter 7 Environmental protection and pollution control.
[104] DNV GL 2017.
[105] Laursen, W. 2017. Noise control at sea and in port. Maritime Executive.
[106] Heise et al. 2017

The National Marine Fisheries Service has also issued guidance for thresholds for permanent and temporary threshold shift for marine mammals. [107] This guidance should inform EPA's numeric criteria, although it should be noted that these thresholds do not adequately protect against behavioral disturbance that may interfere with essential marine mammal behaviors. Thus, more conservative thresholds should be established that take into account the best available science on acoustic disturbance of marine mammals.

There are also established standards for the measurement of underwater noise emissions from ships.[108]

b. Avoid biologically important areas during key seasons

One option for avoiding the harmful effects of vessel noise pollution on marine mammals is to require vessels to avoid biologically important areas during the seasons used by the animals. Experts have defined biologically important areas for marine mammals in U.S. waters.[109] See for example, the biologically important feeding area for North Atlantic right whales is displayed in blue in the figure below. Biologically important areas fall are described in four categories:

- **Reproductive Areas**: Areas and months within which a particular species or population selectively mates, gives birth, or is found with neonates or other sensitive age classes.
- **Feeding Areas**: Areas and months within which a particular species or population selectively feeds. These may either be found consistently in space and time, or may be associated with ephemeral features that are less predictable but can be delineated and are generally located within a larger identifiable area.
- **Migratory Corridors**: Areas and months within which a substantial portion of a species or population is known to migrate; the corridor is typically delimited on one or both sides by land or ice.
- **Small and Resident Population**: Areas and months within which small and resident populations occupying a limited geographic extent exist.

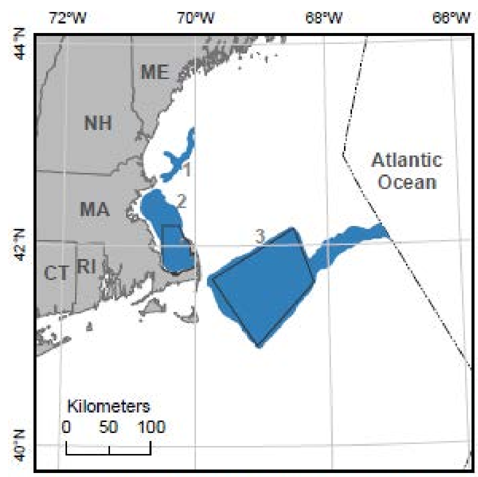

Figure 2.4. North Atlantic right whale (*Eubalaena glacialis*) feeding BIAs in the northeast Atlantic: (1) June and July, October to December on Jeffreys Ledge; (2) February to April on Cape Cod Bay and Massachusetts Bay; and (3) April to June in the Great South Channel and on the northern edge of Georges Bank, substantiated through extensive vessel- and aerial-based survey data, photo-identification data, radio-tracking data, and expert judgment; NOAA Critical Habitat designation outlines are shown within areas 2 and 3.

[107] National Marine Fisheries Service. 2018. 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.
[108] Aglaia Badino et al. 2012. Noise emitted from ships: impact inside and outside the vessels. Procedia - Social and Behavioral Sciences 48:868 – 879.
[109] Van Parijs, S. M., Curtice, C., & Ferguson, M. C. (Eds.). 2015. Biologically Important Areas for cetaceans within U.S. waters. Aquatic Mammals (Special Issue), 41(1). 128 pp.

To ensure that protected marine mammals are not harmed or harassed by vessel noise emissions, EPA should require that vessels avoid biologically important areas, or in the alternative require a speed limit of no more than 10 knots in biologically important areas. Slower vessel speeds reduce underwater noise.[110]

c. Best management practices and control technology for vessel noise emissions

To mitigate the impacts after targets are identified and monitoring mechanisms established, various measures have been discussed by the International Maritime Organization (IMO) and implemented in various geographical locations. In 2014 the IMO put forward guidelines to reduce commercial ship noise, including consideration of current ship design, onboard machinery, emerging technologies, and operations (including ship speed).[111]

There are common and technologically feasible best management practices and control technologies to reduce noise emissions from vessels. A study as part of the Enhancing Cetacean Habitat and Observation (ECHO) Program evaluated vessel quieting options including their effectiveness and feasibility.[112] Regular propeller cleaning and repair received the top score among the rating criteria, and other effective measures include: "1) regular cleaning of the hull, 2) decoupling coating, 3) Propeller Boss Cap Fins (PBCF), 4) Schneekluth duct, 5) Mewis duct, 6) air injection and bubble curtains, and 7) a type of vessel that uses LNG-fueled, gas and steam turbine powered (COGAS) and electrically driven technology."[113]

In summary, EPA should require vessel quieting to address noise pollution that impairs the acoustic underwater environment and harms aquatic life.

B. EPA must set a zero-discharge limit and require best management practices to control plastic pellets

EPA should impose a numeric limit of zero for discharge of plastic pellets, powders, granules, and flakes (collectively referred to as "pellets") into surface waters. It should also describe the best management practices to prevent the discharge of such plastic pellets into U.S. waters. Vessels periodically discharge preproduction plastics during the process of loading and transporting such cargo. EPA itself acknowledged back in 1993 that discharge of plastic pellets from vessels was a problem:[114]

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[110] Joy, R. et al. 2019. Potential Benefits of Vessel Slowdowns on Endangered Southern Resident Killer Whales. Front. Mar. Sci. 6:344.
[111] IMO 2014. Guidelines for the reduction of underwater noise form commercial shipping to address adverse impacts to marine life. MEPC1/Circ. 883.
[112] Chmelnitsky 2017. Vessel quieting design, technology, and maintenance options for potential inclusion in EcoAction Program Enhancing Cetacean Habitat and Observation Program.
[113] Chmelnitsky 2017.
[114] U.S. Envtl. Prot. Agency. 1993. Plastic Pellets in the Aquatic Environment Sources and Recommendations, A Summary, EPA 842-S-93-001; *see also* EPA. 1992. The study of floatable debris in U.S. Waters (Harbor Studies Program) March 1989 through April 1991.

> The presence of pellets in U.S. coastal waters was first reported in the early 1970s, and pellets have since been reported in most of the world's oceans. More recently, EPA studies of aquatic debris (EPA Harbor Studies Program) revealed widespread distribution of plastic pellets in U.S. harbors located on the Atlantic, Pacific, and Gulf coasts, and pellets were among the most commonly found items in most of the harbors. Pellets were found in 13 out of 14 harbors sampled. The greatest number of pellets was found in the Houston Ship Channel at Houston, Texas, where more than 250,000 pellets were collected in one sample alone. Notably, Houston has one of the greatest concentrations of plastics industry facilities in the United States.

On August 2, 2020, a vessel released millions, and possibly billions, of plastic pellets into the Mississippi River that have been deemed "irretrievable."[115] Discharges of plastic pellets from vessels are common, and they are a growing threat to water quality and aquatic life.

The plastic industry is in the midst of a boom. According to the American Chemistry Council, the plastics and chemical industry is investing more than $204 billion in the United States for an estimated 333 projects (including new facilities and expansions) designed in large part to convert plentiful and affordable natural gas from shale into petrochemical and plastic products).[116] The industry aims to increase North American plastics production by at least 35 percent by 2025.[117] These new plastics will be used to manufacture a variety of products, including water bottles, straws, utensils, food wrappers, packaging, shopping bags, and other single-use items that account for approximately 40 percent of plastic use.[118]

Vessel discharges of plastic pellets adversely impact the aquatic environment in numerous ways, including from: ingestion by marine animals, including fish, sea turtles, birds, and marine mammals; becoming embedded in sediments and plant matter; introducing toxic plastic additives to the environment, such as bisphenol a and nonylphenol; and accumulating other toxic chemicals on pellet surfaces, such as PCBs and dioxin, which end up in the aquatic food chain when ingested.

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[115] Baurick, T. 2020. No cleanup planned as millions of plastic pellets wash up along Mississippi River and flow to the Gulf, https://www.nola.com/news/environment/article_b4fba760-e18d-11ea-9b0b-b3a2123cf48b.html.

[116] American Chemistry Council. 2019. U.S. Chemical Investment Linked to Shale Gas: $204 Billion and Counting, https://www.americanchemistry.com/Policy/Energy/Shale-Gas/Fact-Sheet-US-Chemical-Investment-Linked-to-Shale-Gas.pdf

[117] Center for International Environmental Law, et al. 2017. How Fracked Gas, Cheap Oil, and Unburnable Coal Are Driving the Plastics Boom, https://www.ciel.org/wp-content/uploads/2017/09/Fueling-Plastics-How-Fracked-Gas-Cheap-Oil-and-Unburnable-Coal-are-Driving-the-Plastics-Boom.pdf; Center for International Environmental Law. 2019a. Plastic & Health: The Hidden Costs of a Plastic Planet (Feb. 2019a), https://www.ciel.org/plasticandhealth/. [CIEL 2019a]; Center for International Environmental Law. 2019b. Plastic & Climate: The Hidden Costs of a Plastic Planet, https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf. [CIEL 2019b].

[118] Geyer, R. et al. 2017. Production, use, and fate of all plastics ever made, Sci. Adv. 3.

EPA has the authority and duty to limit plastic pellet discharges. The proposed rule states it "does not regulate loss or spillage of transported materials," but it should. Nothing in the Clean Water Act or the VIDA precludes EPA from setting standards on the discharge of plastics. Moreover, because of the deleterious effects of plastics, EPA not only has the authority but the duty under the Clean Water Act and VIDA to establish standards for vessels.

The control mechanisms to prevent the discharge of plastic pellets are currently available and in some cases are already being voluntarily used by the plastic industry.[119] Inspecting and securing cargo, as well as containment pans, good housekeeping, and screens are practicable control technologies that can prevent plastic pellets from entering surface waters. A prohibition on discharging plastic pellet pollution is necessary and achievable. Accordingly, EPA must update its vessel discharge rule to include measures to prevent plastic pellets from being discharged.

i. Plastic pollution harms water quality and the environment

Production and shipping of plastic results in the loss of millions of plastic pellets to the environment. Vessels loading and shipping plastic pellets discharge them to surface waters. Once in the environment, plastic pellets are persistent and can be transported long distances from their source in flowing surface waters such as streams, rivers, and oceans. We must find ways to stem the tide of plastic pollution, including plastic pellet pollution, and vessel discharge rules are a necessary and key part of the solution.

Trillions of pieces of plastic float in the world's oceans.[120] Global trends reveal increasing plastic accumulations in aquatic habitats, consistent with the increasing trend in plastic production: a 560-fold increase in just over 60 years.[121] Tragically, under a business-as-usual scenario, the ocean is expected to contain one ton of plastic for every three tons of fish by 2025, and more plastics than fish (by weight) by 2050.[122]

Of the 51 trillion plastic particles currently floating in the world's oceans,[123] 92 percent are microplastics.[124] Microplastics, generally defined as plastic particles less than five millimeters in length or diameter, constitute a major threat to marine wildlife and water quality. While some

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[119] EPA 1993.
[120] Eriksen, Marcus et al. 2014. Plastic pollution in the world's oceans: more than 5 trillion plastic pieces weighing over 250,000 tons afloat at sea, 9 PLoS ONE 9:e111913; van Sebille, Erik et al. 2015. A global inventory of small floating plastic debris, Environ. Res. Letters 10:124006; Derraik, José G.B. 2002. The pollution of the marine environment by plastic debris: a review, Marine Pollution Bull. 44:842; Barnes, David K.A. et al. 2009. Accumulation and fragmentation of plastic debris in global environments, Phil. Trans. R. Soc. B 364:1985; Rodrigues, Alyssa et al. 2019. Colonisation of plastic pellets (nurdles) by E. coli at public bathing beaches, Marine Pollution Bull. 139:376.
[121] Thompson, Richard C. et al. 2013. Lost at Sea: where is all the plastic? 304 Science 838 (2004); Goldstein, Miriam C. et al., Scales of spatial heterogeneity of plastic marine debris in the northeast Pacific Ocean, 8 PLos ONE e80020.
[122] World Economic Forum, 2016. Ellen MacArthur Foundation, The new plastics community: Rethinking the future of plastics, http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf.
[123] van Sebille et al. 2015.
[124] Eriksen et al. 2014.

microplastics are the result of larger pieces breaking down, up to 30 percent of the ocean's microplastics originate as plastic pellets, or nurdles, that are used as a raw material to make plastic products.[125] Microplastics are ubiquitous to coastal and marine environments, found at sites worldwide from the poles to the equator and from the ocean surface to the sea floor.[126] One California survey reported 118,705,732 plastic pellets on the state's beaches, and in the Los Angeles area alone, 20 tons of microplastics are carried into the Pacific Ocean every day (Moore et al. 2011).[127]

A rapidly growing body of research suggests there is not one square mile of ocean surface anywhere on earth not polluted with microplastics.[128] Microplastics comprise the majority of plastic pollution in the global ocean.[129] Ocean currents rapidly disperse microplastic particles, and scientists have found microplastics accumulating in remote locations far from population centers, including Arctic and Antarctic waters .[130]

Plastic pellets—also known as primary microplastics—have caused documented damage to freshwater, coastal, and marine ecosystems. They also represent one of the most common types of plastic pollution in these environments.[131] Pellets frequently spill during handling at plastic

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[125] Boucher, Julien & Damien Friot 2017. Primary microplastics in the oceans: a global evaluation of sources, IUCN, https://portals.iucn.org/library/sites/library/files/documents/2017-002.pdf; Karkanorachaki, Katerina et al. 2018. Plastic pellets, meso- and microplastics on the coastline of Northern Crete: Distribution and organic pollution, Marine Pollution Bull. 133:578.

[126] Barnes et al. 2009; Bergmann, Melanie, Lars Gutow & Michael Klages (eds.) 2015. Marine Anthropogenic Litter; Browne, Mark Anthony et al. 2011. Accumulations of microplastic on shorelines worldwide: sources and sinks, Envtl. Sci. & Tech. 45:9175; Ferreira, Guilherme V.B., Mário Barletta & André R.A. Lima et al. 2019. Use of estuarine resources by top predator fishes. How do ecological patterns affect rates of contamination by microplastics?, Sci. Total Envt. 655:292; Ivar do Sul, Juliana A. & Monica F. Costa. 2014.The present and future of microplastic pollution in the marine environment, Envtl. Pollution 185:352; Obbard, Rachel W. et al. 2014. Global warming releases microplastic legacy frozen in Arctic Sea ice, 2 Earth's Future 315; O'Donovan, Sarit et al. 2018. Ecotoxicological Effects of Chemical Contaminants Adsorbed to Microplastics in the Clam *Scrobicularia plana*, 5 Frontiers in Marine Sci; Woodall, Lucy C. et al. 2014. The deep sea is a major sink for microplastic debris, R. Soc'y Open Sci. 1:140317.

[127] Moore, C.J., G.L. Lattin & A.F. Zellers 2011. Quantity and type of plastic debris flowing from two urban rivers to coastal waters and beaches of Southern California, Revista da Gestão Costeira Integrada 11:65.

[128] Eriksen et al. 2013.

[129] To illustrate, a recent study on plastic particles flowing from two rivers into coastal areas in southern California found that microplastic particles were 16 times more abundant and had a cumulative weight three times greater than larger particles (Moore et al. 2011); *see also* Boucher & Friot 2017.

[130] Isobe, Atsuhiko, Percentage of microbeads in pelagic microplastics within Japanese coastal waters, 110 Marine Pollution Bull. 432 (2016); Cózar, Andrés et al., The Arctic Ocean as a dead end for floating plastic in the North Atlantic branch of the Thermohaline Circulation, 3 Sci. Advances e1600582 (2017); O'Donovan et al. 2018; Chen, Q. et al., Marine microplastics bound dioxin-like chemicals: model explanation and risk assessment, 364 J. Hazardous Materials 82 (2019).

[131] Moore et al. 2011; Anbumani, Sadasivam & Poonam Kakkar 2018. Ecotoxicological Effects of Microplastics on Biota: A Review, Envtl. Sci. & Pollution Res. 25:14,373; Karkanorachaki et al. 2018; O'Donovan et al 2018; Rodrigues et al. 2019.

factories as well as during loading and transportation both on land and at sea.[132] Extant protective measures, including U.S. federal regulations, appear insufficient to curb the flow of pellet pollution.

ii. Microplastic impacts on aquatic wildlife

Plastics harm fish and wildlife both through physical effects of ingestion (e.g. intestinal blockage) and by acting as a transfer agent for toxic chemicals.[133] Many plastics—including pellets—adsorb persistent environmental chemicals,[134] such as polychlorinated biphenyls (PCBs), pesticides like dichlorodiphenyltrichloroethane (DDT), polycyclic aromatic hydrocarbons ("PAHs"), heavy metals, and dioxins.[135] Scientists began acknowledging plastic's role as a toxin vector as early as 1973 .[136] Because of their large surface-area-to-volume ratio and their tendency to attract contaminants more readily than natural sediments, plastic fragments concentrate organic pollutants; these concentrations can be up to 1,000,000 times higher than that of the surrounding seawater.[137] The two types of plastic that the petro-plastics facilities discussed in this petition will primarily produce—polyethylene and polypropylene—show a particularly strong adsorption capacity for harmful chemicals, including PAHs and DDT.[138]

Aquatic species may ingest these pollutant-laden plastic particles, resulting in lethal and sublethal harms. The absorbed toxins—as well as plastic additives such as bisphenol A ("BPA"), phthalate plasticizers, and flame retardants—can leach from ingested plastics into animal

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[132] Ashton, Karen et al. 2010. Association of metals with plastic production pellets in the marine environment, Marine Pollution Bull. 60:2050.
[133] Hammer, Jort, Michiel H.S. Kraak & John R. Parsons. 2012. Plastics in the Marine Environment: The Dark Side of a Modern Gift, Rev. Envtl. Contamination & Toxicology220; CIEL 2019b.
[134] Adsorbed toxins are toxins that are "stuck" to plastic particles. Interestingly, toxin adsorption to plastic surfaces may reduce contaminant biodegradation—meaning the contaminants do not break down and persist for an even longer time in the environment than they would were they not adsorbed to plastic (Hammer et al. 2012).
[135] Teuten, Emma L. et al. 2009 *Transport and release of chemicals from plastics to the environment and to wildlife*, Phil. Trans. R. Soc'y B 364:2027; Rochman, Chelsea M. et al. 2013. Ingested plastic transfers hazardous chemicals to fish and induces hepatic stress, Scientific Reports 3:3263; Wright, Stephanie L. et al. 2013. Microplastic ingestion decreases energy reserves in marine worms, Current Biology 23:R1031; Hammer et al. 2012; O'Donovan et al. 2018; Chen et al. 2019.
[136] CIEL 2019b.
[137] Guzzetti, Eleonora et al. 2018. Microplastic in Marine Organisms: Environmental and Toxicological Effects, 64 Envtl. Toxicology & Pharmacology 64:164; Rios, Lorena M., Charles Moore & Patrick R. Jones. 2007. Persistent organic pollutants carried by synthetic polymers in the ocean environment, Marine Pollution Bull. 54:1230; Bakir, Adil et al. 2014. Enhanced desorption of persistent organic pollutants from microplastics under simulated physiological conditions, Envtl. Pollution 185:16; Anbumani & Kakkar 2018; Karkarnorachaki et al. 2018.
[138] O'Donovan et al. 2018.

tissues,[139] inducing adverse effects such as endocrine disruption (that is, the disruption of hormone systems), neurotoxicity, and carcinogenesis.[140]

Scientists have documented over 2200 species impacted by ocean plastic pollution and at least 690 that have ingested microplastics.[141] Because of their small size and environmental persistence, microplastics remain readily available to ingestion by a wide variety of marine organisms for an extended period of time.[142] Plankton, invertebrates, fish, sea birds, sea turtles, and marine mammals all are known to adsorb, ingest, or otherwise uptake microplastics.[143] Trophic transfer of microplastics (*i.e.,* transfer up the food chain) also occurs, with the potential transfer of microplastics to humans when they eat shrimp, bivalves, fish, or other marine organisms containing these pollutants .[144]

Smaller and larger microplastic particles harm wildlife in different ways. Larger particles may have longer residence time in the digestive tract, in turn leading to increased toxicant release.[145] Smaller micro- and nanoplastics may move into an organism's cells, causing a variety of harms discussed in more detail below.[146] Smaller particles may also carry more of a toxicant load, as their increased surface area to volume ratio allows them to adsorb more contaminants.[147] Documented harms from ingestion of microplastics and adsorbed contaminants include but are not limited to decreased feeding and growth; increased stress; behavioral modifications; reproductive harms; immunotoxicity; neurological harms; alteration of gene expression; cancer; and increased mortality.[148]

***Plankton*:** Microplastics inhibit growth of planktonic marine microalgae; they also decrease growth, fertility, and fecundity, and increase mortality of copepods, an important zooplankton species .[149] Scientists observed a similar reproductive response, as well as reduced feeding, growth, and survival rates, in freshwater *Daphnia* species.[150] These impacts not only affect the

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[139] These contaminants can be released into animal digestive tracts up to 30 times faster than to seawater (CIEL 2019b).
[140] Teuten at al. 2009; Hammer et al. 2012; Rochman et al. 2013; Anbumani & Kakkar 2018; O'Donovan et al. 2018.
[141] Gall, S.C. & R.C. Thompson 2015.The Impact of Debris on Marine Life, Marine Pollution Bull. 92:170; Litterbase: Online Portal for Marine Litter, https://litterbase.awi.de/; CIEL 2019b; *see also* Table 2, "Observed Ecotoxicity of Microplastics in Different Model Systems," *in* Anbumani & Kakkar 2018.
[142] Nelms, S.E. et al. 2019. Microplastics in marine mammals stranded around the British coast: ubiquitous but transitory?, 9 Scientific Reports 1075.
[143]Duncan, Emily M. et al. 2019. Microplastic ingestion ubiquitous in marine turtles, Global Change Biology 25:744; Herrera, A. et al. 2019. Microplastic ingestion by Atlantic chub mackerel (Scomber colias) in the Canary Islands coast, 139 Marine Pollution Bull. 139:127; Donohue, Mary J. et al. 2019.Evaluating exposure of northern fur seals, Callorhinus ursinus, to microplastic pollution through fecal analysis, Marine Pollution Bull. 138:213; Anbumani & Kakkar 2018; Gall & Thompson 2015; Guzzetti et al. 2018; O'Donovan et al. 2018.
[144] O'Donovan et al. 2018; CIEL 2019b; Ferreira et al. 2019; Herrera et al. 2019.
[145] O'Donovan et al. 2018.
[146] *Id.*
[147] Anbumani & Kakkar 2018; O'Donovan et al. 2018.
[148] O'Donovan et al. 2018.
[149] Anbumani & Kakkar 2018; Guzzetti et al. 2018.
[150] *Id.*

planktonic organisms themselves, but also higher trophic level organisms that rely on plankton as a primary food source.[151]Finally, impacts to plankton species that uptake CO_2 from the atmosphere may significantly reduce the ocean's ability to absorb and store greenhouse gases, with serious implications for atmospheric warming .[152]

***Invertebrates*:** Scientists report microplastic ingestion in a variety of marine invertebrate species, including mollusks, sea worms, and crabs.[153] Effects include inflammation; reduced feeding activity; suppressed immune system function; reproductive harms; damage to gills and digestive tract; increased mortality; and possible DNA damage.[154] Microplastics also harm corals by reducing calcification and inducing bleaching and tissue death.[155]

Fish: Freshwater, estuarine, and marine fish ingest microplastics and their adsorbed pollutants either directly or through contaminated prey.[156] Such ingestion induces physiological effects and harm, including liver toxicity, endocrine disruption, behavioral changes, and intestinal effects.[157]

Seabirds: Seabirds are among the most sensitive wildlife species to microplastics pollution due to high frequency of ingestion, impacts on body condition, and transmission of toxic chemicals.[158] Ingested plastic may stay in seabirds' stomachs for months, potentially interfering with feeding behavior and increasing leached contaminant loads .[159] Laboratory studies show that contaminants (including PCBs and DDT) from microplastics ingested by shearwater chicks are released once inside the bird's body.[160] Plastic contaminants like endocrine-disrupting phthalates affect seabirds across the globe, even in remote environments like the Arctic.[161]

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[151] *Id.*
[152] CIEL 2019b.
[153] Graham, Erin R. & Joseph T. Thompson, 2009. Deposit and suspension-feeding sea cucumbers (*Echinodermata*) ingest plastic fragments, J. Experimental Marine Biology & Ecology 368:22; Gall & Thompson 2015; Guzzetti et al. 2018; CIEL 2019b; Duncan et al. 2019.
[154] Mearns, Alan J. et al. 2013. Effects of Pollution on Marine Organisms, Water Envt. Research 85:1828; Browne, Mark A. et al. 2008. Ingested microplastic plastic translocates to the circulatory system of the mussel, *Mytilus edulis* (L.), Envtl. Sci. & Tech. 42:5026; Anbumani & Kakkar 2018; Duncan et al. 2019; Guzzetti et al. 2018; Herrera et al. 2019; O'Donovan et al. 2018; Wright et al. 2013.
[155] Chapron, L. et al. 2018. Macro- and microplastics affect cold-water corals growth, feeding and behavior, Sci. Reports 8:15,299; Reichert, Jessica et al. 2018. Responses of reef building corals to microplastic exposure, Envtl. Pollution 237:955; Gall & Thompson 2015; Donohue et al. 2019.
[156] Anbumani & Kakkar 2018; Duncan et al. 2019; Herrera et al. 2019.
[157] Anbumani & Kakkar 2018; CIEL 2019b; Guzzetti et al. 2018.
[158] Wilcox, Chris, Erik Van Sebille & Britta Denise Hardesty, 2015. Threat of plastic pollution to seabirds is global, pervasive, and increasing, Proc. Nat'l Acad. Sci. 112:11899; CIEL 2019b.
[159] Gall & Thompson 2015.
[160] Ryan, P.G., A.D. Connell & B.D. Gardner. 1988. Plastic ingestion and PCBs in seabirds: is there a relationship? 19 Marine Pollution Bull. 19:174; Teuten et al. 2009; Hammer et al. 2012; Gall & Thompson 2015; O'Donovan et al. 2018.
[161] Sample, Ian, *Plastics Reach Remote Pristine Environments, Scientists Say*, THE GUARDIAN, Feb. 17, 2019, https://www.theguardian.com/science/2019/feb/17/plastics-reach-remote-pristine-environments-scientists-say.

Scientists estimate that by 2050, the percentage of seabird species ingesting plastic will reach 99.8 percent, resulting in increased mortality and decreased reproduction.[162]

Sea turtles: Plastic pollution also poses a serious risk to sea turtles.[163] Scientists have documented ingestion of microplastic particles in all seven species of sea turtles .[164] This microplastic consumption exposes sea turtles to dangerous toxins and pathogens that affect reproduction and survival.[165]

Marine mammals: Marine mammals, including whales and seals, likewise ingest and may be harmed by microplastics and adsorbed contaminants. Such ingestion occurs directly as a consequence of feeding activity or through predation on contaminated prey.[166] There also exists the possibility that whales inhale microplastics when they surface to breathe .[167] In addition to leaching contaminants, microplastics can clog baleen, which impedes feeding behavior, reduces body condition, and suppresses immune response.[168] Nelms et al. (2019) found evidence of a possible relationship between a cetacean's body burden of microplastics and cause of death—specifically that animals dying from infectious disease contained a higher number of plastic particles than those dying from other causes.[169]

iii. Human health risks associated with marine microplastic pollution

Marine species from plankton to invertebrates to large pelagic fishes have been shown to ingest microplastics (or prey that contain them).[170] Thus, people who ingest aquatic plants or seafood may be exposed to dangerous levels of contaminants. Scientists have yet to fully investigate the human health implications of microplastic ingestion from fishes and other seafood, but it stands to be serious, especially given the prevalence of microplastics in fish caught and sold for human consumption both nationally and internationally.[171]

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162 Wilcox et al. 2015.
163 CIEL 2019b.
164 Garrison, Samantha R. & Mariana M.P.B. Fuentes, 2019. Marine Debris at Nesting Grounds Used by the Northern Gulf of Mexico Loggerhead Recovery Unit, Marine Pollution Bull. 139:59; Guzzetti et al. 2018; Duncan et al. 2019.
165 Schuyler, Qamar et al. 2012. To eat or not to eat? Debris selectivity by marine turtles, PLoS ONE 7: e40884; Duncan et al. 2019; Garrison et al. 2019; Guzzetti et al. 2018.
166 Zhu et al., 2019. Cetaceans and microplastics: First report of microplastic ingestion by a coastal delphinid, *Sousa chinensis*, Sci. Total Envt. 659:649.
167 Nelms et al. 2019.
168 Guzzetti et al. 2018.
169 *See also* Donohue et al. 2019; Gall & Thompson 2015) (discussing microplastics' effects on seals and sea lions).
170 Romeo, Teresa et al., 2015. First evidence of presence of plastic debris in stomach of large pelagic fish in the Mediterranean Sea, Marine Pollution Bull. 95:358.
171 *See,* e.g., Van Cauwenberghe, Lisbeth & Colin R. Janssen, 2014. Microplastics in bivalves cultured for human consumption, Envtl. Pollution 193:65; Bergmann et al. 2015; Rochman, Chelsea M. et al. 2015. Anthropogenic debris in seafood: plastic debris and fibers from textiles in fish and bivalves sold for human consumption, 5 Sci. Reports 5: 14,340; Herrera et al. 2019.

Robust medical evidence links various persistent organic pollutants commonly found on microplastics with a host of human illnesses, including cancers (e.g., breast cancer, pancreatic cancer, non-Hodgkin's lymphoma, adult-onset leukemia, and soft tissue sarcomas), neurological disorders (e.g., attention deficit disorder, impaired memory, learning disabilities, and behavioral problems), and reproductive disorders (e.g., menstrual disorders, abnormal sperm, miscarriages, pre-term delivery, low birth weight, altered sex ratios, and shortened lactation periods).[172] Many of these persistent organic pollutants bioaccumulate and biomagnify up the food chain, posing a risk of harm for higher trophic-level organisms, including humans.[173]

An additional human health concern from microplastic pollution relates to plastics' ability to harbor infectious agents.[174] Both viruses and bacteria, including *Escherichia coli* and *Vibrio* (which cause gastrointestinal illness in humans), find refuge on pellets. The potential for microbial contamination-related impacts grows as coastal regions warm from climate change; such warming increases both the range of pathogenic microbes and the likelihood that storm surges and other events bring contaminated pellets into contact with humans.[175]

Another concerning development is the discovery that microplastic is contaminating drinking water supplies. Scientists have only recently studied plastic pollution in freshwater, but it is now documented in groundwater,[176] and it is at least as ubiquitous in rivers and streams as it is in marine environments.[177] For example, a scientist recently swam the length of the Tennessee River—the drinking water source for 4.7 million people—and found one of the highest concentrations of microplastics in the world.[178] Samples showed 18,000 particles per cubic meter of water, which is 8,000 percent higher than measurements in the Rhine and 80 percent higher than measurements in the Yangtze River—the source of 55 percent of all river-born microplastic entering the ocean.[179]

Recent studies have also found microplastics at the outflows of drinking water treatment facilities, and in tap water, bottled water, and even domestic beer.[180] The first study that looked

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[172] CIEL 2019a.
[173] Wassermann, M. et al., 1979. World PCBs map: storage and effects in man and his biologic environment in the 1970s, Ann. N.Y. Acad. Sci. 320:69; Gobas, Frank A.P.C. et al. 1995. Time response of the Lake Ontario ecosystem to virtual elimination of PCBs*,* Envtl. Sci. & Tech. *29:*2038; Rochman et al. 2013.
[174] Wright et al. 2013; Donohue et al. 2019; Mearns et al. 2013; CIEL 2019a; Rodrigues et al. 2019.
[175] Rodrigues et al. 2019.
[176] Panno, Samuel V. et al. 2019. Microplastic Contamination in Karst Groundwater Systems, Groundwater 57:189.
[177] Koelmans, Albert A. et al., 2019. Microplastics in freshwaters and drinking water: Critical review and assessment of data quality, Water Res 155:410; McCormick, Amanda R. et al. 2016. Microplastic in surface waters of urban rivers: concentration, sources, and associated bacterial assemblages, Ecosphere 7:e01556.
[178] Tennessee Aquarium, *A Plastic Pandemic - German Scientist's Analysis Finds Staggering Levels of Microplastic Pollution in Tennessee River* (Oct. 18, 2018), https://www.tnaqua.org/newsroom/entry/a-plastic-pandemic-german-scientists-analysis-finds-staggering-levels-of-microplastic-pollution-in-tennessee-river.
[179] *Id.*
[180] Eerkes-Medrano, Dafne et al. 2019. Microplastics in drinking water: A review and assessment, Envtl Sci & Health 7:69; Novotna, Katerina et al., 2019 Microplastics in drinking water treatment – Current

at microplastics in bottled water found concentrations as high as 10,000 plastic pieces per litre of water, with only 17 of 259 bottles testing free of microplastics.[181]

iv. Ecological impacts from microplastics

In addition to the wildlife and human health impacts just described, microplastic pollution impacts ecosystem structure and function.[182] For example, microplastics affect seafloor and open ocean habitats by altering biogeochemical cycles, including carbon storage (with implications for climate change).[183]

Microplastics affect nearshore and inshore environments—such as sandy beaches—through sediment contamination.[184] The presence of microplastics also alters physical properties of beaches, including heat transfer and water movement.[185] These changes may have broad ecological implications for a wide variety of beach dwelling organisms and their eggs—including crustaceans, mollusks, fish, and sea turtles—and climate change may exacerbate these impacts.[186] These concerns are not merely theoretical: researchers recently found anthropogenic marine debris, including plastics, at 10 loggerhead sea turtle nesting beaches—including protected areas.[187]

In addition, because plastics do not readily degrade, they become vehicles for invasive species dispersal—effectively serving as a raft for exotic species transport and as a colonizing surface in areas otherwise lacking one.[188] These invasive organisms can prove devastating when they move into a new area, wiping out native species, and also harming human health and local economies (*see* discussion on viruses and bacteria, *supra*).[189]

Environmental plastic pollution also directly contributes to climate change.[190] When plastic particles are exposed to the elements, they slowly break down. Photodegradation (*i.e.,*

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knowledge and research needs, Sci Total Environ 667:730; Pivokonsky, Martin et al., 2018. Occurrence of microplastics in raw and treated drinking water, Sci Total Environ 43:644; Kosuth, Mary et al., Anthropogenic contamination of tap water, beer, and sea salt, PLoS ONE 13(4):e0194970; Koelmans et al. 2019.

[181] Kosuth et al. 2018.

[182] Guzzetti et al. 2018; CIEL 2019b.

[183] *Id.*

[184] Oehlmann, Jörg et al., 2009 A critical analysis of the biological impacts of plasticizers on wildlife, Phil. Trans. R. Soc'y B 364:2047; Rios et al. 2007; Gall & Thompson 2015.

[185] Carson, Henry S. et al. 2011. Small plastic debris changes water movement and heat transfer through beach sediments, Marine Pollution Bull. 62:1708; Gall & Thompson 2015.

[186] Carson et al. 2011; Valenzuela, N. et al. 2019Extreme Thermal Fluctuations from Climate Change Unexpectedly Accelerate Demographic Collapse of Vertebrates with Temperature-Dependent Sex Determination, Nature Sci. Rep. 9:4254, https://www.nature.com/articles/s41598-019-40597-4.pdf.

[187] Garrison et al. 2019.

[188] Gregory, Murray R. 2009. Environmental implications of plastic debris in marine settings—entanglement, ingestion, smothering, hangers-on, hitch-hiking and alien invasions, Phil. Trans. R. Soc'y B 364:2013; Barnes et al. 2009; Hammer et al. 2012; Mearns et al. 2013; Wright et al. 2013; Gall & Thompson 2015; Guzzetti et al. 2018.

[189] Barnes et al. 2009.

[190] CIEL 2019b.

degradation caused by exposure to sunlight) of plastic triggers the production of greenhouse gases; this off-gassing increases as the plastic particles become smaller. The breakdown of low-density polyethylene, in particular, releases methane, ethylene (C_2H_4), ethane, and propylene at a high rate. As more plastic accumulates in the environment, so too will greenhouse gas emissions from this source increase.[191]

Finally, plastic pollution litters our beaches, harming the aesthetic, recreational, tourism, and economic values of our waterways and seashores.

v. EPA should set a zero-discharge limit of plastic materials and establish best management practices

As described above, preproduction plastics threaten water quality, aquatic life and human health and EPA must prevent discharge of plastic pellets, etc., by vessels. EPA has the authority and the obligation to address plastic pellet pollution from vessels that load and transport such cargo. To meet the Clean Water Act's goal that all waters should be fishable and swimable, the Act protects water quality for the protection and propagation of fish, shellfish and wildlife. 40 C.F.R. § 131.2. The VIDA also provides authority to set numeric standards and best management standards. Establishing a standard of zero-discharge along with best management practices is also consistent with MARPOL that prohibits plastic pollution,[192] and thus far has been insufficient to control such pollution from vessels. To protect water quality there is a need to ensure that plastic pellets are not discharged from vessels transporting them. The State of California adopted Best Management Practices that demonstrate that such measures are feasible in the plastic production industry.[193] Accordingly, EPA should adopt standards that are at least as robust as those already in use, and the rule should be amended to state:

Plastic Materials

(a) No discharge of plastics will be permitted. Examples of plastics required to be controlled include plastic resin pellets, powders, flakes, additives, regrind, scrap, and recycling.

To ensure compliance with a zero-discharge standard, monitoring and enforcement provisions must be added. The following language should be added:

(b) Best Management Practices. All vessels that transport plastic materials shall:
   a. use durable sealed containers designed not to rupture under typical loading and unloading activities;
   b. secure and inspect containers prior to each transit;
   c. use capture devices, such as catch pans, as a form of secondary containment during transfers, loading and unloading;
   d. maintain a schedule of routine housekeeping and vacuuming to prevent the escape of plastic materials;

[191] *Id.*
[192] MARPOL Annex V; 33 U.S.C. § 1953.
[193] NPDES No. CAS000001 (2014).

e. develop a containment system designed to trap the smallest plastic material handled — including, for example, screens that can capture plastic pellets on discharge outfalls; and
f. report any exceedance of the zero discharge to the US Coast Guard within 2 working days.

Promulgation of standards to prevent discharges of plastic will protect aquatic life and marine habitat, and it will also reduce the amount of plastic that ends up in seafood.

V. Enforcement

The proposed rule does not indicate how it will be enforced and instead relies on the Coast Guard for the drafting of any enforcement mechanisms and relinquishes any EPA enforcement authority. The EPA should retain its authority to enforce Clean Water Act water pollution controls and should not hand it over to the Coast Guard—an agency that is not equipped to assume this type of enforcement responsibility. In addition, monitoring and reporting requirements should be strengthened EPA must consult on the impacts of the proposed rule on threatened and endangered species. Will the EPA continue to publish the NOIs for coverage under the rule similar to the VGP? The information contained in the NOIs submitted by the shipping industry is incredibly valuable to the public and should continue under the VIDA rule. Will the public be able to see compliance and enforcement documents without using FOIA to gain access? Currently the EPA forces the public to use FOIA to gain more insight into the compliance and enforcement of the VGP which is too burdensome. Any regulation under VIDA should increase public transparency and accountability. The ability of states to enact and enforce their own ballast water rules to protect themselves from pollution and invasive species needs to be restored. Finally, the VIDA regulation should maintain the right of citizens to petition courts if ballast water and other shipping pollution protections are too weak or not enforced.

VI. No Discharge Zones

While we are aware that the VIDA legislation allows for the application for No Discharge Zones for pollutants in addition to sewage—which is the only pollutant the CWA currently sets out for prohibition from discharge—the EPA is proposing to both take additional regulatory jurisdiction from states and increase the burden on states when applying to the Administrator for a No Discharge Zone under the CWA. It is unclear which discharges EPA might consider for inclusion in the creation of a No Discharge Zone. Also, would the more than 90 sewage No Discharge Zones around the country have to apply again when EPA designates additional pollutants for No Discharge Zone application? States are already free to ban discharges of pollutants into state waters with the exception of sewage and this rule would make it more difficult for states to act on their own for the many pollutants that are generated by the shipping industry. The one pollutant that make sense for inclusion is graywater since it is so closely related to sewage in its constituents. At a minimum, the language in section 139.52(vii) of the proposed regulation should be stricken from the rule as it is not indicated in the VIDA legislation itself that the No Discharge Zone regulations should be updated in this fashion and places additional burdens on the state to ban such discharges.

In Section 139.52 the proposed rule includes the following requirements as summarized in the proposed rule:

> EPA proposes that a state application for such a [No Discharge Zone] prohibition must include (i) a signature by the Governor; (ii) a certification that the protection and enhancement of the waters for which the state is seeking a prohibition require greater environmental protection than the applicable national standard of performance provides; (iii) a detailed analysis of how the requested prohibition for each individual discharge requested will protect the waters for which the state is seeking a prohibition; (iv) a table identifying types and number of vessels operating in the waterbody and a table identifying the types and number of vessels that will be the subject of the prohibition; (v) a map detailing the location, operating hours, draught requirements, and service capabilities of commercial and recreational pump-out facilities (both mobile and stationary) available to receive each individual discharge in the waters for which the state is seeking a prohibition; (vi) a table identifying the location and geographic area of each proposed no-discharge zone; and **(vii) a detailed analysis of how the vessels subject to the prohibition may be impacted with regards to collection capability, storage capability, need for retrofitting, travel time to facility, and safety concerns.**

EPA justifies this increase in burden by stating that "EPA is proposing that these additional procedures because its history with CWA Section 312 sewage no-discharge zones suggests that the statutory language does not provide enough detail or description to clearly define a workable process without additional clarification."

However, the regulatory language for the CWA provides plenty of detail for a No Discharge Zone application. 40 CFR § 140.4(a) already contains much of what is set out by EPA in the VIDA rule. At a minimum, subsection (vii) highlighted above in bold should be stricken from the VIDA rule as it is the addition that places an unreasonable burden on states applying for No Discharge Zones.

CWA regulations already request the following information from states requesting a No Discharge Zone:

> **§ 140.4** Complete prohibition.
> (a) Prohibition pursuant to CWA section 312(f)(3): a State may completely prohibit the discharge from all vessels of any sewage, whether treated or not, into some or all of the waters within such State by making a written application to the Administrator, Environmental Protection Agency, and by receiving the Administrator's affirmative determination pursuant to section 312(f)(3) of the Act. Upon receipt of an application under section 312(f)(3) of the Act, the Administrator will determine within 90 days whether adequate facilities for the safe and sanitary removal and treatment of sewage from all vessels using such waters are reasonably available. Applications made by States pursuant to section 312(f)(3) of the Act shall include:

> (1) A certification that the protection and enhancement of the waters described in the petition require greater environmental protection than the applicable Federal standard;
> (2) A map showing the location of commercial and recreational pump-out facilities;
> (3) A description of the location of pump-out facilities within waters designated for no discharge;
> (4) The general schedule of operating hours of the pump-out facilities;
> (5) The draught requirements on vessels that may be excluded because of insufficient water depth adjacent to the facility;
> (6) Information indicating that treatment of wastes from such pump-out facilities is in conformance with Federal law; and
> (7) Information on vessel population and vessel usage of the subject waters. 40 CFR § 140.4(a)

Adding additional burdens on states to include the details in the VIDA rule highlighted above is unreasonable as the applications for No Discharge Zones are already extremely detailed and significantly burdensome for states to complete. In most cases the applications take years to complete due to the diligence of state applicants and adding additional burdens that are not indicated by the VIDA legislation[194] is inappropriate. We request that the entire section be stricken from the VIDA rule since regulatory language already exists in 40 CFR § 140.4(a) and at a minimum, subsection (iiv) should be removed.

VII. Conclusion

For the reasons detailed in this correspondence the Center for Biological Diversity, Friends of the Earth, and the Wishtoyo Foundation request that the EPA revise the proposed rule for the Vessel Incidental Discharge Act.

Sincerely,

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[194] Section 903(a)(10)(D) of the VIDA legislation.