Via email and certified U.S. mail

October 31, 2019

Andrew Wheeler, Administrator
U.S. Environmental Protection Agency
Office of the Administrator, 1101A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
Wheeler.andrew@Epa.gov

Re: 60-Day Notice of Intent to Sue: Violations of the Clean Water Act; Failure to Identify Hawaiian Waters Impaired by Plastic Pollution

Dear Administrator Wheeler,

This letter serves as official notice of the Center for Biological Diversity's (the "Center") intent to file suit under section 505(a)(2) of the Clean Water Act ("CWA"), 33 U.S.C. § 1365(a)(2), against the United States Environmental Protection Agency ("EPA") and its Administrator for failing to perform a non-discretionary action under the CWA. Specifically, the Center intends to sue EPA for **violating its mandatory duty to identify Hawaiian coastal waters as impaired by plastic pollution**, as required by section 303(d) of the CWA, *id.* § 1313(d). EPA's failure to perform its non-discretionary duty to identify waters not meeting water quality standards constitutes a violation of the CWA.

EPA has ignored scientific evidence that plastic pollution is causing violations of Hawaii's water quality standards at seventeen different locations. According to existing water quality standards, all Hawaiian waters must be free of pollutants, and ocean waters must support marine life and coral reefs. Numerous studies have documented the presence of microplastics in the State's marine waters, including off Kamilo Beach on the Big Island, and the damage these plastics are doing to local ecosystems, including exposing fish, birds, sea turtles, and other sensitive wildlife to dangerous toxins that threaten their survival and reproduction; and jeopardizing public health. Studies also show that a significant portion of microplastics contaminating Hawaii's waters are from local sources within Hawaii.

EPA must recognize and list the coastal and oceanic waters impaired by plastic pollution in order to begin the process of reducing plastics in Hawaii's waters. If EPA does not revise Hawaii's list of impaired waters within 60 days, the Center will pursue litigation.

Plastic Pollution is Harmful to Hawaiian Water Quality

Plastic pollution poses a serious threat to Hawaii's water quality and vulnerable marine ecosystems. Microplastics, generally defined here as plastic particles that are less than 5

millimeters ("mm"), are especially emerging as a major threat to marine wildlife and water quality generally, and to Hawaiian waters specifically. Hawaii's open coastal and marine waters, and sandy bottom beaches are heavily impacted by microplastic pollution.

1. Microplastics Threaten Water Quality and Ecosystem Health

Trillions of pieces of plastic float in the global ocean, and billions more are found on beaches around the world. (Eriksen *et al.* 2014; van Sebille *et al.* 2015; Derraik *et al*. 2002; Barnes *et al.* 2009; Rodrigues *et al.* 2019). The vast majority of marine debris, including plastic, originates from land-based sources like urban runoff, inadequate waste disposal and management, and industrial activity (Gordon 2006). Unfortunately, the plastic pollution problem continues to grow. 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. (Thompson *et al.* 2004; Goldstein *et al.* 2013). 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. (Ellen MacArthur Foundation 2016).

Plastics harm wildlife and fisheries species both through physical effects of ingestion (*e.g.*, intestinal blockage) and by acting as a transfer agent for toxic chemicals. (Hammer *et al.* 2012). In addition, large plastic particles, such as derelict fishing gear, entangle fish and marine mammals and can lead to death. Many plastics adsorb persistent environmental chemicals[1] including polychlorinated biphenyls ("PCBs"), pesticides like dichlorodiphenyltrichloroethane ("DDT"), polycyclic aromatic hydrocarbons ("PAHs"), heavy metals, and dioxins. (Teuten *et al*. 2009; Hammer *et al.* 2012; Van *et al*. 2012; Rochman *et al*. 2013b; Wright *et al.* 2013; O'Donovan *et al.* 2018; Chen *et al.* 2019; CIEL 2019). 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. (Rios *et al.* 2007; Bakir *et al.* 2014; Anbumani & Kakkar 2018; Guzzetti *et al.* 2018; Karkarnorachaki *et al.* 2018).

Scientists have documented over 2,200 species impacted by marine debris, including many Hawaiian species, and at least 690 that have ingested microplastics. (Gall & Thompson 2015; CIEL 2019; Litterbase 2019).[2] For example, scientists have recorded ingestion of microplastic particles in all seven species of sea turtles. (Guzzetti *et al.* 2018; Duncan *et al.* 2019; Garrison & Fuentes 2019). This microplastic consumption exposes sea turtles to dangerous toxins and pathogens that affect reproduction and survival. (Schuyler *Et al.* 2012; Duncan *et al.* 2019; Garrison & Fuentes 2019; Guzzetti *et al.* 2018). 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. (Nelms *et al.* 2019). Plankton, invertebrates, fish, sea birds, sea turtles, and marine mammals all are known to adsorb, ingest, or otherwise uptake microplastics. (Anbumani & Kakkar 2018; Gall & Thompson 2015; Guzzetti *et al.* 2018O'Donovan *et al.* 2018; Duncan *et al.* 2019; Herrera *et al.* 2019). Trophic transfer of microplastics (*i.e.,* transfer up the food chain) also occurs, with the potential transfer of

[1] 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).

[2] *See also* Table 2, "Observed Ecotoxicity of Microplastics in Different Model Systems," *in* Anbumani & Kakkar 2018.

microplastics to humans when they eat shrimp, bivalves, fish, or other marine organisms containing these pollutants. (O'Donovan *et al.* 2018; CIEL 2019; Donohue *et al.* 2019; Ferreira *et al.* 2019; Herrera *et al.* 2019).

Marine species from plankton to invertebrates to large pelagic fishes have been shown to ingest microplastics (or prey that contain them). (Romeo *et al.* 2015). Thus, people who ingest aquatic plants or seafood may be exposed to dangerous levels of contaminants. (U.S. EPA 2006). Scientists have yet to fully investigate the human health implications of microplastic ingestion by fishes, but it stands to be serious, especially given the prevalence of microplastics in fish caught and sold for human consumption both nationally and internationally. (*See, e.g.,* Van Cauwenberghe & Janssen 2014; Bergmann *et al.* 2015; Rochman *et al.* 2015; 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, 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, shortened period of lactation). (CIEL 2019). 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. (Wasserman *et al.* 1979; Gobas *et al.* 1995; Rochman *et al.* 2013b).

2. Plastic Pollution Threatens Hawaiian Waters

Numerous studies have documented the presence of microplastics in Hawaii. These studies, detailed in our comments submitted October 30, 2015 and attached as Exhibit A, demonstrate the degree to which plastics have permeated Hawaiian waters, from the Big Island to the north-west Hawaiian Islands, and are impacting the State's marine resources.

In brief, many marine waters in Hawaii are contaminated by plastics. Studies have found high concentrations of microplastics in open coastal marine and oceanic waters, and microplastic samples are often contaminated with various persistent organic pollutants. (Eriksen et al. 2014; Rios et al. 2007). Thousands of pieces of mircoplastic pollution have been documented on various beaches on Kauai's north, east, and south shores. (Cooper & Corcoran 2010). A study of Kamilo beach on the Big Island showed that microplastic pollution in beach sediments increased permeability of the sediment and lowered subsurface temperatures, which could alter the sex determination of turtles. (Carson et al. 2011). Various beaches on Oahu, Molakai, Hawaii and Tern Island are contaminated with microplastics. (McDermid & McMullen 2004).

The environmental problems arising from the skyrocketing usage and disposal of plastics has long been documented in the scientific literature. Plastic pollution pollutes Hawaii's ocean waters, harms sensitive marine environments and wildlife, and jeopardizes human health.

The Clean Water Act and Hawaii's Water Quality Standards

Congress enacted the CWA, 33 U.S.C. §§ 1251, *et seq*., with the express purpose of "restor[ing] and maintain[ing] the chemical, physical, and biological integrity

of the Nation's waters." *Id*. § 1251(a). The goals of the CWA are to guarantee "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation" and to promptly eliminate water pollution. *Id.* § 1251(a).

Towards these goals, the CWA requires each state to establish water quality standards for bodies of water within the state's boundaries. *Id*. § 1313(a)-(c); 40 C.F.R. § 130.3. To do so, a state first designates the use or uses of a particular body of water (e.g., recreation, shellfish production), *see* 40 C.F.R. § 131.10, and then designates water quality criteria necessary to protect that designated use, *id*. § 131.11. These water quality standards include numeric criteria, narrative criteria, water body uses, and antidegradation requirements and should "provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation." *Id*. § 130.3.

Section 303(d) of the CWA then requires states to establish a list of impaired water bodies within their boundaries for which existing pollution controls "are not stringent enough" to ensure "any water quality standard applicable" will be met. 33 U.S.C. § 1313(d). "Each State shall assemble and evaluate all existing and readily available water quality related data and information to develop the list." 40 C.F.R. § 130.7(b)(5).

The state's list of impaired waters must include all water bodies that fail to meet "any water quality standard," including numeric criteria, narrative criteria, water body uses, and antidegradation requirements. *Id*. § 130.7(b)(1),(3) & (d)(2). The list must also include waters that are threatened, waters currently attaining water quality standards but are not expected to meet applicable water quality standards before the next listing cycle. *Id*. § 130.7(b)(5)(iv).

Relevant here, many of Hawaii's water quality standards relate to plastic pollution. First, all of Hawaii's waters "shall be free of substances attributable to domestic, industrial, or other controllable sources of pollutants." Hawaii Administrative Rules "HAR", § 11-54-4(a). Pollutants include materials that will settle to form bottom deposits; floating materials; substances that will result in objectionable color or turbidity in receiving waters; substances that are toxic or harmful to human, animal, plant or aquatic life; and substances that produce undesirable aquatic life. *Id.* § 11-54-4(a)1-5.

Second, Hawaii's ocean water must protect designated uses that include "the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment," *id.* § 11-54-3(c)(1) (for class AA waters), and recreation and aesthetic enjoyment and uses must be "compatible with the protection and propagation of fish, shellfish, and wildlife." *Id.* § 11-54-3(c)(2) (for class A waters). Class AA waters must also remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alternation of water quality from any human caused source or action. *Id.* § 11-54-2(c)(2).

Third, Hawaii protects the designated uses of reefs and reef communities, including mollusks, echinoderms, worms, crustaceans, and reef-building corals, and living coral thickets, mounds, or platforms. HAR § 11-54-7. Hawaii's marine bottom systems must "remain as nearly as possible in their natural pristine state with an absolute minimum of pollution from any human-

induced source" for class 1 ecosystems, *id.* § 11-54-3(d)(1), which class II ecosystems must be protected for the propagation of fish, shellfish and wildlife. *Id.* § 11-54-3(d)(2).

Finally, Hawaii has a general policy of water quality anti-degradation for all waters within its jurisdiction, where:

> (a) Existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
>
> (b) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the director finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the director shall assure water quality adequate to protect existing uses fully. Further, the director shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.
>
> (c) Where existing high quality waters constitute an outstanding resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected . . . .
>
> HAR, § 11-54-1.1

If any of these water quality standards are not met, Hawaii must include those water bodies on their impaired waters list. Once a state develops its impaired waters list, the state must submit the list to EPA, and EPA must approve, disapprove, or partially disapprove the impaired waters list. 33 U.S.C. § 1313(d)(2). If EPA disapproves a state's list, then EPA itself must establish a list of impaired waters within 30 days. *Id*. § 1313(d)(2); 40 C.F.R. § 130.7(d)(2). EPA must solicit and consider public comment on such listings. 40 C.F.R. § 130.7(d)(2).

Once a water body is listed as impaired pursuant to CWA section 303(d), the state has the authority and duty to control pollutants from all sources that are causing the impairment. Specifically, the state or EPA must establish total maximum daily loads of pollutants that a water body can receive and still attain water quality standards. 33 U.S.C. § 1313(d). States then implement the maximum loads by incorporating them into the state's water quality management plan and controlling pollution from point and nonpoint sources. *Id*. § 1313(e); 40 C.F.R. §§ 130.6, 130.7(d)(2). The goal of section 303(d) is to ensure that our nation's waters attain water quality standards whatever the source of the pollution.

Hawaii's Impaired Waters List

In 2015, the State of Hawaii solicited data for the preparation of the State's 2016 Water Quality and Assessment Report (Integrated Report), or list of impaired waters, pursuant to section 303(d) of the CWA. The Center submitted comments on microplastic pollution as detailed in this letter, and included the scientific sources that formed the basis for those comments. The State failed to examine the microplastic data submitted by the Center and did not list any waters as impaired due to plastic pollution. In its draft Report, the State said that it "reviewed [the Center's] data submittal and is not able to assess that information in the context of the IR at this time." The State submitted its 2016 Integrated Report to the EPA on December 15, 2017, acknowledging the Center's data submission but stating that "[a]t this time, the HIDOH-CWB will not list microplastics as a pollutant to state waters as the State does not have a numeric criterion specific to microplastics, or an assessment method to interpret its narrative criteria. Adopting a numeric water quality criterion for microplastics is beyond the scope of the Integrated Report." On February 15, 2018 EPA approved Hawaii's 2016 Integrated Report. In its approval letter, EPA stated that it had "reviewed the State's responses to public comments and has found the State's responses reasonable and in accordance with federal listing requirements."

In May 2018, without previously putting out a call for data, the State of Hawaii released a draft 2018 Integrated Report. The draft Report does not evaluate the microplastic data previously submitted by the Center, and no marine waters are listed as impaired due to plastic pollution. The state submitted the 2018 Integrated Report to EPA in June 2018. On August 16, 2018, EPA approved the State's 2018 Integrated Report without listing any plastic-impaired waters or acknowledging the data submitted by the Center on plastic pollution.

Violations of Hawaii's Water Quality Standards and Water Bodies to Be Listed as Impaired

EPA must list seventeen of Hawaii's coastal and oceanic waters as impaired due to plastic pollution. Specifically, EPA must list: (1) the open coastal marine and oceanic waters off the south-east coast of Hawaii; (2) oceanic waters off Necker Island; (3) oceanic waters off Nihoa Island; (4) oceanic waters between Nihoa and Niihau; (5) open coastal marine waters off Kaula; (6) open coastal waters off Tern Island; (7) open coastal waters of Kamilo Beach, Hawaii; (8) open coastal waters off Kalihiai, Kauai; (9) open coastal waters off Kealia, Kauai; (10) open coastal waters of Lydgate, Kauai; (11) open coastal waters of Mahaulepu, Kauai; (12) open coastal waters off Nankuli Beach, Oahu; (13) open coastal waters off North Halawa Valley, Molokai; (14) open coastal waters off South Halawa Valley, Molokai; (15) open coastal waters off Green Sands Beach, Hawaii; (16) open coastal waters off North Waipio Valley, Hawaii; and (17) open coastal waters off South Waipio Valley, Hawaii.

A number of studies document the presence of microplastics in these Hawaiian waters in violation of several water quality standards.[3] EPA has a duty to ensure that all

[3] Those studies, detailed in the Center's comment letter dated October 30, 2015, include: (1) Eriksen et al. 2014 - Net tows in open coastal marine and oceanic waters of Hawaii and in the north-west Hawaiian Islands ("NWHI") found high concentrations of microplastics (>49,000 particles/km2); (2) Rios et al. 2007 - Microplastic samples collected from beaches on Tern Island and Hawaii Island were contaminated with various persistent organic

existing water quality related data is evaluated, 40 C.F.R. § 130.7(b)(5), and must list these water bodies as impaired under section 303(d) of the CWA because existing pollution controls are insufficient for them to meet the State's water quality standards. *See* 33 U.S.C. § 1313(d). EPA's failure to consider the best scientific data on microplastics and identify each of these waters as impaired by plastic pollution under section 303(d), 33 U.S.C. § 1313(d), constitutes a violation of the CWA.

1. The Open coastal marine and oceanic waters off the south-east coast of Hawaii; oceanic waters off Necker Island; oceanic waters off Nihoa Island; oceanic waters between Nihoa and Niihau; and open coastal marine waters off Kaula

The open coastal marine and oceanic waters of south-east Hawaii, open coastal waters of Kaula Island, and oceanic waters of various Northwestern Hawaiian Islands warrant listing because water samples indicate various water quality violations as summarized in Table 1, pages 18-19 of the Center's 2015 comments ("Table 1"). Data from Erikson et al. 2014 indicate that due to high concentrations of microplastics, open coastal waters off the south-east coast of Hawaii, considered a class AA water body, are not in its "natural pristine state . . . with an absolute minimum of pollution or alteration of water quality from a human caused course." HAR, § 11-54-3(c)(1).

The data from Eriksen et al. (2014) also demonstrate that these bodies of water violate water quality standards HAR, § 11-54-4(a)1-5, as none of them are free of "substances attributable to domestic, industrial, or other controllable sources of pollutants." The controllable source of pollutants, in this case microplastics, qualify as floating materials, materials that will settle to form bottom deposits, substances that will result in objectionable color or turbidity in receiving waters, substances that are toxic or harmful to human, animal, plant or aquatic life, and substances that produce undesirable aquatic life. The waters must be listed even if the source of microplastics is unknown or from non-local origin due Hawaii's proximity to the North Pacific gyre (Moore et al. 2001). Notably, Carson et al. (2013) demonstrated that the south-east of Hawaii acts as a sink for plastic pollution originating from Hilo and Pohoiki (Carson et al. 2013). Thus, a substantial proportion of the microplastics documented by Eriksen et al. (2014) is from land-based sources in Hawaii.

Other data collected off the south-east coast of Hawaii by Erikson et al. (2014) exhibit high concentrations of microplastics, demonstrating that the waters violate designated use water quality standard HAR, § 11-54-3(c)(1). Class AA waters must be protected for "the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment." The endangered hawksbill turtle (*Eretmochelys*

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pollutants including polycyclic aromatic hydrocarbons ("PAHs"), polychlorinated biphenyls ("PCBs"), and dichlorodiphenyltrichloro-ethanes ("DDTs"); (3) Carson et al. 2011 - A study of Kamilo Beach on the island of Hawaii showed that microplastic pollution in beach sediments increased permeability of the sediment and lowered subsurface temperatures, which could alter the sex determination of sea turtles; (4) Cooper & Corcoran 2010 - Thousands of pieces of microplastic pollution were documented on various beaches on Kauai's north, east and south shores; (5) McDermid & McMullen 2004 - A study sampling various beaches on Oahu, Molokai, Hawaii, and Tern Island found a total of 811 microplastics. These studies, and the Center's comment letter, are attached as Exhibit A.

imbricata) forages in waters surrounding the island of Hawaii, and nest on various beaches on the south-east coast of the island (NOAA). Hawksbill turtles are known to ingest, and are therefore vulnerable to the dangers associated with, plastic pollution including starvation due to false sense of satiation, intestinal blockage, and transfer of dangerous chemicals (Schuyler et al. 2015). The levels of microplastics found in waters in which hawksbill turtles forage threatens their ability to propagate successfully.

The deleterious impacts of microplastics on marine life, including shellfish, pelagic fish, sea turtles, seabirds and coral reefs are well documented and are discussed at length above. The levels of microplastics documented in these waters threaten the propagation of marine life, as well as the conservation of coral reefs and thus violate HAR, § 11-54-3(c)(1). In addition, because of the high concentration of microplastics documented by Eriksen et al. (2014), all of the above waters listed violate Hawaii's anti-degradation standards which require that the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife (HAR, § 11-54-1.1).

2. Open coastal waters off Tern Island

The open coastal waters off beaches on Tern Island should be designated as impaired, as data reported by Rios et al. (2007) indicate water quality violations summarized in Table 1. Microplastic samples taken from heavily polluted beaches on Tern Island contained elevated levels of persistent organic pollutants including PCBs (980ng/g) and PAHs (500ng/g). McDermid & McMullen (2004) found hundreds of fragments of plastics on South Beach, Tern Island, the majority of which were microplastics.

The open coastal waters off the beaches of Tern Island are in violation of HAR, § 11-54-3(d)(1) which states that class I marine bottom ecosystems must "remain as nearly as possible in their natural pristine state with an absolute minimum of pollution from any human-induced source" and "to the extent possible, the wilderness character of these areas shall be protected." The presence of microplastics on a remote, uninhabited beach, indicate that the plastic debris was deposited via the surrounding waters. Indeed, a 16-year study spanning from 1990 through 2006 found the annual deposition rate of debris on Tern Island, of which 71% was composed of plastic, ranged from 1,116 in 2001 to 5,195 items in 2004 (Friedlander et al. 2005; Morishige et al. 2007). Such incredibly high volumes of plastic deposited on beaches demonstrates that the surrounding waters are impaired. The plastic is obviously of human origin, and the threat it poses to wildlife degrades the wilderness character of the area. Thus these waters violate HAR, § 11-54-3(d)(1).

The data from Rios et al. (2007) and McDermid & McMullen (2004) also demonstrate that the open coastal waters off the beaches of Tern Island bodies violate water quality standards HAR, § 11-54-4(a)1-5, as they are not free of "substances attributable to domestic, industrial, or other controllable sources of pollutants." Microplastics qualify as floating materials, materials that will settle to form bottom deposits, substances that will result in objectionable color or turbidity in receiving waters, substances that are toxic or harmful to human, animal, plant or aquatic life, and substances that produce undesirable aquatic life.

The open coastal waters off the beaches of Tern Island also violate Hawaii's anti-degradation standards which require that the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife. *See* HAR, § 11-54-1.1. Tern Island is ecologically important for numerous species of wildlife, including seabirds, the endangered Hawaiian monk seal (*Monachus schauinslandi*), and the threatened Hawaiian green turtle (*Chelonia mydas*). Ninety percent of Hawaiian green turtles nest in the French Frigate Shoals, including Tern Island. Considering the findings of Carson et al. (2011), that show how changes in physical properties on Hawaiian beaches due to microplastic pollution may have detrimental ecological consequences for nesting sea turtles, the high occurrence of microplastics on Tern Island is of particular concern. Green turtles have also been shown to ingest microplastics. This can lead to bodily harm or death by blocking the gut, piercing the gut wall, or by starvation through a false sense of satiation (Schuyler et al. 2013).

Tern Island provides nesting habitat for millions of seabirds, including numerous species at risk of ingestion of plastic pollution. A study by Wilcox et al. (2015) found that the black-footed albatross (*Diomedea nigripes*), Laysan albatross (*Diomedea immutabilis*), short-tailed albatross (*Diomedea albatrus*), brown booby (*Sula leucogaster*), masked booby (*Sula dactylatra*), red-footed booby (*Sula sula*), great frigatebird (*Fregata minor*), bonin petrel (*Pterodroma hypoleuca*), Bulwer's petrel (*Bulweria bulwerii*), Tristram's storm petrel (*Oceanodroma tristrami*), Christmas shearwater (*Puffinus nativitatis*), wedge-tailed shearwater (*Puffinus pacificus*), and red-tailed tropic bird (*Phaethon rubricauda*), all found within the Hawaiian Islands, are at risk of ingestion of plastic pollution.

Persistent organic pollutants are considered among the most persistent anthropogenic organic compounds introduced into the environment. As discussed above, some of these are highly toxic and have a wide range of chronic effects, including endocrine disruption and carcinogenicity, as well as ecological impacts including decreased fish populations (McKinley & Johnston 2010). While scientists lack a thorough understanding of how to evaluate the risks associated with chemicals derived from marine plastics, emerging evidence that these compounds can transfer to the tissue of organisms at various trophic levels warns us that the environmental impacts of discarded plastics should not be underestimated (Teuten et al. 2015). The EPA found that biomagnification of contaminants up the food chain via the ingestion of microplastics may contribute to the loading of PCBs and other contaminants found in the sensitive environments on and around Tern Island (EPA 2014).

Considering the diversity of wildlife present on Tern Island that is threatened by plastic pollution, the presence of microplastics on beaches of Tern Island indicate that the pollution in the coastal marine waters endanger the propagation of numerous species of wildlife, violating HAR, § 11-54-1.1.

3. Open coastal waters of Kamilo Beach, Hawaii

The open coastal waters off of Kamilo Beach need to be listed as impaired because site specific data show numerous water quality violations summarized in Table 1.

Carson et al. (2011) found that the majority of 66 sediment samples from Kamilo Beach contained microplastics. Data show that Kamilo Beach is heavily impacted from plastic pollution, with the top 5 cm of Kamilo Beach averaging over 3% plastic by weight, with a maximum observed value of 30.2% (Carson et al. 2011). Rios et al. (2007) found that microplastics taken from Kamilo Beach were contaminated with persistent organic pollutants including PCBs (55ng/g).

The open coastal waters surrounding Kamilo Beach, a class II marine bottom ecosystem, are in violation of water quality standards HAR, § 11-54-4(a)1-5, as they are not free of "substances attributable to domestic, industrial, or other controllable sources of pollutants." Microplastics are pollutants because they are floating materials, materials that will settle to form bottom deposits, substances that will result in objectionable color, substances that are toxic or harmful to human, animal, plant or aquatic life, and substances that produce undesirable aquatic life.

Local sources of pollution contribute significantly to plastic on Kamilo Beach. Some plastic pollution accumulates as a consequence of Hawaii's proximity to the major debris accumulation zone of the North Pacific Gyre (Howell et al. 2012; Ribic et al. 2012; Carson et al. 2013). The microplastic pollution documented by Carson et al. (2011) on Kamilo Beach is a manifestation of surrounding waters severely impacted by microplastic pollution. Importantly, a significant portion of the plastic debris is of local origin, though it is not littered directly onto the beach, as Kamilo Beach is difficult to access. Carson et al. (2013) demonstrated that plastic pollution originating from more densely populated areas of Hawaii is deposited on various beaches throughout the archipelago, including Kamilo Beach, via ocean currents. Thus, a substantial proportion of the microplastics documented by Carson et al. (2013) are from local sources within Hawaii and can be controlled locally. The data from Carson et al. (2010) and Rios et al. (2007) therefore demonstrate that water quality standards HAR, § 11-54-4(a)1-5 are not attained.

Data from Carson et al. (2011) and Rios et al. (2007) also suggest that designated uses for Kamilo Beach are not being attained. Class II marine bottom ecosystems must be protected for the propagation of fish, shellfish and wildlife (HAR, § 11-54-3(d)(2)). Carson et al. (2011) found that the presence of microplastics on Kamilo Beach increased permeability of the sediment and lowered subsurface temperatures. The authors conclude that microplastics deposited on beaches in modest concentrations reduce subsurface temperatures inducing a variety of effects on broad array of organisms including those with temperature-dependent sex determination such as sea turtles (Carson et al. 2011). For example, even low concentration of plastic (1.5%) decreased the maximum temperature of sediments by 0.75ºC. Considering that hawksbill turtles (Eretmochelys imbricata) demonstrated a shift from 100% males to 100% females over only a 1.8 C window, these relatively modest changes are relevant to the window of sex-determination temperatures in sea turtles (Carson et al. 2011). Hawksbill turtles nest on various beaches on the south-east coast of Hawaii, and forage in waters surrounding the island (NOAA), and are directly threatened by the presence of microplastics in these waters. Taken in consideration with information presented above on the various ecological impacts of microplastics on nearshore environments and beach dwelling organisms, it is clear that the presence of microplastics in quantities observed on

Kamilo Beach by Carson et al. (2011) threaten to impede the propagation of a variety of species of marine wildlife, and therefore violate HAR, § 11-54-3(d)(2).

Finally, because of the significant amount of microplastic present on Kamilo Beach, the surrounding waters violate Hawaii's anti-degradation standards which require that the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife. *See* HAR, § 11-54-1.1.

4. Open coastal waters off Kalihiai, Kauai, open coastal waters off Kealia, Kauai; open coastal waters of Lydgate, Kauai; and open coastal waters of Mahaulepu, Kauai

The open coastal waters off the beaches of Kalihiwai, Kealia, Kauai, Lydgate, and Mahaulepu on Kauai need to be listed as impaired because site specific data shows numerous water quality violations summarized in Table 1 of the Center's comments.

A total of 2,539 pieces of plastic were collected from beaches on Kauai in March 2008, the majority of which were plastics <5cm; many were microplastics (Cooper & Corcoran 2010). The rate of accumulation of plastics on a typical Kauai Beach was also estimated by collecting plastic over 11 days on Maha'ulepu; an average of 484 pieces/day were deposited on the beach from the surrounding waters (Cooper & Corcoran 2010). Once plastic is deposited onto beaches, chemical and mechanical processes degrade plastic debris into smaller pieces, exacerbating the problem of microplastic pollution (Corcoran et al. 2009; Cooper & Corcoran 2010).

Data from Cooper & Corcoran (2010) demonstrate that the waters off of the beaches of Mahaulepu, Lydgate, Kalihiwai, and Kealia on Kauai are out of compliance with HAR, § 11-54-3(d)(2), which requires that class II ecosystems must be protected for the propagation of fish, shellfish and wildlife. As reviewed above, and discussed by Carson et al. 2011, even modest concentrations of microplastics are likely to have ecological consequences on a broad array of marine and beach dwelling organisms, and are thus threaten the propagation of marine wildlife.

Lastly, because of the significant amount of microplastic deposited on the beaches of Kauai, the adjacent coastal waters violate Hawaii's anti-degradation standards which require that the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife. *See* HAR, § 11-54-1.1.

5. Open coastal waters off Nankuli Beach, Oahu; open coastal waters off North Halawa Valley, Molokai; open coastal waters off South Halawa Valley, Molokai; open coastal waters off Green Sands Beach, Hawaii; open coastal waters off North Waipio Valley, Hawaii; and open coastal waters off South Waipio Valley, Hawaii

The coastal waters off the beaches listed in the heading above are impaired due to abundance of microplastics as shown in McDermid & McMullen (2004), violating numerous water quality standards summarized in Table 1. Over 800 pieces of plastic were collected on some of the more remote beaches of the Hawaiian Islands, over 90% of which were <4.75 mm. All beaches sampled were polluted with microplastics deposited from coastal waters.

The open coastal waters adjoining the beaches listed above, class II marine bottom ecosystems, are in violation of water quality standards HAR, § 11-54-4(a)1-5, as they are not free of "substances attributable to domestic, industrial, or other controllable sources of pollutants." Microplastics are pollutants because they are floating materials, materials that will settle to form bottom deposits, substances that will result in objectionable color, substances that are toxic or harmful to human, animal, plant or aquatic life, and substances that produce undesirable aquatic life. Therefore data from McDermid & McMullen (2004) show this water quality standard is not attained.

Class II marine bottom ecosystems must be protected for the propagation of fish, shellfish and wildlife HAR, § 11-54-3(d)(2). Data presented in McDermid & McMullen (2004) indicate that Halawa Valley North on Molkai is heavily impacted by microplastic pollution. Because of the significant ecological impacts to wildlife associated with microplastic pollution discussed at length above, the data indicate that waters off Halawa Valley do not attain this water quality standard.

Because of the significant amount of microplastic documented on Halawa Valley North on Molokai, the surrounding waters violate Hawaii's anti-degradation standards which require that the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife. *See* HAR, § 11-54-1.1.

Conclusion

For the above reasons, EPA must designate as threatened or impaired the specific water bodies identified in this letter. EPA's failure to do so threatens sensitive wildlife, marine ecosystems, and public health with plastic pollution. By identifying areas listed as impaired, the State of Hawaii can begin to develop strategies to lessen the local sources of plastic pollution, and better protect public health and the environment from harmful microplastics.

If EPA does not take action to remedy the violations discussed in this letter, within 60 days, we will pursue litigation in federal court. Please let me know if you have any questions.

Sincerely,

/s/ Emily Jeffers
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