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BEFORE THE SUBCOMMITTEE ON INTERIOR, ENVIRONMENT, AND RELATED
AGENCIES
HOUSE COMMITTEE ON APPROPRIATIONS
ON MARINE DEBRIS**

SEPTEMBER 19, 2019

Good morning Chair McCollum, Ranking Member Joyce, and members of the Subcommittee. Thank you for the opportunity to discuss marine debris and its impact on wildlife. My testimony will focus on the U.S. Fish and Wildlife Service's (Service) role in addressing the threat of marine debris to our ocean and coastal areas.

Marine Debris Overview

Marine debris is one of the most pervasive global threats to the health of the world's coastal areas, oceans, and waterways. It is an issue of local, regional, national, and international concern. Marine debris can injure or kill marine and coastal wildlife; damage and degrade habitats; interfere with navigational safety; cause economic loss to fishing and maritime industries; degrade the quality of life in coastal communities; and threaten human health and safety. The Service works collaboratively with Federal and non-Federal partners to address marine debris and its impacts on wildlife.

Marine debris is defined as "any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or Great Lakes" (33 U.S.C. 1951 et seq., as amended by in 2012 by Title VI of Public Law 112-213 and 2018 by Public Law 115-265). Anything man-made – such as fishing gear, plastic bags, beverage bottles, balloons, food wrappers, and even vessels – can become marine debris through dumping, improper waste management, litter that is blown or washed out to sea through storm drains, and extreme natural events which can transport both small and large items into the ocean. Major marine debris events caused by natural disasters, such as the 2017 hurricanes Harvey, Irma and Maria and 2018 typhoon Yutu, continue to bring national and international attention to the marine debris issue.

It is believed that at least 8 million tons of plastic end up in our oceans every year, and make up 80 percent of all marine debris from surface waters to deep-sea sediments. The National Oceanic and Atmospheric Administration (NOAA) estimates there are somewhere between 20 million and 1.8 billion pieces of plastic along the coastline of the United States, with the number likely at the upper end of this range. Marine debris can be found even in the deepest parts of our ocean. For example, a plastic bag was documented in 2016 by the Okeanos Explorer submersible at Enigma Seamount in the Arc of Fire National Wildlife Refuge, part of the Marianas Trench Marine National Monument.

There are three main types of marine debris that impact wildlife: plastics, derelict fishing gear, and abandoned and derelict vessels. Each is discussed briefly below.

Plastics and Microplastics

Plastics are one of the most extensive types of marine debris. They are commonly used in many items, and as society has developed new uses for them the variety and quantity of plastic items found in the marine environment has increased dramatically. Plastics are now known to break down into smaller components, called microplastics. Microplastics and their associated toxic chemical components contribute to human and wildlife health risks as the toxic microplastics are ingested and move through the marine food web.

The impact of these plastics isn't limited to our oceans. Research in 2014 discovered that plastic particle counts reached one million plastic particle parts per square mile in Lake Erie, with higher counts found in Lake Ontario;¹ The Great Lakes have among the highest densities of microplastics recorded. Microfibers, a type of microplastic, are also pervasive in the marine environment, and while our knowledge of the impacts of microfibers is limited, they make up the majority of microplastics, and can even be found in the seafood we consume.

Plastics such as bottle caps, balloons, and lighters are mistaken for food or the debris item may have been attached and ingested accidentally with other food by wildlife such as sea turtles, seabirds, and marine mammals. Plastic ingestion leads to loss of nutrition, internal injury, intestinal blockage, starvation, and death in wildlife. Seabirds are especially vulnerable to plastic pollution; a recent study found plastic in 90 percent of seabirds.² In addition to plastic ingestion, other debris such as packing bands, balloon strings, rubber bands, six-pack rings, and mesh bags can lead to entanglement. Entanglement affects many different types of animals: 44 sea bird species, nine cetacean species, 11 pinniped species, 31 invertebrate species/taxa, and six sea turtle species reported entangled in marine debris in the United States.³ Recovery Plans for Endangered Species Act listed loggerhead, leatherback, green, and Kemp's Ridley sea turtles all list marine debris as one of the highest priority threats facing these protected species.

Derelict Fishing Gear

A second highly visible and impactful form of marine debris is derelict fishing gear (DFG). DFG has numerous impacts on the environment, including: damaging marine habitats, entangling marine species including seabirds and marine mammals, creating hazards to navigation, and ghost fishing of commercially important species resulting in lost catch opportunities and economic losses for fishermen. One of the most notable types of impacts from this type of marine debris is wildlife entanglement. Derelict nets, ropes, line, or other fishing gear can wrap around marine life. Entanglement has led to injury, illness, suffocation, starvation, and death.

Sea turtles are at great risk for entanglement in marine debris, and this has caused injuries and in many cases death for a variety of sea turtle species. One study found that between 1997–2009, over 1,000 sea turtles were found stranded in Florida due to entanglement in fishing gear.⁴ Some of these entanglements resulted from netting and monofilament line that accumulated on both artificial and natural reefs. These areas are often heavily fished, resulting in snagging of hooks

and discarding of lines. Turtles foraging and/or resting in these areas can become entangled and drown.

Bird species become entangled when swimming in bodies of water where line and netting is carelessly discarded, and sometimes use fishing line and netting fragments as nesting material, which can lead to entanglement of both the parents and chicks. Easy solutions for responsible fishers include proper disposal of monofilament line and awareness of safe procedures for dehooking and disentangling entrapped birds.

Abandoned and Derelict Vessels

Abandoned and derelict vessels (ADV) are a third highly visible type of marine debris with thousands littering our nation's coastal waters. ADVs threaten oceans, coasts, and waterways by obstructing navigational channels, causing harm to the environment, and diminishing commercial and recreational activities. ADVs may pose an immediate or future threat to wildlife and wildlife habitat from the release of hazardous substances to surrounding areas. ADVs may occur in large numbers, following a natural disaster such as a hurricane, or as a single vessel. Following the 2017 hurricanes, the Service and its partners removed damaged vessels from Florida, Puerto Rico, U.S. Virgin Islands National Wildlife Refuges and adjacent communities.

ADV occurring in remote locations are difficult to reach for cleanup and assessment of the impacts. Removal of such ADVs is very expensive and technical. As an example, in 1993 Jin Shiang Fa wrecked at Rose Atoll National Wildlife Refuge in American Samoa. Although the sum of the wreck was removed initially by the responsible party, over 215 tons of debris were left behind on the perimeter of the reef and lagoon when funds ran out. Iron debris from the wreck caused an overgrowth of cyanobacteria, which the Service and partners continue to monitor. The Service has also removed nearly one million pounds of shipwrecks at Palmyra Atoll and Kingman Reef National Wildlife Refuges, which fueled outbreaks of algae and invasive corallimorphs.

Examples from Across the National Wildlife Refuge System

The National Wildlife Refuge System (Refuge System), managed by the Service, is the world's premier network of public lands devoted to conserving wildlife and habitat for the benefit of future generations. There are over 850 million acres of land and water in the Refuge System, which preserves a diverse array of terrestrial, wetland, and ocean ecosystems. The Refuge System plays an essential role in providing outdoor recreation opportunities to the American public and the associated economic benefits to local communities. The Refuge System includes more than 180 refuges and over 750 million acres that protect ocean, coastal or Great Lakes habitats. Spanning from above the Arctic Circle to south of the Equator, the Refuge System protects an incredible diversity of marine and coastal ecosystems, including salt marshes, rocky shorelines, tide pools, sandy beaches, kelp forests, mangroves, seagrass meadows, barrier islands, estuaries, lagoons, tidal creeks, tropical coral atolls, as well as open ocean. Marine debris is an issue that impacts coastal and island refuges across the country. Examples include:

Northwestern Hawaiian Islands and Midway Atoll National Wildlife Refuges

The Northwestern Hawaiian Islands are made up of dozens of tiny islands, atolls and shoals, spanning 1,200 nautical miles of the world's largest ocean. These remote islands and atolls are home to an ecosystem that hosts more than 7,000 species, including marine mammals, fishes, sea turtles, birds, and invertebrates. At least one quarter are endemic and found nowhere else on Earth. These remote islands are rarely visited, and often considered to be some of the most pristine places on earth. However, plastic from the "Great Pacific Garbage Patch," an enormous area where high concentrations of litter – the majority of which are microplastics – accumulates here.

Annual accumulation of marine debris within the Papahānaumokuākea Marine National Monument, which includes the Midway Atoll and Northwestern Hawaiian Islands National Wildlife Refuges, is estimated at 52 metric tons per year.⁵ Much of this debris is comprised of derelict fishing gear: 848 metric tons (more than 900 tons or 1.9 million pounds) have been recovered since 1996. The Northwestern Hawaiian Islands are home to approximately 70 percent of the tropical, shallow-water coral reef habitat in the nation. Derelict fishing gear threatens these reefs, as well as the threatened and endangered turtles, dolphins, seals, and other wildlife that inhabit them.

Tern Island is an important nesting site for Hawaiian green sea turtles, a monk seal pupping site, and home to many bird species. There, storms have eroded the islands' shores, exposing debris that entraps monk seals and sea turtles. Midway Atoll is home to nearly three million birds, including endangered Laysan ducks, the world's largest albatross colony, and 19 other seabird species. The oldest known wild bird continues to nest at Midway, a Laysan albatross named Wisdom that is at least 68 years old and currently raising another chick. Albatross scour thousands of ocean miles in search of food for their young. Along with fish, they scoop up plastic debris. The stomachs of nearly all dead albatross chicks contain plastic (e.g. cigarette lighters, parts of toys, and fishing gear) all fed to them by their parents. It is estimated that albatross carry over 5 tons of plastic to Midway each year to feed their chicks. Another 5-10 tons of marine debris washes up on Midway beaches each year. Recent studies indicate that there is a 20.4 percent chance of lifetime mortality for seabirds ingesting a single debris item, rising to 100 percent after consuming 93 items.⁶

The Service partners with NOAA and the U.S. Coast Guard to remove much of the marine debris on Midway and in the Northwestern Hawaiian Islands. The nets and plastics are brought back to Honolulu aboard the NOAA ship or charter vessel. A key partner in the recycling process, Schnitzer Steel (a metal recycling company) chops the fishing nets into small pieces. The net pieces are then transported to the City and County of Honolulu's H-Power Plant (a Covanta Energy Corporation facility), where they are safely incinerated to produce electricity for the island of Oahu.

Maine Coastal Island National Wildlife Refuge Complex

The Maine Coastal Islands National Wildlife Refuge Complex consists of five individual refuges that span the coast of Maine and support an incredible diversity of habitats, including coastal islands, forested headlands, estuaries, and freshwater wetlands. All totaled, the Refuge includes approximately 8,238 acres of diverse coastal Maine habitats, including forested and non-forested

offshore islands, coastal salt marsh, open field, and upland mature spruce-fir forest. The majority of the islands within the refuge are considered nationally significant nesting islands and support endangered and threatened species, colonial nesting seabirds, wading birds, and waterfowl.

The islands and Refuge shoreline accumulate marine debris throughout the year, but especially during seasonal storms and high tides when debris, including derelict lobster traps, washes ashore. This derelict gear poses threats to the breeding birds that use the islands for nesting. Cleanups held by the Refuge in past years have collected over 19,200 pounds of marine debris from a 0.66 mile section of shoreline. The Refuge continues to work with the community and partners, such as Maine Audubon, to support cleanups. Planning cleanup efforts on Refuge islands is logistically challenging as it requires calm seas, and volunteers and transportation to/from the cleanup site, as well as transfer of the debris to the mainland.

Florida Keys National Wildlife Refuge Complex

The Florida Keys National Wildlife Refuges Complex includes Key West National Wildlife Refuge, Great White Heron National Wildlife Refuge, and Crocodile Lake National Wildlife Refuge. Key West Refuge is among the first refuges established in the United States. President Roosevelt created the Refuge in 1908 as a preserve and breeding ground for colonial nesting birds and other wildlife. The Refuge encompasses 208,308 acres of land and water, only one percent of which (2,019 acres) is land. It contains vital feeding, breeding areas, and nesting beaches for both green and loggerhead sea turtles.

In 2017, Hurricane Irma delivered a significant blow to the communities and wildlife of the Florida Keys. The storm broke up fragile coral reefs, uprooted sponges, and blanketed the seafloor with sediment. Irma also left in its wake a significant amount of marine debris, which may float subsurface, making navigation challenging, or become submerged, causing damage to reef resources. An estimated 1,800 vessels sunk due to the hurricane, many of which were in the Keys, and Florida lobstermen estimated losing over 150,000 traps. Refuge beaches, important for nesting sea turtles and surrounded by seagrass habitats where turtles forage, were heavily impacted during the height of nesting season. The traps, ropes and buoys created dangerous obstacles for sea turtles and other wildlife. Following the hurricane, Refuge staff engaged in a complex exercise alongside Federal, State, and local partners to clean up Refuge lands and waters. Today, the Refuge continues to repair/restore infrastructure and habitats impacted by the storm, and to study impacts of resulting marine debris on wildlife resources.

Conclusion

The scope of marine debris and its impacts on wildlife is serious. The effects of marine debris can be observed at most of the Service's coastal and island refuges across the country. It also affects many species, including threatened and endangered plants and animals that the Service is working to recover. Preventing and cleaning up marine debris can be addressed by ensuring a comprehensive approach that is local in scale and global in scope, directed primarily at source prevention and education. Investing in prevention and education will reduce the threat of marine debris to wildlife and habitats, and future conservation efforts are likely to be less costly, more flexible, and more successful over time.

Addressing marine debris is a complex task that requires the engagement of multiple Federal agencies, State and local governments, Tribes, industry, and the international community. To that end, the Service participates in the Interagency Marine Debris Coordinating Committee (IMDCC), a multi-agency group tasked with ensuring that this comprehensive approach is implemented. The unanimous passage and 2018 signing of the Save our Seas Act, which extended NOAA's marine debris program for five years and focused efforts on addressing the waste stream at an international level, was also an important step towards addressing the problem of marine debris.

Marine debris is preventable through increased public awareness, changing individuals' behaviors, and movement towards an economy of reduced pollution and waste. The Service works to educate visitors to National Wildlife Refuges on the impacts of marine debris to humans and wildlife, and benefits from the commitment of hundreds of volunteers who participate in marine debris cleanups and citizen science on our National Wildlife Refuges. We are also working with Federal and non-Federal partners to better understand the causes and effects of marine debris, identify strategies to address this issue, and educate the public on ways they can be a part of the solution.

¹ Mason, S.A., Eriksen, M., and Edwards, W.J. (2014). "Great Lakes Plastic Pollution Survey," 57th Annual Conference on Great Lakes Research (IAGLR 2014), Hamilton, Ontario.

² Wilcox, C., E. V. Seville, and B. D. Hardesty. 2015. Plastic in seabirds is pervasive and increasing. *Proceedings of the National Academy of Sciences* 201502108; DOI: 10.1073/pnas.1502108112.

³ National Oceanic and Atmospheric Administration Marine Debris Program. 2014 Report on the Entanglement of Marine Species in Marine Debris with an Emphasis on Species in the United States. Silver Spring, MD. 28 pp

⁴ Adimey, N.A, C.A. Hudak, J.R. Powell, K. Bassos-Hull, A.Foley, N.A. Farmer, L. White, and K. Minch. Fishery gear interactions from stranded bottlenose dolphins, Florida manatees and sea turtles in Florida, U.S.A. *Marine Pollution Bulletin* 81: 103-115.

⁵ O. J. Damero, M. Parke, M. A. Albins, and R. Brainard. 2007. Marine debris accumulation in the Northwestern Hawaiian Islands: An examination of rates and processes. *Marine Pollution Bulletin* 54:4, p. 423-433.

⁶ L. Roman, B.D. Hardesty, M. A. Hindell, and C. Wilcox. 2019. A quantitative analysis linking seabird mortality and marine debris ingestion *Scientific Reports* v. 9, Article number: 3202.