

WRITTEN TESTIMONY OF DR. JONATHAN BAILLIE

Executive Vice President and Chief Scientist
National Geographic Society

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“Cleaning Up the Oceans: How to Reduce the Impact of Man-Made Trash on the
Environment, Wildlife, and Human Health?”

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Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee, I would like to thank you for holding this timely hearing about cleaning up our world's oceans. The Committee's leadership on this global crisis is critical, and I am grateful for the opportunity to share my expertise on behalf of National Geographic and to assist with your mission.

As my testimony will further demonstrate, understanding and addressing how man-made trash reaches and impacts our oceans is a top priority for National Geographic. Our world's oceans are deeply impacted by human activities, including overfishing, man-made pollutants, and beyond.

Due to its widespread and consistently increasing use, plastic is one of the top threats to the environment, marine wildlife, human health, and the economy. Whether it takes the form of abandoned fishing nets or litter making its way into our oceans, and whether the pieces are large or small, the world's unchecked use of plastics has sparked a global crisis.

PLASTICS: A GLOBAL CRISIS

There are about 9.2 billion tons of plastic in the world today. And nearly 500 million tons of plastic continue to be produced annually.

About 40 percent — or roughly 180 million tons — of this annual total is only used once before being discarded. This leaves more than 6.9 billion tons, or over 75 percent of the plastic existing globally, as plastic waste.

Unlike most other consumer materials, no one knows how long it takes plastic to biodegrade completely, with estimates ranging from 450 years to never. This leaves our world with an ever-increasing amount of plastic waste.¹

¹ Laura Parker, “Plastic: We made it. We depend on it. We're drowning in it.” *National Geographic*, June 2018, 40-69.

An estimated 150 million tons of plastic are currently circulating in our marine environments.² And a 2015 study found that between 5.3 and 14 million additional tons of plastic enter the ocean each year.³

Due to plastic's relatively recent introduction, more research into its impact on our oceans is needed. However, some alarming consequences have already been identified.

Impact of Plastic Debris on Marine Wildlife⁴



Photo by Brian Skerry, National Geographic

There is a large body of evidence demonstrating that plastic debris is often deadly to marine wildlife. Unfortunately, the durability of plastic ensures that its presence in marine ecosystems is persistent at all levels, ranging from large marine mammals to the smallest krill.⁵

Research indicates that at least 700 marine animal species have consumed or become entangled in plastics. They face entanglement in plastics such as “ghost nets” — fishing nets

² Oceans Caucus Foundation. “Marine Debris.” Published March 15, 2015. <http://www.ocfoundation.us/the-issues/marine-debris>

³ Jenna Jambeck et al, “Plastic waste inputs from land into the ocean,” *Science* 347, no. 6223 (2015): 768-771. <http://science.sciencemag.org/content/347/6223/768>

⁴ Natasha Daly, “A Toll on Wildlife,” *National Geographic*, June 2018, 80-84.

⁵ Amanda Dawson et al, “Turning microplastics into nanoplastics through digestive fragmentation by Antarctic krill,” *Nature Communications* 9, Article number 1001 (2018). <https://www.nature.com/articles/s41467-018-03465-9>

that have been left or lost in the ocean by fishermen — or six pack rings. The animals confuse plastic bags or smaller plastic fragments with food. Plastics of all sizes are tied to everything from digestive track blockages to immediate death.⁶

Plastic debris not only exists in forms that we can see, such as bottles and plastic bags, but is also broken down into much smaller pieces by light exposure, ocean drift, and marine organism digestion. These microplastics — or pieces smaller than one-fifth of an inch — linger for centuries.⁷ Scientists have already found microplastics in 114 aquatic species, more than half of which are consumed by humans.⁸

In addition, microplastics cause physiological issues in marine species. Pollutants that wash off the land and into the sea adhere to microplastics, causing problems ranging from organ damage to reproductive abnormalities in the marine organisms that consume them.⁹

We do not yet understand the full implications of plastic debris on marine wildlife. However, National Geographic and scientists around the world are working every day to better understand this issue.

Impact of Plastic Debris on Humans



Photo by Randy Olson, National Geographic

⁶ Elizabeth Royte, “A Threat to Us?” *National Geographic*, June 2018, 84-87.

⁷ *Ibid.*

⁸ GESAMP, “Sources, fate and effects of microplastics in the marine environment: part two of a global assessment” (Kershaw, P.J., and Rochman, C.M., eds). (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 93 (2016): 220.

⁹ Elizabeth Royte, “A Threat to Us?” *National Geographic*, June 2018, 84-87.

Research has demonstrated that many of the fish and shellfish humans eat are consuming microplastics. It has also tied plastics to issues ranging from weight gain to brain development impairment.

We do not yet know at what quantity human consumption of microplastics will have adverse effects and how other factors such as food preparation affect microplastic toxicity.¹⁰ However, we do know that microplastics have entered our food chain.

Scientists are expressing additional concern about the potential impact of nanoplastics on human health. Nanoplastics are less than 100 billionths of a meter in size and are created as microplastics continue to degrade. Their miniscule size makes them impossible for scientists to trace in the seafood humans consume. However, scientists worry that these tiny nanoplastics, which can penetrate cells and move into tissues and organs, pose a risk to humans.

Despite the scientific questions that remain at the micro- and nanoscales, the impact of marine plastic is evident at the macroscale. Oceans and coastal ecosystems provide an irreplaceable benefit to the U.S. economy. Our oceans support over 28 million American jobs. In fact, between the fishing, boating, tourism, recreation, and ocean transport industries combined, one in six U.S. jobs is marine-related. Additionally, U.S. consumers alone spend over \$55 billion on fishery products, and coastal areas account for 85 percent of U.S. tourism revenue.¹¹

Scientists are still in the early phase of studying how extensively the global plastic crisis has impacted and will continue to impact our world. However, they have already demonstrated that plastic pollution poses a tremendous threat to our oceans, the marine wildlife that inhabits them, and the U.S. economy.

My Background on the Issue

Prior to joining National Geographic in 2016, I spent 20 years at the Zoological Society of London (ZSL) working on projects focused on threatened species and their habitats in over 50 countries.

While at ZSL, I helped develop the Living Planet Index, Sampled Red List Index, and Wildlife Picture Index. I also worked with a network of 8,000 scientists to produce the first International Union for the Conservation of Nature (IUCN) Red List of Threatened Species using quantitative criteria to assess extinction risk. I then partnered with IUCN to produce the first list of the 100 most threatened animals, plants, and fungi and co-chaired the IUCN Regional Red List working group and the IUCN Special Survival Commission Pangolin Specialist Group.

I led the ZSL team that founded the EDGE of Existence program, which focuses on Evolutionarily Distinct and Globally Endangered (EDGE) species and supporting young

¹⁰ Ibid.

¹¹ U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service. "What does the ocean have to do with human health?" <https://oceanservice.noaa.gov/facts/ocean-human-health.html>

scientists around the world working to protect animals facing extinction. While at ZSL, I also founded the Conservation Technology Unit and the Business and Biodiversity Programme.

I helped initiate United for Wildlife, a collaboration of seven of the most influential conservation organizations working to address illegal wildlife trade at scale. Under this collaboration, I led the development of the award-winning digital conservation leadership training platform, the Rhino Impact Investment, and the development of technology for nature.

It was also during this time that I co-led the first large-scale retail activism project to focus on ocean conservation: Project Ocean. The partnership between ZSL and Selfridges, a chain of high-end department stores in the United Kingdom, highlighted the unthinkable prospect of the world's major fisheries collapsing by 2050.

The retail platform provided the opportunity for conservationists from ZSL to reach a wider audience and have a global impact. Twenty-two non-governmental organizations (NGOs) dedicated to environmental and sustainable issues embraced the initiative, leading to public discussions between political figures at Selfridges on World Oceans Day 2011. Project Ocean culminated with a long-term joint project between Selfridges and ZSL: a 50-hectare, or 124-acre, marine protected area in the Philippines, aiming to safeguard fish species and their coral reef ecosystem.

The success of this initiative demonstrated the effect that public awareness initiatives can have on major global problems. Now, as National Geographic's Executive Vice President and Chief Scientist, I have access to an unparalleled media megaphone to address the issues facing our oceans today.

Planet or Plastic?



June 2018 issue of National Geographic Magazine

For 130 years, National Geographic has pushed the boundaries of exploration to further our understanding of the planet and empower us all to create a healthy and sustainable future for generations to come. We do this by investing in bold people and transformative ideas and sharing what we learn with audiences around the globe. Our ultimate goal is to achieve a planet in balance, one that provides for humanity and the untold millions of other species with which we live.

Today, our brand reaches millions of people of all ages in 172 countries every month. National Geographic publishes in 37 languages, our broadcast channels air in 43 languages, and our social media channels reach 436 million.

Through the power of our scientific research and storytelling, the integrity of our brand, and the reach of our global media platforms, we are uniquely positioned to engage with the public, to educate and raise awareness, and to build consciousness and help drive change.

In May of 2018, National Geographic launched *Planet or Plastic?*, a multiyear initiative aimed at raising awareness about the global plastic waste crisis and reducing the amount of single-use plastic that enters the world's oceans. The initiative was showcased in the June 2018 "Planet or

Plastic?” issue of National Geographic magazine and across our digital platforms to educate our audiences about the crisis and to show them how to take accountability for this global emergency.

We’re encouraging our audiences to pledge to take small, attainable steps, such as using reusable shopping bags, skipping straws, carrying a reusable bottle, and properly disposing of trash. We are demonstrating that when we work together, we can reduce single-use plastics and make a lasting impact on the global plastic crisis.¹²

As of last month, our *Planet or Plastic?* education initiative had already generated over 938 million content views across our digital platforms. And our worldwide reach has prompted 47,000 people to take the pledge to reduce single-use plastics.

INVESTING IN CHANGE

National Geographic’s commitment to addressing this issue goes beyond storytelling. It also includes grants to support hundreds of National Geographic Explorers. Through the power of our grants program, these bold individuals are changing the world by furthering the collective understanding of our planet and empowering the global community to generate solutions for a healthier and more sustainable future.

Stopping Plastic Pollution at its Source¹³

Inland plastic can travel many miles to enter our world’s oceans. A combination of direct dumping of waste into rivers and litter flowing from land to local waterways during rainstorms creates an unintentional plastic waste conveyor system. The waste from local waterways feeds into larger tributaries and rivers that ultimately transport the inland waste into our oceans. Via this mechanism, polluted rivers deliver a significant portion of the millions of tons of plastic that enter oceans annually.¹⁴

Through our grants program, we are partnering with scientists and innovators who are working diligently to find ways to keep plastics from ever reaching the ocean. To better understand how plastic waste flows to the ocean in the first place and to prevent it from ending up there, National Geographic Explorers will be journeying from the source of the plastic in the rivers to the ocean. Their goal: to understand the types and pathways of plastic in a river system and to provide science-based information that will engage citizens and help policymakers, businesses, and NGOs implement solutions to this growing crisis.

¹² National Geographic. “Planet or Plastic?” <https://www.nationalgeographic.com/environment/plasticpledge/>

¹³ National Geographic. “Plastics: Source to Sea.” <https://www.nationalgeographic.org/projects/ocean-plastics/>

¹⁴ Laura Parker et al, “What Happens to the Plastic We Throw Out,” *National Geographic*. <https://www.nationalgeographic.com/magazine/2018/06/the-journey-of-plastic-around-the-globe/>

Improving Plastics Waste Management¹⁵

Approximately 80 percent of marine debris comes from land-based sources.¹⁶ Improved solid waste management reduces the amount of plastics entering the oceans annually.

Award-winning National Geographic Explorer and environmental engineer Jenna Jambeck has researched marine debris since 2001 and has raised awareness via her research on plastic waste leakage into water systems. In her 2016 testimony before the Senate Committee on Environment and Public Works Subcommittee on Fisheries, Water, and Wildlife, Jambeck pointed to plastic pollution's economic and environmental impact as well as the ability to combat widespread plastic pollution via well-researched and culturally appropriate strategies.¹⁷

Today, Jambeck advances her work on finding scientifically supported and culturally relevant solutions with funding from National Geographic's grants program. She works in Vietnam — a country with an often-informal solid waste management system — to better understand and improve waste management, and to ultimately reduce the quantity of plastics entering water systems via local partnerships and education.

Cleaning Up Plastic Fishing Gear Pollution¹⁸

National Geographic Explorer Heather Koldewey works with ZSL to help communities clean up ocean plastic as part of the National Geographic Ocean Plastics Initiative. Through interdisciplinary research and conservation action at the interface between communities and the environment, Koldewey drives real change in the communities she touches.

Today, Koldewey works in the Philippines and beyond to combat ocean plastics, starting with ghost nets. Abandoned fishing gear comprises around 10 percent of all plastic trash in the oceans. More than 705,000 tons of fishing nets are lost yearly, according to the United Nations,¹⁹ and nearly half the weight of the Great Pacific Garbage Patch's surface debris is fishing gear.

Abandoned fishing gear is directly connected with a disproportionately large number of marine wildlife fatalities. World Animal Protection estimates that more than 100,000 large whales, sea lions, and seals are killed every year by fishing gear, in addition to an “inestimable” number of sea birds, turtles, and fish.

¹⁵ National Geographic. “Grants Across the Globe: Working With The Independent Waste Collector Community In Vietnam To Reduce Leakage Of Plastic To The Ocean.” https://www.nationalgeographic.org/grants/where-we-work/A1228097?filter=activity_status:All&q=Jenna%20Romness%20Jambeck

¹⁶ Oceans Caucus Foundation. “Marine Debris.”

¹⁷ *Marine Debris and Wildlife: Impacts, Sources and Solutions: Hearing before the U.S. Senate Committee on Environment and Public Works*, 114th Cong. (2016) (written testimony of Jenna R. Jambeck, Ph.D., Associate Professor of Environmental Engineering, College of Engineering, University of Georgia).

¹⁸ Laura Parker, “These Communities Turn Discarded Fishing Nets Into Carpets,” *National Geographic*, Published June 13, 2018. <https://news.nationalgeographic.com/2018/06/heather-koldewey-explorer-nets-plastic-philippines-ocean-culture/?beta=true>

¹⁹ Eric Gilman et al, Food and Agriculture Organization of the United Nations, *Abandoned, lost or otherwise discarded gillnets and trammel nets: Methods to estimate ghost fishing mortality, and the status of regional monitoring and management*, 2016, FAO Fisheries and Aquaculture Technical Paper No. 600, Rome, Italy.

Koldewey saw this critical issue as an opportunity for partnership. By developing Net-Works, a collaboration between global carpet tile manufacturer Interface, Inc. and ZSL, she developed a successful community-based supply chain for retrieving and discarding fishing nets. Net-Works partners with coastal communities to collect discarded fishing nets, convert them into nylon yarn, and sell them to Interface to create carpet tiles. So far, the initiative has collected and recycled 208 tons of discarded fishing nets, removing these dangerous threats to marine wildlife from our oceans and empowering local communities with economic opportunity.²⁰

Partnership for Change²¹

National Geographic is also partnering with Sky Ocean Ventures to create the largest global media campaign to reduce plastic litter in the ocean. We've committed \$10 million to bring our scientific expertise, grants, and media reach to the partnership.

The partnership will make grants available to proposals that will measurably reduce plastic pollution before it reaches the ocean, including improved recycling, waste management, stakeholder engagement, and more. It will also convene a series of Innovation Challenges, uniting the best international minds around technologies designed to reduce plastic waste and its impact on oceans. Additionally, the partnership will create an event series engaging industry leaders, corporations, institutions and foundations around the issue of marine plastic pollution.

AN OPPORTUNITY FOR U.S. LEADERSHIP

Our planet is at a crossroads. World plastic production is increasing exponentially. In 1950, 2.3 million tons were produced. In 1993, 162 million tons were produced. And in 2015, 448 million tons were produced.²² As plastic production grows, so does the threat plastic waste poses to our oceans and the wildlife and economies that depend upon them.

However, as Laura Parker wrote in the June National Geographic magazine cover story, plastics have been a boon to humanity. They helped the Allies win World War II, "eased travel into space, and revolutionized medicine ... In airbags, incubators, helmets, or simply by delivering clean drinking water to poor people in those now demonized disposable bottles, plastics save lives daily."²³

Now, it's a matter of learning to balance the potential provided by plastic with the threat plastic waste poses to our world. We know that the ocean's currents ensure that marine plastic pollution will never be just one nation's problem. Any plastic waste that is introduced to the system will impact wildlife and economies around the globe.

²⁰ Zoological Society of London. "Asia: Net-Works." <https://www.zsl.org/conservation/regions/asia/net-works>

²¹ National Geographic 2018. "Sky and National Geographic Work Together to Fight Ocean Plastic." <http://press.nationalgeographic.com/2018/04/16/sky-and-national-geographic-work-together-to-fight-ocean-plastic/>

²² National Geographic. "10 Shocking Facts About Plastic." <https://www.nationalgeographic.com/environment/plastic-facts/>

²³ Susan Goldberg, "The Plastic Apocalypse," *National Geographic*, June 2018, 6.

This is why National Geographic launched the *Planet or Plastic?* initiative and why we are dedicated to encouraging consumers to end their reliance on the single-use plastics.

National Geographic is committed to continuing to raise international awareness through our media and education arms and to better understanding and addressing the issue through research and community partnership. We are working with corporations, NGOs, and other institutions around the world to eliminate single-use plastic and promote recyclability.

However, addressing this issue will require true global partnership. In this process, it's important to remember that our work must start with evaluating our own practices.

With *Planet or Plastic?*, we hope to do nothing less than transform consumer behavior — and we're starting at home. To kick off this multiyear initiative, National Geographic is conducting an internal audit of our headquarters in Washington, D.C., to assess how our own operations and supply chain use plastic. From the plastic wrappers in which our magazines were formerly distributed to the materials we use in our cafeteria, we're identifying and eliminating single-use plastics.

Now, it's time for the United States to do the same. The United States is one of the most developed nations in the world. So why aren't we addressing this issue head-on? Why are we relying on sending our plastic recyclables overseas instead of developing a robust recycling capability of our own? And why do we continue to use plastics that can't be recycled at all?

U.S. Plastic Waste

Today, an estimated 94 percent of Americans have access to recycling. However, our nation lacks standardization on which materials are considered recyclable and what community collection practices look like.²⁴ This contributes to this shocking metric: In the United States, 91 percent of recyclable plastic is not actually recycled.²⁵

Additionally, more than half of plastic waste that is recycled in the United States has been exported to hundreds of countries around the world because our own recycling sector is under resourced. Historically, China has been responsible for recycling 45 percent the world's plastic and paper products.

However, this year, China stopped accepting recycling from abroad. This is related to the fact that many countries, including the United States, transitioned to single-stream recycling. Single-stream recycling was designed to streamline recycling and reduce consumer burden by allowing all recyclables — from paper to plastic to glass — to go into the same bin. However, this streamlining process means that much of the waste reaching China is too contaminated with non-recyclables to provide China with the profit margin needed to continue processing the world's recyclables. As a result, estimates predict that 122 tons of potentially recyclable plastic

²⁴ Drew Desilver, "Perceptions and realities of recycling vary widely from place to place," *Pew Research Center*, Published October 7, 2016. <http://www.pewresearch.org/fact-tank/2016/10/07/perceptions-and-realities-of-recycling-vary-widely-from-place-to-place/>

²⁵ Faye Flam, "The Recycling Game Is Rigged Against You," *Bloomberg*, Published June 27, 2018. <https://www.bloomberg.com/view/articles/2018-06-27/plastic-recycling-is-a-problem-consumers-can-t-solve>

will be diverted from Chinese recycling facilities, likely ending up in landfills.²⁶ However, the global shortage in recycling capabilities is only one piece of the issue.

Some plastics are too difficult to recycle in the first place. Due to their prevalence in our daily lives, multilayer plastics, which are used in products ranging from disposable coffee cups to snack packaging, are particularly problematic. Multilayer plastics incorporate materials such as paper or aluminum, tightly stacking thin layers of the materials alongside plastic and making the separation and processing of these materials nearly impossible. While material production advancements make these multilayer plastics cheap, readily available, and utilitarian, the non-recyclable nature of these single-use materials is a major contributor to the global plastic crisis.²⁷

Unfortunately, this means that our nation's plastic waste footprint is an issue that consumers and individual organizations cannot solve alone. It requires a shift in how our nation as a whole manages plastic design and recapture, a task that only the U.S. federal government is able to take on.

Model Nation and Innovation

I understand that federalism and regulation concerns make addressing this issue challenging. However, we cannot stymie the global plastic crisis without U.S. federal government involvement.

The U.S. government can play a stronger role in addressing the global plastic crisis by convening conversations with industry leaders and encouraging them to present solutions and commit to targets. The United States is a global leader in innovation. Our government continuously invests in American ingenuity. Now, it must invest in solutions to the global plastic crisis through private sector and entrepreneurial innovation around better material design and recapture.

Only the federal government is positioned to implement the solutions developed by private sector leaders at a nationwide scale. But as part of our *Planet or Plastic?* initiative, National Geographic would like to offer our support to U.S. policymakers as they address this issue.

On behalf of National Geographic, I would like to offer to convene a summit in Washington, D.C., to bring together policymakers, industry leaders, and other essential stakeholders for a critical discussion about how the United States can lead in this space. The *Planet or Plastic?* Summit will ensure that the right voices are in the room as we look at the current state of plastic waste in the United States and, in turn, how to advance the American recycling industry, move away from non-recyclable and single-use plastics, and find better alternatives to plastic where possible. And equally importantly, National Geographic wants to bring our powerful storytelling to bear to amplify the results of this conversation and to raise awareness of what the United States is doing to address the global plastic crisis.

²⁶ Amy Brooks, Shunli Wang, and Jenna Jambeck, "The Chinese import ban and its impact on global plastic waste trade," *Science Advances* Vol. 4, no. 6 (2018). <http://advances.sciencemag.org/content/4/6/eaat0131>

²⁷ Lilly Sedaghat, "7 Things You Didn't Know About Plastic (and Recycling)," *National Geographic*, Published April 4, 2018. <https://blog.nationalgeographic.org/2018/04/04/7-things-you-didnt-know-about-plastic-and-recycling/>

While the plastic crisis has no boundaries, the U.S. government must first take its own steps to protect the oceans and marine wildlife upon which one in six American jobs depend.²⁸ Perhaps the time has come to examine the feasibility of a federal regulatory approach that would provide minimum standards on plastic use and recycling. The approach could provide incentives and mandates — carrots and sticks — for states to adopt the right recycling protocols and provide national standards for plastic import, manufacturing, and use.

It's a bold solution, but this crisis requires one. It's time to stop the plastic pollution that got us into this mess in the first place — and to step up and be a true global leader on this issue.

²⁸ U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service. "What does the ocean have to do with human health?" <https://oceanservice.noaa.gov/facts/ocean-human-health.html>

APPENDIX

World Map Display of Plastic Waste in Oceans via National Geographic

“Drowning in Plastic,” *National Geographic*, June 2018. 55-57.

https://www.dropbox.com/sh/gdcr7416n8qpfxl/AAAHejRDyj9XCpNaUkVSBc3Za?dl=0&review=00_MAP+plastics_grfx_map.jpg

Recent Editorial Co-Authored by Jonathan Baillie

Jonathan Baillie and Ya-Ping Zhang, “Space for Nature,” *Science* 361, no. 6407 (2018): 1051. <http://science.sciencemag.org/content/361/6407/1051>