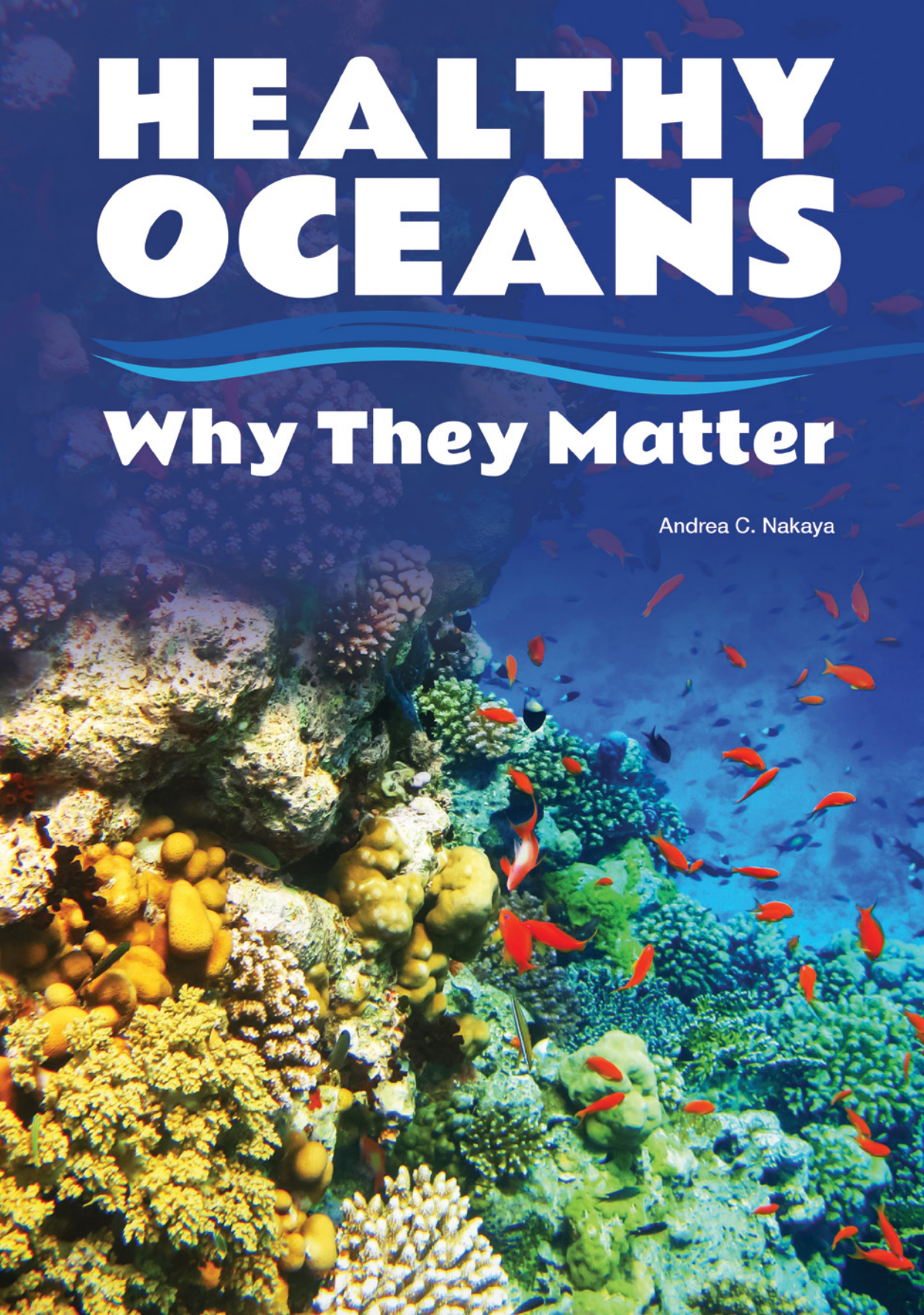


# HEALTHY OCEANS

## Why They Matter

Andrea C. Nakaya



# CONTENTS

## **Introduction** **4**

More Important than Most People Realize

## **Chapter One** **8**

The Importance of the Oceans

## **Chapter Two** **18**

Climate Change

## **Chapter Three** **28**

Pollution

## **Chapter Four** **37**

Overuse

## **Chapter Five** **46**

Keeping the Oceans Healthy

**Source Notes** **56**

**Organizations and Websites** **60**

**For Further Research** **61**

**Index** **62**



## CHAPTER THREE

# Pollution

Somewhere in the North Pacific Ocean, an area of rotating currents called a gyre pulls marine debris into its center. It is one of five gyres found in the world's oceans. The gyre in the North Pacific is pulling in so much debris that it has been given the nickname "Great Pacific Garbage Patch." Most of the trash the gyre has accumulated comes from land—and most of it is plastic. While there are some standard plastic objects (like bottles and fishing line) trapped in the gyre, most of the plastic is actually in the form of very small pieces. Plastic, it turns out, breaks down quickly in the ocean. As the National Geographic Society notes, "These patches are almost entirely made up of tiny bits of plastic, called microplastics. Microplastics can't always be seen by the naked eye. Even satellite imagery doesn't show a giant patch of garbage. The microplastics of the Great Pacific Garbage Patch can simply make the water look like a cloudy soup. This soup is intermixed with larger items, such as fishing gear and shoes."<sup>26</sup>

Plastic is not the only pollutant in the world's oceans. In one 2020 examination of ocean pollution and human health, researchers concluded, "Pollution of the oceans is widespread, it is worsening, and its geographic extent is expanding. Ocean pollution is a complex and ever-changing mixture of chemicals and biological materials that includes plastic waste, petroleum-based pollutants, toxic metals, manufactured chemicals, pharmaceuticals, pesticides, and a noxious stew of nitrogen, phosphorus, fertilizer, and sewage."<sup>27</sup> The oceans are being greatly harmed by all of these different pollutants.

## Plastic

When it comes to pollution in the ocean, plastic is one of the biggest problems. Plastic is cheap to produce and extremely versatile. It is used in packaging, medical devices, cars, clothing, furniture, home appliances, computers, and mobile phones. And when it is no longer needed, it becomes waste. According to the United Nations Environment Programme, every year, the world produces 30 million metric tons of plastic waste. According to a 2021 report by the National Academy of Sciences, the United States produces more plastic waste than any other country. The problem with all that waste is that plastic does not decompose. It breaks down into smaller and smaller pieces, but these pieces stay in the environment. As the world produces more and more plastic every year, more and more plastic is accumulating in the environment. Much of it ends up in the oceans.

Plastic in the oceans comes from many different things. Single-use plastics are a major source of ocean pollution. It is estimated that about half of all the plastic that the world produces consists of single-use items such as water bottles, straws, plastic bags, and food packaging that are used once then thrown away. Another source of plastic in the oceans is discarded fishing gear such as nets, lines, and ropes. Scientist and activist Marcus Eriksen has been on numerous ocean expeditions. He explains, “Nets and buoys are designed to last.” Much of this sturdy fishing gear gets lost or discarded, creating new ocean hazards. For example, he says, “lost nets or ‘ghost nets’ are indiscriminate killers, likely catching more fish when lost than when used for fishing. They become navigational hazards, tangling boat propellers, and wreak ecological havoc, bulldozing coral reefs and tearing coral apart.”<sup>28</sup>

Another major source of plastic pollution in the oceans is the clothing

**“Lost nets or ‘ghost nets’ are indiscriminate killers, likely catching more fish when lost than when used for fishing.”<sup>28</sup>**


—Marcus Eriksen, an activist and scientist

industry. Will McCallum is head of oceans at Greenpeace UK, where he campaigns against plastics. He says, “It comes as a surprise to most people that the clothes they wear are one of the greatest sources of plastic in the ocean. Minuscule strands of clothing, normally made of nylon or polyester and much finer than human hair, are shed from our clothes every time we wear them, wash them, and, of course, when we throw them away.”<sup>29</sup>

The oceans are awash in plastic. This, warns the international Environmental Investigation Agency, is a problem of global proportions. “The reach and depth of the contamination is horrifying,” the organization states. “Microplastics have been documented in all marine habitats—from the ocean surface and sea ice to the seabed.”<sup>30</sup>

## How Plastic Harms the Oceans

All that plastic is causing harm in many ways. Scientists have found that it is becoming more and more common for marine creatures to eat plastic. These creatures often do so because they think it is food. For instance, sea turtles eat plastic bags because they mistake them for jellyfish, which are among their favorite foods. Seabirds commonly eat plastic too. On Lord Howe Island, off the eastern coast of Australia, a team of biologists have worked to save shearwater chicks that were dying from plastic. The chicks



*Plastic goods, such as bottles and fishing line, break down in the ocean into very small pieces called microplastics. In some areas, these pieces form hundreds of square miles of dangerous debris.*

## Ocean Animals and Noise Pollution

In addition to polluting the ocean with things like plastic, runoff, and oil, humans are causing another kind of pollution: noise pollution. Oil drilling, military sonar, and shipping all create noise under the water, and that can be disruptive and harmful to the creatures that live there. The National Ocean Service details some of these harms. It says, “Higher noise levels can reduce the ability of animals to communicate with potential mates, other group members, their offspring, or feeding partners. Noise can also reduce an ocean animal’s ability to hear environmental cues that are vital for survival, including those key to avoiding predators, finding food, and navigating to preferred habitats.” The Ocean Conservancy says that the COVID-19 pandemic has revealed just how much underwater noise is affecting some creatures. It explains:

When the world came to a halt . . . [in 2020] around COVID-19, international shipping declined 20% in just a few months, resulting in about a 25% decrease in noise in our seas. Due to this decrease, we’re seeing in real time how animals can prosper in quieter seas. One study in Alaska found humpback whales socializing, feeding and even napping in once-busy channels. Orcas in Scotland and Canada have been found closer to shore.

National Ocean Service, “What Is Ocean Noise?,” February 26, 2021. <https://oceanservice.noaa.gov>.

Ocean Conservancy, “How Does Underwater Noise Impact Our Ocean?,” July 7, 2021. <https://oceanconservancy.org>.

had stomachs so full of plastic that there was no room for food. “It was shocking to see how much would come out of one chick,” says Liz Bonnin, who accompanied the group for a BBC documentary about plastics. “We saw, I think 90 pieces come out of one of the chicks on the second night.”<sup>31</sup> Even when sea creatures do not directly eat plastic, they often end up eating it when they eat smaller creatures that have done so. For example, a dolphin might be too intelligent to eat a piece of plastic floating in the ocean, but



# SOURCE NOTES

## Introduction: More Important than Most People Realize

1. Philip J. Landrigan et al., "Human Health and Ocean Pollution," *Annals of Global Health*, December 3, 2020. <https://annalsofglobalhealth.org>.
2. Karen Sack, "Protecting Ocean Health Will Protect the Health of Humankind," *UN Chronicle*, June 8, 2020. [www.un.org](http://www.un.org).
3. Quoted in Stephen Leahy, "Climate Change Driving Entire Planet to Dangerous 'Tipping Point,'" *National Geographic*, November 30, 2019. [www.nationalgeographic.co.uk](http://www.nationalgeographic.co.uk).
4. Quoted in UN News, "'Simply No Scenario' Where Humanity Can Survive on an Ocean-Free Planet," June 1, 2021. <https://news.un.org>.

## Chapter One: The Importance of the Oceans

5. United Nations Environment Programme, "Why Do Oceans and Seas Matter?" [www.unep.org](http://www.unep.org).
6. National Geographic Society, "Ocean," October 21, 2019. [www.nationalgeographic.org](http://www.nationalgeographic.org).
7. United Nations Educational, Scientific and Cultural Organization, "Ocean Life: The Marine Age of Discovery," 2021. <https://en.unesco.org>.
8. National Ocean Service, "How Much Oxygen Comes from the Ocean?," February 26, 2021. <https://oceanservice.noaa.gov>.
9. Sean Fleming, "Here Are 5 Reasons Why the Ocean Is So Important," World Economic Forum, August 29, 2019. [www.weforum.org](http://www.weforum.org).
10. National Oceanic and Atmospheric Administration, "How Does the Ocean Affect Climate and Weather on Land?" <https://oceanexplorer.noaa.gov>.
11. Fleming, "Here Are 5 Reasons Why the Ocean Is So Important."
12. Quoted in Craig Welch, "Sea Change: Food for Millions," *Seattle Times*, December 21, 2013. <http://apps.seattletimes.com>.
13. Quoted in Marla Cimini, "'Blue Mind': Why Being Near the Water Makes You Happy," *USA Today*, November 13, 2017. [www.usatoday.com](http://www.usatoday.com).

# ORGANIZATIONS AND WEBSITES

## **National Oceanic and Atmospheric Administration (NOAA)**

[www.noaa.gov](http://www.noaa.gov)

This government agency works to gather information about the natural world—including the oceans—and help people better understand it. The NOAA website includes a wide variety of information on the oceans, fisheries, climate, and weather.

## **Natural Resources Defense Council (NRDC)**

[www.nrdc.org](http://www.nrdc.org)

The NRDC believes that people have the right to clean air, clean water, and healthy communities, and it works to protect those rights. Its website contains numerous articles about the ocean.

## **Ocean Conservancy**

<https://oceanconservancy.org>

The Ocean Conservancy is an organization that works to protect the ocean and educate the public. Its website has information about conservation efforts and the many different threats to ocean health.

## **Seafood Watch**

[www.seafoodwatch.org](http://www.seafoodwatch.org)

Seafood Watch works with businesses, governments, and consumers in an effort to increase sustainable fishing. Its website contains articles about sustainability and guides on how to eat sustainably.

## **US Environmental Protection Agency (EPA)**

[www.epa.gov](http://www.epa.gov)

The EPA is a US government agency that works to protect the environment, including coastal areas and oceans. Its website contains information about the oceans and about climate change.



# FOR FURTHER RESEARCH

## Books

Albert Bates, *Dark Side of the Ocean: The Destruction of Our Seas, Why It Matters, and What We Can Do About It*. Summertown, TN: GroundSwell, 2020.

Alex Rogers, *The Deep: The Secret Life of Our Oceans*. New South Wales, Australia: Wildfire, 2019.

Hannah Testa, *Taking on the Plastics Crisis*. New York: Penguin Workshop, 2020.

Deborah Rowan Wright, *Future Sea: How to Rescue and Protect the World's Oceans*. Chicago: University of Chicago Press, 2020.

## Internet Sources

Global Coral Reef Monitoring Network, "Status of Coral Reefs of the World: 2020," 2020. <https://gcrmn.net>.

Brian Palmer, "High Seas: Few Rules, Fewer Sheriffs," Natural Resources Defense Council, January 16, 2019. [www.nrdc.org](http://www.nrdc.org).

Hans-Otto Pörtner et al., "IPCC Special Report on the Ocean and Cryosphere in a Changing Climate," Intergovernmental Panel on Climate Change, 2019. [www.ipcc.ch](http://www.ipcc.ch).

Todd Woody, "California's Kelp Forests Are Disappearing in a Warming World. Can They Be Saved?," *National Geographic*, April 30, 2020. [www.nationalgeographic.com](http://www.nationalgeographic.com).

# INDEX

*Note: Boldface page numbers indicate illustrations.*

- abyssopelagic zone, 15
- acidification, rise in, 5, 20
- Advances in Atmospheric Sciences*, 19
- agricultural runoff, 33–35
- Alami, Aida, 46–47
- algae, 33–35
- Annals of Global Health*, 4–5
- Atlantic Meridional Overturning Circulation (AMOC), 24–25
- Baltic Sea, 35
- Barrett, Ko, 48
- bathypelagic zone, 15
- beluga whales, **20**
- Bergman, Bjorn, 45
- bioplastics, 49–50
- blast fishing, 42
- Blue Mind* (Nichols), 16–17
- Bond, Nick, 21–22
- Bonnin, Liz, 31
- bottom trawling, 41–42, **43**
- Bozkir, Volkan, 7
- Brown, Chris, 50–51
- Burke, Maya, 35
- bycatches, 40
- carbon dioxide
  - increase in acidity in oceans and, 5, 20
  - increase in amount of, in atmosphere, 19
  - kelp and, 22
  - as necessary for life, 19
  - renewable energy to reduce emissions, 46–48, **47**
  - seaweed and, 49
- Caribbean monk seal, 11
- climate, oceans' regulation of, 12–14, 24–25
- climate migrants, 27
- clothing, plastics in, 29–30
- container ships, **16**
- coral reefs, **6**
  - acidity of oceans and, 5, 20
  - bleaching of, **23**, 23–24
  - importance of, 6–7
- currents
  - as climate regulators, 24–25
  - transportation of heat by, 13, 14
- dead zones, 34, 35
- depths of oceans, 9
- Dillon, Tom, 55
- dolphins
  - habitation zone, 15
  - plastics eaten by, 31–32
  - snared by fishing gear, 40, **43**
- drugs, 14–15
- Duarte, Carlos M., 46
- economy, importance of oceans to, 15–17, **16**
- Emanuel, Kerry, 25
- Environmental Defense Fund, 52
- Environmental Investigation Agency, 30, 39
- Environmental Protection Agency (EPA). *See* US Environmental Protection Agency (EPA)
- epipelagic zone, 15
- Eriksen, Marcus, 29
- European Commission, 37
- European Environment Agency, 35
- eutrophication, 34, 35
- exploration of seabed, 13
- Fischels, Josie, 34–35
- fish and fishing
  - acidity of oceans and, 20
  - annual world consumption, 37–38
  - blast fishing, 42
  - bottom trawling by, 41–42, **43**
  - depletion of stocks, 5
  - gear, 29
    - effects on animals described, 32–33
    - seals and, **32**
    - sea turtles and, 41
    - whales and dolphins and, 40, **43**
  - habitation zones, 15
  - illegal practices, 43–45
  - snaring of whales and dolphins during, 40
  - as source of protein, 14
  - stocks rebuilt in US, 52
  - sustainable
    - described, 50–51
    - government regulations and, 52
    - in less developed countries, 52–53
    - purchasing only fish caught by, **51**, 51–52
    - versus unsustainable, 38–40
  - technology as revolutionizing, 38
  - wasted catches, 40
  - zooplankton and, 22
- Fleming, Sean, 13, 14
- Foley, Katrina, 36
- food, 14, 30–33
  - See also* fish and fishing
- Food and Agriculture Organization of the United Nations (FAO)
  - amount of fish harvest wasted, 40
  - annual increase in fish consumption, 37
  - on unsustainable fishing, 39–40
- fossil fuels, reducing usage of, 46–48, **47**
- freshwater supplies, 21
- Gaffney, Owen, 7