



MARINE POLLUTION

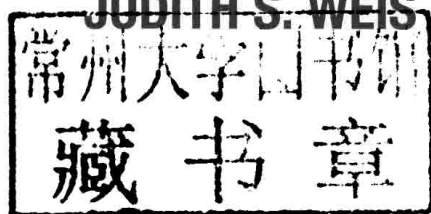
WHAT EVERYONE NEEDS TO KNOW®

JUDITH S. WEIS

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PREFACE

Many people throughout the world were horrified to read daily reports about the huge volume of oil spewing from the drilling rig Deepwater Horizon in the Gulf of Mexico for many months in 2010. People were similarly riveted reading the news and seeing on TV photos of the oil-covered birds and sea otters in Prince William Sound, Alaska after the *Exxon Valdez* spill in 1989. These spectacular tragic events are fortunately rare. People may also become aware of marine pollution through some smaller events such as a fish kill in a local area, excessive debris or seaweed littering the beach, or discolored water from an algal bloom. These visible signs of marine pollution are not all there is. There are many types of pollution that have no visible signs and are only detected by sophisticated chemical analysis. In this case, what you don't know can sometimes hurt you—and if it doesn't hurt us, it might hurt marine organisms.

The marine environment is under assault from overfishing, habitat loss, and pollution. New kinds of pollutants (“contaminants of emerging concern”) include both new pollutants and old pollutants that no one ever paid attention to before. These include pharmaceuticals that are designed to have effects on the body at very low concentrations. The unsightly volumes of marine debris, mostly plastic, washing up on beaches and collecting in great garbage patches in the oceans is something that most people have heard about. Marine debris made the

headlines in March and April 2014 when the search and rescue teams seeking the missing Malaysia Airlines Flight 370 discovered that the ocean is full of garbage. When ships were able to retrieve “suspicious” items that planes had spotted, it turned out not to be debris from the missing plane, but ordinary garbage swirling around in the ocean.

New awareness of the damaging effects of loud noise on marine animals, especially mammals, is of great concern, as it may relate to whale beaching incidents. There has been increasing concern and attention in recent years to the effects of ocean acidification, caused by increased levels of carbon dioxide in the atmosphere. While much of the concern and attention is about impaired shell formation, people are also discovering effects of ocean acidification on physiology and behavior as well. Perhaps the most widespread and serious type of pollution worldwide is eutrophication due to excess nutrients, which stimulate algal blooms and reduce the level of oxygen. While eutrophic areas and “dead zones” are increasing around the world, there is also some good news in that many persistent organic pollutants have been banned and are no longer manufactured (even though they still remain in sediments and accumulate in marine life). Also, the frequency of oil spills has gone down in the past few decades. In addition to this reduction of inputs of some historical pollutants, efforts have begun to physically remove highly contaminated sediments from some of the estuarine toxic hot-spots in the United States under the auspices of the Superfund Program.

This book, like others in the *What Everyone Needs to Know*® series, is intended for the general public, including policymakers, naturalists, environmentalists, students, and scientists in other fields. I hope it will provide greater understanding and stimulate greater interest in the topic, and I hope that a more educated public will strongly support taking action to reduce marine pollution. In this book I cover the visible and the invisible types of marine pollution—where it comes from, what it does, and how we might be able to reduce it. Chapters are

organized by type of pollution. In addition to the usual types of pollution, there is a chapter dealing with invasive species, not always considered a type of pollution, under the category of biological pollution. I also have a chapter about climate change—comprising global warming, sea level rise, and ocean acidification—and effects on marine life. Within each chapter I include questions that you may have thought about, including potential effects of the pollutants on our own health, and many questions you may not have wondered about, including topics such as the fate of chemical pollutants in the marine environment, what effects pollutants have on marine organisms, and how marine organisms cope with different types of pollutants. I hope that in both cases you will find the answers interesting and useful. Perhaps they will stimulate you to think of additional questions that you would like to know about. The final chapter covers prospects for the future and includes sections on international and national laws regulating pollution, how states and municipalities can reduce pollution, and steps that individuals can take to reduce pollution. A large number of suggestions are provided on how you can make a difference in reducing marine pollution.

ACKNOWLEDGMENTS

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