Section 4
Ocean Pollution

Key Concept Activities on land and in the ocean contribute to ocean pollution.

What You Will Learn
- Most of the pollution in the ocean comes from multiple sources.
- Oil pollution in the ocean harms wildlife and can cost billions of dollars to clean up.
- Laws have been passed to reduce pollution, and organizations are working to clean up the oceans.

Why It Matters
Polluted oceans harm wildlife and people and are costly to clean up.

It is a hot summer day at the beach. You can hardly wait to swim in the ocean. You run to the surf only to be met by piles of trash washed up on the shore. Where did all that trash come from? People have thrown their trash in the ocean for thousands of years. This trash has harmed the living things in the oceans, as well as the people and animals that depend on them. Fortunately, we are becoming more aware of ocean pollution, and we are learning from our mistakes.

Nonpoint-Source Pollution
There are many sources of ocean pollution. Some of these sources are easily identified, but others are more difficult to pinpoint. **Nonpoint-source pollution** is pollution that comes from many sources rather than from just a single site. Some common sources of nonpoint-source pollutants are shown in **Figure 1.**

Figure1 Examples of Nonpoint-Source Pollution

Oil and gasoline that have leaked from cars onto streets can wash into storm sewers that drain into the ocean.

Boats and other watercraft can leak gasoline and oil directly into bodies of water, including the ocean.

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Most ocean pollution is nonpoint-source pollution. Human activities on land can pollute rivers, which then flow into the ocean and bring the pollutants they carry with them. Nonpoint-source pollutants are very hard to regulate and control because they enter bodies of water in many different ways. Nonpoint-source pollution can be reduced by using less lawn chemicals and disposing of used motor oil properly.

Point-Source Pollution

Water pollution caused by a leaking oil tanker, a factory, or a wastewater treatment plant is one type of point-source pollution. **Point-source pollution** is pollution that comes from a specific site. However, even when the source of pollution is known, cleanup of the pollution is difficult.

Trash Dumping

People dump trash in many places, including the ocean, as shown in **Figure 2.** In the 1980s, scientists became alarmed by the kinds of trash

that were washing up on beaches. Bandages, vials of blood, and syringes (needles) were found among the waste. Some of the blood in the vials even contained the AIDS virus.

Figure 2 This barge will dump the trash it carries in the ocean. This is an example of point-source pollution.

The Environmental Protection Agency (EPA) began an investigation and discovered that hospitals in the United States produce an average of 3 million tons of medical waste each year. Because of stricter laws, much of this medical waste is now buried in sanitary landfills. However, dumping trash in the ocean is still a common practice in many countries.

Effects of Trash Dumping

Trash thrown into the ocean can affect the organisms that live in the ocean. It also affects those organisms that depend on the ocean for food. Trash such as plastic can be very harmful to ocean organisms. Most plastic materials do not break down for thousands of years. Marine animals can mistake plastic materials for food and choke or become strangled. The sea gull in **Figure 3** is tangled up in a piece of plastic trash.

Figure 3 Marine animals can be strangled by plastic trash or can choke if they mistake the plastic for food.

Sludge Dumping

Raw sewage is all of the liquid and solid wastes that are flushed down toilets and poured down drains. After collecting in sewer drains, raw sewage is sent through a treatment plant, where it undergoes a cleaning process that removes solid waste. The solid waste is called *sludge.*

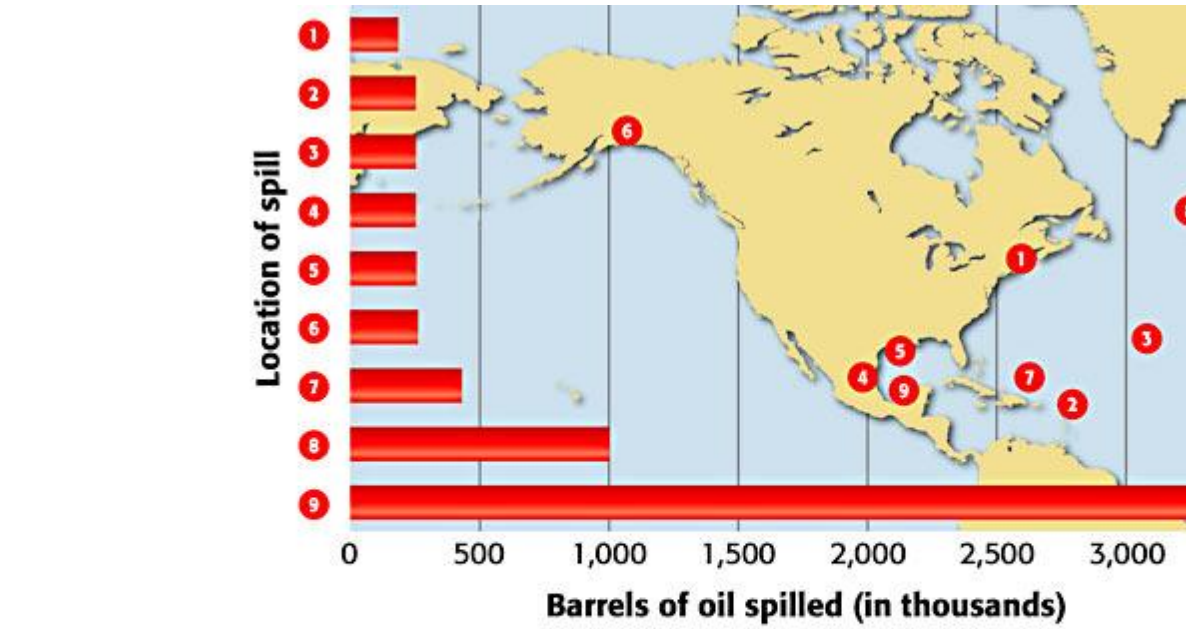
In many areas, people dump sludge into the ocean several kilometers offshore, as shown in **Figure 4.** Sometimes the sludge settles to the ocean floor. However, sometimes currents stir up the sludge and move it closer to shore. This sludge can pollute beaches and can kill marine life. By 1990, the United States alone had discharged 38 trillion liters of treated sludge into the waters along its coasts. Many countries have now banned sludge dumping. Yet it continues to occur in many areas of the world.

Figure 4 Sludge is the solid part of waste matter and often carries bacteria. Sludge makes beaches dirty and kills marine animals.

Oil Spills

Oil is in high demand around the world because of its use as an energy source. For this reason, large tankers must transport billions of barrels of oil across the oceans. If not handled properly, these transports can lead to oil spills. **Figure 5** shows some of the major oil spills that have happened off the coasts of North America.

Figure 5 Oil Spills in North America



Effects of Oil Spills

One of the oil spills shown on the map in **Figure 5** happened in Prince William Sound, Alaska, in 1989. A supertanker struck a reef and spilled more than 260,000 barrels of crude oil along the shorelines of Alaska. The amount of spilled oil is roughly equivalent to the water in 125 Olympic-sized swimming pools.

The oil company spent $2.1 billion in trying to clean up the mess. Many Alaskans who made their living from fishing lost their businesses. Alaska's economy will probably continue to suffer for decades. However, there were nonmonetary costs on Alaska's wildlife as well. Although some animals were saved, many plants and animals died as a

result of the spill.

Standards Check Describe one nonmonetary cost of oil spills.

Preventing Oil Spills

In 1990, the Oil Pollution Act was passed. It was a direct response to the oil spill in Prince William Sound. Under the law, all oil tankers operating in United States waters must be protected by double hulls by 2015. If the outer hull of the ship is damaged, an inner hull prevents oil from spilling into the ocean.

Although oil spills can harm plants, animals, and people, these spills are responsible for only about 5% of oil pollution in the oceans, as shown in **Figure 6.** Most of the oil that pollutes the oceans is caused by nonpoint-source pollution on land.

Figure 6 You can see how this oil spill in Galveston, Texas, pollutes the ocean. But as the graph shows, most of the oil that pollutes the oceans comes from everyday human activities.

Saving Our Ocean Resources

Although humans have done much to harm the ocean's resources, we have also begun to do more to save them. From international treaties to volunteer cleanups, efforts to conserve and protect the ocean's resources are making an impact around the world.

Nations Take Notice

When ocean pollution reached an all-time high, many countries recognized the need to work together to solve the problem. In 1989, a treaty was passed by 64 countries that prohibits the dumping of certain metals, plastics, oil, and radioactive wastes into the ocean. Many other international agreements and laws restricting ocean pollution have been made. However, waste dumping and oil spills still occur. Therefore, waste continues to wash ashore, as shown in **Figure 7.** Enforcing pollutionpreventing laws at all times is not always easy.

Figure 7 Making an effort to pick up trash on a beach can help make the beach safer for plants, animals, and people.

Citizens Take Charge

Citizens of many countries have demanded that their governments do more to solve the growing problem of ocean pollution. The United States now spends more than $130 million each year to protect the oceans and beaches. Citizens have also begun to take the matter into their own hands. In the early 1980s, citizens began to organize beach cleanups. For example, in **Figure 7,** teens picked up trash on the beaches of Santa Monica. Millions of tons of trash have been gathered from the beaches. And people are being educated about the hazards of ocean dumping.

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Laws in the United States

The United States, like many other countries, has taken additional measures to control local pollution. These measures include making laws. In 1972, Congress passed the Clean Water Act. This law put the Environmental Protection Agency in charge of issuing permits for any dumping of trash into the ocean.

Later that year, the U.S. Marine Protection, Research, and Sanctuaries Act was passed. This law prohibits the dumping of any material that would affect human health, the environment, or businesses that depend on the ocean. These laws have helped decrease the pollution entering our oceans.

Section Summary

- The two main types of water pollution are nonpoint-source pollution and point-source pollution.
- Types of nonpoint-source pollution include oil and gasoline from cars, trucks, and

watercraft, as well as of pesticides, herbicides, and fertilizers.
- Oil spills harm wildlife and local fishing economies and cost billions of dollars to clean up.
- Efforts to save ocean resources include laws, international treaties, and volunteer cleanups.

Chapter Summary

The Big Idea

Oceans cover 71% of Earth's surface and contain natural resources that must be protected.

Section 1

Earth's Oceans

Key Concept The characteristics of ocean water, such as temperature and salinity, affect the circulation of the ocean.

- Ocean water contains dissolved solids that make the water salty.
- The temperature of ocean water varies with depth, latitude, and movement of the water.

The global ocean covers most of Earth's surface.

Section 2
The Ocean Floor

Key Concept Many different technologies have helped scientists study the topography of the ocean basins.

- Scientists use sonar, underwater vessels, drilling, and satellites to study the ocean floor.
- Ocean floor features formed because of tectonic plate movement.

Underwater vessels help scientists explore the ocean.

Section 3
Resources from the Ocean

Key Concept The ocean is an important source of

living and nonliving resources.

- The ocean is an important source for food, salt, fresh water, oil, tidal energy, and minerals.
- Oil is the most valuable resource obtained from the ocean.

Tides can be used to generate energy.

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Animals can be harmed by ocean pollution.