The Papahānaumokuākea Marine National Monument, the largest conservation area in the United States, was established by President George W. Bush in 2006. With the designation of this sanctuary, the president protected a chain of islands, atolls, and reefs extending across 140,000 square miles, northwest of the larger inhabited islands of Hawaii. The monument protects some of the most pristine and diverse coral reefs and over 7,000 marine species, including rare and endangered species such as the Laysan albatross and the Hawaiian monk seal. The string of isolated islands and coral atolls make up the world’s largest tropical seabird rookery, supporting 14 million nesting seabirds. The preserve is also home to a wealth of cultural and historic heritage sites, including ship wrecks and World Heritage cultural sites for native Hawaiians.

Despite its remote location, Papahānaumokuākea, also known as the Northwestern Hawaiian Islands Marine National Monument, remains vulnerable to the flotsam and jetsam of modern life. The islands and reefs lie within the vast circulating currents known as the Pacific gyre. These swirling currents, driven by winds and the Coriolis effect (causing a 15° drift to the left in the Northern Hemisphere), concentrate nutrients, organic debris, and, in recent decades, an ocean of plastic trash. Often called the Great Pacific Garbage Patch, or the Pacific Garbage Gyre, this region of floating plastic debris is really a drifting cloud of plastic particles, soda bottles and caps, disposable shopping bags, packaging, discarded fishing nets, and other debris. Much of it consists of tiny fragments floating just below the surface, but some pieces are large and recognizable, and some float 20-30 meters deep. The greatest concentrations of plastic debris occur in the eastern Pacific, between California and Hawaii, and in the western Pacific near Japan. But the trash field extends across the ocean, with lesser aggregations near the Papahānaumokuākea preserve. Similar garbage patches have been identified in the Atlantic and elsewhere in the world’s oceans, but the Pacific cases are the best studied.

The Pacific garbage gyre is thought to contain more than 100 million tons of plastic. In some areas this debris outweighs the living biomass. Fish have been found with stomachs full of plastic fragments. Seabirds gulp down plastic fragments, then regurgitate them for their chicks. With stomachs blocked by indigestible bottle caps, disposable lighters, and other items, chicks starve to death. In one study of Laysan albatrosses, 90 percent of the carcasses of dead albatross chicks contained plastic fragments (Fig. 21.1). Seals, turtles, porpoises, and seabirds become ensnared in ghost fishing nets and drown, or they die from ingesting indigestible materials. Oceanographers worry that this debris is slowly starving ocean ecosystems.

Surveys at sea and on beaches indicate that 50-80 percent of the floating material originates onshore. The rest is discarded or lost at sea. Stray shopping bags, drink containers, fast-food boxes, and other refuse fall from dumpsters, wash away from landfills, or are discarded on the street, then wash into storm sewers and streams. Eventually these items travel to the sea, where they gradually break into smaller pieces as they join the great global masses of ocean plastic.

The problem has been extraordinarily difficult to address because it is widespread, diffuse, abundant, and constantly replenished by careless or incomplete disposal of waste onshore and at sea. But growing awareness is starting to make a difference. Cleanup cruises in Papahānaumokuākea have collected more than 700 metric tons of discarded fishing gear that had clogged reefs.

In Papahānaumokuākea and elsewhere, marine debris has also caught the public’s attention, and widespread beach cleanups are having an effect. According to the EPA, beach cleanups involved 183,000 people across the United States, collecting nearly 2,000 tons of debris from 9,000 miles of coastline in 2008. Increasing awareness is also encouraging many fishing boats to reduce disposal of plastic garbage at sea. Because all this material fouls fishing gear, costing time and money, it is in their interest to bring in the garbage they produce or collect in their nets.

You can help, too: the next time you see plastic debris that’s about to wash into a storm sewer, remember that everything ends up eventually in the ocean. Pick it up if you can, and try to prevent

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2 Pronounced papa noo mokua kaa. To hear the pronunciation, visit the monument’s website: www.papahanaumokuakea.gov