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MPAs and marine litter: Snapshots of how sites are addressing the problem worldwide

Marine litter – and particularly its plastic component, commonly called 'ocean plastic' or 'plastic pollution' – is a hot topic now. Photos and television programs showing marine wildlife killed by plastic pollution have sparked public outcries. Governments are condemning ocean plastic, passing plastic bag bans and joining international coalitions to address it. Global campaigns are calling on consumers to reject single-use plastic products, like drink straws, and India has announced its plan to ban single-use plastics by 2022. A 2017 study determined that plastic pollution may now be the gateway to engaging the next generation of ocean conservationists. And the UN committed its 2018 World Environment Day to the cause of beating plastic pollution.

When MPA News last covered marine debris in 2011, the topic was much lower profile. Now seemingly everyone, including MPA managers, is paying closer attention. Case in point: a 2017 webinar on microplastics that was co-sponsored by MPA News drew over 700 registrants.

Some MPAs are heavily impacted by plastic pollution due to their location near population centers or their position on ocean currents. These even include highly isolated sites like Papahānaumokuākea Marine National Monument and Pitcairn Islands Marine Reserve. Other MPAs have relatively little marine litter. But the presence of plastic waste has now been documented from the Arctic to the Antarctic, and even in the deepest part of the ocean – the Marianas Trench, itself an MPA.

In this issue of MPA News, we provide a few snapshots of what several MPAs are doing with regard to marine litter. (Please see our ensuing article for a primer on the topic of marine litter itself, including where it comes from and its impacts on marine ecosystems.)

A. Papahānaumokuākea: A massive, ongoing program to clean up marine debris

The 1.5-million km^2 Papahānaumokuākea Marine National Monument (PMNM) surrounds the ten islands and atolls of the Northwestern Hawaiian Islands, in the central North Pacific Ocean. It is a remote place, mostly uninhabited by humans. Despite its remoteness, however, it is a major destination for marine litter. As we noted in our 2011 article, PMNM is located in the middle of the North Pacific subtropical gyre, a clockwise-moving series of currents that has the effect of retaining and circulating much of the debris that enters the North Pacific. The islands of PMNM act as a kind of comb, catching litter from the gyre and piling it up on the reefs and shorelines.

The agencies that manage PMNM work to monitor the debris, remove it, and dispose of the waste. Some of this work dates back to the 1990s, even predating the designation of the protected area. The most recent cleanup mission (2016) collected, among other things, 1468 beverage bottles, 4457 bottle caps, 485 toothbrushes and other personal care products, and 570 shoes and flip-flop sandals.

The 2016 PMNM cleanup mission also collected 1843 derelict fishing nets or net fragments. Discarded or abandoned fishing gear is a major source of ocean plastic. The days of fishing nets made of jute (cotton) and other biodegradable natural materials are largely gone. Nets are now primarily made of nylon and similar plastics. In the ocean, discarded nets can continue to float for months or years, effectively re-baiting themselves with newly snared creatures. These are called 'ghostnets'. Once the ghostnets reach PMNM, they often beach on shorelines or snag on coral reefs. Since 1996, a total of 848 metric tons of derelict fishing gear and plastics have been removed from the Northwestern Hawaiian Islands, using highly trained NOAA divers operating off large vessels. Nearly all of the removal is done by hand. (For more detail on what happens to the removed nets, see our 2011 article.)

The PMNM cleanup mission, which had occurred on a near-annual basis until 2016, has since been rescheduled to every two or three years, says Mark Manuel of the NOAA Marine Debris Program. "The personnel, person-hours, and overall effort depend on funding availability, human resources, and ship availability, and there are increasing constraints," he says. A large-scale effort, as was last conducted in 2014, can spend 30 or more days at sea and make visits to multiple islands and atolls. It is a major undertaking.

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Papahānaumokuākea marine debris page: https://www.papahanaumokuakea.gov/monsternet.html

B. Pelagos: Studying the presence of microplastics and related chemicals in an MPA's wildlife

The 90,000-km^2 Pelagos Sanctuary for Mediterranean Marine Mammals is jointly overseen by France, Italy, and Monaco. With several metropolitan areas on its coastal boundary (Nice, Monte Carlo, Genoa, and others), the MPA is subject to pollution, including plastics. The MPA is working closely with scientist Maria Cristina Fossi of the University of Siena to understand the scale of its marine litter problem.

Much of Fossi's work is on microplastics, a relatively new focus of marine litter science. Microplastics are small plastic pieces less than 5 millimeters long. They come from larger plastic debris that degrades into smaller pieces. They also come from things like microbeads – tiny pieces of plastic that are added to many health and beauty products, such as cleansers. These tiny particles pass through most wastewater treatment systems and can end up in the tissues of marine wildlife when ingested. Fossi is measuring the presence of microplastics and various plastic chemicals in the marine wildlife of Pelagos.

Fin whales, because they are filter feeders and very large, can be significantly exposed to microplastic ingestion: they trap thousands of liters of water with each gulp. Fossi has documented, through skin samples and biopsies of stranded whales in the Pelagos area, the presence of plasticizers (chemicals added to plastic to make it less brittle) in the whales' blubber – an indicator of plastic ingestion. She also compared the findings to those from fin whales in the Gulf of California (in North America) and found the chemical levels in Pelagos whales were significantly higher. The elevated presence of plasticizers in Pelagos whales exposes their tissues to higher oxidative stress, says Fossi, which could lead to tissue damage and a number of diseases. She has found similarly elevated levels in basking sharks, other fish, and sea turtles in the region.

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C. Santorini: Cleaning up ghostnets to raise the profile of a proposed MPA

On the Greek island of Santorini in the Aegean Sea, a bottom-up project is underway to designate a partial no-take marine reserve. Co-spearheaded by Cousteau Divers (an NGO) and involving fishing groups and other local stakeholders, the project aims to benefit the local tourism industry and provide an area for fish stock replenishment. A proposal for the MPA was presented to Greece's Ministry of Agricultural Development and Food in 2017 and awaits approval.

To raise awareness of the proposed MPA, as well as the global problem of ghostnets, a cleanup of the site was carried out on 8 June 2018. The cleanup was a collaboration of Atlantis Diving Centre (a local dive center, one of the initiators of the MPA together with Cousteau Divers), Ghost Fishing (an NGO), Healthy Seas (an initiative to collect ghostnets for transforming into usable yarn), and other groups. Involving eight volunteer divers, the event's highlight was the removal of a 150m ghostnet from the underwater site. The collected netting will ultimately be recycled into fabrics for swimwear.

Healthy Seas is open to working with other MPAs to help coordinate ghostnet cleanups at their sites. “We would be happy to hear from MPAs’ managing bodies,” says Veronika Mikos of Healthy Seas. “Right now we are working in five countries – UK, Belgium, The Netherlands, Greece and Italy – but we hope to expand our reach.”

For more information:

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D. Sabah: Addressed plastic bottle problem, but other plastics now an issue

In our 2011 article on marine litter and MPAs, we reported that the government of the Malaysian state of Sabah directed its parks agency to institute a plastic bottle reduction program in its MPAs due to a glut of bottles discarded on beaches by tourists. Cleanup efforts in 2009 at one site in particular – the 30-km^2 Tunku Abdul Rahman Park – removed 700 kg of trash, with much of it plastic bottles. Another 800kg was removed in 2010. While short of a ban, the program urged tourists to avoid using plastic bottles inside Sabah MPAs. We reported the program was seeing good results.

Now the same MPA is back in the news, but for another plastic reason: ghostnets. A June 2018 article in New Straits Times tells how nets lost or dumped by fishers nearby are snagging on the park’s reefs and threatening coral. The nets have measured up to 300m in length. Dive operators, who worked with park staff to implement the bottle reduction program with their clients, are now partnering again to remove nets.

In adjacent Indonesia, the local government of Bali declared a ‘trash emergency’ in 2017 when monsoon storms washed thousands of tons of plastic waste onto the island’s beaches. Most of Indonesia has minimal infrastructure for municipal waste management, so much of its garbage ends up in the ocean, and Indonesia as a whole is the second-biggest contributor to ocean plastic after China. Imams in Indonesia’s two largest Islamic organizations have been enlisted to raise awareness about plastic waste.

E. Florida Keys: Cleaning up tens of thousands of lost lobster traps after a hurricane

The spiny lobster fishery in the Florida Keys (in the southeastern US) is a sizable one. In Monroe County, which includes the islands of the Florida Keys, there were 350,000 spiny lobster traps deployed one year ago. Then Hurricane Irma came through in September 2017. After the storm, 150,000 of the traps were severely displaced – strewn throughout the 7300-km^2 Florida Keys National Marine Sanctuary (FKNMS). The traps are mostly wood and concrete, but have some plastic parts.

In response, FKNMS, with support from the National Marine Sanctuary Foundation, has established a project called Goal: Clean Seas Florida Keys. It launched in April 2018. The scale of the cleanup needed is beyond what the Sanctuary management could do by itself, so the project enlists the help of dive shops to find and retrieve the traps. In return, the project offers the dive operators training on how to remove the traps, and guidance on how to secure permits to do so. Because the state of Florida regulates traps as property, and because the MPA has strict regulations on removing any wildlife (the traps often have algae or other sea life growing on them by the time they’re found), permits are required. Dive shops are also able to apply for funding to support their work: the National Marine Sanctuary Foundation seeded the project with US $80,000.

The project is using flyover photos from September 2017 (taken by University of Florida researchers) to direct divers to likely areas of congregations of traps. “We’re still in the beginning phase,” says Marlies Tumolo, who coordinates the project. “We’ve trained 40 dive shop staff so far and a couple shops have started cleanups. People are excited.”

For more information:

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