



TRASH TALKING WITH NICK MALLOS

STORY BY ERICA ROWELL

A 150-ton dock. A 24-foot skiff. A soccer ball. A Harley-Davidson. And Styrofoam, lots of Styrofoam.

What's the common thread for these items? After being swept away by the one-two punch of the 9.0 earthquake and tsunami that devastated the shores of northern Japan last year, all journeyed thousands of miles across the Pacific Ocean to wash up on North American beaches in 2012.

Tsunami Debris Estimates and Uncertainties

The Japanese government estimates that the tragedy sent some five million tons of debris into the ocean, 70 percent of which is believed to have

sunk quickly. Of the debris still afloat, it's estimated that up to 75,000 tons could reach North America over the next few years. And it's that debris—what already has arrived and what has yet to come—that brought together scientists and other experts from Japan and the United States for a three-day confab in Oregon. Among them was Nick Mallos MEM'10, a conservation biologist and ocean debris specialist at Ocean Conservancy, an environmental advocacy group based in Washington, D.C.

"There's a lot of uncertainty surrounding tsunami debris," says Mallos. "How much is going to show up? Is it going to make landfall

tomorrow or a year or two from now? We certainly cannot predict when and how much is going to make landfall, but we absolutely can prepare for it."

And preparing for the tsunami debris was what the meeting was all about—a working weekend to share information and sketch in what's known to offset the sea of unknowns that responders and affected communities face.

Working with Communities a Common Thread for Mallos

Working with communities on environmental issues has been a lodestar in Mallos's career. After graduating from Dickinson College in 2007, he taught marine science at Sound to Sea, an

In early June, a 66-foot, 150-ton dock dislodged by the tsunami washed ashore at Agate Beach, Oregon. Photos courtesy Oregon Parks and Recreation Department





Nick Mallos MEM'10 on Cannon Beach, Oregon; Cannon Beach City Manager Rick Mays with reporters August 2012.

Steve Dipaola Photos

experiential school in Salter Path, N.C.

The following year at the Nicholas School of the Environment, he interned at **Lisa Campbell's** lab, working on a National Science Foundation-funded study of 700 volunteers along the North Carolina coast who monitor and collect data on endangered sea turtles—their crawl tracks, nests, hatchings and so forth.

“Nick’s experience on the beaches led to his interest in volunteerism and what motivates people to commit so much time and energy into something they believe in,” says Campbell, Rachel Carson Associate Professor of Marine Affairs and Policy, who is based at the Duke Marine Lab in Beaufort, N.C.

That interest was further sparked through Walking Fish, a community-focused program to source locally harvested seafood to a member-based community in Durham, which Mallos helped get off the ground in 2009 with fellow Nicholas School students **Joshua Stoll**, **Kim Gordon**, **Alexis (Ramirez) Baldera** (now working with Mallos at Ocean Conservancy), and **Jennifer Bruce**. Mallos received his master of environmental management degree from the Nicholas School in 2010.

At Ocean Conservancy, Mallos continues to explore the nexus of citizen science and marine conservation, routinely working with volunteer beach cleaners on massive grassroots efforts to

stave off the ever-mounting problem of everyday ocean debris.

A VISIT TO CANNON BEACH

But the marine debris that brought Mallos to Oregon was not run-of-the-mill ocean trash. It was trash that the giant waves striking Japan on March 11, 2011 had swept into the ocean.

In June 2012, Cannon Beach, about 100 miles northwest of Portland, had received two to three times the normal volume of ocean debris for a summer month. Ocean debris typically washes ashore along the Oregon coast in winter storm surges, **Richard Mays**, city manager of Cannon Beach told Mallos and his workshop colleagues. But the





DEBRIS IN JAPAN

PG 28 and 30: Japan disaster evidence still prevalent 15 months after tsunami. Mallos picks up tsunami debris, Gamo Tidal Flats, Miyagi Prefecture.

heavy volume of Styrofoam, plastic debris and other trash that had made landfall in summer was tsunami debris that had arrived earlier than predicted and not just in Cannon Beach. Tsunami debris has washed ashore on beaches from southern Oregon all the way north to Alaska since March, and in September it showed up in Hawaii. This has meant major challenges for the responders.

Those challenges, it was clear to the workshop group, were very similar to those associated with traditional ocean debris—namely, its negative effects on tourism, wildlife and the economy.

TACKLING THE TSUNAMI DEBRIS: RESOURCES, COSTS, INVASIVES

Added disposal costs for the tsunami debris are a major concern for West Coast communities. Mays estimates that tsunami debris will cost his city \$3,000-5,000 a year. In a down economy, any added costs are bad news, so one can imagine what officials in the small seaside community of Agate Beach, about 100 miles south of Cannon, were thinking. There, in early June, a 66-foot, 150-pound dock that had been dislodged by the tsunami washed ashore.

Removal costs were not the only issue of concern. The fact that it had originated in a marine environment had scientists like Mallos worried.

When traditional ocean trash, which by and large starts on land, picks up barnacles and other pelagic organisms on its seaward travel, those clingers-on pose little threat to coasts because they are generally not adapted to survive in near-shore environments.

“When marine-based trash encrusted with species from coastal or estuarine areas travels across ocean waters and settles in a near-shore environment in a totally new ecosystem, those non-native species can compete without natural predators for food and other resources,” says Mallos.

The result can be ecosystem chaos.

“In many respects the threats posed by ocean trash—entanglement of marine animals, ingestion by marine animals, navigation hazards, all of those types of things—will potentially be exacerbated by tsunami debris,” says Mallos. “But one new potential risk is the threat of invasive species, as we’ve seen with the dock that washed up on Agate Beach.”

That dock, it turns out, had carried millions of barnacles, mussels, algae, crabs, seaweed and other organisms on it from Japan: In all, some 90 different species were found to have hitchhiked a ride, including at least two that are on the top 100 list of worst pests.

The Oregon Fish and Wildlife Department calls the Northern Pacific sea star (*Asterias amurensis*) a “voracious feeder” that “preys on native marine organisms” and describes Wakame algae (*Undaria pinnatifida*) as a quick-growing seaweed that could “become a fouling nuisance on ... marine structures” and “block out sunlight essential for the survival of native kelps, seaweeds, and other marine algae.” Both were found on the Agate Beach dock.

As Ocean Conservancy’s Kaitlin Gaffney put it, invasive species represent the “second greatest threat to biological diversity after habitat loss” and cost an

estimated \$138 billion annually.

To nip the threat of invasives in the bud, the dock at Agate Beach was scraped and torched clean, and the more than two tons of non-native species removed from it were buried well above the high-tide line. Then, the massive dock was sliced into pieces and hauled off to a landfill. The removal cost: \$84,155, which is almost equal to the total two-year beach cleanup budget.

A LOOK AT THE DISASTER FROM JAPANESE SHORES

Two months before the Oregon workshop, Mallos was in Japan surveying some of the regions hardest hit by the tsunami. From there he was to embark on an ocean voyage to track the debris fields working their way across the Pacific. An illness kept him from making that Pacific journey, but his time in Japan’s Iwate and Miyagi prefectures was hardly fruitless.

Teaming up with 11 members of the Japan Environmental Action Network, a long-time Ocean Conservancy partner, and a local group called Cleanup Gamo, Mallos conducted a beach cleanup. The task was monumental, a seeming pebble or two of cleanup on a vast beach of debris and destruction. But while they only could make a dent, it’s these efforts, Mallos explains, that when multiplied can make a demonstrable difference. Perhaps, when viewed through this lens, there’s a tiny silver lining to the tsunami trash—and that is the spotlight it is shining on the larger, longer-lasting global problem of everyday trash that is accumulating in our ocean.

“The tsunami was a human tragedy and a natural disaster that was certainly unpredictable and unpreventable,” says Mallos. “But the trash that plagues our ocean and beaches daily is preventable. And we know the solution to that: reducing trash at its source and beginning to clean up our beaches and waterways around the year.”

THE EVER-GROWING PLASTIC PROBLEM

That solution is certainly a challenge. Even on that gorgeous day in August combing Cannon Beach at its cleanest, Mallos easily collected a small pile of trash. Ocean Conservancy’s annual beach cleanup puts an even finer point on it—in 2011, nearly 600,000 volunteers around the world collected more than 9 million pounds of ocean trash and debris. And while the volume is enormous, it’s not just the big items that are troublesome.

“People focus a lot on the big pieces of debris—the detergent bottles, the water bottles, the fishing nets,” he says. “And those things are certainly problematic in their own right, but small pieces of plastic persist in the ocean for a very long time and we’re only beginning to understand what potential impact they have on the ecosystem, both from an ingestion perspective and the potential leakage of chemicals and other pollutants that are in the ocean.”

Because it’s so brittle, derelict plastic often breaks into ever-smaller pieces, posing an ever-larger problem for ocean environments. Big problems also arise from tiny nurdles—the raw,

pre-manufacture resin pellets used to make much of the plastic products that dominate our lives.

Unfortunately, these plastic building blocks are entering waterways and washing ashore beaches the world over—through storm drains when spilled on land and at sea during ocean transport. In July a cargo ship dumped 150 tons of nurdles into the ocean during Typhoon Vicente, scattering them onto Hong Kong’s beaches by the millions.

The massive problem of plastics plagues the marine environment and coastal areas just about everywhere, including on remote islands in the Antarctic and the Pacific.

“When I was out on Midway with Andy Read’s Marine Conservation Biology class in 2010,” says Mallos, “we dissected albatross chick carcasses and found nurdles and other small pieces of plastic in there.” (Read, Rachel Carson Professor of Marine Conservation Biology, is based at the Duke Marine Lab.)

Birds that feed on this small plastic, which they mistake for fish eggs, do not receive proper energy—a nutritional deficit that can lead to starvation. Then there is the problem of toxicity.

“Studies show that sea turtles, seabirds and fish with large quantities of plastic in their guts also show high levels of PCBs and other contaminants in their blood,” says Mallos. “Because fish are such a fundamental source of food for higher levels of species, there’s the potential risk that such toxicity can bioaccumulate up the food chain to the species we eat,

like tuna, and pose a threat to human health.”

‘THERE IS NO ‘AWAY’ WITH TRASH’

Amid the daunting challenge of addressing marine debris alongside the ongoing challenge of the Japanese to rebuild and recover from the natural disaster, there are community-based glimmers of hope.

In June, seven-year-old Kazuki Yamakawa from Miyagi prefecture was reunited with his soccer ball, which had washed ashore a remote beach in Alaska. In May, Ikuo Yokoyama, the 29-year-old Harley owner, who is still getting his life in order following the tragic events of March 2011, reportedly requested his bike, which had been found on Graham Island off the coast of British Columbia, be donated to the Harley-Davidson museum as a memorial to those who perished in the natural disaster. It’s these small gestures that restore a sense of humanity and underscore the truly global nature of ocean pollution problems—and its solutions.

“One positive takeaway from the disaster, perhaps,” said Mallos, “is the notion that there is one ocean and it connects every person and every continent on this earth, and what that means for us is there is no ‘away’ for trash.”

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Garbage from around the world washes ashore on Midway. Mallos looks for debris from bowsprit of Brigantine *Kaisei* in North Pacific Gyre. Japan and Midway photos courtesy of Nick Mallos.



Andrew Blackwell Photo