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Ocean Expeditions: News from The Ocean Cleanup and Oceanographer Julia Reisser

NOT IMPOSSIBLE NOW STAFF · AUG 31, 2016

By Julia Travers

In just a few years, The Ocean Cleanup has come a long way. It was four years ago that then teenager Boyan Slat introduced his soon-to-be viral ocean cleanup concept during a TEDx Talk, and in 2013 The Ocean Cleanup was founded. Below, read about a few of their incredible recent milestones along the road to the Pacific Cleanup, which they plan to start in 2020. A special thanks to Oceanographer Julia Reisser, who leads the ocean plastic research team and who shared some information and reflections about her work in Oceanography and with The Ocean Cleanup with us at Not Impossible Now.

What Is It?

The Ocean Cleanup plans to use the ocean currents to passively clean plastic out of the ocean. It involves using floating barriers connected in a V-shape to catch plastic without mechanical propulsion. As their site explains, "it will act almost like a horizontal funnel; wind and surface currents will push plastics further and further into the array until the plastics reach the inner tip, where they will be drawn into the collection platform." Their feasibility report found that in 10 years, a 100-kilometer array could remove 42% of the plastics in the North Pacific gyre (a gyre is an area where plastics are concentrated in the ocean). Because sea life is neutrally buoyant and the plastic collection process is slow, sea life will be able to float under or swim around or under the barrier. Plastic, being positively buoyant, will be collected near the surface. The Ocean Cleanup focuses solely on floating plastic, most of which is located within a depth of five meters. They will conduct field studies on environmental impacts during pilots and will also have an independent institution do so.

Mega Expedition (2015)

In 2015 the Mega Expedition mapped 3.5 million square kilometers of the Great Pacific Garbage Patch between Hawaii and California with 30 ships. One of the main missions of this expedition was to get a clearer estimate of the amounts and sizes of plastic in this area in order to better plan for the cleanup process. Previous estimates in this type of study were found to vary widely and to focus on measuring primarily smaller pieces of plastic.

Oceanographer Julia Reisser cites the Mega Expedition, in which she lead the mothership and "sampled ocean plastics in the heart of the so-called Great Pacific Garbage Patch," as one of her top two professional ventures. The other was "an expedition to Elephant Island (Antarctica) where [she] stayed one month living in a container to attach satellite transmitters into Elephant Seals." Reisser has over 10 year of experience at sea around the globe, and had written numerous peer-reviewed publications.

The mothership Reisser lead on the Mega Expedition was the 171 foot-long Ocean Star, and it carried the Mega Trawl: two wide nets designed to capture massive amounts of multi-sized plastic. The patch was further measured with Manta Trawls behind each ship (standard surface trawls). Crews used The Ocean Cleanup App too, which allowed them to count and record visible plastic debris and is actually available for public use on iTunes and Google Play. Seven of the ghost nets (tangled knots of fishing gear than can be several meters across) they recovered on this expedition were heavier than 50 kg.

Reisser reflects on the expedition:

"I was very honored to lead the first expedition sampling ocean plastics from a wide range of sizes. What surprised me the most were the very high loads of big pieces of debris (e.g. buoys, packaging items, nets, etc.), and how the plastic load is so much higher than that of marine life inhabiting the sea surface of this remote marine region."

North Sea Prototype (2016)

The North Sea prototype is a 100 meter barrier segment which has been deployed in the North Sea near The Netherlands. The prototype will be tested in open waters for a year to determine how well it survives at sea in extreme weather. The Ocean Cleanup explains that at “this test site, conditions during a minor storm are more severe than those in exceptionally heavy storms (occurring once every 100 years) in the Pacific Ocean.” Sensors will record the prototype’s movements and the data will help engineers to refine the system to be as durable as possible.

The Aerial Expedition (2016)

In August of 2016, The Ocean Cleanup announced another milestone: the Aerial Expedition. In the fall of 2016, a C-130 Hercules aircraft will be used to further explore, understand, and measure the dimensions of the ocean garbage patch from above, with the use of sensors and expert spotters. It aims to cover more than 300 times the area of the Mega Expedition, and to quantify the largest pieces of plastic trash in the ocean. The expedition aircraft will take off from Moffett Airfield in Mountain View, CA and the expedition patch logo reads, “Ghost Net Busters.”

Oceanographer Julia Reisser says she is currently busy analyzing datasets for a “scientific manuscript about the plastic pollution levels in the Great Pacific Garbage Patch.” The Ocean Cleanup hopes to publish a study with the combined data from the Mega Expedition and the Aerial Expedition in 2017. I was curious as to whether with all this intensive study of the ocean and of pollution, Reisser could still think of it as a place to play and relax. Here’s her response:

“Yes, the ocean is what relaxes me the most. In fact, my laptop is in front of a big beach front window. Seeing, listening, and breathing the ocean definitely helps me to be productive as well as remember to take breaks and relax. I love to go for walks and run on the beach. In summer time, I also enjoy swimming, stand-up paddling, snorkeling, and scuba diving. I am a PADI Divemaster and during my Master’s degree, I observed and described the behavior of more than 1,500 sea turtles underwater. 😊”

You check out The Ocean Cleanup’s site for more updates and information on their progress, and follow them on Facebook, Instagram, and Twitter. You can also follow Boyan Slat @BoyanSlat and Julia Reisser @julia_reisser, where she shared on August 23rd that she “had a great testing flight for upcoming @TheOceanCleanup Aerial Expedition.”

Sources:

<http://www.theoceancleanup.com/>

https://www.researchgate.net/profile/Julia_Reisser

<https://itunes.apple.com/us/app/the-ocean-cleanup-survey-app/id999527436?mt=8>

<https://play.google.com/store/apps/details?id=com.theoceancleanup.surveyapp>

<https://www.facebook.com/TheOceanCleanup/>

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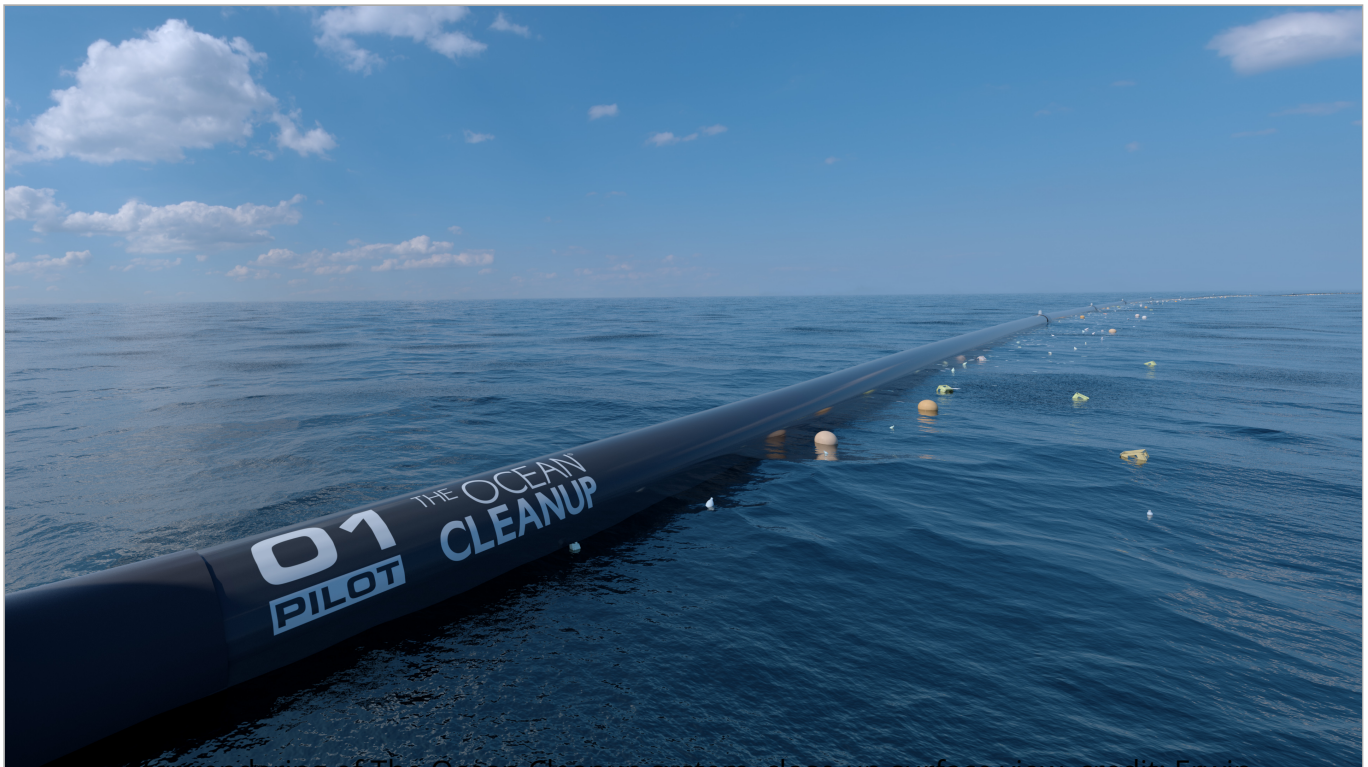


Ocean Cleanup Tests New Plastic-Collecting Prototype

WRITTEN BY: Julia Travers (/profile/226916)

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Since its founding in 2013, The Ocean Cleanup (<https://www.theoceancleanup.com/>) has carried out extensive research and simulations, embarked on several large-scale plastic-reconnaissance expeditions, and learned from prototype-testing. The current result of these efforts is a revision of the first design of their ocean-plastic-collecting apparatus. The new plan was announced in May 2017, is currently being tested in the North Sea and is scheduled for Pacific trials soon after. The group aims to deploy the first operational system within the year.



Computer rendering of The Ocean Cleanup system, close-up surface view, credit: Erwin Zwart, The Ocean Cleanup
(https://assets.labroots.com/_public/_files/system/ck/trending/close-up%20surface_dd238296cf8a0f907e79ff761370bb74.jpg)

Founder Boyan Slat's original plan was to build a series of plastic traps, like horizontal funnels, out of V-shaped barriers floating on the ocean surface and moored to the seabed. Both this design and the current reiteration aim to use the ocean's currents to passively collect plastic from the surface. The new design entails the use of an array of smaller, drifting U-shaped screens that will be equipped with sea anchors about 600 meters below the surface.

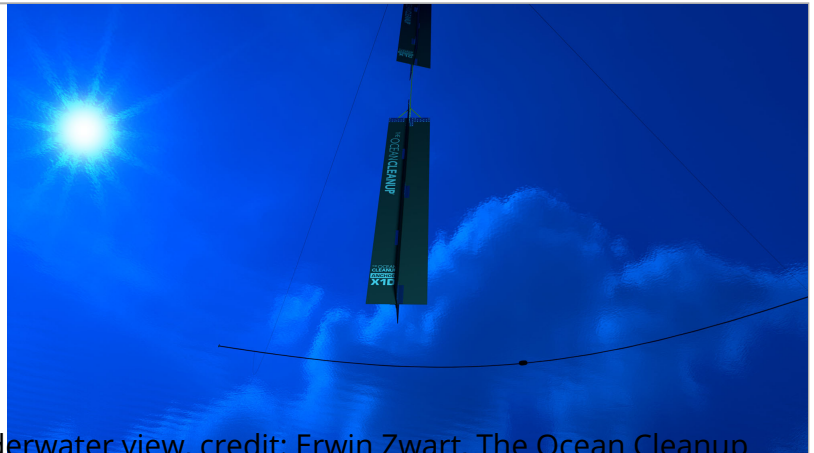
"Maybe at first sight, this approach seems counter intuitive - you might expect that putting up a fixed barrier would be most effective in our attempts to catch plastic," says Slat. "When you think of it, it becomes more logical," he adds, pointing out that establishing a difference in speed between the plastic and the barrier is the most important factor in collecting plastic.

"If you then follow the same, or a similar path as the plastic, you will end up with your cleaning systems in the areas of the highest concentration. The effectiveness of this way of working, according to our models, is about twice as good" he explains. The Ocean Cleanup's models of this system show it can clean 50 percent of the Great Pacific Garbage Patch's (GPGP) plastic in five years, in contrast to the previous outlook of cleaning up 42 percent in 10 years. The plan is for the plastic to be collected and recycled. According to The Ocean Cleanup (<https://www.theoceancleanup.com/faq/>), "many parties have expressed an interest in obtaining" their collected ocean plastic and some of it might "be turned into oil" to run their support vessels.

The new, mobile barriers are designed to naturally gravitate to areas where the plastic gravitates. Just as the ocean's currents move plastic and other debris into five regions called gyres, they gather plastic "at higher concentrations in certain zones of the GPGP; it's like having little patches within the patch," says Oceanographer Julia Reisser, who leads the ocean (https://www.labroots.com/trending/technology/7291/brightening-ocean-clouds-reduce-dangerous-hurricanes) plastic research team. "This means that if we can well predict or monitor these little patches -- via satellite maybe -- we can enhance the efficiency of cleanup operations."

During the previous research expeditions, Reisser was surprised by the amount of large plastic debris in the GPGP. "Some of these items are bundles of fishing nets weighing more than a [ton]!" she expresses. She was also concerned to learn through their research "that the plastic loads within surface waters of the GPGP far outweighs the biomass inhabiting this marine region ... there is far more plastic than natural prey available for surface feeders such as marine turtles and sea birds." She and her team have now completed their research on the results of The Ocean Cleanup's Mega and Aerial Expeditions and "Pollutants in Plastics within the North Pacific Subtropical Gyre" was published (http://pubs.acs.org/doi/abs/10.1021/acs.est.7b04682) in *Environmental Science and Technology* in Nov. 2017.

The Ocean Cleanup's original moored model was designed to allow marine life to move around or float under it. Slat says the new systems also move very slowly, "so from the perspective of a



3D rendering of new system with anchor, underwater view, credit: Erwin Zwart, The Ocean Cleanup
https://www.labroots.com/_public/_files/system/ck/trending/anchor_ec8f6985a8e999d05405c66808841ca3.jpg

living creature there is not so much different from the stationary version." While for neutrally buoyant marine life the down-force in front of the screen will be lessened, he says, "it will still be there, though, so plankton and jelly fish will still be able to passively pass under the system without a problem."

While the project still faces questions, such as how the new screens will hold up to the ocean's powerful forces, the new model may possess advantages over the original. Along with the predicted improved efficiency, the smaller systems will be cheaper and easier to build, test, fix and remove if necessary. Construction of a full array could scale up gradually over time.

In late Sept. 2017, The Ocean Cleanup announced on its Facebook page (<https://www.facebook.com/TheOceanCleanup/>) that the “new North Sea prototype test program is now up and running in its full setup.” It runs the tests in the North Sea off the coast of The Netherlands because of the extreme weather conditions there. The website explains that these tests will evaluate two new floater-screen connections in three variations in order to find the strongest version. Antifouling methods, which counteract the growth of organisms on underwater surfaces, will also be tested. These processes aim to prevent biofouling that could attract sea life or hinder the system’s performance. In Oct., The Ocean Cleanup posted on social media that the floater (the part that catches plastic and keeps the system afloat) “of the first ocean cleanup system is in production.”

If The Ocean Cleanup sticks to schedule, the Pacific trials of the new design will begin soon and the first cleanup system will be deployed in the Pacific in mid-2018.

The Ocean Cleanup's New North Sea ...
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Julia Travers is a journalist, writer, artist and teacher. She frequently covers science, tech and conservation.

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