

# SYSTEM 001 INFO PACK 2018

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LAUNCHING



**SYSTEM  
001**

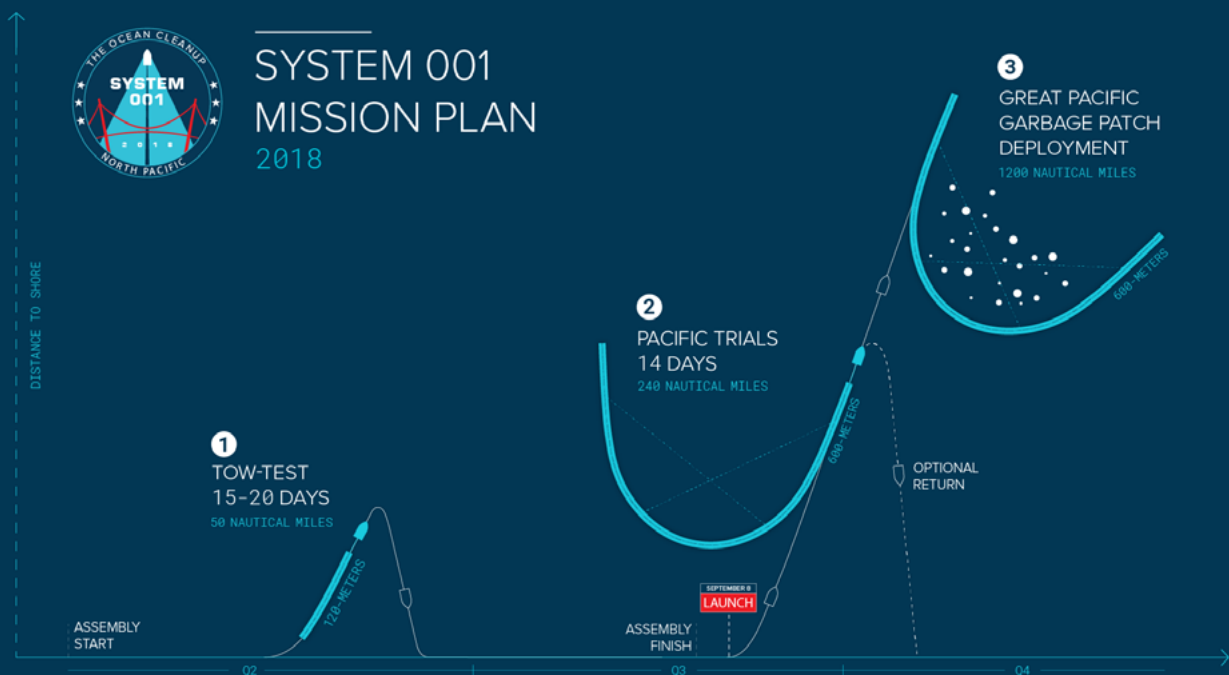
THE OCEAN **CLEANUP**<sup>®</sup>

# SYSTEM 001

After 273 scale model tests, six at-sea prototypes, a comprehensive mapping of the Great Pacific Garbage Patch (GPGP) with 30 vessels and an airplane, and several technology iterations, we are now ready to put the world's first ocean cleanup system to the test, launching from San Francisco on September 8th.

On Saturday, September 8th, The Ocean Cleanup's 2,000-foot-long ocean cleanup system will depart from San Francisco Bay, through the Golden Gate Bridge and into the Pacific Ocean.





## MISSION PLAN

Before launching System 001 into the GPGP, we towed a 120-meter (400-foot) section of the cleanup system through rough seas, 50 nautical miles offshore, in May of this year. This was done to assess how well the system behaves while being towed as well as to test the seaworthiness of the design. The segment was towed a total of 500 miles in multiple directions and various sea states with the screen pulled up and again with it down. After the successful completion of the tow test, the assembly of the remainder of the system continued at the yard in Alameda, California.

On Saturday, **September 8**, the system will be ready for launch and will be towed out to the Pacific Ocean for one final check during the **Pacific Trials**, 240 nautical miles offshore. It will take about 3 days to complete the transfer to the Pacific Trials testing area, where System 001 will be installed in its operational U-shape configuration for the first time. The system's behavior will be extensively monitored during this final rehearsal, which is expected to last around two weeks.

After the trials have concluded, System 001 will be towed the remaining ~1000 nautical miles to the **Great Pacific Garbage Patch**. This will be a long journey, as the average tow speed is 2-4 knots. We expect that the trip to the patch will take approximately two to three more weeks. Once it arrives, the cleanup will commence.

# SYSTEM 001 PROOF-OF-CONCEPT

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We're confident we've eliminated risks where possible, but not everything can be calculated, simulated or tested at scale. The only way to be sure is to trial at full scale. Our first system should be regarded as a beta system, allowing us to eliminate the last remaining uncertainties before scaling up. Before we can claim a proof-of-concept, we want to assess the following points within the first 6 months of operation for System 001:

## **1. The behavior of the cleanup system**

We want to evaluate if the system behaves as intended, regarding its U-shape configuration and movement with the wind, currents and waves. We hope to confirm this within the first two weeks of the Pacific Trials.

## **2. The ability to concentrate and retain plastic**

Although many attempts have been made to predict the plastic capturing efficiency of the cleanup system with help of scale models and computer models, these calculations have inherent uncertainty. The only way to confirm the system's efficiency is by testing it at full scale. We aim to confirm the system's ability to efficiently catch and retain plastic within the first months of operation in the patch.

## **3. Survivability**

The ocean can be a very destructive environment. This is why we have engineered and tested the system to utilize and withstand the forces of the ocean, such as waves and salt water corrosion. While designing the structure, we considered load cases that have the probability of occurring only once in a hundred years. We found the key to survivability is flexibility, so we designed the system to be limber enough to follow the waves. Because the system is free-floating, it can also drift when subjected to high current speeds or gale force winds. We will be able to confidently confirm the survivability of the cleanup system in April, if it made it through extreme winter weather without significant damage.





Extensive **monitoring** will be carried out 24/7 to observe the **system's behavior and its surrounding environment**. The monitoring program will commence as of the Pacific Trials and continue for the first year of operation in the GPGP. This is to ensure that enough data is collected on the behavior of the system to be able to implement our lessons learned in the developments of System 002.

We will monitor the system and its surroundings continuously with the help both human observers as well as equipment on and around the system. We will be using PAM, cameras on the system, acoustic buoys and the AutoNaut™, an autonomous, remotely-operated surveillance vessel.

## SURROUNDING ENVIRONMENT

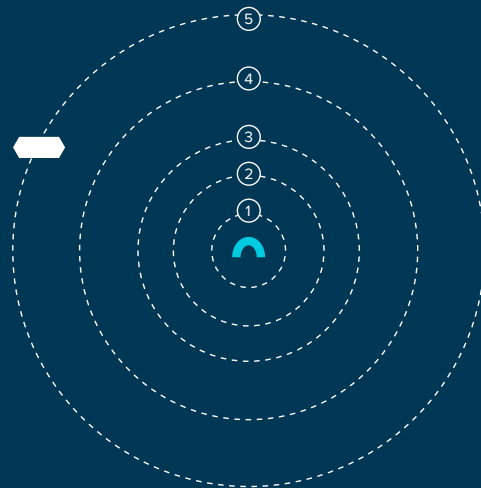
In addition to the development and assembly of the system, The Ocean Cleanup has worked closely with various stakeholders involved in operations on the high seas as well as conducting extensive research on the marine environment in the GPGP with the help of external experts within the field.

**Marine traffic:** The Great Pacific Garbage Patch is vast (twice the size of Texas) and vessels crossing through it are rare - on average there are less than five within its boundaries at any given time. This, combined with the relatively small size of the cleanup systems, the chances of a vessel interacting with a system are minor. We have still chosen to go to advanced safety measures (indicated in the image below) and we will also continuously monitor the health and whereabouts of our systems through on-board cameras and GPS trackers. We will be able to identify if the system drifts too close to the outer edges of the patch (where vessel traffic density can be higher), allowing us to manually correct the system's trajectory by towing it back to the center of the patch.

### THESE MEASURES RESULT IN FIVE WAYS FOR VESSELS TO SPOT OUR SYSTEMS IN THE GPGP

- ⑤ Navigational warnings every 5 days
- ④ AIS Transmission every 3 min
- ③ Radar reflector
- ② Lights from lanterns
- ① Visuals of systems

*Typical system speed is around 1 knot, up to max 3 knots in storm conditions*



We entered into an [agreement](#) with the Dutch State in June, in which the Netherlands support a legal framework for The Ocean Cleanup's offshore activities in relation to other users of the high seas. As a consequence of this agreement, System 001 carries the Dutch flag. Sponsored by the Netherlands and Vanuatu, we have been invited to present our plans at the International Maritime Organization, without raising objections from member states.

Additionally, BIMCO, the world's largest international shipping association, has shown their support of The Ocean Cleanup, and acts as an ambassador for our case with their more than 2000 members in more than 120 countries. We are also working closely together with the US Coast Guard, who are in charge of the charting of the North Pacific, and will inform local shipping traffic by means of regular notices to mariners about the presence of our system.

**Marine life:** During our development process, we have sought guidance from a number of specialist groups, such as [CSA Ocean Sciences](#), the National Oceanic and Atmospheric Administration (NOAA – US Department of Commerce) and the University of Miami (Department of Marine Ecosystem and Society). There are four main points in which the systems have been designed to be inherently safe for marine life:

1. The systems move through the ocean at extremely low speeds - slow enough for creatures to swim out of its path.
2. Because the skirt is impenetrable, the current will flow underneath, guiding with it organisms that can't actively move, while the plastic (which floats) remains inside the system.
3. As the skirt is not a net, loose lines or openings that could capture fish, turtles or marine mammals have been avoided, thus sea life cannot become entangled.
4. We will only remove the retained plastic from the water periodically, which means people will always be present to check for marine life before the plastic is lifted out of the water, as well as use deterrent methods, if necessary.



## SCALE UP TO FULL FLEET

The lessons learned from our first system will be implemented into the design of System 002, which will be developed in parallel to the offshore operations of System 001 in 2018/2019. While System 001 aims to prove the technology, system 002 will build on the lessons of System 001 and prepares the design for full-scale roll-out. It most likely will be slightly larger than System 001. System 002 is scheduled to go into production in the second half of 2019.

After this continued development phase, we will deploy the second system and gradually ramp up to a full fleet of approximately 60 systems, starting in 2020. Following the ramp-up in the Pacific, we aim to expand the cleanup operation to the other 4 ocean garbage patches as well.

To finance the fleet, we will be welcoming companies and individuals to sponsor the cleanup systems. By turning the collected plastic into valuable products, we aim to make the cleanup fleet financially self-sustainable.



If everything goes well with System 001, we hope to bring the first plastic back to San Francisco within months of the deployment in the Great Pacific Garbage Patch. During the period where System 001 is the only active cleanup system, we project 50 tons of plastic to be extracted per year. The full fleet of systems is projected to extract up to 14,000 tons of plastic per year. We estimate to be able to remove 50% of the plastic circulating in the Great Pacific Garbage Patch every 5 years, once we have reached full scale deployment of 60 systems.

Our objective is to valorize as much of the harvest as technically - and commercially – possible. We aim for ‘zero waste’ operations, with no debris to end up in a landfill. Our recycling operations will be based on partnerships with existing recycling companies who have capacity to process the material or are willing to invest in our mission.

# MORE DETAILS

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## **System 001 content:**

[theoceancleanup.com/system-001-launch-presskit/](https://theoceancleanup.com/system-001-launch-presskit/)

## **Media gallery:**

[theoceancleanup.com/media-gallery/](https://theoceancleanup.com/media-gallery/)

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## **Live stream:**

[theoceancleanup.com/system001](https://theoceancleanup.com/system001)

