Marine Debris: Species transported on Japanese Tsunami Marine Debris & Research priorities for marine debris in Oregon

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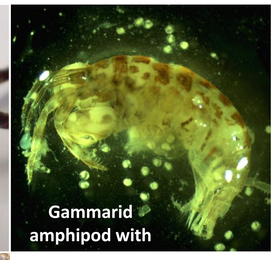
Tsunami-driven release of marine debris

- On March 11, 2011 a magnitude 9.0 earthquake occurred off the coast of Oshika Peninsula, Honshu, Japan. This earthquake generated a tsunami that struck Japan as well as various locations around the Pacific Ocean.
- The magnitude of debris released into the Pacific Ocean is hard to estimate but surveys indicate at least 5 million tons of debris was washed out by the tsunami. Much (~70%) could have sunk off the coast of Japan and the rest would have floated away and dispersed.
- This Japanese Tsunami Marine Debris (JTMD) not only served as prime **habitat for biofouling species** but also as a **method of transport** over large distances.
- JTMD items include boats, skiffs, buoys, docks, etc. – since June 2012, >300 items have been documented.
- High windage items reached the Pacific Northwest coast winter of 2011-12, and Hawaii summer of 2012.

Japanese dock that reached Agate Beach, OR in 2012 covered in > 100 living species of nearshore Japanese origin

Examples of JTMD Species



In March 2013, live juvenile striped beakfish, *Oplegnathus fasciatus*, arrived after travelling > 5,000 miles in a small Japanese fishing boat that washed up on the Washington coast.

Some species have a history of travel

Have the JTMD species travelled before this event? If so, how?

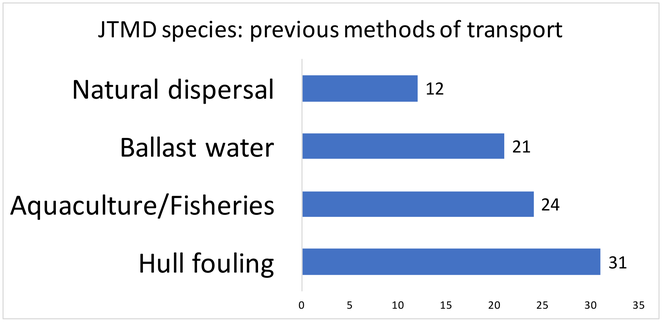


Figure 1. Out of the 98 JTMD species in our database, some have previously travelled outside their native range through hull fouling (n=31), aquaculture/fisheries trade (n=24), ballast water (n=21), and natural dispersal (n=12).

The marine debris issue and workshop

Marine debris (MD) is a growing global problem that is harming the environment and economy. It is impeding navigation, entangling wildlife, polluting beaches, and much more. To prevent and reduce the amount of MD, more research is needed to explore the issue and to figure out what aspects of MD research should be prioritized. On May 30, 2017, NOAA Marine Debris Program held a workshop for Oregon stakeholders prioritizing research to help address MD in Oregon.

My work: I redistributed the survey of MD research priorities from the workshop, and broadened out the audience to more groups in Oregon: managers, researchers, interested citizens, and citizen scientists, for a total of 116 responses. Survey methods were both online and in-person surveying. The results of the workshop and my surveying efforts can help to guide local marine debris research.

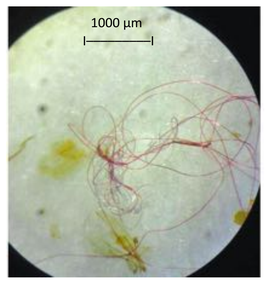
Marine debris: the small stuff

Microplastics: plastic particles that are less than 5 mm in diameter, and can be a challenge to detect and remove from the environment due to their size.

Sources of microplastics in the ocean:

- Larger plastic debris breaking down through weathering
- Synthetic microfibers
- **Microbeads** from health and beauty products (image below)

Synthetic clothing fibers: polyester, acrylic, nylon, spandex, etc. are petroleum derived fibers. Clothing made from synthetics shed tiny fibers in the wash, and these microfibers end up in the marine environment in large quantities.



Results: Priority rankings of MD topics

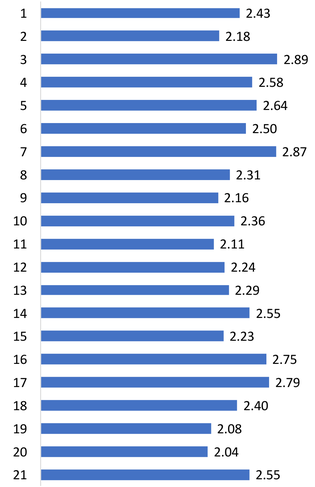


Figure 2. Survey respondents' (n=116) rankings of 21 MD research topics. A higher score correlates with a higher priority ranking.

TOP 3 MD Research Priorities:

1. Marine debris impact on Oregon's ecosystems.
2. Microplastics impact on Oregon's ecosystems.
3. Investigating approaches for working with industry to reduce plastic waste, especially packaging.

Engage State of the Coast Attendees

With your help and feedback on marine debris, I can compare the input from State of the Coast attendees with the results from the MD Research Priorities Workshop rankings. By engaging local stakeholders, I can further surveying efforts to help guide local MD research.

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NOAA Marine Debris Program
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MRM marine resource management
PICES North Pacific Marine Science Organization