

Sea Grant  
Oregon

# Oregon Marine Debris Research Priorities Workshop Proceedings

August 2017

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## **Acknowledgment**

The Oregon Marine Debris Research Priorities Workshop Proceedings were drafted by Matthew Coomer, Nir Barnea, and Jamie Doyle. Many thanks go to the participants of the workshop, who provided the content of these proceedings; to the National Oceanic and Atmospheric Administration Marine Debris Program, for supporting the workshop and the drafting and editing of the proceedings; to Oregon Sea Grant, for planning, facilitation, and note-taking during the workshop; and to Oregon State University, the Environmental Protection Agency, and Oregon Office of the Governor for valuable assistance in planning the workshop.

## **For citation purposes, please use:**

National Oceanic and Atmospheric Administration Marine Debris Program (2017). Oregon Marine Debris Research Priorities Workshop Proceedings. Silver Spring, MD: National Oceanic and Atmospheric Administration Marine Debris Program.

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# Introduction

Marine debris is a growing problem that harms the environment and the economy. Its impacts range from impeding navigation to entangling wildlife and fouling beaches. Research helps explore this issue, bridges knowledge gaps, and supports prevention and reduction efforts.

In the recently-released **Oregon Marine Debris Action Plan** (OR MDAP), local stakeholders identified future research actions to help combat marine debris. One such action was to, “Develop research priorities for marine debris in Oregon with a focus on sources and reduction strategies. Encourage research to quantify and prevent the impacts of marine debris”. The National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program and Oregon Sea Grant volunteered to co-lead this action, with Oregon State University (OSU) and the Environmental Protection Agency (EPA) as partners. Together this group engaged local stakeholders, generated ideas, and held a workshop discussing and prioritizing research to help address marine debris in Oregon.

## The Process

The OR MDAP contains a local stakeholder-generated Marine Debris Priority List. It includes a research section that lists ideas relevant to Oregon, which the organizers sent to OR MDAP participants and other practitioners prior to the workshop. These parties reviewed, ranked, and added to the research topics, with a focus on addressing knowledge gaps.

Based on their replies, the workshop organizers drafted a marine debris research priorities list. They invited participants to attend a one-day workshop at OSU Corvallis, Oregon for evaluating and prioritizing these research ideas.

## The Workshop

On May 30, 2017, twenty-four marine debris researchers and practitioners came together for the first Oregon Marine Debris Research Priorities Workshop. The workshop built upon the OR MDAP, with a goal of prioritizing research topics to help address local marine debris issues (see **Appendix I** for workshop agenda).

The workshop began with overview presentations on marine debris research activities nationally and in Oregon. Participants shared their insight and ideas on local marine debris research needs (see **Appendix II** for a summary of research needs). Participants then examined and ranked these research needs in order to establish and vote on top research priorities.

Organizers totaled and ranked the research priority votes in a list from most to least support. These rankings identify the participants’ views of current research needed to best support Oregon efforts to address marine debris.

# Research Priorities Ranking

The organizers categorized research ideas according to their subject matter. At the end of the workshop, the participants voted for their top five research priorities and this table shows their ranking from most to least votes.

Final Rankings	
Research Categories	Ranking (Order)
4.1 Identify the sources, quantity, and types of marine debris in Oregon.	1st
1.1 Evaluate the impact of marine debris on Oregon's ecosystems.	2nd
1.2 Evaluate the impact of microplastics on Oregon's ecosystems.	3rd
5.1 Develop and evaluate a matrix to prioritize marine debris cleanup in Oregon based on debris accumulation and area sensitivity.	4th
3.4 Investigate best approaches for working with industry to reduce plastic waste, especially packaging.	5th
3.1 Evaluate the efficacy of marine debris prevention efforts, including education and outreach, legislation and regulation, upstream capture devices, etc.	6th
2.2 Determine the overall cost associated with marine debris cleanup in Oregon.	7th
3.3 Conduct a baseline survey of marine debris knowledge in Oregon relating to general plastic pollution knowledge, plastic consumption and use habits, feelings towards plastic legislation (ex. bag bans), etc.	7th
2.1 Evaluate the impact of marine debris on Oregon's economy.	8th
3.2 Evaluate methods to improve data collection during cleanups.	8th
5.2 Conduct a quantitative assessment of marine debris deposition and accumulation along the Oregon coast.	8th
1.4 Explore methods to prevent or capture synthetic clothing fibers prior to deposition in the marine environment.	9th
4.2 Identify the sources, quantity, and types of microplastics in Oregon.	9th
4.5 Determine the source of trawl nets found on Oregon beaches.	9th
5.3 Determine the baseline and seasonal variability of microplastic deposition along the Oregon coast.	9th
3.5 Conduct a literature review on major marine debris research to better focus local research efforts on knowledge gaps.	10th
4.3 Evaluate efficacy of beach cleanups: areas cleaned, optimal frequency of cleanups, etc.	10th
1.3 Quantify marine debris as a vector for aquatic invasive species (AIS) and those species' impacts on Oregon ecosystems	11th
1.5 Conduct a life cycle assessment of popular plastic alternatives to determine environmental impacts.	12th
4.4 Determine the annual average loss of crab pots in Oregon.	12th

# Discussion

During the participant group discussion, several major themes emerged:

**Funding sources:** Moving forward, participants emphasized the importance of identifying funding sources for local research. Several researchers described previously developing marine debris-related projects that they were unable to perform due to a lack of financial resources. By identifying funding sources and their parameters, researchers could focus on topics that are important to the Oregon marine debris community and are feasible to conduct. Many participants felt that future marine debris research workshops should include this topic.

**Literature Review:** Participants noted the need to identify and learn from completed or ongoing research elsewhere, before starting new efforts in Oregon. Projects should consider a literature review or other data collection prior to starting new projects. This groundwork would be very helpful on topics that are not unique to Oregon, such as:

- Marine debris-related behavioral research.
- Economic impacts of marine debris on fisheries.
- Crab pot loss and impacts, including studies around the Chesapeake Bay.
- Microfiber sources and impacts.
- Recent microplastic studies.

**General research:** Participants noted that many research questions are not Oregon-specific, but are still of interest and would be beneficial and applicable for Oregon. Many topics have Oregon-relevant angles worth exploring.

**Diverse perspectives:** Participants noted that engaging with practitioners from diverse fields and backgrounds was very helpful for information sharing.

Each group presented a summary to the forum, followed by a group discussion which helped to clarify and refine the research questions. Here are the ideas and suggestions that stemmed from these discussions:

## 1. Marine Debris Environmental/Ecosystem Impacts

### 1.1 Evaluate the impact of marine debris on Oregon's ecosystems.

Participants felt that Oregon-specific marine debris impact data and case studies are an important priority. They suggested more research on:

- Oregon marine debris sources, including those on upper and lower watersheds, as well as a quantification of their waste generation.
- Marine debris sources and amounts generated in Oregon compared to other regions.
- Derelict fishing gear (DFG) impacts, including entanglement, ingestion, and the socioeconomic toll.

**Priority ranked #2**

## 1. Marine Debris Environmental/Ecosystem Impacts

### 1.2 Evaluate the impact of microplastics on Oregon's ecosystems.

Participants suggested more research on microplastics in the following areas:

- Microplastic bioaccumulation, toxicological effects, and potential transfer to humans.
- Evaluation of in-state sources compared to marine debris in other regions.
- Assessment of Oregon's baseline microplastic concentration on the coast and its fluctuations.
- Study the fate of microplastics in the marine environment – do they degrade? How quickly?

#### ***Priority ranked #3***

### 1.3 Quantify marine debris as a vector for aquatic invasive species (AIS) and those species' impacts on Oregon ecosystems.

Participants wanted quantification of marine debris as a vector for aquatic invasive species (AIS) and those species' impacts on Oregon ecosystems. More specifically, they suggested:

- Investigating the connection between marine debris and AIS, with a quantification of impacts to Oregon ecosystems.
- Impact of severe marine debris events, like the Japanese tsunami, and connection to AIS colonization and ecosystem degradation.
- Investigating mariculture and aquaculture as vectors for AIS.

### 1.4 Explore methods to prevent or capture synthetic clothing fibers prior to deposition in the marine environment.

Participants felt that microfibers are important to address through research. Oregonians are often eager to address local environmental issues, and microfibers have local connections. Oregon is home to a number of outdoor gear manufacturers that generate the pollutant, presenting researchers with an opportunity to work directly with industry. Though some participants thought this topic was more universal and that the need for Oregon-specific projects is limited, many still felt research should be done regarding:

- Techniques to capture fibers.
- The difference in fiber shedding between widely-used materials.

### 1.5 Conduct a life cycle assessment of popular plastic alternatives to determine environmental impacts.

Compostable products and other plastic alternatives seem to have a high adoption rate in Oregon and, though many saw this subject as more universal, participants felt research is needed on:

- The degradation rates and ocean impacts of plastic alternatives
- The benefits of alternatives; some are industrial compost only; how much does that happen and how well do people understand this?
- Alternatives to the alternatives; what would work better?

## 2. Economic Impacts

### 2.1 Evaluate the impact of marine debris on Oregon's economy.

Oregon's coast has a healthy economy and is dependent on tourism. Participants suggested that more research should be conducted on:

- Marine debris impacts on seafood, especially regarding popular species' plastic consumption rates and susceptibility to polychlorinated biphenyls (PCBs).
- DFG economic impacts and potential gear identification methods.

### 2.2 Determine the overall cost associated with marine debris cleanup in Oregon.

Participants suggested research regarding cleanup costs:

- Marine debris impacts on demand for local beaches, especially on potential tourism losses.
- The difference in removal costs between debris in waterways and debris on shorelines.

## 3. Behavior Change and Baseline Knowledge

### 3.1 Evaluate the efficacy of marine debris prevention efforts, including education and outreach, legislation and regulation, upstream capture devices, etc.

Participants felt this idea was too broad a grouping: they believed that the education and legislation topics were each valuable in their own right, while upstream capture better fits into topic 3.4. With that in mind, they suggested research on:

- Oregonian values to better tailor marine debris education campaigns, reduction projects, and regulatory efforts.
- Oregonian beliefs and opinions regarding existing and proposed debris-related legislation.

### 3.2 Evaluate methods to improve data collection during cleanups.

Participants thought this topic belonged in Category 4, if related to effectiveness of physical clean-ups. If related to behavior change, it could be reworded to "Research behavior change that leads to improved data collection." Given the possible interpretations, there was little discussion on this topic.

### 3.3 Conduct a baseline survey of marine debris knowledge in Oregon relating to general plastic pollution knowledge, plastic consumption and use habits, feelings towards plastic legislation (ex. bag bans), etc.

Regarding the baseline survey, participants suggested:

- Developing a survey that collects data about marine debris knowledge, values, and behaviors.
- Revising management plans and reduction efforts based on compiled information regarding Oregonian beliefs.



### 3. Behavior Change and Baseline Knowledge

#### 3.4 Investigate best approaches for working with industry to reduce plastic waste, especially packaging.

Participants thought that industry-focused projects could look into:

- How changing business practices changes consumer practices.
- How related efforts in other states, like Hawaii, can be adapted for Oregon.

**Priority ranked #5**

#### 3.5 Conduct a literature review on major marine debris research to better focus local research efforts on knowledge gaps.

Group participants believed this topic was an important starting point for Oregon marine debris research efforts. They noted that many studies exist but are not easily accessible. More specifically, they suggested:

- Creating a hub where key data is available and summarized for general use.
- Adapting outreach, education, and prevention efforts for Oregon based on the literature review.

### 4. Source Identification & Removal

#### 4.1 Identify the sources, quantity, and types of marine debris in Oregon.

Participants felt that determining sources of debris in Oregon and their contribution compared to outside sources is crucial. On that note, they suggested work on:

- Marine debris seasonal variation, especially as it relates to commercial fishing. This work could better involve the industry in reduction efforts.
- Perception issues related to Oregon debris, for example: Oregonians may only attribute waste to coastal and foreign sources rather than inland and upstream communities.
- River surveys, potentially with drones, to learn upstream debris accumulation and aid reduction efforts.
- DFG identification measures such as net identification.
- How plastic packing bands enter marine environments and potential alternatives; this idea may be a redesign priority where industry research and development efforts could focus on developing solutions.

**Priority ranked #1**

#### 4.2 Identify the sources, quantity, and types of microplastics in Oregon.

The nearest primary microplastics factory to Oregon is located in San Pedro, CA. As a result, participants felt that most Oregon beach microplastics are secondary, coming from photodegraded fragments and fibers. COASST is conducting microplastic surveys in nine locations and participants mentioned other work on wastewater sources. They felt that research on this topic could:

- Compare pre-production and secondary microplastic counts.
- Investigate seasonal and spatial accumulation patterns.
- Examine debris transport mechanisms as they relate to Oregon shipping practices.

## 4. Source Identification & Removal

### 4.3 Evaluate efficacy of beach cleanups: areas cleaned, optimal frequency of cleanups, etc.

Although some practitioners felt that “efficacy” in this context was unclear, participants generally felt that beach cleanups could benefit from research on:

- Cleanup management and seasonal timing.
- How to best use volunteer resources based on debris accumulation and distribution.
- Cost-efficient ways to tag and track items.

### 4.4 Determine the annual average loss of crab pots in Oregon.

Participants thought the Oregon Dungeness Crab Commission and other recovery programs data is sufficient. They noted that existing Chesapeake Bay research could also inform local projects and needs to be included in a literature review. As a result, crab pot loss ranked as a low priority for new research.

### 4.5 Determine the source of trawl nets found on Oregon beaches.

Regarding trawl nets, participants wanted work on:

- DFG identification methods and sourcing; net identification methods are used by Australia’s Commonwealth Scientific and Industrial Research Organisation, how can they be put into local practice, and what already exists here?
- Ways to involve Oregon fishermen groups on net and gear identification implementation.

## 5. Deposition and Accumulation

### 5.1 Develop and evaluate a matrix to prioritize marine debris cleanup in Oregon based on debris accumulation and area sensitivity.

Participants felt that existing data from programs like SOLVE could help investigate debris variation and improve upstream cleanup efforts. More specifically, they suggested research on:

- Why debris increases at certain times and accumulates at certain locations.
- Debris interactions with watersheds and its effect on cleanup feasibility and cost.

**Priority ranked #4**

### 5.2 Conduct a quantitative assessment of marine debris deposition and accumulation along the Oregon coast.

Some participants felt that research relating to topic 5.2 needed to take place before conducting the actions suggested in 5.1. Other practitioners thought that enough anecdotal deposition information exists to develop the matrix under topic 5.1 without a quantitative assessment.

## 5. Deposition and Accumulation

### 5.3 Determine the baseline and seasonal variability of microplastic deposition along the Oregon coast.

Participants suggested collecting data to assess microplastic deposition baselines if none is already available. They also recommended:

- Establishing consistent programs to quantify and list microplastic debris, especially in regards to tracking materials, like polyethylene, versus items, like beverage bottles.
- Tracking marine debris and microplastic seasonal variability at different sampling locations when establishing a baseline, taking into account factors that increase marine debris deposition such as winter storms.

## Summary and Next Steps

The Oregon Marine Debris Research Priorities Workshop brought together local researchers and practitioners to engage in sharing important ideas while facilitating collaboration. These proceedings are just a portion of the workshop's benefit. The remainder is in the connections participants developed during the workshop, which will enhance their projects.

As the workshop concluded, many participants asked about holding a second research event and beginning more of the OR MDAP future actions. As a next step, participants would like to investigate some of the top priority areas more thoroughly and discuss specific projects they could design to meet research needs.

This workshop and its proceedings are the first step in the Action Plan-inspired path towards more marine debris solutions in Oregon. The ranked priorities and identified research projects are compiled in the proceedings to make them accessible to everyone. Researchers are encouraged to incorporate these priorities in their research, and to address these research needs in any way they are able. Researching marine debris is a collective effort, and we value the efforts of anyone contributing to these research priorities in Oregon.

# Appendix I

## Workshop Agenda

### Oregon Marine Debris Research Priorities Workshop

**Goal:** Identify and Prioritize Research to Help Address Marine Debris in Oregon

**Date:** Tuesday May 30, 2017

**Time:** 9:00am - 3:00pm

**Venue:** Room MU 206, 112 Memorial Union, 2501 SW Jefferson Way, Corvallis, OR

<b>Time</b>	<b>Session</b>
8:30 AM	Registration (coffee and refreshments provided)
9:00 AM	Welcome, introduction, and workshop overview
9:20 AM	Marine debris research overview: Oregon and nationwide
10:00 AM	Group discussion of marine debris research needs in Oregon
10:50 AM	Break
11:00 AM	Research topics discussion in small groups
Noon	Lunch (on your own)
1:00 PM	Research topics debrief
2:00 PM	Break
2:10 PM	Research topics ranking
2:50 PM	Summary and next steps
3:00 PM	Adjourn

# Appendix II

## Workshop Participants

<b>Name</b>	<b>Organization</b>
<b>Barnea, Nir*</b>	<b>NOAA Marine Debris Program</b>
Burgess, Hillary	University of Washington
Carlin-Morgan, Kerry	Oregon Coast Aquarium
Castelli, Chris	Department of State Land
Cogle, James	Oregon State Marine Board
<b>Coomer, Matt</b>	<b>NOAA Marine Debris Program</b>
Crews, Tracy	Oregon State University/Oregon Sea Grant
<b>Dayger, Cat</b>	<b>Office of the Governor Kate Brown</b>
Dolliver, Jane	Oregon State University/Seabird Oceanography Lab
<b>Doyle, Jamie</b>	<b>Oregon Sea Grant</b>
Flier, Meagan	Confederated Tribes of the Grand Ronde
<b>Gilman, Reva</b>	<b>Oregon State University</b>
<b>Harris, Sydney</b>	<b>US Environmental Protection Agency</b>
Hathaway, Chris	Lower Columbia River Estuary Partnership
Hawkins, Joy	SOLVE Oregon
Lanier, Andy	Oregon Department of Land Conservation and Development
<b>Lohrman, Bridgette</b>	<b>US Environmental Protection Agency</b>
Marcoe, Keith	Lower Columbia Estuary Partnership
Parker, Ryan	Oregon Parks and Recreation Department
Phillips, Preson	Oregon Parks and Recreation Department
Pleasant, Mary	Oregon Sea Grant
Plybon, Charlie	Surfrider Foundation
Rice, Jim	Oregon State University/Marine Mammal Stranding Network
Rumrill, Steve	Oregon Department of Fish and Wildlife
Saelens, Mark	Lincoln County Oregon Waste Management
Barth, Jack	Oregon State University

# Appendix III

## Participant Connections to Marine Debris Research

Following the Marine Debris Research overview presentations, participants shared how they would use new research results and what they hoped to learn from the workshop. Here is a summary of their responses:

*How would/do you use the research results? I would like to use the results to...*

- Generate new ideas for research, policy, education, and preventative action that can reduce marine debris' impacts.
- Better understand the marine debris issue, generally and locally, and how to address it.
- Distribute updated, Oregon-specific information to local governments to promote citizen engagement. Promote positive behavior changes and boost business involvement.
- Mitigate impacts on ecosystems through identifying marine debris-affected species and creating ecological risk assessments for microplastics along the Oregon coast.
- Boost funding resource and volunteer efficacy through better targeting of areas for debris removal. Prioritize the most affected areas and harmful debris types for removal.
- Gain perspective on how different stakeholders and government agencies, from the federal to local level and NGOs, approach the issue.
- Inform management plans to aid fisheries, reduce debris sources, improve cleanups, and educate the public. Predict costs for marine debris related projects and cleanup.

*What is one thing that you want to get out of today? I want this workshop to help me...*

- Understand marine debris research and its practitioners' priorities better. Generate ideas for supporting these efforts, including actionable items with timelines.
- Improve collaboration between stakeholders and connect the data to its users. Support more local partners based on their marine debris priorities.
- Learn more about how marine debris, especially on the micro level, impacts ecosystems. Understand the current research and priorities in this regard better.
- Improve my organization's engagement with this issue.
- Stay current on future actions post-OR MDAP and connect with other practitioners.
- Understand marine debris research and clean-up today, including current engineering advances and mechanisms to intercept debris.
- Prioritize inland marine debris removal and learn about the funding available.
- Spread awareness of microplastic/microfibers, from their sources to ecological impacts, in Oregon's marine and estuarine environments.
- Organize volunteer cleanups to support Oregon marine debris reduction and prevention.
- Gain more perspective on marine debris in Oregon with topical points for outreach.
- Learn about current behavioral research to reach consumers more effectively. Adapt national messaging for Oregon stakeholders and audiences.

# Appendix IV

## Research Priorities

### 1. Marine Debris Environmental/Ecosystem Impacts

- 1.1 Evaluate the impact of marine debris on Oregon's ecosystems.
- 1.2 Evaluate the impact of microplastics on Oregon's ecosystems.
- 1.3 Quantify marine debris as a vector for aquatic invasive species (AIS) and those species' impacts on Oregon ecosystems
- 1.4 Explore methods to prevent or capture synthetic clothing fibers prior to deposition in the marine environment.
- 1.5 Conduct a life cycle assessment of popular plastic alternatives to determine environmental impacts.

### 2. Economic Impacts

- 2.1 Marine debris impact on Oregon's economy.
- 2.2 Determine the overall cost associated with marine debris cleanup in Oregon.

### 3. Behavior Change and Baseline Knowledge

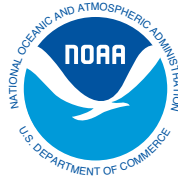
- 3.1 Evaluate the efficacy of marine debris prevention efforts, including education and outreach, legislation and regulation, upstream capture devices, etc.
- 3.2 Evaluate methods to improve data collection during cleanups.
- 3.3 Conduct a baseline survey of marine debris knowledge in Oregon relating to general plastic pollution knowledge, plastic consumption and use habits, feelings towards plastic legislation (ex. bag bans), etc.
- 3.4 Investigate best approaches for working with industry to reduce plastic waste, especially packaging.
- 3.5 Conduct a literature review on major marine debris research to better focus local research efforts on knowledge gaps.

### 4. Source Identification & Removal

- 4.1 Identify the sources, quantity, and types of marine debris in Oregon.
- 4.2 Identify the sources, quantity, and types of microplastics in Oregon.
- 4.3 Evaluate efficacy of beach cleanups: areas cleaned, optimal frequency of cleanups, etc.
- 4.4 Determine the annual average loss of crab pots in Oregon.
- 4.5 Determine the source of trawl nets found on Oregon beaches.

### 5. Deposition and Accumulation

- 5.1 Develop and evaluate a matrix to prioritize marine debris cleanup in Oregon based on debris accumulation and area sensitivity.
- 5.2 Conduct a quantitative assessment of marine debris deposition and accumulation along the Oregon coast.
- 5.3 Determine the baseline and seasonal variability of microplastic deposition along the Oregon coast.



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