

NOAA Marine Debris Program
NOAA Office of National Marine Sanctuaries

Marine Debris Toolkit

for educators



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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE

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Earth Day

Marine debris is one of the most prevalent issues across our one ocean. It comes in all shapes and sizes and can impact the environment, navigation safety, the economy, and human health. Preventing marine debris begins at the individual level, through commitments to reduce and responsibly manage our waste.

Efforts to address this preventable challenge vary and can include focused research to better understand distribution and abundance of debris, working with academia to pursue research projects, and removal and mitigation efforts (e.g., beach cleanups, “ghost gear” removal). In addition efforts can include engaging community partners through locally-driven projects. *However, the key to changing personal action and making changes from within communities comes from targeted education and outreach.*

In response to this problem, the NOAA Marine Debris Program and the Office of National Marine Sanctuaries are pleased to introduce the NOAA Marine Debris Kit; one tool in helping the next generation understand the impacts of marine debris through hands-on, investigative surveys that involve the student from beginning to the end. This kit will provide a way to engage youth, educate them on the issue of marine debris, provide them opportunities to collect and analyze marine debris in their local community, and compare their results with youth across the nation and world. Most importantly, it provides our youth the tools to make a difference and the encouragement to find their voice.

NOAA is committed to making tangible changes which will benefit our environment. We believe every student, regardless of where they live, should be involved in making these changes with us and become stewards for our one ocean.

Sincerely,

Nancy Wallace
Director
NOAA Marine Debris Program

John Armor
Director
NOAA Office of National
Marine Sanctuaries



Roadmap to Student Success

Welcome to NOAA's Marine Debris Toolkit! Thank you for your interest in engaging your students in marine debris monitoring. Your students' monitoring and outreach efforts are an important step towards protecting marine environments from the dangers of marine debris.

The Marine Debris Toolkit is an excellent tool for developing a marine debris monitoring program in your classroom. Successful use of this kit involves a full-circle approach — beginning with education, continuing with monitoring efforts, and looping back around to *student-driven* engagement and outreach.

In this kit you will find four sections:

Section 1. Teacher Resources

In this section you will find a compilation of teacher resources to aid you in your marine debris education efforts. Links to the recommended curriculum, Winged Ambassadors, and additional curricula are provided, along with educational articles, videos, and websites. In addition, a web-based PowerPoint presentation on marine debris is included with informational notes to help supplement the text within the presentation.

Section 2. Guidelines for Data Collection

Comprehensive guidelines for data collection through NOAA's Marine Debris Monitoring and Assessment Project are included in this section. Safety guidelines, survey methods, datasheets, a recommended monitoring tools list, and a photo identification guide are also incorporated.

Section 3. Guidelines for Data Analysis

This section presents a brief overview of how to submit your students' data into the Marine Debris Monitoring and Assessment Project database as well as templates for analyzing student data.

Section 4. Community Engagement and Outreach

The Community Engagement and Outreach section provides several ideas on how to engage your students in marine debris activities on campus. This includes ideas on how to empower your students to share their message with their community.

We are committed to making this kit work for you and your students. We hope you will share your feedback with us in the teacher reflection form located at the end of this kit.

Keep an eye out for
'Tips from the Field'
throughout this toolkit:
formulated by
experienced educators!

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Section 1: Teacher Resources

Curriculum & Lesson Plans

| | Category | Title | Grade Level | Link | Source |
|---|---------------|---|---|---|---|
| 1 | Marine Debris | Winged Ambassadors <i>*Top choice for curriculum</i> | Grades 6-8 with extensions for 9-12 | http://www.downloadwingedambassadors.org | NOAA Office of National Marine Sanctuaries, Oikonos, Papahānaumokuākea Marine National Monument |
| 2 | Marine Debris | Marine Debris – Composition and Abundance | Grades 4-5 | https://marinedebris.noaa.gov/curriculum/comprehensive-web-based-marine-debris-steamss-curriculum | Oregon Coast Aquarium; NOAA Marine Debris Program |
| 3 | Marine Debris | Turning the Tide on Trash: A Learning Guide on Marine Debris | Grades 1-12 | https://marinedebris.noaa.gov/turning-tide-trash | NOAA Marine Debris Program |
| 4 | Marine Debris | The Educator's Guide to Marine Debris: Southeast and Gulf of Mexico | Grades 5-8 | https://marinedebris.noaa.gov/educators-guide-marine-debris-southeast-and-gulf-mexico | NOAA Marine Debris |
| 5 | Marine Debris | "How can a model describe how microplastics move in the ocean?" | Grades 6-12 | http://www.montereybayaquarium.org/-/m/pdf/education/curriculum/aquarium-6-12-gyre-in-a-bottle-ngss.pdf | Monterey Bay Aquarium* |
| 6 | Marine Debris | "Where can you find plastic in the water column and how might it affect the animals that live there?" | Grades 6-8 | http://www.montereybayaquarium.org/-/m/pdf/education/curriculum/aquarium-6-8-plastics-in-the-water-column.pdf | Monterey Bay Aquarium* |
| 7 | Marine Debris | C-MORE Science Kits - Marine Debris | Grades 8-12 | http://stempreacademy.hawaii.edu/c-more/marine-debris | University of Hawaii'i* |

| | | | | | |
|----|--------------------------------------|---|-------------|---|---|
| 8 | Marine Debris | "How can hazardous waste be cleaned up with the least impact on the environment while keeping within a budget?" | Grades 3-5 | https://www.montereybayaquarium.org/-/m/pdf/education/curriculum/aquarium-6-8-beach-contamination.pdf | Monterey Bay Aquarium* |
| 9 | Marine Debris | Teaching Your Students About Marine Debris: A Classroom Activity | Grades K-8 | http://ocean.si.edu/blog/teaching-your-students-about-marine-debris-classroom-activity | Smithsonian: National Museum of Natural History* |
| 10 | Marine Debris | Marine Debris Keiki Education and Outreach (MDKEO) Program | Grades K-5 | https://marinedebris.noaa.gov/curricula/marine-debris-keiki-education-outreach-program | Hawai'i Wildlife Fund* |
| 11 | Marine Debris | An Educator's Guide to Marine Debris | Grades K-12 | https://marinedebris.noaa.gov/educators-guide-marine-debris | North American Marine Environment Protection Association* |
| 12 | Marine Debris | Waves, Wetlands, and Watersheds | Grades 3-8 | https://www.coastal.ca.gov/publiced/waves/waves_pdfs.html | California Coastal Commission* |
| 13 | Marine Debris | Washed Ashore Curriculum | Grades 5-8 | http://washedashore.org/iamdc/ | Washedashore.org* |
| 14 | Ocean Health/Marine Debris/Recycling | Bag It! Curriculum for Teachers | Grades 4-12 | http://bagitmovie.com/downloads/EducationPacke_t_7.pdf | bagitmovie.com* |
| 15 | Refuse/Reduce/Reuse/Recycle/Rot | "What types of plastics do we use the most? How can we reduce our single-use plastics?" | Grades 6-12 | http://www.montereybayaquarium.org/-/m/pdf/education/curriculum/aquarium-6-12-plastic-use-audit-ngss.pdf | Monterey Bay Aquarium* |
| 16 | Refuse/Reduce/Reuse/Recycle/Rot | "How do we use plastics? Are there better or worse uses of plastics?" | Grades 6-8 | http://www.montereybayaquarium.org/-/m/pdf/education/curriculum/aquarium-6-8-plastics-reduce-use-recycle-ngss.pdf | Monterey Bay Aquarium* |
| 17 | Refuse/Reduce/Reuse/Recycle/Rot | Reducing, Reusing, and Recycling Classroom Waste | Grades K-3 | http://www.calrecycle.ca.gov/education/curriculum/CTL/K3Module/Unit2/Unit2.pdf | CalRecycle* |

Don't forget to check out the Marine Debris Toolkit – Introduction to Marine Debris PowerPoint presentation!
[\[https://marinedebris.noaa.gov/curricula/marine-debris-monitoring-toolkit-educators\]](https://marinedebris.noaa.gov/curricula/marine-debris-monitoring-toolkit-educators)

*Partner source

Educational Articles

| | Category | Title | Grade Level | Link | Partner Source |
|----|-------------------|---|-------------|---|---|
| 1 | Marine Debris | Innovative Solutions to Tackling Plastic Pollution in the Ocean | Grades 4-12 | http://response.restoration.noaa.gov/about/media/innovative-solutions-tackling-plastic-pollution-ocean.html | NOAA: Office of Response and Restoration |
| 2 | Marine Debris | The Best Way to Deal with Ocean Trash | Grades 4-12 | http://news.nationalgeographic.com/news/2014/04/140414-ocean-garbage-patch-plastic-pacific-debris/ | National Geographic |
| 3 | Marine Debris | 2015 Trash Free Seas Report: By the Numbers | Grades K-12 | http://www.oceanconservancy.org/our-work/international-coastal-cleanup/2015-by-the-numbers.html | Ocean Conservancy |
| 4 | Marine Debris | Ocean Trash: 5.25 Trillion Pieces and Counting, But Big Questions Remain | Grades 4-12 | http://news.nationalgeographic.com/news/2015/01/150109-oceans-plastic-sea-trash-science-marine-debris/ | National Geographic |
| 5 | Marine Debris | Leading Ocean Advocacy Groups Join Forces to Tackle Microfiber Pollution | Grades 6-12 | https://www.theguardian.com/lifeandstyle/2016/sep/07/micro-fiber-pollution-ocean-advocacy-groups-alliance | The Guardian |
| 6 | Marine Debris | Bottles, Bags, Ropes and Toothbrushes: the Struggle to Track Ocean Plastics | Grades 9-12 | http://www.nature.com/news/bottles-bags-ropes-and-toothbrushes-the-struggle-to-track-ocean-plastics-1.20432 | Nature |
| 7 | Marine Debris | Understanding Plastic Pollution: A Call for Community Action | Grades 6-12 | http://www.huffingtonpost.com/lonely-whale-foundation/understanding-plastic-pollution-a-call-for-community-action_b_10316800.html | Huffington Post – the Lonely Whale Foundation |
| 8 | Marine Debris | Photos: 1,300 Students Make Coastal Cleanup their Mission for the Day | Grades K-12 | http://www.ocregister.com/2016/06/03/photos-1300-students-make-coastal-cleanup-their-mission-for-the-day/ | The Orange County Register |
| 9 | Ocean Protection | Why It's Important to Save Our Seas' Last Pristine Places | Grades 6-12 | http://www.nationalgeographic.com/magazine/2017/02/saving-our-seas-president-obama-oceans-conservation/ | National Geographic |
| 10 | Plastic Reduction | 100 Steps to a Plastic-Free Life | Grades K-12 | https://myplasticfreelife.com/plasticfreeguide/ | My Plastic Free Life |
| 11 | Plastic Reduction | 10 Ways to Reduce Plastic Pollution | Grades K-12 | https://www.nrdc.org/stories/10-ways-reduce-plastic-pollution | Natural Resources Defense Council |

Educational Videos

| | Topic | Title | Grade Level | Video Length | Link | Source |
|----|---------------------------------|--|-------------|--------------|--|------------------------|
| 1 | Marine Debris | Trash Talk | All Ages | 2:08 | https://marinedebris.noaa.gov/discover-issue/trash-talk http://oceanoday.noaa.gov/trashtalk_webinar/ | NOAA: Ocean Today |
| 2 | Marine Debris | The Plastic Vagabond | All Ages | 6:58 | https://www.youtube.com/watch?v=Yio40ZMxqmY | Tara Expedition* |
| 3 | Marine Debris | Ocean Confetti | All Ages | 2:56 | https://www.youtube.com/watch?v=qVoFeELi_vQ | MinuteEarth* |
| 4 | Marine Debris | Plastic Pollution in the World's Oceans | Grades 6-12 | 3:01 | https://vimeo.com/113359330 | The 5 Gyres Institute* |
| 5 | Marine Debris | The Nurdles' Quest for Ocean Domination | All Ages | 4:54 | https://www.youtube.com/watch?v=KpVpJsDjWj8 | TedEd* |
| 6 | Marine Debris | Two Minutes on Oceans w/ Jim Toomey: Marine Litter | All Ages | 2:13 | https://www.youtube.com/watch?v=DtfAhy2lgAA | James Toomey* |
| 7 | Marine Debris | How Plastic Microbeads are Causing Big Problems | Grades 6-12 | 4:35 | https://www.youtube.com/watch?v=Bic7QEVrNe4&feature=youtu.be | Lush Cosmetics* |
| 8 | Refuse/Reuse/Reduce/Recycle/Rot | Why I Live a Zero Waste Life: Lauren Singer | Grades 9-12 | 13:30 | https://www.youtube.com/watch?v=pF72px2R3Hg | Ted Talk* |
| 9 | Refuse/Reuse/Reduce/Recycle/Rot | What Really Happens to the Plastic You Throw Away | All Ages | 4:06 | https://www.youtube.com/watch?v=_6xINyWPpB8 | TedEd* |
| 10 | Refuse/Reuse/Reduce/Recycle/Rot | You Can Live Life Without Producing Trash | Grades 6-12 | 4:37 | https://www.youtube.com/watch?v=nYDQcBQUdpw | Seeker Stories* |
| 11 | Refuse/Reuse/Reduce/Recycle/Rot | How This Town Produces No Trash | Grades 6-12 | 5:05 | https://www.youtube.com/watch?v=eym10GGidQU | Seeker Stories* |
| 12 | Take Action | Our Campaign to Ban Plastic Bags in Bali | All Ages | 11:00 | https://www.ted.com/talks/melati_and_isabel_wijzen_our_campaign_to_ban_plastic_bags_in_bali?language=en | Ted Talk* |

*Partner source

Educational Websites

| | Category | Title | Description | Grade Level | Link | Source |
|---|---------------|---|---|-------------|--|--------------------------------------|
| 1 | Marine Debris | NOAA Marine Debris Program | A richly informative website dedicated to NOAA's efforts in addressing the national and international issue of marine debris. | Grades K-12 | https://marinedebris.noaa.gov/ | NOAA |
| 2 | Marine Debris | Rise Above Plastics | RAP's mission is to reduce the impacts of plastics in the marine environment by raising awareness about the dangers of plastic pollution and by advocating for a reduction of single-use plastics and the recycling of all plastics. | Grades K-12 | https://www.surfrider.org/programs/rise-above-plastics http://public.surfrider.org/RAP/RAP_Toolkit.pdf | Surfrider Foundation* |
| 3 | Marine Debris | Plastic Pollution Coalition | This international alliance of individuals, businesses and organizations is working together to stop plastic pollution in our environment. Learn about how they are making a difference and how you can help. | Grades K-12 | http://www.plasticpollutioncoalition.org/ | Plastic Pollution Coalition* |
| 4 | Marine Debris | Marine Research and Education | The Algalita Marine Research Foundation is one of the leading research organizations of marine plastic pollution. They offer a variety of educational resources and materials for use in the classroom. | Grades K-12 | http://www.algalita.org/ | Algalita Marine Research Foundation* |
| 5 | Marine Debris | Inquiry to Student Environmental Action | The "Inquiry to Student Environmental Action" (I2SEA) project promotes international collaboration among high school and secondary school students as they learn about, discuss, and envision solutions to shared environmental challenges. | Grades K-12 | http://web.stanford.edu/group/inquiry2insight/cgi-bin/i2sea-r2b/i2s.php?page=about | Stanford University* |
| 6 | Marine Debris | More Ocean. Less Plastic. | The 5 Gyres Institute aims to educate the public on the dangers of plastics polluting our oceans. They implement local, national, and international projects with the goal of creating a world with plastic-free oceans. | Grades K-12 | https://www.5gyres.org/ | The 5 Gyres Institute* |
| 7 | Marine Debris | From the Bow Seat | From the Bow Seat hopes to inspire the next generation of ocean caretakers through using means of writing, poetry, music, crafting, painting, or developing a film to tell the story of our world oceans. | Grades K-12 | http://www.fromthebowseat.org/index.php | From the Bow Seat* |

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|----|---------------------------------|--------------------|--|-------------|---|-----------------------------|
| 8 | Refuse/Reuse/Reduce/Recycle/Rot | Stop Waste | This integrated public agency consists of a collaboration between the Alameda Waste Management Authority and the Alameda County Source Reduction and Recycling Board. The agency offers resources, programs, and support to schools in Alameda County to promote recycling and other waste reduction strategies. | Grades K-12 | http://www.stopwaste.org/ | Stop Waste Project* |
| 9 | Refuse/Reuse/Reduce/Recycle/Rot | Art From Scrap | In addition to a Watershed Resource Center and a Reuse Store, this environmental education organization in Santa Barbara brings a Green School Education Program into the classroom. | Grades K-12 | http://www.exploreecology.org/environmental-education-presentations.php | Explore Ecology* |
| 10 | Refuse/Reuse/Reduce/Recycle/Rot | Waste Free Lunches | Waste Free Lunches provides information on why being "waste-free" is important and how one can start a program at their school or in their workplace. In addition, they supply helpful tips for getting started, tracking progress, and maintaining the program. | Grades K-12 | http://www.wastefreelunches.org/ | Waste Free Lunches Project* |
| 11 | Refuse/Reuse/Reduce/Recycle/Rot | Recycle Works | Includes recycling curriculum and project ideas for students, information about setting up recycling programs at school, gardening and composting projects, tips for your facilities and maintenance staff, and the latest news about legislation. | Grades K-12 | http://www.recycleworks.org/ | RecycleWorks* |

*Partner source

Introduction to Marine Debris

PowerPoint Presentation Notes

Check out the 'Introduction to Marine Debris' PowerPoint Presentation:
[<https://marinedebris.noaa.gov/curricula/marine-debris-monitoring-toolkit-educators>]

SLIDE 1: Intro Slide

SLIDES 2 – 8: There is one global ocean system - visit National Ocean Service
<http://oceanservice.noaa.gov/facts/howmanyoceans.html>

The ocean covers 71 percent of the Earth's surface and contains 97 percent of the planet's water. More than 95 percent of the underwater world remains unexplored.

SLIDES 9 – 12: Thank You Ocean Report – “The ocean takes care of us. Let's return the favor.” <http://www.thankyouocean.org/>

“The ocean is a vital resource that provides food, water, commerce, recreation, medicine and even the air we breathe. Today, our ocean faces unprecedented threats from pollution, trash, declining fisheries and multiple impacts from climate change.”

For more information about the ocean, visit **National Ocean Service**, America's ocean and coastal agency - <http://oceanservice.noaa.gov/about/>

SLIDES 13- 17: National Marine Sanctuaries, <http://sanctuaries.noaa.gov/>
FAQs, <http://sanctuaries.noaa.gov/about/faqs/welcome.html>
History, <http://sanctuaries.noaa.gov/about/history/welcome.html>

The National Marine Sanctuary System is composed of 13 national marine sanctuaries and two marine national monuments. The sites range in size from less than one square mile of **Monitor National Marine Sanctuary** to almost 583,000 square miles of **Papahānaumokuākea** (Hawaiian name meaning 'a sacred name, a sacred place') **Marine National Monument**.

SLIDE 18: NOAA - <http://www.noaa.gov/>
NOAA history - <http://www.history.noaa.gov/index.html>

The National Oceanic and Atmospheric Administration (NOAA) is a federal agency that is within the Department of Commerce. Similar to NASA, where NASA focuses on space and aeronautics, NOAA focuses on the ocean and atmosphere.

NOAA is concerned with the conditions of our ocean and atmosphere and informing people about the changing conditions around them.

NOAA's missions include:

- Science, Service, and Stewardship.
- To understand and predict changes in climate, weather, ocean, and coasts,
- To share that knowledge and information with others, and
- To conserve and manage coastal and marine ecosystems and resources.

NOAA's line offices include:

- National Weather Service
- National Marine Fisheries Service
- National Environmental Satellite Data, Information and Service
- National Ocean Service
- Office of Oceanic and Atmospheric Research
- Office of Program Planning and Integration

SLIDE 19: The ocean is a magnificent place!

Know Your Ocean:

<http://oceantoday.noaa.gov/knowyourocean/>

<http://www.who.edu/know-your-ocean/>

To learn more about what lies beneath the ocean's surface, check out: noaa.gov/fisheries

Earth is Blue: <http://sanctuaries.noaa.gov/earthisblue.html>

When you look at our planet from space, one thing is abundantly clear: **Earth Is Blue**. Our planet is an ocean planet, and whether you live near the coast or a thousand miles from it, the ocean is part of your life. From providing the food we eat to determining our weather, the ocean matters to each of us -- and the National Marine Sanctuary System protects this vital resource.

With that in mind, the photos and videos of Earth Is Blue bring these ocean treasures directly to smartphones and computers all over the world, where they can serve as a tangible reminder that no matter where you are, the ocean and Great Lakes are in your hands. We hope these images inspire you to help care for our ocean and to spread the word that Earth isn't green -- it's blue.

SLIDES 20 – 22: Introduction to Marine Debris

What is marine debris?

Our oceans are filled with items that do not belong there. Huge amounts of consumer plastics, metals, rubber, paper, textiles, derelict fishing gear, vessels, and other lost or discarded items enter the marine environment every day, making marine debris one of the most widespread pollution problems facing the world's ocean and waterways.

Marine debris is defined as any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes. It is a global problem, and it is an everyday problem. There is no part of the world left untouched by debris and its impacts. Marine debris is a threat to our environment, navigation safety, the economy, and human health.

Learn more about marine debris through NOAA's Marine Debris Program: <https://marinedebris.noaa.gov/discover-issue>

What we currently know about plastic marine debris: <https://marinedebris.noaa.gov/what-we-know-about-plastic-marine-debris>

Types and sources of Marine Debris:

<https://marinedebris.noaa.gov/discover-issue/types-and-sources>

SLIDE 23: What are Gyres?

An ocean gyre is a large system of circular ocean currents formed by global wind patterns and forces created by Earth's rotation. - National Geographic

To learn more about types of gyres and how they form, check out:

<http://www.nationalgeographic.org/encyclopedia/ocean-gyre/>

These whirlpools of water attract floating pollutants, acting as an epicenter for marine debris in the ocean.

Check out 5 Gyres to learn more about the impacts of plastic pollutants in these gyres: <https://www.5gyres.org/>

SLIDE 24 – 26: What is the difference between a macroplastic and a microplastic? What are their impacts?

Microplastics are **small plastic pieces** less than five millimeters long which can be harmful to our ocean and aquatic life.

- To learn more about microplastics: <http://oceanservice.noaa.gov/facts/microplastics.html>

Whereas, macroplastics are any plastic pieces larger than five millimeters long. Both forms of plastic pollution can be harmful to our environment. To learn more about the impacts of plastic pollutants on marine organisms, check out: <http://www.cleanwater.org/problem-marine-plastic-pollution>

SLIDE 27: How can plastic ingestion harm humans?

It is still unknown whether plastic pollutants can move up the food chain and onto our very own plates. However, scientists speculate that this may not be unlikely.

- A great informational PDF created by Nate Seltenrich goes into more detail about this uncertainty:
<https://ehp.niehs.nih.gov/wp-content/uploads/123/2/ehp.123-A34.alt.pdf>

SLIDES 28 – 30: Where do microplastics originate from?

Plastics do not biodegrade, instead they photodegrade:

Once exposed to wave action and sunlight, large plastic pieces (such as a water bottle, or floating plastic fragment) break down into smaller and smaller pieces. Specifically, when exposed to UV light and infrared radiation (from the sun), the polymer in the plastic piece becomes brittle causing it to break down into ever-diminishing pieces. This process takes time, but with the abundant amount of plastics in our ocean, it doesn't take long for macroplastics to create microplastics.

The problem with plastic microbeads:

- Macroplastics are not the only thing contributing to the microplastic issue, many microplastics start out as just that – a microplastic.
- Plastic microbeads are microplastics that are often used in cosmetics as an exfoliator. Your toothpaste, face wash and body soaps can potentially contain these little pollutants.
- Due to their design, these microbeads wash down the drain and make their way to your local wastewater treatment facility.
- At these facilities, the microbeads make their way through the filtration system and back out into local rivers, streams and the ocean.

To learn more about the issues surrounding plastic microbeads, check out: <http://storyofstuff.org/plastic-microbeads-ban-the-bead/>

To learn more about the Federal Microbead-Free Waters Act of 2015, visit:

<https://www.fda.gov/cosmetics/guidanceregulation/lawsregulations/ucm531849.htm>

The truth about microfiber pollution:

- Tiny synthetic fibers, that originate from synthetic textiles (e.g. polyester, acrylic, nylon), are being found in waterways and the ocean.
 - o Water treatment facilities currently do not have anything in place to capture these microscopic fibers.
- Researchers have recently located plastic fibers in fish and shellfish being sold in California and Indonesia for human consumption: <https://www.nature.com/articles/srep14340>

To learn more about what you can do to reduce microfiber pollution, visit: <http://www.plasticpollutioncoalition.org/pft/2017/3/2/15-ways-to-stop-microfiber-pollution-now>

SLIDES 31 – 40: What can YOU do?

What we do on land has a direct impact on our local watersheds and ocean. What can you do on land to better protect marine environments?

- For more tips on how to reduce waste at school, in your community and at home, check out the EPA's webpage on how to reduce waste in several aspects of your life:
<https://www.epa.gov/recycle/reducing-waste-what-you-can-do>

Make art, not trash: turning your trash into art is a great way to repurpose items that would otherwise end up in the landfill. For your students next art project, consider using the trash on campus as their medium.

- For ideas and examples of artwork, check out the following links:
<http://time.com/4358434/world-oceans-day-art-marine-plastic/>
<http://magazines.scholastic.com/news/2016/09/Turning-Trash-Into-Art>

Section 2: Guidelines for Data Collection

Marine Debris Monitoring & Assessment Project

As a part of your school's participation in actively preventing marine debris, you will be contributing to the Marine Debris Monitoring & Assessment Project (also known as the **MDMAP**). You may ask yourself, what is the **MDMAP**? Below we provide an overview of the main goals of the **MDMAP**.



What is marine debris?

Marine Debris has become a pervasive form of pollution in our ocean. It is a unique environmental issue in that most debris is visible to the naked eye, making it easy for us to make connections between the debris we see in the environment and items we use in our everyday lives.

What is the MDMAP?

The **MDMAP** is a citizen science initiative to survey and record the amount and types of marine debris in the environment by engaging NOAA partners and volunteers across the nation.

MDMAP Background

The [NOAA Marine Debris Program](#) created the **MDMAP** in order to provide monitoring tools to partner organizations nationwide. The NOAA monitoring protocols were designed to be widely applicable and inexpensive to implement, and intended to promote standardization of shoreline marine debris monitoring efforts.

What will my students' data be used for?

Regular, rigorous, long-term monitoring studies conducted through the MDMAP can provide meaningful data on the distribution, types, and abundance of debris in the marine environment. Knowing where, how much, and what types of debris are present, as well as how the debris load is changing over time, is essential to developing new and effective prevention policies and strategies for education and outreach.

- Further, the **MDMAP's** network of partner organizations and the results of locally-based shoreline monitoring studies provide great opportunities for outreach and raising awareness about marine debris issues, sharing the message that *every individual can become a part of the solution.*

You and your students will be making a difference!

MDMAP volunteers are the backbone of this effort, and we would not have a successful project without them. The countless hours that our volunteers and partners have contributed over the lifetime of this project, and will in the future, is commendable and something we are incredibly grateful for. MDMAP partners have come from the non-profit, academic, and government sectors, and in some cases we've even had individual volunteers adopt a shoreline monitoring site.

Every individual can become a part of the solution.

Participation in the **MDMAP** puts data collected on debris from your local beaches into a larger national context. All data uploaded to the **MDMAP** Online Database is openly available to the research community for any data analysis efforts, including any projects sponsored by NOAA. The [NOAA Marine Debris Program](#) is committed to continuing to work with the marine debris community, applying **MDMAP** monitoring data to answer key research questions about debris in the environment. This will hopefully bring us to the ultimate goal of developing more effective prevention and mitigation strategies to prevent the impacts of marine debris on our ocean. Last but not least, **MDMAP** is a great excuse to get outside and get to know your local shoreline.

Get MDMAP Updates!

The [MDMAP Get Started Toolbox](#) is a repository for the latest MDMAP information and results. You can also send an email to MD.monitoring@noaa.gov to sign up for the MDMAP E-Newsletter.

Marine Debris Monitoring – Safety First!

The health and safety of you and your students is the **number one priority** during any field activity. Always use caution before, during, and after field surveys to prevent injury to yourself, other beach goers, or the environment. Establish student boundaries before beginning your monitoring survey and determine a signal for notifying a student if they have crossed a set boundary.

1. Before you leave your school site for any survey activity, make sure you've considered how you will get help if needed.
 - First and foremost, use the buddy system. Your students should always have at least one other student with them in the field at all times (in addition to adult chaperones).
 - Second, make sure you have a way to communicate with others in case of emergency – whether that is a cell phone, radio, or emergency responder.
 - Lastly, make sure someone at your school site knows where you are going to be and when you expect to return.
2. Always check the weather and tidal conditions before scheduling your survey. NOAA weather forecasts can be found at www.weather.gov.
 - Never conduct field operations in severe weather.
3. Always bring proper gear and multiple layers of clothing for the range of possible weather conditions.
 - In addition to being prepared for inclement weather, it's important to recognize and understand the symptoms of heat stress.
 - These can include headache, nausea, weakness, thirst, and heavy sweating or red, hot, dry skin. If you or any of your students experience these symptoms, stop your survey immediately to rest and hydrate, and call 911 if your symptoms are severe.
4. Ocean conditions can change rapidly. Check the tides at your survey site at www.tidesandcurrents.noaa.gov.
 - Surveys should always be conducted at low tide.
 - Going out at low tide is a good safety precaution, especially in areas that may be flooded or inaccessible at high tide. Continuously keep an eye on the tide as you conduct your survey.
5. Make sure you pack everything you might need in the field.
 - Always wear and have sunscreen with you, even if it is cloudy.
 - In addition, bring a first aid kit, hand sanitizer, plenty of water, and a snack.
6. Make sure you and your students are wearing appropriate clothing such as:
 - Closed toed shoes
 - Gloves (if you are handling debris items)
7. Stay alert and be aware of your surroundings and any potential hazards.
 - If you come across any potential hazardous materials — such as oil, chemical drums, or propane tanks — alert local personnel or land managers (such as a park ranger) immediately.
 - In some cases, you may need to dial 9-1-1 and the National Response Center at 1-800-424-8802.
 - Do not attempt to move or pick up any item that looks like it may be dangerous or pose any kind of hazard.
 - Establish a list of items that you would like your students to avoid picking up prior to your first field trip.
 - Dead animals, syringes, needles, sharp or rusty items, or other hazardous objects.

Tips from the field:
Make sure your students bring plenty of water on each site visit!



Photo credit: NOAA Marine Debris Program

Interacting with marine mammals is **very dangerous**. At all times, keep your students away from any live marine mammals you may come across during your survey. If the animal appears to be injured, call your local rescue network.
<http://www.fisheries.noaa.gov/pr/health/report.htm>

Review these safety tips on a regular basis and make sure any new students or adult chaperones are properly trained and prepared.

Survey Types & Site Selection

Step 1. Familiarize yourself with the MDMAP Survey Protocol prior to beginning your monitoring efforts.

To help educate yourself and your students, check out the MDMAP's Get Started Toolbox:

<https://marinedebris.noaa.gov/research/monitoring-toolbox>.

MDMAP Survey Protocol

What is an **accumulation survey**?

Accumulation surveys provide information on the rate of deposition of debris onto the shoreline. This type of survey is more suited to a stretch of shoreline where you can conduct a thorough cleanup, since debris needs to be removed from the entire length of the shoreline for each visit.

- These protocols are flexible for participating schools. Although **it is recommended to survey the site at least two times throughout the year** – choose a schedule that fits well for your school.

Survey Characteristics

| Characteristic | Accumulation Surveys |
|---|---|
| Will debris be removed during the survey? | Yes |
| Time required per survey | More |
| Length of shoreline monitoring site | 100 meters |
| Types of data that can be collected | <ul style="list-style-type: none"> - Debris deposition rate (# of items per unit area per unit time) - Debris material types - Debris weight |

Step 2. Select your Survey Site. Before choosing your survey site, there are a few things you should consider.

How to Choose your Survey Site

1. Choose an appropriate shoreline location based on the objectives of your students' study. If your students wish to examine debris deposited onto the shoreline from offshore, select a site with low recreation or human usage.
2. Pull up your planned site on google maps to view an aerial image of your study site. Within this image, categorize the various areas within your location. For example, your location may cover a span of shoreline 1 km long. Within that 1 km, there may be an area with heavy recreational use and another area where an urban stream mouth is located. Identify any barriers to shoreline access or offshore structures that may affect nearshore circulation (such as jetties). See example image below.



3. Select a survey site according to the following characteristics:
 - Sandy beach or pebble shoreline
 - Clear, direct, year-round access
 - No breakwaters or jetties
 - At least 100 m in length parallel to the water (sites less than 100 meters are acceptable for accumulation surveys).
 - No regular cleanup activities
 - Check with local cleanup organizations to determine which sites are already heavily monitored

Each of these characteristics should be met *where possible*, but can be modified to best fit your school's resources and accessibility. Your shoreline surveys may be conducted at a local river or stream if you cannot easily access a beach. However, it is important to note that the river's shoreline should be 100 meters in length and easily accessible for your group of students.

Tips from the field:
Practice! The more the merrier, at least 2 – 3 times.

Before Your Students Begin Their Surveys

- It is highly recommended that your students practice their survey method on campus **at least once** before their planned survey date. This is also a great way to keep your campus free of debris! Pick a 100-meter section of campus to test drive your chosen survey method.

***Campus debris data should not be recorded in the MDMAP database.**

Prior to your student's first data collection, a trained adult chaperone should visit the site and complete the **Shoreline Characterization Sheet** for your site. On this datasheet the following will be noted:

- GPS coordinates in decimal degrees* at the beginning and end of your shoreline site, or at the site's four corners if the width of the beach is less than 6 meters
- Shoreline characteristics (e.g. tidal range and substrate); and
- Surrounding land-use characteristics that may influence the delivery of land-based debris to the site (e.g. farmland 5 kilometers from a small town or urban parkland 50 meters away from a river mouth).

Tips from the field:
Practice logging longitude and latitude with your students on school grounds before taking them to your survey site. Start by taking them to the four corners of your campus!

*To teach your students more about GPS coordinates (and how to convert a coordinate to decimal degrees), check out the following YouTube video: <https://youtu.be/ALN7gXF1thY>

Note: The Shoreline Characterization Sheet needs to be completed only once per site per year unless major changes occur to the shoreline.

Shore IDs (on the Shoreline Characterization Sheet) should be created based on the shoreline name or location (e.g. Fort Smallwood). In addition, be sure to add '**_MDschool**' to the end of your shoreline ID. This extension is to ensure that you will be able to locate your shoreline data AND other participating school's data within the MDMAP database. For example, if your site name was Fort Smallwood, your site ID would read FortSmallwood_**_MDschool**.

The Shoreline Characterization Sheet and Debris Datasheets were adapted from Chesire et al. (2009)¹.

¹Cheshire, A.C., E. Adler, et al. (2009). UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter, UNEP Regional Seas Intergovernmental Oceanographic Commission: 132 pp.

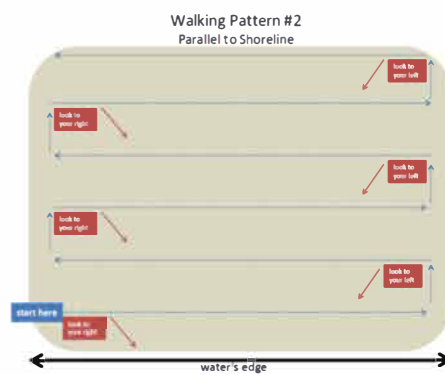
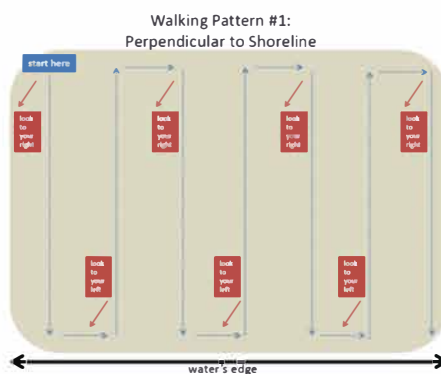
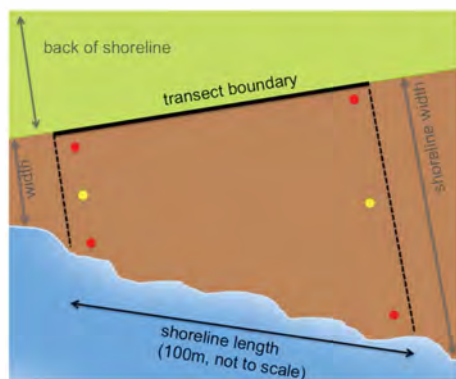
Accumulation Surveys

The following protocol should be followed when conducting an accumulation survey.

- BEFORE arriving at the site, check local tide tables and plan to arrive at your site during low tide.
- ONCE ARRIVED begin filling out the Accumulation Survey Debris Datasheet's Additional Information section. Mark the beginning and end of your shoreline site, perhaps with flags or stakes. Measure the shoreline width near the midpoint of the survey area, and record GPS coordinates at the corners of the site (GPS coordinates are marked in red in the diagram below). REMEMBER to pick up these markers at the end of your survey to make sure they do not become marine debris!
 - The back of the shoreline is where the primary substrate (e.g., sand) changes (e.g., sand becomes gravel) or at the first barrier (e.g., vegetation line).
 - If you haven't already completed the Shoreline Characterization Sheet for your site during a previous visit, do so now.
- As one of the adult chaperones completes the first page of the Accumulation Survey Debris Datasheet and/or the Shoreline Characterization Sheet, have another chaperone split the students into groups of 3 or 4:
 - Based on the number of students present, divide the site (using more flags or other markers) and assign one group per section of shoreline.
 - One student should be in charge of tallying the debris data onto the Accumulation Survey Debris Datasheet. Each group will have their own datasheet for tallying debris.
 - Another student can search for and pick up the debris as they come across it (an additional student can assist with this).
 - The third student in the group can be in charge of taking pictures of the debris found by the group.
- In order to cover the entire site from water's edge to the back of the shoreline, decide whether your students will walk the survey area parallel or perpendicular to the water. Once determined, divide the survey area evenly and distribute the student groups among these sections. Student surveyors should traverse the survey area in a pre-determined walking pattern until the entire site is cleared of marine debris.

Tips from the field:
Create 'student engagement jobs' – site characterization recorders, debris datasheet recorders, debris collectors, leaders, photographers, etc.

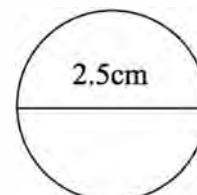
Examples of walking pattern schematics



- Record on your Accumulation Survey Debris Datasheet counts of debris items that measure over 2.5 cm, or 1 inch (~bottle cap size), in the **longest** dimension. **Debris smaller than 2.5 cm should still get picked up, just not recorded on the datasheet.** Record large debris items, anything bigger than 1 foot (~ 0.3 m, typical forearm length from palm to elbow) in the large debris section of the Accumulation Survey Debris Datasheet.
- Take photos of your shoreline site and some of the debris items!

To view an accumulation survey tutorial visit:
https://marinedebris.noaa.gov/sites/default/files/videos/original/5_accumulation_KSedits_withSLaudio.mp4.mp4

Tips from the field:
Go over these tutorials with your students before your first site visit.



Accumulation Survey Sheets



Accumulation Survey Site Characterization | Version 2.0 | March 2016

| | | | |
|---|---------------|-----------|---|
| NOAA MDMAP Site Characterization Sheet Accumulation Surveys Complete this form ONCE for each site location | Organization | | Name of organization responsible for collecting the data |
| | Surveyor name | | Name of person responsible for filling in this sheet |
| | Phone number | | Phone contact for surveyor |
| | Date | | Date of this survey |
| SAMPLING AREA | | | |
| Shoreline name | | | Name or ID by which this section of shoreline is known (e.g., beach name, park) |
| State/County | | | State and county where your site is located |
| Coordinates at start of shoreline section | Latitude | Longitude | Recorded as XXX.XXXX (decimal degrees) at start of shoreline section (in both corners if width > 6 meters) |
| | | | |
| | | | |
| Coordinates at end of shoreline section | Latitude | Longitude | Recorded as XXX.XXXX (decimal degrees) at end of shoreline section (in both corners if width > 6 meters) |
| | | | |
| | | | |
| Photo number/ID | | | The digital identification number(s) of photos taken of shoreline section |
| SHORELINE CHARACTERISTICS | | | |
| Length of sample area (usually 100 m) | | | Length parallel to water measured along the midpoint of the shoreline (in meters) |
| Shoreline slope (°) | | | Slope above horizontal (between 0 - 90°) |
| Substratum type | | | For example, a sandy or gravel beach |
| Substrate uniformity | | | Percent coverage of the primary substrate type (%) |
| Tidal range | | | Max & min vertical tidal range. Use tide chart (usually in feet). |
| Tidal distance | | | Horizontal distance (in meters) from low- to high-tide line. Measure on beach at low and high tides or estimate based on wrack lines. |
| Back of shoreline | | | Describe landward limit (e.g., vegetation, rock wall, cliff, dunes, parking lot) |
| Aspect | | | Direction you are facing when you look out at the water (e.g., northeast) |

The Site Characterization Sheet needs to only be filled out **once per site per year**.



| LAND-USE CHARACTERISTICS | | | |
|---|----------|----|---|
| Location & major usage | Urban | | Select one and indicate major usage (e.g., recreation, boat access, remote) |
| | Suburban | | |
| | Rural | | |
| Access | | | Vehicular (you can drive to your site), pedestrian (must walk), isolated (need a boat or plane) |
| Nearest town | | | Name of nearest town |
| Nearest town distance | | | Driving distance to nearest town (miles) |
| Nearest town direction | | | Direction to nearest town (cardinal direction) |
| Nearest river name | | | If applicable, name of nearest river or stream. If blank, assumed to mean no inputs nearby |
| Nearest river distance | | | Straight line distance to nearest river/stream (km) |
| Nearest river direction | | | Direction to nearest river/stream (cardinal direction from site) |
| River/creek input to beach | YES | NO | Does nearest river/stream have an outlet within this shoreline section? |
| Pipe or drain input | YES | NO | Is there a storm drain or channelized outlet within shoreline section? |
| Notes (including description, landmarks, coastal hydrography, offshore barriers, etc.): | | | |
| | | | |

The Site Characterization Sheet needs to only be filled out **once per site per year**.



NOAA Marine Debris Toolkit - Accumulation Survey Debris Datasheet

Surveyor name(s): _____

Date of survey: _____ Number of people conducting the survey: _____

Survey Site Information

Name of organization (School name, group name, etc.): _____

Survey type: Accumulation Survey

Location

Location type (check one): Beach (coastal) Watershed (inland waterway; river, stream, lake)

Shoreline name (beach, stream, river or park name): _____ MDSchool

What are the coordinates of the start of your shoreline site?

Record coordinates in decimal degrees.

| Latitude | Longitude |
|----------|-----------|
| | |
| | |

What are the coordinates of the end of your shoreline site?

Record coordinates in decimal degrees.

| Latitude | Longitude |
|----------|-----------|
| | |
| | |

What is the width of the beach? _____

Measure the width of the beach by measuring the meters from the water's edge to the back of the shoreline.

Time

Survey start time: _____ Survey end time: _____

Time of low tide (*list time of most recent, or upcoming low tide*): _____

Season (*winter, spring, summer, fall, tropical wet, etc.*): _____

Date of previous survey (*leave blank if this is your first survey*): _____

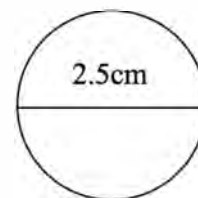
Recent storm activity: _____

Describe any significant storm activity within the previous week

Large Debris (larger than 1 ft.; *do not include these items in your tallies*)

| Item type (vessel, net, etc.) | Status (sunken, stranded, buried) | Approximate width (meters) | Approximate length (meters) | Description |
|----------------------------------|--------------------------------------|-------------------------------|--------------------------------|-------------|
| | | | | |
| | | | | |

Please list any notes you took on debris items and/or description(s) of items you were unable to classify below.



Only record debris items that are larger than 2.5 cm on the back of this datasheet.

Debris Collected

Total of tallies for each item should be added into the blue boxes at the end of your survey. Items listed as 'other' should be specified on the blue dotted line.



Example: Other [*Coffee stirrer*] |||||

For assistance with classifying debris items, reference the Marine Debris Photo Identification Guide in this toolkit.

Plastic

| | | | |
|---|--|--|---|
| <input type="text"/> Plastic fragments | <input type="text"/> Hard | <input type="text"/> Foamed | <input type="text"/> Film |
| <input type="text"/> Food wrappers | <input type="text"/> Beverage bottles | <input type="text"/> Other jugs or containers | <input type="text"/> Bottle or container caps |
| <input type="text"/> Cigar tips | <input type="text"/> Cigarettes | <input type="text"/> Disposable cigarette lighters | <input type="text"/> 6-pack rings |
| <input type="text"/> Bags | <input type="text"/> Plastic rope/small net pieces | <input type="text"/> Buoys & floats | <input type="text"/> Fishing lures & line |
| <input type="text"/> Cups <small>(incl. polystyrene/foamed plastic)</small> | <input type="text"/> Plastic utensils | <input type="text"/> Straws | <input type="text"/> Balloons – Mylar |
| <input type="text"/> Personal care products | <input type="text"/> Other [..... | | |

Metal

| | |
|--|------------------------------------|
| <input type="text"/> Aluminum/tin cans | <input type="text"/> Aerosol Cans |
| <input type="text"/> Metal fragments | <input type="text"/> Other [..... |

Glass

| | |
|---------------------------------------|------------------------------------|
| <input type="text"/> Beverage bottles | <input type="text"/> Jars |
| <input type="text"/> Glass fragments | <input type="text"/> Other [..... |

Rubber

| | |
|---------------------------------------|---------------------------------------|
| <input type="text"/> Flip-flops | <input type="text"/> Gloves |
| <input type="text"/> Tires | <input type="text"/> Balloons – Latex |
| <input type="text"/> Rubber fragments | <input type="text"/> Other [..... |

Processed Lumber (no natural wood)

| | |
|--|---|
| <input type="text"/> Cardboard cartons | <input type="text"/> Paper and cardboard |
| <input type="text"/> Paper bags | <input type="text"/> Lumber/building material |
| <input type="text"/> Other [..... | |

Cloth/Fabric

| | |
|---------------------------------------|--|
| <input type="text"/> Clothing & shoes | <input type="text"/> Gloves (non-rubber) |
| <input type="text"/> Towels/rags | <input type="text"/> Rope/net pieces (non-nylon) |
| <input type="text"/> Fabric pieces | <input type="text"/> Other [..... |

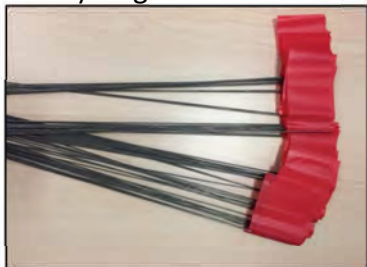
Other/Unclassifiable

Before entering your data into the MDMAP database, combine all datasheets from each group participating in the survey into a single dataset. Only one dataset per survey should be submitted to the MDMAP database.

Marine Debris Monitoring Supplies

Below are some suggested tools for your monitoring efforts. Absolute necessities are listed in **red**, whereas suggestions are listed in **green**.

Survey Flags:



Measuring Tape:



Tips from the field:
Instead of plastic buckets, repurposed burlap sacks are great for collecting debris!

| Tool: | Where to buy: |
|---|--|
| Survey flags: used to mark out your site <ul style="list-style-type: none"> - 1 set per site | Home improvement stores, online |
| Measuring tape (hand-held): for measuring your site <ul style="list-style-type: none"> - 100-meter tape preferred - 1 per site - <i>For measuring survey sites</i> | Home improvement stores, online |
| Gloves: for students to use during monitoring <ul style="list-style-type: none"> - 1 glove per student is recommended to save resources and reduce waste - Single-use nitrile gloves or multi-use gardening gloves work best | General merchandise retailers, home improvement stores, online |
| Bags* : for storing items collected during monitoring <ul style="list-style-type: none"> - 1 per group of students to save resources and reduce waste - <i>Only needed for accumulation surveys</i> | General merchandise retailers, home improvement stores, online |
| GPS Tracking Tool: for recording coordinates <ul style="list-style-type: none"> - 1 per group of students | FREE Google Maps app is the easiest way to track your coordinates on Apple or Android phones. |
| Datasheets: to keep a tally of debris <ul style="list-style-type: none"> - 1 per group of students | <i>Printed from this toolkit!</i> |
| Pencils: to keep a tally of debris <ul style="list-style-type: none"> - 1 per group of students | Office supply store, general merchandise retailers, online |
| Clipboards: for carrying/recording on datasheets while monitoring <ul style="list-style-type: none"> - 1 per group of students | Office supply store, general merchandise retailers, online |
| Buckets**: for storing items collected during monitoring <ul style="list-style-type: none"> - 1 per group of students to save resources and reduce waste | Home improvement stores, online |
| Sturdy 12' Ruler: for measuring marine debris <ul style="list-style-type: none"> - 1 per survey site | Office supply store, general merchandise retailers, online |
| Camera: for photographing marine debris | General merchandise retailers, online |

* Make it waste free! Have your students create their own reusable bags using old t-shirts. Check out the 'Action Project Ideas' section to learn how to make *no-sew t-shirt bags*.

** Buckets are a durable alternative to plastic trash bags, however this is only a suggestion – choose the best item for your school's budget/resources.

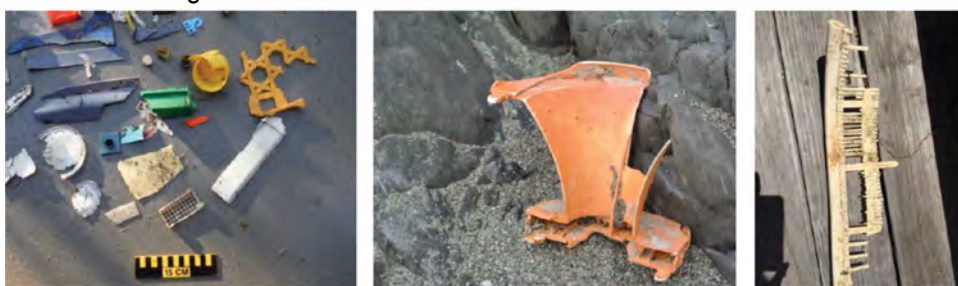
Marine Debris Survey Photo Identification Guide

This guide is a tool for categorizing marine debris items during monthly field surveys. The examples of debris types within each category are meant to assist in reporting survey results. To view and search the full photo identification guide and photo captions, visit the MDMAP Get Started Toolbox online Monitoring Photo Gallery at <https://marinedebris.noaa.gov/research/monitoring-toolbox>.

Print a copy of this guide and laminate it for students to use in the field!

Plastics

Hard Plastic Fragments*



Plastic fragments > 2.5 cm that retain hard structure (though with weathering, hard plastics may become brittle and break apart when a little force is applied).

Foamed Plastic Fragments*



Plastic fragments > 2.5 cm that are lightweight and can generally be broken apart or that crumble easily (however, exposure to the environment may reduce 'crumble-ability').

Filmed Plastic Fragments*



Plastic fragments > 2.5 cm that are composed of thin plastic sheets/films; these filmed plastics are flimsy and bend easily.

*A fragment is a piece of a larger item that cannot be identified, or that is less than 50% of the original item.

Food Wrappers



Food wrappers are distinguished from plastic films by identifiable labels. Food wrappers come in a variety of types and sizes.

Plastic Beverage Bottles



Plastic beverage bottles can include milk/juice jugs, or containers for soft drinks, water, juice, and sports drinks. They come in a variety of sizes and colors (translucent, green, brown, light blue, etc.).

Other Jugs/Containers



Other jugs/containers include a variety of plastic packaging types. Examples include: food containers (yogurt, take out, etc.), plastic buckets, baskets, or barrels.

Bottle Caps/Container Caps



Bottle and container caps come in various sizes and colors.

Cigar Tips



Cigar tips come on some cigar brands and are typically off-white in color. Only record cigar tips that are longer than 2.5 cm.

Cigarettes & Cigarette Filters



Cigarettes and cigarette filters can be hard or spongy (both are made of a synthetic polymer). Some cigarettes may not have filters and are composed of only tobacco and paper. Only record cigarette butts that are longer than 2.5 cm.

Disposable Cigarette Lighters



Disposable cigarette lighters have a casing made of hard plastic (usually with a metal top). They may or may not contain fluids. Be very careful when picking up a cigarette lighter – make sure an adult chaperone is with you at all times.

6-Pack Rings



6-Pack Rings are composed of a semi-flexible (but very strong) plastic material. They are used in the packaging of soda cans and other types of beverages.

Bags



Plastic bags are made of a thin film. Examples include bags used for: dry cleaning, newspapers, bread, frozen foods, bulk ice, fresh produce, grocery bags, household garbage, etc. As long as at least half of the bag is present, these items should be recorded as bags.

Plastic Rope & Small Net Pieces



Plastic rope and small net pieces are composed of synthetic material rather than cloth or fabric. Fishing line is NOT included in this category, but should be recorded under "Fishing Lures & Line".

Buoys & Floats



Generally associated with fishing and boating activities, a buoy floats at the surface and is attached to the seafloor. These come in various sizes, shapes and colors.

Fishing Lures & Line



Fishing lures come in a variety of shapes, sizes and materials depending on their function. Modern types are made of plastic with hooks and eyes for lines. Fishing line with lures attached should be recorded as one item.

Cups



Cups can be made of hard or foamed plastic. Most paper cups are coated with a plastic film. Plastic coated cups are included in this category.

Plastic Utensils



Plastic utensils include disposable knives, forks, and spoons.

Straws



Straws come in various colors and sizes ranging from shorter ones to longer ones.

Balloons – Mylar



Mylar balloons have a seam and are made of foil coated plastic. They usually have a shiny, reflective surface and often have designs w/ pictures and/or words.

Personal Care Products



This category is broad. Various products such as health and beauty containers, combs, toothbrushes, chap stick tubes, etc. are included in this category.

Plastic Other



Items that do not fit into one of the plastic categories above. Describe the “other” items in the notes section.

Metal

Aluminum/Tin Cans



Aluminum/Tin cans are used for beverages (e.g. sodas, juice, etc.) and food items. Exposure to the environment will cause these containers to deteriorate – aluminum cans become brittle over time and collapse. Tin cans rust when exposed to the environment.

Aerosol Cans



Aerosol cans have an outer shell made of metal (aluminum or steel) and compressed contents. The spray valve will be made of plastic and the cap is also usually plastic. The spray valve and cap will most likely not be attached to the canister.

Metal Fragments



A metal fragment is a piece of a larger item that cannot be identified, or that is less than 50% of the original item. Metal pieces that have been exposed to the environment may rust depending upon their material.

Metal Other



Items that do not fit into one of the metal categories above. Describe the "other" items in the notes section.

Glass

Glass Beverage Bottles



Glass beverage bottles are used for sodas, water, and other types of liquids. These bottles come in assorted colors (clear, green, brown, blue, etc.) and in different shapes and sizes. Most glass beverage bottles have metal caps.

Jars



Many glass jars are used for food, condiments, make-up, and other materials. This type of debris is usually associated with household waste (land-based sources) or gallery waste (ocean-based sources). The lids are usually metal.

Glass Fragments



Glass fragments are pieces of larger glass items that cannot be identified, or are less than 50% of the original item. If glass fragments have been in the environment for long periods of time, they may become weathered and appear with smooth edges and a frosty appearance (e.g. sea glass).

Newly-fragmented glass pieces are likely sharp, so take care in picking up these items (use gloves or a scooper to remove sharp pieces of glass). Always make sure to have an adult chaperone with you.

Glass Other



Items that do not fit into one of the glass categories above. Describe the "other" items in the notes section.

Rubber

Flip Flops



Flip-flops or "slippers" are primarily composed of a rubber sole. Other shoes that have a primarily rubber exterior, such as fishing boots, should be recorded under Rubber – Other.

Rubber Gloves



Work gloves used for fishing may be made of natural rubber latex, nitrile (synthetic rubber compound), neoprene (polychloroprene), or polyvinyl alcohol rubber (synthetic). Note: In some geographic areas, evidence of sea turtles attempting to feed on discarded gloves can be seen with diamond-shaped bites in the gloves.

Tires



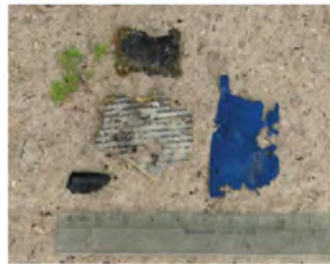
Tires can come in various sizes (trucks, cars, trailers, bicycles, recreational vehicles, lawn mowers, etc.) and may have the wheel rim (metal), hub cap (metal) and/or covering lug nuts (metal) still attached.

Balloons – Latex



Latex balloons are the traditional “party” balloons. They are also often used at festivals, open houses, sales, mass balloon releases, etc. These balloons are made of natural or synthetic latex, are usually round or oval in shape, and can come in a variety of colors.

Rubber Fragments



A rubber fragment is a piece of a larger item that cannot be identified, or that is less than 50% of the original item. Rubber fragments may not feel like “rubber” due to their degradation when exposed to the environment. Due to oxidation, rubber may even feel brittle.

Rubber Other



Items that do not fit into one of the rubber categories above. Describe the “other” items in the notes section.

Processed Lumber

Cardboard Cartons



Cardboard cartons can be anything from cereal boxes to moving boxes, and are distinguished from Paper and Cardboard because they hold their carton/container shape. They will begin to deteriorate the longer they are exposed to the environment. The longer it is exposed the faster it will deteriorate.

Paper and Cardboard



Paper consists of newspapers, magazines, books, and other items. These materials will deteriorate due to exposure to the environment.

Paper Bags



Examples of paper bags include: fast food bags (e.g. fast food consumed on/near the beach), grocery bags, etc. The bags will begin to deteriorate the longer they are exposed to the environment. As bags absorb moisture, the paper will fall apart.

Lumber/Building Material



Lumber that has been cut into beams/planks or treated by humans should be recorded as lumber/building material. Natural woody debris and burnt firewood are not considered marine debris.

Processed Lumber Other



Items that do not fit into one of the processed lumber categories above. Describe the "other" items in the notes section.

Cloth/Fabric

Clothing & Shoes



Examples of clothing items include: shorts, tops, underwear, socks, etc. Shoes recorded here should be primarily composed of cloth/fabric on the exterior.

Gloves (non-rubber)



Gloves (non-rubber) made of fabric.

Towels/Rags



Fabric towels/rags left behind by beach-goers or used on boats for working with equipment and maintenance (cleaning) activities.

Rope/Net Pieces (non-nylon)



Rope/net pieces that are made of fabric can be identified by a “softer” feel in most cases. This includes large (very thick) natural ropes used as mooring lines for ships when in port.

Fabric Pieces



Fabric pieces can't be identified as an original object due to deterioration. Fabric pieces may tear when pulled apart.

Cloth/Fabric Other



Items that do not fit into one of the cloth/fabric categories above. Describe the “other” items in the notes section.

Other/Unclassified



Other/Unclassified

If the primary material type could not be identified or is not listed, record the item as “other or unclassified”. This may include leather items, concrete, etc.

Photo Identification Guide adapted from the MDMAP Photo Identification Guide:
<https://marinedebris.noaa.gov/mdmap-database-reference-documents/mdmap-photo-identification-guide>

Section 3: Guidelines for Data Analysis

Entering Data into the MDMAP Database



Photo: NOAA Marine Debris Program

The MDMAP Database is an online repository for MDMAP shoreline marine debris survey data, and is the only way to submit your students' data to NOAA. The database was created as a tool to assemble data from various local marine debris monitoring efforts. This enables us to compile a bigger picture of the issue at regional and national scales. The database facilitates data sharing and analysis by making survey data available to researchers, students, and other interested parties. The database is housed at <https://mdmap.orr.noaa.gov/>, and features a map of MDMAP shoreline sites on the homepage.

Tips from the field:

Check your students' data BEFORE they input it into the MDMAP database. Only ONE database entry should occur after each site visit.

1. To access the database, navigate to <https://mdmap.orr.noaa.gov/> and select "request an account." You'll receive an email letting you know when your account is active.
 - o Set up a single account that can be used by all students in your classroom to ensure that your school's data is kept in one place.
2. The database has site characterization and survey entry pages that mirror the paper datasheets used in during your field survey. To create a shoreline site in the database, look for the **blue** "Add a New Site" button in the top right-hand corner, fill out your site characterization information (*don't forget to add "_MDschool" at the end of your site name*) and upload any photos you may have taken of your site.
3. Once your site is created, you can submit survey data and photos after each survey. From the site characterization page, look for the **blue** "Submit New Survey" button to navigate to the survey submission page. Then, simply translate the information from your paper datasheets into the online form. *For standing stock surveys, each transect is submitted as a separate survey.* Shoreline sites and surveys created under your account login can only be edited by you, but other users can download your survey data and view your photos. Any photos uploaded to the database can be used by NOAA. Photos showing students' faces should not be uploaded without parent consent.
 - o The database has a **Custom Data Tab** (located in the top left tool bar), which is where users can add unique debris types to their datasheets within the framework of the debris types on the standard datasheet. This feature allows users to track data on debris items that may be locally relevant, but are less common on a national scale. Refer to the [Database User Guide](#) (link at bottom of the page) for more information on how to create and work with custom data.
4. The homepage of the database also features an "other sites" section where you can explore other survey teams' sites, surveys and photos. All data and photos go through a verification process before being made public. Keep in mind that other users can explore your data as well.
 - o This is an excellent way for your students to explore **_MDschool** data from other participating schools!
5. You can download survey data to an excel file from the **reporting tab** – located in the top left tool bar. There are a few different types of reports to choose from, depending on whether you're looking for accumulation or standing stock survey data. Reports are filtered based on location and time, so you can choose which sites and surveys you're interested in.

An in-depth explanation of these processes can be found in the Database User Guide. For more information, visit: <https://marinedebris.noaa.gov/sites/default/files/publications-files/NOAA%20MDMAP%20Database%20User%20Guide.pdf>

To view the data entry tutorial visit: https://marinedebris.noaa.gov/sites/default/files/videos/original/6_Data_Entry_KSedits_withSLaudio.mp4.mp4

Analyzing Your Data

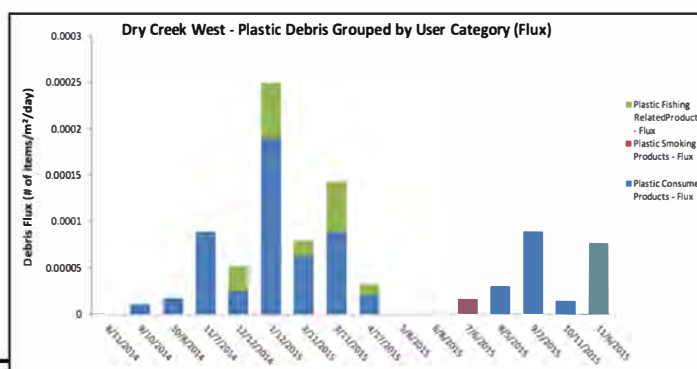
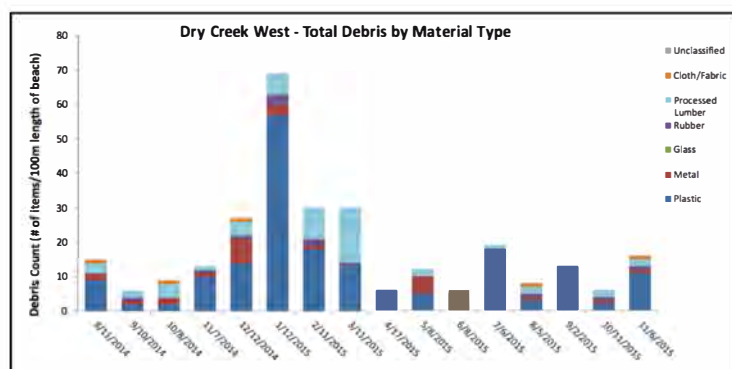
The Importance of Creating Visual Displays with Your Data

Creating figures using the data collected during your students' surveys is a great way for students to analyze patterns in debris as well as better understand the impacts marine debris may have on local marine environments. Encourage your students to build figures and design infographics to share with their peers, families, or community members! Allowing them to share their data beyond the classroom is an excellent way to give your students an active voice in the fight against marine debris. For more ideas on how to spread awareness about marine debris, check out the final section of the Marine Debris Toolkit on Community Engagement and Outreach.

The MDMAP has excellent resources for mapping and analyzing the data collected during your students' surveys. The MDMAP data analysis templates provide interested volunteers, students, partners, or organizations an opportunity to easily visualize shoreline monitoring data from the MDMAP database. The templates will take your students from raw data to marine debris visualization tools/figures with as few 'clicks' as possible. The tabs are arranged in an 'order of operations' manner at the bottom of the excel files, starting with **Tab 1. Enter Accumulation Data Here**. At the top of each tab, instructions walk through the steps required to create your figures. **Tab 2. Debris by User category** analyzes debris by three user categories: Plastic Consumer Products, Plastic Smoking Products, and Plastic Fishing Related Products. After following instructions for tabs 1 and 2, you are ready to view your figures!



TO BEGIN: have your students download the excel files and figure example documents from:
<https://marinedebris.noaa.gov/mdmap-data-analysis-examples-and-templates>



Examples of Marine Debris data figures can be found on the webpage *listed above* along with informative PDFs on how to interpret their data.

*Tips from the field:
Have patience in
getting the data right!*

Section 4: Community Engagement and Outreach

School Activities List

Below are some suggested activities and resources to help educate, energize, and engage your students as they learn how to combat marine debris at school, at home, and out in their communities*.

*Please note: These activities are not directed to specific grade levels. Please adjust accordingly.

| | |
|---|--|
| <p><u>Litterless Lunch Contest</u>: Create a competition (between classes/grades) to see who can produce the least amount of waste during contest duration.</p> | |
| <p><u>Debris Scavenger Hunt</u>: Turn your school campus' debris into a scavenger hunt! Put together a list of common debris items that can be found on your campus and reward the students who collect the most items off this list!</p> | |
| <p><u>Plastic is a Deadly Meal</u>: See what it's like for marine animals to find food in a sea of debris! Put together a bowl of rice ("food") and lentils ("plastic") and see how much "food" they can scoop out while avoiding the "plastic."</p> | |
| <p><u>Swedish Fishing Contest</u>: See what it's like to be an albatross trying to sort through an ocean of plastic trash (bottle caps, plastic bags, etc.) to find the fish. Put trash into a large bucket/bin and hide the sweet treats (i.e. Swedish Fish) in there (ideally in individual wrapped packets so that students could eat them when they catch them). Have students use trash picker-uppers that mimic a bird's beak to grab them.</p> | |
| <p><u>Sorting Contest</u>: Students are given a variety of waste items to try to get in the right sorting buckets within a limited amount of time (i.e. landfill vs. recycling vs. compost).</p> | |
| <p><u>Get the Word out About Marine Debris</u>: Include student-written notes/letters/articles/editorials about marine debris in student newspapers, email blasts, or letters home to parents. Flood the local newspaper with students' "Letter to the Editor"! Have your students present their findings to the local city council, school board, Rotary Club, etc. about why it is important to protect the ocean and/or local watershed from marine debris.</p> | |
| <p><u>Art for Change</u>: Create big and small art using waste materials (from beach/stream cleanups, school, or at home) and celebrate with a school-wide art exhibit.</p> |  <p>Photo credit: Students for Zero Waste Week</p> |
| <p><u>Trashion Show</u>: Host a "Trashion" show where students can model their original fashion attire created with recycled/reusable "debris"!</p> | |
| <p><u>Create/Decorate Reusable Bags</u>: Provide materials for your students to decorate reusable bags or better yet, make reusable bags out of old T-shirts!</p> | |
| <p><u>Tote-Your-Own-Trash Day</u>: Students carry their own trash bag around with them for a day to gain insight into how much waste they generate. Make time for student reflection.</p> | |
| <p><u>Waste Audits</u>: Have students assess and brainstorm ways to reduce waste at school, in the community, and/or at home.</p> | |
| <p><u>"Do Without" Week</u>: Challenge your students to choose one debris item that they can do without for the week (single-use plastic water bottles, snack bags, etc.). Have students write a reflection about how easy or difficult it was for them to do without. Bonus points for students who share this reflection with their peers via word-of-mouth, an online blog, or a social media post!</p> | |
| <p><u>Public Service Announcements</u>: Have your students create Public Service Announcements (PSAs) about the dangers of marine debris to share during morning announcements or with local radio stations.</p> | |

Action Project Ideas

| | Category | Title | Description | Grade Level | Link | Source |
|---|--------------------------------------|---|---|-------------|--|------------------------------|
| 1 | Marine Debris – Art | Our Changing Seas Series | Courtney Mattison is an artist and ocean advocate working to inspire policy makers and the public to conserve our changing seas. | Grades K-12 | http://courtneymattison.com/ | Courtney Mattison; Artist* |
| 2 | Marine Debris – Art | Picking Up the Pieces | A woman from California photographs the trash she finds daily on her walks, hoping to raise awareness for marine debris. | Grades K-12 | http://thereisnoaway.net/ | There is No "Away" Project* |
| 3 | Marine Debris – Art | Art to Save the Sea | Washed Ashore builds and exhibits aesthetically powerful art to educate a global audience about plastic pollution in oceans and waterways and spark positive changes in consumer habits. | Grades K-12 | http://washedashore.org/ | Washed Ashore* |
| 5 | Marine Debris – Art | From the Bow Seat: Ocean Awareness Programs | Bow Seat Ocean Awareness Programs believes that students who learn by creating and making experience deeper learning and longer-lasting behavior change. The arts provide diverse and powerful opportunities for expression and communication of ideas. | Grades K-12 | http://www.fromthebowseat.org/ | Bow Sea Awareness Programs* |
| 6 | Marine Debris – Art | No-sew T-shirt Bags | What is a fun way for students to raise money for their Zero Waste projects? Recycle old t-shirts by creating no sew tote bags! This easy to follow, step-by-step guide shows you how to create an excellent alternative to single-use plastic bags! | Grades K-12 | https://snapguide.com/guides/make-a-tote-bag-from-an-old-t-shirt-no-sewing/ | Zuleika Lambe on Snapguide* |
| 7 | Marine Debris – Community Engagement | Marine Debris Blogging | Have your students create a Marine Debris Blog to share what they have learned with others! Free blogging platforms are available online, with easy formatting for students to customize the look of their blog. This activity gives students a great opportunity to use their voice to raise awareness about the dangers of marine debris. | Grades 6-12 | How to choose the best platform: http://www.wpbeginner.com/beginners-guide/how-to-choose-the-best-blogging-platform/ Idea inspired by: https://marinedebrisblog.wordpress.com/ | NOAA's Marine Debris Program |
| 8 | Marine Debris – Community Engagement | Join the Last Plastic Straw Movement | Feeling a bit overwhelmed by the idea of ridding your life of plastic products? Start small! The Last Plastic Straw movement inspires participants to empower and educate the public on plastic pollution – starting with plastic straws. Have your students reach out to local restaurants to ask them to stop serving straws, to only serve them upon request, or to switch out their plastic straw supply with a more sustainable option such as paper straws. | Grades K-12 | http://thelastplasticstraw.org/ Leave these printable, double-sided cards at the restaurants you reach out to: http://thelastplasticstraw.org/wp-content/uploads/2014/09/The-Last-Plastic-Straw-Info-Card.pdf | The Last Plastic Straw* |

| | | | | | | |
|----|--------------------------------------|--|--|-------------|--|--|
| 9 | Marine Debris – Community Engagement | Write a Letter to Your Local Community Members | Contact your local community members to raise awareness about your students' efforts or to let them know about the issues surrounding marine debris and what we can do to help. Encourage your students to share their survey data in their letter to inform members of the community of their efforts. Check out the 'Writing to Your Community' template below! | Grades K-12 | Interested in writing a letter to the editor? Check out the link below for a list of newspapers in your area: http://www.usnpl.com/ | United States Newspapers (USNPL)* |
| 10 | Marine Debris – Campus Engagement | Install Water Refill Stations on Campus | Help reduce the use of single-use plastic bottles by installing water refill stations on your campus. Raise money for this action project through crowd-funding, selling reusable water bottles on campus, or reaching out to your local drinking water provider. | Grades K-12 | Check out this neat article about how a high school accomplished a similar installation: https://www.banthebottle.net/articles/water-refill-stations-help-students-stay-hydrated-during-san-diego-drought/ | Ban the Bottle* |
| 11 | Marine Debris – Campus Engagement | Reduce Waste in Your Cafeteria | Noticing debris from those pesky spork packs on your campus? Give your students the option to choose only ONE single-use item by replacing these packs with bulk dispenser options – such as a fork, spoon, or plastic straw dispenser. Does your school still have Styrofoam trays? Replace single-use Styrofoam trays with cardboard trays – a more sustainable option! | Grades K-12 | Check out the following articles to learn more about what students are trying to do in their school cafeterias: http://highschool.latimes.com/bell-high-school/opinion-away-with-straws/ http://www.alaskapublic.org/2017/02/27/students-work-to-reduce-ocean-trash-one-spork-at-a-time/ For more information on how to reduce waste in your cafeteria, visit: https://www.fns.usda.gov/school-meals/creative-solutions-ending-school-food-waste | LA Times, Alaska Public Media, & the USDA Food and Nutrition Service* |
| 12 | Marine Debris – Education | Students for Zero Waste Week | <i>Students for Zero Waste Week</i> is a school-driven, week-long campaign to reduce waste on school campuses and within local communities with the intentions of moving towards zero waste. This campaign is a great way for students to determine how to transform their Zero Waste Week into a Zero Waste way of life. | Grades K-12 | http://sanctuaries.noaa.gov/education/ocean-guardian/zero-waste-week/ | NOAA's Office of National Marine Sanctuaries and The Ocean Guardian School Program |
| 13 | Marine Debris – Education | School Garden | Establish a sustainable way to provide food for your school's cafeteria or other school programs by starting a school garden! School gardens help reduce waste, can act as an outdoor classroom, and can further connect students to the world we live in. | Grades K-12 | https://www.ecoliteracy.org/sites/default/files/uploads/getting-started-2009.pdf | Center for Ecoliteracy* |

*Partner source

Writing to a Member in Your Community

Sample formatting for a letter to your community members

Follow the below template to write an informative letter to your local community members (e.g. restaurants, business owners, letters to the editor, etc.). Remember to keep your letter brief, no longer than one page – typed.

Return Address

Your Name
Address
City, State Abbreviation Zip Code

Date

[insert date]

Community Member's Address

[insert community member's full name]
Community member's Address
City, State Abbreviation Zip Code

Salutation

Dear Mr. *or* Ms.[insert last name]:

Introduce yourself by stating your name, where you live, what school you attend

My name is [insert your name] and I live in [insert your city, state]. I am currently a [insert grade] student at [insert school name].

Why are you writing your fellow community member?

I am writing you to ask that you consider the impact marine debris has on our environment. [Include a few sentences on how marine debris has an impact on the environment and the organisms living within it. Inform your fellow community member of your efforts to keep the environment clean through marine debris monitoring. If you have completed your survey(s) add a sentence or two about what you found. Finish up this section with a sentence about how you think they may be able to help protect marine environments. Be specific!].

Ask for a response

I appreciate your help and request that you please consider sending me a response to let me know your thoughts on this issue.

Thank your fellow community member for his/her time

Thank you for your time.

End with your signature

Sincerely,
[sign your name]
[clearly write your name if your signature is difficult to read]

Marine Debris Toolkit - Teacher Reflection Form

Thank you for utilizing the Marine Debris Toolkit! Your feedback is valuable – please take the time to fill out the following reflection form so we can determine how to mold this kit to best suit your needs. Completed forms should be scanned and emailed to Seaberry Nachbar: seaberry.nachbar@noaa.gov.

| |
|--|
| What did you find most helpful about this kit? |
| |
| What did you find least helpful about this kit? |
| |
| Did you utilize any of the recommended curricula? |
| |
| How effective was the use of the recommended curriculum? |
| |
| Which survey method did you end up utilizing? Why? |
| |

Did you find any aspects of your monitoring efforts difficult?

What section do you think could use the most improvement?

What more would you like to see in this toolkit?

Did you notice any behavior changes amongst your students?

Did your students share their marine debris monitoring with their peers and/or the community? If so, what was their sharing method?