Virginia Marine Debris Reduction Plan

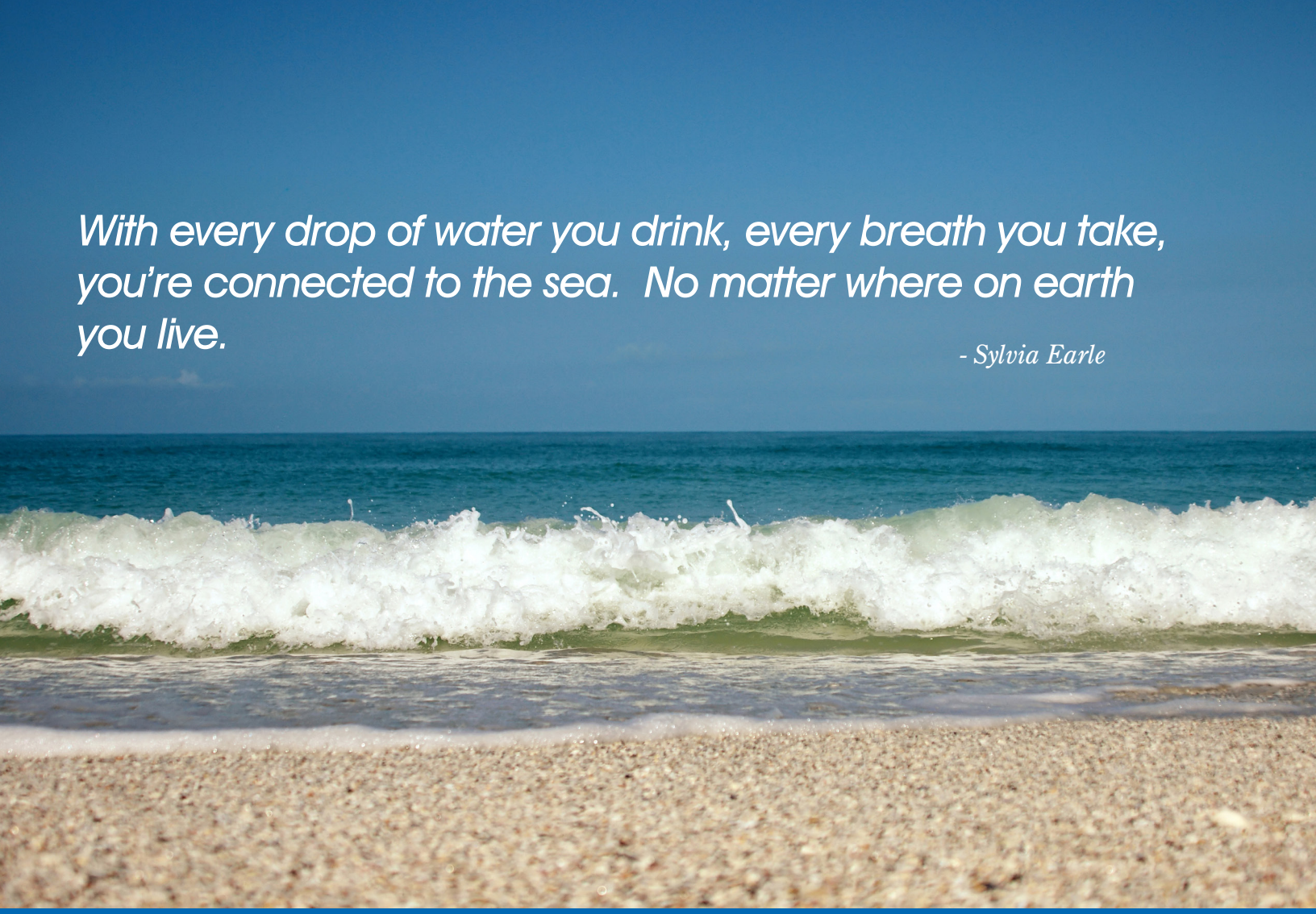
Summary & Look Ahead

March 2016

VIRGINIA MARINE DEBRIS REDUCTION

Exploring Solutions: Educate • Motivate • Innovate

Virginia Coastal Zone
MANAGEMENT PROGRAM



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The Virginia CZM Program is a network of state and local government agencies working to create more vital and sustainable coastal communities and ecosystems. Virginia's coastal zone includes the 29 counties and 17 cities of Tidewater Virginia and all tidal waters to the three-mile territorial sea boundary.

The Virginia CZM Program includes state and local laws and policies to protect and manage Virginia's coastal resources.

The Virginia CZM Program is part of the national coastal zone management program, a voluntary partnership between the National Oceanic and Atmospheric Administration and U.S. coastal states and territories authorized by the Coastal Zone Management Act of 1972, as amended.

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Virginia Marine Debris Reduction Plan

Marine debris has become one of the most widespread pollution problems in the world's oceans and waterways, impacting wildlife, human health and safety, habitats, and economies.

To strategically address this problem, the Virginia Coastal Zone Management (CZM) Program undertook a participatory and collaborative planning process from 2012 to 2014 that culminated in the development of the *Virginia Marine Debris Reduction Plan*.

The *Virginia Marine Debris Reduction Plan* charts a course to measurably reduce marine debris in Virginia's coastal rivers, bays and Atlantic Ocean, focusing on specific actions that are politically, socially, and economically feasible and that can be accomplished in the near-term (2 years) and longer-term (up to 10 years).

The Plan outlines the problem and provides a roadmap for Virginia's nonprofit organizations, local governments, state agencies, regional partners, researchers, and industries to work together on sustained approaches to reducing the flow of plastics and other trash items into inland, coastal and ocean waters.

This report summarizes the Plan completed in 2014, provides a brief update on recent accomplishments, and a look at next steps. The complete Plan can be viewed at: *www.deq.virginia.gov/Programs/CoastalZoneManagement/CZMIssuesInitiatives/MarineDebris.aspx*.

K. Register, CVW

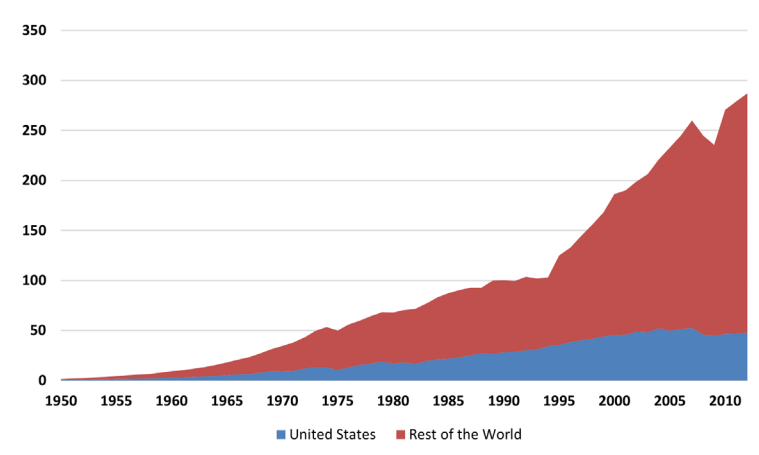
Sources

Marine debris is 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.

-- *NOAA Marine Debris Program*

US and Global Plastic Resin Production

[million metric tons]



Source: American Chemistry Council, 2013, Plastic Resins in the United States.

An Abundance of Plastic

The amount of plastics generated in the U.S. and worldwide since 1960 has risen sharply. It is estimated that one-third of this plastic material becomes single-use disposable packaging. One result of these trends can be seen in freshwater rivers, coastal waters, and the ocean where synthetic materials like plastic are found on the water surface, in the water column, and in the benthic (bottom) regions of water bodies.

While methods of determining abundance of marine debris vary, there is agreement that the majority of marine debris (up to 75 percent) is made up of plastics.

Microplastics: A Growing Concern

Eventually, larger plastics will degrade into smaller and smaller pieces (*image "A" at right*). These smaller plastic pieces (smaller than 5mm in size) are termed 'microplastics' (*image "B" at right*) – for example, one plastic bottle can be transformed into hundreds of shards of microplastic over time. Another source of microplastics is polyethylene and polypropylene microbeads found in personal care products (facial scrubs, toothpaste), in industrial scrubbers used for abrasive blast cleaning, and in resin pellets used in the plastic manufacturing process (*image "C" at right*). 'Microfibers' are another type of microplastic that are generated from washing synthetic clothing made of polyester and nylon.

Small pieces of plastic are becoming one of the major components of marine debris. Most wastewater treatment plants are not equipped to remove microbeads, so they pass through to streams, rivers, and eventually the ocean or freshwater lakes.

There is growing evidence that microplastic debris is consumed by many species, including fish.

NOAA MDP

NOAA MDP

NOAA MDP

Ocean Conservancy

Sources

Land-based sources come from people who…

- Litter while driving or walking
- Illegally dump waste
- Overload or fail to empty trash receptacles and dumpsters
- Fail to secure trucks that are loaded with waste items
- Practice other improper disposal of trash on land

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D. Field, DCR

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Ocean Conservancy

Land-based Sources: The Urban Runoff Connection

The majority of trash in coastal waters and the ocean comes from inland sources via storm drains, streams and rivers. Sources of litter in our environment are myriad and all start with inadvertent or intentional discards by people. While many people believe that storm drains in urban and developed areas transport rainwater to a place where it is "cleaned up," this is rarely true. Litter and trash (along with pet waste, pesticides, herbicides, fertilizers, and motor oil) are often carried by stormwater directly into streams, bays, and the ocean.

NOAA MDR

Airborne Sources: "Gone" with the Wind

While the majority of debris enters the ocean via watersheds, another method of debris transport involves wind. Light items, such as plastic bags and helium-filled balloons, can travel for miles.

A comprehensive response to marine debris must take into consideration sources of debris that may be outside of local, regional, or state jurisdictional boundaries. The airshed of the Chesapeake Bay is a great deal larger than its watershed.

Water-based Sources: Overboard on Debris

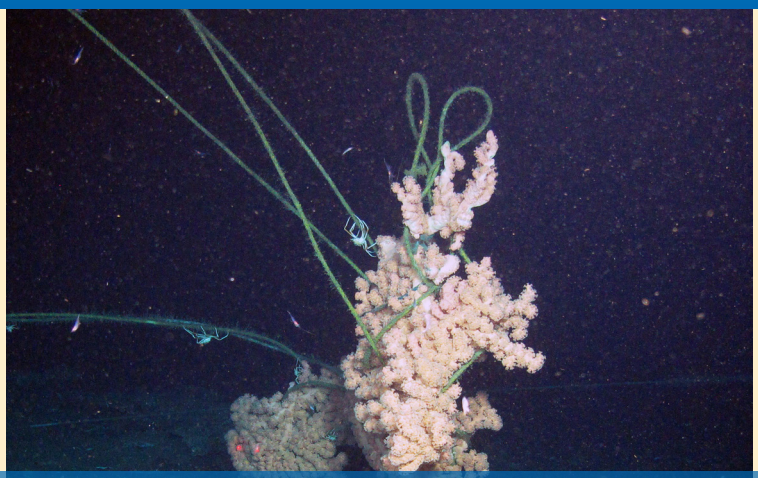
Marine debris does not all come from the land. Water-based (or ocean-based) debris includes abandoned nets, crab pots, fishing line, and other lost or derelict commercial and recreational fishing equipment. When abandoned, discarded, or unattended, fishing gear continues to capture and kill, becoming exponentially deadly to marine life.

Water-based marine debris also includes litter from boats, ships and illegal discharges.

Virginia Aquarium

C. Trapani

IMPACTS



Impacts to Wildlife

More than 260 species of animals worldwide—including marine mammals, birds, turtles, crustaceans, and fish—have been entangled in marine debris or have ingested it, according to the United Nations Environmental Programme

Fishing line and nets, plastic ribbons on balloons, and similar types of trash can easily entangle animals. The NOAA Marine Debris Program reports that individuals of at least 115 different marine species have become entangled in plastic marine debris in the United States.

Marine animals also consume plastic bags, micro-plastics, balloons, and other types of marine debris when they mistake it for food or accidentally ingest it during normal feeding activity. Ingesting debris items can cause throat or digestive track obstruction and damage to the gut, resulting in malnutrition or death.

Impacts to Ecosystems

Plastic tarps, abandoned nets and fishing gear, tires, and other debris can smother and crush sensitive ecosystems such as deep sea corals found in the submarine canyons 50 to 60 miles off Virginia's coast.

Hazardous chemical contaminants found in the water sorb, or attach, to the tiny pieces of plastic found in the water column. These microplastics can then be consumed by animals that are at the lowest trophic (feeding) levels in the marine and freshwater environments.

(Image above left) Oystercatcher chick trapped underneath clam netting. Photo by P. Denmom, USFWS. (Image below left) Sea turtle entangled in fishing net. Photo courtesy of NOAA Marine Debris Program. (Image above right) Deep sea corals in the Baltimore Canyon are entangled in fishing line. Photo by S. Ross, University of North Carolina-Wilmington. (Image below) Virginia Aquarium Stranding Response Team members examine a young Sei whale found dead in August 2014. A section of a DVD case (inset image) was found in her stomach. Photos by S. Katz, The Virginian Pilot; Virginia Aquarium.

Impacts

Impacts to Coastal Economies

Marine debris can also have considerable economic costs to coastal communities. Marine debris is an eyesore along shorelines around the world. It degrades the beauty of the coastal environment and, in many cases, may cause economic loss if an area is a popular tourist destination. Would you want to swim at a beach littered in trash? Virginia communities spend taxpayer dollars on beach cleanups, litter removal, street sweeping, and other methods to prevent or remove marine debris. A NOAA Marine Debris Program economic study in California showed that beach goers avoid littered beaches, spending their recreational dollars elsewhere.

Impacts to Humans

Medical and personal hygiene debris containing pathogens can enter waterways when sewer systems fail or overflow. Broken glass, syringes, and other hazardous debris items can also harm bare-foot beach goers. Boaters' safety can be compromised when debris items – fishing line, nets, plastic bags, and rope pieces – wrap around boat propellers or clog seawater intakes. Plastic debris serves to concentrate and transport chemical pollutants into the marine food web, and potentially to human diets. Chemicals of concern include those used in the manufacture of the plastics, as well as pollutants present in the ocean water absorbed and concentrated in the plastic (and thus made available for animal consumption). (*Rochman et al. - www.nature.com/articles/srep14340.*)

(Image above left) Volunteers participating in a cleanup of litter along the banks of the Potomac River. Photo by K. Register, Clean Virginia Waterways. (Image below left) Photo courtesy of Ocean Conservancy. (Image above right) Rope wrapped around boat propeller. Photo courtesy of NOAA Marine Debris Program. (Image below right) Plastic fragments, fibers, plastic film, plastic foam and plastic monofilament have been found in fish, like Striped Bass. Photo courtesy of Virginia Outdoors website.

Understanding and Responding

Understanding the nature and scope of the problem is key to effectively addressing marine debris pollution. Several research studies and volunteer cleanup events contribute data that help define the problem.

International Coastal Cleanup in Virginia

Clean Virginia Waterways organizes this annual statewide cleanup of streams, rivers, bays, and coastal waters throughout Virginia as part of the Ocean Conservancy's International Coastal Cleanup (ICC). Volunteers tally the number of cigarette butts, beverage containers, food-related wrappers, balloons, plastic bags, and other common marine debris items, which has helped Clean Virginia Waterways of Longwood University build a comprehensive database of litter and marine debris found in Virginia's waterways.

The table at right reflects data collected since 1995 by ICC volunteers, and shows the top 20 items reported in Virginia over a 20-year period. In aggregate, beverage- and food- related items dominate the list.

Top 20 Items by Number Reported by Volunteers During 20 Years of the International Coastal Cleanup in Virginia

Rank	Item
1	Cigarettes/Cigarette Filters
2	Beverage Bottles (Plastic)
3	Food Wrappers/Containers
4	Bags (Plastic)
5	Beverage Cans
6	Beverage Bottles (Glass)
7	Cups, Plates, Forks, Knives, Spoons (Plastic)
8	Caps, Lids
9	Straws, Stirrers
10	Building Materials
11	Tires
12	Balloons
13	Clothing, Shoes
14	Tobacco Packaging/Wrappers
15	Toys
16	Fishing Line
17	Rope
18	Cigar Tips
19	Bait Containers/Packaging
20	Cigarette Lighters

Purple = smoking-related items
Blue = beverage- and food-related items

Data from Clean Virginia Waterways of Longwood University.

National Marine Debris Monitoring Program

From 2001 through 2006, the Ocean Conservancy conducted the National Marine Debris Monitoring Program which collected data about the most common items found on coastal beaches. In the region that included Virginia, the most common debris items were:

- Straws (41,015 or 39.4% of all items found)
- Plastic beverage bottles (14,382 or 13.8%)
- Plastic bags, < 1 meter (8,076 or 7.7%)
- Balloons (8,050 or 7.7%)
- Cotton swabs (6,177 or 5.9%)

Derelict Crab Pots in the Chesapeake Bay and Virginia Coastal Waters

CCRM, VIMS

Researchers at the Center for Coastal Resources Management (Virginia Institute of Marine Science) have explored the potential impacts that derelict (abandoned or lost) crab pots have on the blue crab fishery and other marine-oriented species including fish, eels, turtles and birds. Crab pot loss rates are estimated at ~20%, resulting in the potential addition of ~60,000 pots annually to the derelict crab pot population in Virginia's waters. Many of the crab pots are lost due to storms or boat propellers that accidentally cut the pots free from their buoys.

More than 34,000 derelict crab pots were removed from the Chesapeake Bay as part of the Virginia Marine Debris Location and Removal Program that paid out-of-work crab dredgers to use side-imaging sonar units to find, document and remove abandoned crab pots and other marine debris. The program, funded by NOAA and implemented by VIMS and Virginia Marine Resources Commission, also resulted in important data that will improve future recovery of these "ghost pots" and further reduce their inadvertent trapping of wildlife.

Since derelict fishing pots can be a source of mortality for target and bycatch species for several years, VIMS' researchers tested modifications to crab pots including easy-to-install biodegradable panels that completely degrade into environmentally-neutral constituents after approximately one year. Research found that these biodegradable panels do not adversely affect catch. Properly designed biodegradable escape panels appear to be a viable solution to mitigate adverse effects of derelict pots.

Clam Netting from Aquaculture Operations

D. Field, DCR

Plastic mesh, generally referred to as "clam netting," is used as a predator deterrent over the subaqueous tidal lands where clams are grown to market size. According to VIMS, Virginia leads the nation in the culture of hard clams. From 2004 to 2006, the Virginia CZM Program supported research by the Virginia Eastern Shorekeeper to locate, assess, and document the wide distribution of clam net on the barrier islands and beaches of Virginia's Eastern Shore and also to monitor potential impacts to the coastal ecosystem. Because of the hemispheric importance of the Virginia barrier islands for nesting and migratory birds, the study focused on nets found on the barrier beaches, dunes and adjacent areas. The netting becomes marine debris when cut by boat propellers, moved by storms, or discarded inappropriately, and can entangle and kill shorebirds.

Virginia Balloon Litter Study

C. Trapani

Clean Virginia Waterways and the Virginia Aquarium & Marine Science Center have been collecting information since 2012 to better understand the sources, impacts and accumulation patterns of littered balloons. Sea turtles can ingest balloons, mistaking them for jellyfish. People who find a littered balloon anywhere in Virginia or in its coastal waters are asked to provide information via a website survey: *www.virginiaballoonstudy.org/.*

Setting Virginia's Priorities

Balloons

Plastic Bags

Fishing gear (commercial and recreational)

Microplastics

Cigarette butts and smoking-related litter

Beverage- and food-related litter

Most Acheiveable Marine Debris Types

A survey of Virginia experts identified the nine marine debris sources for which achievable (socially, politically and economically) actions could be developed:

Land-based marine debris sources (in order of achievability)

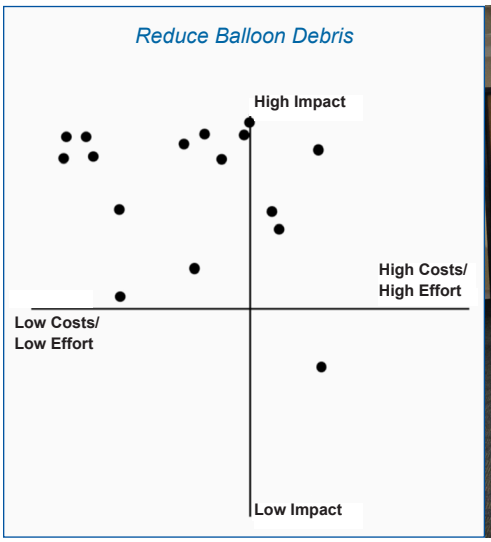
1. Plastic bags
2. Cigarette butts and smoking-related litter
3. Balloons from intentional mass releases
4. Beverage containers, straws, and food-related packaging
5. Waste from land-based industrial/manufacturing facilities
6. Uncovered trucks (includes municipal and commercial waste-hauling vehicles)

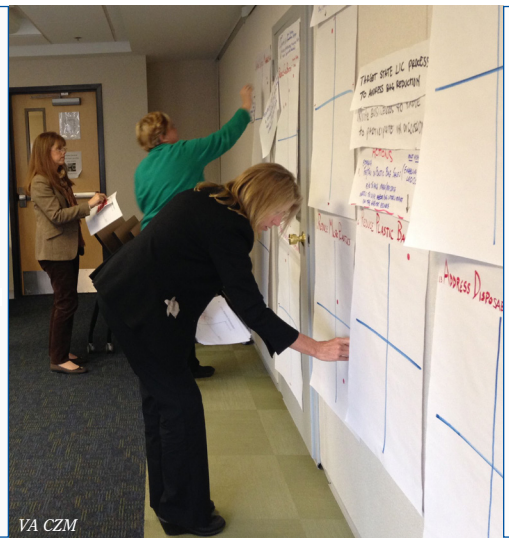
Ocean-based marine debris sources (in order of achievability)

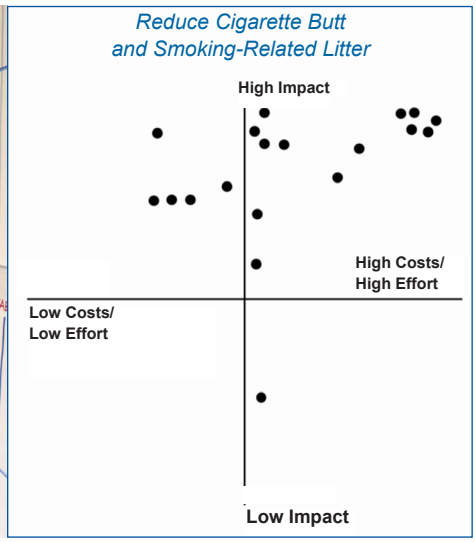
1. Abandoned commercial fishing gear including crab pots
2. Waste from cargo, cruise, or other ocean-going commercial ships
3. Vessels: lost, abandoned, or derelict

Setting Virginia's Priorities

Deciding which of the top 9 marine debris sources to focus on first was a major outcome of Virginia's Marine Debris Reduction Plan. After reviewing the results from the Stakeholder Survey and interviews, members of the Virginia Marine Debris Reduction Plan Leadership Team were asked to select their priorities for Virginia in the near-term based on what they saw as politically, economically, and socially feasible, and on the "bang for buck" or the costs and benefits of potential actions. Members placed dots on charts for each proposed action according to how high or low a positive impact the action would have and how high or low the cost or effort would be to achieve the action (*image and graphs below*). Those with the highest impact, and lowest cost, were then selected for near-term action strategies.







Goals and Strategies

The over-arching goal of the Virginia Marine Debris Reduction Plan is to reduce the amount of trash and marine debris from land-based and water-based sources in Virginia through leadership, prevention, interception, innovation, and removal for ecological, social, and economic benefits.

Goals of the Virginia Marine Debris Reduction Plan

Lead:
Pursue a collaborative and coordinated approach to reduce marine debris from land- and water-based sources, and establish a long-term overarching Virginia Marine Debris Advisory Committee.

Prevent:
Reduce marine debris through source reduction, preventing trash from becoming litter and entering the water, and by preventing fishing gear from becoming lost or abandoned.

Intercept:
Reduce marine debris by intercepting litter at storm drains.

Innovate:
Reduce marine debris through innovation of materials, designs, practices, equipment, technologies, and recovery.

Remove and Clean Up:
Reduce marine debris by removing and cleaning up litter and debris items as well as mitigating the impacts and the damage marine debris causes.

Strategies of the Virginia Marine Debris Reduction Plan

The strategies of the Virginia Marine Debris Plan describe how success will be achieved, through a coordinated approach, by:

Influencing individual behaviors and choices that contribute to marine debris problems.

Fostering collaboration between agencies, local governments, researchers, manufacturers and businesses, non-profit organizations, and citizens.

Increasing knowledge to better understand sources, fates, impacts, and solutions to marine debris.

Securing adequate funding to support research, coordination, behavior change campaign development, infrastructure improvements, and grants to local governments.

Improving regulations, including incentives and disincentives, to reduce waste at the source and to prevent pollution.

NOAA/MDP

Goal 1: Lead

Create the Virginia Marine Debris Advisory Committee.

Audience: The Virginia Marine Debris Advisory Committee will oversee a coordinated program to reduce targeted sources of marine debris; establish criteria and track implementation progress and challenges; assist in aligning the Virginia Marine Debris Reduction Plan with state and regional programs; and guide the adaptive management of the Plan using a 2-year evaluation cycle.

Program Leadership Strategies

Change Behaviors

- Examine ways to synchronize the many silos of current activities and change management behavior to be more collaborative.

Collaboration

- Foster coordination, cooperation, and communication among government agencies (federal, state and local), nonprofit organizations, research institutions, industry, and consumers.
- Identify and invite missing parties to the table to help with VMDRP implementation.
- Create, maintain, and share an inventory of litter-prevention and marine debris projects, best practices, and research that are underway in Virginia and regionally.
- Use web-based tools to foster collaboration, increase internal and external communication, and track implementation of the VMDRP.

Increase Knowledge

- Identify knowledge gaps and foster collaboration on research.

Fund

- Identify existing and potential revenue streams to sustain statewide marine debris and litter prevention.

Improve Regulations

- Analyze existing legislation and policies and provide recommendations for improvements.

VA CZM

Notes

Reduce marine debris through prevention.

Audience: While everyone can help prevent marine debris, targeting specific groups may accelerate pollution prevention: restaurants and retail businesses; gas stations; landscape managers; local governments, especially stormwater managers; consumers; marina and boat ramp operators; event and memorial Planners.

Prevention Strategies

Change Behaviors

- Develop and implement social marketing campaigns to reduce marine debris from specific sources, and to help make the public better stewards of our waterways and oceans.
- Promote desired behavior change through incentives and disincentives (positive and negative reinforcements).
- Disseminate effective best practices to address marine debris from land-based and water-based sources.
- Develop and implement dedicated education and outreach initiatives, tools, and campaigns to encourage changes in behavior and improve efforts to address marine debris.

Collaboration

- Create a clearinghouse of marine debris prevention activities, tools, and resources.
- Develop regional approaches – when and where possible.
- Collaborate with other groups to implement or expand their litter-prevention turnkey programs in Virginia.

Increase Knowledge

- Increase knowledge about effective methods to change behaviors.
- Support systemic waste-source reduction research, including investigations of reusable, biodegradable, and other alternative materials.
- Analyze ecological and economic impacts of litter and marine debris to Virginia's tourism revenue, recreational spending, property values, and economically important species.

Fund

- Identify existing and potential revenue streams to sustain statewide marine debris and litter prevention.
- Seek funding from a diverse array of sources, including industry partners, to support local community-based marine debris prevention projects that benefit coastal habitat, waterways, and wildlife.
- Prioritize the allocation of funding to support Plan implementation.

Improve Regulations

- Analyze existing legislation and policies and provide recommendations to support waste minimization of the most common and harmful items found as marine debris (e.g., single-use plastic bags, food and beverage packaging, balloons, cigarette butts, and microbeads).
- Support increased enforcement of Virginia's current laws such as littering, illegal dumping, balloon releases, waste management, and stormwater runoff.

Notes

GOAL 3: INTERCEPT

Reduce marine debris by intercepting litter at storm drains.

Audience: Intercepting litter has unique challenges for stormwater managers, the target audience for the interception goal.

Interception Strategies

Change Behaviors

- Assess trash interception practices in municipal separate storm sewer systems (MS4s) and non-MS4 permitted localities and facilitate cross-departmental communication to support effective litter and marine debris education and management.

Collaboration

- Facilitate the expansion of inter-jurisdictional programs and public-private partnerships to intercept litter.

Increase Knowledge

- Conduct literature review of existing research on effectiveness of stormwater interception best practices for commonly littered items.
- Conduct research to determine best practices for interception and removal of of micro-beads at wastewater treatment plants.
- Work with local MS4 program managers to determine resource needs to address floatables and litter.

Fund

- Identify existing and potential revenue streams to sustain statewide marine debris and litter prevention.
- Secure dedicated funding from a diverse array of sources to support interception infrastructure and practices.
- Explore bulk or state procurement of the most effective interception equipment in order to reduce the burden of cost on localities.

Improve Regulations

- Analyze existing legislation and policies and develop strategies to improve interception infrastructure through legislation, regulations, and policies.

CLEAN WATER ACT

Under the Clean Water Act, the storm sewer systems in large and mid-size localities are regulated as point sources and are called municipal separate storm sewer systems (MS4s). In Virginia, there are more than 115 permitted MS4s, which are regulated under the Virginia Stormwater Management Program. Permits require MS4 owners/operators to implement a series of programs to reduce the discharge of pollutants in order to protect the water quality of nearby streams, rivers, wetlands, and bays. This includes keeping litter and trash out of storm drains.

Notes

GOAL 4: INNOVATE

Reduce marine debris through innovation of materials, designs, practices, equipment, technologies, and recovery.

Audience: Industry and trade groups, academic researchers, and manufacturing and production facilities/businesses are the target audience. These entities are involved in developing materials, products, practices, and packaging to reduce and minimize waste; increasing recyclability and biodegradability; and encouraging practices and behaviors that will reduce litter and marine debris.

Innovation Strategies

Change Behaviors

- Promote the adoption of innovative practices and behaviors that will lead to a reduction in litter and lost fishing gear – through media attention, educational opportunities, and partnerships with academic institutions, non-governmental agencies, and local, state, and regional governments.

Collaboration

- Explore and develop innovative methods for sharing information and data.
- Encourage innovation through collaboration between government, non-governmental organizations, businesses, and industries in Virginia and the mid-Atlantic region.

Increase Knowledge

- Conduct, promote, and sponsor collaborative research to locate and remove lost and abandoned fishing gear.
- Conduct, promote, and sponsor collaborative research on alternative packaging and innovative product design for commonly littered items.
- Conduct, promote, and sponsor collaborative research on innovative interception and recovery.
- Conduct, promote, and sponsor collaborative research on successful social marketing campaigns that target common, persistent, and harmful marine debris (e.g., balloons, single use plastic bags, lost and derelict fishing gear, crab pots, microplastics, and cigarette butts).
- Conduct, promote, and sponsor collaborative research on successful social marketing campaigns for targeting specific audiences, including those from the recreational and commercial fishing communities, economically disadvantaged communities, and other areas with unique marine debris problems.

Fund

- Incentivize partnerships to fund alternative material research and development as well as commercialization of the results of the partnerships.
- Provide incentives (or subsidies) to encourage the use and adoption of alternative materials.

Improve Regulations

- Reduce legal and administrative barriers to adopting alternative materials and practices.

Notes

GOAL 5: REMOVE, CLEAN UP, MITIGATE

Reduce marine debris by removing and cleaning up litter and debris items and mitigate the impacts of marine debris.

Audience: Many litter cleanup programs can engage a broad audience, but there is also a role for targeted cleanups that require targeted audiences. For example, locating and retrieving crab pots or derelict vessels requires special knowledge, skills, and equipment.

Removal, Clean Up, and Mitigation Strategies

Change Behaviors

- Engage the public in active, personal participation including cleanup events to remove debris from in-land waterways, shorelines, and coastal waters.

Collaboration

- Support multi-jurisdictional and public-private partnerships in cleanup and removal efforts to create long-term ecological improvements for coastal and in-land waterways, habitat, and wildlife.
- Support clearinghouse for cleanup and removal events and programs to include events, approaches, organizing groups, results of and data generated during cleanup events.
- Identify partners for on-water clean up activities.

Increase Knowledge

- Identify and investigate barriers to cleanup and removal efforts.
- Support research on effectiveness of various removal methods.
- Facilitate creation of data collection and sharing system.
- Increase awareness of monitoring results, volunteer cleanup data, and marine debris removal programs and outcomes.

Fund

- Identify existing and potential revenue streams to sustain statewide marine debris and litter prevention.
- Seek dedicated funding from a diverse array of sources.

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K. Register, CVW

CVW

K. Register, CVW

CCRM, VIMS

- Provide incentives (or subsidies) to encourage the commercial fishing industry and others to remove derelict crab pots, clam netting, and other lost or derelict fishing gear and repurpose or recycle the materials when possible.
- Support funding for locally driven, community-based marine debris removal projects that benefit coastal habitat, waterways, and wildlife.

Improve Regulations

- Remove administrative barriers to clean up events and removal of lost or derelict gear and derelict vessels.

Summit Notes

Actions Since 2014

Implementation of near-term priorities in the Virginia Marine Debris Reduction Plan is underway thanks to the Virginia Marine Debris Advisory Committee and stakeholders who were engaged in the creation of the Plan. Here are a few highlights that address the goals of "lead", "prevent" and "remove."

Lead: 2nd Virginia Marine Debris Summit

This Summit provides marine debris experts, state and local resource managers, community educators and other stakeholders the opportunity to review the early accomplishments of the Virginia Marine Debris Reduction Plan, share ongoing research, and further develop ideas for mid- and long-term actions as well as explore emerging issues.

Lead: Multi-state Coordination

As a member of the Mid-Atlantic Regional Planning Body, Virginia is leading efforts to incorporate marine debris reduction into the Mid-Atlantic Ocean Plan. The plan will be released for public comment in summer 2016.

Remove: Derelict Crab Pots in the Chesapeake Bay and Virginia Coastal Waters

Researchers at VIMS published their findings on the economic impacts of derelict crab pots in the article "The Dilemma of Derelict Gear" based on the removal of ghost fishing gear (*see page 7*). They estimate that removing derelict pots led to an additional 30 million pounds of harvested blue crabs – valued at $21.3 million. By removing ghost fishing gear, actively fished crab pots were found to be significantly more productive. Aspects of this research were funded by NOAA/National Marine Fisheries Service, National Fish and Wildlife Foundation, and the Office of the Virginia Secretary of Natural Resources.

Prevent: Cigarette Litter Prevention in Hampton Roads

Cigarette butts, one of the items of top concern identified in the Virginia Marine Debris Reduction Plan, were addressed through two unique Cigarette Litter Prevention Program projects (funded by Keep America Beautiful) that were conducted in 2015 in Virginia Beach and Hampton Roads. Through these projects, the Hampton Roads Planning District Commission and Clean Virginia Waterways built new capacity and stronger local partnerships while also achieving exceptional reduction in cigarette litter.

Lead: Monitoring Marine Debris in Virginia's Coastal Zone

With funding from NOAA through the Virginia CZM Program, researchers and volunteers from the Virginia Aquarium & Marine Science Center, together with Clean Virginia Waterways, are monitoring the quantities and types of marine debris found at four coastal sites (Chincoteague National Wildlife Refuge, Fisherman Island National Wildlife Refuge, Back Bay National Wildlife Refuge, and Grandview Nature Preserve in Hampton). This research uses NOAA's national protocols, and the resulting data are entered into the national database.

Prevent: Balloon Debris Reduction Social Marketing Campaign

A deadly and common source of marine debris is the mass release of balloons and their attachments. Often associated with important events in life, balloon releases evoke powerful emotional responses in participants. How do we change people's behavior to lessen such a widespread source of marine debris?

The Virginia Coastal Zone Management Program, Clean Virginia Waterways, OpinionWorks, and their partners, are developing a social marketing approach

Mid-term Actions (2016-2020)

The Virginia Marine Debris Advisory Committee, with further input from attendees of the Second Virginia Marine Debris Summit (March 2016) and stakeholders at the local, state and federal level, will work together to develop selected mid-term actions of the Virginia Marine Debris Reduction Plan into implementation strategies.

In December 2014, the Virginia CZM Program's Coastal Policy Team recognized that the reduction of marine debris will have positive impacts on coastal resources, protected species, and economically important species such as blue crabs, and therefore agreed that there is an urgent need to move ahead on the recommendations found in the Virginia Marine Debris Reduction Plan. Therefore, the Virginia CZM Program, with funding from NOAA's Office of Coastal Management, plans to continue its leadership in coordinating marine debris reduction efforts in the Commonwealth, through 2021 including:

- Continuation of the monitoring project and the balloon social marketing campaign.
- Increased efforts to work with existing statewide groups on marine debris awareness, as well as NOAA, the Mid-Atlantic Regional Council on the Ocean (MARCO) and the Mid-Atlantic Regional Planning Body (RPB) to develop a Mid-Atlantic marine debris reduction plan that can build upon Virginia's efforts. The Mid-Atlantic RPB is proposing to include work on marine debris reduction in its Ocean Action Plan (to be released in June 2016).
- Support ongoing waste source reduction efforts, and facilitate collaboration and the transfer of knowledge about successful marine debris prevention programs, policies, and campaigns.
- Research and develop arguments (particularly economic ones) that will be compelling to build popular support for legislation and policies that will support waste minimization of the most common items found as marine debris. This can include the economic costs of marine debris on tourism, community cleanup budgets, MS4 compliance, and economically important species and to the agricultural community.
- Engage MS4 permittees and stakeholders in a review of current policies and practices found in MS4 permits regarding litter and debris monitoring, prevention and interception.
- Support social marketing campaigns aimed at influencing behaviors that are associated with reducing marine debris.

to address this difficult problem. Step One is getting to know the motivations of the target audience. What causes Virginians to participate in balloon releases, whether in celebration, commemoration, or bereavement? How can we prompt people to make a different decision?

With a grant from the NOAA Marine Debris Program and funding from the Virginia CZM Program, this formative research will be completed in summer 2016, a campaign strategy will be developed and a pilot will be launched in spring 2017.

Work with partners on this project is also building our capacity to research, design and implement social marketing campaigns.

SOCIAL MARKETING

Social marketing is a process that applies research, tools and techniques focused on influencing, and ultimately achieving, a change in behavior. Social marketing applies commercial marketing principles and techniques to influence target audience behaviors that benefit society as well as the target audience.

Social marketing is an audience-driven approach and places an emphasis on understanding what impedes and motivates a target audience to act. Social science research suggests that such an approach is most likely to bring about behavioral change.

To Learn More About Social Marketing:

Fostering Sustainable Behavior: *www.cbsm.com*

Tools of Change: *www.toolsofchange.com*

Virginia Coastal Zone
MANAGEMENT PROGRAM

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

CLEAN VIRGINIA WATERWAYS
OF LONGWOOD UNIVERSITY

Virginia Marine Debris Reduction Plan Leadership Team

This team worked together in 2013 to develop a Marine Debris Reduction Plan for Virginia.

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Susan Park, PhD - Assistant Director for Research, Virginia Sea Grant,

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Kathy Russell - Education and Outreach Coordinator, TFC Recycling

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Several others contributed to this Plan. They are listed in the document *Developing a Marine Debris Reduction Plan for Virginia*. Further information and references can also be found in that document available at *www.deq.state.va.us/Programs/CoastalZoneManagement/CZMIssuesInitiatives/MarineDebris.aspx*.