

Florida Marine Debris Reduction Guidance Plan

Report prepared by: Leonardo Mata, Florida Department of Environmental Protection, Coastal Management Program

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Florida Marine Debris Reduction Guidance Plan

Note to Readers

The information contained in this document is a compilation of recommended strategies and actions towards reducing the amount and impacts of marine debris in Florida. It is the culmination of annual meetings over several years with marine debris specialized working groups composed of federal and state agencies, local governments, non-governmental organizations, universities, and industry and coordinated through the Florida Coastal Management Program and the U.S. National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program. This is not, however, a final or prescriptive document. The marine debris reduction guidance plan is voluntary and designed to be a living document that can be updated based on successes and challenges in tackling existing marine debris issues.

In order to implement strategies and actions outlined in this plan, additional public and stakeholder input may be sought by the agency or entity with authority to execute recommended actions. Please contact the Florida Coastal Management Program to stay informed regarding updates of this document made as a result of any stakeholder/public comment.

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Introduction

Marine debris is one of the most widespread problems facing the world's oceans today. Beaches, local ecosystems and watersheds – the foundation of Florida's tourism and fishing industries – are negatively impacted by debris. Thus, it is important for Florida to reduce the amount and impacts of marine and estuarine debris through a collaborative, statewide approach, which builds on the strengths and resources of local organizations.

With the support of the National Oceanic and Atmospheric Administration (NOAA), a variety of Florida stakeholders and partners working on reducing marine debris came together to recommend strategies and actions that can, upon implementation, reduce the amount and impacts of marine debris in Florida. This document describes the process of developing Florida's Marine Debris Reduction Guidance Plan (FMDRGP) by the participating partners coordinated by the Florida Coastal Management Program and the NOAA Marine Debris Program, to accommodate the ideas, strategies, and recommended actions in a cohesive and standardized format. The purpose of the FMDRGP is to serve as a guidance document or a central point of reference for improved collaboration and coordination among the multitude of stakeholders across Florida, to avoid duplication and optimize the efficiency and efficacy of their efforts. The document is not intended to be regulatory or specifically binding on actions or timeframes.

The FMDRGP describes specific goals, objectives, strategies and recommended actions with the overarching goal of reducing marine debris on a statewide basis and thereby reducing its ecological, social and economic impacts. The guidance plan identifies priorities that could be feasibly coordinated and accomplished to reduce marine debris in Florida's waters in the near- and long-term.

This document is organized as follows:

Chapter 1 – general characterization and definition of marine debris, its sources, fate and impacts, and how to address the issue.

Chapter 2 – programs and activities currently underway in Florida to address the issues and the need for coordination and collaboration.

Chapter 3 – groundwork preceding the development of the Florida Marine Debris Reduction Guidance Plan, its structure and descriptions of elements (goals, objectives, strategies and actions).

Chapter 4 – the Florida Marine Debris Reduction Guidance Plan.

Chapter 5 – priority strategies that could be feasibly implemented and would result in significant impacts on the reduction goals.

1. Marine debris: characterization of the problem

1.1. Definitions with a historical perspective

Marine debris was first described as early as 1870, when Jules Verne in his novel *Twenty Thousand Leagues under the Sea*, provided a graphic narrative of how floating debris accumulates in ocean gyres in the chapter on the Sargasso Sea: “Above us, huddled among the brown weeds, there floated objects originating from all over: tree trunks ripped from the Rocky Mountains or the Andes and sent floating down the Amazon or the Mississippi, numerous pieces of wreckage, remnants of keels or undersides bulwarks staved in and so weighted down with seashells and barnacles, they couldn’t rise to the surface of the ocean”. Only one-century later (in the late 1960s) marine debris was addressed for the first time in the scientific literature. Marine debris was initially seen as a curiosity by scientists, who reported interactions between marine debris and marine organisms, particularly ingestion of plastic items by seabirds (Kenyon and Kridler, 1969) and entanglement of seals with man-made items (Fowler, 1987). Through the 1970s and 1980s most of the impacts of marine debris to marine systems were identified, baseline data were collected on the distribution, abundance and impacts of marine litter, and policies were formulated to tackle the problem (see Ryan, 2015). Recently there has been a resurgence in research interest on marine debris, following reports of mid-ocean ‘garbage patches’ (Moore et al., 2001) and of microplastics and their potential impacts on the health of marine ecosystems (Oehlmann et al., 2009).

The definition of marine debris, also referred to as marine litter, marine garbage or ocean debris, broadened as the knowledge about its sources, distribution and impacts increased. Scientists generally defined marine debris as *any manufactured or processed solid waste material (typically inert) that enters the marine environment from any source* (Coe and Rogers, 1997). In 2005, the United Nations Environment Programme (UNEP) defined marine debris as *any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment* (UNEP, 2005). In 2011, the UNEP and the US National Oceanic and Atmospheric Administration (NOAA) co-hosted the Fifth International Marine Debris Conference. The conference brought the marine debris community together to develop and create a document known as the *Honolulu Strategy – A Global Framework for the Prevention and Management of Marine Debris* (NOAA & UNEP, 2011). In this reference document, marine debris is defined as *any anthropogenic, manufactured, or processed solid material (regardless of size) discarded, disposed of, or abandoned in the environment, including all materials discarded into the sea, on the shore, or brought indirectly to the sea by rivers, sewage, stormwater, waves, or winds*.

For the purposes of this document, marine debris will follow the definition established by NOAA and the United States Coast Guard (USCG) 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* (15 C.F.R. Part 909 Section 909.1 and the 2012 Marine Debris Act).

1.2. Global composition and sources of marine debris

Marine debris is one of the most widespread problems facing the world's oceans, waterways and coastlines due to its ubiquitous presence, its ability to travel long distances and traverse territorial borders, and the difficulties in identifying its source. Two source categories are generally acknowledged: (1) from actions that take place on land (land-based sources), and (2) from actions that take place in waterways and the marine environment (water-based sources).

1.2.1. Land-based sources

Land-based sources of marine debris begin on city streets, public parks, waterfront areas, landfills and other land surfaces ranging from coastal areas to farther inland (Table 1). While marine debris can be related to intentional acts of littering, accidental litter is also a frequent cause of marine debris, when mishandled materials are blown by the wind, or washed by rain into storm drains, eventually entering streams, lakes, watersheds and oceans (Ten Brink et al., 2009). Debris may also be the result of inadequate reception facilities for waste (inadequately covered waste containers and waste container vehicles), and in some cases of poorly managed landfills. Therefore, any litter, regardless of whether it is purposely or accidentally discarded or lost, and even properly disposed of, has the potential to become marine debris (UNEP, 2009). Activities in waterfront and fishing piers are also sources of land-based marine debris. Finally, acute weather events and natural disasters, such as hurricanes and tsunamis, contribute a significant amount of land-based marine debris in the ocean (Table 1) (NOAA, 2008).

1.2.2. Water-based sources

Marine debris is also generated at sea and waterways by fishing, merchant, military and research vessels; cargo and cruise ships; recreational boats; aquaculture facilities; and offshore petroleum and gas platforms (Table 1). Commercial and recreational fishing vessels may create marine debris if they discard trash overboard, fail or are unable to retrieve nets, ropes, floats and other fishing-related gear. Cargo ships may lose cargo or cargo containers at sea as a result of poor loading practices or incidents at sea. Aquaculture infrastructure, materials and equipment can generate marine debris due to practices

that lead to loss or abandonment of equipment (UNEP, 2009). Another water-based source of marine debris is abandoned and derelict vessels. Vessels are sometimes abandoned when they reach the end of their useful life or when boat owners cannot keep up with their maintenance due to time and economic constraints. Similar to land-based sources, even when equipment and waste are properly managed at sea, marine debris may still result through accidental loss or system failure, particularly during severe weather events (Table 1) (NOAA, 2008).

Table 1 – Main sources of marine debris worldwide.

Main land-based sources of marine debris	Main water-based sources of marine debris
<ul style="list-style-type: none"> • Urban debris in runoff (from city streets, public parks, waterfronts and other land surfaces from coastal areas or farther inland); • Municipal landfills; • Discharges of untreated municipal sewage and stormwater; • Coastal areas (residents, day visitors and tourists); • Ports and marinas. 	<ul style="list-style-type: none"> • Fishing, merchant, military, and research vessels; • Cargo and cruise ships; • Recreational boats; • Aquaculture facilities; • Offshore petroleum and gas platforms.

The most common types of marine debris are everyday consumer goods comprised by a wide variety of items (including but not limited to plastics, glass, metals and rubber) and in a range of sizes (from microplastics to derelict vessels) (UNEP, 2009; Ocean Conservancy, 2016). Some of the most common marine debris items found worldwide include:

- Smoking-related waste (cigarette filters, cigar tips and disposable lighters)
- Food and beverage-related waste (plastic drink containers, glass bottles, aluminum cans, lids, food wrappers, bags and disposable cups, plates, cutlery, and straws)
- Manufacturing and transportation-related waste (resin pellets, pallets, packaging, plastic sheeting and straps)
- Fishing-related debris (fish/lobster traps, crab pots, fishing lines, ropes, floats and nets)

1.3. The fate and impacts of marine debris

After entering the waterways, debris can blow around; remain floating on the water surface; drift in the water column; get entangled on shallow, tidal bottoms; or sink to the seabed at various depths (UNEP, 2005). Debris commonly found on the seabed are dense items such as derelict fishing gear, metal, cans and plastics (Moore and Allen 2000; Lee et al., 2006). Buoyant debris can remain floating on the sea surface or suspended in the water column. Floating and suspended debris is generally composed of plastic and polystyrene items, cigarette butts, cardboard, ropes and food wrappings (McIlgorm, 2008). Heavy items sink and remain close to their source, while light items remain close to the source if they become trapped in sheltered bays or entangled on shallow tidal bottoms of coastal shores, otherwise they can be transported from coastal zones and throughout the world's oceans by currents and winds. Models suggest that marine debris tends to accumulate in the central oceanic gyres within two years of deposition (Martinez et al., 2009). Eventually these items will break down into smaller pieces and sink or float ashore. As a result, marine debris can be found in all sea areas of the world, even in remote places far away from any obvious land or water-based sources (e.g., on islands in the middle of oceans, and in the polar regions).

Regardless of the source and fate of marine debris, it can negatively affect human health and marine life in coastal areas and in the water. The range and scale of the impacts of marine debris are diverse and depend on the type, quantity and location of debris (the environment and ecosystem components). Impacts are usually divided into three general categories: environmental, social and public, and economic. However, most of the times the impacts are interrelated and frequently dependent upon one another (Ten Brink et al., 2009).

1.3.1. Environmental impacts

Marine debris can cause a wide variety of adverse environmental impacts at the individual, species and ecosystems levels. The most common impacts include:

- Mortality or sub-lethal impacts to plants and animals through entanglements, injury and ghost fishing (Adimey et al., 2014; Butler and Matthews, 2015);
- Mortality or sub-lethal impacts to animals through ingestion (intestinal blockage, malnutrition and poisoning) (Gall and Thompson, 2015);
- Blockage of filter feeding mechanisms from uptake of microplastics and microfibers (Rochman et al., 2015);

- Physical damage and smothering of benthic community structure, including sensitive habitats such as reefs, seagrasses, the mangroves (Chiappone et al., 2005);
- Potential to facilitate the invasion of non-native species (Winston, 1982);
- Bio-accumulation of chemicals from plastics (Kershaw and Leslie 2012).

1.3.2. Social and public impacts

The social impacts of marine debris are rooted in the ways in which marine debris affects people's quality of life, whereas public impacts are imbedded in health and safety concerns (Cho, 2006; Cheshire et al., 2009). The main social and public impacts include:

- Reduced recreational opportunities;
- Loss of aesthetics and/or visual amenity;
- Perceived or actual risks to public health and safety (hazards to swimmers and divers; cuts, abrasions and puncture injuries; leaching of poisonous chemicals);
- Navigational hazards.

1.3.3. Economic impacts

Fishing, transportation and tourism sectors, as well as governments and local communities, suffer from negative economic and financial impacts of marine debris. The main economic impacts include:

- Cost to tourism (e.g. loss of visual amenity and obstruction to beach use) (Ofiara and Brown 1999);
- Cost to vessel operators (e.g. downtime and damage due to entanglements) (McIntosh et al. 2000);
- Losses to fishery and aquaculture operations (e.g. cost of lost gear, value of lost catch or harvest, and loss of future catch from competition with lost gear) (Scheld et al., 2016);
- Costs for cleanup, animal rescue operations, recovery and disposal.

1.4. Solutions to marine debris

Just as marine debris is derived from many sources worldwide, there are many potential ways to address each type of marine debris. For example, participating in local cleanups and preventive measures, such as reduce, reuse and recycle of items can make a difference. However, measures to reduce or prevent marine debris must be taken in a large number of places, with a large number of activities, in a wide range of societal sectors, and by many people in various situations (UNEP, 2005). To

address such complexity, the UNEP and NOAA sponsored the development of an extensive global framework document for the prevention and management of marine debris – *the Honolulu Strategy* (NOAA & UNEP, 2011). This document aims to provide a focal point for improved collaboration and coordination among a multitude of stakeholders. It also provides ideas and strategies for organizations, regions, or countries to address marine debris through their own means. The outcomes of the Florida Marine Debris Reduction Guidance Plan are expected to regionally support and contribute to the Honolulu Strategy's worldwide goals.

2. Marine debris in Florida

Marine debris in Florida is generated from multiple sources – it comes from inland areas and is transported by waterways from densely populated (residents, day visitors and tourists) coastal areas; it comes from the sea in both the Atlantic and the Gulf, where a range of industrial and recreational activities (boating, fisheries and aquaculture) occur. Moreover, coastal Florida is vulnerable to regular natural disasters that can result in acute waterway debris incidents. Consequently, marine debris generated in Florida comes in a range of forms and sizes – from microplastics to derelict vessels. To effectively address the marine debris problem in Florida, it is important to have a baseline for comparison and develop coordinated responses and activities among stakeholders and organizations to reduce marine debris and its impacts.

The dynamic and diffuse nature of marine debris makes systematic assessments of the problem extremely difficult, and reliable estimates of amount and composition are relatively rare (but see Jambeck et al., 2010 for plastics). Global estimates of the amount of marine debris were made in three ways: estimating the amount of debris currently in the ocean; determining how much enters the ocean each year; and surveying the amount of marine debris with monitoring programs (UNEP, 2009). While there is no comprehensive assessment of the abundance of marine debris in Florida, nor of how much enters the waterways each year, data from marine debris tracking and reduction programs in Florida provides a snapshot of what's contributing to marine debris in coastal areas of Florida and its waters. The following section lists some of these programs and associated data. Identification of the type and source of marine debris may be helpful in guiding strategies and priorities, and making effective management and policy decisions to address marine debris in Florida.

2.1. Programs reducing marine debris in Florida

2.1.1. In coastal areas

The following programs monitor and remove shoreline marine debris in coastal areas, and marine debris items on tidal bottoms of coastal shores (beaches and mangroves).

National Marine Debris Monitoring Program

Between 2001 and 2006 the Ocean Conservancy conducted a project on behalf of the U.S. Environmental Protection Agency to establish baseline data on the amount of the marine debris along the U.S. shoreline (Sheavly, 2007). For five years, over 600-trained volunteers in 21 coastal states, including Florida used a scientifically valid protocol to monitor ‘indicator’ items of marine debris. The country was divided into nine regions based on several criteria, including: the types of marine debris previously found in those areas; prevailing currents; and logistical considerations of access and other management concerns. The coast of Florida was split between Region 3 (from Morehead City, North Carolina to Port Everglades, Florida) and Region 4 (from Port Everglades, Florida to Gulf Shores, Alabama). Up to 20 beach sites within each region were identified and randomly selected. The surveys found that nearly 80% of all coastal debris in those two regions was comprised of just six types of marine debris (Table 2).

Table 2 – Relative percentage of the six most common types of marine debris collected in the two regions of coastal Florida during the 5 year-long National Marine Debris Monitoring Program.

Debris item	Percent of total number		
	Region 3	Region 4	Average
Straws	18.3	24.3	21.3
Plastic bottles: beverage	17.2	14.3	15.75
Other plastic bottles	10.4	13.5	11.95
Plastic bags with seam < 1m	13.6	7.1	10.35
Metal beverage cans	7.9	12.9	10.4
Balloons	11.8	5.9	8.85
Total	79.2	78	78.6

International Coastal Cleanup

The Ocean Conservancy organizes the annual International Coastal Cleanup. Since 1986, volunteers have removed debris from hundreds of coastal areas worldwide and collect data on the type, number and total weight of the marine debris collected. While these cleanups do not follow a scientifically valid protocol, the information is still useful and informative to assess and review the nature and

characteristics of marine debris. During the 2015 International Coastal Cleanup, almost 30,000 volunteers removed 952,568 items weighing 346,265 pounds from Florida’s coastal areas (Ocean Conservancy, 2016). The top 10 most common items are everyday consumer items such as cigarette butts, food wrappers, and various parts of beverage containers; and in total, represent about 62% of all items collected (Table 3).

Table 3 – The top 10 most common marine debris items collected in Florida during the 2015 International Coastal Cleanup event (total items collected: 952,568).

Type of debris	Number of items
Cigarette Butts	246,502
Bottle Caps (Plastic)	74,477
Food wrappers (candy, chips)	64,321
Beverage bottles (plastic)	46,987
Bottle caps (metal)	35,896
Straws, stirrers	33,720
Beverage cans	31,059
Beverage bottles (glass)	25,620
Plastic & foam packaging	18,252
Other plastic bags	16,168
Total	593,002

2.1.2. At sea

Shoreline debris, primarily consumer products, may have its origin from either upland or at sea sources. The common feature is that shoreline debris is usually buoyant or windborne allowing it to be transported and accumulate on coastlines. Equipment and materials lost, abandoned or discarded at sea that sink can accumulate on the ocean floor. The following programs track and remove marine debris in Florida waters.

Marine Debris Reporting and Removal Program (Southeast Florida Reef Cleanup)

The Marine Debris Reporting and Removal Program of the Florida Department of Environmental Protection and the Southeast Florida Coral Reef Initiative seeks to raise awareness about marine debris; minimize its impacts through cleanup efforts; and develop strategies to reduce the amount of debris impacting southeast Florida coral reefs

(<http://www.dep.state.fl.us/coastal/programs/coral/debris1.htm>). The program encourages local divers

and dive shops to report marine debris and organizes annual reef clean-ups in southeast Florida. Each summer, volunteer divers collect and report marine debris which is then categorized into five main groups: 1) fishing debris (e.g., monofilament fishing line, leaders, lures); 2) trash (e.g., bottles, cans, plastic bags); 3) household debris (e.g., plastic chairs, bungee cords, ceramic tiles); 4) boating debris (e.g., lines, zincs), and 5) scuba/snorkeling debris (e.g., snorkels, weight belts, mesh bags). The two most prevalent marine debris categories found on the reefs were fishing debris and trash (Table 4). The most prevalent items in the trash category were aluminum cans, followed by glass and plastic beverage bottles, whereas the fishing debris was mostly composed of monofilament fishing line (Bohnsack, 2013).

Table 4 – Relative prevalence (percent %) of marine debris recovered during the Southeast Florida Reef Cleanup events between the years 2011 and 2015.

Category	2011	2012	2013	2014	2015
Fishing	31.7%	43.7%	43%	56.6%	67.8%
Boating	15%	4.9%	8%	2.6%	2.8%
Diving	6.6%	2.1%	1%	0.3%	1.2%
Household	16.7%	10.3%	7%	6.3%	3.4%
Trash	30%	39.0%	41%	34.2%	24.6%

Derelict Trap Retrieval and Debris Removal Program

Various stakeholder groups, including the commercial fishing industry, identified lost and abandoned fishing traps as a problem in Florida's marine environment. According to a 2002 study, 90% of the seabed debris encountered in the Florida Keys was derelict fishing gear (Chiappone et al. 2002). Once traps become lost or abandoned, they may spark user conflicts; "ghost fish" (continue to trap marine organisms until traps degrade enough to allow escape); visually pollute; cause damage to sensitive habitats such as coral reefs; and can also become hazards to navigation. The Florida Fish and Wildlife Conservation Commission (FWC) has two programs dedicated to removing lost and abandoned traps from state waters. The Spiny Lobster, Stone Crab and Blue Crab Trap Retrieval Program contracts commercial fishermen to remove fishable traps from state waters during closed fishing seasons and the Derelict trap and Trap Debris Removal Program authorizes volunteer groups to collect derelict traps and trap debris during open or closed seasons (<http://myfwc.com/fishing/saltwater/trap-debris>). These two programs were responsible for removing almost 34,000 traps since 2009, the year that the derelict blue crab trap retrieval program was first established. Prior to 2007 trap retrieval was limited to Monroe county. Since then stone crab trap retrieval efforts were expanded to include the Gulf coast through

Wakulla County (Fig. 1). It is important to note that these programs focus only on recovering traps that still have their buoys, since fishable traps that no longer have buoys, i.e. ghost traps, are difficult to locate. Although estimated trap loss rates vary annually and by fishery, FWC has documented that nearly 100,000 lobster traps are lost annually. The number of stone crab and blue crab traps lost is not well documented; however, hurricanes and severe winter storms can cause considerable loss of traps.

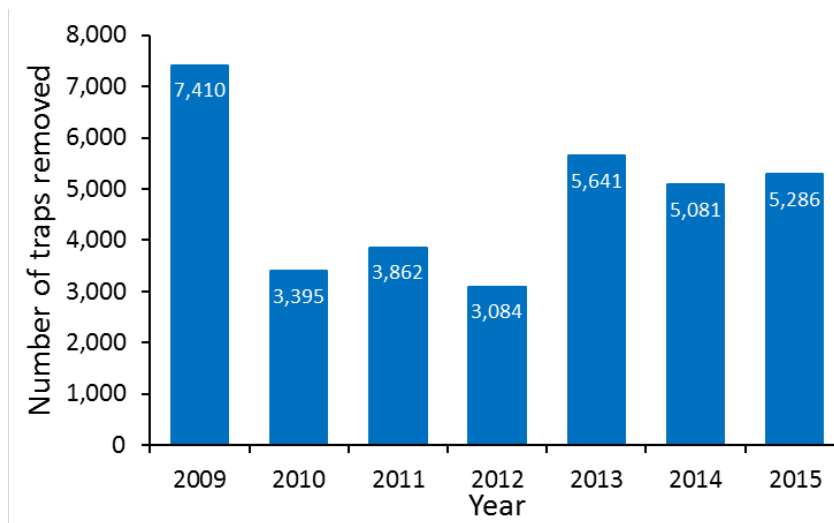


Figure 1 - Annual number of traps removed by the Florida Fish and Wildlife Conservation Commission's Lobster and Crab Trap Retrieval Programs between the years 2009 and 2015.

Monofilament Recovery & Recycling Program

The Monofilament Recovery & Recycling Program (<http://mrrp.myfwc.com/home.aspx>) is a statewide effort coordinated by the Florida Fish and Wildlife Conservation Commission to educate the public on the problems caused by monofilament fishing line left in the environment. The program encourages recycling through an established network of monofilament fishing line recycling bins and drop-off locations. The program also conducts volunteer monofilament fishing line cleanup and outreach events. Since Florida initiated the program in 1999, several states have implemented their own similar programs.

Derelict Vessel Removal Program

Florida is a popular boating state and leads the nation in the number of registered vessels. In coordination with county and municipal law enforcement agencies, the Florida Fish and Wildlife Conservation Commission (FWC), Division of Law Enforcement oversees the investigative and legal processing of abandoned and derelict vessels (ADV) within public waters of the state. In 2009, the FWC

created a statewide multi-agency online database to track and report the number of ADV cases. Some ADV cases are resolved (closed) through compliance by responsible vessel owners, the remaining vessels are often removed and disposed of by government authorities at taxpayer expense. From 2010-2014, the number of derelict vessel cases opened and resolved annually by the FWC Division of Law Enforcement were on average 244 and 271 cases respectively (Fig. 2).

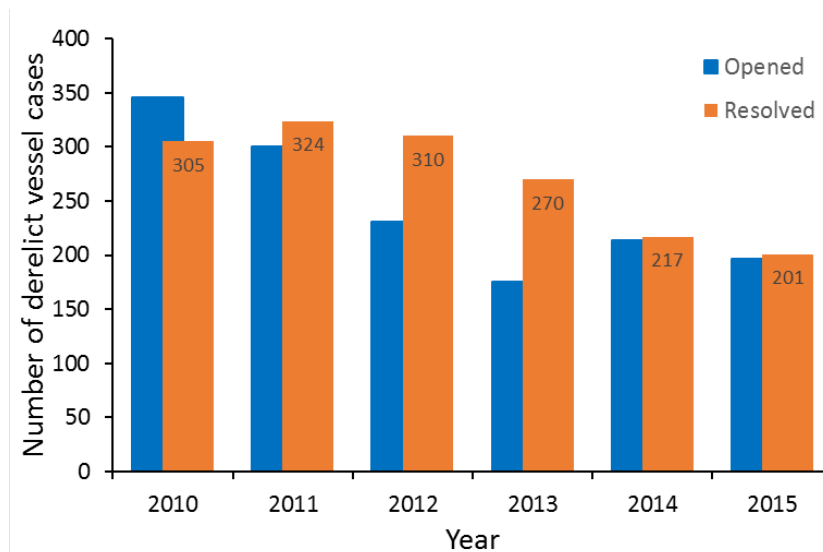


Figure 2 - Number of derelict vessel cases opened and closed by the Florida Fish and Wildlife Conservation Commission, Division of Law Enforcement between the years 2010 and 2015.

Clean Marina and Clean Boater Programs

Florida's Clean Marina and Clean Boater Programs are designed to bring awareness of the environmental measures designed to protect Florida's waterways regarding marine facilities (marinas, boatyards and marine retailers) <http://www.dep.state.fl.us/cleanmarina/about.htm>. The Florida Clean Marina Program is a voluntary designation program with a proactive approach to environmental stewardship and focuses on marine facilities including marina, boatyards and marine retailers. To become designated as a Clean Marina, facilities must implement a set of measures designed to address critical environmental issues such as sensitive habitat, waste management, stormwater control, spill prevention and emergency preparedness. The Florida Clean Boater Program encourages boaters to safeguard the state's waterways by adopting environmentally friendly practices such as proper trash management and recycling.

2.2. The need for collaboration and coordination

In addition to efforts identified previously, a wide range of other individual and collective efforts and activities are continuously underway in Florida to better assess, prevent and cleanup litter and marine debris. These activities are sponsored, organized or led by federal organizations, state agencies, local governments, nongovernmental organizations, researchers, industry, educators, as well as citizen volunteers. These activities include research, education and outreach for litter prevention, and cleanup events.

Local initiatives have an important role in efforts to reduce marine debris in Florida. Voluntary litter and marine debris cleanup events organized by local organizations and citizens play an important role in reducing the amount and impacts of local marine debris. Most importantly, these activities are helping to increase awareness about the need to prevent litter and tackle marine debris before it enters our waterways. However, due to the diversity and complexity of types of marine debris, sources and solutions, and the increasing number of programs and agencies involved in responding to marine debris in Florida, it is essential to support mechanisms and opportunities that enhance collaboration and coordination. A marine debris reduction guidance plan for Florida will serve as a support document, providing stakeholders and partners with a central point of reference for collaborative and coordinated responses, and foster complementary activities towards reducing marine debris and its impacts in Florida.

3. Developing a guidance plan to reduce marine debris in Florida

3.1. Preliminary meetings to gather partners and stakeholders to recommend strategies and actions

Entities working specifically on marine debris and those whose activities indirectly affect or impact the efforts of agencies working on the issue, benefit from working together to find effective solutions for marine debris. With that in mind, the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program hosted a series of three Florida Marine Debris Management Guidance Plan meetings. In May of 2014, thirty-five representatives from state agencies, local governments, various non-governmental organizations, universities, and other NOAA offices attended the meeting to strengthen regional effectiveness by sharing successes and challenges in tackling existing marine debris priorities. Facilitated discussions with state and federal leaders working on marine debris issues brought consensus on five priority marine debris topics for Florida:

1. Consumer Debris
2. Derelict Fishing Gear,
3. Abandoned and Derelict Vessels,
4. Marine Debris Emergency Response,
5. Wildlife and Habitat Impacts.

The participants were split into five working groups according to their expertise to address each of the five priority marine debris topics for Florida. In preparation for the next meeting, leads and co-leads, who have been identified in Appendix A, were selected to help facilitate each working group.

A follow-up meeting held in March of 2015, allowed the working groups to build upon the work accomplished at the first meeting, by listing their goals, strategies, and recommended actions. One of the outcomes of this meeting was the need to hire a coordinator to draft a guidance plan, in which the ideas, strategies and recommended actions of the working groups could be presented in a cohesive and standardized format. After the meeting, the working group leads and co-leads held regular meetings with their teams and with the coordinator to refine strategies and actions and fit them within the framework of the Florida Marine Debris Reduction Guidance Plan (FMDRGP).

During a third meeting in May of 2016, participants reviewed and edited a draft of the FMDRGP, refined and added additional recommended actions, strategies, and selected the top-three priority strategies of their working group. The selection process for the priority strategies included attendees ranking the strategies of their working group based on three variables: the potential impact of the strategy on the reduction goal; the feasibility or the likelihood that the strategy will be successfully implemented; and the timing or opportunity to implement the strategy. Each member of the group was asked to rank all strategies according to those three variables from 1 (low) to 5 (high), as explained in Table 5. The group's average score for each strategy was plotted into a bubble matrix, in which the spread of strategies in the matrix represented the group's opinion as to whether a strategy would have a low or high feasibility, have a low or high impact on the reduction goal, and if now is a good opportunity to implement it. The strategies were also ranked after multiplying the average score of the variables and then sorted from the highest to the lowest value. The matrixes and score tables aimed to assist the working groups in determining the top-three priority strategies to address each specific goal of the FMDRGP.

Table 5 – Variables and ratings used to prioritize the top three strategies of each specific goal.

Variables and description	Rating and explanation
Feasibility – likelihood that the strategy will be successfully implemented	1 – strategy cannot be carried out; most actions cannot at all be implemented 2 – very low probability that the strategy can be implemented 3 – some constraints exist, but >50% probability that the actions of the strategy can be successfully implemented 4 – minimal constraints and high probability that strategy can be implemented 5 – Some actions of the strategy are already being implemented and/or most can be implemented without any constraints
Impact – impact that implementing the strategy has on the reduction goal	1 – implementing the strategy will only have a minor impact on the reduction goal 2 – 3 – implementing the strategy will have some impact on the reduction goal 4 – 5 – implementing the strategy will have a significant impact on the reduction goal
Timing – opportunity to implement the strategy	1 – Now is not a good time to successfully implement the strategy 2 – 3 – Now it is a good time to successfully implement the strategy 4 – 5 – The strategy is somehow already being implemented

3.2. The framework of the Florida Marine Debris Reduction Guidance Plan

The FMDRGP describes specific goals, objectives, strategies and recommended actions with the overarching goal of reducing marine debris. Each specific goal has objectives that suggest how each goal may be accomplished. Objectives in the FMDRGP are high-level concepts that serve as guides to a set of strategies. A cohesive set of strategies are then linked to each objective. Each strategy is a broad concept that describes how success may be achieved and serves as a guide to a set of recommended actions that may accomplish the objectives of each goal if implemented. Finally, actions listed can guide the voluntary support of the FMDRGP's goal to reduce marine debris (Fig. 3).

Conceptual diagrams were developed to illustrate: (1) the major causes or sources of specific marine debris issues; and (2) solutions to prevent and ameliorate the issue. These solutions were translated into the objectives of the framework, which houses the strategies that may contribute to achieve each specific goal.

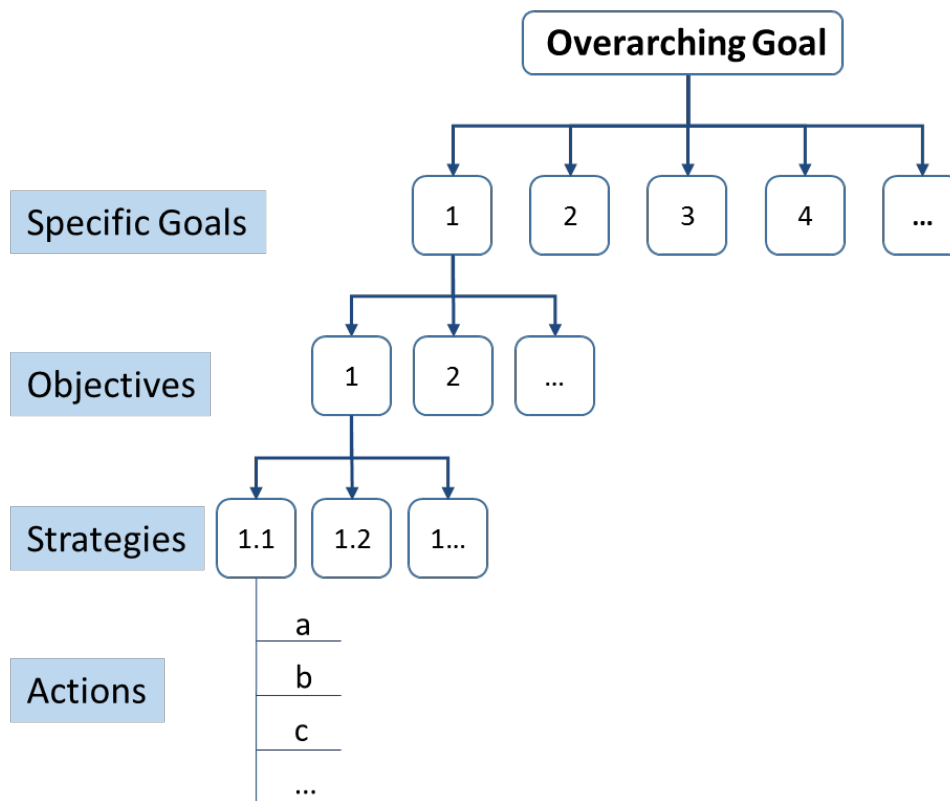


Figure 3 – The framework of the Florida Marine Debris Reduction Guidance Plan.

4. Florida Marine Debris Reduction Guidance Plan

4.1. Purpose of the guidance plan

The complexity of marine debris issue, and the diversity of ways it can be addressed by the various partners (public, non-profit organizations, state, federal and private sector) necessitate a structured approach that emphasizes voluntary actions. The purpose of the Florida Marine Debris Reduction Guidance Plan (FMDRGP) is to offer a framework that provides further guidance and structure for identifying objectives, strategies and recommended actions towards the goal of reducing marine debris in Florida. It is also intended to serve as a guidance document for improved collaboration and coordination among the various stakeholders across Florida, and to avoid duplication and optimize the efficiency and efficacy of their resources. The FMDRGP is designed to be fluid, where objectives, strategies and recommended actions can be refined and updated as tasks are completed or new ones arise.

In summary, the FMDRGP will serve as a:

- Planning tool for developing, discussing and refining strategies and recommended actions across Florida;
- Common frame of reference for collaboration and sharing best practices and lessons learned;
- Guiding and monitoring tool to evaluate the effectiveness of the marine debris reduction efforts over time.

4.2. Overview of the goals

The FMDRGP describes specific goals, objectives, strategies and actions with the overarching goal of reducing marine debris on a statewide basis and thereby reducing its ecological, social and economic impacts. The specific goals were set in accordance with the five priority marine debris topics for Florida, as described and illustrated below (Fig. 4):

1. Reduce the Amount of Consumer Debris
2. Reduce the Amount of Derelict Fishing Gear
3. Reduce the Amount of Abandoned and Derelict Vessels
4. Increase the Capacity to Respond to Emergency Debris
5. Reduce the Impacts on Wildlife and Habitats

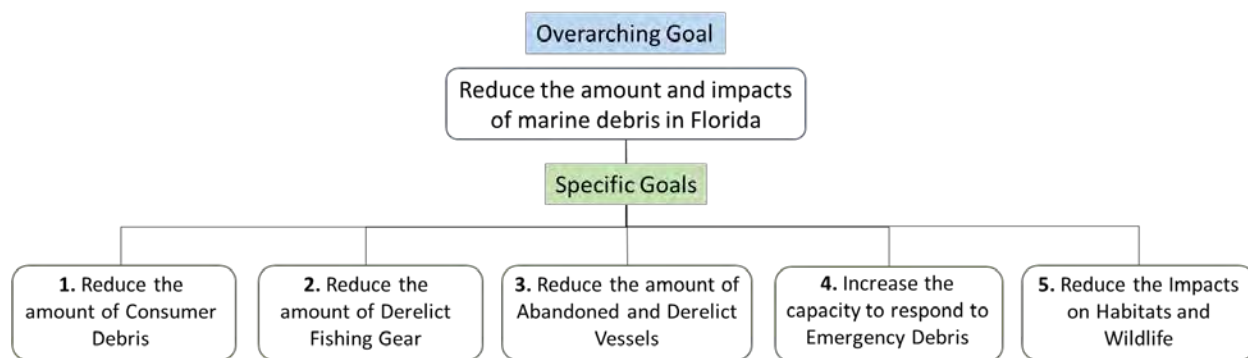


Figure 4 – Overview of the overarching goal and the specific goals of the Florida Marine Debris Reduction Guidance Plan.

Goals 1, 2, and 3 focus on reducing the most common land- and sea-based sources of marine debris in Florida. Goal 4 focuses on increasing the capacity to rapidly coordinate a response to address (remove) emergency debris, i.e., debris that poses an imminent threat to humans or wildlife, and/or any debris

originated from a disaster event. Goal 5 focuses on minimizing the impacts of marine debris on the environment, assessing and researching the interactions of marine debris with wildlife and habitats.

4.3. Goal 1 – Reduce the Amount of Consumer Debris

Understanding human behaviors linked to littering will improve our ability to develop programs that prevent land-based sources of marine debris. It is crucial to look at the root causes and seek to understand the specific behaviors that cause consumer debris to become marine debris. For example, consider the difference between visitors who lose plastic toys on the shoreline; overflowing bins at a waterfront park after an event; bus stops and major transportation arteries that concentrate convenience food packaging; and recreational boaters' refuse actions on water, or at marinas. Each potential source of consumer debris requires a different solution to either change the behavior or manage the debris (Fig. 5).

Addressing the most common causes and sources of consumer debris will require engaging a variety of stakeholder organizations who have the institutional mission and capacity to carry out actions. These organizations range from municipalities to the tourism and hospitality businesses to neighborhood associations and other civic organizations. Four approaches (solutions) to prevent and manage consumer debris in Florida were developed (Fig. 5). These approaches focus on education and outreach to specific audiences and work to include or expand the adoption of behavior-oriented prevention-focused best practices.

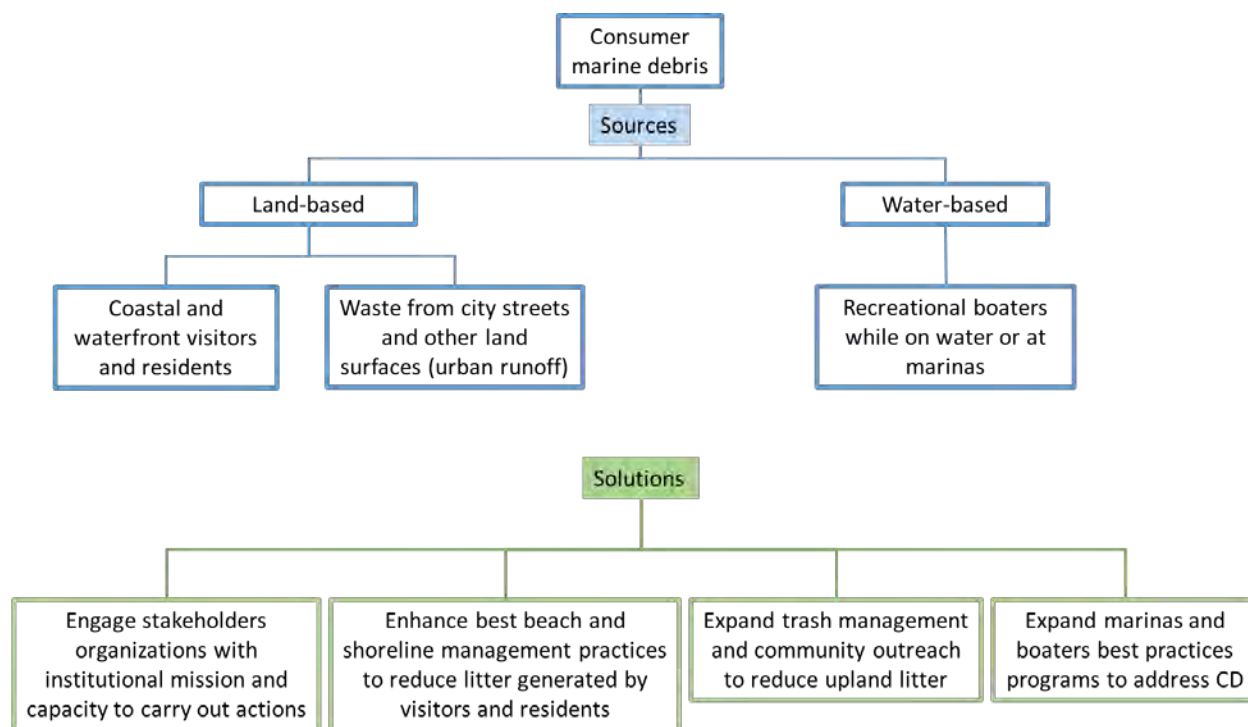


Figure 5 – Conceptual diagrams of the main sources of consumer debris in Florida and suggested solutions to prevent and intercept consumer items before becoming marine debris.

The four solutions illustrated in Figure 5 were converted into four broad objectives that guided the development of seven recommended strategies suggested to prevent, manage (intercept), and remove marine debris originated from consumer debris in Florida (Table 6). The strategies that are bolded in the table below were identified as the top priority strategies for implementation under this goal.

Table 6 – List of objectives, strategies and actions suggested to reduce the amount of consumer debris.

Goal 1 – Reduce the Amount of Consumer Debris (CD)	
Objective 1 – To increase collaboration among key stakeholder organizations	
Strategy 1.1 – Recruit organizations to jointly develop and work on strategies and actions (e.g. sources, impacts, prevention, disposal and messaging)	
a	Develop partnerships with County and City associations to reach Community Relations, Public Works, Stormwater Management Department
b	Develop a partnership with Visit Florida and statewide tourism organizations to develop messaging for visitors, guests and employees
c	Increase/expand collaboration with marine industry organizations (i.e. Marine Industry Association of Florida) and recreational fishing retail businesses
Objective 2 – To enhance beach, waterbodies and shoreline management practices to reduce the amount of litter generated by visitors and residents	

Strategy 2.1 – Compile and disseminate information to municipalities to create awareness of best practices, with emphasis on bin management, special events and resident/visitor education (signage and outreach)	
a	Organize workgroups with expertise in key fields to collect information, review and prioritize needs/opportunities for beaches, rivers, waterfront parks, bridges and piers
b	Collect information (plans, documents, articles, PPTs) on best practices for: bin management, signage and communications
c	Collect information on best practices for event planning/managing to implement “green and clean” outdoor public events (improve disposal, recycling and reduce single-use plastics)
d	Develop online resource site which shares existing resources
e	Develop new documents including tip sheets, PPTs, guidance plans, and check-list for self-assessment
Strategy 2.2 – Collaborate with Hospitality and Tourism organizations to create awareness of best practices and effective visitor/guest communications	
a	Engage tourism industry organizations to define opportunities for collaboration to develop best practices/guidance recommendations and identify workforce training
b	Engage tourism marketing organizations and their agencies to help develop creative marketing/communications campaigns and materials, and signage ideas for businesses to encourage “clean and green” behavior and help consumers recognize that Florida supports sound sustainability practices)
c	Develop a plan and encourage regional foodservice leadership forums to increase awareness/use of sustainability and conservation practices, suppliers and products
Objective 3 – To improve/expand trash management and community outreach to reduce upland litter prone to become marine debris	
Strategy 3.1 – Support knowledge sharing with/between municipalities, volunteer organizations and Keep Florida Beautiful Affiliates	
a	Develop plan to facilitate/encourage statewide collaboration and knowledge-sharing activities which connect civic organizations, municipal organizations and non-profits/environmental orgs
b	Work with Keep Florida Beautiful affiliates and other interested organizations to disseminate prevention-focused outreach training to volunteers and adoption programs
c	Work with municipal stormwater managers to develop list of chronically impacted watersheds in key regions, analyze municipal costs/impacts and upland causes to develop new community outreach programs to improve trash-impacted watersheds
d	Collect examples of effective outreach programs for neighborhood associations and local businesses
e	<p>Leverage insights from Pinellas County Collaborating Clean Communities to conduct “train the trainer” webinars and one workshop for other regions to implement Clean Community Forums in conjunction with key organizations</p> <p>Proposed regions based on existing volunteers:</p> <ul style="list-style-type: none"> • Charlotte Harbor National Estuary Program annual meeting • Keep Florida Beautiful annual meeting 2017 • Miami-Dade County • Palm Beach County
Objective 4 – To update marina and boater best practices programs to address marine debris	
Strategy 4.1 – Conduct education and outreach to target audiences	
a	Disseminate information on CD to boaters through outreach events (e.g. boat shows, fishing tournaments and local events)

b	Disseminate information on CD to marinas through industry contacts such as MIAF (Marine Industry Association of Florida)
c	Conduct workshops and online webinars for marina managers and marina staff on best management practices for CD
Strategy 4.2 – Work with marina managers to recommend boater-generated debris best practices	
a	Develop increased partnerships with marina managers encouraging them to develop CD programs within their own facilities
b	Create a presentation that can be disseminated to marinas, boating clubs, on boater best management practices including CD
c	Expand and support the dissemination of the Clean Boater Program, where boaters sign the Clean Boater Pledge, including bringing trash back to shore
d	Develop increased partnerships with marina managers for distribution of education materials on the state’s behalf
e	Emphasize boater generated marine debris in the Clean Boating Habits booklet
Strategy 4.3 – Coordinate actions to improve disposal and recycling options for waste originated by boaters and marinas	
a	Expand on the Clean Boater Pledge into the marinas so their boaters sign the pledge
b	Work with marinas and boatyards on developing recycling programs
c	Increase recognized boater efforts for bringing their trash back to shore (e.g., stickers, small incentive item, boater debris bag)
d	Encourage marina managers to develop a newsletter or other flyer to recognize their recycling program

Objective 1: Given that many organizations and agencies may have responsibilities for different aspects of implementation, reduction and communications, the supporting strategies of this objective focus on building partnerships with three distinct sectors: municipalities, tourism/hospitality and marinas. The partnerships will lay the foundation to facilitate dialogue, increase knowledge-sharing and collaboration that will support Objectives 2, 3, and 4. This objective is crucial to developing consistent statewide education and outreach activities and approaches that can be locally implemented and meet the needs of local stakeholders and end-customers.

Objective 2: Once partnerships are created, it is crucial to work on laying the foundation for the municipalities to implement “everyday” best practices for beach, waterbodies and shorelines targeting bin management, signage and information. With gorgeous sites and weather, special events are a wonderful part of Florida life and appeal to visitors and residents alike. However, events can be a sporadic large-scale contributor to marine debris, and impact municipal budgets. Thus, one of the strategies will seek new ideas for municipal and private contractors in the pre-event planning phase to reduce burdens on city waste management and reduce trash in the waterways. Strategy 2.2. addresses the benefit of working with tourism-industry organizations to jointly develop creative programs for the private sector that defines practices/opportunities to help keep Florida beautiful. The intent is to

simultaneously create awareness of good practices among visitors and that these actions can protect our water and marine life. These combined strategies will support tourism destination marketing efforts to reach discerning visitors in new international markets.

Objective 3: Decreasing the amount of solid waste entering upland stormwater systems in key areas would reduce aquatic/marine debris. Cities are already implementing community outreach activities to support/comply with the Municipal Stormwater Separate Sewer Systems program requirements per Florida Department of Environmental Protection/ U.S. Environmental Protection Agency. This objective strives to provide support through increased collaboration/knowledge-sharing with volunteer organizations and Keep Florida Beautiful affiliates to assess current community practices, interests, barriers, and identify community-supported action to reduce upland trash at key “entry points”. By using positive, location-specific messages that reflect the social use/context in empowerment oriented outreach activities, it is possible to improve community action.

Objective 4: The “Clean Marina” and “Clean Boater” programs cover important marine debris related topics such as waste management practices for both boaters and marinas and storm preparedness actions. However, there is room to expand these documents to include the consumer debris information suggesting tips for prevention and disposal options. Furthermore, it is also important to coordinate actions to increase incentives and options for boaters to properly dispose of their waste.

4.4. Goal 2 – Reduce the Amount of Derelict Fishing Gear

Derelict fishing gear in Florida is generally abandoned, lost or discarded fishing gear (nets, ropes, traps, fishing line, etc.). Derelict fishing gear can continue to catch or entangle marine organisms indiscriminately for a period of time until it degrades enough to allow escape, a phenomenon known as ghost fishing (Macfadyen et al. 2009). It can also cause damage to benthic habitats such as seagrass beds and corals. Research on derelict fishing gear in Florida is limited, but has been identified as predominantly trap debris and discarded fishing line originating from both recreational and commercial fisheries. A survey of marine debris conducted in the Florida Keys found that derelict fishing gear (lobster traps, trap debris, and hook and line fishing gear) represented approximately 90% of the marine debris encountered by item (Chiappone et al. 2002). Aquaculture can also contribute to marine debris through the loss or abandonment of gear and supplies (e.g. culture bags, cover netting, buoys, worn structural components). For the purpose of this document, marine debris from abandoned or derelict aquaculture gear is considered a type of derelict fishing gear.

Derelict fishing gear is often caused by losses due to acute weather events, accidental cut-offs by boaters, and due to the design and use of the gear. Discarded fishing gear is also a source of derelict fishing gear, partially due to the lack of convenient and low-cost disposal options. Abandoned fishing gear occurs for a myriad of reasons, but may include a lack of awareness of the impacts of abandoning fishing gear (Fig. 6). Fishermen, government officials, non-governmental organizations, and community groups often assist with derelict fishing gear cleanup efforts, but removal is still challenging and costly because most derelict fishing gear is submerged and spread out, making it difficult to detect. While it is important to increase the capacity to report and remove, prevention is the long-term key to reducing the amount of derelict fishing gear in Florida. This can be achieved by developing effective messaging for specific user groups focusing on impacts and prevention of derelict fishing gear, as well as gear disposal and recycling options; by ensuring that best practices are in place to reduce loss of gear; and by improving disposal and recycling options of unwanted gear (Fig. 6).

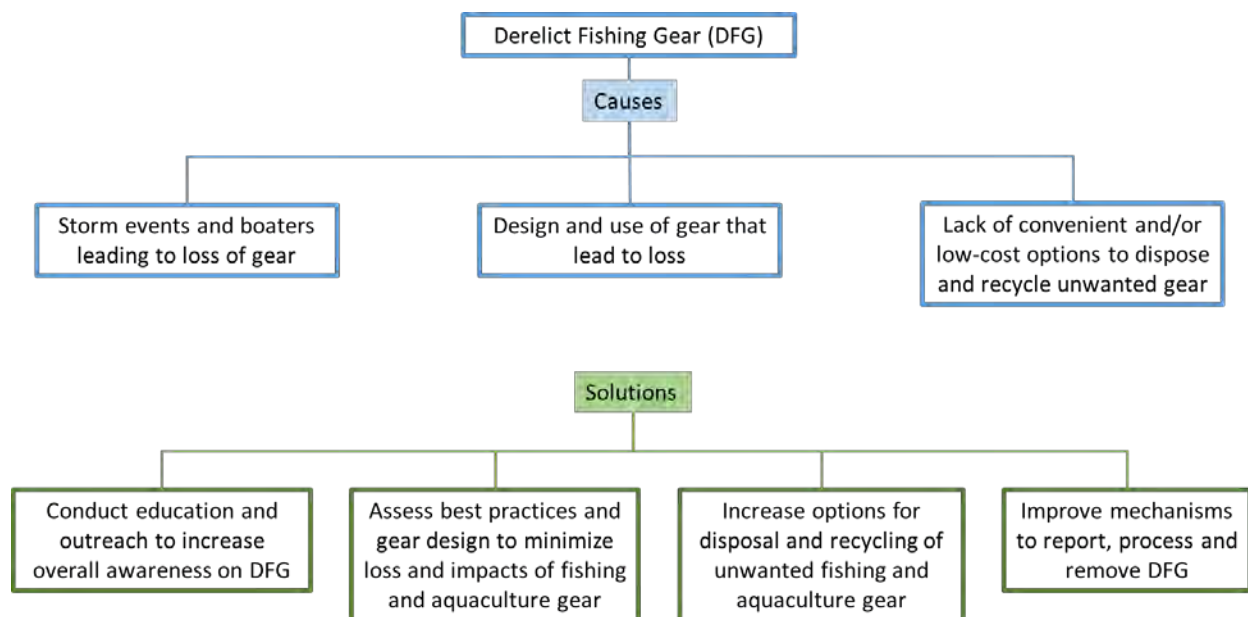


Figure 6 – Conceptual diagrams of the main causes of derelict fishing gear in Florida and suggested preventive and removal solutions.

The four solutions illustrated in Figure 6 were converted into five broad objectives that guided the development of twelve recommended strategies suggested to prevent, manage and remove marine

debris originated from derelict fishing gear in Florida (Table 7). The strategies that are bolded in the table below were identified as the top priority strategies for implementation under this goal.

Table 7 – List of objectives, strategies and actions suggested to reduce the amount of derelict fishing gear.

Goal 2 – Reduce the Amount of Derelict Fishing Gear (DFG)	
Objective 1 – To increase overall awareness on DFG	
Strategy 1.1 – Conduct education and outreach to target audiences on DFG	
a	Develop effective DFG messaging for specific marine user groups (focus on impacts, prevention, disposal, recycling and removal options)
b	Incorporate DFG messaging into education materials (e.g., boater safety course, print media, pamphlets, etc.)
c	Conduct training and outreach (flyers and web served videos) for: <ul style="list-style-type: none"> • Recreational trap deployment (proper line rigging and marking) • Gear recovery/retrieval • Disposal/recycling options
Objective 2 – To reduce loss and impacts of fishing gear	
Strategy 2.1 – Assess fisheries best management practices	
a	Gather input from stakeholders to identify ways to reduce trap loss
b	Measure recreational trapping effort
Strategy 2.2 – Research alternative trap designs to refine selectivity and reduce ghost fishing	
a	Investigate alternative trap/gear designs
b	Assess the effects of using biodegradable panels on trap fishing and catch
Objective 3 – To increase options for disposal and recycling of unwanted fishing gear	
Strategy 3.1 – Coordinate with stakeholders to facilitate access to and increase disposal/recycling options and incentives	
a	Investigate the potential of having a broader presence of Fishing for Energy and similar programs statewide to provide accessible collection points
b	Investigate sources of incentives for fishers to dispose/recycle gear appropriately
c	Develop collaborations with county solid waste to reduce or eliminate tipping fees on DFG
Strategy 3.2 – Expand the monofilament recycling program	
a	Educate fishers on the benefits of using the monofilament recycling bins, and distribute personal monofilament recycling bins
b	Recruit volunteers to gather fixed bin data and to maintain bins
c	Explore alternate recycling options and incentives to increase awareness and use of the program
Objective 4 – To build capacity to report, process and remove DFG	
Strategy 4.1 – Improve methods on reporting and processing DFG data	
a	Use central data portal to focus volunteer reporting efforts (e.g. Marine Debris Tracker App or other similar app or service)
b	Develop a DFG database (inventory) for reported lost gear (identify sources, disposition and hotspots)
c	Establish a process to produce trend report (annually or bi-annually) based on reported data

Strategy 4.2 – Increase public participation in DFG removal by increasing numbers engaged and clarifying authority for removal	
a	Develop training programs to build cadre of trainers and extension agents to run DFG removal efforts
b	Empower and train individuals to become trainers of DFG removal (Sea Grant or similar organizations – use consistent messages where possible)
c	Trainers to organize, train and execute DFG removal with groups
d	Encourage county use of community service hours to conduct DFG cleanups
Strategy 4.3 – Assess costs and funding mechanisms for education, removal and disposal	
a	Use information from data portal to assess costs and funding needs
b	Identify funding sources and mechanisms
Objective 5 – To address marine debris from aquaculture practices	
Strategy 5.1 – Conduct education and outreach to target audiences	
a	Develop effective messaging on aquaculture debris and incorporate it into education materials (e.g. Shellfish Harvester Education, pamphlets)
b	Conduct training and outreach for aquaculture debris prevention/management, handling practices, and disposal/recycling options (e.g. expand the harvester training debris segment)
Strategy 5.2 – Assess aquaculture best management practices	
a	Suggest alternatives to the use of cover netting in aquaculture practices.
b	Brand/label IDs to all aquaculture gear to identify the owners of aquaculture debris
Strategy 5.3 – Coordinate with stakeholders to facilitate access to and increase disposal/recycling options and incentives	
a	Investigate the potential to have dumpsters placed at key locations. Make dumpsters accessible to all waterway users.
b	Investigate potential incentives to dispose of / recycle derelict aquaculture gear
c	Develop collaborations with county solid waste management entities to reduce or eliminate tipping fees on aquaculture debris
Strategy 5.4 – Improve methods on reporting and removing aquaculture debris	
a	Develop a smart phone “App” to report aquaculture debris (identify sources, disposition and hotspots)
b	Encourage county use of community service hours to conduct aquaculture debris cleanups
c	Collaborate with local FFA or 4-H club to engage classes on ongoing pickups of aquaculture debris.

Objective 1: Education and outreach is a cross-cutting strategy intended to increase the overall awareness of derelict fishing gear its impacts, prevention, and disposal or recycling options. Messaging should be developed to target specific stakeholders and user groups.

Objective 2: Reduce gear loss and impacts of derelict fishing gear by assessing fisheries best management practices by coordinating with key stakeholders and user groups to identify ways to reduce or prevent the loss of traps and other fishing gear. Furthermore, the impacts of lost traps may be minimized by investigating alternative gear designs and assessing the effects of using biodegradable materials in fishing gear that is most prone to loss (reduced ghost-fishing time). The use of fewer traps

would likely lead to the loss of fewer traps; therefore, assessment and education regarding the use of the fewest number of traps required to maintain historic landings would be useful.

Objective 3: The recommended strategies in this objective focus on increasing available disposal/recycling points, facilitating their access through incentives to dispose unwanted gear appropriately (e.g., collaborate with solid waste programs to establish reduced tipping fees for derelict fishing gear), and expanding existing statewide monofilament recycling programs.

Objective 4: Build the capacity to report lost gear is intended to aid in reducing costs associated with locating and removing gear, and it also generates useful data and information to identify hot spots, disposition and trends, which can ultimately enhance removal efforts and better evaluate preventive measures. Once hot spots are identified, removal efforts can be optimized by increasing the participation of the public with proper training to engage in the removal of derelict fishing gear.

Objective 5: Education of aquaculture users on the merits of being good stewards of the resource is paramount to prevent debris from aquaculture activities. Furthermore, the current practices can be reviewed and updated to reduce the loss of aquaculture supplies. Once gear becomes damaged or obsolete, farmers should have access to an increased number of options and incentives to dispose and recycle the aquaculture gear and supplies properly. And finally, building the capacity to report and engage more groups in cleanup events will diminish the impacts of aquaculture derelict gear.

4.5. Goal 3 – Reduce the Amount of Abandoned and Derelict Vessels

Abandoned and derelict vessels (ADV) are a major issue in Florida largely due to the vast number (over a million) of commercial and recreational vessels in the state. The ADV can range in size from small recreational vessels to large steel hulled commercial vessels, but the majority of the ADV in Florida are recreational vessels. Vessels can contribute to marine debris as a consequence of damage from strong storms or hurricanes. Additionally, vessels that reach the end of their useful lives, are abandoned or given them to people who do not have the means to maintain the vessel, (Fig. 7). These vessels can become derelict resulting in environmental and navigational hazards. The cost of removal of these vessels, often at taxpayer expense, is usually higher than if the vessels were disposed of properly.

Although owners are responsible to maintain their vessel so that it does not become an ADV, it is often difficult to find or hold the owner responsible. In most cases, owners don't have insurance or the financial means to properly remove and dispose of the ADV, so the burden often falls to the taxpayers. FWC and local authorities remove many derelict vessels from Florida waters, but some remaining

derelict vessels are illegitimately picked up by individuals or lost to the ocean. Through careful outreach strategies, continuous removal by county governments and a collaborative effort of community policing using the state’s “At-Risk” citations and the statewide ADV Database, some success is occurring. However, additional removal funding, enforcement, and financial penalties are some of the usual solutions to reduce the amount of ADV (Fig. 7). On the preventive side, the solutions include increasing awareness of specific audiences linked with ADV; enforce compliance with laws and ensuring owners keep up with maintenance required to keep the vessel operational; prevent owners from abandoning their vessels or to transfer the title of a derelict vessel; and increasing the vessel donation and disposal options for vessel owners (Fig. 7).

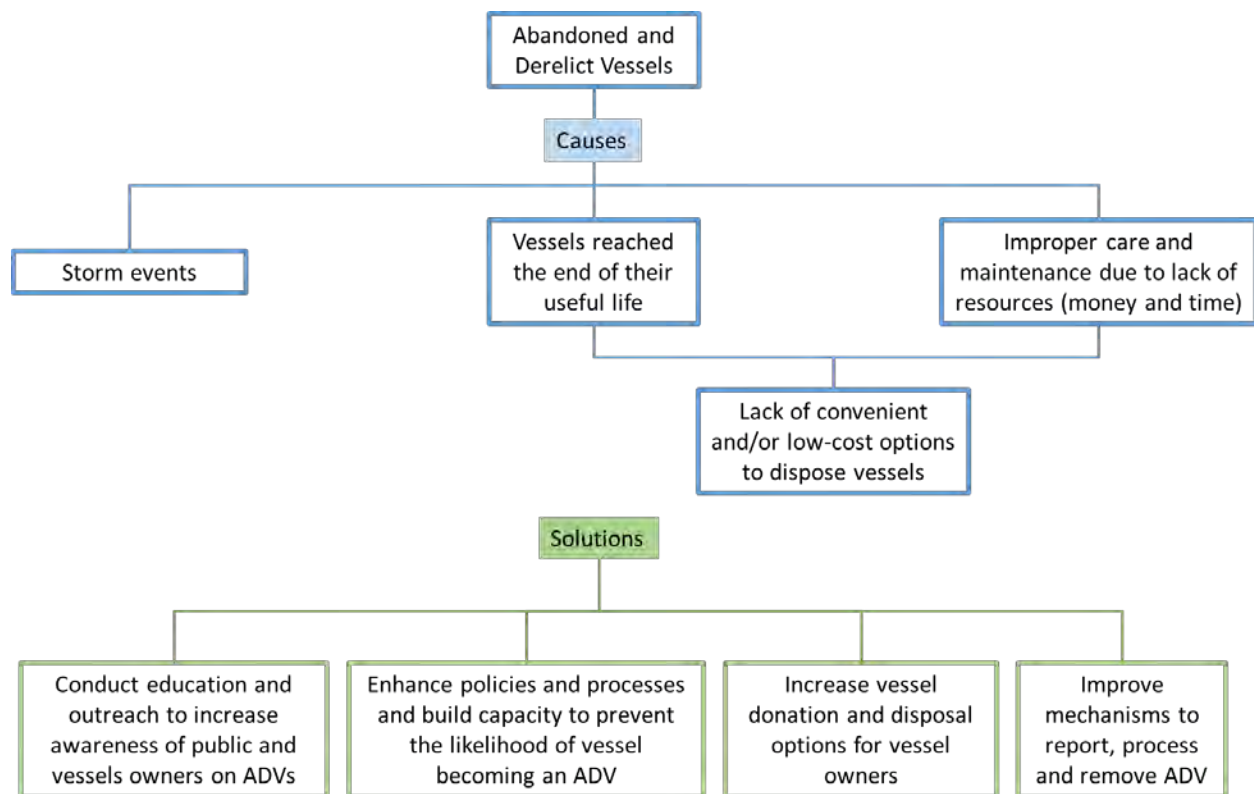


Figure 7 – Conceptual diagrams of the main causes for abandoned and derelict vessels in Florida and suggested preventive and removal solutions.

The four solutions illustrated in Figure 7 were converted into four broad objectives that guided the development of nine recommended strategies suggested to prevent and remove derelict vessels from

state waters (Table 8). The strategies that are bolded in the table below were identified as the top priority strategies for implementation under this goal.

Table 8 – List of objectives, strategies and actions suggested to reduce the amount of abandoned and derelict vessels.

Goal 3 – Reduce the Amount of Abandoned and Derelict Vessels (ADV)	
Objective 1 – To conduct education and outreach to increase overall awareness on ADVs	
Strategy 1.1 – Educate target audiences on ADVs (e.g. impacts, prevention, reporting, disposal options and legal consequences)	
a	Write press releases (e.g. highlighting ADV case consequences, etc.)
b	Create video(s) about ADV topics (e.g. impacts)
c	Incorporate ADV message into existing education materials (e.g. print media, pamphlets)
d	Offer Counties the opportunity to create and distribute information about vessel disposal options to vessel owners cited for having a vessel at risk of becoming abandoned or derelict. FWC must approve.
e	Produce PSA to inform target audiences on ADV prevention (e.g. proper title transfers)
f	Create social media platforms to inform target audiences on ADVs
g	Research and develop ADV messaging through DHSMV (e.g. registration renewals and title documents)
h	Develop CLE/CEU course to educate legal professionals about ADVs
Objective 2 – To prevent likelihood of vessel becoming an ADV	
Strategy 2.1 – Explore policies and processes to reduce the occurrence of ADVs	
a	Encourage long-term solutions for floating structures at the local government level
b	Evaluate counties use of title transfer restrictions to prevent derelict vessel abandonment
c	Provide assistance to local governments and stakeholders who want to enhance ADV policies
Strategy 2.2 – Coordinate actions with Florida DHSMV to improve title and regulatory processes	
a	Work with DHSMV to improve guidelines and title documents related to vessel registration
b	Coordinate with DHSMV employees on proper title transfers
c	Work with DHSMV to give vessel owners information about mailing in titles
Strategy 2.3 – Build capacity to enforce compliance with ADV laws	
a	Increase number of ADV-educated law enforcement officers
b	Promote and increase utilization of “vessels at risk of becoming derelict” regulations
Objective 3 – To increase vessel donation and disposal options for vessel owners	
Strategy 3.1 – Assist vessel owners in easily surrendering their vessel by improving disposal options	
a	Coordinate with landfills on waiving or reducing disposal fees to decrease disposal costs of vessels
b	Implement vessel turn-in pilot program
c	Encourage vessel donations through charitable giving (e.g. NGOs or other reputable outlets)
d	Investigate alternative disposal options (e.g. recycling, reusing) of existing materials (e.g. fiberglass)
e	Coordinate with industry partners to discuss ways of making vessels more valuable at the end of their life cycle (e.g. make recyclable, reusable, biodegradable and/or encourage loyalty/buy-back programs)
f	Assess the costs/benefits of a statewide Vessel Turn In Program to determine efficacy
Objective 4 – To build capacity to report, process and remove ADVs	
Strategy 4.1 – Improve methods on reporting and processing of ADVs	

a	Improve derelict vessel reporting process (e.g. develop more intuitive and user friendly website, with link to reporting hotline, list of regional contacts for the public, search function to look up vessel status by registration number)
b	Create a flow chart of processing ADVs for resource managers including a list of stakeholders and their resources
Strategy 4.2 – Improve Abandoned Derelict Vessel database (inventory) and develop trend reports	
a	Establish a baseline on ADV inventory and impacts (i.e. financial and environmental), per FWC ADV database
b	Produce trend report based on annual data
c	Conduct research to identify counties with ADV issues that are not being addressed and assist them in developing an ADV management program
d	Develop incentives to encourage greater use of the Abandoned Derelict Vessel database by Federal, State, and local agencies (e.g. tie removal funding to derelict vessels identified in database)
Strategy 4.3 – Increase/improve funding mechanisms and strategies to remove ADVs	
a	Seek, apply for and obtain additional grant funding sources
b	Coordinate with counties/municipalities (association of counties and league of cities) on all available funding that can be used for ADV removals
c	Investigate voluntary funding opportunities (e.g. trust fund for ADVs, donation checkbox during vessel registration or fishing license transactions)
d	Coordinate with federal agencies for funding and organizational assistance
e	Develop an after-action report for status of reported derelict vessels.
Strategy 4.4 – Continue / maintain engagement with stakeholders involved with ADVs	
a	Identify stakeholders (e.g. legal, industry, resource managers, law enforcement, marinas) and invite to participate in workshops
b	Ask stakeholders to identify and provide suggestions for regulation changes
c	Conduct additional public meetings and public surveys

Objective 1: Education and outreach is a cross-cutting strategy required to achieve the specific goal of reducing ADVs in Florida’s waterways. Education and outreach activities must be targeted to specific audiences linked with the causes and solutions for ADVs, and include social media platforms, press releases and education materials. Target audiences include: vessel owners on maintaining their vessels in operating condition to avoid legal consequences, proper title transferring, and on options to donate and dispose of vessels properly; legal professionals to enhance prosecutions; Florida Department of Highway Safety and Motor Vehicles staff to improve ADV messaging; and the public to become aware of ADV issues. Education and outreach will contribute to an overall increased awareness of the problem and its impacts, and ultimately on a reduced occurrence of ADVs; an increased number of vessels properly disposed of or donated; and an increased number of reported and removed ADV.

Objective 2: Prevent likelihood of vessels becoming ADVs. Ultimately, this objective should lead to a reduced occurrence of ADVs in Florida’s waters. Florida Statute (2016), “327.4107 vessels at risk of becoming derelict on waters of this state” is now in effect but could be evaluated for effectiveness. Part

of this issue could include evaluation of counties use of title transfer restrictions to prevent vessel abandonment.

Objective 3: Increase awareness and promote vessel donation options. Identify and increase disposal alternatives for unwanted vessels to expand the capacity for vessel owners to properly remove and dispose of abandoned or non-operational vessels. Coordination among agencies and industry partners is needed to increase the number of disposal options. A particular issue to address are the costs to dispose of unwanted vessels. Options to reduce or waive disposal fees or find value in vessels at the end of their life cycle might promote proper disposal. Assessing a statewide “vessel turn in” program may further decrease ADVs.

Objective 4: Improvements are needed to increase the ability to report and process ADVs statewide. Increased reporting of ADVs can be facilitated through education and outreach activities targeted to appropriate audiences. Conducting research on annual removal data and producing trend reports will increase understanding of the problem. With the increased efficiency of reporting and processing, and improved quantity and quality of information on ADVs, it is expected that the quantity of ADVs removed and capabilities to assess the problem will be increased. The removal of ADVs is costly and identification of additional funding sources to remove ADVs or prevent boats from becoming ADVs would be beneficial. By building capacity to report and increasing funding mechanisms to remove ADVs, the effectiveness of ADVs removal operations will be increased.

4.6. Goal 4 – Increase the Capacity to Respond to Emergency Debris

This guidance plan considers emergency debris as 1) any type of debris that due to its nature and location creates an emergency that has potential to cause harm to humans, wildlife and habitats; and 2) any debris resultant from a disaster, such as a severe storm event or a hurricane (Fig. 8). These two types of marine debris threats require preparedness to respond rapidly in order to reduce their potential impacts. Florida has a history of experiencing both large-scale emergency marine debris events due to hurricanes and single incidents that create an emergency due to the imminent risks to humans, wildlife or habitats.

Two groups were formed to address these two types of emergency debris (Fig. 8). One group (Rapid Response Debris) developed a Marine Debris Rapid Response Program (a partnership between DEP and FWC) to respond to marine debris of unknown origins that poses an imminent threat to human health and safety and/or natural resources and is not covered under another existing marine debris program.

The other group (Disaster Debris Program) strives to coordinate a response to debris resulting from a catastrophic event. The Florida Department of Emergency Management (DEM) State Emergency Operations Center operates as the command center for the state and coordinates response tasks and missions.

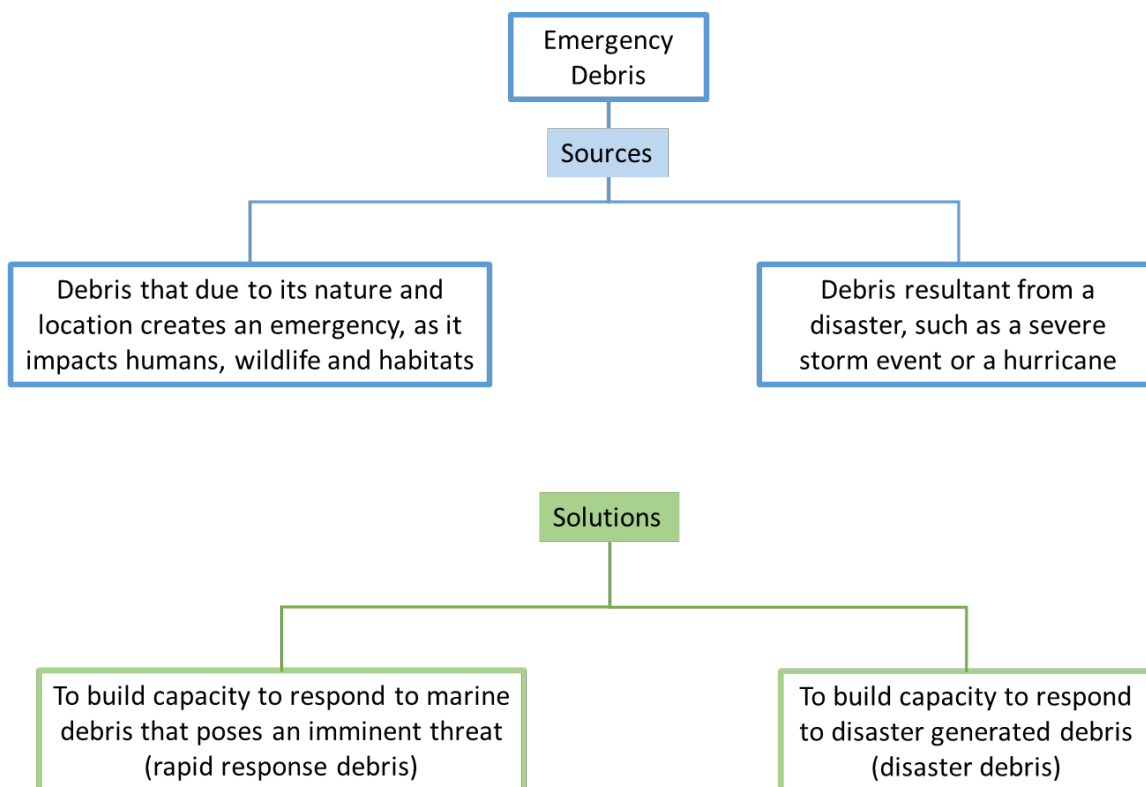


Figure 8 – Conceptual diagrams of the main sources of emergency type of debris and suggested solutions.

The two solutions illustrated in Figure 8 were converted into two broad objectives that guided the development of nine recommended strategies suggested to increase the capacity to respond to emergency debris in Florida (Table 9). The strategies that are bolded in the table below were identified as the top priority strategies for implementation under this goal.

Table 9 – List of objectives, strategies and actions suggested to reduce the amount of emergency debris in Florida.

Goal 4 – Increase the Capacity to Respond to Emergency Debris	
Objective 1 – To build the capacity to rapidly respond to marine debris that poses an imminent threat to humans, wildlife or habitats (rapid response debris)	
Strategy 1.1 – Evaluate the need for a state-wide steering committee for planning	
a	Identify committee members to include regional group leads, non-profits, some local/state/federal governments' representatives, industries, businesses, education institutions, and concerned citizens
b	Determine the need for meetings and communication strategies for the steering committee to coordinate statewide planning
c	Create a protocol for prioritizing rapid response debris removal across the state
Strategy 1.2 – Create regional groups composed of agencies with the authority to remove rapid response debris as well as other pertinent organizations	
a	Identify regional leads and group members
b	Schedule regular meetings for group members to share up-to-date information
c	Establish regional protocol/criteria to determine if reported debris qualifies for removal through this program and subsequently, to activate a response and to remove rapid response debris that qualifies for removal
Strategy 1.3 – Work to establish a stable, long-term source of funding for the rapid response debris program	
a	Assess funding needs for education, removal and disposal, and restoration of incident impacted habitat
b	Identify potential funding sources, either local, region, state or national
c	Identify mechanisms to distribute funds efficiently
Strategy 1.4 – Assess the impacts, restoration and recovery of marine ecosystems due to rapid response debris events	
a	Develop a mechanism to collect and maintain reports of debris and its location
b	Document impacts on marine ecosystems associated with rapid response debris
c	Develop a monitoring approach to assess ecological recovery of impacted sites following removal of debris
d	Establish criteria to restore incident areas, and restore them if deemed appropriate
Strategy 1.5 – Develop effective education and outreach mechanisms to targeted specific audiences linked to rapid response debris	
a	Identify existing marine debris reporting systems and add rapid response debris reporting to them
b	Identify target audiences linked to rapid response debris, and develop effective education materials for them
c	Create mechanisms to share up-to-date information about rapid response debris locations and removal projects with the public
Objective 2 – To build the capacity to respond to disaster debris in marine systems	
Strategy 2.1 – Maintain, exercise and evaluate Florida Incident Waterway Debris Response Guide	
a	Update the contact list annually (prior to June 1 st) by NOAA Marine Debris Program
b	Review every two years and update the guidance document as appropriate

c	Conduct exercises either stand alone or as injects into larger exercises
d	Develop after-action reports and lessons learned from exercises to inform updates to the guidance document
Strategy 2.2 – Coordinate with local, regional, state, and federal emergency planners to review and incorporate the Florida Incident Waterway Debris Response Guide into emergency response plans as applicable	
a	Develop a leadership framework and identify appropriate partners and their roles and responsibilities
b	Coordinate with USCG Sector Contingency Planning and force readiness Departments to review guide as possible annex to area contingency plan
c	Coordinate with state emergency planners to review Florida Incident Waterway Response Guide and provide guidance to local partners as possible annex into emergency response plans
Strategy 2.3 – Assess, document and map disaster debris	
a	Collect and maintain reports of debris and its location
b	Coordinate among partners to document pre-event hotspots and post-event impacts on people, the marine environment, property and economy
c	Use collected information to develop maps and distribute appropriately
Strategy 2.4 – Evaluate and provide guidance on methods to remove disaster debris	
a	Assess existing removal best management practices (BMPs)
b	Coordinate with partners and subject matter experts to evaluate BMPs
c	Modify existing BMPs to include as annexes to the Florida Incident Waterway Response Guide and/or other emergency plans as appropriate

Objective 1: Coordination with various stakeholders including nonprofit organizations, as well as local, state, regional, and federal agencies is the essential first step to build the capacity to rapidly respond to marine debris that is posing an imminent threat to humans, wildlife or habitats. Through regular communication amongst group members of pertinent organizations, protocols can be developed to qualify and prioritize rapid response debris removal efforts. Then it is fundamental to establish stable sources of funding that can be efficiently distributed to quickly respond to rapid response debris. Finally, education and outreach strategies will contribute to an overall increased awareness of rapid response type of debris and its impacts, and will engender citizen stewardship. Establishing reporting hotlines will decrease the time to respond to rapid response debris and consequently minimize its impacts.

Objective 2: An Incident Waterway Debris Response Guide has been developed that strives to improve preparedness for response and recovery operations following an acute waterway debris release incident in Florida. The guide is a living document and will need regular updates to incorporate additional information and any changes as needed. Ultimately, the waterway debris response guide could be incorporated into existing local, regional, and state emergency plans, as a way marine debris generated by emergency events can be considered in their response plans. To quickly respond to disaster debris and minimize its impacts, it is important to assess and improve existing removal best

management practices and, in case of an emergency event, to document and map the location of disaster debris.

4.7. Goal 5 – Reduce the Impact of marine debris on Wildlife and Habitats

The impacts of marine debris on wildlife and habitats generally refers to sea animals ingesting or becoming entangled in marine debris, and physical damage and disruption of habitats by marine debris (Fig. 9). In Florida, there is a persistent problem with fishing line that is lost, discarded, or abandoned in the marine environment and can become an entanglement hazard for wildlife. Hook and line represent approximately 75% of the fishery gear interactions with protected and endangered megafauna species (such as dolphins, manatees and turtles), followed by trap pot gear and fishing nets (Adimey et al., 2014). The number of total reported fishery gear interaction cases with these animals has been increasing over time (Adimey et al., 2014). Observed shorebird and seabird entanglements (hook and line) have also been increasing over time. Often entangled or hooked birds have trailing monofilament line which is carried back to rookery islands, among other areas) and pose risks for nesting colonies. Abandoned or derelict traps and nets also pose the threat of ghost fishing. While ghost fishing is hazardous to marine megafauna such as sharks, whales, and sea turtles, it also poses a serious threat to many recreational fisheries species. Consumer type of debris (such as disposable single use plastics, microplastics, balloons and cigarette butts) are also increasingly found in seabirds and sea turtle's stomachs as they often mimic and are found in the vicinity of their natural food sources. Habitat impacts from marine debris encompass physical damage to the underwater and coastal habitats in Florida (e.g. reefs, beaches and seagrass beds) and habitat quality issues. Physical damage has been observed, largely from abandoned (lost or discarded) and derelict debris (including vessels and fishing gear) as well as storm related debris.

Reducing the amount of marine debris entering and present in Florida waters (addressed by goals 1 to 4) is paramount for a successful reduction of the impacts on wildlife and habitats. The focus of this goal is to minimize the impacts of marine debris on wildlife and habitats by increasing the understanding on their interactions through better data monitoring and assessment, developing protocols (with species/habitat expert review) for removal of debris from sensitive habitats (e.g. rookeries), strengthening response to wildlife entanglements and expanding scientific research. The results will help identify, prioritize, and implement effective strategies to address the problem at the source (Fig. 9).

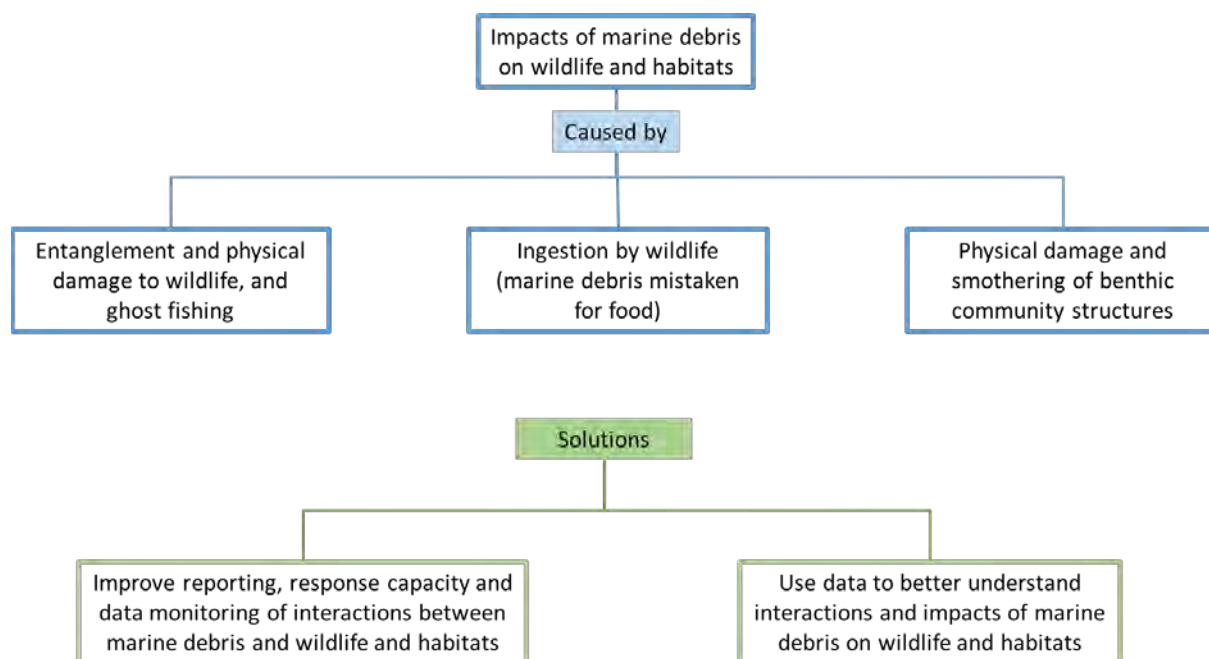


Figure 9 – Conceptual diagrams of the main causes for environmental impacts by marine debris and suggested solutions.

The two solutions illustrated in Figure 9 were converted into two broad objectives that guided the development of seven recommended strategies suggested to reduce the impacts of marine debris on wildlife and habitats in Florida (Table 10). The strategies that are bolded in the table below were identified as the top priority strategies for implementation under this strategy.

Table 10 – List of objectives, strategies and actions suggested to reduce the impacts of marine debris on wildlife and habitats.

Goal 5 – Reduce the Impacts of Marine Debris on Wildlife and Habitats	
Objective 1 – To build the capacity to improve reporting, response and data monitoring of marine debris interactions with wildlife and habitats	
Strategy 1.1 – Streamline/improve the reporting system for wildlife entanglements	
a	Review existing data and protocols that are used for reporting
b	Identify critical data criteria that need to be reported with entanglement incidents
c	Outreach (Use one central, well publicized phone number statewide to report entanglements)
d	Include capability for responders to report occurrences to other agencies (improve collaboration/coordination).
e	Decrease turnaround time for available data
f	Create/update and provide dispatcher with flowchart for response and the key information to gather for protected and non-protected species
Strategy 1.2 – Create a reporting system for significant habitat impacts	

a	Review/assess any existing systems that may be in place (check with state, federal and local agencies, marine patrols, etc.)
b	Identify critical data criteria that need to be reported with habitats incidents
c	Identify ways for citizen scientists to contribute to reporting and monitoring efforts
d	Develop a flowchart for response and the key information to gather
Strategy 1.3 – Establish response protocols for habitat impacts and mitigation	
a	Review existing protocols
b	Identify permitting constraints
c	Identify critical data criteria that need to be included in the protocols
d	Identify habitat specific issues
e	Review existing restoration efforts (e.g. DEP/Coral Reef Conservation Program)
Strategy 1.4 – Establish/expand guidelines and outreach for the reporting public	
a	Review and evaluate existing guidelines
b	Stakeholder engagement for dissemination and effective implementation of the protocols
c	Identify funding options for outreach efforts and products
d	Solicit species and habitat experts to review guidelines
e	Establish a protocol for regular maintenance of the guidelines
f	Review outreach effectiveness
Objective 2 – To better understand interactions and impacts of marine debris on wildlife and habitats	
Strategy 2.1 – Establish baseline information of impacts by species, habitats and debris types	
a	Identify responsible agency to manage the clearinghouse
b	Develop a clearinghouse to collect data on entanglement/ingestion, and habitat incidents <ul style="list-style-type: none"> • Develop partnerships for data sharing • Increase access to data (developing data sharing mechanisms)
c	Develop a consistent formatting for guidelines
d	Identify hotspots for marine debris interactions and accumulations
e	Develop a statewide model and trend analysis to inform managers
f	Identify data gaps and research priorities
Strategy 2.2 – Conduct research on the processes of how wildlife entanglements and ingestion occurs and impacts on species health and wildlife populations	
a	Develop stakeholder surveys <ul style="list-style-type: none"> • angler surveys to gather information on wildlife interactions and gear loss • surveys to report habitat impacts
b	Directed research on wildlife interactions with, and the impacts of, marine debris (e.g. microplastics cycling and uptake by wildlife, hotspots of interactions, health and risk assessment, long term and cumulative effects)
Strategy 2.3 – Develop impact minimization measures or guidelines	
a	Identify stakeholders
b	Establish partnerships
c	Disseminate the information

Objective 1: Facilitate better reporting systems for marine debris related injured wildlife and disrupted habitats as it is crucial to respond to incidents in a timely manner. This will increase access to

data to better understand these interactions, sources and hotspots (Objective 2). Establish effective protocols and guidelines to collect critical data and to respond effectively to the incident once reported.

Objective 2: Develop a clearinghouse to increase access to data to help establish baseline information of impacts by species, habitats and debris types, and to identify data gaps and establish research priority guidelines. This information will help to identify and close some of the gaps in knowledge on the process of how and where entanglements and ingestion occurs, including understanding the prevalence of abandoned or derelict gear types, interactions by animal life stage, and evaluating and identifying “hot spots” for interactions and trends. This data will also allow us to better understand the cause and effects of marine debris related habitat damage as well as the immediate, long term, and cumulative effects and how to best minimize and mitigate these impacts.

5. Priority strategies for implementation

The Florida Marine Debris Reduction Guidance Plan suggests 44 strategies, including 161 recommended actions towards reducing the amount and impacts of marine debris in Florida in support of five specific reduction goals. In this section, the number of suggested strategies was reduced to 16 priority strategies based on their potential impact on the specific reduction goal, their likelihood to be successfully implemented, and the opportunity for implementation (Table 11). These priority strategies were identified by the working groups after discussing the outcomes from the matrixes and ranking tables generated from the breakout activity during the third marine debris reduction meeting (see section 3.1 for details).

Table 11 – Priority strategies identified for each specific goal of the Florida Marine Debris Reduction Guidance Plan.

Goal 1 – Reduce the Amount of Consumer Debris
Strategy 1.1 – Recruit organizations to jointly develop and work on strategies and actions (e.g. sources, impacts, prevention, disposal and messaging)
Strategy 2.1 – Compile and disseminate information to municipalities to create awareness of best practices, with emphasis on bin management, special events and resident/visitor education (signage and outreach)
Strategy 3.1 – Support knowledge sharing with/between municipalities, volunteer organizations and Keep Florida Beautiful Affiliates
Goal 2 – Reduce the Amount of Derelict Fishing Gear (DFG)
Strategy 1.1 – Conduct education and outreach to target audiences on DFG

Strategy 2.2 – Research alternative trap designs to refine selectivity and reduce ghost fishing
Strategy 3.2 – Expand the monofilament recycling program
Strategy 4.2 – Increase public participation in DFG removal by increasing numbers engaged and clarifying authority for removal
Goal 3 – Reduce the Amount of Abandoned and Derelict Vessels (ADVs)
Strategy 1.1 – Educate target audiences on ADVs (e.g. impacts, prevention, reporting, disposal options and legal consequences)
Strategy 4.2 – Improve Abandoned Derelict Vessel database (inventory) and develop trend reports
Strategy 4.4 – Continue / maintain engagement with stakeholders involved with ADVs
Goal 4 – Increase the Capacity to Respond to Emergency Debris
Strategy 1.1 – Evaluate the need for a state-wide steering committee for planning
Strategy 1.2 – Create regional groups composed of agencies with the authority to remove rapid response debris as well as other pertinent organizations
Strategy 2.1 – Maintain, exercise and evaluate Florida Incident Waterway Debris Response Guide
Goal 5 – Reduce the Impact of Marine Debris on Wildlife and Habitats
Strategy 1.1 – Streamline/improve the reporting system for wildlife entanglements
Strategy 1.2 – Create a reporting system for significant habitat impacts
Strategy 2.1 – Establish baseline information of impacts by species, habitats and debris types

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Appendix A. List of participants at the Florida Marine Debris Reduction Guidance Plan meetings, and/or contributors to the Florida Marine Debris Reduction Guidance Plan. Leads and Co-Leads for the working groups are **bolded**.

Last Name:	First name:	Organization:
Adimey	Nicole	NOAA – Marine Mammal Stranding Program
Albins	Kimberly	NOAA – Marine Debris Program
Bailey	Rhonda	FWC – Fish and Wildlife Research Institute
Bassos-Hull	Kim	Chicago Zoological Society/Mote Marine Lab
Beck	Cathy	US Geological Service
Bohnsack	Karen	DEP – Coral Reef Conservation Program
Butler	Casey	FWC - Fish and Wildlife Research Institute
Cannon	Samuel	Florida Division of Emergency Management
Carnahan	Libby	UF/IFAS Extension, Florida Sea Grant
Cucinotta	Katelyn	Sea to Shore Alliance
DePlasco	Patricia	Keep Pinellas Beautiful
Dodson	Tara	St. John's County
Donley	Liz	Charlotte Harbor NEP
Ellinor	Dan	FWC – Marine Fisheries Management
Ennis	Bradley	FWC – Marine Fisheries Management
Faulhaber	Craig	FWC – Division of Habitat and Species Conservation
Frey	Carlos	City of St. Petersburg
Fujisaki	Ikuko	University of Florida
Gandy	Ryan	FWC – Fish and Wildlife Research Institute
Golubovich	Mike	St. John's County
Gohres	Amy	Genwest-NOAA
Grainger	Pamela	DEP – Office of Sustainable Initiatives
Gruver	Pamela	FWC – Marine Fisheries Management
Hammer	Alison	NOAA – Marine Debris Program
Herndon	Andy	NOAA – Fisheries Protected Resources
Hitchins	Celia	Monroe County
Hitchins	Todd	Florida Keys National Marine Sanctuary
Horning	Phil	FWC – Division of Law Enforcement
Howell	Amber	FWC – Fish and Wildlife Research Institute
Kelly	Bill	Florida Keys Commercial Fishermen's Association
Kerrigan	Kristi	DEP – Coral Reef Conservation Program
Kirsch	Kevin	NOAA – Assessment and Restoration Division
Klein	Gary	FWC – Division of Law Enforcement
Knickerbocker	Kal	Florida Department of Agriculture and Consumer Services – Division of Aquaculture
Land	Marshalluna	FWC – Fish and Wildlife Research Institute
Latshaw	Sarah	NOAA – Marine Debris Program
Lawler-Ellington	Stephanie	Keep Pinellas Beautiful
Lazar	Ann	DEP – Coastal Management Program

Leonard	Brenda	DEP – Office of Sustainable Initiatives
Lopez	Fernando	Hillsborough County Marine Safety Unit
Lovewell	Gretchen	Mote Marine Laboratory
Mase	Blair	NOAA – Southeast Regional Stranding Coordinator
Mata	Leonardo	DEP – Coastal Management Program
Matthews	Tom	FWC – Fish and Wildlife Research Institute
McDevitt	Erin	FWC – Division of Habitat and Species Conservation
McGee	Jennifer	FWC – Division of Habitat and Species Conservation
McGuire	Maia	Florida SeaGrant – University of Florida
McHugh	Katie	Chicago Zoological Society / Sarasota Dolphin Research Program
Meehan	Sean	NOAA – Restoration Center Southeast
Miller	Kyle	FWC – Division of Marine Fisheries Management
Monroe	Mathew	Florida Sea Grant
Nolan	Tracy	Debris Free Oceans
Oxenrider	Kevin	FWC – Division of Habitat and Species Conservation
Pitchford	Tom	FWC – Fish and Wildlife Research Institute
Pomerance	Caiti	NOAA – Office for Coastal Management
Powell	Jessica	NOAA – National Marine Fisheries Service
Quinn	Pat	Broward County
Rachal	Mark	Audubon Florida
Renchen	Gabriella	FWC – Fish and Wildlife Research Institute
Reynolds	CJ	International Ocean Institute, College of Marine Science, University of South Florida
Riley	Darrin	FWC – Division of Law Enforcement
Rolfe	Jason	NOAA – Marine Debris Program
Rose	Jacqueline	Gulf of Mexico Regional Coastal Training Program
Ryan	Ronda	Sarasota Bay Watch
Samek	Kelly	DEP – Florida Coastal Office
Sanderson	Devin	ReelCycle, Inc.
Sapp	Portia	Florida Department of Agriculture and Consumer Services – Division of Aquaculture
Schoenwald	Dara	VolunteerCleanup.org (Miami-Dade Coastal Cleanup, Inc.)
Scharer	Rachel	FWC – Fish and Wildlife Research Institute
Schutes	Allison	Ocean Conservancy
Shirah	Ginger	Florida Division of Emergency Management
Smith	Kent	FWC – Division of Habitat and Species Conservation
Stiller	Heidi	NOAA – Office for Coastal Management
Torres	Hannah	University of South Florida
Wallace	Nancy	NOAA – Marine Debris Program
Werndli	Stephen	NOAA – Florida Keys National Marine Sanctuary