



Participant Agenda **May 21-22, 2019** **Florida Marine Debris Reduction Workshop**

Nova Southeastern University Guy Harvey Oceanographic Center
800 North Ocean Drive, Dania Beach, FL 33004

Workshop Goal | To increase coordination between government, industry, and academia by convening stakeholders to update and revise the Florida Marine Debris Reduction Guidance Plan. The workshop will bring together diverse perspectives in the marine debris community to develop recommended strategies and actions to reduce the impacts and amount of marine debris in Florida.

Objectives | During this workshop, participants will:

- Share working group updates, and review updated working group structure
- Assess existing guidance and determine what to update and/or augment for each working group moving forward into a reduction plan
- Set baseline meeting schedules and reporting processes for working groups
- Identify target audiences for each working group
- Identify data gaps and research needs
- Learn about funding opportunities

Work Groups

- Abandoned and Derelict Vessels (ADV)
- Community Action (CA)
- Derelict Fishing Gear (DFG)
- Emergency Response (ER)
- Research and Data: Wildlife and Habitat Impacts and Human Dimensions (RD)



Participant Agenda

Day 1- Tuesday, May 21, 2019 (8:30 AM - 4:30 PM)

- 8:30 AM** **Registration check-in** (Coffee and light refreshments)
- 9:00 AM** **Welcome and Introductions**
- 9:45 AM** **Florida Marine Debris Community: History & Updated Working Group Structure**
- Sarah Latshaw, NOAA Marine Debris Program
- 10:00 AM** **Working Group Updates: Successes and Challenges**
- Abandoned and Derelict Vessels
 - Community Action
 - Derelict Fishing Gear
 - Emergency Response
 - Research and Data: Wildlife and Habitat Impacts and Human Dimensions
- 10:50 AM** **Break**
- 11:00 AM** **Funding Opportunities & Discussion**
- Ann Lazar, Florida Department of Environmental Protection
 - Charles Grisafi, NOAA Marine Debris Program
- 11:30 AM** **Perspectives from the Pacific: California Ocean Litter Prevention Strategy**
- Sherry Lippiatt, California Regional Coordinator, NOAA Marine Debris Program
- 12:00 PM** **Lunch** (Provided by NOVA Southeastern University)
- 1:00 PM** **Charge to the Working Groups, Instructions for Breakout Sessions**
- 1:15 PM** **Working Group Breakouts**
- Assess existing guidance and determine what is complete
 - Review goals and strategies, update as necessary, and identify any new strategies
- 2:15 PM** **Break**
- 2:30 PM** **Working Group Breakouts**
- Begin to identify specific actions (who, what, and when)
- 4:00 PM** **Report Out on Strategies and Goals**
- 4:30 PM** **Adjourn**
- 5:30 PM** **Networking Event:** [LauderAle Brewery and Tap Room](#)



Participant Agenda

Day 2- Wednesday, May 22, 2019 (8:30 AM - 4:30 PM)

8:30 AM	Coffee and light refreshments
9:00 AM	Welcome Back, Overview of Agenda Day 2
9:05 AM	Overview of Environmental Protection Agency (EPA)'s Trash Free Waters Program <ul style="list-style-type: none">Chris Plymale, Environmental Protection Agency
9:35 AM	Stormwater Infrastructure, Maintenance, and Data Collection <ul style="list-style-type: none">Margarita Kruyff, City of Miami Beach
10:05 AM	Break
10:20 AM	Working Group Breakouts <ul style="list-style-type: none">Existing data, data gaps, and resource needs
11:30 AM	Lunch (Provided by Nova Southeastern University)
12:30 PM	Group Discussion: Communication and Organization <ul style="list-style-type: none">Baseline meeting schedulesTracking and reporting processes for working groups
1:00 PM	Working Group Breakouts <ul style="list-style-type: none">Continue to identify and refine specific actionsFunding ideas
2:15 PM	Break
2:30 PM	Working Group Breakouts <ul style="list-style-type: none">Finalize specific actionsPrepare for working group report out
3:30 PM	Final Working Group Report Outs
4:00 PM	Wrap up and next steps
4:30 PM	Workshop Adjourn

Please note the specific times may change due to day-of logistics and considerations.

Florida Marine Debris Reduction Workshop

Abandoned and Derelict Vessel Program Overview



ADV Workshop Team

- **Phil Horning**, Florida Fish and Wildlife Conservation Commission
- **John Ricisak**, Miami-Dade Dept of Environmental Resources Management
- **James Davis**, United States Coast Guard, Finance and Logistics
- **Kirk Kilfoyle**, NOVA Southeastern University Oceanographic Center
- **Sarah Latshaw**, National Oceanic and Atmospheric Administration
- **Jena McNeal**, Palm Beach County, Environmental Analyst

- Our goals are to enhance the existing FMDRGP with potential opportunities to Prevent ADVs from occurring and eliminate existing ADVs from the environment.





11,000 miles of rivers,
streams & waterways





2,276 miles of tidal
shoreline





1,197 Miles of Florida Coastline



Florida Marine Debris Reduction Workshop - Dania Beach - 2019

663 miles of accessible beaches



Florida Marine Debris Reduction Workshop - Dania Beach - 2019



**7,700 Lakes greater
than 10 acres**





Estimated 1.3 million vessels foreign and domestic

Florida Marine Debris Reduction Workshop - Dania Beach - 2019





115 Million visitors 2018

Florida Marine Debris Reduction Workshop - Dania Beach - 2019





Waterfront is Crucial for Economy



Florida Marine Debris Reduction Workshop - Dania Beach - 2019

What is an ADV

s 823.11, F.S.

Abandoned and Derelict Vessels.

(1) “Derelict vessel” means any vessel, as defined in s. 327.02, that is left, stored, or abandoned:

(a) In a wrecked, junked, or substantially dismantled condition upon any public waters of this state.



Derelict Vessel Causes

- Abandonment by owners due to neglect or financial inability
- Intentional abandonment of vessels by their owners or others
- Hurricanes and other natural disasters affecting vessels on the water
- Inability for vessel owners to get rid of their aging and failing vessels
- Improper transfer of vessel titles causing cloudy ownership



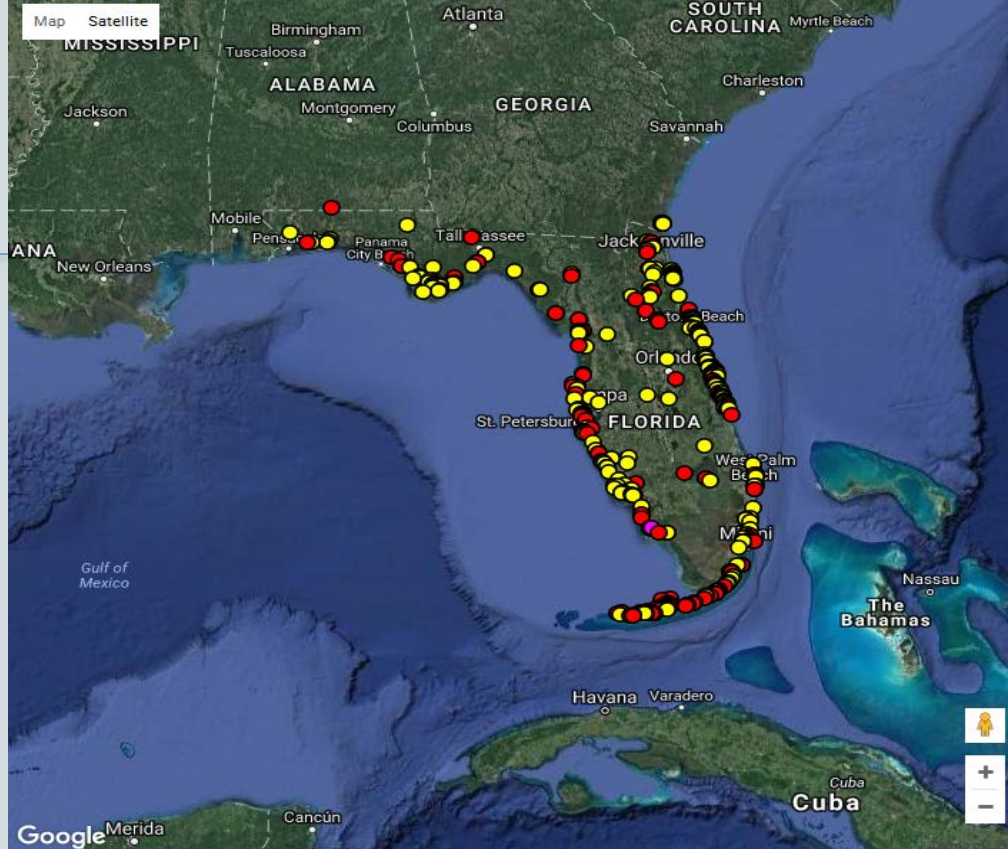
Potential Solutions to ADV Issues

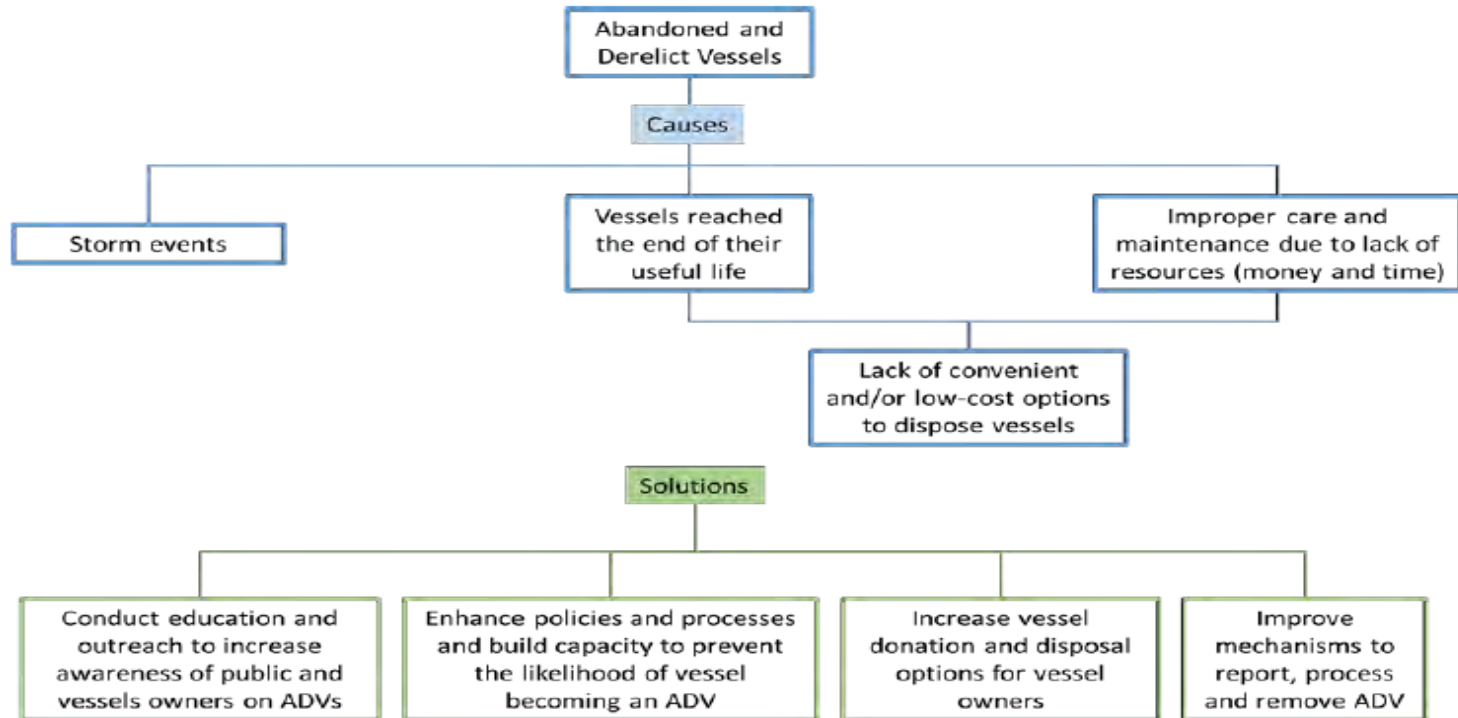
- Outreach opportunities to vessel owner communities
- Legal changes that would enhance states ADV reduction
- Collaborative relationships and partnerships for better management of issues pertaining to ADVs
- Funding mechanisms available to ADV management agencies
- Funding mechanisms available for prevention activities



150 Nav Hazard DV's
270 Non Nav Hazard DV's

420 Total Active Derelict Vessels
Total Estimated Removal Cost
15,120 LF X \$450.00 P/LF
\$6,804,000.00





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 28 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.



Team Goals For This Workshop

1. Review & determine the plan's objectives for completed tasks & present and future validity
2. Discuss legal and operational changes since the last meeting to determine any new objectives to assist in the reduction of ADV's
3. Edit the ADV portion of the Plan to include additions and revisions to the plan
4. Create an action plan to implement and follow through on changes to the plan as written



Community Action Working Group Update

FLORIDA MARINE DEBRIS REDUCTION WORKSHOP

MAY 21-22, 2019



Goal 1 – Reduce the Amount of Consumer Debris

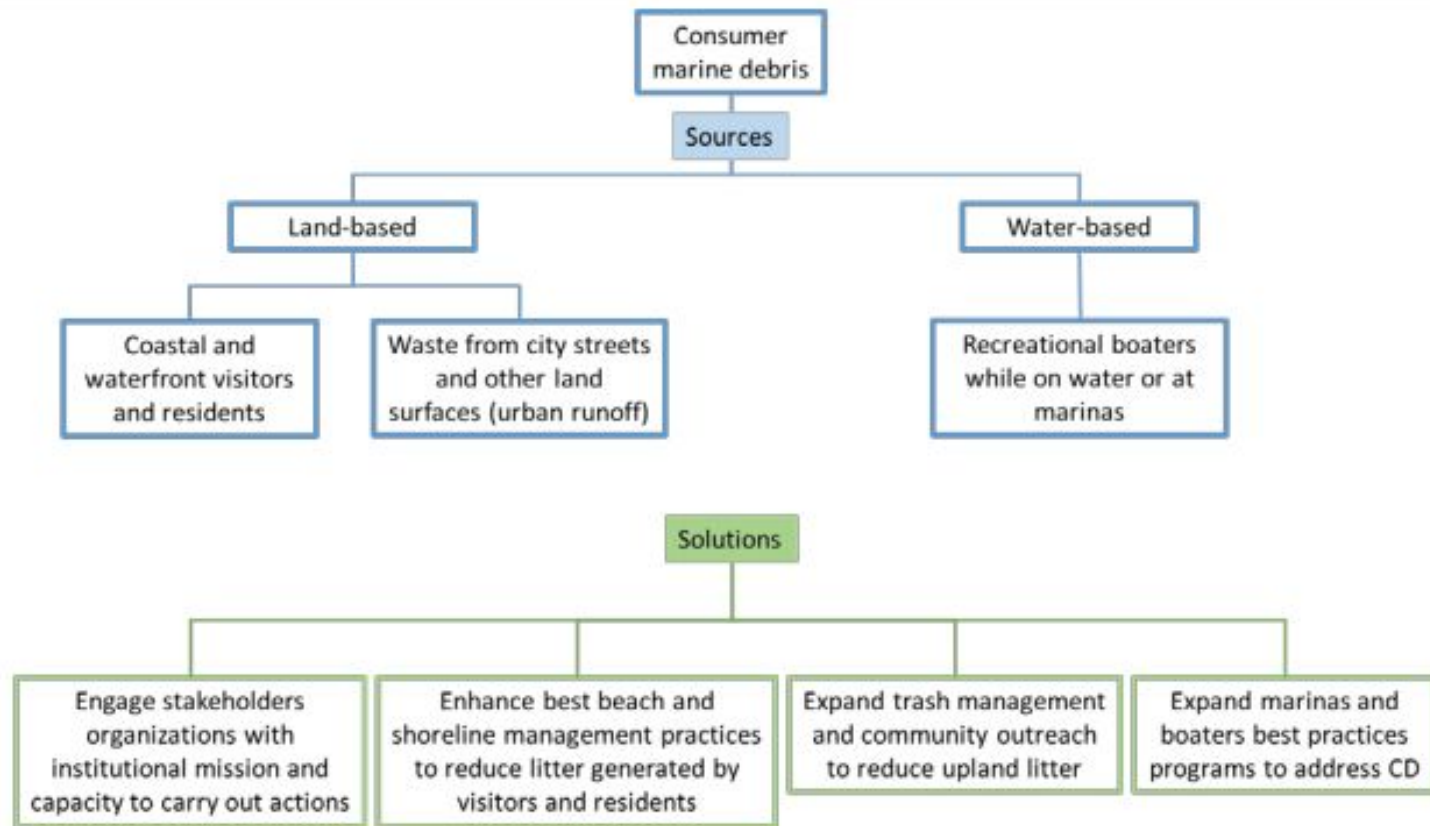
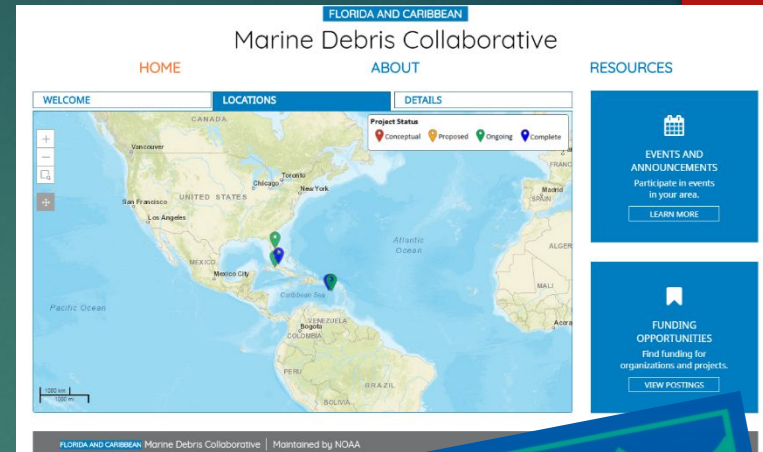


Figure 5 – Conceptual diagrams of the main sources of consumer debris in Florida and suggested solutions to prevent and intercept consumer items before becoming marine debris.

Goal Successes

- NOAA MDP funded Florida Marine Debris Regional Collaboration Portal
- New working group members
- Local bans: success resulting from working group members and citizens engaging local elected officials and decision makers.
- New DEP “Skip the Straw” Campaign
- DEP CCCL Beach Events
 - BMPs guide
- DEP Clean Marina initiatives
 - Clean Marina Action Plan updates
 - Clean Boater Pledge
 - Outreach to marina managers





Florida Department of Environmental Protection

Clean Marina Action Plan Checklist



8. SOLID WASTE:	Yes	No	N/A
Properly manage and dispose of all solid wastes, following state and federal regulations?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide signage and education identifying solid waste disposal practices?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Train marina staff in proper waste management?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide convenient trash disposal and education on marine debris to marina patrons?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide recycling facilities to marina patrons?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coordinate actions to improve disposal and recycling options for waste originated by boaters and marina patrons, such as coastal cleanup?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide recognition to boaters who properly dispose of litter?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Store soiled rags in fire proof, labeled containers and recycled with permitted facility?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensure used batteries are stored with caps closed, on an impervious surface and protected from the weather?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Properly label, store, transport, and / or recycle used batteries according to state regulations?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Florida Prevention Project

The Sea Around Us- Raising awareness and changing behaviors to reduce single-use plastic consumption on a coastal college campus.

Project Partner: Eckerd College



Photo: St. Pete Catalyst



Objectives:

Develop Undergraduate Marine Debris Courses

Campus Plastic Reduction Challenge

College Program Event Series

Audits of College Department Practices

Assess campus marine debris knowledge and attitudes toward prevention

Removal Events – 11 Beach Cleanups



Consumer Debris in Florida



Bird Key – Uninhabited island



MacArthur Causeway / Port of Miami

Canal Systems in Miami

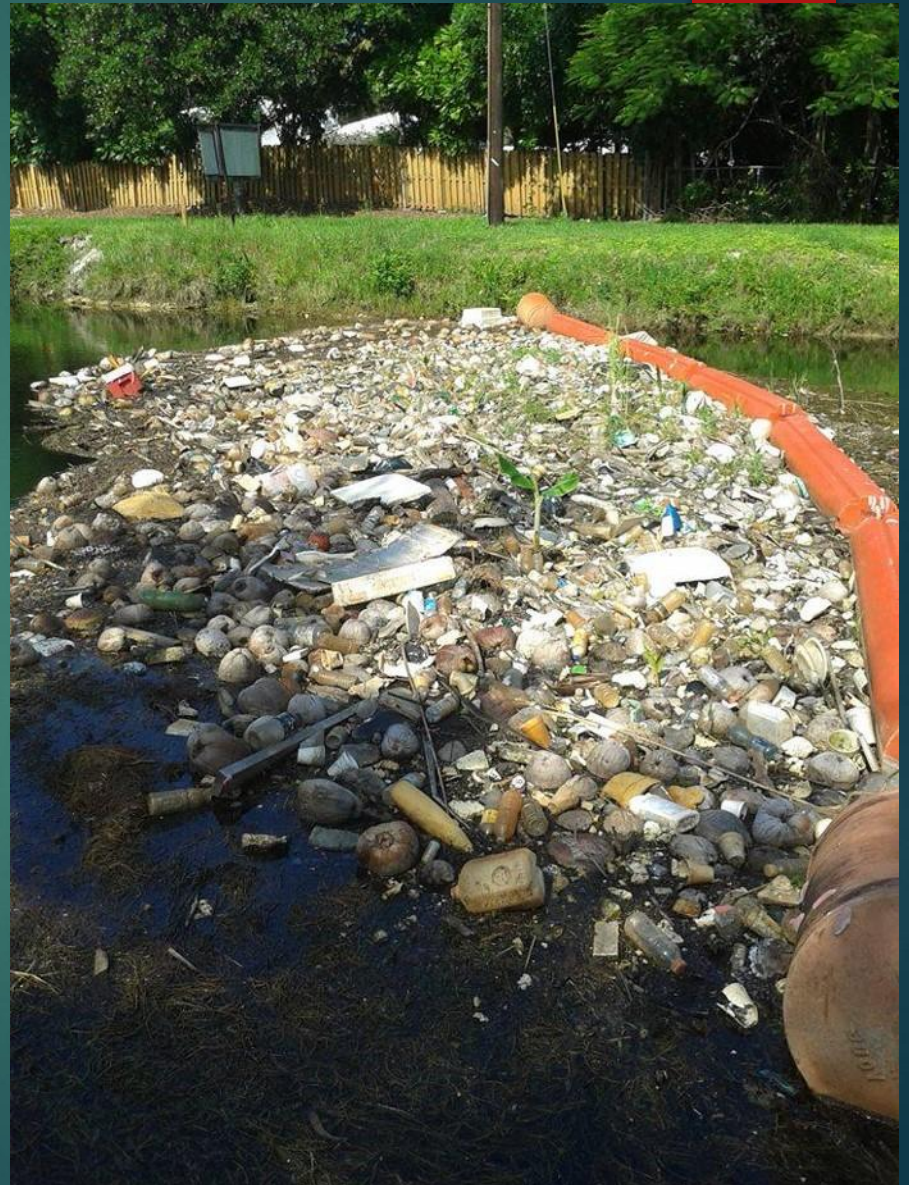


Photo credit: Dave Dobler, Volunteer Cleanup. Org

Next Steps

Goal has been renamed to **Community Action** based on lessons learned, partner feedback, and new focus

New objectives for the Community Action Goal:

I. Stormwater management

- I. Policy
- II. Infrastructure
- III. Maintenance/Data Collection

II. Solid waste management

- I. Recycling
- II. Litter reduction
- III. Local infrastructure/proper disposal

III. Outreach and education to local governments

IV. Partnerships with industry (retailers, restaurants, tourism/hospitality)



Derelict Fishing Gear Working Group Updates

Pamela Gruver

Florida Fish and Wildlife Conservation Commission

Division of Marine Fisheries Management



Objective 1: To increase overall awareness on DFG

Strategy 1.1 (a) : Develop effective DFG messaging for specific marine user groups (focus on impacts, prevention, disposal, recycling and removal options)

Strategy 1.1 (b): Incorporate DFG messaging into education materials (e.g., boater safety course, print media, pamphlets, etc.)

Strategy 1.1 c : Conduct training and outreach (flyers and web served videos) for:

- Recreational trap deployment (proper line rigging and marking)
- Gear recovery/retrieval
- Disposal/recycling options

Ocean Aid 360 - In progress

- Education and outreach activities associated with Ghost Trap Rodeos support all of the strategies of Objective 1, as well as strategy 4.2 (increase public participation in DFG removal)
- Developed in-person training programs, which have reached nearly 300 volunteers; hosted TV and radio shows representing the potential to reach up to 43,000 people; developed an informational ghost trap video
- Effort to increase public participation in DFG removal has led to volunteers donating 1,800 individual hours in cleanups and removing 19,000 pounds of marine debris



Objective 2: To reduce loss and impacts of fishing gear

Strategy 2.1 – Assess fisheries best management practice+A+A6:A11

Strategy 2.1 (a): Gather input from stakeholders to identify ways to reduce trap loss

Strategy 2.1 (b): Measure recreational trapping effort

Strategy 2.2 – Research alternative trap designs to refine selectivity and reduce ghost fishing

Strategy 2.2 (a): Investigate alternative trap/gear designs

Strategy 2.2 (b): Assess the effects of using biodegradable panels on trap fishing and catch

2.1 (b) - Complete

- FWC implemented new recreational stone crab trap and blue crab trap registration requirements to improve estimates of participation and fishing effort and to improve recreational harvest data collection

2.2 (b) - In progress

- FWRI recently completed a study testing the efficacy of adding cull rings of different sizes to stone crab traps to reduce catch of undersized stone crabs and bycatch
- Several commercial fishermen in the Keys have voluntarily added these cull rings to their traps
- FWC tentatively planning to begin rulemaking later this year to start the process of requiring cull rings on stone crab traps



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

Strategy 3.1 (a): Investigate the potential of having a broader presence of Fishing for Energy and similar programs statewide to provide accessible collection points

Strategy 3.1 (b): Investigate sources of incentives for fishers to dispose/recycle gear appropriately

Strategy 3.1 (c): Develop collaborations with county solid waste to reduce or eliminate tipping fees on DFG

3.1(a) – In progress

- In partnership with NFWF, FWC removed 85 tons of material and over 3,000 traps displaced by Hurricane Irma throughout the Florida Keys
- Where possible, gear was recycled through the Fishing for Energy Program, though heavy machinery like excavators were required to break the concrete trap bottoms into small pieces that the power plant could contend with



Objective 4: To build capacity to report, process and remove DFG

Strategy 4.2 – Increase public participation in DFG removal by increasing numbers engaged and clarifying authority for removal

Strategy 4.2 (a): Develop training programs to build cadre of trainers and extension agents to run DFG removal efforts

Strategy 4.2 (b): Empower and train individuals to become trainers of DFG removal (Sea Grant or similar organizations – use consistent messages where possible)

Strategy 4.2 (c): Trainers to organize, train and execute DFG removal with groups

Strategy 4.2 (d): Encourage county use of community service hours to conduct DFG cleanups

Ocean Aid 360 - In progress

- As previously mentioned, Ocean Aid 360's in-person training programs have engaged hundreds of volunteers

Goal: Clean Seas Florida Keys - In progress

- 140 professional divers and 409 recreational divers trained to remove submerged debris from reefs and participated in cleanups
- 814.92 volunteer diver hours; 14,063 pounds removed; 14,000' of trap line removed



Strategy 4.1 – Improve methods on reporting and processing DFG data

Strategy 4.1 (a): Use central data portal to focus volunteer reporting efforts (e.g. Marine Debris Tracker App or other similar app or service)

4.1 (a) - **Complete**

NOAA MDP developed a FL regional collaboration portal to share information



Objective 5: To address marine debris from aquaculture practices

Strategy 5.1 – Conduct education and outreach to target audiences

Strategy 5.1 (a): Develop effective messaging on aquaculture debris and incorporate it into education materials (e.g. Shellfish Harvester Education, pamphlets)

Strategy 5.1 (b): Conduct training and outreach for aquaculture debris prevention/management, handling practices, and disposal/recycling options (e.g. expand the harvester training debris segment)

5.1 (a) - Complete

- FDACS incorporated marine debris training into the mandatory Shellfish Harvester Education annual online training and produced a technical bulletin on shellfish aquaculture gear management and debris reduction techniques

5.1 (b) - In progress

- FDACS/ NOAA hosted targeted education workshops geared towards aquaculture/industry farmers in Sept 2018



Strategy 5.2 – Assess aquaculture best management practices

Strategy 5.2 (a): Suggest alternatives to the use of cover netting in aquaculture practices.

Strategy 5.2 (b): Brand/label IDs to all aquaculture gear to identify the owners of aquaculture debris

5.2 (a) - In progress

- FDACS pursuing funding through NOAA and USDA to develop a biodegradable clam cover net alternative
- Established and promote clam gear net coatings, and other alternatives to plastic cover netting

5.2 (b) - Complete

- All floating gear is required to be marked, but clam cover nets may also be required to be marked in next rule development session



Strategy 5.3 – Coordinate with stakeholders to facilitate access to and increase disposal/recycling options and incentives

Strategy 5.3 (a): Investigate the potential to have dumpsters placed at key locations. Make dumpsters accessible to all waterway users.

Strategy 5.3 (b): Investigate potential incentives to dispose of / recycle derelict aquaculture gear

Strategy 5.3 (c): Develop collaborations with county solid waste management entities to reduce or eliminate tipping fees on aquaculture debris

5.3 (a) - Complete

- Cedar Key Aquaculture Asso. funded several commercial dumpsters placed in strategic locations that have greatly increased disposal opportunities and compliance by clam farmers
- Funding approved for additional dumpsters throughout the state

5.3 (c) - Complete (Levy County)

- Levy County is the main area of concern as other shellfish aquaculture gear is reused and not disposed of very frequently

Strategy 5.4 – Improve methods on reporting and removing aquaculture debris

Strategy 5.4 (a): Develop a smart phone “App” to report aquaculture debris (identify sources, disposition and hotspots)

5.4 (a) - In progress

- Several apps identified and FDACS will promote the adoption of these apps in publication to be sent to the industry



What's useful?

- Strategies related to outreach and education - progress across Objective 1 (increase overall awareness of DFG) as targeted education of specific things like the plastic straw campaign, ghost trap rodeos, etc., seems to be gaining recognition from the general public.



What needs to change?

- DFG from natural disasters should be included as an objective or strategy
- 2.2 (b) (investigate alternative trap/gear designs) becoming more important; specifically, plastic traps and the increased use of plastic components in traps, floats, and trap line



Roadblocks?

- Funding - hurricane response funds, as well as increased awareness and education, could provide support for cleanups



Questions?





Research and Data Work Group

- 2014- 2018, Wildlife and Habitat Impacts Group (WHIG)
- 2018 – Present, Research and Data Work Group (Jennifer)
- 2 Sub-Groups, Wildlife and Habitat Impacts (Kim) & Human Dimensions and Economics (TBD)
- Why the Reorganization?
- Status of HD&E

Status since 2017 (release of the FMDRGP)

- **Objective 1 – To build the capacity to improve reporting, response and data monitoring of marine debris interactions with wildlife and habitats**

April 4, 2019



Photo Credit: Chicago Zoological Society's Sarasota Dolphin Research Program, NOAA Permit 18786-03



Photo Credit: Chicago Zoological Society's Sarasota Dolphin Research Program, NOAA Permit 18786-03

“After collaborating with NOAA Fisheries, a rescue team was assembled to catch the dolphin, remove the gear, look at the animal's overall health, treat it as necessary, and release the dolphin back into its natural habitat. This kind of rescue effort requires a lot of resources; in this case eight boats and 48 people including veterinary staff, biologists, and trained dolphin handlers.”

Reporting Outreach Coordination

Successes

Post Hurricane Removals and Habitat Monitoring

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

Data Turnaround Public Reporting

Challenges/
Areas To
Work On

Non-Hurricane Related Habitat Reporting, Monitoring, and Mitigation

Objective 1 – To build the capacity to improve reporting, response and data monitoring of marine debris interactions with wildlife and habitats

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Status since 2017 (release of the FMDRGP)

- **Objective 2 – To better understand interactions and impacts of marine debris on wildlife and habitats**

Florida Keys, Post-Hurricane Irma



***Rough-toothed
dolphin calf***

Fort Myers

April 23, 2019



***Bottlenose
dolphin sub-
adult***

Fort Myers

May 7, 2019

**Portal
Hot Spots (In
Progress)
Collaborations**

Successes

**BMPs for Special
Events
Increase in Research**

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 |

Statewide Model Trend Analysis

Challenges/
Areas To
Work On

Research Priorities/Data Gaps Collaborations

Objective 2 – To better understand interactions and impacts of marine debris on wildlife and habitats

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- | | |
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Marine Pollution Bulletin 129 (2018) 179–185

Contents lists available at ScienceDirect

Marine Pollution Bulletin

journal homepage: www.elsevier.com/locate/marpolbul



Quantity and types of microplastics in the organic tissues of the eastern oyster *Crassostrea virginica* and Atlantic mud crab *Panopeus herbstii* from a Florida estuary

Heidi R. Waite*, Melinda J. Donnelly, Linda J. Walters

Department of Biology, University of Central Florida, 4000 Central Florida Blvd, Orlando, FL, United States

ARTICLE INFO

Keywords:
Plastic debris
Pollution
Bivalve
Mosquito Lagoon
Indian River Lagoon

ABSTRACT

This study determined the quantity and diversity of microplastics in water and soft tissues of eastern oysters (*Crassostrea virginica*) and Atlantic mud crabs (*Panopeus herbstii*) in Mosquito Lagoon, a shallow, microtidal estuary along the east coast of central Florida. One-liter water samples had an average of 23.1 microplastic pieces (n = 15). Crabs (n = 90) had an average of 4.2 pieces in tissues/individual plus an average of 20.3 pieces/pieces (n = 15). Crabs (n = 90) had an average of 4.2 pieces in tissues/individual plus an average of 20.3 pieces/pieces (n = 15). Individual temporarily entangled in exposed surfaces and released within 5 days in tanks. Adult oysters (n = 90) had an average of 16.5 microplastic pieces/individual. Fibers, mostly royal/dark blue in color, dominated our collections. When compared per gram of tissue, crabs had two orders of magnitude more microplastic pieces than oysters. Our numbers were higher than previous studies on invertebrate microplastics; this is potentially the result of extensive urbanization, limited flushing, and intensive recreational usage of Mosquito Lagoon.

Quantity and Types of Organic Tissue of Oysters and Mosquito Lagoon

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Increasing awareness provides a unique opportunity for the participants' cleanup on the participants' location. This pilot study revealed the public's knowledge on Jetties location. This revealed participants, specifically that cleanup events influence the understanding how cleanups influence the future marine conservation events

study area to a attitude and awareness research surveyed biodiversity, and marine biodiversity, and differences between the participants had a greater understanding of local marine public's understanding of local marine instrumental to local community leaders throughout the community.

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Moving Forward

- *Updating the Plan*
- *New Work Group Members, New Stakeholder and Partner Groups*
- *Reorganization/Evaluation of Existing Objectives and New Objectives*
- *Define Objectives and Strategies for the Human Dimension and Economics Sub-Group*
- *Identify and Prioritize Research Needs/Data Gaps*
- *Increase Collaborations and Expand Partnerships*
- *R&D for ADV, DFG, ER, and CD*