Marine Debris and Abandoned Vessels:

Identification, Reduction and Prevention through Community-based Education and Action

Marine Debris Monitor Training Manual

August 2010

Contents

What is Marine Debris?.....3

Where Does Marine Debris Come From?.....3
Land-Based.....3
Ocean-Based.....3

What are the Impacts of Marine Debris?.....3
Environmental Impacts.....3
Economic Impacts.....3
Human Health and Safety Impacts.....4

Introduction to the Project.....4
Goals.....4
Scope.....4
Project Partners.....4

Marine Debris Monitoring Protocols.....5
Search Areas: Charleston area.....5
Maps and Imagery.....5
GPS Units.....5
Reporting Data.....5
Sample Marine Debris Monitoring Data Sheet.....7

Filling out the Marine Debris Monitoring Data Sheet.....9
Recording Location Data.....9
1. Object Description.....9
2. Habitat and Navigational Impacts.....11
3. Age of Object.....12
4. Is there evidence of:.....12
Example of Completed Data Sheet.....13

How Will This Data be Used?.....15

Safety.....15

For More Information.....15

SCDHEC Agency Jurisdictional Flow Chart 16

SCDHEC Agency Jurisdiction – In water 17

What is Marine Debris?

Marine debris is any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes. (*NOAA Marine Debris Program*)

Where Does Marine Debris Come From?

Land-Based

Improperly managed waste, such as trash deliberately thrown on streets or left on the beach, and trash that overflows from waste receptacles, enters coastal waters through stormwater drains and waterways. Plastic bottles, food wrappers, cigarette butts, beach toys, and clothing are typical examples of land-based marine debris. Land-based marine debris also comes from industrial and manufacturing facilities and construction and demolition sites if production, equipment, trash disposal, and waste streams are improperly managed. Land-based marine debris can also be the result of a lack of waste management options which results in the improper dumping of wastes.

Ocean-Based

Materials that are intentionally or inadvertently lost from vessels and stationary platforms at sea create ocean-based debris. Fishing gear may be lost from commercial and recreational fishing vessels, and items such as beverage containers, food wrappers, etc. are often blown or swept off of vessels. Vessels themselves can become marine debris items when abandoned or sunken. In protected harbors and bays these vessels may persist for years, while in open, exposed coastal environments the debris from disintegrating vessels may be widespread along shorelines and across underwater habitats.

What Are the Impacts of Marine Debris?

Environmental Impacts

Wildlife hazards: It is estimated that some 100,000 marine mammals die every year from entanglement or ingestion of marine debris. An animal may become entangled in a debris object when attracted to it as part of normal behavior or out of curiosity, for example by using a piece of debris as a shelter. Entanglement can cause suffocation, injury, impair movement, and limit or prevent an animal's ability to feed or escape predators. Ingestion of debris can cause starvation or malnutrition if the ingested items block the intestinal tract, preventing digestion, or accumulate in the digestive tract, lessening the animal's desire to feed.

Habitat loss: Lost or discarded fishing nets and gear can drag along the ocean floor, damaging reefs and submerged aquatic vegetation. Oyster reefs, mud flats, and the marsh surface can be damaged by debris through physical action, such as the breaking off of shell or scraping of the surface, and by changes to erosion or sedimentation rates that may be caused by the debris. Debris can also damage marsh habitats by shading vegetation and contamination of sediments.

Economic Impacts

Tourism: Coastal communities can lose millions in revenue from tourism when marine debris makes beaches unattractive or unsafe for visitors. Additionally, cleaning up beaches littered with debris can be very expensive.

Fishing: Marine debris can cause costly or irreparable damage to boats, for example when fishing nets wrap around propellers, plastic sheeting clog cooling water intakes, and lost nets or lines entangle vessels. Ghost fishing by lost gear also kills thousands of fish that might otherwise have been caught for income, and can lead to decreases in local stock.

Human Health and Safety Impacts

Navigation hazards: Marine debris can become a navigation hazard when large objects block navigation channels or submerged objects cause damage to hulls of vessels. Abandoned fishing nets and lines can become wrapped around boat propellers and disable vessels.

Chemical contaminants: Contaminated debris, including medical waste and sewage, can pose a public health hazard through disease transmission. Oils that leak from mechanics can coat the surface of oysters and marshes, smothering organisms. Birds and fish can also be coated with or ingest oils and other chemicals that leak from debris.

Visitor safety: Sharp objects, such as broken glass and rusted metal, can cause injuries when stepped on the beach or ocean floor.

INTRODUCTION TO THE PROJECT

Through a grant from the NOAA Marine Debris Program, a number of SC organizations and agencies have collaborated in an effort to address marine debris issues, prevention and reduction in coastal South Carolina. The main target will be derelict/abandoned vessels with a secondary target on large debris, such as fishing gear.

Goals

I. To identify the extent of derelict/abandoned vessels and fishing gear and assess their impact on NOAA trust resources in coastal South Carolina.

II. Identify and test the barriers and opportunities to reduce and prevent marine debris in coastal South Carolina.

Scope

1. A coast-wide, online volunteer reporting form for abandoned vessels and large debris items will be created and used in conjunction with a limited web-based interactive ArcIMS/ArcGIS Server web site that displays some location, description and photographic representation of documented debris items on SCDHEC web site This would promote and collaborate with the recently developed Charleston area open-source map of the non-profit Charleston WaterKeeper
2. **Community-based volunteers will be recruited and trained as spotting teams to systematically cover three study areas to report and evaluate debris using the rubric developed to assess environmental impacts of marine debris on NOAA trust estuarine areas.**
3. In Year One, a focus group of selected community-based representatives in three parts of the state from commercial/recreational fishing, nature-based tourism, marine industry, and governmental organizations will identify opinions about marine debris issues and challenges and opportunities to address prevention and reduction. In Year Two, a focus group of similar representatives will provide feedback of the outreach efforts and web-based reporting system as an evaluation strategy.
4. A 2-day, fishing gear disposal event will be held in the Charleston area in partnership with the Charleston Waterkeeper at selected marina and boating ramps.

Project Partners

North Inlet-Winyah Bay National Estuarine Research Reserve
South Carolina Sea Grant Consortium
COSEE SouthEast
South Carolina Department of Health and Environmental Control – Ocean & Coastal Resource Management
South Carolina Department of Natural Resources
South Carolina Aquarium
Charleston Waterkeeper

MARINE DEBRIS MONITORING PROTOCOLS

Search Areas: Charleston Area

Maps within the Charleston area have been divided into a grid of .5 km^2 cells. Each cell is named by a letter indicating the cell column on the x-axis and a number indicating the cell row on the y-axis. Volunteer monitor teams will be assigned blocks of grid cells to search, and as cells are completed they will be marked on the web site. When a debris item is spotted, enter the grid number on the data sheet.

Searches should be done near low tide, with the exception of searches done by kayak/canoe in the smaller upper-tidal channels. Open water, oyster reefs, sand bars and the 10 m of marsh edge adjacent to tidal channels should be included in the search.

Maps and Imagery

Volunteers will be provided with an aerial image of areas around Charleston showing the search grid and close-up images of their assigned search areas. It is also recommended that volunteers carry a navigational chart, especially if they are unfamiliar with the tidal creeks and channels of the Charleston search areas.

GPS Units

Hand-held GPS units should be used to record the location of debris objects. The format for the latitude and longitude should be in **decimal degrees** (hddd.dddddo) and the map datum should be **WGS 84**. GPS units may be available to use from the local marine debris monitoring coordinator.

Using the Garmin GPS 72H

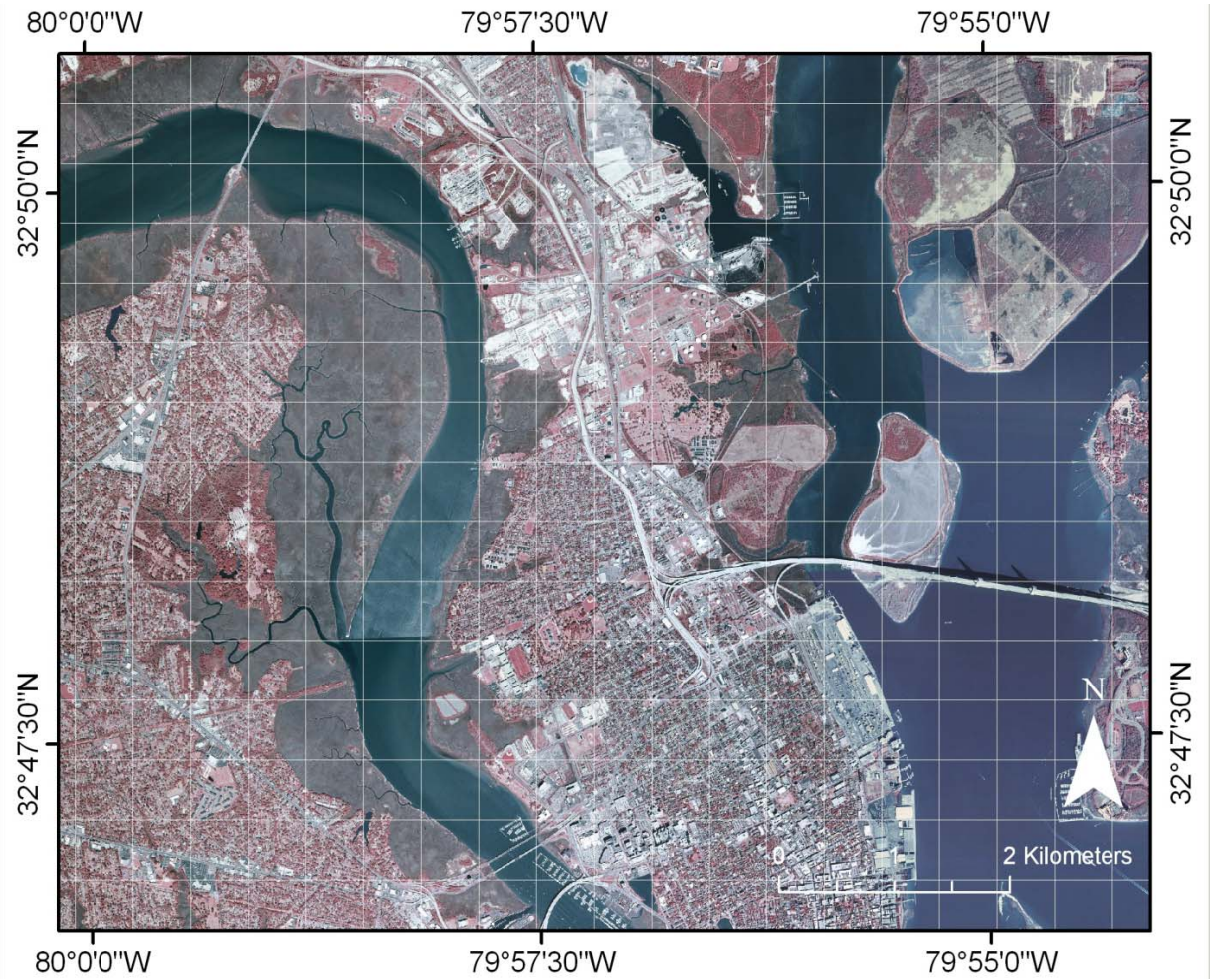
1. Press the RED BULB button to turn the unit on or off.
2. Press the PAGE button to navigate through the main pages.
   - Read the coordinates from the bottom of the *GPS Information Page*.
   - Use the *Compass Page* to determine the direction of the marine debris from the boat.
3. To record a location, press and hold the ENTER (MARK) button until the *Mark Waypoint* page appears.
   - To change the waypoint information, use the center rocker button to scroll to the appropriate field, press ENTER to select the field, then use the rocker button to scroll to the desired letter/number.
   - Press ENTER, scroll to OK, and press enter again to finish and return to the navigation page.
4. To retrieve waypoint information, press the MENU button twice to get to the main menu. Use the rocker button to scroll to *points*, and press ENTER. Scroll to point name and press ENTER twice to see the waypoint information.

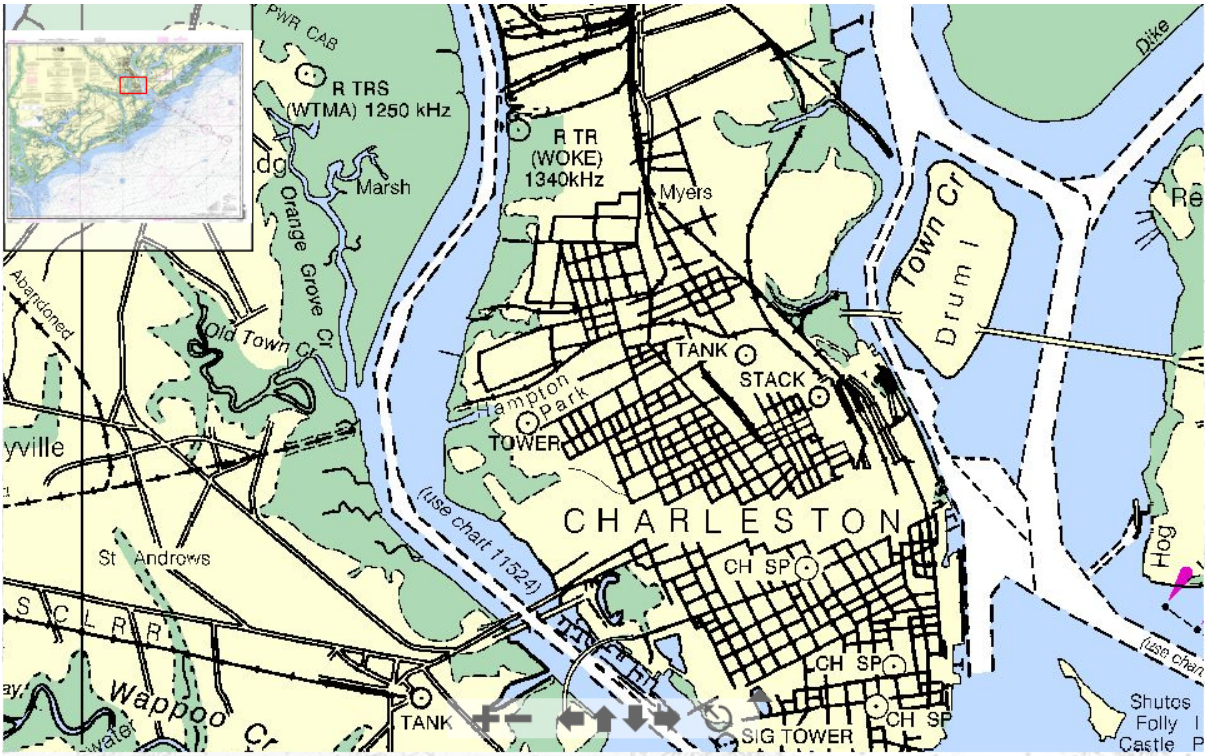
GPS Information Page

Reporting Data

Sheets can be mailed or faxed to:
Elizabeth Vernon Bell,
SC Sea Grant Consortium
287 Meeting Street
Charleston, SC 29401
843.953.2080 (fax)

SAMPLE SEARCH GRID MAP





Sample Marine Debris Monitoring Data Sheet

Front: Information about the observer, location, and conditions is entered in the box at the top of the sheet. Information that describes the type and impacts of the object is entered below. Check one box for questions 1, 2 and 3 and enter as much information as possible. For question 4, check all that apply.

Observer name_____ Location_____ Grid #_____ Sighting #_____
Date _____Time_____ Tide (high, low, rising, falling) _____
Weather Conditions _____ _____
Site: Your GPS Coordinates: Latitude_____Longitude_____
Bay/Creek/Channel name _____
Estimated observer distance and direction from object_____
Did you take a digital image of this item? Yes ____ No ___

1.Object description:

☐ Abandoned vessel: Vessel ID (if present)_____
Estimated vessel length_____

☐ Large debris (larger than refrigerator):
Description_____
Estimated dimensions_____

☐ Fishing net: Material (monofilament, nylon, polypro, etc)_____

☐ Derelict crab trap: Attached floats number_____
Description_____

☐ Other_____

2. Habitat and Navigational Impacts:

☐ In navigation channel (estimated water depth) _____

☐ The object is a navigation hazard

☐ On intertidal oyster reef

☐ There is apparent damage to the reef

☐ On intertidal mud flat

☐ On salt marsh surface: Distance from channel edge_____

☐ There is apparent damage to the marsh surface

3. Age:

☐ Appears to be recent (within past year)

☐ Appears to be more than 1 yr old

☐ New position for previously sighted object

☐ Object location appears to be stable

4. Is there evidence of:

☐ Wildlife entanglement_____

☐ Ghost fishing_____

☐ Gas/Oil/Chemical leak_____

☐ Other:_____

☐ No evidence of impacts

Back: On the back of the form is a summary of the instructions for filling in information.

INSTRUCTIONS

Observer name: Please enter the full name of the team leader.

Location name: **GT** = Georgetown county, **CH** = Charleston county, **CO** = Colleton, **BE** = Beaufort

Grid #: Enter the grid number from the observer chart provided

Sighting #: Enter the sighting number for each grid location (e.g. 2nd sighting in grid # 3)

Weather conditions: Cold, rainy, etc.

Site: Your GPS coordinates: Enter the coordinates of your vessel location as decimal degrees NAVD88

Bay/creek/channel name: Enter name of water body if known

Estimated observer distance from object: Enter the compass direction and distance from you vessel to the object, e.g. 50 m NNW.

Did you take a digital image: Pictures of objects should be uploaded to the url_____

1. Object Description: Please check appropriate description and enter as much information as possible.

2. Habitat and Navigation Impacts: Check the appropriate box for the location of the object.

- The object is a **navigation hazard** if it is located in the main channel and projects above the surface of the water at low tide.
- The object is causing **damage to the reef** if it is directly covering or shading part of the reef, has cause pieces of the reef to break off, or is causing sedimentation of the reef.
- The object is causing • **damage to the marsh surface** if it is directly covering or shading marsh vegetation, has caused erosion of marsh sediment, or is causing sedimentation on the marsh surface.

3. Age: Please estimate if the object has been present for less than or more than one year.
Indications that the object has been present **more than one year** include oyster/barnacle settlement, rust, it is partially buried, or plants growing on or through object.

4. **Is there evidence of:**

Wildlife entanglement: A deceased animal or the remains or evidence of (e.g. feathers) an animal having been trapped by the object

Ghost Fishing: Deceased crabs, fish, terrapins are inside of trap or net

Gas/oil/chemical leak: A sheen or discoloration of the water or mud surrounding the object

Other: Any other significant impact the object may be having on the surrounding habitat, e.g. causing erosion of surrounding surface, shading vegetation, etc.

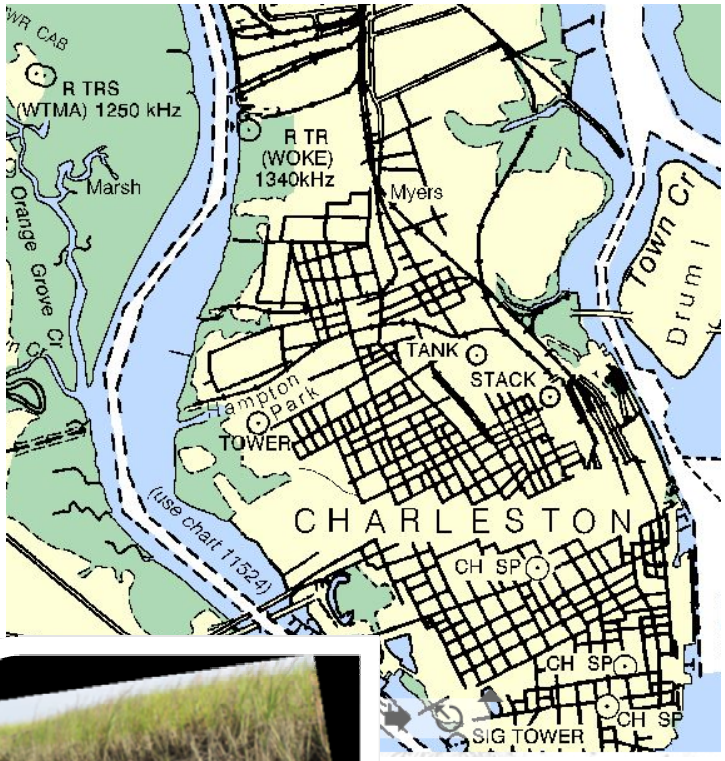
Filling out the Marine Debris Monitoring Data sheet

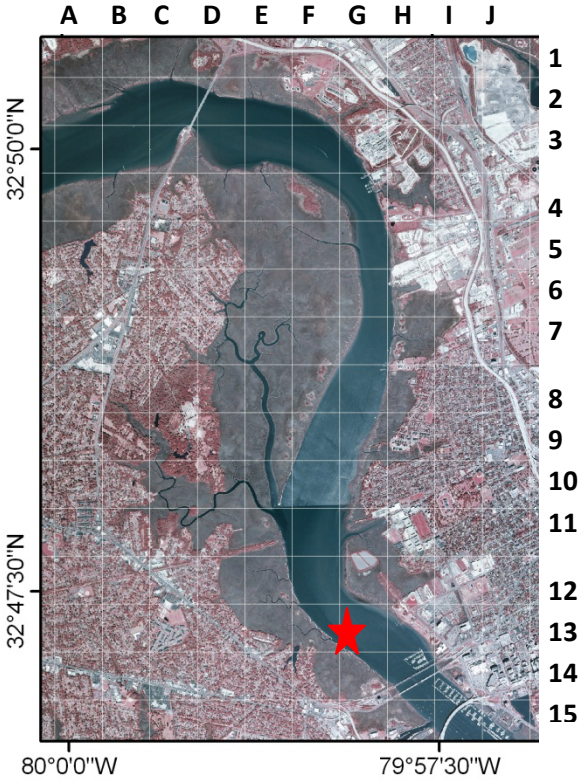
Recording Location Data

The County location of the search area should be recorded using the two letter designation **GT** = Georgetown county, **CH** = Charleston county, **CO** = Colleton, **BE** = Beaufort. The grid number is recorded as well as the sighting number with that grid cell.

The GPS location of the boat should be recorded when a debris object is spotted, as well as the name of the creek or water body (if known) and estimated distance and direction of the debris from the boat. The format for the latitude and longitude should be in **decimal degrees** (hddd.dddddo) and the map datum should be **WGS 84**. Most GPS units have a built in compass that can be used to determine the direction of the object from the boat.

Example





Observer name Jane Doe Location CH Grid # G13 Sighting # 1

Date 1-Sept-2010 Time 1330 Tide (high, low, rising, falling) falling

Weather Conditions _____

Site: Your GPS Coordinates: Latitude 32.35609 Longitude 79.77531

Bay/Creek/Channel name Ashley River

Estimated observer distance and direction from object 10m

Did you take a digital image of this item? Yes √ No ___

1. Object Description

Please check appropriate description and enter as much information as possible.

EXAMPLES OF COMMON MARINE DEBRIS:

Abandoned vessel: Floating, sunken, partially sunken, or stranded boats that have been abandoned and do not show any signs of being actively maintained. Large pieces of vessels that have broken up should also be recorded. Record any identifying information, but do not approach the vessel if it is unsafe or a navigation hazard.

SC DHEC

Cyrus Buffum

SC DHEC-OCRM

Large debris: Large objects that do not appear to be a part of a vessel should be recorded in this category. Examples include appliances, construction materials, tires and dock floats.

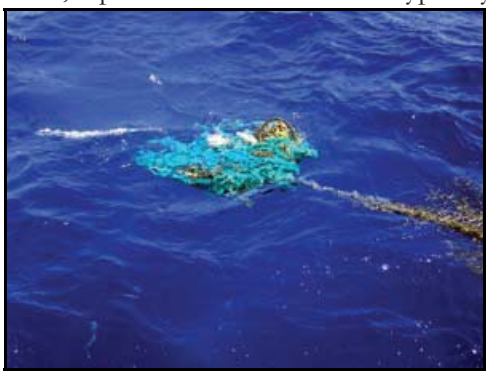
La. Dept. Wildlife and Fisheries

Jennifer Plunket

Jennifer Plunket

Fishing net: Fishing net and line is often seen tangled with other debris. Monofilament line is a single strand, often clear or brightly colored. Cast nets, dip nets and seine nets are typically made from nylon or polypropylene.

NOAA



NOAA

Low Country Angler

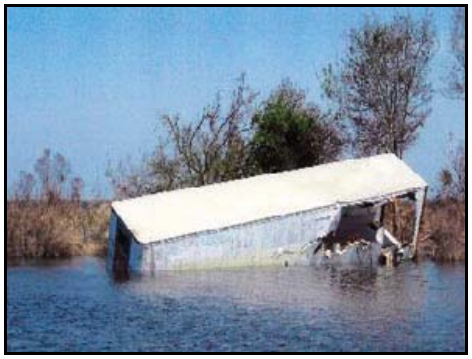
Derelict crab trap: Traps that are completely or partially exposed at low tide, or are stranded on the marsh or oyster reef or a sand bar, are considered to be derelict.

Jennifer Plunket *P. R. Hoar*

Florida- DEP

2. Habitat and Navigational Impacts

Navigation Hazard: An object is considered to be a navigation hazard if it is located in the main channel and projects above the surface of the water at low tide.



Lundie Spence *Coast Guard/FEMA* *James Baughn*

Damage to Oyster Reef: The object is causing damage to the oyster reef if it is directly covering or shading part of the reef, has caused pieces of the reef to break off, or is causing sedimentation of the reef.

Damage to Marsh Surface: The object is causing damage to the marsh surface if it is directly covering or shading the vegetation, has caused erosion of marsh sediment, or is causing sedimentation on the marsh surface.

SC DHEC *US EPA*

3. Age of Object

Object with extensive growth of encrusting organisms (barnacles, oysters), have vegetation growing through them, are rusted, or are partially buried are considered to be more than one year old.

NOAA

4. Is there evidence of:

Wildlife entanglement: A deceased animal or the remains or evidence (e.g. feathers, skeleton) of an animal having been trapped by the object should be reported. Please report marine mammal remains to ?

Ocean Conservancy *Art Zackrison* *Al Segars*

Ghost fishing: Deceased crabs, fish or terrapins are evidence that a trap or net is 'ghost fishing' , or continuing to catch aquatic animals after it is no longer being maintained.

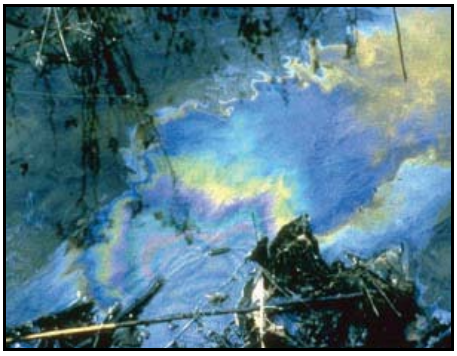
VIMS

VIMS

S. Giordano, NOAA

Gas/oil/chemical leak: A sheen or discoloration of the water or mud surrounding an object is evidence that there is a chemical leak. Rusty or broken containers with chemical symbol stickers may also indicate chemical contamination has occurred.

NOAA



EPA

Ocean Conservancy

Other: Examples of other marine debris impacts could include non-stationary navigation/safety hazards, large areas where small, floatable trash seems to accumulate, and marine navigation/safety structures such as float lines and buoys that have become displaced.

NOAA

Ocean Conservancy

NOAA

Example of Completed Data Sheet

Below is a sample of how the data sheet would be filled out using the example given above of a derelict crab trap found in the Ashley River in Charleston.

Observer name_Jane Doe_____ Location_CH____ Grid #__G13___ Sighting #_1___
Date __1-Sept-2010_____ Time_1330_____ Tide (high, low, rising, falling) __falling_____
Weather Conditions _____ _____
Site: Your GPS Coordinates: Latitude_32.35609_____ Longitude__79.77531_____
Bay/Creek/Channel name _____Ashley River___ _____
Estimated observer distance and direction from object__10m_____ _____
Did you take a digital image of this item? Yes _√___ No ___

1.Object description:

☐ Abandoned vessel: Vessel ID (if present)_____
Estimated vessel length_____

☐ Large debris (larger than refrigerator):
Description_____
Estimated dimensions_____

☐ Fishing net: Material (monofilament, nylon, polypro, etc)_____

X Derelict crab trap: Attached floats number_no float_____
Description_half buried in mud/half crushed_____

☐ Other_____

2. Habitat and Navigational Impacts:

☐ In navigation channel (estimated water depth) _____

☐ The object is a navigation hazard

☐ On intertidal oyster reef

☐ There is apparent damage to the reef

X On intertidal mud flat

☐ On salt marsh surface: Distance from channel edge_____

☐ There is apparent damage to the marsh surface

3. Age:

X Appears to be recent (within past year)

☐ Appears to be more than 1 yr old

☐ New position for previously sighted object

☐ Object location appears to be stable

4. Is there evidence of:

☐ Wildlife entanglement_____

X Ghost fishing_____

☐ Gas/Oil/Chemical leak_____

☐ Other:_____

☐ No evidence of impacts

HOW WILL THIS DATA BE USED?

Data from this survey will be used to determine the extent, location and types of large marine debris in the coastal waters of South Carolina. This information will guide the development of future marine debris removal projects. Analysis of the reported locations of debris will also provide insight into areas where marine debris may accumulate (hot spots) and help to determine possible sources of debris. Marine debris prevention and removal efforts can then be more effectively focused to address specific problem areas. This data will also be used as a baseline to measure the progress of marine debris prevention efforts.

Reported locations, descriptions and photographs of derelict vessels and large marine debris will be shown on a web site hosted by SCDHEC.

Safety

Please do not attempt to remove abandoned vessels, fishing gear or large debris objects. These objects are often more difficult to remove than they appear and attempts to remove them can cause injury to people, vessels and the habitat. The intent of this project is to document the locations of marine debris so that a plan can be developed for the safe removal of these objects. Also, please follow normal safety measures for being on the water, including leaving a float plan with the route you plan to travel and an estimated time of return, and carrying a cell phone, first aid kit, and life vests as required. Project partners are not liable for injuries incurred by volunteers participating in this project.

For More Information

North Inlet Survey Contact: Jen Plunket, jen@belle.baruch.sc.edu, 843.904.9033
Charleston Survey Contact: Elizabeth Vernon Bell, elizabeth.vernon@scseagrant.org, 843.953.2078
Beaufort Survey Contact: Amber Von Harten, ambervh@clemson.edu, 843.255.6060 ext 112

Related Web Sites:

North Inlet-Winyah Bay National Estuarine Research Reserve: **www.northinlet.sc.edu**

NI-WB NERR Marine Debris Monitoring: **www.northinlet.sc.edu/stewardship/marinedebris.html**

SCDHEC OCRM: **www.scdhec.gov/environment/ocrm/**

SCDHEC Marine Debris Initiative: **www.scdhec.gov/environment/ocrm/outreach/marine_debris.htm**

http://www.scdhec.gov/environment/ocrm/vessel_removal.htm

South Carolina Sea Grant Consortium: **www.scseagrant.org/**

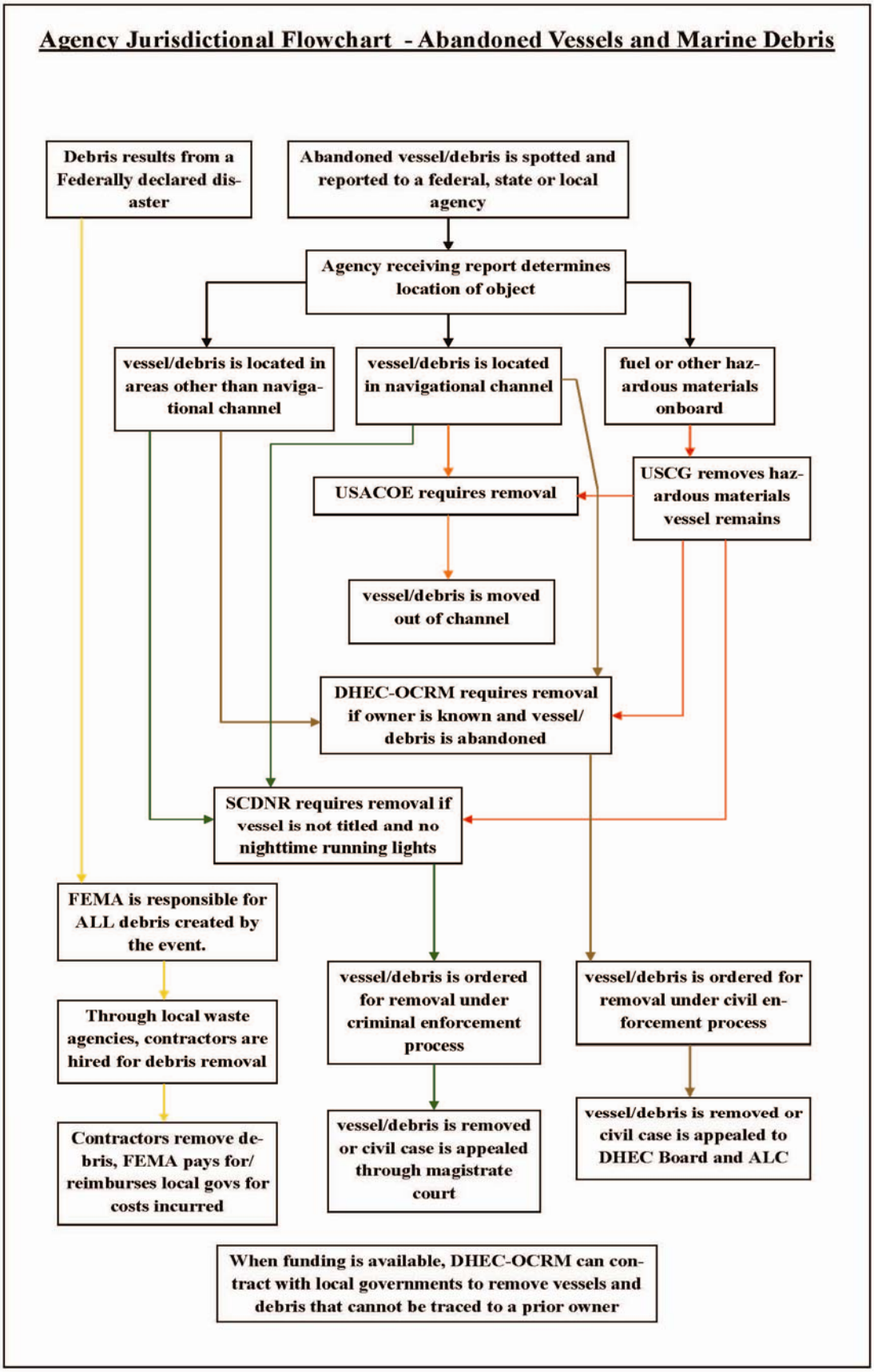
Center for Ocean Sciences Education Excellence: **www.cosee-se.org/**

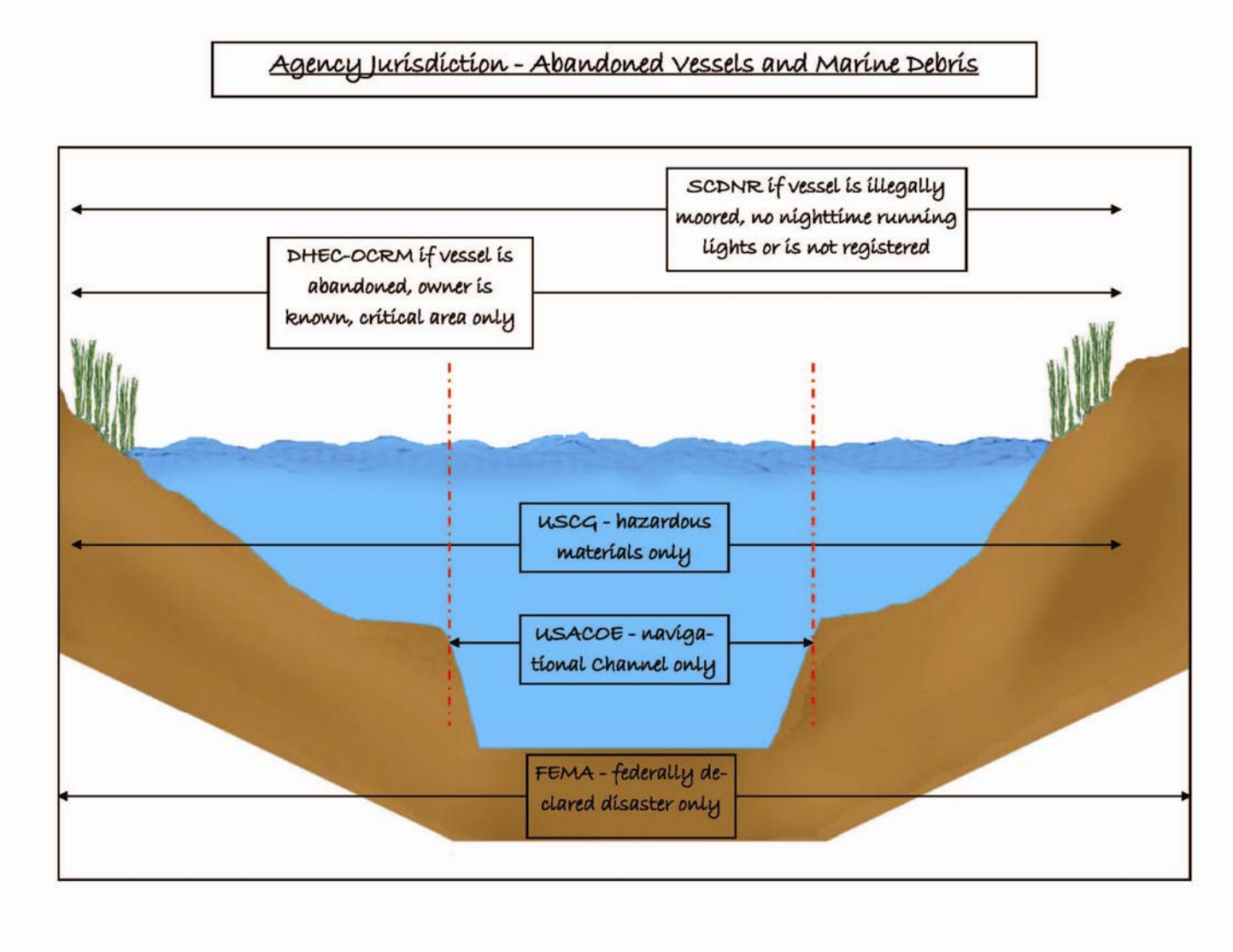
NOAA Marine Debris Program: **http://marinedebris.noaa.gov/**

US EPA Marine Debris Infomation: **www.epa.gov/owow/oceans/debris/index.html**

South Carolina Adopt a Beach: **www.scdhec.gov/environment/ocrm/outreach/clean_beach.htm**

NOAA Clean Marina Initiative: **http://coastalmanagement.noaa.gov/marinas.html**


Agency Jurisdictional Flowchart - Abandoned Vessels and Marine Debris
Debris results from a Federally declared disaster
Abandoned vessel/debris is spotted and reported to a federal, state or local agency
Agency receiving report determines location of object
vessel/debris is located in areas other than navigational channel
vessel/debris is located in navigational channel
fuel or other hazardous materials onboard
USACOE requires removal
USCG removes hazardous materials vessel remains
vessel/debris is moved out of channel
DHEC-OCRM requires removal if owner is known and vessel/ debris is abandoned
SCDNR requires removal if vessel is not titled and no nighttime running lights
FEMA is responsible for ALL debris created by the event.
Through local waste agencies, contractors are hired for debris removal
Contractors remove debris, FEMA pays for/ reimburses local govs for costs incurred
vessel/debris is ordered for removal under criminal enforcement process
vessel/debris is removed or civil case is appealed through magistrate court
vessel/debris is ordered for removal under civil enforcement process
vessel/debris is removed or civil case is appealed to DHEC Board and ALC
When funding is available, DHEC-OCRM can contract with local governments to remove vessels and debris that cannot be traced to a prior owner


Agency Jurisdiction - Abandoned Vessels and Marine Debris
SCDNR if vessel is illegally moored, no nighttime running lights or is not registered
DHEC-OCRM if vessel is abandoned, owner is known, critical area only
USCG - hazardous materials only
USACOE - navigational Channel only
FEMA - federally declared disaster only