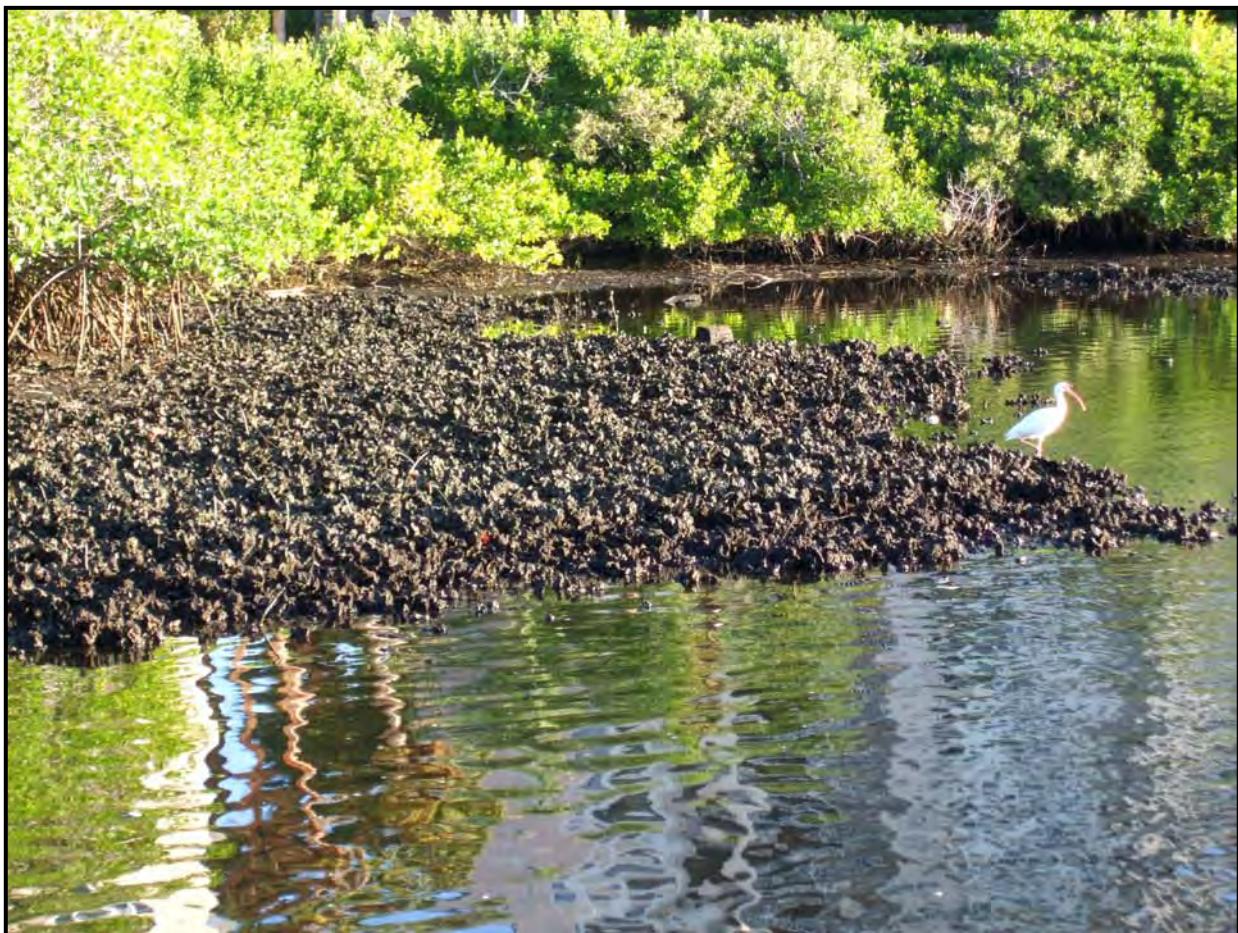


**SARASOTA COUNTY
WATER QUALITY PLANNING**

**METHODS MANUAL FOR FIELD
MAPPING OF OYSTERS**

January 1, 2011

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INTRODUCTION

Oyster reefs are vital structural components of estuarine and bay ecosystems. Not only are they important commercial and recreational resources, they provide essential habitat and cover for numerous aquatic organisms; the larvae, spat, and adult oysters are an important food source for fish, birds, and other aquatic organisms; they play a crucial role in water quality improvement through their capacity to filter 30 to 60 gallons of water per oyster, per day; and, as a result of their sessile nature and adaptation to a wide salinity range, they function as key bioindicators of the relative health of aquatic ecosystems in bays, estuaries, and the tidal extent of coastal creeks. Because of these valuable attributes, it is important to have a current data set of oyster habitat locations throughout the county. These data will serve as a baseline to compare with future trends as watersheds are altered through development or restoration processes. They may also aid in the identification of potential restoration sites.

In recent years, projects have been conducted by the Sarasota Bay Estuary Program, Charlotte Harbor National Estuary Program, Sea Grant, and Sarasota County to develop historical and current maps depicting the location and extent of oyster habitat in county bays. Until now, there has been a limited effort to map oysters in the county coastal creeks. In Phase I of a county-wide oyster mapping effort during late 2008 through early spring 2009, Sarasota County Water Quality Planning staff developed methods and effectively mapped oyster habitat in 17 county coastal creeks: Whitaker Bayou, Hudson Bayou, Phillipi Creek, Matheny Creek, Elligraw Bayou, Clower Creek, Catfish Creek, North Creek, South Creek, Shakett Creek, Curry Creek, Hatchett Creek, Forked Creek, Gottfried Creek, and Ainger Creek. Phase II will entail recruiting volunteers to help map oyster habitat in all county bays.

This manual describes protocols and methods for mapping oyster habitats in county creeks, estuaries, and bays. These methods were based on Florida Wildlife Commission protocols used in Tampa Bay oyster habitat mapping efforts.

OBJECTIVES

The goals and objectives of the mapping project are:

- Develop current, detailed baseline maps of oyster habitat in Sarasota County bays, estuaries, and coastal creeks including even the most seemingly insignificant oyster habitat features (ex. Single clumps).
- Identify upstream extent of oyster habitat in coastal creeks.
- Analyze the data to identify potential habitat restoration sites.

GENERAL CONSIDERATIONS

A two-member team is ideal for the field assessment, since one can operate the vessel and the other can record the various oyster habitats on the maps. They can trade-off duties, if desired.

Team members must be able to operate a vehicle and tow a boat and trailer. They must be proficient in operating a vessel in open and very shallow water and in turning the vessel around in tight spaces such as shallow, narrow canals. The vessel should be a shallow-draft motorboat, such as a Jon Boat, large enough to safely traverse open water and the ICW, with a Bimini top for protection from the sun and inclement weather. The team members should also have a working knowledge of tides, currents, vessel traffic, and local regulations such as Manatee Zones. It would be helpful for team members to complete a safe boating course and possess a Boating Safety Education I.D. Card.

PREPARATION

A. Schedule

Mapping must be scheduled at low tide in order for the oyster habitat to be accurately mapped. Consult tide prediction tables for Sarasota Bay, Venice Inlet, and Lemon Bay for the appropriate creeks. (**Table 1**) Two exceptions are Catfish and North Creeks which must be approached through a shallow, oyster-filled, mangrove tunnel that divides the lower creeks from Little Sarasota Bay. It can only be transited during very high tide and it may be necessary to wade on oysters. Time on-site must be kept as brief as possible to prevent being stranded by a falling tide. For some creeks, 2 or more can be mapped in 1 day, with plenty of time allowed for transit. Those pairs or trios are Whitaker and Hudson Bayous; Matheny and Clower Creeks and Elligraw Bayou; Catfish and North Creeks; Alligator and Hatchett Creeks; and Forked and Woodmere Creeks. Phillippi Creek, South Creek, Curry Creek, Gottfried Creek and Ainger Creek all take 1 full day each. Shakett Creek is the only creek that requires 2 full days.

Table 1. Tide Prediction Table for Each Creek

Creek	Tide Prediction Table	Creek	Tide Prediction Table
Whitaker Bayou	Sarasota Bay	Shakett Creek	Venice Inlet
Hudson Bayou	Sarasota Bay	Curry Creek	Venice Inlet
Phillippi Creek	Sarasota Bay	Hatchett Creek	Venice Inlet
Matheny Creek	Sarasota Bay	Alligator Creek	Lemon Bay
Elligraw Bayou	Sarasota Bay	Woodmere Creek	Lemon Bay
Clower Creek	Venice Inlet	Forked Creek	Lemon Bay
Catfish Creek	Venice Inlet	Gottfried Creek	Lemon Bay
North Creek	Venice Inlet	Ainger Creek	Lemon Bay
South Creek	Venice Inlet		

After the creeks are scheduled, send a copy of the schedule to Sarasota County Drainage Operations and Maintenance (DOM) to reserve the vessel and make sure there are no conflicts with the schedules of DOM staff.

B. Maps

Aerial maps of each creek should be created in ArcMap using the GIS.AERIAL2006_COLOR_1FT, which provides a clearer image. They should be set up on legal sized paper and scaled to either 1:550 or 1:700. The first map should begin at the mouth of the creek and be labeled as such (ex. Phillippi Creek – Mouth). Subsequent maps should be labeled with the name of the creek and numbers 1,2,3, etc. As the maps progress upstream, a landmark (tree, boat, dock, etc.) at the upstream edge of the first map should be identified that will overlap and match up with the same landmark on the downstream edge of the next map. It should be marked with an X plus the number of the next map, so the person mapping will be able to line the subsequent maps up quickly and easily. Label the rest of the maps in this manner. When a side canal is reached, label those segments with letters of the alphabet. For example, if a side canal occurs on map 3, the canal segments should be labeled with the name of the creek and 3-A, 3-B, 3-C, etc. After each map is created, export and save it as a JPG. file so that it can be printed out on legal sized paper at a later date.

To protect them and prevent damage from spray, rain, wind or any other unexpected conditions, laminate the maps in 10 mil plastic pouches. Two maps can be laminated back to back in one pouch. Alternate the maps so the person mapping does not have to turn the map over to see the next segment. This way, the landmarks described in the previous paragraph can easily be lined up from map to map. For example, in the first pouch laminate the creek-mouth map on the front and #2 map on the back; in the second pouch laminate the #1 map on the front and the #3 map on the back. Alternate the A, B, and C maps for the side canals in the same way. Continue in this manner until all of the maps have been laminated. Place them in a legal sized file folder for storage.

C. Field Sheet

A field sheet should be prepared for each creek that includes the following information: Date, Time On, Time Off, Crew, Creek, Tide, Upstream Extent (Latitude/Longitude) Sediment characterization, and Habitat Characterization Codes and printed on waterproof paper. (See Example) The Habitat Characterization Codes were modeled after those used in a Tampa Bay oyster habitat mapping project and are in **Table 2**

See Habitat Characterizations Section for detailed habitat descriptions.

Table 2. Habitat Characterization Codes

Habitat Characterization Codes		Habitat Characterization Codes	
Habitat	Code	Habitat	Code
Shell	S	Oyster Clumps/Reef	CR
Scattered Shell	SS	Mangrove Apron	MA
Oyster Clumps	C	Mangrove Root Oys.	MRO
Scattered Oys. Clumps	SC	Seawall	SW
Oyster Reef	R	Rip Rap	RR

Since oysters were observed along seawalls and on riprap, it was necessary to develop characterization codes for those as well. (**Table 3**) Four codes that described the vertical size of the horizontal bands of oysters growing on seawalls and riprap were created. For example, the code SW-1 stands for “Light” growth meaning a single or multiple layer of oysters, 6” wide (tall) or less growing on a seawall. The growth can be a solid band or scattered along the wall. The code SW-2 stands for “Medium” growth or single or multiple layers of oysters 6” to 12” wide growing on a seawall. The code SW-3 stands for “Heavy” growth or multiple layers of oysters, 12” to 18” wide growing on a seawall. The code SW-4 stands for “Very Heavy” growth or multiple layers of oysters greater than 18” wide growing on a seawall. The codes RR-1 through RR-4 would be used to describe oyster growth on riprap in the same manner.

Table 3. Seawall/RipRap Classification Codes

Seawall/RipRap Classification Codes	
Bands	Code
Light: $\leq 6"$; 1-2 layers	SW-1/RR-1
Medium : $> 6" \leq 12"$; >1 layer thick	SW-2/RR-2
Heavy: $> 12" \leq 18"$; >1 layer thick	SW-3/RR-3
Very Heavy: $>18"$; >1 layer thick	SW-4/RR-4

Solid Line: Oysters are mostly solid along wall

Broken line: Oysters are sporadic along wall

MOBILIZATION

In the days prior to the scheduled creek trip, assemble the gear listed in **Table 4**. Use the table as a checklist on the day of departure to avoid leaving anything behind.

Table 4. Equipment Check-List

Vessel
Licenses and Registration
Fuel and Oil
Anchor(s) and Line
Paddle
Fire Extinguisher
Personal Flotation Devices
Throwable Float
Whistle or Horn
Visual Distress Signal
Dewatering Device
Dry Box
Project
Laminated Maps
Field Log/Pens
Permanent Markers - Fine Point Black
Digital Camera/Batteries
GPS
Personal
Cell Phone
Sun Protection (cream, hat, glasses, etc.)
Food and Beverages
Rain Gear
Binoculars

A 2 crew minimum is required to conduct the assessment. In all cases, crew safety is of paramount importance. County staff should refer to and follow the procedures outlined in Section 2: Safety Procedures in the “Sarasota County Water Quality Sampling, Analysis, and Reporting Procedures Manual.” Although the mapping work is conducted from within the vessel, it may be occasionally necessary for crew members to wade through survey area. Oyster shells are very sharp and infections from cuts are very serious and can even be life threatening. Heavy boots or shoes must be worn at all times while working in the water around oysters. If a crew member sustains a cut, first aid should be given immediately and medical attention should be sought as soon as practicable. The crew may at any time judge that local conditions present a threat or hazard to their personal safety and discontinue the work. Examples of natural hazards include high wind, fog, or lightning; extreme waves or currents; and red tides.

Depending upon the size of the creeks, the team should pick up the vessel be on the way to the boat ramp by 7:30 AM and be on-site in the first creek by about 9:00 AM. The

team should be out of the creek and at the boat ramp by 2:30 – 3:00 PM in order to have time to clean up the boat, return it to its storage facility, and return to the office.

Under normal conditions, the boat ramps closest to a given creek are listed in **Table 5**.

Table 5. Boat Ramp Access to Creeks

BOAT RAMP ACCESS	
Creek	Boat Ramp
Whitaker Bayou	Centennial Park
Hudson Bayou	Centennial Park
Phillippi Creek	Centennial Park
Matheny Creek	Turtle Beach
Elligraw Bayou	Turtle Beach
Clower Creek	Turtle Beach
Catfish Creek	Turtle Beach
North Creek	Turtle Beach
South Creek	Turtle Beach or Nokomis Beach
Shakett Creek	Higel Park
Curry Creek	Venice Marina Park
Hatchett Creek	Venice Marina Park
Alligator Creek	Manasota Beach Road
Woodmere Creek	Manasota Beach Road
Forked Creek	Manasota Beach Road
Gottfried Creek	Ainger Creek Park
Ainger Creek	Ainger Creek Park

Note: Ainger Creek Park is in Charlotte County and requires a launch fee.
Take coins and dollar bills.

STANDARD MAPPING METHODS

Upon arriving at the site, complete the top part of the Field Sheet with the Date, Time On, Crew, Creek, and Tide. Begin mapping on the north side of the creek and proceed slowly upstream. Each oyster habitat should be recorded on the map with a black Sharpie, Fine or Extra-Fine Point Permanent Marker. When a side canal is reached, map it from the port (left) side going in and again from the port side after turning around and proceeding back to the main channel. The canals should be mapped one side at a time, because it is difficult to accurately map both sides at the same time even in narrow canals where the habitat is clearly visible on both sides. The operator of the vessel should go slowly enough for the person mapping to be able to comfortably map the habitat. He/she may even help out by identifying habitat locations. Landmarks such as boat docks, houses, vegetation, bridges, and power lines can be used to orient the vessel location with the aerial map. Since the work is conducted at low tide, it may be difficult to access certain

areas as a result of heavy sedimentation or other barriers. Binoculars are very useful in allowing the crew to identify habitats from a distance.

Proceed upstream until no oyster habitat is observed. Record the Lat./Long. of the upstream extent on the map. Proceed upstream past that point for an additional one or two tenths of a kilometer to make sure that no additional oyster habitat is found. After the creek is mapped, complete the field sheet with Time Off, Sediment Types, Upstream Extent, and record any unusual observations or conditions under the Comments Section.

HABITAT CHARACTERIZATIONS

Shell - S

Oyster shell habitat is found along the natural shoreline, altered shoreline such as seawalls, bulkheads, and riprap, under docks, and under water off-shore. This habitat consists of single shells (usually dead) that cover an area densely enough that a person cannot walk across it without stepping on a shell. The shell can act as cultch for oyster recruitment.

Scattered Shell - SS

Scattered shell habitat is the same as Shell habitat, except that the shells are scattered over an area so that a person can easily walk across it without stepping on a shell.

Oyster Clumps - C

Oyster clumps are clusters of 2 or more oysters that are cemented together. The oysters may be live, recently dead, and/or dead. The clumps may be found along the natural shoreline, altered shoreline such as seawalls, bulkheads, and riprap, under docks and on pilings, and under water off-shore. This habitat consists of clumps that cover a small area densely enough that you cannot walk across it without stepping on a clump.

Scattered Oyster Clumps – SC

Scattered oyster clump habitat is the same as oyster clump habitat, except that the clumps are scattered over an area so that a person can easily walk across it without stepping on a clump.

Oyster Reef - R

There are several types of oyster reefs. They are usually classified by their configuration and location relative to the nearest shoreline. Most patch reefs are located in shallow water, are usually detached from the mainland, have irregular but solid outlines, and are ringed by sand or mud. Mangroves may or may not be growing out of this type of reef. Some patch reefs may also form on outcroppings or other solid substrate that is attached to the mainland. String reefs are usually long and narrow reefs that are situated at right

angles to tidal currents across the mouths of rivers, creeks, sounds, and lagoons. All of these types of oyster reefs will be denoted by the letter “R”. Fringe reefs usually adjoin the shore and are also called Mangrove Aprons, which are described below.

Oyster Clumps/Reef - CR

This type of habitat is a central area dominated by a solid oyster reef with clumps and/or scattered clumps surrounding the main reef.

Mangrove Apron - MA

A mangrove apron, or fringe oyster reef, can be distinguished from other oyster reefs by their structure and configuration. A mangrove apron is a solid oyster reef growing in a narrow band around the base of mangroves that are not growing in the reef, but, instead, are rooted and growing in a substrate composed of soil, sand, mud, etc. The mangrove apron may grow along the shoreline, or totally encircle a mangrove island that is detached from the mainland.

Mangrove Root Oysters - MRO

Mangrove root oysters are simply oysters that grow on the drop roots of the Red Mangrove. They may be single shells or small clumps.

Seawall – SW and RipRap - RR

Where bottom substrate is not adequate to support healthy oyster populations, oysters will recruit on other forms of solid substrate such as seawalls, bulkheads, and riprap, under docks, and on pilings. A method was developed to characterize the size, thickness, and vertical extent of these habitats using 4 categories: Light, Medium, Heavy and Very Heavy. (See Field Sheet, Section C)

MAPPING TECHNIQUES

All maps must be marked in a consistent manner in ArcGIS ArcMap. There are three layers used to identify the oyster habitats: Oyster_Points, Oyster_Lines, and Oyster_Polygons. After marking the map using the appropriate layer, record the appropriate habitat characterization code in its attribute table.

Lines

- Use a solid line to denote area covered by dense shell
- Use a broken line to denote area covered by scattered shell
- Use a solid line to denote area covered by dense clumps
- Use a broken line to denote area covered by scattered clumps
- Use a solid line along seawall and riprap to denote solid bands of oysters
- Use a broken line along seawall and riprap to denote sporadic oysters
- Use a solid line to denote that most of mangrove roots are covered with oysters

- Use a broken line to denote that oysters occur only sporadically among mangrove roots
- Use a solid line to denote a mangrove apron

Polygons

- Use a polygon to denote oyster reef

Points

- Points may or may not be used
- Use a point to denote the extent of oysters upstream, if the last habitat observed is a clump or a few shells.
- Use a point to denote clumps on pilings

VOLUNTEER MAPPING PROGRAM

In order to map oyster habitat in the County bays, it may be necessary to recruit volunteers and develop a county-wide volunteer network. A potential resource is the pool of volunteers participating in the Volunteer Seagrass and Scallop Monitoring Programs. The role of the volunteers would be to survey specified areas of County bays during lowtide, identify all oyster habitats associated with the sites, and record locations using a GPS.

Volunteer Equipment:

- Flats Boat, Jon Boat, Kayak, or Canoe
- GPS
- Oyster Habitat Field Sheet – County will provide

Volunteer Procedures:

The volunteers will follow applicable procedures and methods outlined in this manual with the following exceptions:

- The volunteer(s) will use his/her own vessel, be responsible for equipping it with all Coast Guard required and approved safety equipment, and be responsible for following all navigational rules and regulations.
- The volunteer(s) will be assigned a specific area or may choose an area of his/her preference (close to volunteer residence).
- The volunteer(s) will receive training and guidance from County staff.
- The volunteer(s) will be required to sign a liability waiver.

SARASOTA COUNTY VOLUNTEER OYSTER MAPPING PROJECT

Release of Liability

THE UNDERSIGNED being (check one) ____ at least 18 years of age ("Volunteer"), or ____ younger than 18 years of age and accompanied by a parent/guardian hereby (collectively, the "Young Volunteer"), acknowledge reading and accepting the following Release, and state as follows:

1. The Undersigned is/are in good health and is/are physically and mentally capable of performing the volunteer tasks associated with the Oyster Mapping Project.
2. The Undersigned acknowledge receiving training on the operation of any necessary equipment, including safety equipment, Global Positioning System equipment, and depth finders.
3. The Undersigned understands that while participating as a volunteer in the Oyster Mapping Project he/she is not considered to be an employee, agent, or representative of Sarasota County Government and agrees not to hold him/herself out as such to other persons. He/she also understands that he/she will not be compensated monetarily or otherwise by Sarasota County.
4. The Undersigned understands that participating in the Oyster Mapping Project involves the use of watercraft and potential contact or immersion in water during multiple events on different dates. The Undersigned assumes the risks of injury associated with, but not limited to, working outdoors in natural settings, traversing both natural and man-made terrain, exposure to harmful aquatic organisms, and changing weather conditions. The Undersigned understands that whether he/she uses a privately owned/operated vessel, or if Sarasota County government is the owner/operator of the vessel, it does not assume any responsibility for any loss, damage, or injury, including death, to his/her person or property associated with maintenance and operation of the vessel by the county.
5. The Undersigned understands that when he/she use his/her own vessel for this project, they are responsible for the conduct and safety of all passengers. The Undersigned will comply with all safety regulations and registrations associated with the operation and maintenance of a vessel.
6. The Undersigned consents, (if a minor, the undersigned parents or guardians consent) to emergency medical treatment or procedures in the event that he/she is unable to give actual consent and agrees to remain solely responsible for all related costs and expenses, if any, and further agree (if a minor, the undersigned parents or guardians agree) to indemnify, defend, and hold harmless Sarasota County Government from payment and/or liability in connection with the costs and expenses.
6. The Undersigned releases and indemnifies Sarasota County, its respective officers, staff, agents, employees, volunteers, and subsidiaries, affiliates, sponsors, and suppliers associated with the Oyster Mapping Project of and from any liability, claims, demands (including attorney fees), actions and causes of action whatsoever arising out of or related to any loss, damage, or injury, including death, which may be sustained by the Undersigned while participating in the Oyster Mapping Project.

THE UNDERSIGNED HAS (HAVE) READ THE FOREGOING RELEASE, UNDERSTAND ITS CONTENTS AND SIGNS IT WITH FULL KNOWLEDGE OF ITS SIGNIFICANCE.

If Volunteer is under 18 years old:

Name of Volunteer (please print)

Signature of Volunteer

Address

City/Zip

Phone Number

Date

Emergency contact: name and phone no.

Name of parent/guardian (please print)

Signature of parent/guardian

Address

City/Zip

Phone Number

Date

Emergency contact: name and phone number

SARASOTA COUNTY BAY MAPPING PROJECT

In order to map oyster habitat in County bays and complete the project, a new method using GIS was developed in January 2011 to allow Water Resources staff to efficiently and effectively map the habitat without requiring the help of volunteers or the time, effort, and cost to create and laminate aerial maps of all the shorelines in the county. The SOPs for preparation and mobilization are identical to those when the creeks were mapped. Two habitat characterization codes were added to the bay mapping effort (**Table 6**) to distinguish oyster habitat on floating docks and pilings.

Table 6. Habitat Characterization Codes

Habitat Characterization Codes		Habitat Characterization Codes	
Habitat	Code	Habitat	Code
Shell	S	Mangrove Apron	MA
Scattered Shell	SS	Mangrove Root Oysters	MRO
Oyster Clumps	C	Seawall	SW
Scattered Oyster Clumps	SC	Rip Rap	RR
Oyster Reef	R	Pilings	P
Oyster Clumps/Reef	CR	Floating Docks	D

It was also decided that codes for oyster condition could be beneficial. A coding system was developed to denote the health of the oyster habitats: Code 0 – Oysters are mostly dead; Code 1 – There is a fairly even distribution of live and dead oysters; Code 2 – Oysters are mostly live. (**Table 7**)

Table 7.

Oyster Condition	
Mostly Dead	0
Even Distribution Live/Dead	1
Mostly Live	2

STANDARD MAPPING PROCEDURES

Aerial maps of all county bays were downloaded into a rugged, portable tablet personal computer that was designed to be used in the field. The habitat can be “drawn” directly

onto the computer's touch screen using either a stylus or a mouse. Mapping staff follow the following procedures:

- Open ArcMap and choose the appropriate mapping area.
- Turn on the GPS.
- Open the editor drop down box and choose “start editing”.
- Open the attribute table.
- Open the keyboard.
- Open the target drop down box and choose either “SC_Oysters_Polygon” for reefs or “SC_Oyster_Lines” for all of the other habitats.
- Using the stylus, draw the identified habitat on the touchscreen.
- Record the appropriate habitat characterization code in the CODE box in the attribute table and the appropriate oyster condition code in the comment box.
- Save edits often.
- Save edits and map at the end of the trip and shut down computer.
- The data can then be downloaded into work computers and be shared among staff.

OYSTER MAPPING FIELD SHEETS

**2008 Field Sheet for Creeks
2011 Field Sheet for Bays**

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SARASOTA COUNTY WATER RESOURCES
2008 COASTAL CREEK OYSTER MAPPING FIELD SHEET

Date: _____ Time On: _____ Time Off: _____

Crew: _____

Creek: _____ Tide: _____

Upstream Extent: Latitude _____ Longitude: _____

Sediment: Rock Mud Sand Algae Shell Organic

Habitat Characterization Codes

Habitat	Code
Shell	S
Scattered Shell	SS
Oyster Clumps	C
Scattered Oys. Clumps	SC
Oyster Reef	R
Oys. Clumps/Reef	CR
Mangrove Apron	MA
Mangrove Root Oys.	MRO
Seawall	SW
Rip Rap	RR

Seawall Classification Codes

Layers	Code
Sparse: ≤ 6"; 1 layer	SW-1
Light : > 6" < 12"; >1 layer	SW-2
Medium: > 12" < 18"; >1 layer	SW-3
Heavy - >18"; >1 layer	SW-4

Solid line: Oysters are mostly solid along wall

Broken Line: Oysters are sporadic along wall

Comments: _____

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2011 OYSTER MAPPING FIELD SHEET SARASOTA COUNTY BAYS

Date: _____ Time In: _____ Time Out: _____
Crew: _____
Bay: _____ Tide Stage: _____
Boat Ramp: _____
Starting Point: _____ End Point: _____

Habitat Characterization Codes

Habitat	Code
Shell	S
Scattered Shell	SS
Oyster Clumps	C
Scattered Oys. Clumps	SC
Oyster Reef	R
Oyster Clumps/Reef	CR
Mangrove Apron	MA
Mangrove Root Oys.	MRO
Seawall	SW
Rip Rap	RR
Pilings	P
Floating Docks	D

Seawall Classification Codes

Layers	Code
Light: ≤ 6"; 1-2 layers	SW-1/RR-1
Medium : > 6"≤ 12"; >1 layer	SW-2/RR-2
Heavy: > 12"≤18"; >1 layer	SW-3/RR-3
Very Heavy - >18"; >1 layer	SW-4/RR-4

Solid line: Oysters are mostly solid along wall

— — — — — Broken Line: Oysters are sporadic along wall

Oyster Condition

Oyster Condition	
Mostly Dead	0
Even Distribution Live/Dead	1
Mostly Live	2

Comments:

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OYSTER HABITAT CHARACTERIZATION

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EXAMPLES OF OYSTER HABITAT CHARACTERIZATIONS



SCATTERED SHELL
Shells are scattered along the shoreline and in the water



SCATTERED CLUMPS - SC AND SCATTERED SHELL - SS
Clumps and shells are scattered in the mud along the base of the seawall



OYSTER REEF – R

The reef is detached from the mainland. Mangroves are growing out of the oyster reef



OYSTER REEF - R
The reef is extending out from the mainland



MANGROVE APRON - MA

Also known as a fringe reef, the oysters are growing along the bank and forming an “apron” around the mangroves island. The mangroves are not growing in the reef, but in the sediment that is forming the island.



MANGROVE ROOT OYSTERS - MRO
The oysters are growing on the roots of the Mangrove.



SEAWALL OYSTERS – SW-1

The oyster growth occurs in a single layer or multiple layers and in a thin band less than 6" wide or narrower along the bottom of the seawall. The oyster growth can be solid or scattered along seawall.



SEAWALL OYSTERS – SW-2

The oyster growth occurs in more than one layer thick in a band greater than 6" but less than 12" wide along the seawall



SEAWALL OYSTERS – SW-3

The oyster growth occurs in more than one layer thick in a band greater than 12" but less than 18"
along the seawall. Clumps of oysters grow on pilings



SEAWALL OYSTERS – SW-3

The oyster growth occurs in more than one layer thick in a band greater than 12" but less than 18" wide along the seawall



SEAWALL OYSTERS – SW-4

The oyster growth occurs more than one layer thick and in a band greater than 18" wide along the seawall



RIPRAP OYSTERS – RR-2

The oyster growth occurs in more than one layer in a band greater than 6" but less than 12" wide along the rocks.