Mississippi Canyon 252 Spill
2013 Oyster Resource Mapping Plan

January 16, 2014

Introduction

A Technical Working Group ("Oyster TWG") of experts and trustee agency and BP representatives was assembled following the Mississippi Canyon 252 Spill to develop work plans appropriate to carry out both baseline (pre-injury) and post-impact assessments of oysters throughout the northern Gulf of Mexico. The Oyster TWG mapped potential oyster resource at subtidal sites under the Amendment 2 to the Phase I – High Priority Sites Plan ("Phase I Amendment 2 Plan") and the Oyster Sampling Transition Plan ("Transition Plan"). Nearshore sites were mapped under the 2012 Oyster Intertidal Sampling Plan and the 2013 Nearshore Oyster Sampling Plan. The Trustees decided to complete additional subtidal oyster resource mapping using side-scan sonar in 2013 to assess additional subtidal oyster resource in the north-central Gulf of Mexico. This document presents the plan for completing this mapping. The data generated will be used to estimate the percent cover of oyster resource in various regions to help assess the current state of oyster resource following the MC 252 spill.

The Plan addresses the following topics:

1. Objective/Purpose: This section gives an overview of the objectives of the 2013 Oyster Resource Mapping Plan.

2. Approach and rationale: This section describes the overall purpose and need for oyster resource mapping and cover estimation in 2013.

3. Health and safety: This section summarizes pertinent health and safety protocols applicable to this effort. It includes a number of procedures by reference, all of which should be carefully reviewed and adhered to by all team members.

4. Site selection: This section describes the proposed approach to identifying sites for evaluation.

5. Estimated Study Cost: This section provides an estimate of the cost of implementing the 2013 Oyster Resource Mapping Plan.

Objective/Purpose

After reviewing data generated from the field efforts implemented under previous Deepwater Horizon (DWH) NRDA oyster plans, the Oyster TWG has determined that a need exists for additional side-scan sonar mapping of potential oyster habitat to estimate the percent cover of potential oyster resource in the northern Gulf of Mexico. Oyster resource has not been mapped as part of the NRDA with side-scan sonar since 2010, when it was mapped under the Phase I Amendment 2 Plan. Additional mapping was completed under the Transition Plan using chains, poles, and visual observation of oyster resource. Updated estimates of oyster resource will help inform estimates of the extent of recovery and continued

injury from the Deepwater Horizon Oil Spill. The 2013 Oyster Resource Mapping Plan (hereafter "2013 Mapping Plan") will select a sample of sites and map them in Louisiana, Mississippi, Alabama, and Florida to further characterize the extent of oyster resource within the NRDA study area, including areas of potential injury. The results of this plan will be used to develop percent cover estimates of oyster resource in portions of the study area where site conditions are potentially suitable for oyster resource, but where no data currently exist on the location and extent of oyster resource. Location and extent data in these areas supplement existing mapping data from past DWH NRDA plans and will be used to inform and support injury assessment and restoration planning efforts throughout the study area.

Approach and Rationale

In the summer of 2010, the oyster TWG performed side-scan sonar mapping of potential oyster habitat across Louisiana, Mississippi, Alabama and Florida as part of the Oyster Sampling Plan, Phase I Amendment 2 to assess potential injury to oysters and oyster habitat resulting from the Deepwater Horizon oil spill and response activities conducted by the state of Louisiana. Field teams used side-scan sonar to image the sea floor. One purpose of mapping under the Oyster Sampling Plan, Phase I Amendment 2 was to identify with a high degree of certainty the locations of potential oyster habitat for quadrat and dredge sampling. Following post-processing of these images, contact points representing potential oyster resource and soft sediment were identified. Potential sample locations for collecting quadrat and sediment samples (up to eight each) were selected. These contact points were distributed throughout the 200 meter by 200 meter sample cell across the two substrate types and have been used to determine sampling locations at Phase I Amendment 2 sites in subsequent plans.

In the fall of 2010, the Oyster Sampling Transition Plan was implemented and substrate mapping of 600 meter by 600 meter sites within Tier II Stratum A Plus in Louisiana and Tier II Stratum A in Mississippi completed. Pole mapping techniques (e.g. Appendix A. Transect and Poling Data Collection SOPs) were used to identify substrate into soft bottom (Type 1, Table 1), hard bottom (Type 2, Table 1) and oyster resource (Type 3, Table 1) segments. The data were then used to estimate the proportion of oyster resource in Tier II Stratum A Plus in Louisiana and Tier II Stratum A in Mississippi. Tier II Stratum A was defined as known oyster resource areas. The Plus in Louisiana refers to additional areas of high potential of oyster resource as defined by Louisiana Department of Wildlife and Fisheries (LDWF) biologists.

The Oyster TWG has determined that estimates of oyster resource across the northern Gulf of Mexico in Tier II Stratum B (potential oyster habitat) would provide additional information on the location and abundance of oyster resource (Type 3, Table 1). This plan will conduct side-scan sonar mapping at approximately 447 sites to identify possible oyster resource (in accordance with the SOP in Appendix A) and estimate percent cover of oyster resource in previously unmapped waters containing potential oyster habitat. Identification of oyster resource during the mapping site visit may include some confirmation dredging or tong grabs by the contractor according to industry accepted protocols, as described in the Standard Operating Procedures for this Plan (Appendix A). Equal probability sites will be selected within potential oyster habitat in Louisiana, Mississippi, Alabama and Florida. Sites will be mapped into three substrate Types (Table 1, Allen et al. 2005) using 900 khz, high resolution side-scan sonar. Poling methods will be used to map substrate in areas too shallow for side-scan sonar mapping but sufficiently deep to float a boat. Once the side-scan sonar and transect poling data have been processed in full, results will be validated in approximately 20% of the sites at up to 4 locations in each selected site using either a 24 inch wide oyster hand dredge or tongs. This "Trustee validation" site visit will occur independently of the initial mapping visit. This will result in validation data at approximately 360 locations.

Table 1. Classifications for bottom substrate types.

Bottom Substrate Type	*Categories*	*Brief Description*
Type 1	Soft Mud	Soft, slushy mud – would not support small pieces of cultch material
Type 2	Moderately Firm Mud	Bottom that would support small pieces of cultch material
	Firm Mud or Sand	Compact muddy or sandy substrate
	Buried Shells	Shells buried under sediment
Type 3	Exposed Shell	Single or scattered shells, or hard substrates such as clam shells, limestone, concrete aggregate, etc.
	Reef	Thick shell

Source: State of Louisiana Sampling Protocol for Projects in Public Oyster Areas, available at: http://dnr.louisiana.gov/crm/coastmgt/permitsmitigation/oyster/sampling-protocol.pdf

Health and Safety

This section provides a brief overview of safety requirements as stated in the DWH NOAA NRDA Site Safety Plan. The intent of the DWH NOAA NRDA Site Safety Plan is to establish a structured process and disciplined approach to the mitigation of health, safety, and environmental risks associated with our operations and activities.

Any Federal NRDA field team member must complete all applicable health and safety training as directed by NOAA. The following is a list of items required prior to sampling:

- Review the DWH NOAA NRDA Site Safety Plan (including all attachments)
- Participate in the Hazard Communication Program Training webinar
- Complete and sign the MS Canyon 252 Safety Confirmation Form
- Complete a minimum of 24-hour HAZWOPER Training
- Review the Heat Stress and Cold Stress Training/Awareness PowerPoints
- Complete First Aid/CPR Training

These documents can be found on noaanrda.org on the Field Ops wiki page - General Safety and Guidance documents (http://files.noaanrda.org/field-ops-wiki.nsf/dx/General_Safety_and_Guidance_Documents)

Any encounters with protected species are to be reported to the appropriate authorities. Field crews are also to follow any guidance or BMPs provided by federal, states, or tribal historic preservation officers to avoid potential impacts to protected species or to historic or cultural resources. Any affected historic or cultural resources are to be reported to the appropriate authorities as described in such guidance or BMPs.

Site Selection

Mapping will be conducted in sample sites selected from areas of potential oyster habitat defined in consultation and concordance with state biologists in Alabama, Florida, Mississippi and Louisiana. These areas have not previously been mapped under prior DWHNRDA oyster plans. Areas recently mapped using side-scan sonar methods by federal or state agencies will be excluded.

Strata Definitions and Development

Although state biologists have abundant knowledge of the location of mapped oyster resource in areas open to the public for harvest of seed and/or market sized oysters, knowledge of the location of oyster resource in the greater potential oyster habitat either leased for oyster farming (e.g. in Louisiana) or not actively managed for harvest is lacking. In addition, the boundaries of potential oyster habitat are not outlined as such by each state. Thus, areas outlined as potential oyster habitat were defined differently based on available GIS layers from state fisheries agencies.

In Louisiana, Tier II Stratum B of the Oyster Sampling Plan was defined as potential oyster habitat based on an outline provided by LDWF biologists. Further refinement of Tier II Stratum B was made by LDWF oyster biologists prior to the writing of the current plan. Following this refinement, the potential oyster habitat was further refined in coastal study areas (CSA) 1N, 1S and 3 by excluding 600 by 600 meter sites designated as Tier II Stratum A Plus in the Oyster Sampling Transition Plan. Recall, the proportions of oyster resource in Tier II Stratum A Plus in these CSAs were previously estimated using data collected under the Oyster Sampling Transition Plan. A limited amount of Tier II Stratum A Plus areas were mapped for oyster habitat under the Oyster Sampling Transition Plan in coastal study areas 4/5 and 6. These Tier II Stratum A Plus areas were included with the Tier II Stratum B to provide independent estimates of percent of Type 3 substrate under this mapping plan in coastal study areas 4/5 and 6.

We further excluded areas from Tier II Stratum B that were recently mapped for oyster habitat using side-scan sonar methods under contract to the Louisiana Department of Wildlife & Fisheries (Figures 1, 2 and 4). The remaining potential oyster habitat was stratified by coastal study areas: CSA1N and CSA1S (CSA1N/1S, Figure 2), Mississippi River Bird's Foot (MRBFD, Figure 3), CSA3 (Figure 4), CSA4 and CSA5 (CSA4/5, Figure 5), and CSA6 (Figure 6). Finally, the strata in CSA1N/1S, CSA3, CSA4/5, and CSA 6 were further stratified into oyster lease areas and non-lease areas based on a shapefile of oyster leases (lease_line_6-22_2011_WGS84_datum) received from LDWF in 2011. Stratum MRBFD had a very small region leased for oyster farming and was not stratified further. This resulted in 9 strata in Louisiana waters (Table 2).

In Mississippi, two strata of potential oyster habitat were defined (Table 2, Figure 7) in concordance with state biologists. The first stratum (Coastal Bays) was defined as coastal bay areas inland from Mississippi Sound with potentially suitable oyster habitat. The second stratum (Open Water) bordered the first stratum where it touches Mississippi Sound and included all nearshore area from the Mississippi shoreline southward to the barrier islands or the Louisiana maritime border (whichever was geographically applicable). This second stratum was bounded on the west and east by state maritime borders with

Louisiana and Alabama, respectively, and excluded Tier II Stratum A mapped under the Oyster Sampling Transition Plan.

In Alabama, two strata of potential oyster habitat were created in concordance with state biologists (Table 2, Figure 8). Stratum A consists of areas of known oyster resource and was defined as Tier II Stratum A in the Oyster Sampling Plan. Stratum B includes all of Mobile Bay and Mississippi Sound outward from the Alabama shoreline to barrier islands on the south and the Mississippi maritime border on the west excluding Stratum A.

In Florida, two strata of potential oyster habitat were created in concordance with state biologists (Table 2, Figures 9 – 13). Stratum A consists of mapped oyster resource and was defined as Tier II Stratum A in the Oyster Sampling Plan. Stratum B was defined using a base shapefile of areas with appropriate depth (up to 12 feet) in coastal bays from the Alabama state boundary east to Alligator harbor modified by state biologists to include areas of relatively high probability of potential oyster habitat and excluding Stratum A.

Sample Frame Development

In Louisiana and Mississippi, a complete grid of potential 200 meter sites was overlaid across all B strata to form a candidate sample frame of sites.

1. Potential sites with a site center point that fell within 50 meters of shoreline were dropped to limit the number of potential shoreline edge sites which have a high percentage of marsh and/or land and to increase the ration of potential "interior" sites relative to "edge" sites in small water bodies.
2. Potential sites that fell within the 600x600 meter stratum A were excluded to avoid duplicate sampling and counting of area already sampled and included in stratum A percent cover estimates. In Louisiana, this applies to CSAs 1N, 1S and 3. Recall that in CSAs 4/5 and 6, the original stratum A is being included in strata B for this sampling effort. The remaining potential sites in the sample frame were assigned to individual strata based on the strata area in each site. That is, for sites crossing strata boundaries (i.e. lease with non-lease, lease with lease or non-lease with non-lease), sites were assigned to the strata with the largest area represented in that site.

In Alabama and Florida, a complete grid of potential 200 meter sites was overlaid across all A and B strata to form candidate sample frames.

1. Potential sites with a site center point that fell within 50 meters of shoreline were dropped to limit the number of potential shoreline edge sites which have a high percentage of marsh and/or land and to increase the ration of potential "interior" sites relative to "edge" sites in small water bodies.
2. The remaining potential sites in the sample frame were assigned to strata A and B based on the location of the site center points (i.e. sites with a center point in stratum A were assigned to stratum A and sites with a center point in stratum B were assigned to stratum B).
3. In stratum A, potential sites with a center point within 50 meters of stratum B were dropped to limit the number of reef edge sites and to increase the ratio of potential "interior" sites relative to "edge" sites in small stratum A reefs.

Site Selection

In all states, the end result is a sample frame of potential sites for each strata. Sample sites were selected from each strata sample frame using the generalized random tessellation stratified (GRTS) sampling procedure (Stevens and Olsen 1999 and 2004) to ensure a spatial balance of sample sites with equal probability of selection (Table 2, Figures 1 – 13).

Table 2. Summary of sites selected for 2013 Mapping Plan in Alabama, Florida, Mississippi and the Costal Study Areas (CSA) of Louisiana.

State	Stratum	Number of Sites
AL	A (Mapped Oyster Resource)	25
	B (Unmapped Potential Oyster Habitat)	25
FL	A (Mapped Oyster Resource)	25
	B (Unmapped Potential Oyster Habitat)	25
LA	CSA1N/1S Lease[1]	33
	CSA1N/1S Non-lease[2]	33
	MRBFD[3]	33
	CSA 3 Lease[1]	33
	CSA 3 Non-lease[2]	33
	CSA 4/5 Lease[4]	33
	CSA 4/5 Non-lease[5]	33
	CSA 6 Lease[4]	33
	CSA 6 Non-lease[5]	33
MS	Coastal Bays	25
	Open Water	25

[1] Site center points at least 100 meters from non-lease areas and at least 100 meters from stratum A+
[2] Site center points at least 100 meters from lease areas and at least 100 meters from stratum A+
[3] Mississippi River Bird Foot Delta
[4] Site center points at least 100 meters from non-lease areas
[5] Site center points at least 100 meters from lease areas

Figure 1. Proposed 2013 Oyster Mapping Plan sites in Louisiana: All strata. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

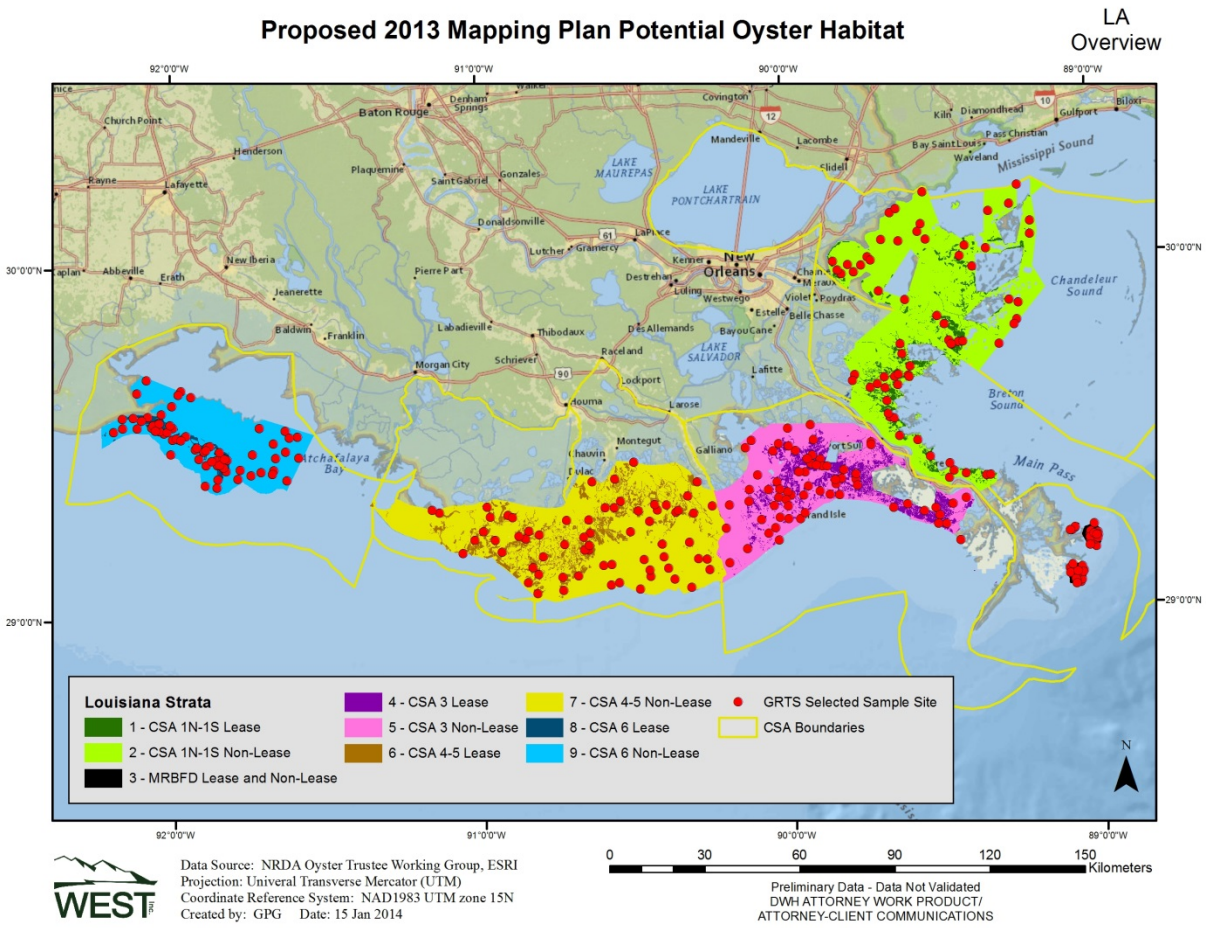


Figure 2. Proposed 2013 Oyster Mapping Plan sites in Louisiana: CSA 1N/1S. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

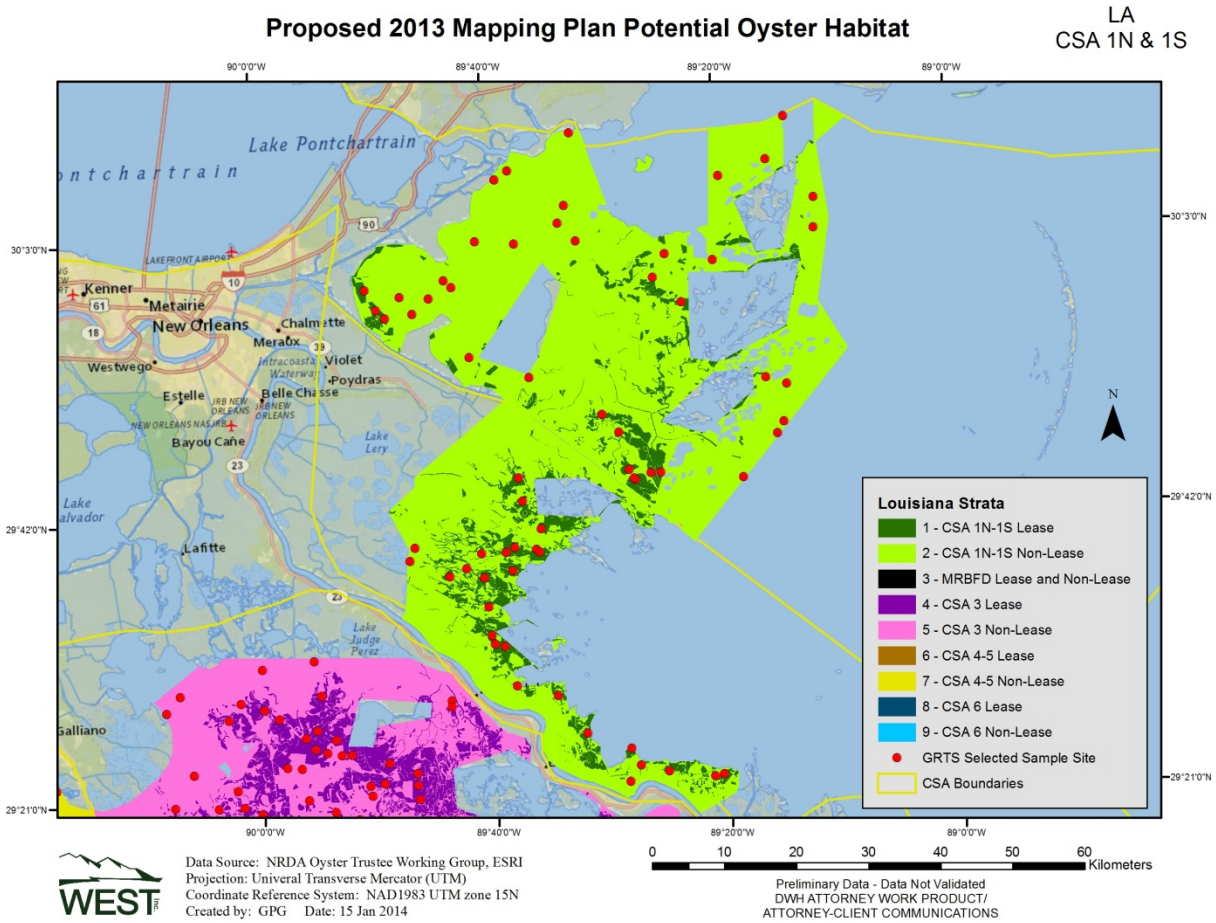


Figure 3. Proposed 2013 Oyster Mapping Plan sites in Louisiana: MRBFD. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

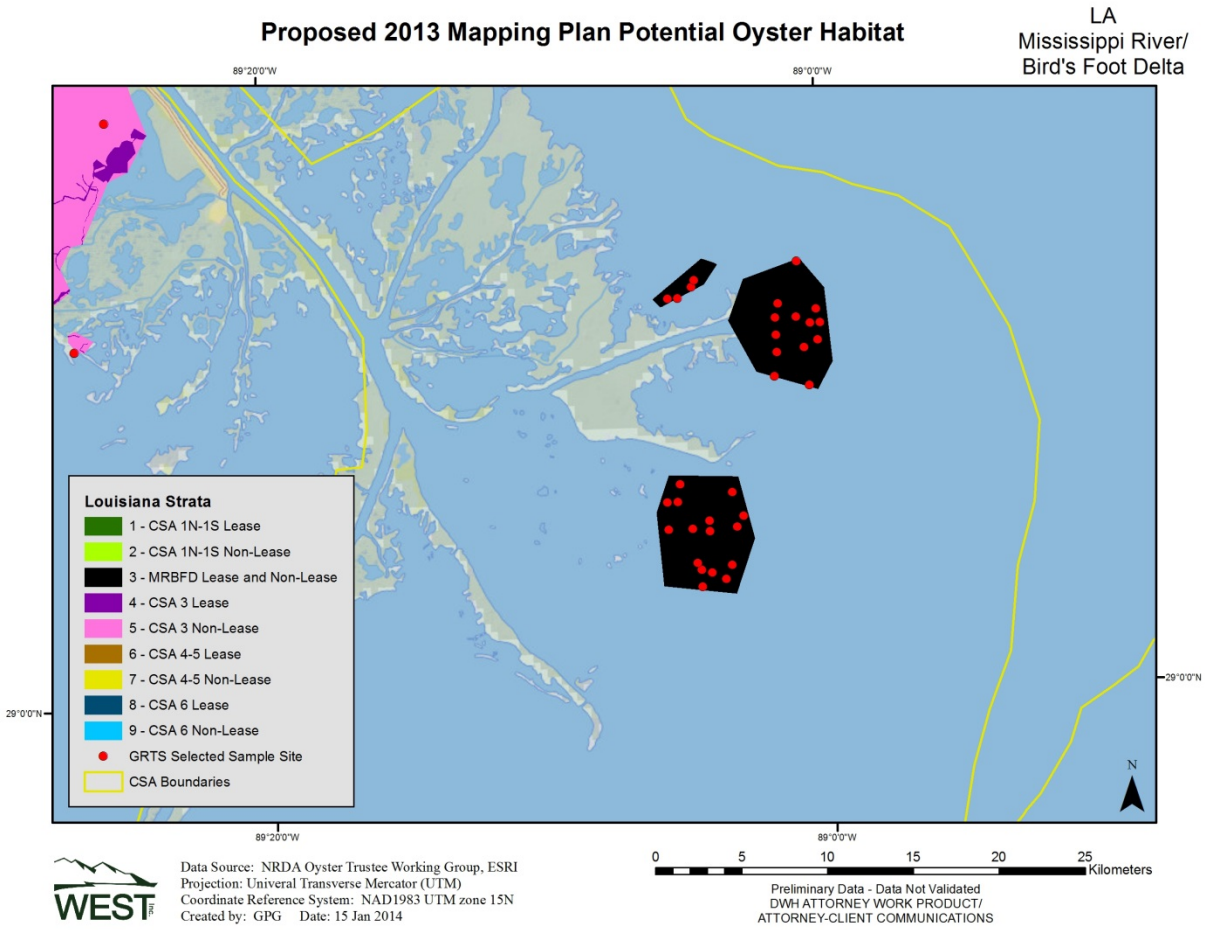


Figure 4. Proposed 2013 Oyster Mapping Plan sites in Louisiana: CSA 3. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

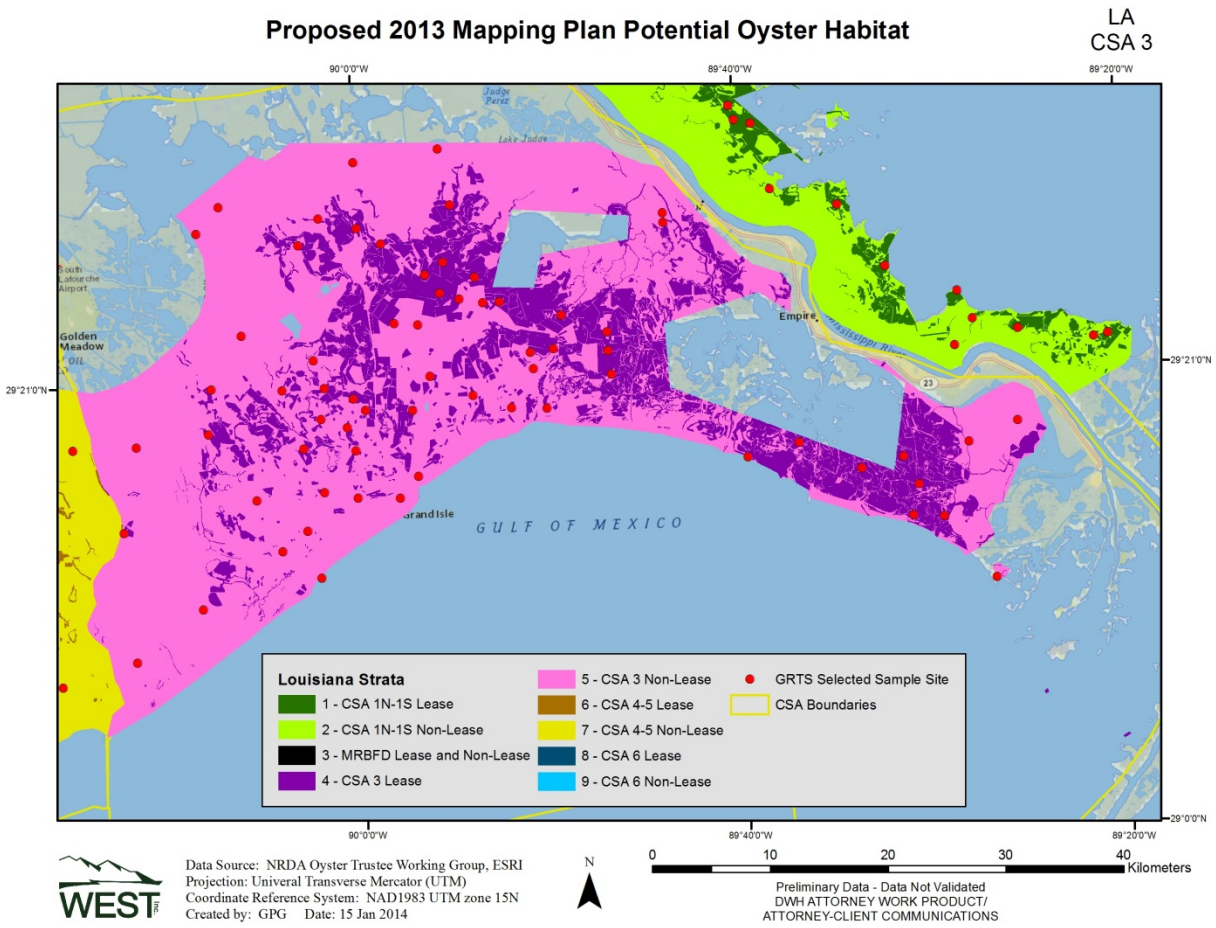


Figure 5. Proposed 2013 Oyster Mapping Plan sites in Louisiana: CSA 4/5. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

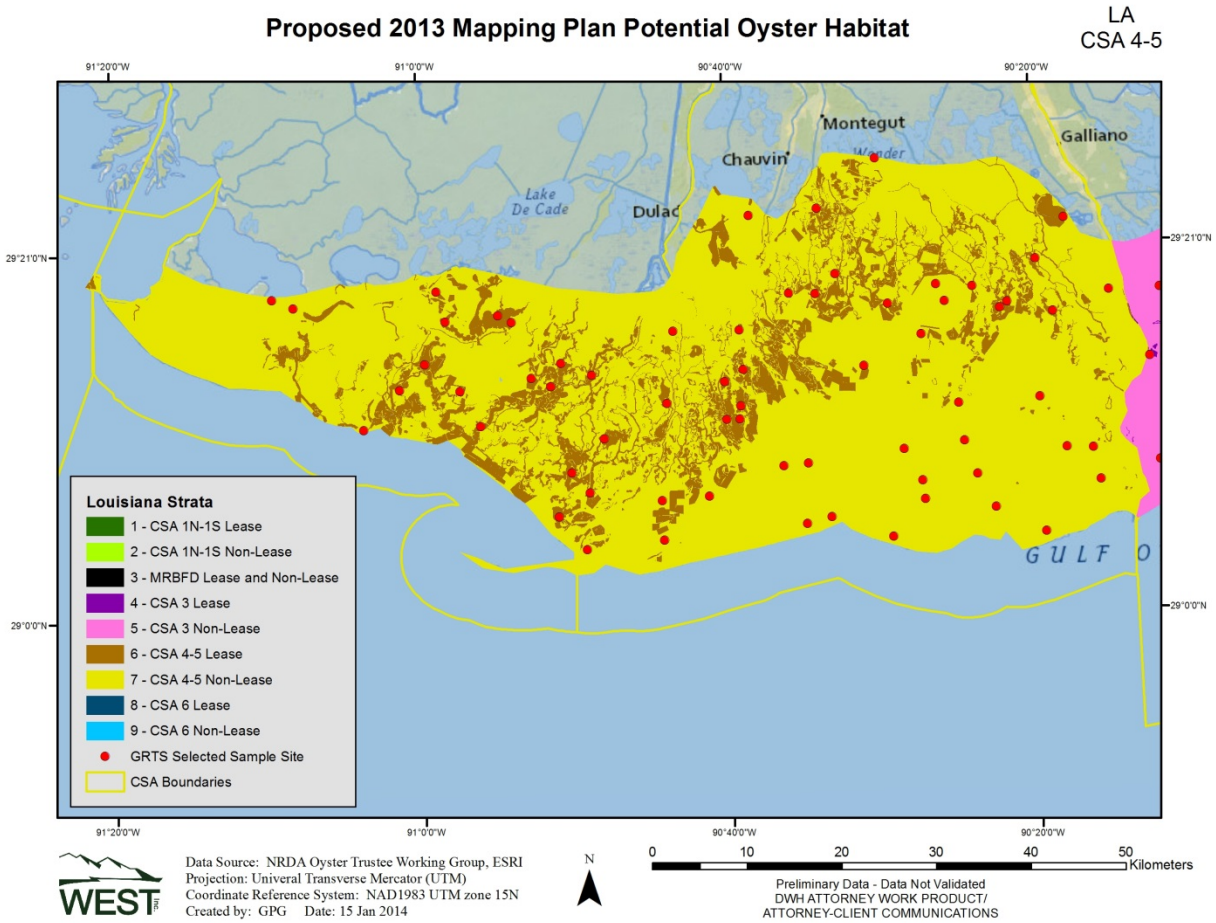


Figure 6. Proposed 2013 Oyster Mapping Plan sites in Louisiana: CSA 6. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

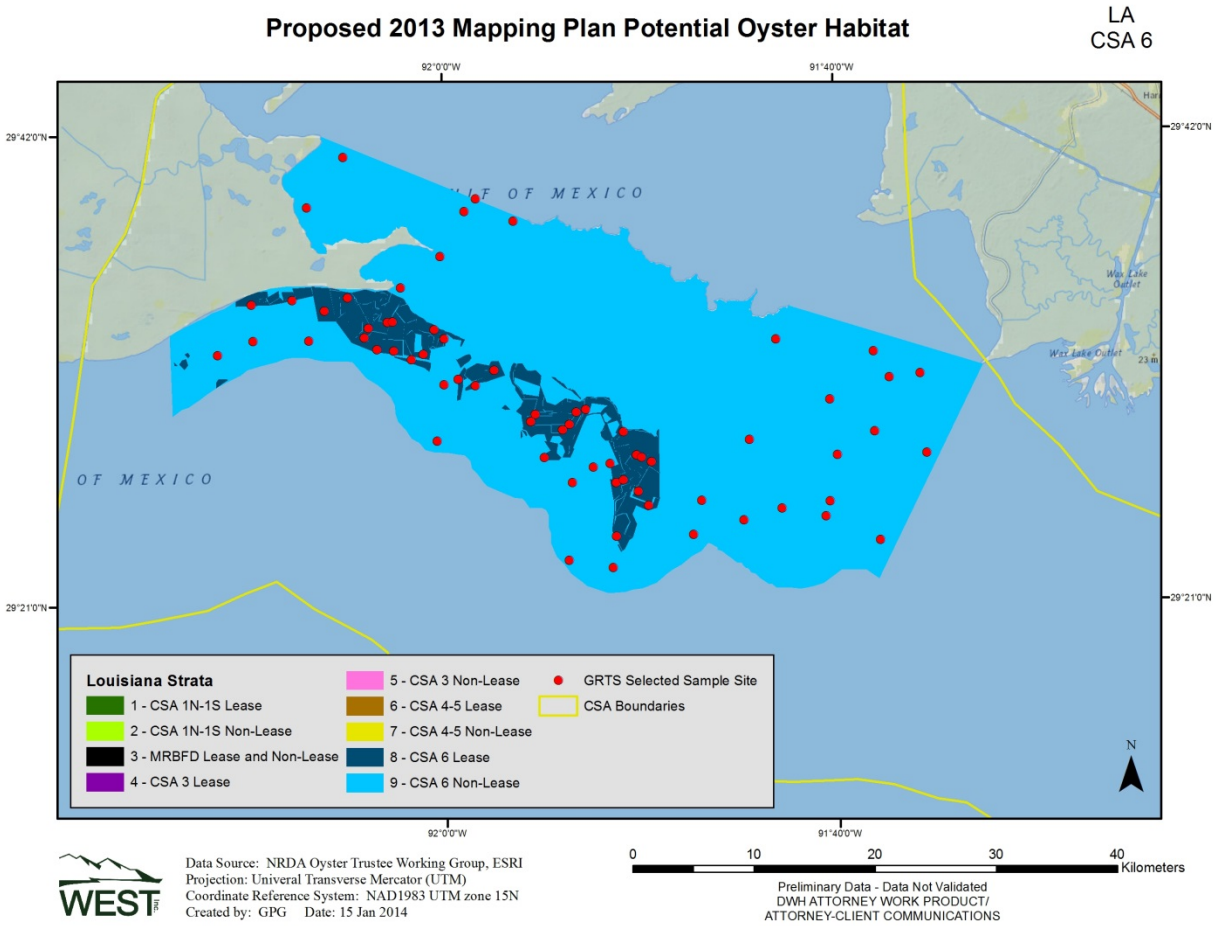


Figure 7. Proposed 2013 Oyster Mapping Plan sites in Mississippi. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

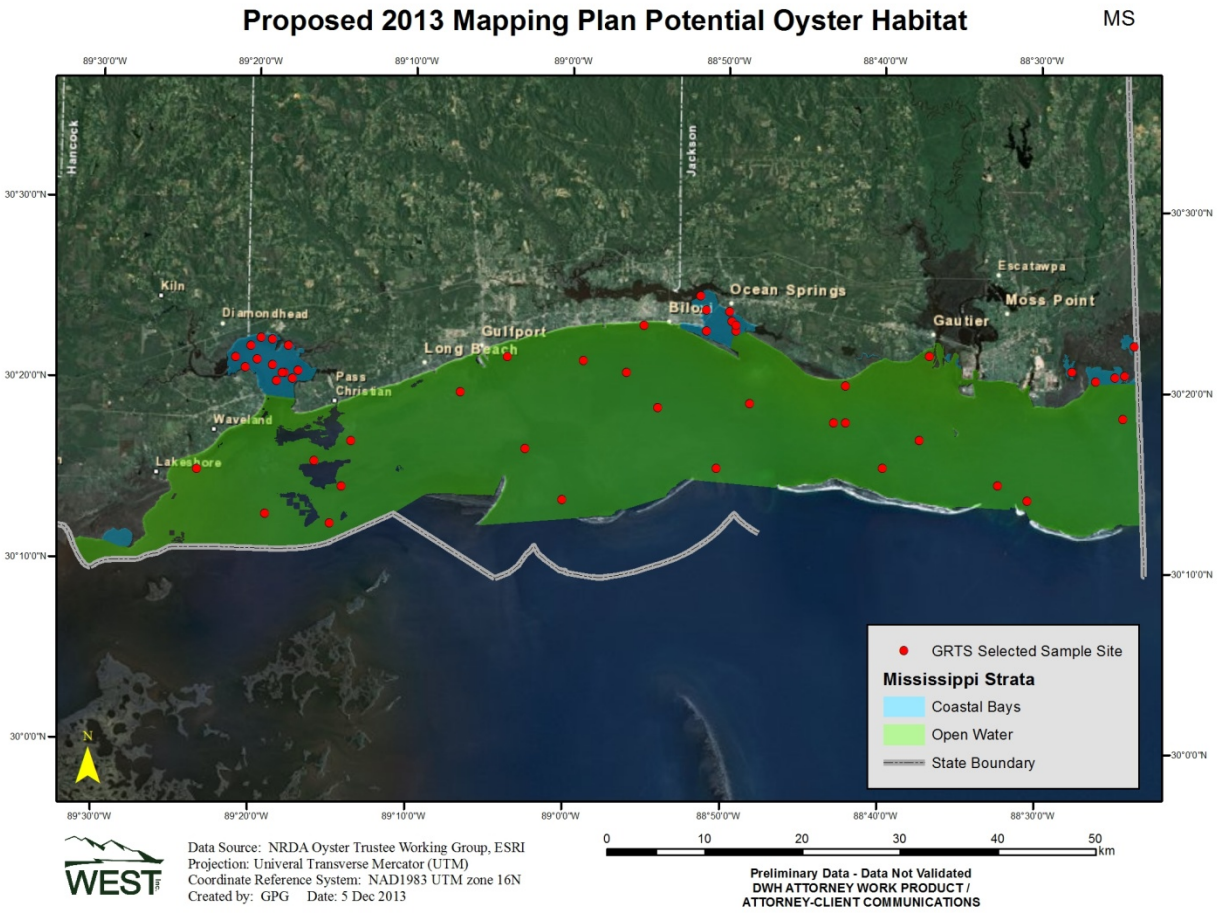


Figure 8. Proposed 2013 Oyster Mapping Plan sites in Alabama. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

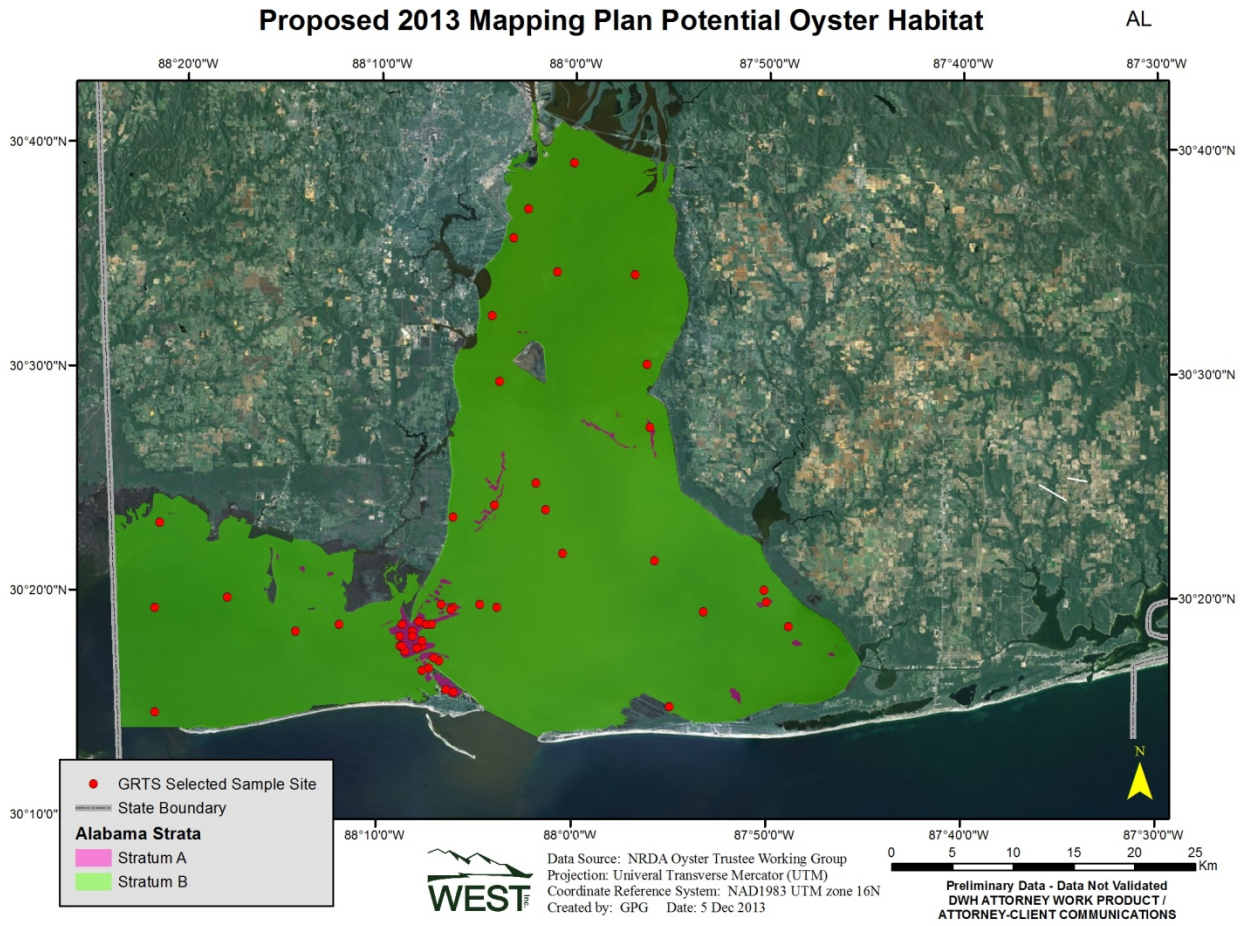


Figure 9. Proposed 2013 Oyster Mapping Plan sites in Florida. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

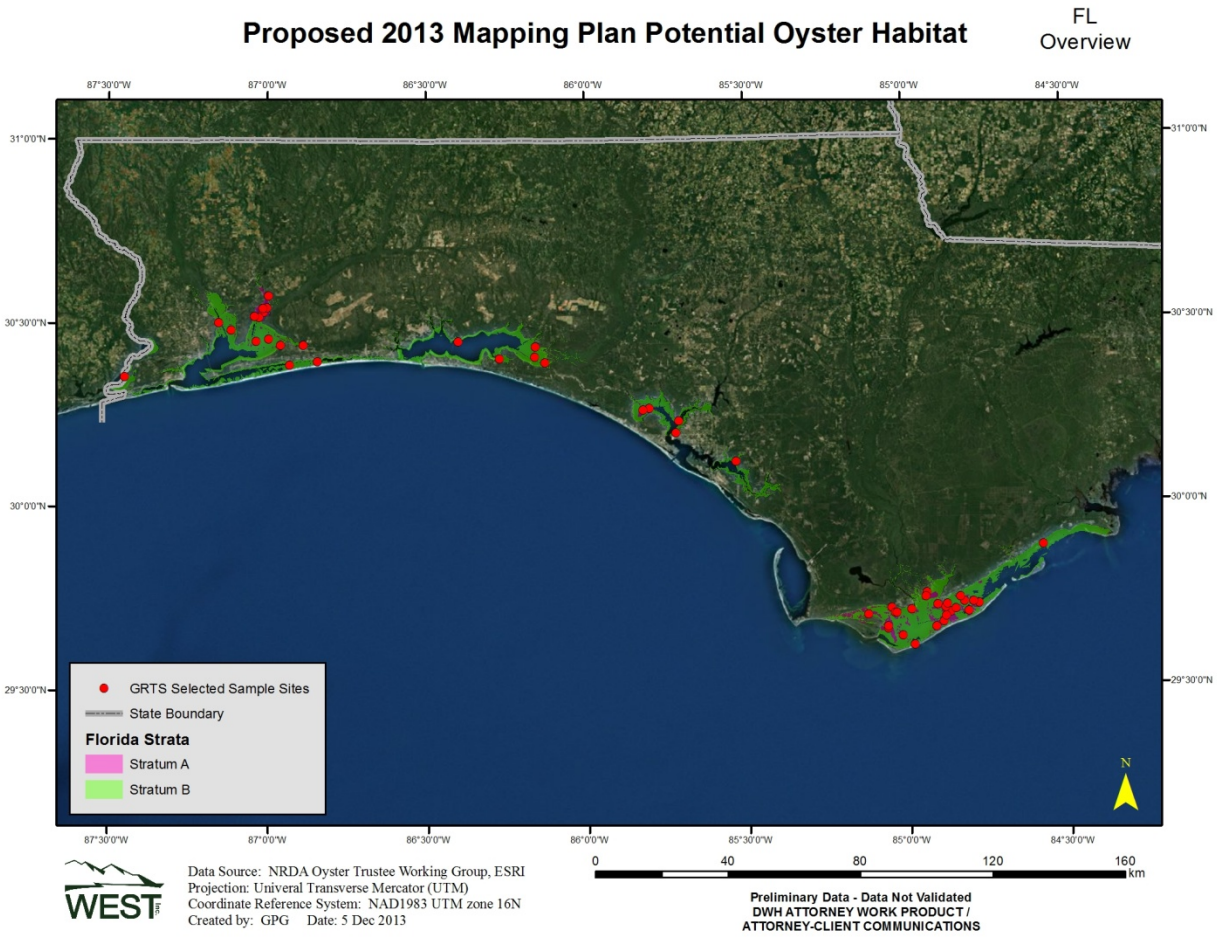


Figure 10. Proposed 2013 Oyster Mapping Plan sites in Florida: Pensacola. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

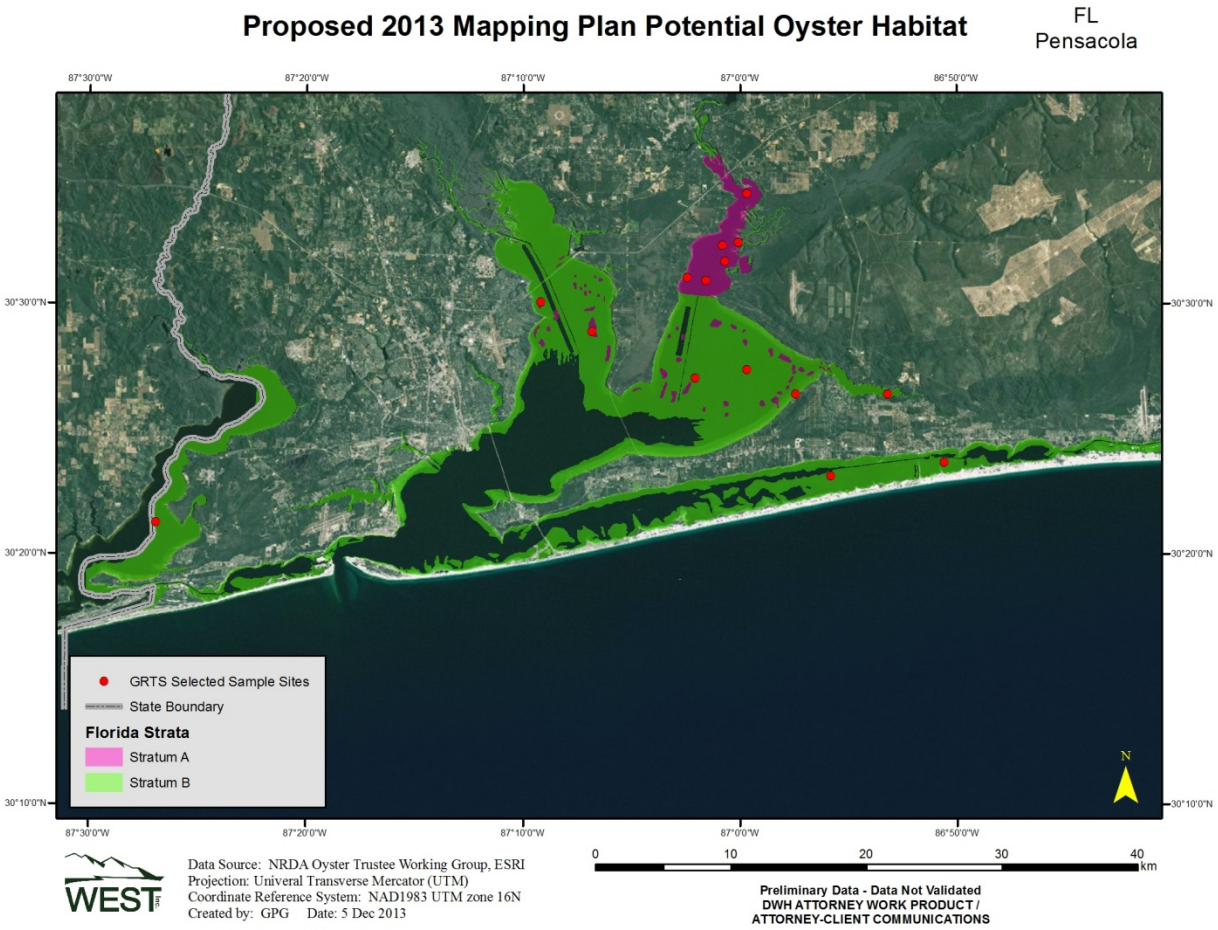


Figure 11. Proposed 2013 Oyster Mapping Plan sites in Florida: Choctawhatchee. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

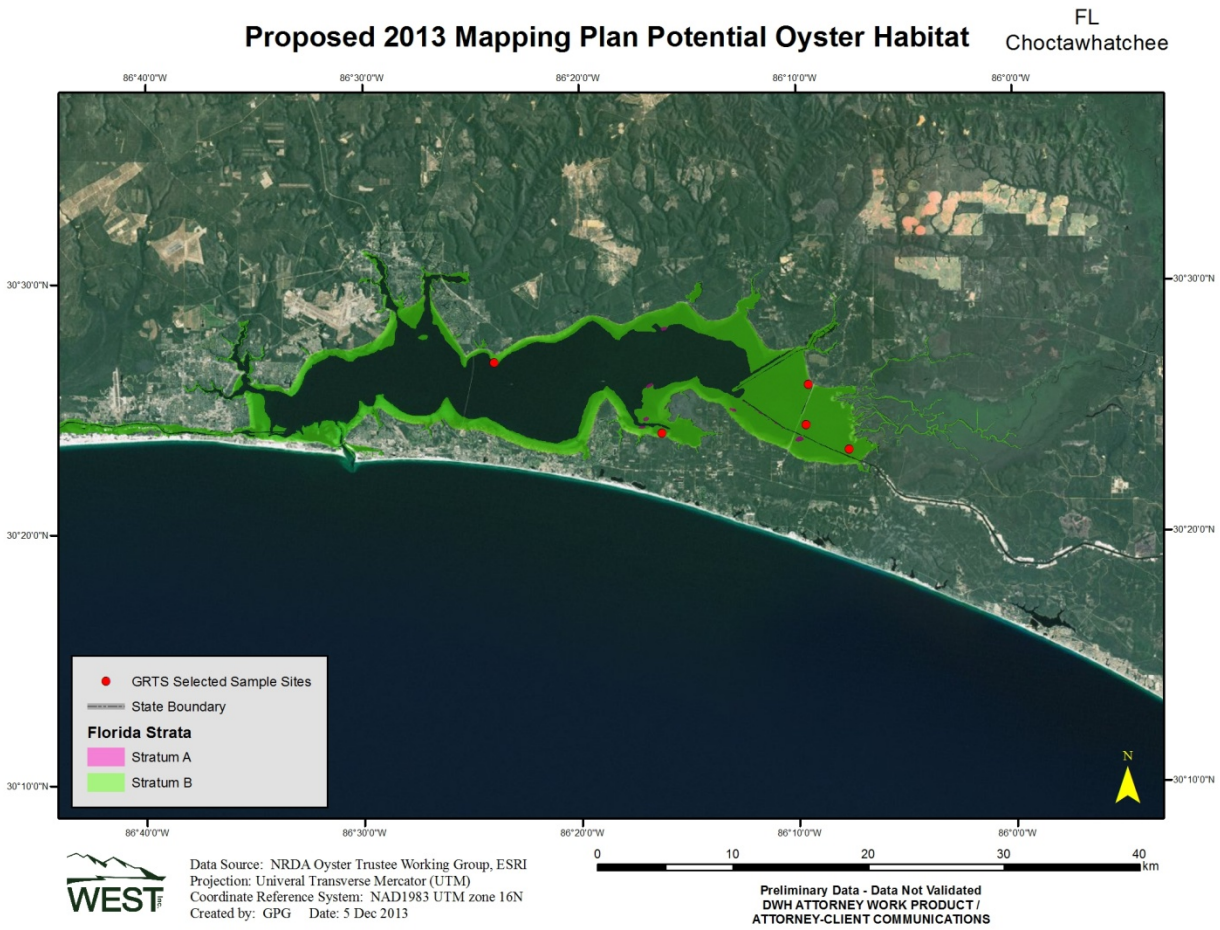


Figure 12. Proposed 2013 Oyster Mapping Plan sites in Florida: St. Andrews. Maps reflect original strata B boundaries after exclusion of stratum A/A+.

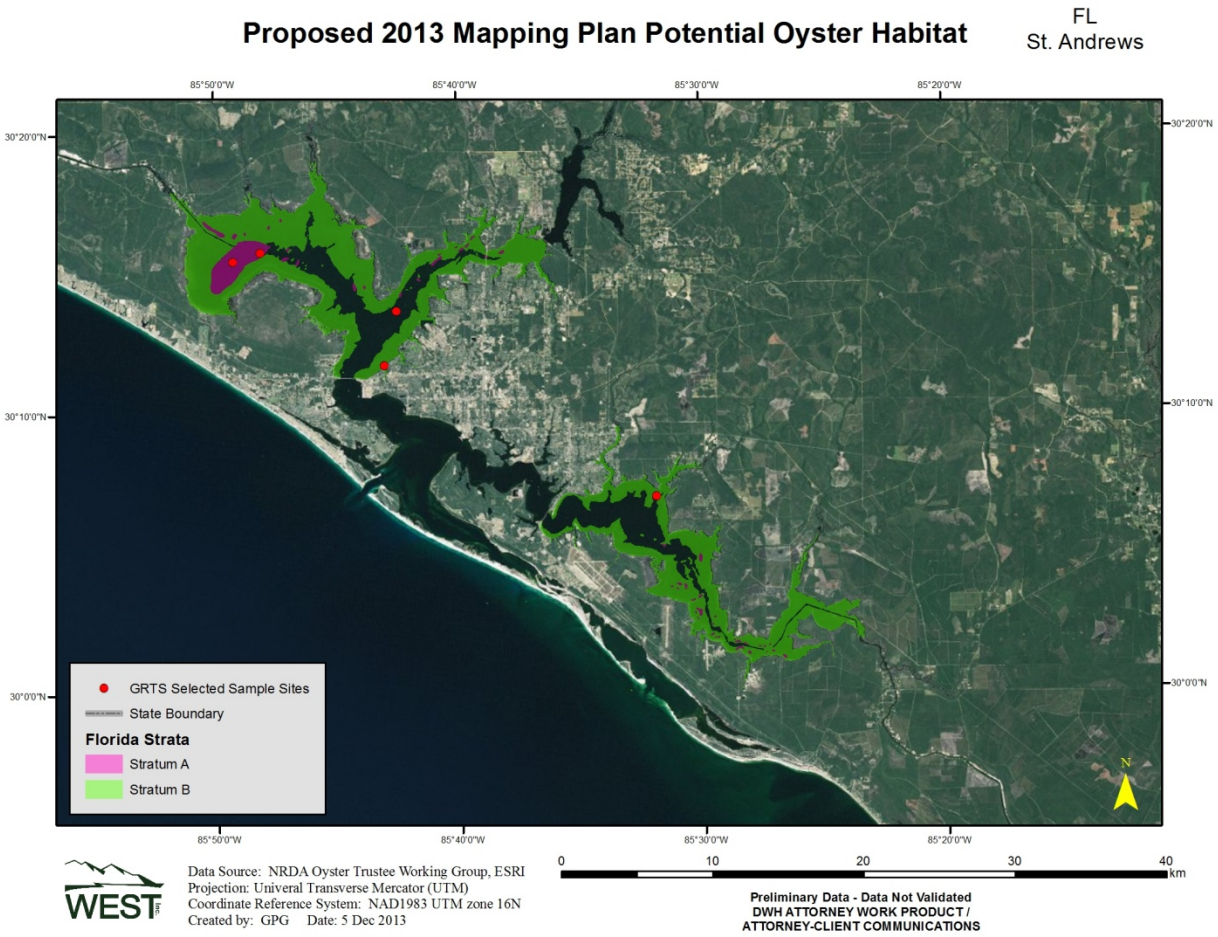
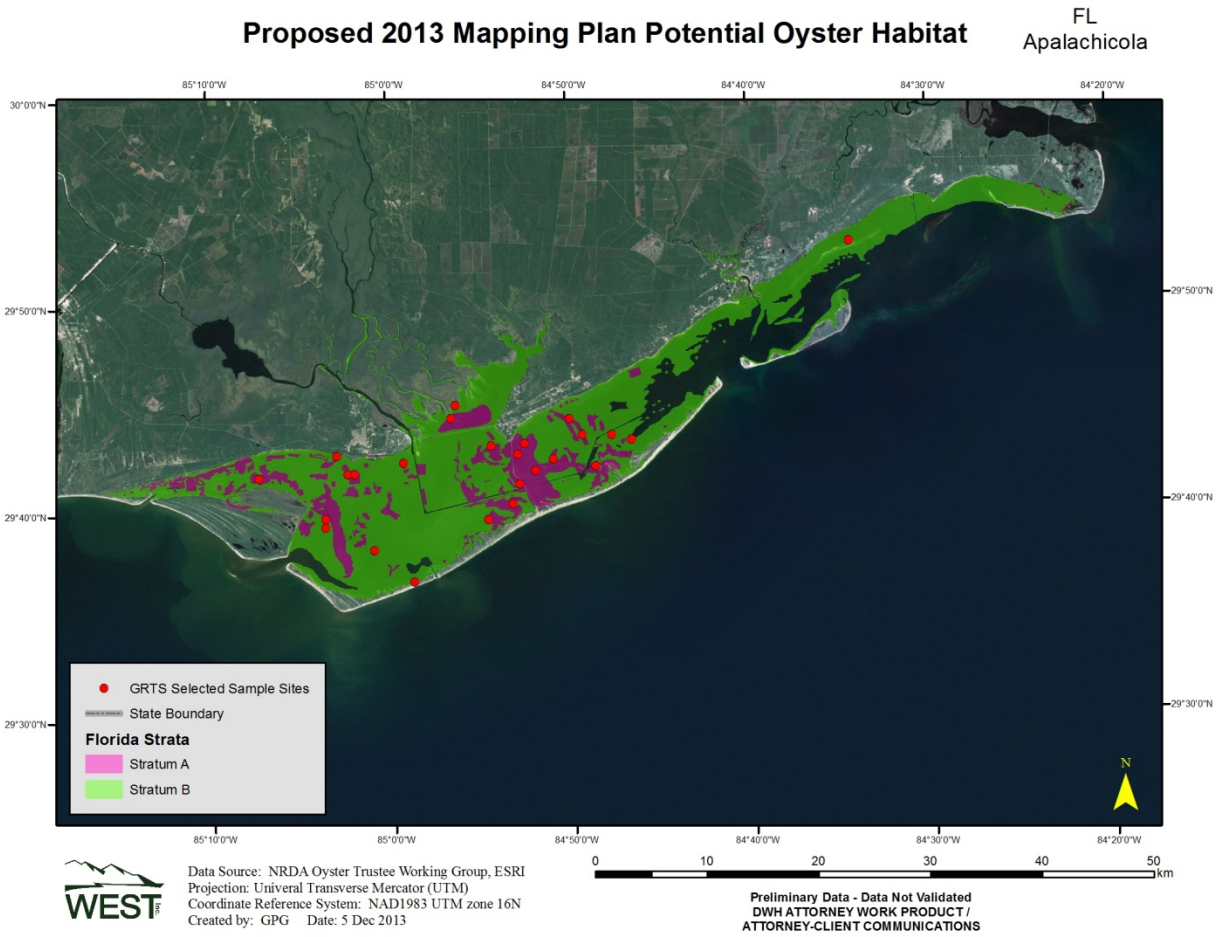


Figure 13. Proposed 2013 Oyster Mapping Plan sites in Florida: Apalachicola. Maps reflect original strata B boundaries after exclusion of stratum A/A+.



Study Cost
TBD - Currently obtaining subcontractor bids; likely will have draft budget by late November.

Literature Cited

Allen, Y. C. Wilson, C. A., Roberts, H. H. and J. Supan. 2005. High resolution mapping and classification of oyster habitats in nearshore Louisiana using sidescan sonar. Estuaries. 28(3): 435-446.

Stevens, D. L. and A. R. Olsen. 1999. Spatial restricted surveys over time for aquatic resources. Journal of Agricultural, Biological and Environmental Statistics 4:415-428.

Stevens, D. L. and A. R. Olsen. 2004. Spatially balanced sampling of natural resources. Journal of the American Statistical Association 99:262-278.

Appendix A – 2013 Mapping Plan Field Data Collection Standard Operating Procedures

Each site will be mapped for potential oyster habitat using side-scan sonar data collection SOPs or transect poling SOPs. Following processing of mapping data, approximately 20% of sites will be revisited for the purpose of results validation using Trustee validation SOPs. Field data collection should proceed as follows:

Field crews will assess each assigned site for accessibility to complete mapping using either the side-scan sonar or transect poling standard operating procedures (SOPs). Sites which cannot be accessed for at least partial side-scan sonar or transect poling mapping of potential oyster habitat will be labeled as inaccessible. Inaccessible sites in a given stratum will be replaced by an equal number of alternate sites selected from the top ranked replacement sites on the ranked GRTS sample site list for that stratum. The objective is to map the full number of target sites per stratum as described in Table 2 of the Plan.

Sites may be declared as inaccessible due to either issues accessing the site or the physical nature of the site itself that precludes mapping. If field crews cannot physically travel to a site due to man-made obstruction, lack of water or thick marsh vegetation the site will be declared as inaccessible. If the site overlays land, marsh vegetation or a man-made obstruction or lacks sufficient water it will be declared as inaccessible. Field crews should record the reason a site is declared inaccessible in the "Site Summary/Signature Form – Mapping" field data form "Site Mapping Summary" and "Site Notes" sections, with supporting photographic documentation prior to moving onto their next site. Field crews should contact Field Ops upon determining a site is inaccessible.

Accessible sites will be mapped using a side-scan sonar system with 900 kHz frequency capable of producing georeferenced, high resolution imagery with an accuracy of +/- 1 m (Figure A-1, Allen et al., 2005) or transect poling data collection following the applicable SOPs. Prior to proceeding with mapping, field crews must determine whether either side-scan sonar mapping or transect poling mapping is appropriate for the site. Side-scan sonar mapping should be completed at all accessible sites (approximately >3 feet depth) unless water depth prohibits its use (approximately <3 feet). In cases with insufficient water depth for side-scan sonar (approximately <3 feet), the site should be mapped using transect poling methods, and teams should indicate the reason for transect poling in the "Site Summary/Signature Form – Mapping" field data form "Site Mapping Summary" section. Field crews will be responsible for recording and maintaining all versions of both hand written (e.g. field data forms) and electronic (e.g. CSV and GeoTiff files) data as applicable.

Side-Scan Sonar Data Collection SOPs

Side-scan sonar data collection should begin at an accessible corner of the 200 by 200 meter grid cell, and should occur in a north/south orientation using a swath of approximately 100 meters (extending 50 meters from either side of the side-scan sonar instrument) with the center of the passes spaced approximately 40 meters apart, and with sufficient passes for the swaths to completely cover the extent of the site. Recall the site is a 200m x 200m square with north/south and east/west oriented sides around the site center point location. Side-scan sonar data should be collected according to industry accepted protocols.

Field crews will use a wood pole to probe the bottom substrate at approximately 40m intervals while simultaneously collecting side-scan sonar data. Substrate will be classified by the contractor at the time of probing according to the three primary categories in Table A-1 and recorded using contractor equipment. The pole should be of sufficient length to reach the maximum expected depth in the sites to be mapped. In the event that the site is greater than the maximum pole length, field crews will proceed with side-scan sonar data collection without probing. The boat should travel continuously along each pass at a speed

sufficient to interpret and record the side-scan sonar data and complete the substrate poling classification at each probe location, as per Table A-1. A waypoint and location coordinates should be collected and saved at each probe location using side-scan sonar mapping equipment.

Identification of oyster resource during the mapping site visit may include some confirmation dredging or tong grabs by the contractor according to industry accepted protocols. After preliminary processing of side-scan sonar or transect poling data, dredges or tong grabs may be taken at the discretion of the contractor in order to confirm substrate Type mapping results, using either a 24-inch wide oyster hand dredge or hand tongs. Waypoints should be taken at the start and end of each dredge and at each tong grab location, and recorded on field data forms "Contractor Confirmation Dredge Form – Mapping" or "Contractor Confirmation Tong Form – Mapping". Contents of each dredge or tong grab will be recorded on field data forms, photographed and used to help interpret side-scan sonar or transect poling data. Specifically, the presence of live and recently dead oysters or hard substrate in a dredge or tong grab will be recorded (see Table A-1). Field teams will photograph the contents of dredge and tong contents, both before and after rinsing. Oysters collected for this purpose during contractor-initiated reconnaissance activities will not be retained.

Field crews will save all side-scan sonar imagery in raw, intermediate and post-processed forms, potentially including but not limited to daily navigation files (e.g., ASCII or CSV files), raw sonar data files (e.g. .xtf format or native file format of side-scan data collection platform), intermediate data files from post-processing software (e.g., CSF files or native file format of side-scan data processing software) and end product data files including raster mosaics (e.g., GeoTiff, GeoJPG, GeoPNG) of scanned grids and digitized shapefiles of targeted habitat (e.g., ESRI shapefiles, AutoCAD DXF). Files should be organized in individual site folders. Shapefiles should be labeled in the format of STATE_SITENAME_DATE_TEAMCODE.shp; in this format, SITENAME should be recorded omitting the hyphens "-" that are indicated in the Field Ops version of the site name, i.e.: "AL_OYSMAPLAA2_011214_65".

Transect Poling Data Collection SOPs

All sites will have transect location coordinates available for use in the event that side-scan sonar data collection cannot proceed as expected due to either insufficient water depth, natural and man-made obstacles or failure of the side-scan sonar equipment. The NOAA-provided chase boat may be used to complete transect poling. Eight, 200m, north/south oriented transects spaced 25 meters apart, with a random start for the first transect between 0 and 25 meters from the western edge of the site, will be generated and pre-programmed into a GPS device for all sites (Figure A-2).

Field crews will use a wood pole to probe the bottom substrate at regular intervals. The pole should be of sufficient length to reach the maximum expected depth in the sites to be mapped. The boat should travel continuously along the transect at a slow speed, just above idle (e.g. approximately 2 knots) during the poling. Field crews should probe the bottom at approximately 10 second intervals beginning and ending at transect start and end locations. A waypoint should be collected and saved with the GPS device and the waypoint, location coordinates and substrate Type recorded on the field data form "Transect Poling Form – Mapping" for the beginning and ending transect locations and at each probe location at which the substrate changes, as identified by the field crew.

If a transect is interrupted due to land, insufficient water depth or other natural or man-made obstacles, field crews should collect and save a waypoint to the GPS device and record the waypoint, coordinates and substrate Type on the field data form "Transect Poling Form – Mapping" with a note in the "Transect notes" section to indicate the data represent a mid-transect stopping location. Likewise, field crews should collect and save a waypoint to the GPS device and record the waypoint, coordinates and substrate

Type on the field data forms with a note in the “Transect Poling Form – Mapping” “Transect notes” section to indicate the data represent a mid-transect starting location. All accessible water on the sites should be mapped, including accessible water on the opposite side of land, insufficient water depth or other natural or man-made obstacles, i.e. the transects should be continued on the opposite side of obstacles if possible.

Table A-1. Classifications for bottom substrate types.

Bottom Substrate Type	*Categories*	*Brief Description*
Type 1	Soft Mud	Soft, slushy mud – would not support small pieces of cultch material
Type 2	Moderately Firm Mud	Bottom that would support small pieces of cultch material
	Firm Mud or Sand	Compact muddy or sandy substrate
	Buried Shells	Shells buried under sediment
Type 3	Exposed Shell	Single or scattered shells, or hard substrates such as clam shells, limestone, concrete aggregate, etc.
	Reef	Thick shell

Source: State of Louisiana Sampling Protocol for Projects in Public Oyster Areas, available at: http://dnr.louisiana.gov/crm/coastmgt/permitsmitigation/oyster/sampling-protocol.pdf

Figure A-1. A side scanned image of oyster reef in Mobile Bay, Alabama

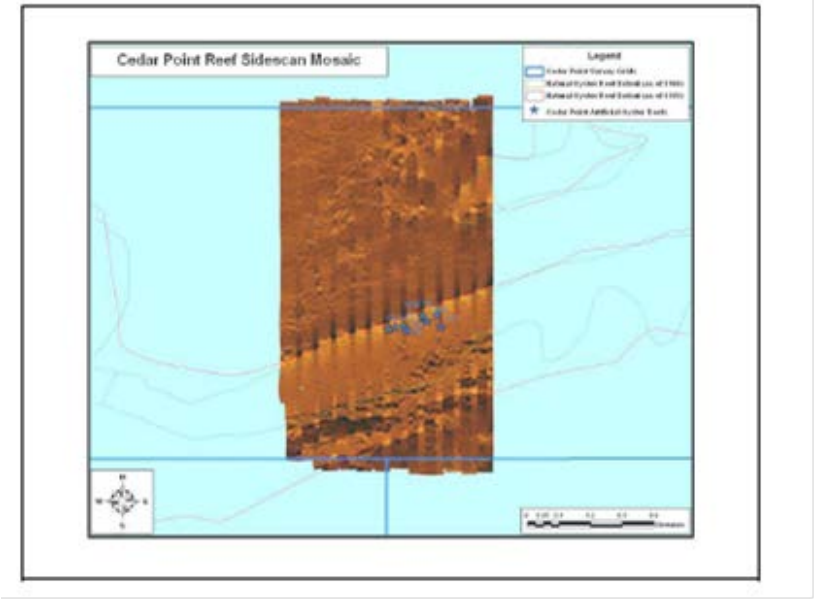
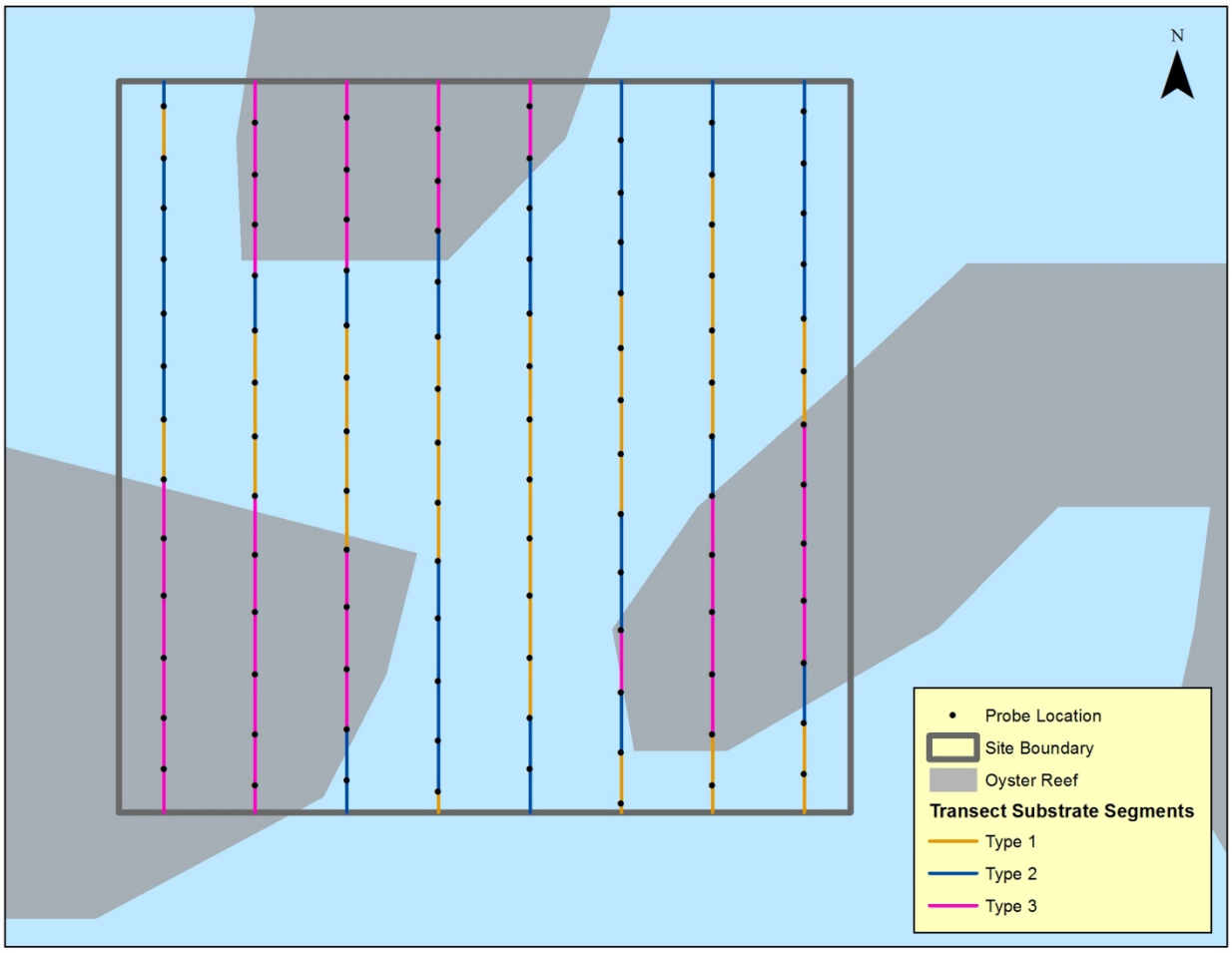


Figure A-2. Hypothetical 2013 Mapping Plan site illustrating the execution of transect poling in the field, showing eight transect lines with probe locations intersecting three oyster reefs and resulting transect substrate segments.



Transects are colored according to substrate segments resulting from the transect poling exercise, following post-processing of the transect mapping data.

Trustee Validation SOPs

The substrate mapping results from the side-scan sonar and transect poling data collection will be validated using either a 24-inch wide oyster hand dredge or hand tongs to check for the presence of oyster resource or hard substrate in each state and substrate Type. Validation will be conducted at a subset of sites, and only at sites which have been mapped and are reported to have Type 3 substrate present (these sites may have Types 1 or 2 substrate present, in addition to Type 3). In MS, AL and FL, 10 sites will be selected for validation in each state using the GRTS sampling procedure or other random procedure to select a set of candidate sites. In LA, 60 sites will be selected for validation using the GRTS sampling procedure or other random procedure to select a set of candidate sites. Field crews will execute dredges or tong grabs along specified paths of 16m in length in each selected site: up to 2 paths in Type 3 substrate, and, if present, up to 1 path each in Types 1 and 2 substrate. The location coordinates of the paths will be determined by the Trustees prior to the validation site visit. Each path will intersect only one substrate Type, according to the mapping results of processed side-scan sonar or transect poling data.

Where their use is appropriate, dredges should be towed along each path selected for validation. In locations where tongs must be used, 8 tong grabs should be obtained along the path at approximately equal intervals beginning and ending at either end of the path. Contents of each dredge or tong grab will be recorded on field data forms “Validation Dredge Form – Trustee Validation” or “Validation Tong Form – Trustee Validation”, photographed and used to help interpret and estimate the total square kilometers of each of the three substrate Types in each state and stratum. Specifically, the presence of live and recently dead oysters or hard substrate in a dredge or tong grab will be recorded (see Table A-1). Field teams will photograph the contents of dredge and tong contents, both before and after rinsing. Oysters collected for this purpose during reconnaissance activities will not be retained.

Literature Cited

Allen, Y. C. Wilson, C. A., Roberts, H. H. and J. Supan. 2005. High resolution mapping and classification of oyster habitats in nearshore Louisiana using sidescan sonar. Estuaries. 28(3): 435-446.