Deepwater Horizon/Mississippi Canyon 252 Spill

As agreed upon by the Trustees and BP, all samples collected for contaminant analysis during the sampling plan described below will be sent to Alpha Analytical or Columbia Analytical Services, unless they are designated to be archived. Samples for other analyses, if not archived, will be sent to the laboratories indicated in the plan below.

Each laboratory shall simultaneously deliver raw data, including all necessary metadata, generated as part of this work plan as a Laboratory Analytical Data Package (LADP) to the trustee Data Management Team (DMT), the Louisiana Oil Spill Coordinator's Office (LOSCO) on behalf of the State of Louisiana and to BP (or ENTRIX behalf of BP). The electronic data deliverable (EDD) spreadsheet with pre-validated analytical results, which is a component of the complete LADP, will also be delivered to the secure FTP drop box maintained by the trustees' Data Management Team (DMT). Any preliminary data distributed to the DMT shall also be distributed to LOSCO and to BP (or ENTRIX on behalf of BP). Thereafter, the DMT will validate and perform quality assurance/quality control (QA/QC) procedures on the LADP consistent with the authorized Quality Assurance Project Plan, after which time the validated/QA/QC-ed data shall be made available simultaneously to all trustees and BP (or ENTRIX on behalf of BP). Any questions raised on the validated/QA/QC results shall be handled per the procedures in the Quality Assurance Project Plan and the issue and results shall be distributed to all parties. In the interest of maintaining one consistent data set for use by all parties, only the validated/QA/QC-ed data set released by the DMT shall be considered the consensus data set. In order to assure reliability of the consensus data and full review by the parties, no party shall publish consensus data until 7 days after such data has been made available to the parties. Also, the LADP shall not be released by the DMT, LOSCO, BP or ENTRIX prior to validation/QA/QC absent a showing of critical operational need. Should any party show a critical operational need for data prior to validation/QA/QC, any released data will be clearly marked "preliminary/un-validated" and will be made available equally to all trustees and to BP (or ENTRIX on behalf of BP).

All materials associated with the collection or analysis of samples under these protocols or pursuant to any approved work plan, except those consumed as a consequence of the applicable sampling or analytical process, must be retained unless and until approval is given for their disposal in accordance with the retention requirements set forth in paragraph 14 of Pretrial Order # 1 (issued August 10, 2010) and any other applicable Court Orders governing tangible items that are or may be issued in MDL No. 2179 IN RE: Oil Spill by the Oil Rig "DEEPWATER HORIZON" (E.D. LA 2010). Such approval to dispose must be given in writing and by a person authorized to direct such action on behalf of the state or federal agency whose employees or contractors are in possession or control of such materials.

This plan will be implemented consistent with existing trustee regulations and policies. All applicable state and federal permits must be obtained prior to conducting work.

Approval of this work plan is for the purposes of obtaining data for the Natural Resource Damage Assessment (NRDA). Parties each reserve its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan.

APPROVED:

_____	_____
Louisiana Trustee Representative:	Date
_____	_____
BP Representative:	Date
_____	_____
NOAA Trustee Representative (on behalf of all other trustees)	Date

Mississippi Canyon 252 Spill
Oyster Sampling Plan
2012 Intertidal Oyster Quadrat Sampling

February 9, 2012

Introduction

A Technical Working Group ("oyster working group") of experts and trustee agency and BP representatives has been assembled to develop work plans appropriate to carry out assessments of potential injury to oysters throughout the northern Gulf of Mexico following the Deepwater Horizon (DWH) oil spill. This document presents a plan to conduct oyster reef quadrat sampling in intertidal zones in the northern Gulf of Mexico.

Objective/Purpose

To date, sampling plans conducted by the oyster working group to assess oyster abundance following the Deepwater Horizon oil spill have focused predominantly on assessing injury to sub-tidal oysters located at depths of one meter or more below the water surface. Recent work under the Assessment Plan for Marsh Edges and Sandy Shorelines (hereafter the Marsh Edge Plan) has identified the presence of oysters at Marsh Edge study sites exhibiting a range of reported total petroleum hydrocarbon (TPH) values in sediments. This 2012 Intertidal Oyster Quadrat Sampling Plan (hereafter the Intertidal Plan) proposes to sample oysters at a subset of these Marsh Edge Plan sites. The sites to be sampled are characterized by a) identified oyster resource in the intertidal zone and/or b) total petroleum hydrocarbon (TPH) screening results indicating oiling equal to or greater than naturally occurring organic matter in the intertidal area.

The purpose of the Intertidal Plan is to assess the need for additional study of potential injury to oysters in the intertidal zone of the Northern Gulf of Mexico following the DWH spill.[1] The oyster working group believes that sampling conducted at this point in time following the DWH spill can still yield valuable information on the health of intertidal oyster resource and the potential for current and possibly future exposure to contaminants, information which may signal the need for additional investigation. Any initial injuries due to the DWH spill and response actions, if they occurred, may still show impacts to current intertidal oyster populations compared to areas with lesser or no exposure. Furthermore, detections of elevated TPH levels in sediments at Marsh Edge sites where oysters were observed indicates the potential exists for current and/or future exposures of oyster resource to contamination that may have originated from the DWH spill.

The oyster working group will use the results of this plan to determine if additional study of the intertidal zone is warranted, based on an evaluation of the following:

[1] We define the intertidal zone as extending from mean high water to a depth of 0.5 meters past mean low water.

1. Whether oysters in the intertidal study area exhibit evidence of degradation resulting from the Deepwater Horizon oil spill and associated response actions, and

2. Whether oysters in the intertidal study area show evidence for continued, chronic exposure to contaminants from the DWH spill.

The focus of the first objective is to determine if intertidal oysters show evidence of injury from the DWH spill and associated response activities. This assessment will be based on examination of size frequency and density of oysters and associated fauna across a range of areas with varying degrees of exposure to DWH spill contaminants and to the consequences of response activities.

The objective will be evaluated by mapping oyster resource at 58 sites from the Marsh Edge Plan and quantitatively sampling sites with oysters using quadrats. Thirty-four of these sites were selected based on the documented observation of oysters during sampling under the Marsh Edge Plan. The remaining 24 sites were added because they had at least one sediment sample collected under the Marsh Edge Plan that was categorized as TEH (total extractable hydrocarbons) level A or B, indicating the presence of petroleum hydrocarbons at levels greater than (A) or roughly equal to (B) the naturally occurring organic matter in the sample. These 58 sites also represent a range of exposures to changes in water quality (e.g., pH and salinity) resulting from actions undertaken by the state of Louisiana in response to the spill in 2010 and/or from the Morganza and Bonnet Carré spillway openings conducted by the Army Corps of Engineers in May 2011. Because a fully factorial design to evaluate all possible factors is not possible with 58 sites, it is not the intent of this work plan to exhaustively assess potential injury, but instead, to complete a modeling exercise to evaluate whether additional resources for resource mapping and biological sampling should be focused on intertidal areas.

The second objective will determine if oysters in the intertidal environment show evidence of ongoing, chronic exposure to residual or re-suspended MC 252 oil. Intertidal areas are high energy environments characterized by frequent re-suspension of sediments. Quantitative chemical analyses of oyster tissues collected to address the first objective will be used to evaluate the second objective and determine if additional sampling is warranted.

The results of the Intertidal Plan will be used to support the assessment of any injury to oyster abundance and biomass and to inform and support restoration planning efforts.

The Plan specifically addresses the following topics:

1. Approach and rationale: This section describes the overall purpose and need for the Intertidal Plan.

2. 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.

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

4. Estimated Study Cost: This section provides an estimate of the cost of implementing the Intertidal Plan.

Approach and Rationale

Estuarine and marine intertidal (defined here as supratidal to 0.5 m depth at mean low water) areas are frequently colonized by oysters in the northern Gulf of Mexico. Although not generally harvested because of logistic difficulties in accessing these areas by boats, intertidal oyster resource represents a valuable habitat for finfish and invertebrates, stabilizes shorelines that are subjected to erosive wave energy, and provides a source of larvae for subtidal areas (see Coen et al. 2007 and Powers et al. 2009 for review). Intertidal habitats have been and may continue to be impacted by the release and re-suspension of MC 252 oil. Based on surveys of past oil spills (e.g., Ixtoc , Tunnel et al. 1981; Exxon Valdez , Peterson et al. 2003; Persian Gulf-Kuwait Conflict, Gundlach et at. 1993, see also NRC 2003) as well as observations from the MC 252 oil spill, intertidal sandy shores and marsh edge habitats often receive and accumulate oil transported by surface waters. Further exposure may occur when oil that has accumulated in bottom sediments is re-suspended by currents and transported to nearshore areas and via tide and wind induced changes in water elevation. Shallow sub-tidal areas sampled under the marsh edge found areas that revealed high TPH values. These surveys also documented oyster resource in approximately 16% of the marsh edge sites visited. As noted previously in the Phase I plan, quadrat sampling provides valuable data on abundance and biomass of oysters and related fauna because it achieves a highly quantitative sample (i.e. the area and effort of the sample are well defined).[2]

Preliminary data obtained from the Phase I Amendment 2 quadrat sampling show low or zero abundance values generally across much of the Phase I study area, including areas that may have been impacted by contaminants from the Deepwater Horizon spill, and/or from freshwater diversions instituted by the state of Louisiana in 2010 in response to the spill. In addition, the preliminary results from dredge-based abundance assessments at Transition Plan sites show

[2] Quantitative sampling of oyster reefs is commonly accomplished by randomly placing on the reef a quadrat made of PVC that covers an area of a full meter square (1 m x 1 m), and then collecting all biota and other material encompassed within that quadrat up to a specified depth equivalent to about the size of one's hand.

similarly low findings. These initial results, as well as potential impacts on oyster resources of freshwater from the Morganza and Bonnet Carré spillway openings in Spring 2011, also warrant assessments of abundance and biomass metrics at intertidal sites using quadrat sampling.

The oyster working group has concluded that the preliminary findings of the Marsh Edge Plan coupled with low oyster abundance in many of the subtidal areas warrant further investigation. The additional sampling proposed in the Intertidal Plan will contribute to the oyster working group's understanding of the geographical extent of injuries to the adult and juvenile oyster populations. Counts of spat-sized oysters from the quadrat samples will complement data on oyster settlement monitoring that the oyster working group has been collecting under the Phase I, Transition, and Spring 2011 Plans.

Below is a summary of the key aspects of the 2012 Intertidal Quadrat Sampling Plan:

- The plan collects samples at locations not previously mapped and sampled under the four prior DWH NRDA oyster plans.
- Table 3 shows the metrics to be assessed and the frequency of sampling proposed for the Intertidal Plan. All samples will be taken in accordance with the protocols and standard operating procedures (SOPs) presented at the end of this document.
- Prior to quadrat sampling, sites will be mapped to determine areas with oyster resource, following the standard operating procedures detailed in Appendix A.
- In locations where oyster resource intersect with mapping transects, oyster abundance and biomass will be measured during one round of quadrat sampling.
- Material collected from the quadrats will be bagged and sent to Dauphin Island Sea Lab (DISL) for abundance counts and biomass of oysters and other observed fauna. Contaminant tissue samples will undergo contaminant analysis by Columbia Analytical Services.

<u>Estimated samples from this activity</u>
Field teams under this plan will sample up to 58 sites located across intertidal regions in the northern Gulf of Mexico. Table 4 summarizes sampling activity in the 2012 Intertidal Quadrat Sampling Plan. Assuming adequate oyster resource exists and is accessible to the teams, the target numbers of samples resulting from this activity are as follows:

- Up to 348 oyster quadrat samples (six per sample site) that will be analyzed for abundance and biomass measurements at DISL;

- Up to 116 oyster tissue samples (two samples per site, six market-sized oysters or equivalent per sample) that will undergo contaminant analysis.

Health and Safety

- The team leader and field crew parties should have completed all applicable health and safety training as directed by NOAA or state agency oil spill policy.
- All field team members must complete the NOAA safety training and documentation requirements as set forth in "Safety Requirements for All Personnel Working on NOAA-led NRDA teams for MS Canyon 252 Incident" (NOAA Safety Documentation Requirements.doc).
- All field team members should read all of the documents in the Safety directory on the case's NOAANRDA.org site.
    - Exception: if site collection activities do not include use of a boat or helicopter, then familiarity with the safety documents for these vehicles is not required.
- Field teams must adhere to all procedures set forth in the most recent version of the MC252 Site Safety Plan ("NRDA_Ops_Safety Plan_08 04 11.docx").
- 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

The Oyster TWG proposes to sample a subset of the 337 sites originally sampled as part of the Marsh Edge Plan. These sites were in turn a subset of the 2,789 sites originally sampled as part of the Shoreline/Vegetation NRDA Pre-assessment Data Collection Plan. The subset of sites proposed for sampling includes the 34 sites at which the sediment sampling teams identified oyster resource as present. (Teams did not quantitatively assess the size of the oyster resource.) All of the shallow sediments and for the marsh sites, the deep sediments in the horizontal zones nearest to shore have undergone initial TPH screening analyses. WEST, Inc. categorized each site based on the maximum TPH screening results with respect to oil observed in the sediment samples for a given site. Table 1 outlines the distribution of sites with respect to TPH level for the 34 sites identified with oyster resource.

Table 1. Distribution of 34 Marsh Edge Plan sites with identified oyster resource.

TEH level	Description	# of Sites
A	TEH greater than naturally occurring organic matter (NOM)	2
B	TEH roughly equal to NOM	5
C	TEH less than NOM	12
D	no observable TEH	15

Although oyster resource was only identified at 34 sites, the low size of the tides during the sediment teams visits to the sites during June - August of 2011, the opaque and turbid nature of gulf coast waters, and the inability to survey all sites at low tide means that sediment teams may not have been able to accurately determine the presence or absence of oyster resource at a site. The oyster TWG believes it is highly likely that some of the remaining 303 Marsh Edge Plan sites have oyster resource.

In order to better meet the plan objectives, an additional 24 Marsh Edge Plan sites with reported TEH levels of A or B are proposed for mapping and sampling. There were an additional 44 Marsh Edge plan sites at which oyster resource was not identified with TEH levels of A and B, 20 of which were identified as beach sites and 24 of which were identified as marsh sites. Since only 4 of the 34 Marsh Edge Plan sites identified with oysters were beach sites, the Oyster TWG proposes to only sample the 24 sites with TEH levels of A or B identified as marsh sites in order to increase the likelihood of finding oyster resource. Table 2 outlines the distribution of sites with respect to TEH level for the proposed 58 sites.

Figures 1 through 7 present maps of the intertidal sampling locations across Louisiana, Mississippi, Alabama, and Florida.

Figure 1: 2012 Intertidal Quadrat Sampling Plan Locations (Louisiana Overview)

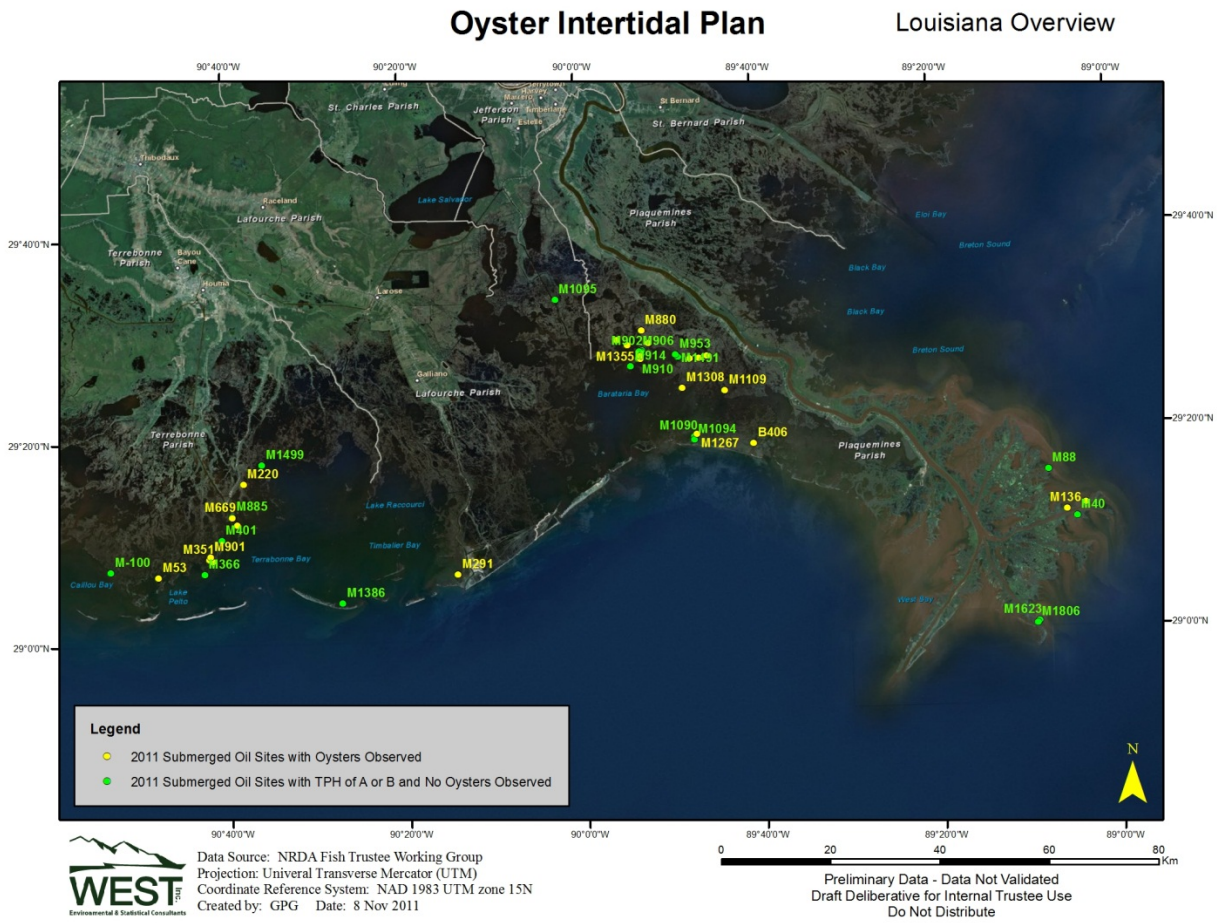


Figure 2: 2012 Intertidal Quadrat Sampling Plan Locations (Barataria Bay, Louisiana)

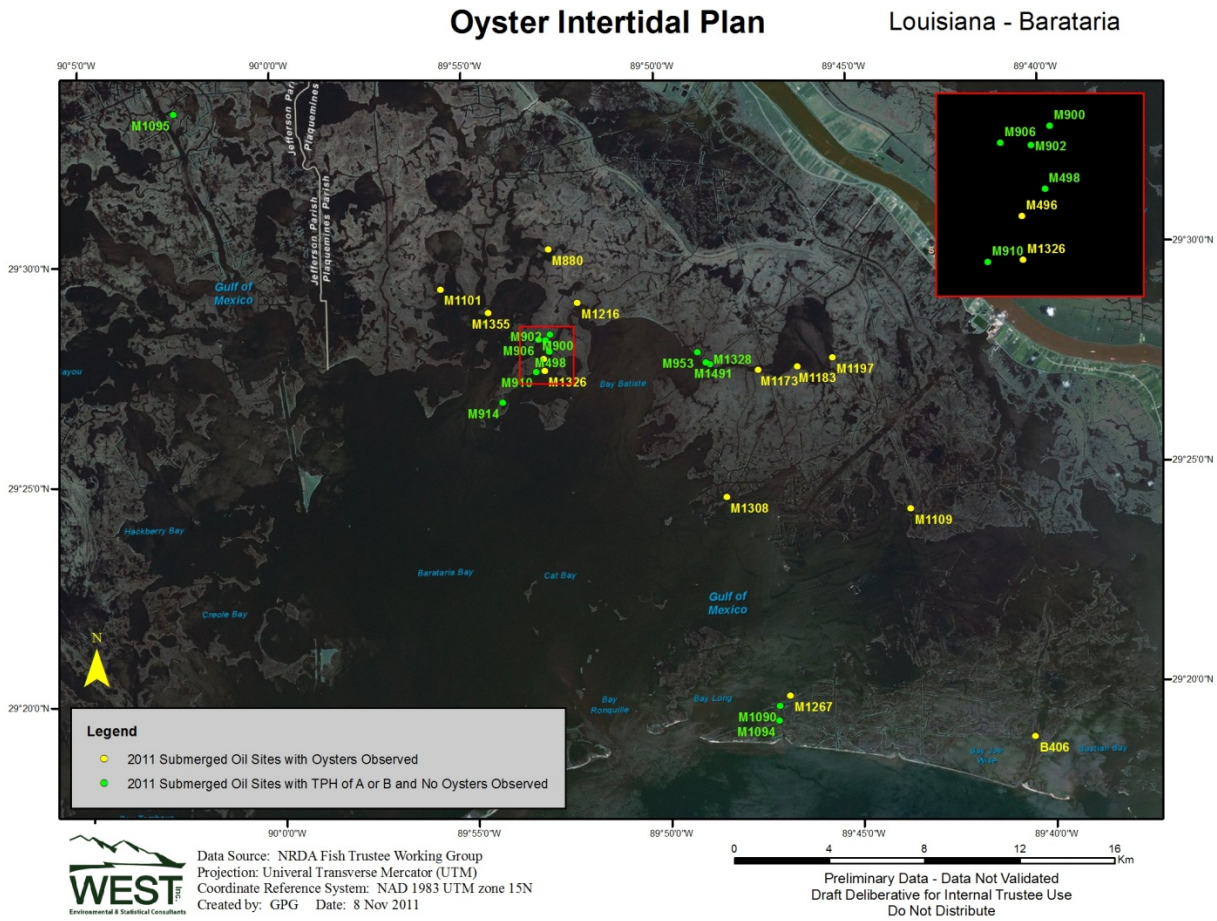


Figure 3: 2012 Intertidal Quadrat Sampling Plan Locations (Mississippi River Delta, Louisiana)

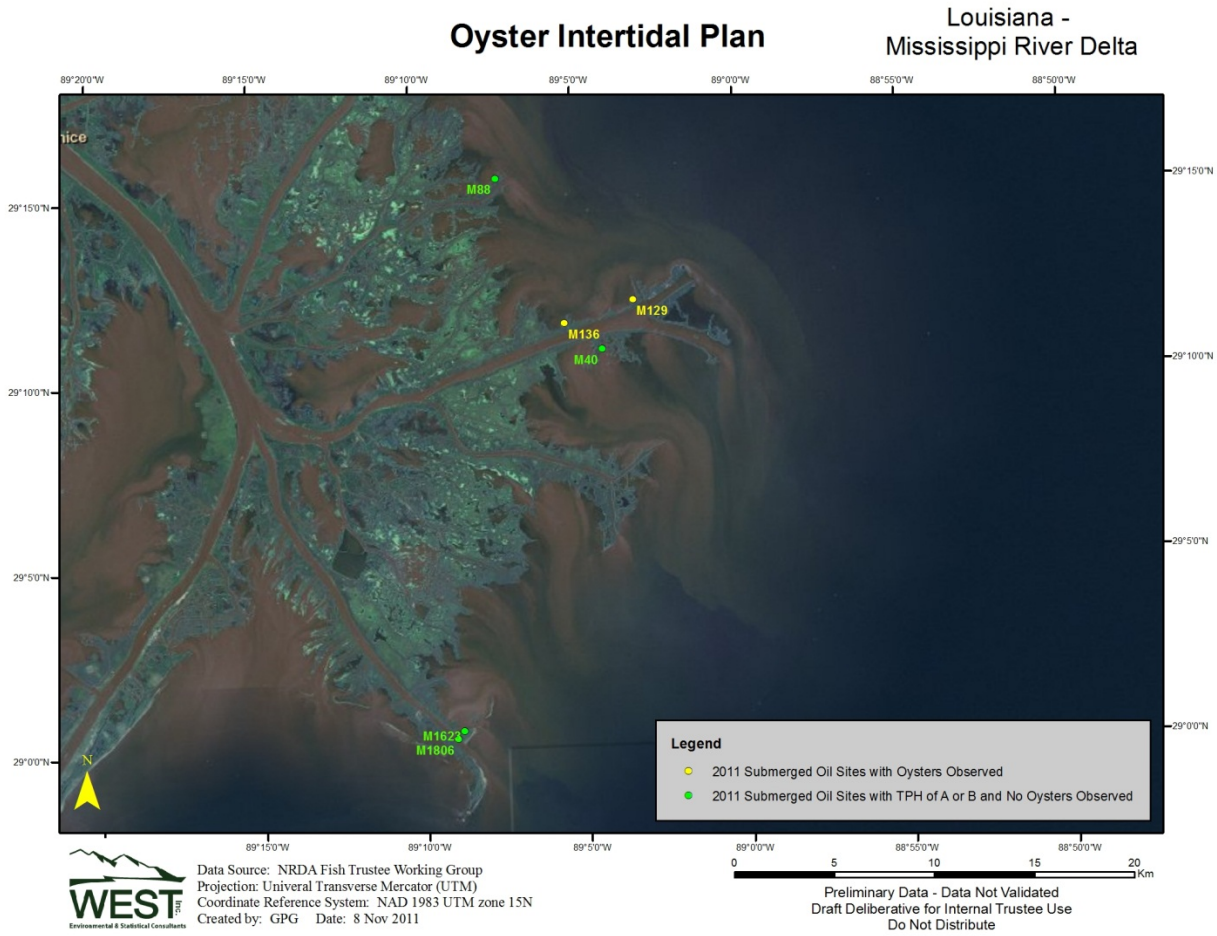


Figure 4: 2012 Intertidal Quadrat Sampling Plan Locations (Terrebonne Bay, Louisiana)

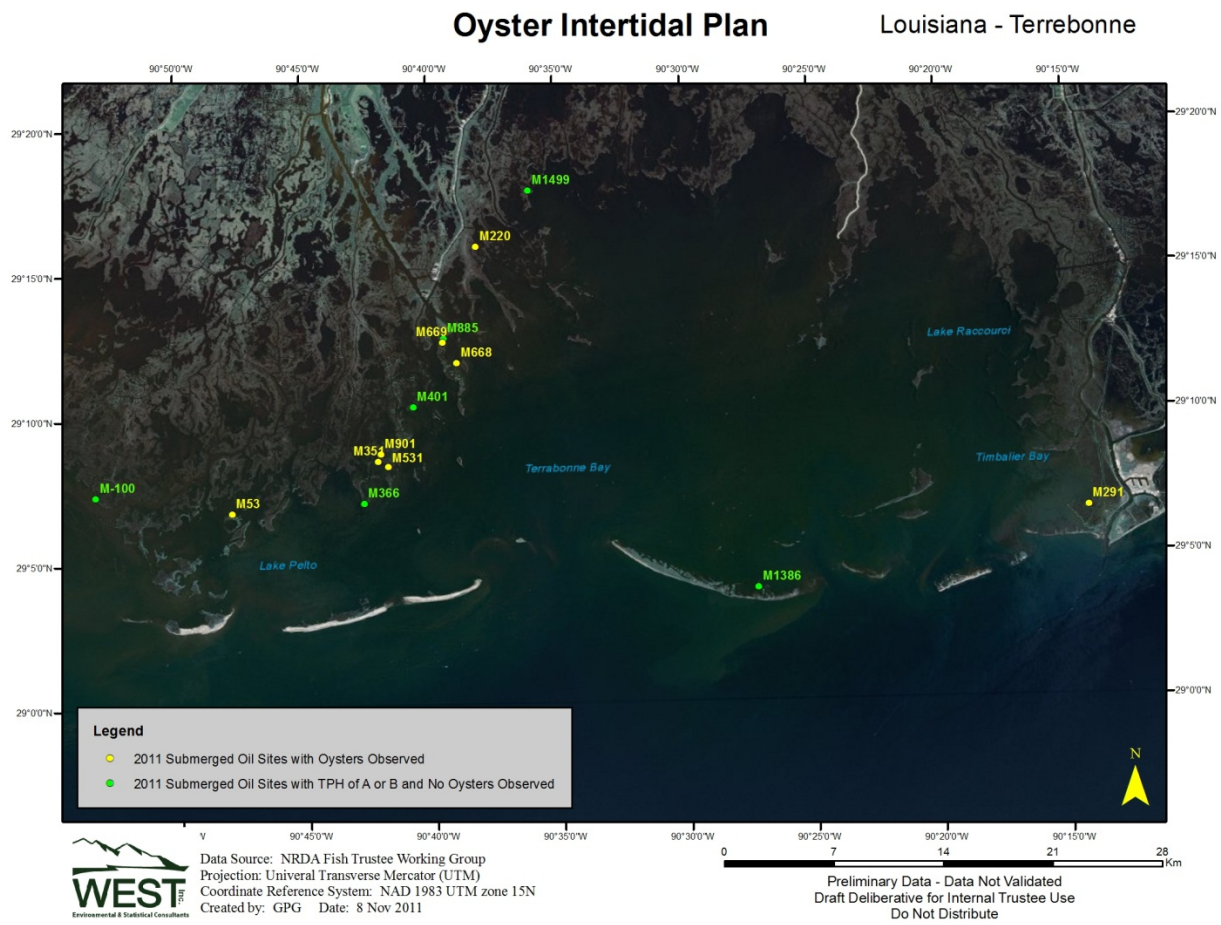


Figure 5: 2012 Intertidal Quadrat Sampling Plan Locations (Mississippi)

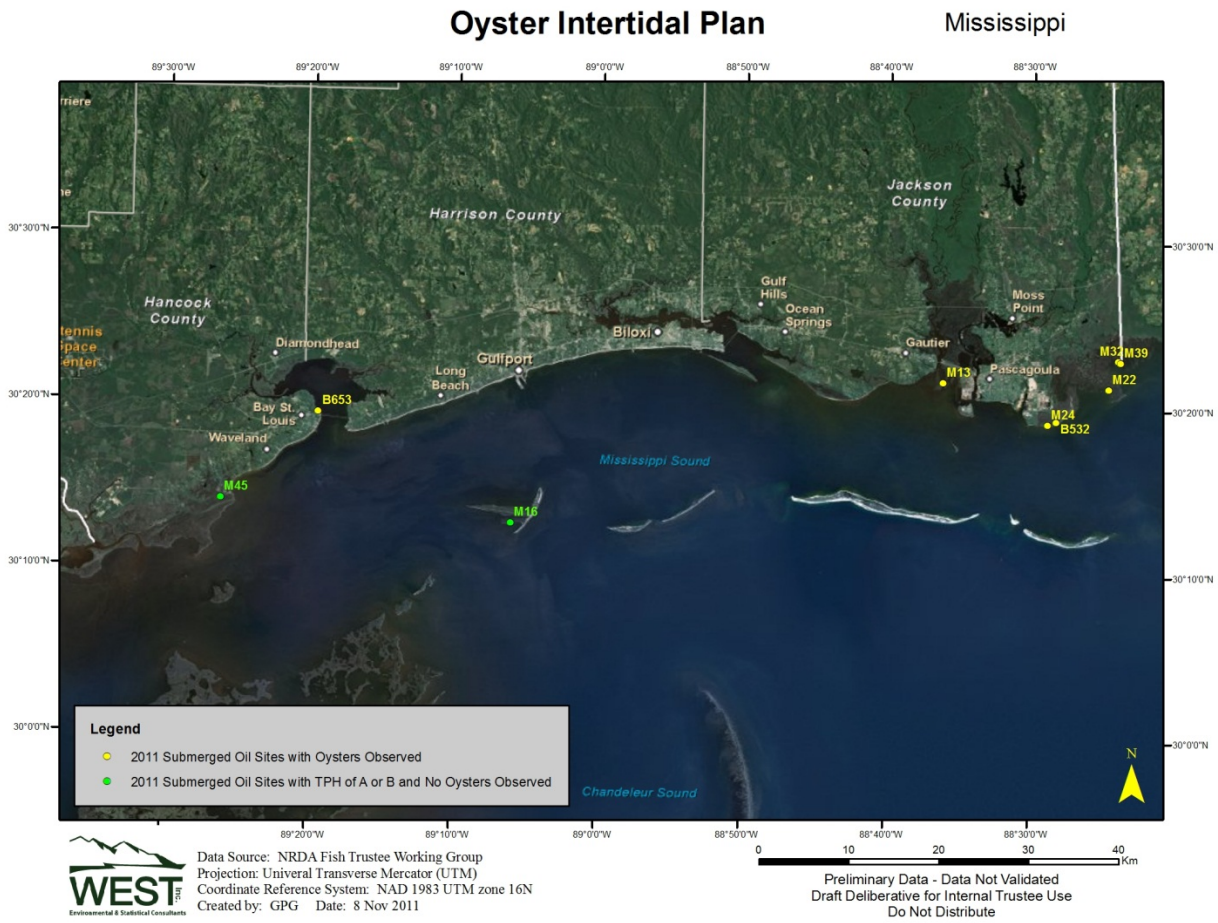


Figure 6: 2012 Intertidal Quadrat Sampling Plan Locations (Alabama)

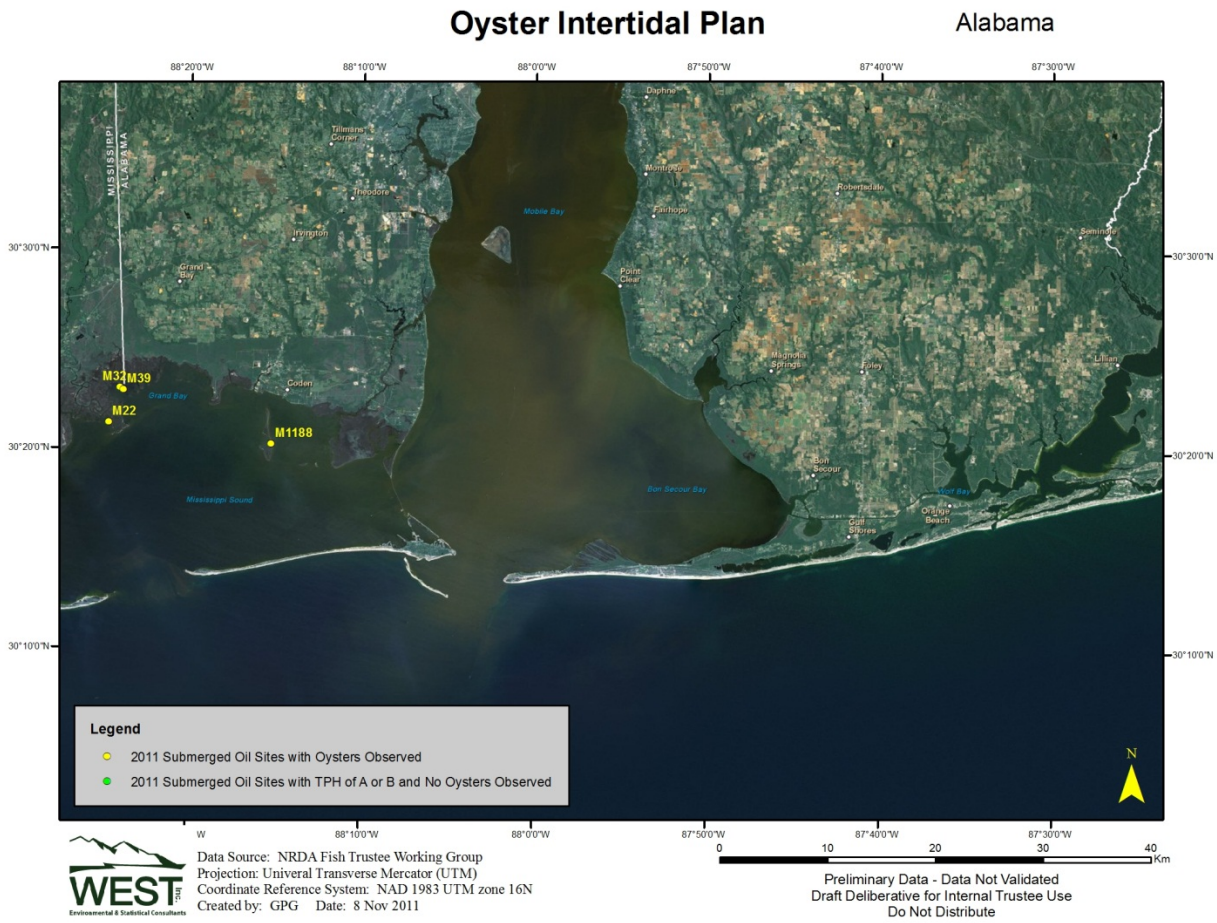


Figure 7: 2012 Intertidal Quadrat Sampling Plan Locations (Florida)

Table 2. Distribution of 58 Marsh Edge Plan sites proposed for sampling in this plan.

TPH level	# of Sites with oyster resource	# of Sites with unknown oyster resource	# of Sites Total	# of Sites to be mapped for oyster resource	# of Sites to be sampled with quadrats
A	2	10	12	12	min 2, up to 12
B	5	14	19	19	min 5, up to 19
C	12	0	12	12	12
D	15	0	15	15	15

Summary of Site Sampling

The Oyster TWG proposes to sample the selected sites as follows:

- Resource Mapping: Forty transects, perpendicular to the shoreline, will be located 5 meters apart within a site. Transects will be systematically located with a random starting location between 0 and 5 meters to the right of the central point of the site (as provided by West, Inc.). Transects will start at the mean high water line and end be approximately 15 to 20 meters in length. Transects will vary in length depending on the ability of the field crews to establish a transect line by manually throwing a weighted line. If oysters are identified on the transect, quadrat sampling will be completed as detailed below. For further information on resource mapping, see the mapping SOP in Appendix A.

- Quadrat Sampling: Quadrat samples will be collected at sites with identified oyster resource based on the mapping activity detailed above and in the SOP in Appendix A. Quadrat samples will be collected at points randomly selected for each site where appropriate substrate (i.e., oyster resource) is present. Up to six independent quadrat samples will be collected per cell. Quadrats are made of PVC and are 1.0 m by 1.0 m (1 meter square). The square meter quadrat will be sampled by hand. Quadrat sampling will be used to determine oyster density, size frequency and biomass. These analyses will be conducted by staff at the Dauphin Island Sea Lab (DISL) in Dauphin Island, Alabama. DISL staff will prepare two composite oyster tissue samples for contaminant analysis from the quadrat samples collected at each site. Each sample will consist of six randomly selected market sized oysters (or equivalent mass of seed or seed plus market sized oysters) taken from half of the collected quadrats at each site.

Cost Estimate

The estimated cost for this plan is $596,820. The subtotal for the field and laboratory costs including oyster resource mapping, quadrat sampling, and quadrat processing is $546,360 and the subtotal for the costs of oyster tissue contaminant analysis is $50,460. For details concerning cost estimates, refer to Table 4: Costs for 2012 Intertidal Oyster Quadrat Sampling Plan as well as the Excel file [Draft_Intertidal_Plan_Costs_020112.xlsx].

The Parties acknowledge that this budget is an estimate, and that actual costs may prove to be higher due to a number of potential factors. BP's commitment to fund the costs of this work includes any additional reasonable costs within the scope of this work plan that may arise because of any contingencies. The trustees will make a good faith effort to notify BP in advance of any such contingencies.

Table 3. Proposed metrics and frequency of sampling.

Metric	Proposed Frequency of Sampling
Effect Metrics	
Oyster abundance (qualitative)	One event
Exposure metrics	
Tissue concentrations	One event
Oiling observations (qualitative)	Collected on each site visit

Table 4. Costs for 2012 Intertidal Oyster Quadrat Sampling Plan.

Item	Unit cost	Units	Units (teams * days or samples)	Total per event	# of events	Total cost (Event Total * frequency)
Oyster Reef Mapping and Quadrat Sampling				**$417,600**	**1.00**	**$417,600**
Personnel	[redacted]	[redacted]	[redacted]	$185,600		$185,600
Boat charges	$2,000	Days	116.00	$232,000		$232,000
Quadrat Processing				**$128,760**	**1.00**	**$128,760**
Personnel	[redacted]	[redacted]	[redacted]	$125,280		$125,280
Supplies	$5	Samples	348	$1,740		$1,740
Shipping and archive charges	$5	Samples	348	$1,740		$1,740
Field/Lab Total						**$546,360**
Analytical Costs						**$50,460**
Oyster Contaminants	$435	sample	116.00	$50,460	**1.00**	$50,460
Total						**$596,820**

Appendix A: Detailed Standard Operating Procedures (SOPs)

Oyster Resource Mapping and Sampling SOP

A. Photographs

See NRDA Field Photography Guidance (available on www.noaanrda.org) for camera preparation and set up prior to field work.

1. Photograph the operating GPS screen showing the date and time to synchronize the photos with the GPS track. Be sure to photograph the GPS unit number if the team will be using multiple GPS units, and use this GPS unit exclusively for all waypoints where photographs are taken.

2. Photograph the boat (include the boat numbers) used for the field work.

3. Photograph waypoints on the GPS at the site center point and at points where oyster quadrats are collected.

4. Photograph the site and any noteworthy site conditions.

5. Photograph any exposed oyster resources at the site - both close-up to show individual oysters and from a distance to capture the extent of the resource.

6. Photograph the collected quadrat samples when observing/describing the resource.

7. Record the photo range numbers as indicated below.

B. Site setup

Each field team will fill out a **2012 Oyster Intertidal Sample Plan Site Visit Form** for each visit to the site. More than one visit may be required to complete a site. There are several sections to each form as follows. Note that the **Site Information** section is on all forms and should be filled out identically for a given site visit. Please see the data sheet reference guide for additional information on how to fill out each field on the data forms.

1. Travel to the site. Field teams will be supplied with the site name and site center point location prior to going to the field.

2. Fill out the Site Information and Team Assignments and GPS Unit #s sections when arriving at the site.

Site Information

- Team Leader

- Leader Code
- Team ID
- Date
- Site name (e.g., SP-FL-B-MESS-604)
- Site ID (e.g., 0604)
- Site Visit (e.g. 1, 2, ... n)
- Time (24 hour)

Team Assignments

- Federal Representatives (Name/Affiliation)
- State Representatives (Name/Affiliation)
- Data Recorder (Name/Affiliation)
- GPS Handler/Photographer (Name/Affiliation)

GPS Unit #:

- GPS Unit #:
- GPS Unit #:

3. Locate the mean high water line. The mean high water line may be determined by a clear color change in the marsh or beach (see figure 8). This color shift indicates the boundary between areas that are normally above the water line and areas that are regularly submerged at high tide. In Louisiana, the mean high tide line marks the start of private property. Remain on the shoreline side of this line while completing field work.

Figure 8: Mean High Water Line

4. Locate the site center point (provide by WEST, Inc.) and adjust to the mean high water line or the edge of the vegetation, whichever is closer to the water. Record the waypoint, latitude and longitude and GPS Unit #. **Note that this should only be completed on the first visit to the site - it is not necessary to adjust the site center point during additional site visits.**

Site Center Point Location

- Waypoint
- Latitude (29 to 31)
- Longitude (-88 to 90)
- GPS Unit #

5. Measure and record the site and atmospheric conditions.

Site and Atmospheric

- Air Temperature (˚C)
- Weather Conditions
- Wave Height (m)
- Wind Condition
- Wind Direction
- General Site Description
- General Resource Setting
- Oiling Conditions

- Tide Station Name
- Tide Station Distance (km)
- Tide status at sampling
- Time (24 hour)

6. Measure and record the physical/chemical parameters in water nearest the site center point. Collect only surface data. Complete YSI calibration or check as necessary. Measurements should be taken at a water depth of at least 20cm.

Physical/Chemical Parameters

- Waypoint #
- Latitude
- Longitude
- GPS Unit #
- Water Temperature (˚C)
- Dissolved Oxygen (%)
- Dissolved Oxygen (mg/L)
- Salinity (ppt)
- YSI Calibrated
- YSI Meter Number
- YSI Calibration Check
- Time (24 hour)
- Conduct Cal Solution
- DO Reading
- Conductivity Reading

C. Site mapping

Each field team will fill out the **2012 Intertidal Sample Plan Oyster Mapping Form I: Group A (Left of Ctr)** and the **2012 Intertidal Sample Plan Oyster Mapping Form I: Group B (Right of Ctr)** and the **2012 Intertidal Sample Plan Oyster Mapping Form II: Group A (Left of Ctr)** and the **2012 Intertidal Sample Plan Oyster Mapping Form II: Group B (Right of Ctr)** when mapping a site. More than one visit may be required to map a site. Note that the **Site Information** section is on all forms and should be filled out identically for a given site visit. Please see the data sheet reference guide for additional information on how to fill out each field on the data forms.

In summary: Forty transects, perpendicular to the shoreline will be located within a site (Figures 10 and 11). Transects will be systematically located with a random starting location between 0

and 5 meters to the right (when facing the water) of the site center point (as provided by West, Inc.). Transects will start at the mean high water line or the edge of the vegetation and be approximately 15 to 20 meters in length. Transects will vary in length depending on the ability of the field crews to establish a transect line by manually throwing a weighted line.

1. Fill out the Site Information section prior to mapping the site. Designate one GPS unit as Unit A and the other as Unit B and record this information on the **Site Visit Form**.

Site Information

- Team Leader
- Leader Code
- Team ID
- Date
- Site name (e.g., SP-LA-B-MESS-604)
- Site ID (e.g., 0604)
- Site Visit (e.g. 1, 2, ... n)
- Time (24 hour)

2. Divide the field team into two groups. Group A will map the left side (when facing the water) of the site and group B will map the right side (when facing the water) of the site. All transects start at the mean high water line or the edge of the vegetation, whichever is closer to the water. The first transect for Group B will start at the distance provided by West, Inc to the right (when facing the water) of the site center point (between 0 to 5 meters). Subsequent transects will be 5 meters away from the previous transect **as measured by following the shoreline**. For Group A, the first transect will begin at 5 meters to the left (when facing the water) of Group B's first transect. Mark the start of each transect by driving a 1" PVC pole into the substrate. Record the waypoint, latitude and longitude of the transect start location. Record the GPS Unit # used to record the waypoint.

3. Manually throw a weighted line perpendicular to the 5 meter section of shoreline at the transect starting location. The line should extend 15 to 20 meters from the shoreline. The transect length should be at least 15 meters. If the distance thrown is less than 15 meters, pull in the transect line and throw again. After the line has been thrown and then pulled taut, record the direction of the line in degrees (this information will help you find selected oyster resource segments to sample after the mapping is complete). Enter a NA into all meter segments for a given transect beyond the end of the transect. For example, if the transect is only 16 meters in length based on the thrown line, enter NA into M17, M18, M19 and M20 for the given transect.

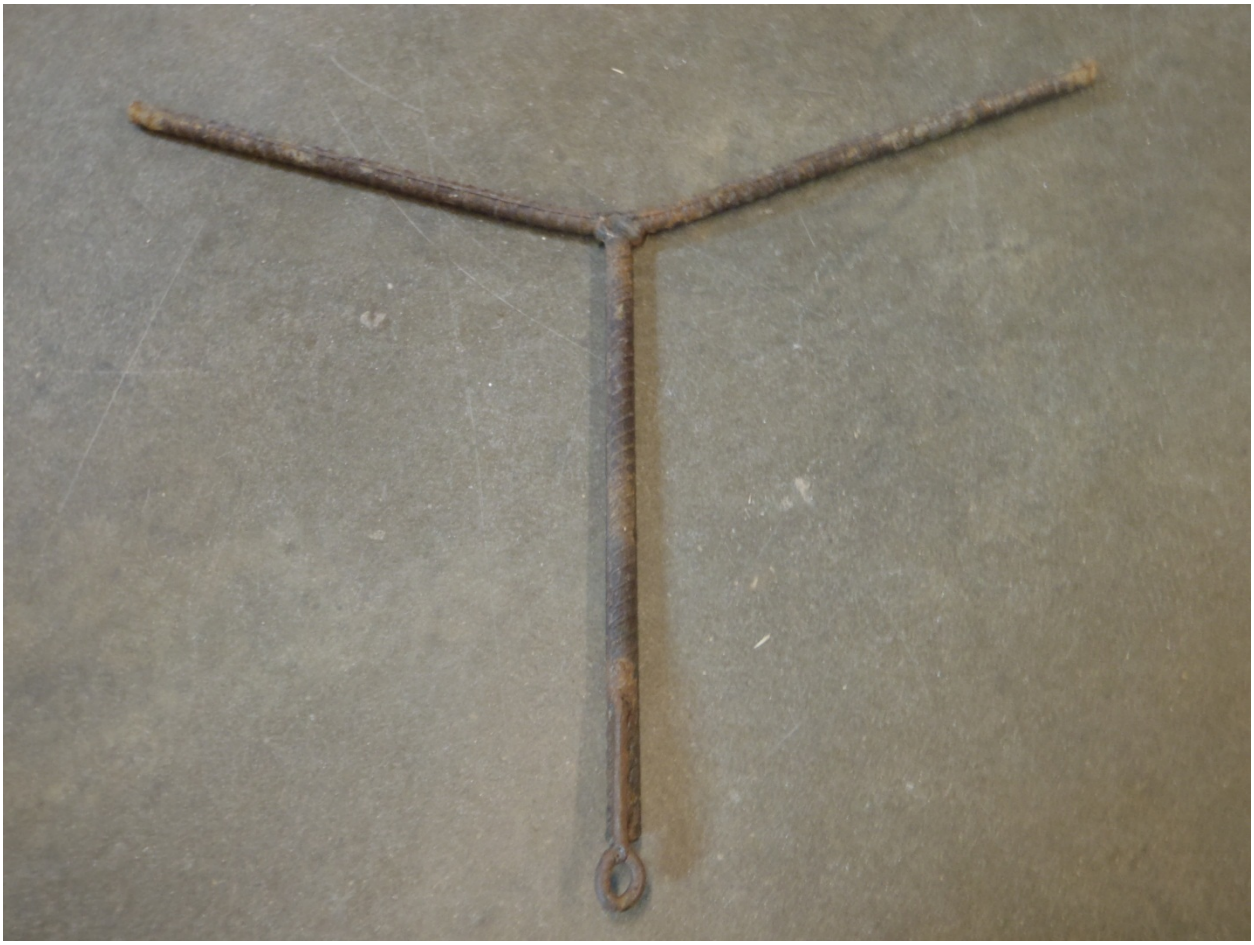
4. Slowly pull the line toward the shore, calling out the meter number to the data recorder based on the markings on the weighted line and feeling for the presence of oyster shell contacting the

metal weight at the end of the line. Group A should record the location of oyster resource segments to the nearest meter on the **2012 Intertidal Sample Plan Oyster Mapping Form I: Group A (Left of Ctr)** and the **2012 Intertidal Sample Plan Oyster Mapping Form II: Group A (Left of Ctr).** Group B should record the location of oyster resource segments to the nearest meter on the **2012 Intertidal Sample Plan Oyster Mapping Form I: Group B (Right of Ctr)** and the **2012 Intertidal Sample Plan Oyster Mapping Form II: Group B (Right of Ctr).** For every meter where at least half of the meter contains oyster resource, enter a "3" in each corresponding cell on the **2012 Intertidal Sample Plan Oyster Mapping Form I.** If greater than half of a meter is covered in vegetation, enter a "4". If less than half of the meter contains no oyster resource, enter a "1" for soft bottom/no resource. For example, if there is oyster reef in greater than half of the meter between 11 and 12 meters along transect 23A then enter an "3" in the cell at the intersection of 23A and M12 the **2012 Oyster Intertidal Sample Plan Oyster Mapping Form II: Group A (Left of Ctr).**

5. If oyster resource is identified along the transect, leave the PVC pole at the start of the transect in place; attach flagging tape to the pole; and write the transect number on the flagging tape and flagging tape. This will help you find the transect when taking quadrats. If oyster resource is not identified along the transect, pull the PVC pole.

6. After finishing each transect, follow the decontamination level 1 procedures detailed in Appendex B, "SOP for Decontamination Procedures for Sampling Equipment," on the mapping implement.

Figure 9. Oyster Resource Mapping Implement



D. Quadrat Sampling

If oyster resource is identified within a site, up to six quadrat samples will be collected.

Each field team will fill out a one or more **2012 Oyster Intertidal Sample Plan Quadrat Selection Form** and up to two **2012 Oyster Intertidal Sample Plan Quadrat Sample Forms** when collecting quadrats at a site. Note that the **Site Information** section is on all forms and should be filled out identically for a given site visit. Please see the data sheet reference guide for additional information on how to fill out each field on the data form. Note which GPS unit is used to record the waypoint, latitude, and longitude for each quadrat.

In summary: Quadrat sample locations will be within meter segments of transects that intersect substrate identified as oyster resource. Quadrats will be sampled in as many different segments of oyster resource as possible depending on the number of oyster resource segments identified. Resource segments to be sampled will be determined by randomly selecting numbers from a bag.

Once an oyster resource segment has been identified, a random location within the segment will be selected for quadrat sampling using the random number list (1 to 20) provided to each field team (Table 1). Quadrats will be placed with one side directly along the transect and the adjacent water side of the quadrat (i.e., the side farthest from shore) even with the selected meter segment. For example, if M5 is selected, the quadrat will be placed with the water side even with meter 5 such that it covers the area from the end of meter 4 to meter 5 along the transect line (Figure 11).

1. Fill out the Site Information sections prior to collecting quadrat samples.

Site Information

- Team Leader
- Leader Code
- Team ID
- Date
- Site name (e.g., SP-FL-B-MESS-604)
- Site ID (e.g., 0604)
- Site Visit (e.g. 1, 2, ... *n*)
- Time (24 hour)

2. Fill out the first four columns of the Oyster Resource section of the **2012 Oyster Intertidal Sample Plan Oyster Quadrat Selection Form**.

- Oyster Resource (1 - *n*)
- Trans (*e.g. 14A*)
- Start Meter (*e.g. M6*)
- End Meter (*e.g. M12*)
- Selected Meter (*e.g. M8*)

3. Select oyster resource segments for sampling by randomly picking numbers from a bag.

Number oyster resource segments sequentially (one through *n*). Consult the table below to determine the sample selection approach based on the number of oyster resource segments identified at the site.

Number of Segments Identified	Sample Selection Approach	Number of Random Draws
1	Sample segment up to 6 times if possible	0
2	Sample each segment up to 3 times if possible	0
3	Sample each segment up to 2 times if possible	0
4	Sample each segment once, then select two segments to sample a second time using by randomly drawing numbers from a bag.	2, plus additional draws if necessary to replace a segment that cannot be sampled more than once.
5	Sample each segment once, then select one segment to sample a second time by randomly drawing numbers from a bag..	1, plus additional draws if necessary to replace a segment that cannot be sampled more than once.
6	Sample each segment once	0, plus additional draws if necessary to replace a segment that cannot be sampled
>6	Select segments to sample by randomly drawing numbers from a bag.	6, plus additional draws if necessary to replace a segment that cannot be sampled.
If a sample location cannot be accessed, first select another location along the same segment using the random number table. If the segment cannot be sampled the specified number of times, select another segment using the random number table.		

If the table directs you to randomly draw numbers from a bag, write the numbers 1 through *n* on identically sized laminated paper squares or poker chips and place them into a bag (e.g., a burlap sack or other suitably opaque container). Randomly select a number from the bag, record the number, and set it aside. ***Do not replace numbers after each selection***. Repeat as indicated in the table above. Record the oyster resource segments selected on the **2012 Oyster Intertidal Sample Plan Oyster Quadrat Selection Form.**

3. Select quadrat sampling location within each selected oyster resource segment.

a. For each oyster resource segment, note the starting location and the ending location of the segment as the distance along the transect to the nearest meter. If any segments are to be sampled multiple times, check the starting and ending distances carefully to make sure that the segment is sufficiently long to sample the number of times indicated using a square meter quadrat (e.g., at least 2 meters long if it is to be sampled twice). If a segment is too short to sample the number of times indicated, replace the extra occurrences as necessary with alternate segments by conducting another random number draw.

b. Consult the random number table in this SOP. Start at the top of the random number list and continue until you reach a number that falls between the starting location and ending location of the oyster reef segment.

c. Repeat for the next reef segment to be sampled, starting through the number table at the number immediately following the number selected for the previous sample. Repeat until you have locations for all six quadrat samples (or the maximum number feasible given mapped resource if less than six).

d. Record the quadrat number, the oyster resource segment #, transect and meter for each of the six reef segments to be sampled on the **Quadrat Sampling Forms** for the site.

4. Collect Quadrat Samples

Samplers should complete the **2012 Oyster Intertidal Sample Plan Quadrat Sample Form** for all quadrat samples collected. Note that the **Site Information** section is on all forms and should be filled out identically for a given site visit. Please see the data sheet reference guide for additional information on how to fill out each field on the data form.

A unique sample ID should be given to each sample and prominently marked on the form according to the Oyster Sample Naming Convention (Appendix B). Sample codes should be recorded in the 2011 Intertidal Sampling Plan Quadrat Sampling Form datasheets and also in the NRDA Sample Collection Form – Tissue/Wrack (available on www.noaanrda.org, under Data Management Field Sample Forms).

Start with the first selected oyster resource segment as indicated on the 2012 Oyster Intertidal Sample Plan Quadrat Selection Form. If the oyster resource segment cannot be sampled, write a No in the Sampled? section and specify the reason in the notes. This will mostly likely be due lack of access to the location or if the location is covered by greater then 0.5 meters of water. If you cannot sample the selected meter section, select an additional meter section within the same resource segment. If there are no additional meter sections to sample within the same resource segment, select a new resource segment and a new meter section within the segment following the procedures outlined above.

Place one edge of the quadrat frame on the substrate directly along the left side of the transect with the water edge (i.e., the edge parallel to and furthest from the shore) even with Gulf side of the selected meter segment. For example, if M5 is selected, the quadrat will be placed with the Gulf side even with the upper limit of meter 5 as identified by the end of the throwing implement (Figure 11).

Record the following information for each quadrat sampled.

- Oyster Resource Segment # (1 - *n*)

- Transect (e.g. 23A)
- Meter (e.g. M5)
- GPS Unit #
- Waypoint
- Lat (29 to 31)
- Lon (-88 to -90)
- Individual Collecting Sample (Name/Affiliation)
- Sample ID
- Photo Range
- Description of Resource (Live, Recently Dead, Dead, No Apparent Resource)
- Quadrat Notes

Record observations of any external evidence of contamination before sampling in the notes section. Avoid sources of contamination such as exhaust fumes and engine cooling systems on vessels. Work upwind of any exhaust. Segregate dirty/clean areas. Lay out clean substrates to work on and replace frequently. Take precautions so as not to introduce cross-contamination from oil on boots and/or tools.

a. Collect the quadrat sample. The sampler handling the oysters should wear Kevlar or other non-contaminating gloves and change gloves after each sample to avoid cross-contamination. Using tools when applicable, harvest all oysters 3-4 cm down into the reef (approximately the depth of a gloved hand)[3]. You should not have to dig into the mud. Record the name and affiliation of the individual collecting the quadrat sample in the given quadrat section. If more than one person is involved, list the field party leader and the person who entered the data (if different).

b. Place all material from the quadrat in a burlap sack. If resource is abundant, multiple sacks may be used to reduce the load on samplers and minimize the likelihood of rupturing the sack. When the quadrat collection is complete, return the sample to the boat.

c. Observe the resource in the bag and note the approximate number of live oysters from the quadrat with respect to the target collection goal. If necessary, dump collected material on a tray to inspect. Record the description of the resource and any other quadrat notes in the given quadrat section. Photograph each quadrat as well as the waypoint at each quadrat location.

d. Return all material to burlap sack and close the sack.

e. Place the burlap sack in a plastic contractor bag.

[3] Collection of all material encompassed within the quadrat to a depth of approximately the size of a diver's gloved hand will capture the preponderance of live and recently dead material present.

f. Samples should be tagged with external and internal tags (flagging tape with permanent marker) that prominently identifies the sample ID. The sample ID should be constructed of the NRDA grid ID, date, matrix, sample team leader code, site ID and sample number along with information regarding the sample type. Please see the Oyster Sample ID Naming Convention in Appendix B. Record the sample ID in the given quadrat section.

g. Immediately place all samples in cooler and keep at on ice until delivered to the intake team.

h. Record the range of photos taken of the quadrat sample on the **2012 Oyster Intertidal Sample Plan Quadrat Sample Form**.

i. If fewer than 12 oysters greater than 3 inches are collected per site or the equivalent, then collect additional oysters either from within quadrats at unsampled alternative oyster resource locations, if available, or by collecting additional oysters at resource locations abutting locations previously sampled. Additional sampling points should be randomly chosen using the random number chart provided in this document. Bag only the live resource for these additional samples for transport to the lab. Oysters from each resource point should be bagged separately and labeled with a unique sample ID (see Appendix B). Samples should include an "H" in the sample name to distinguish hand-collected samples from the quadrat ("Q") samples. Each field team should complete the **2012 Oyster Intertidal Sample Plan Hand-Collection Sample Form** if any oysters are collected in this manner**.** Clean equipment between samples per decontamination procedures in Appendix G. Collect rinsate for proper disposal.

Figure 10.
Hypothetical intertidal site with transects identified.

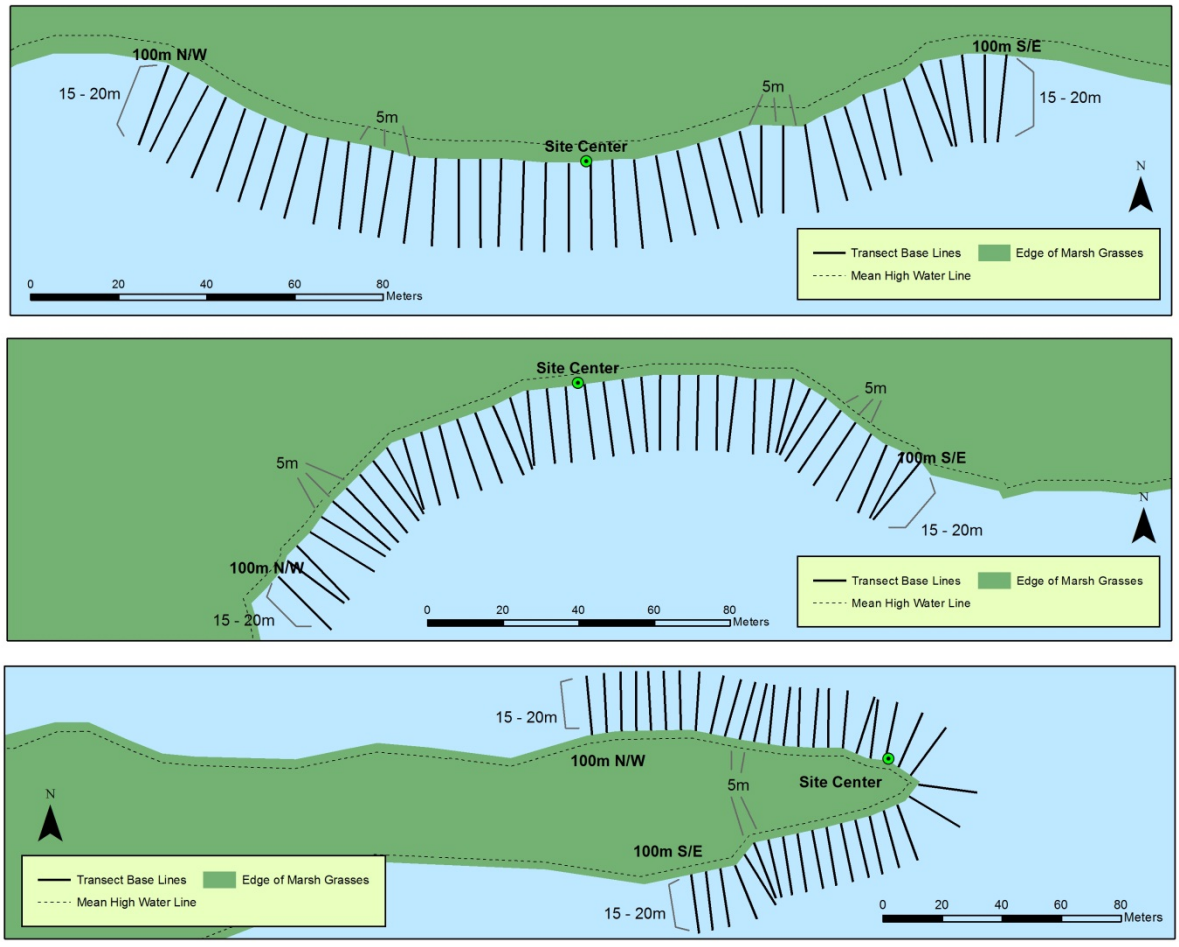


Figure 11.
Hypothetical intertidal site with transects, oyster reef and quadrat locations identified.

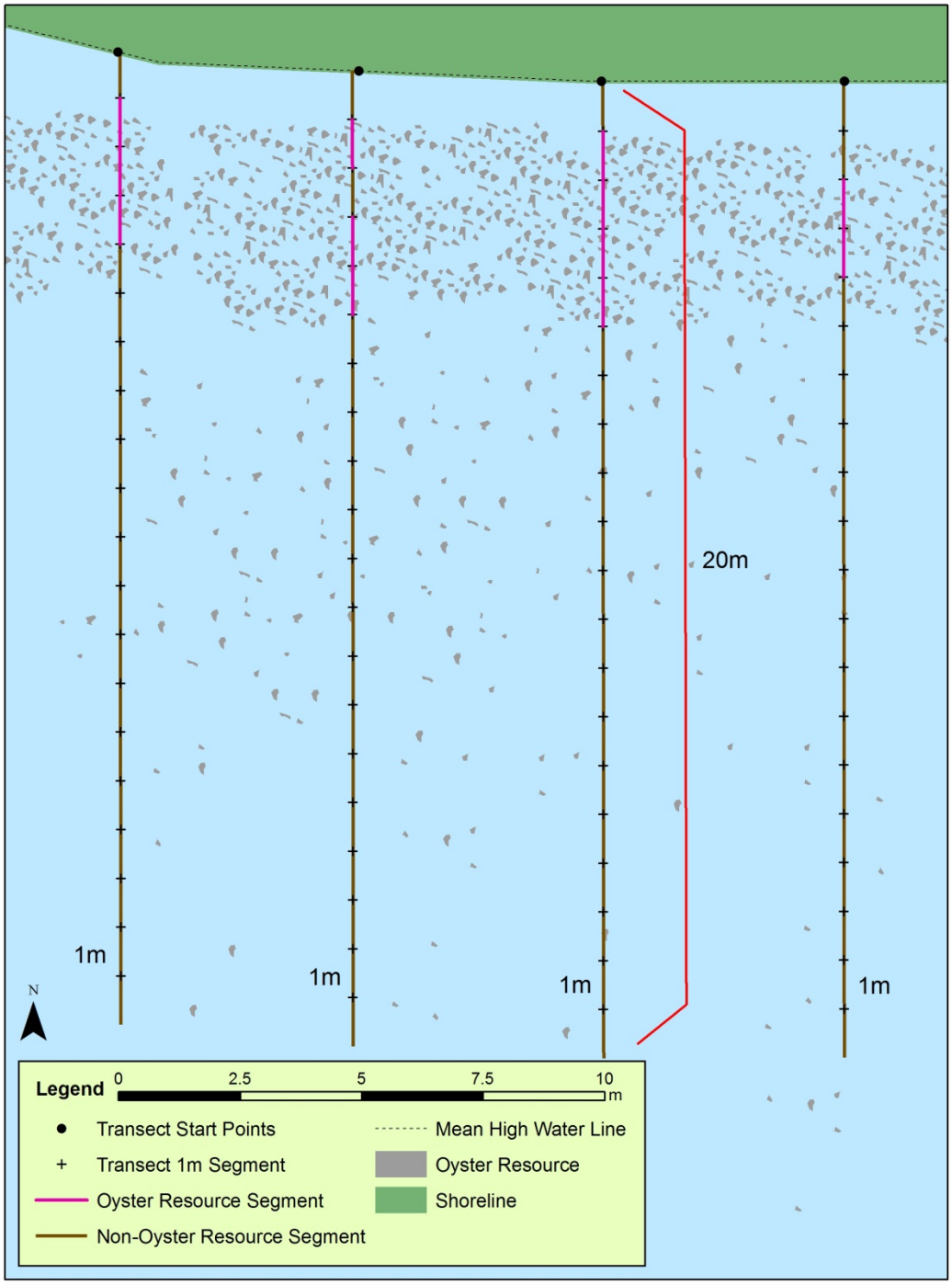


Table 1. Random Number Table for 2012 Intertidal Oyster Quadrat Sampling Plan.

Use this table to select the oyster resource segments at which to collect a quadrat sample. Start with row 1 and move down through the rows. When you reach the end of the table, start again at the beginning.

Row Number	Random Number
1	5
2	14
3	15
4	7
5	12
6	18
7	8
8	3
9	6
10	20
11	9
12	10
13	16
14	1
15	19
16	11
17	13
18	4
19	17
20	2

Table 2. Table of Meter Segment Distances from Shoreline

Meter Segment Name	Start Distance (meters from shoreline)	End Distance (meters from shoreline)
M1	0	1
M2	1	2
M3	2	3
M4	3	4
M5	4	5
M6	5	6
M7	6	7
M8	7	8
M9	8	9
M10	9	10
M11	10	11
M12	11	12
M13	12	13
M14	13	14
M15	14	15
M16	15	16
M17	16	17
M18	17	18
M19	18	19
M20	19	20

E. Site Finish

Each field team should fill out a **2012 Intertidal Sampling Site Summary/Signature Form** for each visit to the site. More than one visit may be required to complete a site. There are several sections to each form as follows. Note that the **Site Information** section is on all forms and should be filled out identically for a given site visit. Please see the data sheet reference guide for additional information on how to fill out each field on the data forms.

1. Fill out the Site Information section prior to leaving the site. Make sure this section is identical on all forms filled in for the site for the given visit.

Site Information

- Team Leader
- Leader Code
- Team ID
- Date
- Site name (e.g., SP-FL-B-MESS-604)
- Site ID (e.g., 0604)
- Site Visit (e.g. 1, 2, ... n)
- Time (24 hour)

2. Record the number of transects mapped and quadrats sampled, the ranges of both the photographs and waypoints taken during the visit to the site.

Site Sampling Summary

- Number of Quadrats Sampled (0 - 6)
- Number of Transects Mapped (0 - 40)
- Photo range
- GPS Unit #
- Waypoint range
- GPS Unit #
- Waypoint range

Site Notes

3. Record any additional notes regarding the site and data collections.

4. Sign, date and time the form. Federal, state and other trustee representatives should all complete their section after careful review of all of the associated data forms.

F. Lab Processing

1. *Sample Processing: Abundance*
Samples will be brought to a non-field location for processing. Samples should be kept in a cooler with ice. Samples should be processed within 96 hours to ensure accurate characterization of live and dead oysters.
Regardless of sample method, both live and dead oysters should be enumerated by size category.

- Measure shell height (SH).
    - Using rulers (when oyster category is easily determined) and calipers (when fine scale separation of categories is needed to measure the distance from the umbo (small tapered end of the oyster) to the maximum limit of the shell.
    - Measure dead oysters in the same way.
        - Dead oysters are oysters that have no living tissue but are still in their articulated form (i.e., the shells are still hinged but no living oyster tissues is present also called "boxes"). These oysters will often appear opened or "gaped".
        - If the oyster is gaped and tissue appears to be undergoing decomposition, these oysters should be enumerated as a separate category
- Classify oysters by size:
    - spat (between 0.4 and 1 inch [10 - 25 mm] shell height),
    - seed or juvenile oysters (between 1 and 3 inches [25 – 75 mm]),
    - market size or "legal" oysters (> 3 inches [75 mm] shell height].

- Identify and enumerate associated biota.
    - Identifications and counts should be entered on separate lines under the "Other Species" category on the Oyster Resource Sample Form. Associated fauna should be archived with the quadrat sample.

2. *Sample Processing: Biomass*

- Weigh living material:
    - Weighed in aggregate by size category.
    - Similarly, dead oysters should be weighed by category. Finally, associated species should be identified and weighed by taxon.
    - Dead oyster still with tissue will be classified as dead and weighed separately.

Equipment List

i. Random number table 1
ii. 3 Surveyor's ropes (30 m each)
iii. Oyster resource mapping implements (rebar triangle, etc)
iv. 6 PVC quadrats
v. 3 sets of calipers and rulers
vi. Large 1 gallon Ziploc bags to separate subsamples for further analyses.

vii. Digital camera with extra batteries
viii. 2 GPS units with extra batteries
ix. 16 pairs of Kevlar gloves (size M and L)
x. Small shovel / tool for separating oysters
xi. Waterproof data sheets (chain-of-custody, sample tracking, photo log, oyster reef sample form)
xii. Waterproof labels or tags
xiii. Waterproof pens
xiv. Flagging tape for external tags
xv. Burlap sacks for sample storage.
xvi. Plastic contractor-grade construction bags
xvii. YSI multimeter for DO, salinity
xviii. 50 1" X 3' PVC poles for marking transects (reusable)
xix. 4 1'' X 5' PVC pole for casting weighted line (reuable)
xx. Rubber mallet for driving PVC poles
xxi. Several lengths of rope up to 25 meters to assist samplers walking in soft substrate
xxii. Personal Protective Gear (PPG) for walking/wading in shallow water and on soft, muddy, uneven, and possibly sharp (oyster reefs) substrate. Tough, boot-foot waders work well, although expect some damage to this equipment in the form of cuts and scrapes to the soles and foot area. Old jeans with thick socks and old shoes/boots can be worn in lieu of waders.

Appendix B: SOP for Decontamination Procedures for Sampling Equipment

Adapted from "the Standard Operating Procedure Decontamination Procedures for Sampling Equipment MC252 Fish Technical Work Group Plans," August 24, 2011

1. Scope and Applicability

This Standard Operating Procedure (SOP) describes equipment and field procedures necessary to properly decontaminate equipment utilized for the MC252 2011 Oyster Quadrat and Sediment Sampling Plan under which sediment and tissue sampling are conducted. This process is designed to minimize the potential for constituent migration and/or cross contamination. This procedure does not apply to personnel decontamination.

2. Summary of Method

The objective of these multimedia sampling programs is to determine and quantify the presence of oil-related chemicals in oyster resource and as well as in oyster tissues. Decontamination procedures appropriate to the oil-related chemicals being assessed may improve the prevention of cross contamination. This SOP presents an adaptive approach to decontamination that ensures sufficiency of decontamination while minimizing the use of and personnel exposure to solvents.

3. Equipment and Supplies

- PPE (including neoprene coated chemical resistant gloves, chemical splash goggles; see Section 4.0 below for additional information including safe work practices)
- Small dry chemical Fire Extinguisher (BC or ABC Rated - 5 lb or larger)
- Bristled Brushes compatible with the solutions being used
- Low Phosphate Detergent (Alconox or Liquinox), diluted in accordance with instructions provided with the product.
- Acetone and Hexane (pesticide grade or better stored in ETFE Bottles)
- Distilled/DI water
- Designated solvent-compatible container for collection of decon waste/rinsates (HDPE ok for hexane and acetone, if acetone concentrations are less than 5%. Otherwise a PTFE liner is needed).
- Secondary containment vessel such as a cooler that can be closed to reduce the likelihood of spills and reduce volatilization
- Clean Ambient/Tap water source
- Wash/rinse tubs compatible with the solutions being used
- Specified area of vessel for decon away from other contaminant sources and other personnel
- If collecting a rinsate blank, small container appropriate for the collection
- Field documentation materials

4. Health and Safety

Health and safety hazards associated with this procedure can be mitigated by the following engineering, administrative, and PPE controls:

HAZARD	CONTROL(S)
Bodily injury due to pinch points or dropped equipment	• Leather gloves and steel-toe boots should be worn while equipment is being handled • Equipment safety features (e.g., lock pins) should be engaged while equipment is being handled
Vapor inhalation	• Use solvents only in well-ventilated areas • Remain upwind of solvent decon work • Advise other workers in the area of the nature of your task and ask them to remain upwind
Skin irritation	• Don proper chemical-resistant gloves (neoprene coated chemical resistant gloves) prior to handling organic solvent • Rinse solvent from gloves before removing • Promptly wash any areas of skin which may have encountered contact with organic solvent and always wash after completing work with hazardous materials
Eye contact	• Don chemical splash goggles prior to retrieving and handling organic solvent • Do not use solvent wash bottle near face
Fire	• Store organic solvents in approved, leak-proof containers (ETFE plastic for either solvent) in a cool, shaded area; do not store in direct sun • Do not smoke near solvent storage or work areas • Do not use or place solvent near flame or other heat source • 5- or 10-pound dry chemical fire extinguisher (Type BC or Type ABC) should be readily accessible during the decon process
Solvent spill	• Place equipment to be decontaminated in containers to capture rinsate • Inspect solvent containers for leaks prior to handling • Have an organic solvent spill kit available and near solvent storage and work areas; workers should be trained in spill kit use

	before the start of each mission
Environmental detriment	• Keep solvent bottles tightly capped to prevent leakage and minimize vaporization. Store in secondary containment vessels • Promptly clean spilled solvent with paper towels and discard in solid used waste container • Maintain solid used materials (e.g., paper towels, disposable gloves, etc.) in a bucket or other container to prevent litter • Promptly replace lids onto rinsate buckets and secondary

NOTE: The above information was determined from job hazard analysis of the work tasks

5. Decontamination Procedures

Levels of Decontamination Procedures and their Selection
All equipment and non-disposable materials that directly contact a sample medium shall be must undergo Level 1 Decontamination (see below) or be pre-cleaned by the manufacturer, in compliance with the protocols described here.

The Level 1 Decontamination procedure shall be the default decontamination procedure for all nondisposable equipment, followed by Level 2 Decontamination when applicable. The observation of oil in the general vicinity of the sampling does not necessitate Level 2 or Level 3 Decontamination (use of solvents; see below), but Level 2 or Level 3 Decontamination can be used at the field crew's discretion.

Level 3 Decontamination must be used when Level 1 and Level 2 Decontamination procedures are not successful (i.e. visible oil is still observed on the equipment or the equipment rinsate).

Level 1- Default decontamination procedure

Scrub[4] all equipment and parts with a dilute detergent mixture and rinse with deionized or distilled water. Inspect the equipment and rinse water for signs of residual oil, other contaminants, or incomplete decontamination.

Level 2 – Inspection and secondary decontamination

[4] The full decontamination process using detergent washing procedures is described below.

Whenever, after the Level 1 Decontamination procedure, there remains some evidence of incomplete decontamination and residual oil (i.e. sheen in rinse water, dark spots on net, etc.) the field team shall repeat Level 1 decontamination.

After the Level 1 Decontamination procedure is repeated, the equipment and rinse shall again be inspected. If after visual inspection there remains evidence of incomplete decontamination and residual oil (i.e. sheen in rinse water, dark spots on the net, etc.) the team shall utilize small quantities of solvents to spot clean the area of residual oil. The decontamination procedures using two solvents are described below.

Level 3 – Expanded solvent decontamination procedures

If after the Level 2 Decontamination procedures the field team determines the decontamination procedures were not adequate, the field team shall cease using the sampling equipment. The equipment shall be isolated and secured while on the work boats. More thorough decontamination, including additional detergent washing, additional solvent spot treatment and/ or expanded solvent treatment, can be conducted upon returning to shore.

Specific Protocols

These protocols are to be followed for all sampling apparatus (e.g., sediment collectors, nets, mixing bowls, etc.). Sediment samples collected for grain size analysis shall require the default procedure only.

All sampling devices between sample collections

- Collect the samples following the Work Plan's sampling protocol
- Wash and scrub with a clean mixture of distilled/DI water and low phosphate detergent
- Rinse equipment with distilled/DI water
- Inspect devices and rinse water; if sheen or oil is observed, repeat the above steps; if not, decontamination is complete
- If sheen or oil is observed after a second decontamination with water and detergent, proceed to the solvent rinsing steps below

Oil/sheen observed after repeated decontamination with water and detergent scrub

- Wash and scrub with a clean mixture of distilled/DI water and low phosphate detergent
- Rinse equipment with distilled/DI water
- Use a ETFE bottle to apply Acetone sparingly[5] to the piece of equipment being decontaminated
- Use a ETFE squirt bottle to apply Hexane sparingly to the piece of equipment being decontaminated

[5] Use the minimum possible to remove the contamination. Teams are limited to 1000ml of each solvent and 24 minutes of total use per day. Delivery rate is also limited by the nozzle size of the squeeze bottles.

- Thoroughly rinse with DI/distilled water

Oiled rinsate must be collected in the designated solvent-compatible container. Keep a lid on this container at all times while not in use and apply the designated rinsate label to the side of the container. These materials will be turned over to appropriate personnel for disposal. Collect non-oiled rinsate in a bucket with lid for disposal.

NOTE: In the event that the total duration of solvent application for either Acetone or Hexane reaches 24 minutes cumulatively over the course of your work day, please discontinue solvent use for that day and contact your Supervisor and Project Safety for further direction.

6. Storage and Disposal of Chemicals and Chemical Waste

Solvents and rinsates will be handled following the specific guidelines listed below:

Solvents

- All solvents will be transported in small amounts (500ml-1000ml)
- All solvents will be transported/stored within closeable secondary containment to prevent spills and volatilization
- Keep all solvents and secondary containment as cool as possible
- Do not store solvents or rinsate materials in vehicles or hotel rooms, utilize the storage facility identified for your sampling crew – acquire the necessary solvent amount in PTFE/Teflon squirt bottles from the storage facility each morning, and return the unused portion and containers after the sampling day

Rinsates Containing Oil and/or Solvents

- Collect all rinsates in the designated solvent-compatible container with the appropriate label on the side
- Place rinsate containers in a secondary containment system to reduce the likelihood of spills and prevent volatilization
- All rinsates containing oil and/or solvents will be transported by authorized persons to the appropriate waste disposal site
- All rinsates will be captured in the same container.[6]

Rinsates Containing Water and/or Low-phosphate Detergents

- Rinsates containing only low phosphate detergents and water will also be containerized and transported to the appropriate waste disposal site

Place rinsate containers in secondary containment during transportation and storage to reduce the likelihood of spills.

Appendix C: OYSTER SAMPLE ID NAMING CONVENTION

[6] Diluting the rinsate from level 2 with the rinsate from level 1 is a key safety factor, reducing both concentration and volatility.

NOAA NRDA Sample Format:

- **LocationCode – DateCode - Matrix Leader# Sample#**
    - 6-digit Location code (from maps located on www.noaanrda.org. These should be the NRDA Grid location code rather than the SCAT location code);
    - 5-digit date: year letter and mmdd (A=2010, B=2011, C=2012);
    - Matrix letter (T = Tissue or S = Sediment);
    - 2 or 3-digit leader code; and
    - 4-digit site ID
- EXAMPLE: **LAAM24-C0102-TA10024**
    - LocationCode = LAAM24;
    - Date = 1/2/2012;
    - Matrix=Tissue;
    - Leader code = A1;
    - Site ID = 0024.

Additional Information for Oysters:

Field Teams

- We will be numbering each sample sequentially *within each site and by sample type* (e.g., each site will have eight quadrats numbered 01Q through 06Q, and any other samples collected by hand should be numbered starting with 01H.) This information will go in the "Sample #" section at the end of the NOAA NRDA required tag.
- Site ID – the Site ID number (e.g., 0024, 3989) will be added to the sample ID immediately preceding the sample number so that the site can be identified. The Site ID number is not unique across states, but with the state abbreviation embedded in the location code the value is unique. *Use leading zeros to ensure that the Site ID is always four digits.*

- Tissue Subtype – In addition, because there are several different tissue sample types, we will add an identifier after the sample number that will indicate the sample type for tissue samples.
    - Q = quadrat sample;
    - H = oysters collected by hand not part of a quadrat (for contaminant analysis only);
    - L = larval sample (add LS for surface, LM for mid water column or LB for bottom); and
    - SP = settlement plate.
    - Example: **LAAM24-C0102-TA10024-01Q**

- Contaminant Samples – For sites where fewer than 12 market sized oysters are collected via quadrat sampling,additional oysters will be collected by hand for contaminant analysis only. Additional samples should be marked as contaminant analysis samples to differentiate these samples from the quadrat samples used for abundance estimates.
    - Example : **LAAM24-C0102-TA10024-01H**
- All additional information describing the samples will be recorded in the "Sample Notes" field of the NOAA NRDA sample collection forms (see OysterExamples.xls). This additional information differs by sample type.
    - Quadrat oysters
        - Site Name
        - Quadrat Number

Lab Teams

- **Quadrat subsamples**
    - Contaminant subsample
        - Keep original sample name for the quadrat from the site and add "-CT", e.g., **LAAM24-B0502-TA10024-01Q-CT**
- The labs will track the sample ID changes, splits and composites in a sample bridge template and upload to noaanrda.org site, under instruction from the data management

TWG. In addition, the labs will upload result information to the www.noaanrda.org site on a frequency agreed upon by the lab and the data management TWG.

References

Coen, L. D., R. D. Brumbaugh, D. Bushek, R. Grizzle, M. W. Luckenbach, M. H. Posey, S. P. Powers, and S. G. Tolley. 2007. Ecosystem services related to oyster restoration. *Marine Ecology Progress Series* 341: 304-307.

Gundlach, E.R., J.C. McCain and Y. Fadlallah. 1993. Distribution of oil along the Saudi Arabian coastline (May/June 1991) as a result of the Gulf War oil spills. *Marine Pollution Bulletin* 27: 93-96.

Peterson, C.H., S.D. Rice, J.W. Short, D. Esler, J.L. Bodkin, B.E. Ballachey, and D.B. Irons. 2003. Long-term ecosystem response to the Exxon Valdez Oil Spill. *Science* 302:2082-2086.

Powers, S. P., C. H. Peterson, J. H. Grabowski, and H. S. Lenihan. 2009. Evaluating the success of constructed oyster reefs in no-harvest sanctuaries: implications for restoration. *Marine Ecology Progress Series* 389: 159-170.

Tunnell, J.W., Jr., Q.R. Dokken, M.E. Kindinger, and L.C. Thebeau. 1981. Effects of the Ixtoc I oil spill on the intertidal and subtidal infaunal populations along lower Texas coast barrier island beaches. Proceedings of the 1981 Oil Spill Conference, 467-475. Washington, D.C.: American Petroleum Institute.