NATURAL RESOURCE DAMAGE ASSESSMENT

WORK PLAN FOR ASSESSING POTENTIAL IMPACTS TO FRESH AND BRACKISH WATER SUBMERGED AQUATIC VEGETATION COMMUNITIES FROM THE DEEPWATER HORIZON (MC 252) OIL SPILL

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For the:

Submerged Aquatic Vegetation Technical Working Group

And the Waterfowl Working Group

On behalf of the Mississippi Canyon 252 Oil Spill Trustees

Project Summary / Background

The Deepwater Horizon (MC252) oil spill began April 20, 2010. The Natural Resource Trustees with particular interest in birds and their supporting submerged aquatic vegetation (SAV) habitats consist of the Department of the Interior (U.S. Fish and Wildlife Service and National Park Service), the National Oceanic and Atmospheric Administration, and the natural resource agencies of the States of Texas, Louisiana, Mississippi, Alabama, and Florida. The Trustees are authorized under the Oil Pollution Act (33 U.S.C. 2701 *et seq*.) and the Comprehensive Environmental Response, and Liability Act (42 U.S.C. 9601 *et seq*.) to assess natural resource damages associated with the harm caused to natural resources by discharges of oil and releases of hazardous substances respectively. The activities proposed in this study plan are part of the natural resource damage assessment being conducted cooperatively by the Trustees and the Responsible Party (RP).

This plan is focused on evaluating exposure to fresh and brackish water submerged aquatic vegetation (SAV) communities in southeastern Louisiana in three areas where oil related to the MC252 discharge was observed on the water and along the adjacent shoreline and marshes. These areas are the Mississippi River delta (Pass a Loutre), Terrebonne Bay, and Barataria Bay. Reference sites, Atchafalaya Delta and Marsh Island, where no oil was observed or documented (as confirmed by SCAT and other reliable sources of data/information) will also be sampled at the same time as the potentially exposed sites. At this time the Pass a Loutre site and the Atchafalaya Delta (reference area) have been prioritized and will be sampled first.

Objectives

The objective of this plan is to determine if fresh and brackish water SAV and associated faunal communities that are likely to support wintering waterfowl and fisheries have been exposed to MC252 related products and or agents by identifying whether PAH residues and PAH sources, or dispersants and other agents, related to the MC252 release are present in sediment, plant, detrital material, and invertebrate tissues collected from oiled and unoiled areas.

If MC252 related exposure is documented, additional plans may be prepared for data collection, and will describe metrics associated with documenting injury within this habitat type.

Project Location

The Pass a Loutre sites and associated reference locations in the Atchafalaya Delta will be sampled first (Figures 1 and 2). Additional sites in Barataria Bay, Terrebonne Bay, and associated reference areas will be sampled once locations have been identified and as weather allows.

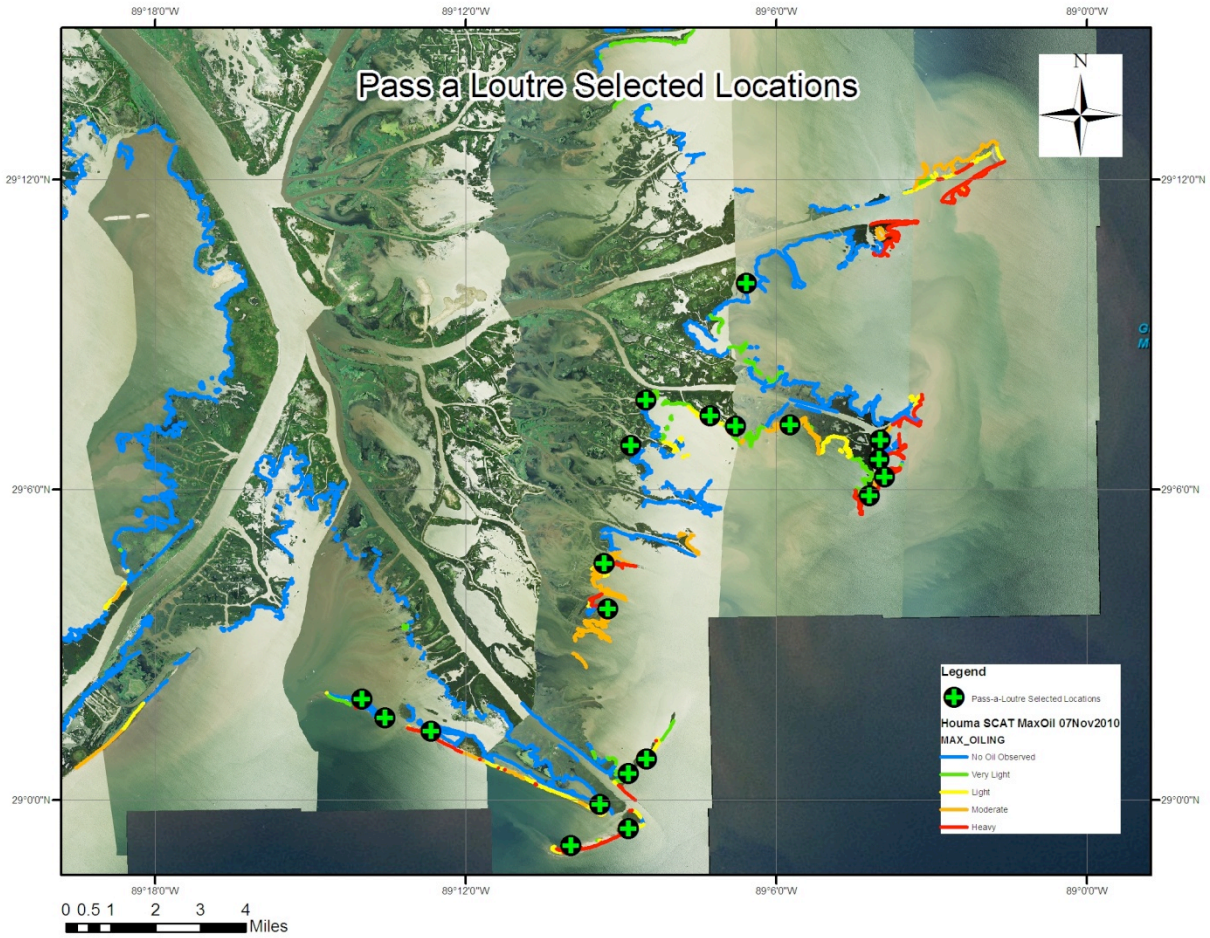

Figure 1. Sampling locations for Pass a Loutre, LA. Sites were selected based on the occurrence of SAV and overlaid with SCAT oiling documentation. Heavily and moderately oiled locations were targeted.

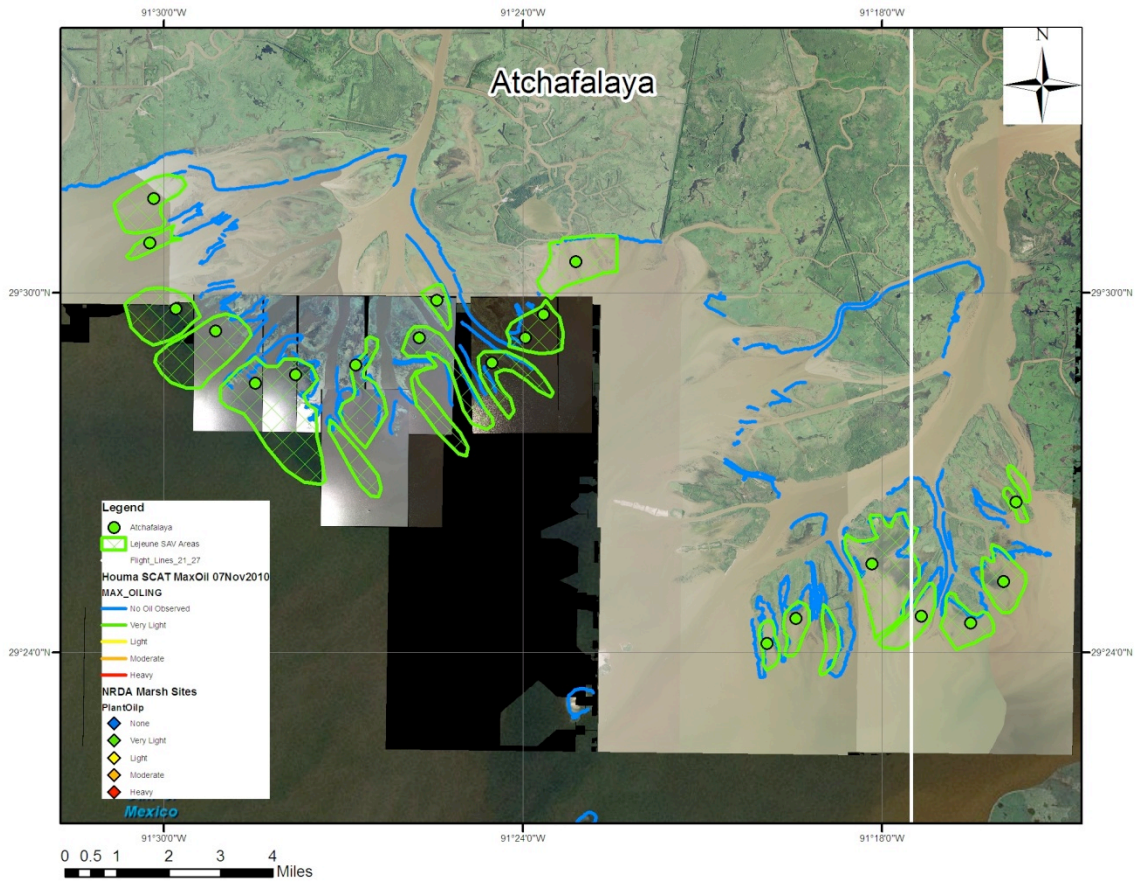

Figure 2. Map of Atchafalaya Delta, LA. Atchafalaya Delta will serve as the reference site for Pass a Loutre. Twenty sampling locations were identified.

Project Timeline

Samples are expected to be taken in December 2010.

Methods

The exposure documentation will follow protocols described in the *Mississippi Canyon 252 Oil Spill Submerged Aquatic Vegetation Tier 1 Pre-Assessment Plan Pre-Impact Baseline Characterization* (SAV Tier 1 Plan). The protocols from the SAV Tier 1 plan are referenced in table 2. The data sheets (appendix C) have been modified to reflect changes in the collection of samples from the nearshore SAV beds.

Sampling Area:

Sampling will focus in three areas where MC252 related oil was observed and documented on adjacent shorelines and marshes, namely Pass a Loutre (fresh/intermediate marsh), Terrebonne Bay (brackish marsh) and Barataria Bay (brackish marsh). Reference sites for each of these locations have also been identified and will be sampled during the same field event as their associated potentially exposed sites. These are the Atchafalaya Delta and Marsh Island Refuge. At this time Pass a Loutre and its corresponding reference site Atchafalaya Delta will be sampled first. Terrebonne, Barataria, and Marsh Island Refuge sampling will occur when additional SAV distribution data is acquired and as weather permits.

Sample Selection:

Sites were co-located with areas identified with "heavy" and "moderate" oiling based on SCAT maps and other reliable information. Sites were also selected in association with public lands in the state of Louisiana and with cooperative large landowners to minimize potential access issues and expedite initiation of this work. Sites were also established based on similar species composition, physical conditions, and habitat setting with un-oiled reference areas (e.g., Atchafalaya River Delta as a fresh/intermediate reference for the Pass a Loutre, and the Vermilion side of Marsh Island Refuge as a brackish reference for the Barataria and Terrebonne areas).

Sample Duration:

The initial exposure sampling will be completed as soon as possible. If any of the exposure metrics (sediment chemistry, invertebrate tissue chemistry, vegetation tissue, and detrital material chemistry) indicate that MC252-related exposure (i.e, that MC252 oil is fingerprinted within any or all the samples) has occurred, the need for additional repeated sampling will be reviewed and approved by the Trustees and BP and sampling will be implemented in these areas.

Sample Size:

A total of up to 100 stations will be sampled. This will include 20 stations at each of the three identified sites where exposure to MC252 related oil has been demonstrated and 20 stations at each of two reference areas. As mentioned previously Pass a Loutre will be sampled first, for a total of 20 stations in potentially exposed locations and 20 in un-oiled reference site.

Data Collection:

Sampling will occur in both fresh/intermediate and brackish SAV beds where exposure to MC252 oil has been demonstrated, as well as in reference areas that were not exposed to MC252 related oil. Methods outlined in the SAV Tier 1 Plan will be followed with limited

modification as appropriate to address nearshore sites. In particular, metrics associated with the following tasks in the SAV Tier 1 Plan will be:

1) Chemistry (sediment, vegetation, detrital material, and invertebrate tissue residues),
2) Documentation of the species collected for chemical analysis and notation of dominant species present by visual inspection.
3) Water quality metrics.
4) Photographs of the samples and sample sites.

Samples collected from stations with "heavy" oiling based on SCAT data will be analyzed followed by those collected from stations categorized with "moderate" oiling. Analysis of reference samples will be conducted only if/when MC252 spill related exposure is determined at stations in the corresponding oil-impacted area. Based on seasonality constraints, sampling for biological metrics, if warranted based on exposure chemistry results, will be delayed until late spring/early summer 2011 and will be described under an addendum to this plan.

SOPs as outlined in the SAV Tier 1 plan will be followed for the collection of exposure data. In addition, habitat characterization metrics will be recorded at each reference and MC252 oil exposed site (including dissolved oxygen (DO), pH, temperature, turbidity, and conductivity/salinity). Specific SOPs (numbering retained from the SAV Tier 1 plan) are summarized in Table 1 and 2 and are included in the Appendices noted.

Sample Analysis:
Sediment, SAV vegetation (plants and detritus) and invertebrate samples will include analysis of hydrocarbon contaminants through analysis of total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAHs) and other constituents as appropriate (Table 1) (For more information, see Appendix B) .

Table 1. Samples to be analyzed and associated analysis.

Sample	Chemistry	Additional analysis
Sediment	TPAH/PAH	Grain size, organic carbon
Vegetation	TPAH/PAH	
Invertebrates	TPAH/PAH	

Table 2. Selected SAV Metrics

Metric	SOP
Exposure metrics	
Sediment chemistry	SOP 2; SOP 3A
Vegetation tissue chemistry	SOP 2; SOP 3C
Detritus chemistry	SOP 2; SOP 3C
Invertebrate tissue chemistry	SOP 2; SOP 3D
Habitat characterization metrics	
Optical conditions	SOP 2
Conductivity/salinity	SOP 2
Depth	SOP 2
Temperature	SOP 2
Dissolved oxygen	SOP 2

Data Handling:

Chain-of-custody procedures will be observed at all times. All samples and data sheets will be transferred with appropriate chain of custody forms.

All field and laboratory data will be collected, managed and stored in accordance with US EPA Good Laboratory Practice regulations (GLPs) to the extent practicable. In accordance with GLPs, all field and laboratory work, and the calibration and use of field and laboratory equipment (e.g. scales, hand held GPS devices, etc.) shall be conducted using written Standard Operating Procedures (SOPs). The appropriate training on particular equipment or in the conduct of specific field studies for all personnel involved with the project shall be documented and those records kept on file by the implementing entity for the duration of this project. All data (including electronically archived data), and original data sheets or electronic files, will be shared among USFWS, BP or their representative, LOSCO and other Trustees. Unless otherwise agreed upon by the Trustees party to this study plan and BP or their designated representative, any samples intended for petroleum hydrocarbon quantification will be sent to an agreed upon NRDA approved lab.

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 on 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 Analytical Quality Assurance Plan(AQAP), after which time the validated/QA/QC'd 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 AQAP 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'd data set released by the DMT shall be considered the consensus data set. In order to ensure 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/unvalidated" and will be made available equally to all trustees and to BP (or ENTRIX on behalf of BP).

Safety:

Field teams will comply with all existing training and safety protocols as applicable to operations. Prior to commencement of field activities, BP/Entrix and the Trustees will agree upon a person or persons to whom study participants may report any safety concerns. Such person(s) will take action to address and resolve reported concerns.

Permits and Section 106:

All State and Federal permits will be obtained. In the event that archaeological materials are encountered or observed during any phase of the Submerged Aquatic Vegetation Communities Work Plan, the team will immediately cease all work within an appropriate radius of the discovery (minimum of 10 meters or 30 feet) and make a reasonable effort to protect the discovery from further disturbance or exposure. Collection of any archaeological material is not permitted. Archaeological materials include any physical evidence of human habitation,

occupation, use, or activity, including the site, location, or context in which such evidence is situated that are at least 100 years of age. Classes of material remains broadly include:

- Surface or subsurface structures, shelters, facilities, or features;
- Surface or subsurface artifact concentrations or scatters;
- Whole or fragmentary tools, implements, containers, weapons and weapon projectiles, clothing, and ornaments;
- By-products, waste products, or debris resulting from manufacture or use of human-made or natural materials;
- Organic waste, such as shell, plant remains, and animal bone;
- Works of artistic or symbolic representation;
- All portions of shipwrecks; and
- Human remains and associated materials.

If an item is found, the team leader will contact Rick Kanaski, FWS-R4 Regional Archaeologist/Regional Historic Preservation Officer, at (843) 784-6310 (O), (912) 257-5434(C) or richard_kanaski@fws.gov to inform him of the discovery and to provide a GPS location, a brief description of the observed material, and at least one digital photograph. If human remains are encountered or discovered, Kanaski will contact the Federal Historic Property Specialist, the relevant State Historic Preservation Officer, and the Tribal Liaison. If Kanaski determines that the remains are Native American, then the Native American Graves Protection and Repatriation (NAGPRA) applies.

Literature Cited

Castellanos, D. L. 1997. Comparison of habitat utilization by nekton species in a Louisiana tidal freshwater ecosystem. M.S. Thesis, University of Southwestern Louisiana, Lafayette, Louisiana.

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Chabreck, Robert H. Winter Habitat of Dabbling Ducks: Physical, Chemical and Biological Aspects, p133-142 in T.A. Bookout (ed), Waterfowl and Wetlands: An Integrated Review, No. Cent. Sec. Wildl. Soc., 1979, Madison, WI

Chamberlain. J. L. Gulf Coast marsh vegetation as food for wintering waterfowl, 1959, J. Wildl. Manage. 23: 97-102

Krull, John N. Aquatic Plant-Macroinvertebrate Associations and Waterfowl, J. Wildl. Manage. (1970) 34:707-718.

Palmisano, A. W. Habitat Preference of Waterfowl and Fur Animals in the Northern Gulf Coast Marshes, Proc. 2nd Coastal Marsh & Est. Mgt. Sym., 1972, pp163-190

Paulus, Stuart L. Feeding Ecology of Gadwalls in Louisiana in the Winter, J. Wildl. Manage., 1982, 46:71-79

APPENDIX A - SOP for Site Characterization (Appendix A; required for all sites) – SOP #2[1]

Equipment

- Sampling Points (if pre-determined)
- GPS with extra batteries
- Digital camera with extra batteries
- Turbidity meter
- Thermometer
- Dissolved oxygen meter
- Salinity/conductivity meter
- Meter stick or weighted transect tape (or boat equipped with depth sounder)
- Garden rake (5-ft handle or longer)
- Waterproof pens
- Waterproof forms (SAV Site Characterization Form, Chain-of-Custody, NRDA Sample Collection Forms for both tissues and sediments, PhotoLogger Form)
- *For equipment specific to collecting samples, see the relevant SOPs.*

Set up and use the GPS unit in accordance with case-wide protocols (see Basic_GPS_Skills_Final_0223_2010.doc, available on the case FTP site).

Samplers should complete all portions of the **SAV Site Characterization Form (1-3)**. The following descriptions correspond to the sections of the SAV Site Characterization Form:

1. *Site Description*

The site name (general geographic location or established sampling area) along with the latitude and longitude coordinates obtained via a GPS should be noted. Coordinates should be recorded in decimal degrees with WGS84 as the datum. The time of day and date should be noted next.

Next, the habitat setting of the SAV bed should be indicated. The habitat setting is a reference to the tidal regime the bed normally experiences (intertidal or subtidal). If the bed is located subtidally, indicate the depth at the time of sampling, in meters. The overall visual condition of the bed should also be described--for example, whether the bed appears to be impacted by oiling, disease, or scarring and to what extent.

[1] SOP numbering retained from the SAV Tier 1 Workplan for consistency

2. *Physical/Chemical Parameters*

Because SAV distribution and abundance are influenced by a range of physical and chemical parameters, several variables should be measured, as indicated in the **SAV Site Characterization Form # 1 – 3** (appendix C) including salinity and water temperature. If beds are subtidal, bottom water samples are the most appropriate to measure. If the beds are intertidal, the nearest source of tidal water should be used if the beds are not flooded at the time sampling is performed.

The standard protocol for rapidly assessing optical conditions in the water column that affect SAV is through use of a turbidity meter.

Oiling (if applicable). Several descriptors are given for the sampler to denote the relative amount of oil present within the area sampled. The list should be thought of as a range of oiled conditions from none to the most saturated.

4. *Sample Collection and Disposition*

For detailed sample collection protocols, see the relevant SOP included in this work plan.

If samples are collected for a site, the individual who collected the sample should be specified on the field data form. If more than one person, list the field party leader and the person who entered the data (if different).

Sample IDs should be clearly listed under each category. If no samples of a given type are taken, write "none". Sample IDs should be assigned in accordance with the instructions in the **NOAA Field Sampling Workbooks** (available on the case's FTP site[2]).

Samples must also be recorded in the appropriate case-wide NRDA Sample Collection Form (also available on the case's FTP site).

Field duplicates should be clearly marked and Field duplicates are separate samples, so should be assigned a new sample number distinct from the original duplicated sample. On the sample form, use the Sample QA/QC Type column to indicate that the sample is a duplicate. The associated parent sample number can be identified in the Sample Notes column (the entire Sample ID should not be required in most situations since the location ID, matrix, and data

should be the same). If a particular type of sample is not collected at a site, enter "none" for that sample type.

6. Photographs

Set up the camera in accordance with NRDA Field Photography Guidance (NRDA_Field_Photographpy_Guidance.doc, available on the case FTP site). **Always begin by taking a photo of the operating GPS screen showing the date and time to synchronize the photos with the GPS track.**

Take photographs of the site and sample collection itself if possible; make sure each photograph or series can be later associated with the corresponding sampling locations (e.g. through use of GPS Photolink software or by keeping a detailed photo log). Do not delete or alter any photographs, the numbering sequence of photos uploaded from your camera must not have any gaps (see separate NRDA Field Photography Guidance).

Enter all photographs into the **NOAA NRDA Trustees Sampler Photo Logger Form**. Follow all required Chain of Custody procedures, as indicated in the data management Chain of Custody training session. Original photo files must either be left on flash cards and placed in locked storage or uploaded to a hard drive and not opened. A copy can be made of the original, and that file may then be opened.

APPENDIX B - SOPs for Sediment, Vegetation, Detritus and Invertebrate Chemistry - SOP#3

Scope of Sediment, Water, Vegetation, detritus, and Invertebrate Chemistry Sampling within SAV beds

The following protocols will be followed to ensure sediment, water, vegetation, detritus and invertebrate data collection is done consistently with other media sampling efforts as well as other sediment and water data collections that may occur opportunistically with other NRDA TWG activities. At this time, locations include nearshore fresh and brackish/intertidal SAV areas in southeastern Louisiana.

Equipment

- (2) 20' boats/site
- (6) trained personnel (staff recommended)
- (8) 12 hr days for sampling per boat
- (8) 8 hr days for sample prep, handling, and shipping
- (4) 150qt ice chests
- (8) 80 qt ice chests
- (6) boxes Nitrile gloves, Nomex coveralls
- (2) Eckman dredges mounted on poles
- Sample containers as described in the protocols below, i.e.:
    - 500 mL (16 oz) or 250 ml (8 oz) glass jars certified-clean to be organic-free (solvent rinsed), with Teflon-lined lids(for sediment chemistry samples)
    - 4 oz glass jars or sealable plastic bags (for grain size analysis samples)
    - 1-liter amber glass containers, certified-clean organic-free (solvent rinsed), with Teflon- or aluminum foil-lined lids (for water chemistry samples)
    - 10-mL glass vials with Teflon septa (for water VOC samples)
    - Pre-cleaned aluminum foils (to make packets for various biota samples) and plastic bags
    - Sample bags (Ziploc quart or gallon size depending on coring device size)
- Laboratory grade detergent, nylon brushes, paper towel
- Sorbent pads
- Plastic sheeting
- Pre-cleaned metal spoons or spatulas
- Food/water for remote deployment of personnel
- 3 GPS units with extra batteries
- 3 digital cameras with extra batteries
- Sampling device (dredge, grab, or core)
- Disposable aluminum pan, on aluminum foil, or on other disposable, non-contaminating material (for mixing samples prior to distribution into jars, if necessary)
- Clear tape

- Chain-of-custody forms
- Sample collection forms
- Waterproof forms: Chain-of-Custody, NRDA Sample Collection Forms, PhotoLogger Forms
- Waterproof pens
- Waterproof labels

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3 A. SOP for SAV Sediment Chemistry

Purpose/Objectives

- To determine the concentration and source of oil compounds in the sediments collected.
- To measure sediment characteristics for interpreting chemical and biological results.
- To maintain the integrity the sample(s) during sampling, transport, and storage.

Methods

Target sample volume for TPH/THC and PAH analysis: two 250 ml (8 oz) glass jars filled ¾ full or one 500 ml (16 oz) jar filled ¾ full.

Target sample volume for grain size analysis: 100 g in sealed plastic bag or 4 oz jar.

Samplers should use disposable surgical gloves and pre-cleaned metal spoons or spatulas.

- Sediment samples \ should be placed in glass containers, certified-clean to be organic-free (solvent rinsed), with Teflon- or aluminum foil-lined lids.
- Decontaminate all sampling gear before using and between sampling stations by washing with laboratory-grade detergent and clean water.
- For subtidal samples when SCUBA is not feasible, lower and retrieve the sampling device at a controlled speed of ~1 foot per second. Sampling devices may include dredges, grabs and cores.
- The device should contact the bottom gently; only its weight or piston mechanism should be used to penetrate the sediment. It is important to minimize disturbance to the surface floc which may contain oil contaminants.
- Inspect the sample to make sure that it meets the following criteria:
    - The sampler is not overfilled; the sediment surface is not pressed against the sampler top.
    - Overlying water is present, indicating minimal leakage.
    - Sediment surface is undisturbed, indicating lack of channeling or sample washout.
    - The desired penetration depth is achieved (e.g., 4-5 cm for a 2 cm sample).
- Siphon off the overlying water near one side of the sampler.
- Using a pre-cleaned flat spoon or spatula, accurately collect the top 2 cm, avoiding sediments in contact with the sides of the sampler. Use a new spoon or spatula for each station. Collect other intervals, per the sampling plan.

- If placing sediment in more than one jar, or if compositing samples from more than one location, the sample must be mixed before placing in the jar(s). This should be performed in a disposable aluminum pan, on aluminum foil, or on other disposable, non-contaminating material.

Labeling / Documentation / Other Considerations

- Prepare sample labels following sample ID protocol provided in the instructions from the trustee data management team.
- Affix sample ID labels to each container and cover with clear tape wrapped around the entire container circumference.
- Apply tape around lid to secure.
- Note collection of sample both in the **SAV Site Characterization Form** and in the **NRDA Sample Collection Form for Soils and Sediments**.
- Field duplicates should be clearly marked and Field duplicates are separate samples, so should be assigned a new sample number distinct from the original duplicated sample. On the sample form, use the Sample QA/QC Type column to indicate that the sample is a duplicate. The associated parent sample number can be identified in the Sample Notes column (the entire Sample ID should not be required in most situations since the location ID, matrix, and data should be the same).
- Preserve all original field notebooks, forms, and notes, which should be signed and dated. If crossing out or correcting any entries, date and initial when making the changes. Documentation is critical; original records will be gathered and kept on file by the trustees.
- Ship known oil-contaminated samples separate from non-contaminated or low contaminated samples to reduce risk of cross-contamination.
- See related NRDA protocol documents for specific sample shipping and notification/ sampling documentation instructions.

Preservation/Holding Times

- Immediately place all samples in cooler and keep at 4°C. Freeze as soon as possible.
- Please see the Analytical Quality Assurance Plan for the MS Canyon 252 (Deepwater Horizon) Natural Resource Damage Assessment (AQAP) for further details on storage and holding times.

3 C. SOP for SAV Vegetation and Detritus Chemistry

Purpose/Sampling Objectives

- To determine the concentration and source of oil compounds (fingerprinting) in/on SAV samples collected.
- To document the presence or absence of oil.
- To maintain the integrity the sample(s) during sampling, transport, and storage.

Treatment of samples will be given the same consideration as those collected for sediment. Vegetation and detrital material will be collected from multiple sampling stations (numbers to be determined). Vegetation and detritus samples for hydrocarbon analysis should be collected in 8-ounce (250 mL) wide-mouth glass jars (certified clean to be organic free). The minimum target sample volumes for vegetation and detrital material is 30 grams (wet weight) although 50 grams is desirable. If the jars are filled approximately 3/4 full the minimum volumes are assuredly achieved. Composite a sufficient number of plants to fill the sample jars approximately 3/4 full. Visibly oiled vegetation requires less volume than unoiled (background) vegetation. Excess sediment adhered to vegetation should be physically removed or avoided to the degree practical. Immediately place all samples in a cooler and keep at between 2-6 degrees C.

Sampling using glass jars is preferred, however, if necessary, pre-cleaned aluminum foil and plastic Ziploc bags can be used instead of glass jars. Solvent-rinsed aluminum foil is available from dwhsampleintake@gmail.com. (Use of aluminum foil that has not been solvent [Dichloromethane. PR (pesticide research) or HPLC grade] rinsed is undesirable as it contains contaminants that interfere with low level hydrocarbon analysis.)

Each vegetation sample should be photographed and the genus and species should be recorded.

3 D. SOP for SAV Invertebrate Chemistry

Purpose/Sampling Objectives

- To determine the concentration and source of oil compounds (fingerprinting) in/on biota collected off and within SAV beds.
- To document the presence or absence of oil.
- To maintain the integrity the sample(s) during sampling, transport, and storage.

Treatment of samples will be given the same consideration as those collected for sediment. Invertebrates will be collected from the blades of SAV or within the beds and will be collected of the same sampling stations for the collection of SAV (numbers to be determined). Invertebrate samples for hydrocarbon analysis should be collected in 8-ounce (250 mL) wide-mouth glass jars (certified clean to be organic free). The minimum target sample volume for invertebrates is 30 grams (wet weight) although 50 grams is desirable. If the jars are filled approximately 3/4 full the minimum volumes will be achieved. Composite a sufficient number of individuals to fill the sample jars approximately 3/4 full. Excess sediment adhered to invertebrates should be physically removed or avoided to the degree practical. Immediately place all samples in a cooler and keep at between 2-6 degrees C.

Sampling using glass jars is preferred, however, if necessary, pre-cleaned aluminum foil and plastic Ziploc bags can be used instead of glass jars. Solvent-rinsed aluminum foil will be available from dwhsampleintake@gmail.com. (Use of aluminum foil that has not been solvent [Dichloromethane. PR (pesticide research) or HPLC grade] rinsed is undesirable as it contains contaminants that interfere with low level hydrocarbon analysis.)

Each invertebrate sample should be photographed and the genus and species should be recorded.

Please note: If collecting small invertebrates, you will need a significant amount of bodies (especially amphipods (e.g., caprellids) and isopods to obtain the number of grams needed).

Appendix C Field Sampling Sheet 1-3

SAV Site Characterization Form #1 [*Page 1 of 3*]

Survey Team ID: _____

Field Crew Leader: _____ _____

Data Entry: _____ _____
(Name) (Agency)

1. Site Descriptors

Site Name/ID:_____ Lat (N)**:_____ Lon** (W)**:_____**

Time:_____ Date:_____

Habitat Setting (check one) ____ Intertidal _____ Subtidal (Depth (m) _____)

Bed size: _____ Width (m**) _____ Length (**m**) Unknown:_____**

Distance of bed from shore: <1m 1-2 2-4 4-10 >10 **Habitat Type:** creek, interior pond, bay

2. Physical/Chemical Parameters

Bottom Salinity (ppt): _____ Air Temperature (C): _____

Conductivity (mlS/µS):_____ Water Temperature (C)_____

Bottom Dissolved Oxygen (mg/L):_____

Weather/Cloud Cover: _____ Wave height (m): _____

Secchi depth (cm):_____

Turbidity Reading (ntu): **_____ (value 1) _____ (value 2)**

Chl Vol (ml) 1: 2: **Water sample for suspended sediment characterization** (# of samples):

Oiled Condition (check one**): _____ None _____ Sheen _____ Light**

_____ Moderate _____ Heavy

3. SAV present: ***Fill in table below, or check if visibility is too poor to estimate: _***

Species	Dominant (y/n)	flowering	Voucher?

SAV Site Characterization Form #2 [*Page 2 of 3]*

Site Name/ID:_____ Lat:_____ Lon:_____

Date:_____ Survey Team ID: _____

4. Point Sample Collection and Disposition

The following subsamples were collected [list all sample IDs for each, indicating any that are field duplicates, as well as geographic coordinates in decimal degrees]

Sediment samples for contaminant analysis:

Sample ID	Latitude	Longitude

Sediment samples for grain size analysis:

Water samples for contaminant analysis:

Vegetation samples for contaminant analysis:

Invertebrate samples for contaminant analysis:

Vegetation/faunal core samples for species and abundance metrics: **Core Diameter (cm)**: _____

Other (Please Describe):_____

SAV Site Characterization Form # 3 [*Page 3 of 3]*

Site Name:_____ Lat:_____ Lon:_____

Date:_____ Survey Team ID: _____

5. Trawl Sample Collection and Disposition [*Enter "none" if no trawl conducted*]

Collected by: _____ _____

Field Crew Leader: _____ _____

Data Entry:_ _____ _____

(Name) (Agency)

Trawl Details

Trawl No.	Starting Lat	Starting Lon	Ending Lat	Ending Lon	RPM	Sample ID
1						
2						

Trawl 1 Sample Data and Disposition			Trawl 2 Sample Data and Disposition		
Species	Number	Sample Retained? (y/n)	Species	Number	Sample Retained? (y/n)

Other Site Notes: _____

_____

BUDGET

COST ELEMENTS Freshwater/Brackish SAV Plan				
Labor : All labor under NOAA contract, NOAA, NPS, USFWS staff or State Reps – all recoverable under NRDA but not calculated here.				
Laboratory Analysis (analytical not included) ***Total cannot be computed. Total will be based on number of samples actually analyzed, which is uncertain at this time.***				
Item	**Unit**	**Rate**	**Number of samples**	**Total**
Sediment forensic chemistry	per sample	$1,500	40	
Vegetation forensic chemistry	per sample	$1,500	40	
Invertebrate forensic chemistry	per sample	$1,500	40	
Laboratory Analysis Total			**120**	
Third Party Labor Costs	**Number of people**	**Rate/hour**	**Number of hours**	**Total**
Newfields consultants	4	[redacted]	[redacted]	[redacted]
Vessel Coordination	1	35.00	5	175.00
Data Intake	2	25.00	10	500.00
Third Party Labor Total				**13,475.00**
Other Direct Costs				
Item	**Unit**	**Rate**	**Number of days**	Total
Boat rental, including gas (need 3 voo vessels)	per team-day	$2,200	3	6,600.00
Other transport	per team-day	$200	3	600.00
Other equipment rental	per team-day	$100	3	300.00
Direct Costs Total				**$7,500.00**
TOTAL				20,975.00
Additional Costs				
Item		Rate		
Project management		0%		
Contingency		0%		
TOTAL				**$20,975.00**
Cost Not Explicitly Included:				
Costs for sampling plan development				
Reanalysis costs if QA/QC goals are not met.				
Costs for audits or other QA/QC measures.				
Report development/data analysis.				
Travel costs, including per diem, from outside of the immediate area				
Costs for sample management team and data management team support			,	

The Parties acknowledge that this budget is an estimate, and that actual costs may prove to be higher. 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. The trustees will make a good faith effort to notify BP in advance of any such increased costs.

WORK PLAN FOR ASSESSING POTENTIAL IMPACTS TO FRESH AND BRACKISH WATER SUBMERGED AQUATIC VEGETATION COMMUNITIES

FROM THE DEEPWATER HORIZON (MC 252) OIL SPILL

******Approval of this work plan is for the purpose of obtaining data for the Natural Resources Damage Assessment. Each party signing below reserves its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan******

The trustees have developed a preliminary conceptual model of the DWH release, potential pathways and routes of exposure, and potential receptors. This preliminary model has informed the trustees' decision to pursue the studies outlined in the work plan. By signing this work plan and agreeing to fund the work outlined, BP is not endorsing the model articulated in the work plan.

APPROVAL

Jessica White — 1/20/2011

NOAA NRDA Trustee — Date

FOR ROLAND GUIDRY — 2/11/11

State of Louisiana Trustee Representative — Date

1-20-11

BP Representative — Date