Northeast Florida Water and Sediment NRDA Baseline Sampling Plan
June 21, 2010

1. Introduction

a. Regional Extent and Resource Management Jurisdictions

The northeast Florida region included in this plan spans five counties (Nassau, Duval, St. Johns, Flagler and Volusia) with approximately 120 miles of coastline extending from the St. Mary's River at the Florida-Georgia border to Ponce Inlet (south of Daytona). Within this region, the Florida Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas directs the management of: 1) the Nassau River-St. Johns River Marshes and Fort Clinch State Park Aquatic Preserves (Nassau and Duval Counties); 2) the Guana Tolomato Matanzas National Estuarine Research Reserve, which includes the Guana River Marsh and Pellicer Creek Aquatic Preserves (St. Johns and Flagler Counties); and 3) the Tomoka Marsh Aquatic Preserve (Flagler and Volusia Counties). Other management programs in this region having coastal/estuarine resource interests and/or responsibilities include (among approximately twenty four entities total) twelve state parks, two state forests, three conservation areas, two national monuments, and an ecological and historic preserve.

b. Vulnerable Northeast Florida Habitats

The coastal region of this portion of Florida consists of three distinct "bar-bound" estuarine systems linked north to south by canals that form part of the Intracoastal Waterway. The major rivers/lagoons in each of these systems include the St. Mary's, Nassau and St. Johns Rivers in the northern section; the Guana, Tolomato, and Matanzas Rivers in the middle section; and the Halifax River in the southern most section.

Salt marsh is a major estuarine habitat for much of this region. Dominant plants include glasswort (*Salicornia* spp.), saltwort (*Batis maritima*), saltmarsh cordgrass (*Spartina alterniflora*), and black needlerush (*Juncus roemerianus*). Tidal exchange helps make salt marsh, in general, one of the most biologically productive natural communities in the world. A myriad of invertebrates and fish including most of the region's commercially and recreationally important species such as shrimp, blue crabs, oysters, grouper, snapper and mullet use these marshes for part or all of their life cycles. Salt marshes are also important by virtue of their storm buffering capacity and pollutant filtering actions.

Mangrove tidal wetlands are another significant habitat type in the southern portion of this northeast Florida region. Both red (*Rhizophora mangle*) and black (*Avicennia germinans*) mangroves are present in Volusia and Flagler Counties, while only patches of black mangrove extend into St. Johns County (the northern ecotone for mangroves on the east coast). In many respects mangroves provide ecological services similar to those of salt marshes, including important nursery habitat for a variety of commercially and recreationally important fish species, buffers for storm events, and carbon sequestration.

Oyster (*Crassostrea virginica*) reefs, both patch and fringing, represent a third prominent habitat type in this coastal region. These islands of hard substrate are found intertidally throughout many of the estuarine waters of northeast Florida. In addition to decreasing turbidity by trapping sediment and stabilizing erosion, the extensive surface area of an oyster reef provides essential habitat for a wide variety of organisms. The reefs are colonized by many suspension-and deposit-feeding organisms including polychaetes, amphipods and mud crabs that are in turn prey to higher trophic level consumers such as blue crabs, black drum and shorebirds.

Unconsolidated substrates (e.g., intertidal sand and mud flats, sand beaches) are widespread communities in this region. While these habitat areas may appear relatively barren, they can support significant populations of infaunal organisms as well as a variety of transient fish, invertebrates and birds. Sand beaches also serve as important recreational areas and afford protection from storms for coastal properties. Estuarine unconsolidated habitat can be particularly susceptible to the accumulation of anthropogenic pollutants such as heavy metals, oils and pesticides associated with fine-grain sediments and organic matter.

2. Sampling Plan

a. Overview

The purpose of this water and sediment sampling plan is to determine the background concentrations of oil compounds in the northeast Florida coastal region prior to potential exposure and impacts from the MS Canyon oil contamination event. The sampling plan was developed to enable collection of samples from representative sites primarily within the estuarine portions of this region. In the selection of sampling sites, local expert knowledge together with trajectory projections from hydrodynamic models of the region were coupled to identify habitat areas where oil would potentially be distributed geographically in the event of entry into these estuarine systems via the various inlets. Consideration was also given to the availability of historical data; hence many of

the proposed sites overlap with, or are in the vicinity of, current or historical water and/or sediment monitoring stations managed through different agencies (e.g., the St. Johns River Water Management District, Florida Department of Environmental Protection, and the GTM National Estuarine Research Reserve).

b. Northeast Florida Subregions

i. Nassau – Duval Subregion

The areal extent of this subregion includes coastal areas of both Nassau and Duval Counties in Northeast Florida. This region stretches from the Florida-Georgia State border on the St. Mary's River down to the Duval-St. Johns County border. The area spans just over 30 linear miles of Atlantic coastline and also includes four major inlets and sounds with their associated salt marsh habitats. Contained within this area are the Ft Clinch and the Nassau River – St. Johns River Marshes Aquatic Preserves; five State Parks that include: Ft Clinch, Amelia Island, Big and Little Talbot Island, and Ft. George Island; Timucuan Ecological and Historic Preserve of the National Park System; and Huguenot Memorial and Hanna Parks, both within the City of Jacksonville Park system. Also many smaller parks (managed by both Nassau and Duval Counties) exist that are adjacent to the state waters in the area. A total of 20 sampling sites were selected for this subregion – five sites are located along the St. Mary's River, seven sites are located along the main thread of the Nassau River, four more sites were chosen within and around the Ft. George Inlet, and the last four sites are located south of the mouth of the St. Johns River.

ii. GTM Subregion

The GTM Research Reserve is located south of Duval County in St. Johns County and extends into Flagler County. The GTM Research Reserve is geographically separated into a northern and southern component, separated by the City of St. Augustine. The northern component is associated with the Tolomato and Guana River estuaries and the southern component is associated with the Matanzas River. This subregion contains 21 sampling sites. The 19 estuary sites were selected based on existing long-term monitoring programs and datasets (including the St. Johns River Water Management District's Northern Coastal Basin Program). Also, two beach sites were selected: one at the southern side of the St. Augustine Inlet (where sand naturally accretes) and the other site is at the Flagler Beach Pier where after an aerial flyover of the coastline there appeared to be a significant amount of sand accretion.

iii. Halifax Subregion

This subregion extends from Bulow Creek in Flagler County to north Ponce Inlet in Volusia County. The Halifax River is a long, wide, shallow estuarine lagoon bounded on the west by the Florida mainland and on the east by a barrier island. The mixing of salt water from the Atlantic Ocean introduced through the Matanzas inlet to the north and the Ponce Inlet to the south, with fresh water from the Tomoka River, Bulow Creek, and the upper Halifax River drainage basin creates the estuary. Red and black mangroves are predominant in this subregion. In this subregion there are a total of 15 sampling sites identified. The 13 estuary sites in this subregion were selected based on existing long-term monitoring programs and datasets (including Volusia County's Environmental Health Lab's surface water quality monitoring program). There are also 2 beach sites identified: one site is on the northern side of the Ponce Inlet (where sand naturally accretes) and the second site is a beach site roughly in the middle of a large expanse of coquina rock.

**Addendum (July 2, 2010): As of the first draft of this plan that was submitted on June 24, 2010, new information has become available that requires additional sampling sites.

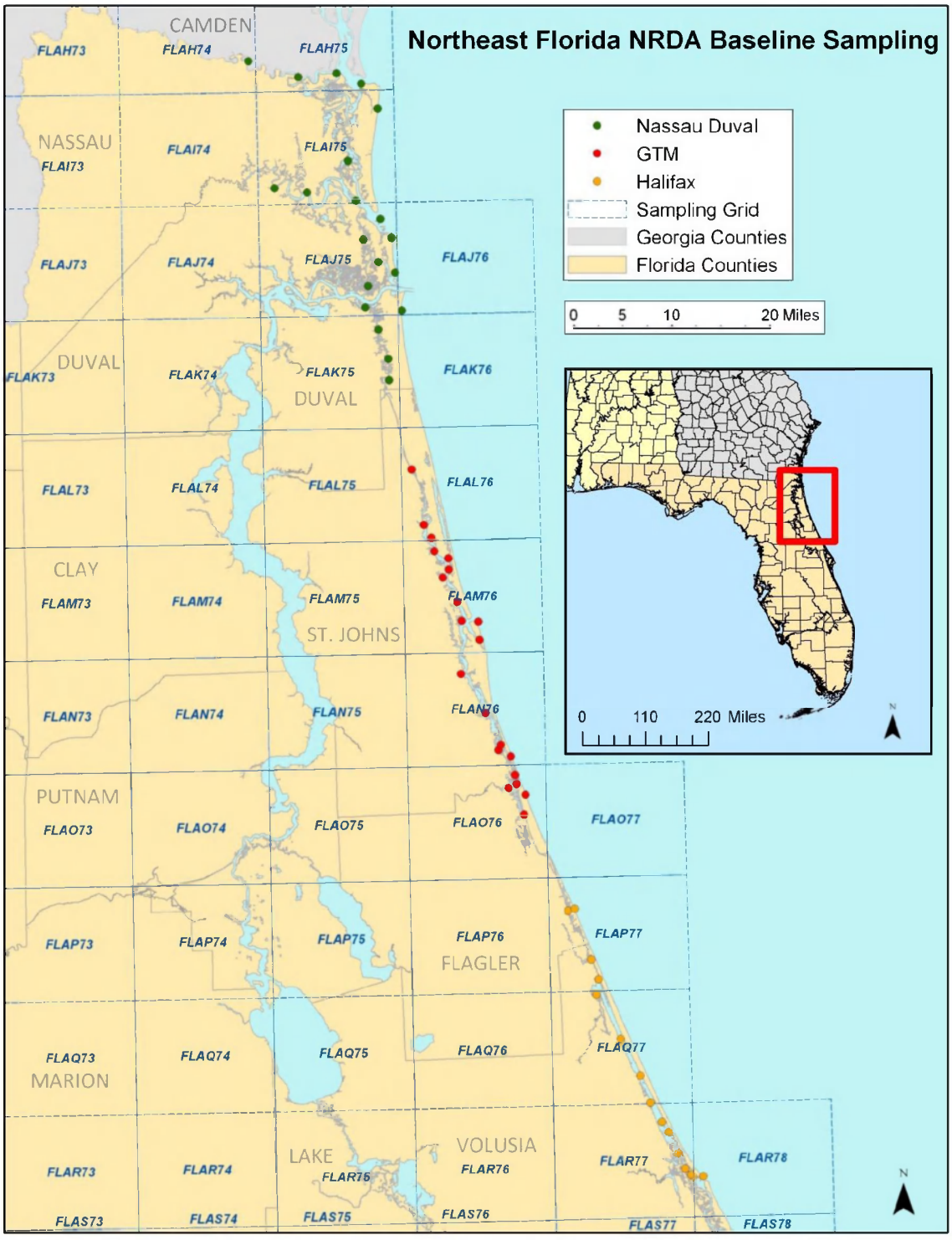
Brevard County officials have requested more beach sampling sites for sediment and water. These sites would have originally been included in the Indian River Lagoon (IRL) Baseline Sampling Plan; however, at the time of the request from Brevard County the IRL Plan had already been approved by the Department of Environmental Protection and the IRL sampling teams were already field sampling. It was suggested that the additional beach sampling sites in Brevard County be added to the Northeast Florida Baseline Sampling Plan as it was under review at the time and had not yet been reviewed. Please see the table below for additional sampling site locations in Brevard County. These sites have not been updated on map of sampling sites below.

The IRL sampling team will be collecting the additional samples from these during the same field sampling time for Northeast Florida.

Brevard County Public Beach Access Point	Latitude	Longitude
Alan Shepard Park	28.357578	-80.603622

Southern access at Patrick Air Force Base	28.214800	-80.596905
Spessard Holland Beach, South Park	28.046880	-80.546531
Juan Ponce de Leon Park	28.010700	-80.529282

3. Map of Sampling Sites



4. Sampling Teams and Cost/Delivery Estimates

i. Subregion Sampling Teams

Team	Subregion
1	Nassau-Duval – St. Mary's and Nassau Rivers
2	Nassau-Duval – St. Johns River
3	Nassau-Duval – land-based team for beach and land sites
4	GTM - all water sites
5	GTM – land-based team for beach and land sites
6	Halifax – all water sites
7	Halifax – land-based team for beach and land sites

ii. Cost/Delivery Estimates

Trustee and other agency services to be provided during the sampling events include 2 people for each of the 7 sampling teams (14 persons). There will also be a 2 person data management team, a 2 person sample management team, and 3 courier teams (1 person per team). The couriers will pick up the samples from the sampling teams at the last location and transport the samples to the data and sample management teams located at the GTM Research Reserve Environmental Education Center. Sampling teams 1, 2, 4, and 6 will require two sampling days to complete the number of sites. All other sampling teams will require only one sampling day. With the exception of the couriers, all teams will participate in a comprehensive orientation and training day just prior to the commencement of sampling.

Estimated costs:

- **Truck Mileage:** 1,730 miles at $0.50 per mile = $865
- **Boat Charges:** 4 boats for 2 days at $300 per day = $2,100
- **Misc. Supplies:** gloves, notebooks, tongue depressors, clear tape, ice, batteries, water, Gatorade etc. = $400
- **Camera use/day:** $100/sampling team/day = $1,100
- **People:** 12 people for 3 days, 6 people for 2 days, and 3 people for 2 half days at 8 hours per day and $15 per hour = $6,120
- **Total:** $10,585

5. Water and Sediment Sampling Protocol

The latest approved Natural Resource Damage Assessment (NRDA) sampling protocols are integrated with DEP Standard Operating Procedures (SOPs) for surface water and intertidal sediment sampling. These protocols will be strictly followed during sampling activities. Prior to mobilization, all field samplers will complete all required training and participate in pre-sampling briefings.

a. Sampling Objectives

1. Collect water and sediment samples to support a Before-After-Control-Impact (BACI) experimental design (BTEX/VOA samples will not be collected).
2. Maintain sample integrity during sampling, transport and storage.
3. Measure water and sediment characteristics for interpreting chemical results.
4. Determine concentration and source of oil compounds in the sample matrix.

b. Surface Water Sampling Protocol – Surface Water

i. Sampling Data Management *(See NRDA Data Management Protocol for Field Sampling 5/14/2010)*

- Assign trustee(s) responsible for all data management.
    - Prepare sampling forms and field log sheets for sample collectors using the ***NRDA Data Management Protocol for Field Sampling 5/14/2010.***
    - Prepare sample labels for field sampling containers.
    - Upload field sampling data, Chain of Custody (COC) information and photos into NOAA's NRDA sampling data management system daily.

ii. Sampling Equipment/Containers

- Two 1-Liter glass containers (certified-clean to be organic free) with Teflon lined lids. Amber glass is preferred to reduce light exposure, but not required.
- Latex or Nitrile gloves (non-powdered)
- Cooler
- Ice packs and wet ice
- GPS
- Digital camera
- Batteries
- Field log sheets
- Field notebook

iii. **Sample Container Labeling**

- Affix sample ID labels to each container and cover with clear tape wrapped around entire container circumference.
- Label each sample container lid with sample ID (using a permanent marker).

iv. **Sample Documentation**

- **Field Notes**
  - Record weather, wave conditions, etc. in field notebook and field log sheet.
  - Sign and date original field notebook and field log sheet.
  - If correcting mistakes/entries use a single line to cross through and be sure to initial and date all changes.
  - All original records will be collected and filed by trustee(s).

- **Photo Documentation/GPS Tracking** ***(See NRDA Field Photography Guidance)***
  - Sync date and time on GPS and Digital Camera.
  - Photograph GPS prior to sample collection.
  - Set-up GPS track log.
  - Photograph each sampling location.
  - Record GPS coordinates for each sample (collect GPS waypoint).
  - Photograph the entire sample collection process.
  - Make sure each photograph or series can be later associated with the corresponding sampling locations.
  - Do not delete, alter or rename any photographs (photos must be in sequential order and not contain gaps).

v. **Sample Collection Procedure**

- Orient watercraft so bow is positioned upstream (when using watercraft).
- Take samples near bow of boat, away and upwind from gasoline outboard engine (when using watercraft).
- Visually inspect glass bottles and caps for defects (DO NOT OPEN). If defect is present do not use the container.
- Collect two 1-Liter surface water grab samples at each sampling site as described below.
- Do not touch or disturb sediment bottom when sampling in shallow water.
- When wading, collect samples upstream from the body.

- Collect sample within top 12 inches of water column (DO NOT SKIM OFF WATER SURFACE).
- Use sample container as collection device (direct grab).

vi. Direct Grab Technique

1. Identify an appropriate site for water collection in the vicinity of the proposed sampling location.
2. Document/Photograph sampling location ***(See NRDA Field Photography Guidance).***
3. Remove a clean pair of gloves from glove box and place on hands.
4. Retrieve pre-labeled sampling container from storage location or cooler.
5. Submerge sampling container between 6-12 inches below water surface.
6. Orient sampling container lid towards water flow.
7. Unscrew sampling container lid.
8. Fill sampling container.
9. Securely place lid on sampling container.
10. Bring sampling container up to water surface.
11. Adjust water sample for sample expansion.
    a. Open sampling container.
    b. Pour out a small amount of water sample leaving approximately 1 inch of headspace.
    c. Securely place lid on sample container.
12. Place sampling container immediately in cooler with wet ice (sample is light sensitive).
13. Complete field log sheet and notes.
14. Repeat steps 2-13 for next sample.

vii. Sample Preservation/Holding Time

- Immediately place all water samples into coolers and keep on ice (DO NOT FREEZE).
- Samples should be extracted by the lab within 7 days of collection or sample integrity will be lost. DO NOT ADD PRESERVATIVE
- Keep samples at 4°C and ship daily to lab (if feasible) to maximize available time for laboratory processing.

viii. Sample Shipping ***(See NRDA Sample Shipping Instructions)***

- Pack samples in ice prior to shipping.
    - Blue Ice: Wrap in bubble wrap and secure in cooler to prevent sample container breakage.

    - Laboratory Ice: Enclose ice in two layers of leak proof sealed bags.
- Include a Chain of Custody (COC) form in each shipping container.
- Ensure all sample containers are labeled.
- Label sample cooler.
- Wrap jars in bubble wrap or other padding to prevent shifting and breakage during shipping.
- Tape the cooler lid shut.
- Label tape on lid: include name, date, MS Canyon 252 NRDA, custody seal.
- Ship using FedEx Priority Overnight.
- Notify laboratory of shipment.

c. Sediment Sampling Protocol – Intertidal Sediments

i. Sampling Data Management ***(See NRDA Data Management Protocol for Field Sampling 5/14/2010)***

- Assign trustee(s) responsible for all data management.
- Prepare sampling forms and field log sheets for sample collectors using the *NRDA Data Management Protocol for Field Sampling 5/14/2010.*
- Prepare sample labels for field sampling containers.
- Upload field sampling data, Chain of Custody (COC) information and photos into NOAA's NRDA sampling data management system daily.

ii. Sampling Equipment/Containers

- Two 500-mL glass containers (certified-clean to be organic free) with Teflon or aluminum-lined lids. (THC and PAH samples)
- One 10-mL glass or plastic container (TOC samples)
- One Whirl-Pak Bag (Grain Size)
- Wooden Tongue Depressors
- Latex or Nitrile gloves (non-powdered)
- Cooler
- Ice packs and wet ice
- GPS
- Digital Camera
- Batteries
- Field log sheets
- Field notebook

iii. **Sample Container Labeling**

- Affix sample ID labels to each container and cover with clear tape wrapped around entire container circumference.
- Label each sample container lid with sample ID (using a permanent marker).

iv. **Sample Documentation**

- **Field Notes**
  - Record weather, wave conditions, etc. in field notebook and field log sheet.
  - Sign and date original field notebook and field log sheet.
  - If correcting mistakes/entries use a single line to cross through and be sure to initial and date all changes.
  - All original records will be collected and filed by trustee(s).

- **Photo Documentation/GPS Tracking** ***(See NRDA Field Photography Guidance)***
  - Sync date and time on GPS and Digital Camera.
  - Photograph GPS prior to sample collection.
  - Set-up GPS track log.
  - Record GPS coordinates for each sample (collect GPS waypoint).
  - Photograph each sampling location prior to sampling.
  - Photograph the entire sample collection process.
  - Ensure each photograph or series can be later associated with the corresponding sampling locations.
  - Do not delete, alter or rename any photographs (photos must be in sequential order and not contain gaps).

v. **Sample Collection Procedure**

- Visually inspect glass bottles and caps for defects (DO NOT OPEN). If defect is present do not use the container.
- Use a wooden tongue depressor to accurately collect the top 2 cm, avoiding contact with disturbed sediments (as described below).
- Composite samples (of at least three subsamples) are recommended for characterization of a sampling site, such as contaminant content in marsh sediments.

Composite Surface Sampling Technique

1. Identify an appropriate site for sediment collection in the vicinity of the proposed sampling location.
2. Document/Photograph sampling location ***(See NRDA Field Photography Guidance).***
3. Remove a clean pair of gloves from glove box and place on hands.

4. Retrieve pre-labeled sampling containers and Whirl-Pak from storage location or cooler.
5. Retrieve new wooden tongue depressors from supply bag.
6. Remove sample container lid (DO NOT TOUCH INSIDE OF SAMPLE LID OR CONTAINER).
7. Collect top 2 cm of surface sediment using the wooden tongue depressor at multiple locations within immediate sampling area.
8. Place samples inside sample containers (fill container).
9. Place lid on sample containers (DO NOT TOUCH INSIDE OF SAMPLE LID OR CONTAINER).
10. Place sample container immediately in cooler with wet ice.
11. Complete field log sheet and notes.
12. Repeat steps 6-11 for TOC collection (10-mL container).
13. Repeat steps 6-11 for Grain size collection (Whirl-Pak).

vi. Sample Preservation/Holding Time

- Immediately place sediment samples into coolers and keep on ice.
- Refrigerate TOC and grain size samples (end of each sampling day).
- Freeze THC and PAH samples (end of each sampling day).
- THC and PAH samples can be held frozen in the dark for several years without loss of sample integrity.
- TOC and grain size samples can be held at 4°C in the dark for 40 days without loss of sample integrity.
- Ship daily to lab (if feasible) to maximize available time for laboratory processing.

vii. Sample Shipping ***(See NRDA Sample Shipping Instructions)***

- Pack samples in ice prior to shipping.
    - Blue Ice: Wrap in bubble wrap and secure in cooler to prevent sample container breakage.
    - Laboratory Ice: Enclose ice in two layers of leak proof sealed bags.
- Include a Chain of Custody (COC) form in each shipping container.
- Ensure all sample containers are labeled.
- Label sample cooler.
- Wrap jars in bubble wrap or other padding to prevent shifting and breakage during shipping.
- Tape the cooler lid shut.
- Label tape on lid: include name, date, MS Canyon 252 NRDA, custody seal.
- Ship using FedEx Priority Overnight.
- Notify laboratory of shipment.

Appendix I – Sampling Sites

Nassau-Duval Subregion	Longitude (W)	Latitude (N)
Nassau_Duval-01	-81.650953	30.741198
Nassau_Duval-03	-81.499924	30.721216
Nassau_Duval-02	-81.565931	30.716608
Nassau_Duval-04	-81.457972	30.704451
Nassau_Duval-05	-81.430478	30.667834
Nassau_Duval-06	-81.482947	30.591414
Nassau_Duval-09	-81.610065	30.553324
Nassau_Duval-08	-81.554092	30.546038
Nassau_Duval-07	-81.470854	30.532438
Nassau_Duval-10	-81.429853	30.504972
Nassau_Duval-11	-81.412170	30.476508
Nassau_Duval-12	-81.460166	30.474214
Nassau_Duval-13	-81.434833	30.440993
Nassau_Duval-14	-81.407319	30.424697
Nassau_Duval-15	-81.453198	30.405602
Nassau_Duval-16	-81.458413	30.374261
Nassau_Duval-17	-81.397206	30.368401
Nassau_Duval-18	-81.437019	30.340997
Nassau_Duval-19	-81.422101	30.297388
Nassau_Duval-20	-81.421170	30.265951

GTM Subregion	Longitude (W)	Latitude (N)
GTM-01	-81.386323	30.132867
GTM-02	-81.367265	30.050878
GTM-03	-81.355078	30.031341
GTM-04	-81.350102	30.011783
GTM-05	-81.326887	30.001123
GTM-06	-81.326677	29.984552
GTM-07	-81.336636	29.972950
GTM-08	-81.313436	29.936516
GTM-09	-81.305952	29.908149
GTM-10	-81.277636	29.906466
GTM-11	-81.276332	29.879746
GTM-12	-81.309526	29.829725
GTM-13	-81.269308	29.771102
GTM-14	-81.243981	29.723676
GTM-15	-81.248027	29.715571

GTM-16	-81.227521	29.706487
GTM-17	-81.221079	29.678757
GTM-18	-81.218438	29.664839
GTM-19	-81.232621	29.659211
GTM-20	-81.203713	29.649065
GTM-21	-81.207529	29.619958

Halifax Subregion	Longitude (W)	Latitude (N)
Halifax-01	-81.124908	29.478325
Halifax-02	-81.136276	29.475823
Halifax-03	-81.098512	29.403397
Halifax-04	-81.087037	29.374104
Halifax-05	-81.091929	29.351498
Halifax-06	-81.051972	29.285235
Halifax-07	-81.020004	29.229996
Halifax-08	-81.004337	29.189895
Halifax-09	-80.985281	29.160570
Halifax-10	-80.974994	29.145585
Halifax-11	-80.958424	29.113871
Halifax-12	-80.948304	29.091417
Halifax-13	-80.939010	29.081798
Halifax-15	-80.917776	29.078980
Halifax-14	-80.934782	29.078487

Unless otherwise agreed upon by the Trustees and BP, all samples will be sent to TDI Brooks Lab.

The 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 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 ENTRIX. 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'd data shall be made available to all trustees and ENTRIX. 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'd data set released by the DMT shall be considered the consensus data set. 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 ENTRIX."

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