Deepwater Horizon NRDA Monitoring Plan
Phase I Early Restoration:
Louisiana Oyster Cultch Project

Prepared by: Louisiana Natural Resource Trustees

Revised November 2014

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1 Introduction

The Louisiana Natural Resource Trustees developed this monitoring plan (Plan) for the Louisiana Oyster Cultch Project (Project). This Project was included as a Phase I Deepwater Horizon early restoration project and was intended to compensate the public for injury to oysters (Deepwater Horizon Natural Resource Trustees, 2012). The purpose of this plan is to describe monitoring activities that will be conducted to evaluate and document restoration effectiveness, including performance criteria for determining the success of restoration or need for interim corrective action (15 CFR 990.55(b)(1)(vii)).

This Plan will be implemented by the Louisiana Department of Wildlife and Fisheries (LDWF) and may be modified over time based on the management needs for the Project.

1.1 Project Overview

The Project involves (1) the placement of oyster cultch onto public oyster seed grounds at six sites throughout coastal Louisiana and (2) the construction of an oyster hatchery facility on Grand Isle, Louisiana that would serve to improve existing oyster hatchery operations and produce supplemental larvae and seed that could help facilitate success of the cultch plantings (Figure 1).

First, LDWF would contract for the placement of cultch material onto approximately 850 acres of public oyster seed grounds throughout coastal Louisiana including 3-mile Bay (in the Ponchartrain hydrologic basin), Drum Bay (Ponchartrain basin), Lake Fortuna (Ponchartrain basin), South Black Bay (Ponchartrain basin), Hackberry Bay (Barataria basin), and Sister Lake (Terrebonne basin) (Figure 1). Cultch material consists of limestone rock, crushed concrete, oyster shell and other similar material that, when placed in oyster spawning areas, provides a substrate on which free swimming oyster larvae can attach and grow into oysters. The cultch materials are planned to be placed at a planting density of 200 cubic yards/acre, although adjustments to this planting density may be made depending upon water bottom characteristics at the time of project implementation. The Louisiana Oyster Cultch Project would employ cultch planting approaches utilized by LDWF since 1917 (LDWF, 2013).

The second portion of the Project involves constructing an oyster hatchery facility that would serve to improve existing oyster hatchery operations to assist with recruitment success of the cultch placement, if necessary. LDWF will contract to construct the Project hatchery building adjacent to the LDWF Fisheries Research Laboratory on Grand Isle, Louisiana. Oyster hatchery activities currently housed at the LDWF Fisheries Research Lab will be relocated to the new hatchery building after construction. Hatchery operations will include oyster broodstock maintenance, algal cultivation, oyster larvae production, and a nursery system for hatchery-raised oysters. The hatchery could produce oyster larvae, spat, or seed that can be broadcast onto Project cultch areas. Once oyster larvae reach the proper age and size in the hatchery, personnel can broadcast the larvae directly over underperforming cultch sites. After the larvae settle on and attach to the cultch, they are called “spat.” Spat can also grow in the hatchery, where larvae are encouraged to settle onto small pieces of shell or micro-cultch. Personnel can place hatchery-produced micro-cultch with spat on Project cultch sites, where the larvae grow to seed- and market-sized oysters. Alternatively, oyster spat can be reared to seed-sized oysters in a nursery area, such as the LDWF remote setting facility in Buras, Louisiana. Oysters introduced into the wild tend to thrive and survive better in their more mature life stages; however, growing late-life-stage oysters costs substantially more than growing early-life-stage oysters and requires difficult handling techniques.

Figure 1. Louisiana oyster cultch planting and hatchery locations

1.2 Restoration Objectives and Performance Criteria

The goal of this restoration Project is to produce seed-sized and sack-sized oysters on public oyster seed grounds to help compensate the public for oyster injuries in Louisiana. The specific restoration objectives relevant to this Plan are to: (1) Create or enhance oyster cultch areas; and (2) Promote oyster settlement and growth, either naturally or through the addition of hatchery-sourced oysters.

Measurement against performance criteria will determine restoration success or the need for corrective action (15 CFR 990.55(b)(1)(vii)). The specific performance criteria for this Project are identified below.

- Cultch Plant Construction and Maintenance: Cover a minimum of 850 acres of public seed ground water bottom with suitable cultch material among six separate cultch placement sites.
- Hatchery Construction and Operation: Design, construct, and operate an oyster hatchery capable of producing oyster larvae as needed during Project implementation.

- Oyster Resource Development: Achieve average oyster density at or above 20 seed oysters/m^2 across 850 acres of cultch at Project sites within 3 years of cultch placement. Seed oysters are defined as those measuring 25 mm and greater from hinge to mouth.

1.3 Conceptual Model

Table 1 provides a conceptual model of the relationship between restoration actions and goal of the Project.

Table 1. Conceptual Model for Louisiana Oyster Cultch Project.

Restoration Actions	As-Built	Interim	Restoration Goal
• Place cultch material on public oyster seed grounds • Construct oyster hatchery facility to produce oyster larvae and/or seed • Enhance oyster cultch sites with hatchery-produced oyster larvae and/or seed, if necessary	• ≥850 acres of cultch material placed onto public oyster seed grounds • Hatchery facility operational and used to enhance oyster production on cultch sites, if necessary	• Oysters settle and grow to seed- and market-size, suitable for public use • Hatchery is operational and able to produce oyster larvae and seed	• To produce seed-size and sack-size oysters on public oyster seed grounds to help compensate for oyster injuries in Louisiana

2 Project Monitoring

The proposed monitoring for this Project is outlined below and is organized by Project objective, with one or more monitoring parameters for each objective. For each of the identified parameters, the Plan includes information on the monitoring methods, timing, frequency, sample size, and sites. In addition, the Plan identifies performance criteria for each parameter, where applicable, including potential corrective actions that may be implemented should performance fall short of the performance criteria. LDWF will perform monitoring activities using standard state oyster monitoring methods (LDWF, 2013), with modifications to address Project objectives.

Objective #1: Create or enhance oyster cultch areas

Parameter #1: Spatial extent of oyster cultch areas

a) **Method**:

- Onsite poling (probing of the water bottom with a wooden or metal rod) and contractor oversight will ensure that the desired acreage of cultch planting is achieved. During construction, LDWF representatives monitor the activities of the contractor and ensure that cultch deposition only occurs within the properly marked and permitted area. Both during

and immediately following construction, LDWF representatives actively probe the water bottom within the plant area to ensure that proper cultch coverage is achieved over the desired acreage. Poling will be conducted by experienced LDWF personnel around the perimeter of each site and throughout the cultch plant area along transects so that the entire area is surveyed. Ancillary information, such as observations of buried cultch and approximate cultch thickness gained from poling will also be collected during poling surveys. Cultch plant boundaries and location of bottom measurements will be determined in the field with a boat mounted or handheld global positioning system (GPS) unit and documented on field datasheets.

b) **Timing and Frequency**:

- During and immediately following construction as conducted under LDWF standard cultch plant monitoring.

c) **Sample Size**:

- The number and spatial extent of poling samples will be based on the acreage of the cultch plant site and observed cultch coverage. The cultch plant site will be sampled so that the entire area of a single Project cultch site is able to be characterized. Experienced LDWF personnel will determine the frequency of poling along transects in the field based on the homogeneity of bottom conditions encountered during the survey; fewer samples will be collected along transects at homogenous sites than at sites with highly variable bottom conditions.

d) **Sites**:

- All six Project cultch sites will be monitored.

e) **Performance Criteria**:

- During construction, LDWF representatives will ensure that cultch deposition only occurs within the properly marked and permitted area.
- At the end of construction, the total area covered with cultch material across the Project should be equal to or greater than the target acreage (850 acres).

f) **Potential Corrective Actions**:

- If the total acreage of exposed cultch does not meet the target acreage immediately after construction, the Contractor (with agreement from the Trustees) will decide on what measures should be taken so that the acreage meets the target objective.
- Additional cultch material may be added.
- Other corrective actions may be considered by the Trustees if appropriate.

Objective #2: Promote oyster settlement and growth

Parameter #1: Oyster density (oysters/m^2), mortality (% dead oysters), and size distribution (mm)

a) **Method**: Oyster density (oysters/m^2), mortality (% dead oysters), and size distribution (spat 0–24 mm, seed 25–74 mm, and market-sized ≥ 75 mm) information will be collected at each Project cultch site to determine if oysters are settling, surviving, and growing to a size and density suitable for commercial or recreational harvest. All data will be collected on standard LDWF oyster sample data sheets (Attachment 1), although header information may be modified to more-accurately reflect this particular monitoring project.

- Quadrat sampling: Oyster density will be determined throughout each Project cultch site via ¼ square-meter quadrat sampling following established LDWF sampling protocol on an annual basis (LDWF, 2013). Quadrat sampling will occur each summer following completion of construction to coincide with LDWF annual oyster stock assessment sampling. Prior to sampling, the Project cultch site area will be divided into equally-sized, consecutively-numbered grid squares; squares would be randomly chosen for sampling during each sampling event. Within each grid, one ¼ square-meter quadrat will be tossed off the sampling vessel on the cultch plant site bottom. From the quadrat, SCUBA divers will collect all oysters, surficial shell/cultch, and associated reef organisms for enumeration and analysis. All materials collected from the quadrat are deemed as the sample. All live and recently dead oysters within each sample are counted, measured and returned to the water.
- Dredge Sampling: LDWF will use dredge sampling to monitor oyster mortality and size between quadrat sampling events. LDWF standard three-minute 24-inch hand dredge tows will be used for Project monitoring. Dredge samples are evaluated in a manner similar to quadrats where all oysters within each sample are measured, counted, and then returned to the water. Dredge sampling is not an appropriate technique to help determine density based performance criteria (20 seed oysters/square-meter), but will provide important information (e.g., mortality, spat recruitment success, etc.) to explain why Project performance criteria may or may not have been achieved at Project cultch sites or be used to identify corrective actions.

b) **Timing and Frequency (See Section 3 for details)**:

- LDWF will conduct quadrat and dredge sampling using standard agency protocols (LDWF Standard Sampling) for cultch placements following cultch plant construction until summer 2014 (LDWF, 2013).
- Beginning in summer 2014, Project-specific monitoring described in this Plan will be conducted by LDWF.
- Beginning in summer 2014, sites will be monitored on a quarterly basis; quadrat sampling in July and dredge sampling in October, January, and April.

c) **Sample Size**:

- LDWF standard protocols use five replicate samples per site for quadrat sampling (¼ square-meter) and dredge tows (24-inch “hand” dredges towed for three minutes).

- Project-specific quadrat sampling will be conducted by LDWF personnel in at least 20 grids at each site, unless data analysis indicates sample size changes are warranted.
- At least 20 replicate dredge samples will be collected by LDWF personnel during each Project-specific sampling event, unless data analysis indicates sample size changes are warranted.
- Following data analysis, the sample size (number of quadrats collected per sampling event) may be increased if sample results are highly variable (i.e., the variance to mean ratio is greater than one). An increase in sample size may be implemented together with a stratified random sampling design, which would divide reefs into different strata (high, medium, and low quality) based on oyster abundance.

d) **Sites**:

- All six Project cultch sites will be sampled.

e) **Performance Criteria**:

- An average density of 20 seed-sized oysters per square meter will indicate successful recruitment and survival of oysters onto the cultch plant site with growth to a size and density suitable for commercial or recreational harvest (Chatry et al., 1983).

f) **Potential Corrective Actions**:

The following section provides potential corrective actions that may be undertaken, as part of a Corrective Action Plan, if the performance criteria are not achieved.

- Additional Cultch at Original Location(s) – This action may be employed if cultch subsidence has occurred such that very little cultch material remains above the mud line. Utilizing the existing cultch as a base material, a thin layer of additional cultch material could be placed on top such that clean, hard substrate is again available above the mud line for oyster recruitment.
- Additional Cultch at Alternate Location(s) – Additional cultch material may be planted at an alternate location where better conditions exist and are anticipated to continue to exist. Samples of cultch material may be tested at the oyster hatchery facility prior to deployment to ensure that oyster larvae will recruit to the material.
- Re-Expose Buried Cultch – Oyster reef may become buried following strong weather systems (e.g., hurricanes) due to shifting sediments and displaced marsh vegetation from tidal surges. Mechanical means could be utilized to more-quickly remove the sediment and vegetative overburden in locations that appear to be appropriate for this action based on sampling that indicates the presence of buried cultch. This is a technique claimed to be successful by oyster leaseholders on private oyster leases. Pulling bag-less dredges, or other implements, over buried cultch material may re-expose the cultch making it once again available for oyster recruitment. This technique was utilized following Hurricanes Andrew (1992) and Katrina (2005) on both public oyster grounds and private oyster leases.

- Deploy Hatchery-Raised Larvae/Spat –Hatchery-raised larvae can be deployed through various techniques: (1) direct release of larvae onto the bottom over the planted cultch; (2) set on micro-cultch at the LDWF Fisheries Research Laboratory to produce oyster spat for deployments; and, (3) set on whole oyster shell or aggregate for subsequent deployment on cultch plants through the LDWF remote setting facility in Buras, Louisiana. LDWF, Louisiana Sea Grant, and industry professionals developed a list of pros and cons for hatchery oyster deployment techniques (Table 2). The technique of choice will depend upon available resources at the time of deployment.
- Other corrective actions may be considered by the Trustees if appropriate.

Table 2. "Stop-Light" diagram showing the comparison between oyster deployment techniques for various evaluation metrics using hatchery-raised oysters. Green colors generally indicate high probability of success. Final oyster density based on evaluation of deployments six months after planting.

Evaluation Metric	**Oyster Deployment Technique Using Hatchery-Raised Larvae**			
	Larvae	***Spat on Micro-Cultch*[1]**	***Spat on Aggregate***	***Spat on Whole Shell***
Initial Production Quantity	High	Medium High	Medium High	Medium High
Survival in Nature to 1" (seed)	Low	Low	Medium High	High
Stability (lack of movement)	Low	Medium High	High	High
Ease of Handling	High	Medium High	Low	Low
Ease of Planting	High	Medium High	Medium	Medium
Final Oyster Density (20 seed/m^2)	Low	Low	Medium	High

1. The success of the spat on micro-cultch technique may be increased with the addition of a nursery phase.

Additional Monitoring

Parameter #1: Environmental conditions

a) **Method**: Environmental conditions, such as water quality, salinity, and populations of oyster predators will be monitored by LDWF in conjunction with the quadrat and dredge tow sampling described above. Physical parameters collected one foot above the cultch surface in conjunction with each biological sample will include salinity, temperature, conductivity, dissolved oxygen, turbidity, and pH. This information will be recorded by field personnel on LDWF field sampling datasheets and field notebooks.

b) **Timing and Frequency**: This information will be collected during quadrat dive sampling and dredge surveys.

c) **Sample Size**: Observations will be conducted and information recorded for each set of biological samples collected per day.

d) **Sites**: All six Project cultch areas.

e) **Performance Criteria**: No specific performance criteria are set for environmental conditions. However, environmental condition information will be used to direct associated corrective actions. For example, if measured salinity gradients are not conducive for spat set, but are favorable for seed growth, then hatchery-produced seed may be used to enhance oyster production in affected sites.
f) **Potential Corrective Actions**: No corrective actions are contemplated for environmental conditions.

Parameter #2: Status of the Project oyster hatchery

a) **Method**: Monitor hatchery construction and operational milestones throughout the Project. When fully operational, oyster production schedules and availability will also be monitored with respect to anticipated corrective actions.
b) **Timing and Frequency**: Communicate status of hatchery operations to Trustees. Production inquiries will be conducted on an as-needed basis when the hatchery is operating.
c) **Sample Size**: Not applicable.
d) **Sites**: Project oyster hatchery.
e) **Performance Criteria**: Hatchery should be able to produce oyster larvae as needed during Project implementation.
f) **Potential Corrective Actions**: If Project hatchery oyster larvae are not available when needed, then alternative sources of hatchery larvae may be identified and used for corrective actions.

3 Monitoring Schedule

Table 3 shows the schedule for the Project monitoring, separated by monitoring activity. Pre-construction monitoring will occur before Project implementation and is not covered in this Plan. Construction monitoring typically occurs within 90 days following Project construction. LDWF conducted monitoring using standard methods (LDWF standard sampling) for new cultch plants at the Project sites prior to summer 2014 (LDWF, 2013). This Plan assumes that Project-specific monitoring would begin in summer 2014. The Plan also assumes that Project performance standards for Parameter 1 of Objective 2 would be met by 2017 and Project-specific monitoring as described in this plan would cease by that time. The Trustees anticipate that after Project-specific monitoring concludes, LDWF would continue to monitor the cultch placement sites using standard LDWF monitoring protocols throughout the time the sites are still producing oysters.

4 Reporting and Data Requirements

This section describes the process the Louisiana Natural Resource Trustees will follow to document, validate and report field data collected for the purposes of performance monitoring. The reporting and data requirements described herein are intended to:

- Maximize the quality, utility, and integrity of monitoring data
- Organize, track, locate, and access monitoring data over the long-term
- Share finalized monitoring data with the public in a consistent and comprehensible format

4.1 Field Data Documentation

The majority of data collected during this Project will be field observations of environmental conditions and enumeration and size assessment of biological organisms. To the extent possible, all environmental and biological data generated during monitoring activities will be documented using standardized Louisiana Department of Wildlife and Fisheries (LDWF) field datasheets (see Attachment 1 of Deepwater Horizon NRDA Monitoring Plan). If standardized datasheets are unavailable or not readily amendable to record Project-specific data, then Project-specific datasheets will be drafted by LDWF prior to conducting any Project monitoring activities.

All tangible forms of field data will be reviewed by LDWF for completeness and accuracy before being finalized. Original hardcopy datasheets and notebooks and photo microSD cards will be retained by LDWF in a secure location in accordance with agency and litigation-hold requirements.

4.2 Field Data Transcription, Validation, and Analysis

All field datasheets and notebook entries will be scanned to PDF files and will be archived along with the hardcopy datasheets. Electronic data files should be named with the date on which the file was created. Where possible, a ReadMe file should be included that describes when the file was created and by whom, and any explanatory notes on the file contents. If a data file is revised, a new copy should be made and the original preserved.

Relevant Project data that are handwritten on hardcopy datasheets or notebooks will be transcribed (entered) into Excel spreadsheets (or similar digital format) for required data analysis by LDWF staff. After transcription of the data, a second person not associated with data transcription will perform a 100% check of the data in the electronic data sheets against the original hardcopy datasheets and/or notebooks, and will make any corrections to transcription errors as appropriate before data are used for any analyses or distributed outside of the agency. After any and all identified errors are addressed, data are considered to be QA/QC'd.

When the data transcription process is complete, electronic datasets can be used for data analysis. Analyses will be conducted by the Louisiana Natural Resource Trustees to derive Project monitoring performance criteria metrics and compile information on oyster abundance, mortality, and size distributions. Additional field observations, such as water quality information, sample site locations, sample dates, predator abundance, shell/cultch condition, and photograph logs may also be transcribed into electronic spreadsheets, checked, and analyzed.

4.3 Document and Sample Retention Requirements

Hardcopy and electronic documents generated during data collection will be retained. Preservation includes retaining and not altering any such thing as to its form, content, or manner of filing. The NRDA monitoring plan for this Project does not include removing any physical samples from the cultch sites. All measurements and enumeration of specimens will be conducted while on the cultch site. However, if any samples are taken, as stipulated in the *June 24, 2011 U.S. District Court, Eastern District of Louisiana Pretrial Order No. 37 Relating to the United States' and Natural Resource Trustees' Testing of Samples*, these samples collected from the field and subsequently analyzed for this Project will be retained.

Project sample retention policies will apply to all samples collected and removed from the cultch site during Project monitoring activities. This primarily includes oyster shells and cultch that is removed from sampling sites to be analyzed after the sampling event concludes. All oysters removed from the same sample site at the same time will be retained as a single sample. Samples will be labeled with the sample site name, replicate number, and date collected.

4.4 Data and Document Transfers

Data and document transfers between the Louisiana Natural Resource Trustees will be conducted throughout the course of this Project. Transfer of electronic files will primarily be accomplished via email.

4.5 Reporting Schedule

Following the summer 2014 data collection effort (see Table 3 of NRDA Monitoring Plan), the Louisiana Natural Resource Trustees will begin developing monitoring progress reports on an annual basis until the Project meets or exceeds the performance criteria specified in the monitoring plan, at which time a comprehensive Final Monitoring Report will be developed and all project-specific performance monitoring would cease. If corrective actions are necessary, the Louisiana Natural Resource Trustees will develop a Corrective Action Plan and provide a schedule of performance monitoring and reporting beyond 2017. All reports will contain monitoring data that have been validated and have undergone final quality control checks.

5 References

Chatry, M., R.J. Dugas, and K.A. Easley. 1983. Optimum salinity regime for oyster production in Louisiana's state seed grounds. *Contrib. Mar. Sci. Univ. Texas* 26:81–94.

Deepwater Horizon Natural Resource Trustees. 2012. Deepwater Horizon Oil Spill Phase I Early Restoration Plan and Environmental Assessment. Available: http://www.doi.gov/deepwaterhorizon/upload/Final-ERP-EA-041712.pdf.

Louisiana Department of Wildlife and Fisheries (LDWF). 2013. LDWF Oyster Fisheries Independent Sampling. Internal document.

Table 3. Monitoring schedule for the Louisiana Oyster Cultch sites.

			LDWF Standard Sampling									Project Specific Monitoring																
			2012				2013				2014				2015				2016				2017					
		At Construction	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4		
Hackberry Bay	Constructed 5/21/2012																											
	Poling to quantify cultch area	X																										
	Quadrat sampling				X				X				X				X				X				X			
	Dredge sampling						X				X			X	X	X		X	X	X		X	X	X		X		
Sister Lake	Constructed 6/2/2012																											
	Poling to quantify cultch area	X																										
	Quadrat sampling				X				X				X				X				X				X			
	Dredge sampling						X				X			X	X	X		X	X	X		X	X	X		X		
Bay Crab	Constructed 10/6/2012																											
	Poling to quantify cultch area	X																										
	Quadrat sampling								X				X				X				X				X			
	Dredge sampling						X			X				X	X	X		X	X	X		X	X	X		X		
Lake Fortuna	Constructed 11/19/2012																											
	Poling to quantify cultch area	X																										
	Quadrat sampling								X				X				X				X				X			
	Dredge sampling						X			X				X	X	X		X	X	X		X	X	X		X		
3- Mile Bay	Constructed 5/9/2013																											
	Poling to quantify cultch area	X																										
	Quadrat sampling								X				X				X				X				X			
	Dredge sampling									X				X	X	X		X	X	X		X	X	X		X		
Drum Bay	Constructed 6/2/2013																											
	Poling to quantify cultch area	X																										
	Quadrat sampling								X				X				X				X				X			
	Dredge sampling									X				X	X	X		X	X	X		X	X	X		X		

Attachment 1: LDWF Oyster Sample Data Sheet

LDWF Oyster Sample Data Sheet

PROJ _____ CSA _____ STATION NAME/NUMBER _____

DATE _____ TIME _____ GEAR TYPE _____ COLLECTORS _____

COMMENTS _____

Air Temp	Wind Direction	Wind Speed	Turbidity			Conductivity	Salinity	Water Temp	DO
					TOP				
					BOTTOM				

Work Group	Size Range (mm)	Live	Dead Valve	Dead Box
		Measure 25 live spat and count the remaining live spat	Measure 25 dead spat & count remaining dead spat	
0	0 – 4			
1	5 – 9			
2	10 – 14			
3	15 – 19			
4	20 – 24			
5	25 – 29			
6	30 – 34			
7	35 – 39			
8	40 – 44			
9	45 – 49			
10	50 – 54			
11	55 – 59			
12	60 – 64			
13	65 – 69			
14	70 – 74			
15	75 – 79			
16	80 – 84			
17	85 – 89			
18	90 – 94			
19	95 – 99			
20	100 – 104			
21	105 – 109			
22	110 – 114			
23	115 – 119			
24	120 – 124			
25	125 – 129			
26	130 – 134			
27	135 – 139			
28	140 – 144			
29	145 – 149			
30	150 – 154			
31	155 – 159			
32	160 – 164			
33	165 – 169			
34	170 – 174			
35	175 – 179			
36	180 – 184			
37	185 – 189			
38	190 – 194			
39	195 – 199			
40	200 – 204			

OYSTER SUMMARY			
	Spat	Seed	Sack
Live			
Dead			
% Mortality			
Total % Mortality			
Seed & Sack % Mortality			

Species	Code	Number
Hooked Mussels	*2135*	
Oyster Drills	*2111*	
Mud Crabs	*2425*	
Blue Crabs	*2003*	
Stone Crabs	*2424*	
Gulf Toadfish	*2109*	

Additional Comments: _____

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Oyster Sample Data Sheet – Rev 3/05