Baseline Environmental Survey Guidance and Procedures for Marine Aquaculture Activities in U.S. Federal Waters of the Gulf of Mexico
October 24th, 2016

Purpose and Authorities

a) Purpose. This document provides information on the baseline environmental survey (BES) requirement for the NOAA Fisheries Gulf Aquaculture Permit (GAP) as well as requirements pertaining to the Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) permit. The information in this document is specific to marine aquaculture operations sited in federal waters of the U.S. Gulf of Mexico (Gulf).

Applicants are ***strongly encouraged*** to contact NOAA Fisheries and EPA prior to beginning survey work on a proposed aquaculture site as additional conditions may apply.

b) Authorities. NOAA Fisheries has the authority to issue GAPs under the Fishery Management Plan for Regulating Offshore Marine Aquaculture in the Gulf of Mexico (FMP) and regulations implementing the amendment codified at 50 CFR § 622, Subpart F. In accordance with the FMP and NOAA Fisheries implementing regulations, a BES of the proposed aquaculture site must be submitted as part of the GAP application package.[1]

The EPA issues NPDES permits under authority of the Clean Water Act (CWA). An NPDES permit is required for any aquaculture operation that produces 100,000 or more pounds of fish per year. The EPA requires that applicants submit baseline data on water quality and benthic systems as part of the NPDES permit application process.[2]

Guidance and Procedures

The BES consists of a ***Seafloor Survey*** and ***Hydrographic Measurements*** and shall be initiated after successful completion of the Pre-Application Meeting with the various federal permitting agencies. Potential applicants are required to conduct a BES of the proposed

[1] Once a GAP has been issued, the NOAA Fisheries requirement for permittees to monitor and report the environmental survey parameters at the site will be met by complying with EPA monitoring requirements.

[2] The EPA also administers Section 403(c) of the CWA which provides that NPDES permits for discharges to the "territorial sea, the waters of the contiguous zone, or the oceans" must be in compliance with the ocean discharge guidelines. These guidelines are used to determine whether or not a discharge will cause "unreasonable degradation" of those waters. Unreasonable degradation is defined as any significant adverse impact to water quality or the marine communities living in the water column and on the seafloor. CWA Section 403(c) requires that the EPA consider location and proximity of the discharges to sensitive marine habitat and communities in a determination of unreasonable degradation and the EPA can deny a permit if it finds that the location will result in significant adverse impacts.

area, analyze the data and submit a report to both the NOAA Fisheries (Jess.Beck@noaa.gov) and designated EPA contact (EPA Region 4 – Ferry.Rol@epal.gov; EPA Region 6 - Afghani.Jim@epa.gov). The processed data used in the analysis should be provided to NOAA and the EPA as part of the BES package.

NOAA Fisheries and the EPA will use the information submitted to determine whether or not particular features exist that could disqualify the proposed area for siting purposes. If the proposed site is disqualified, an alternate site must be chosen and another Pre-Application Meeting scheduled.

1) Seafloor Survey

The purpose of the site seafloor survey is to ensure that the site is clear of benthic and subsurface (*i.e.*, pipelines, buried debris, vessels etc.) features that would preclude the siting of an aquaculture operation. The boundaries of an aquaculture site should be a minimum of 500 meters from such features to provide a protective buffer from construction related activities and operational discharges. ***Note*** that NOAA Fisheries and EPA may modify the boundary distance on a case-by-case basis.

NOAA Fisheries and EPA may waive some or all of the seafloor survey requirements if data from prior seafloor surveys is available for the proposed site. NOAA Fisheries and EPA will make this determination on a case-by-case basis and will consider data quality and completeness. Applicants should note that even if certain requirements are waived, all data must still be analyzed and reported per Section 3.

Survey Methodology

Seafloor Surface

Acoustic (i.e., side-scan sonar) data in the 100 kHz frequency and 500 kHz frequency if available (use frequency and range settings providing best image quality) should be used to interpret for the presence of features on the seafloor surface within the boundaries of the proposed aquaculture site.[3] Survey line spacing should be set so that sonar tracks overlap sufficiently to obtain 100% coverage of the seafloor surface within the proposed site.

[3] NOAA Fisheries recommends designating an observer to scan for marine mammals in the area while conducting acoustic sonar surveys. If marine mammals are observed while conducting surveys, please halt the acoustic sonar survey until the animals have left the survey area.

Survey vessels should use an integrated GPS navigation system that can continuously determine the surface position of the vessel. In water depths greater than 91 meters (300 feet) survey vessels should use acoustic positioning of towed sensors to facilitate sufficiently accurate mapping of any recorded contacts.

A hull mounted, high-frequency, narrow beam hydrographic echo sounder must be employed to obtain bathymetric data. Bathymetry data should be logged digitally and continuously and should be corrected for vessel movement and tides.

Any significant discrete features discovered on the seafloor surface during the acoustic survey should be further resolved by adjusting range settings and frequency as appropriate. NOAA Fisheries and the EPA recognize that acoustical methods may not allow for complete and accurate identification of all seafloor features and will assume that any significant discrete features based on acoustical reflection should be avoided whether or not they are accurately identified. However, the applicant may choose to employ visual (photographic/video) methods of identification of discrete features if they believe it is warranted. In this case, applicants must provide high resolution still photos and/or video to fully and completely identify the discrete features in question.

Sub-Surface

Debris, pipelines and archeological resources may lay below the seafloor surface not detectable by sidescan sonar survey methods. Sub-surface data will be obtained with a magnetometer and a sub-bottom profiler.

> Magnetometer: For all surveys conducted in water depths less than 100 meters (328 feet), a proton precession or cesium total field magnetometer should be used to detect ferrous and other magnetically susceptible metals. Tow the magnetometer sensor as near as possible (but no more than 6 meters (20 feet) above the seafloor) and in a way that minimizes interference from the vessel hull and the other survey instruments.
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> Attach a depth sensor to the magnetometer sensor and annotate each survey line with tow sensor height off seafloor and with start of the line (SOL) and end of the line (EOL) times. Ensure that magnetometer sensitivity is one gamma (γ) or one nanoTesla (nT) or less, and that the data sampling interval does not exceed one (1) second. Ensure also that the background noise level does not exceed a total of 3 gammas peak to peak.
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> Record data on a digital medium in such a way that it can be linked to the positioning data. Make sure that the recording scales are set no higher than 1,000-gamma and 100-gamma full scale, respectively. Annotate shot points and recorder speed.

Sub-Bottom Profiler: Use a very high-frequency subbottom acoustic profiler operating within the 1.5- to 4.5-kHz bandwidth to provide continuous and very high resolution information of near surface geological features within the uppermost 15 meters (50 feet) of sediment. Run the subbottom profiler system to provide penetration that exceeds the depth of disturbance (i.e., the maximum expected anchor penetration).

Make sure that the subbottom profiler system is capable of achieving a resolution of vertical bed separation of at least one (1) foot in the uppermost 15 meters (50 feet) below the mudline.

Record the data digitally to allow signal processing to improve data quality further and allow export to a workstation for integrated interpretation and mapping of the data.

2) Hydrological Measurements

Hydrological information is necessary in order to model the directionality of water quality impacts and organic deposition on the seabed. The modeling results will be used to develop a directed operational monitoring plan for the facility.

A water current meter should be deployed at the approximate center of the proposed aquaculture site. The current speed and direction should be measured at a minimum of three depths: near surface, bottom of suspended cage, and one meter off the seabed. Data collection should occur for one deployment for a minimum of 20 days or 40 tidal cycles, measured hourly. If sufficient historical current data exist for the proposed site, NOAA and the EPA may waive this requirement. NOAA Fisheries and EPA will make this determination on a case-by-case basis and will consider data quality and completeness. Wave data for the site should be obtained from the Wave Information Study (WIS) station (U.S. Army Corps of Engineers) nearest the site. Wave properties to your location should be refracted using linear wave theory. Applicants should note that even if certain requirements are waived, all data must still be analyzed and reported per Section 3.

3) Data Analysis and Report

Field survey reports should be prepared using the guidelines below. Applicants should provide one hard copy and two DVD copies of the report to both NOAA Fisheries and the EPA as part of the permit application package for each agency. Note that DVD report information should be in PDF format. Applicants should also provide two digital copies of all survey maps (as DWG files) to both NOAA Fisheries and the EPA. Survey maps should be oriented to the North American Datum of 1927 (NAD 27) coordinate system. The processed data used in the analysis should be provided to NOAA and the EPA as part of the BES package.

The report should contain an evaluation and synthesis of the data gathered during the field survey. This information should be prepared, signed, and dated by a professional archaeologist who is qualified according to the standards found at 36 CFR part 61 Appendix A (http://www.gpo.gov/fdsys/pkg/CFR-1998-title36-vol1/pdf/CFR-1998-title36-vol1-part61-appA.pdf). Specialists in other fields may participate in data analysis and report preparation, as needed.

The following information should be included in the report.

A. A description of the area surveyed, including the permitted area and its minimum and maximum water depths.

B. A list of the individuals with names, titles and affiliations that were involved in survey planning, fieldwork, and report preparation, and a description of their duties.

C. A discussion of the field survey methodology, including:

1. A brief description of the navigation system, including a statement of its estimated accuracy for the area surveyed.

2. A brief description of survey instrumentation, including scale, sensitivity settings, sampling rates, and tow heights off seafloor, as appropriate for each instrument.

3. A description of the survey vessel, including its size, sensor configuration, instrument set-backs, and navigation antennae locations.

4. Vessel speed and course changes.

5. Sea state and weather conditions.

6. A copy of the ***original*** daily survey operations log. Include sensor height off seafloor for the magnetometer and acoustic survey (sidescan sonar) for the beginning and end of each survey line.

7. A description of survey procedures, including a statement of survey and record quality, a comparison of survey line crossings, and discussion of any problems that may affect the ability of the report preparers to determine the potential for the presence of hazards, debris, human activities (*i.e.*, oil/gas structure, artificial reefs), and biological and archaeological resources in the survey area.

8. An explanation of the problem(s) if unable to meet the survey line spacing or instrumentation guidelines listed above.

D. A navigation post plot map of the survey area at a scale of 1:12,000 showing survey lines, shot points at 152-meter (500-foot) intervals, line direction in the grid projection in which the lease is described (e.g., UTM, Lambert, or geographic coordinates) with tics placed every five inches thereon, and with geodetic graticules every 60 seconds. (Submit one hardcopy and two digital copies (one in PDF format and ESRI Shapefile format) of this map to both NOAA Fisheries and the EPA.) Orient this map, or separate maps at the same scale that also show survey lines, shot points, and line direction, to true north and delineate the following, as appropriate:

1. For sub-bottom profiler data, include the horizontal and vertical extent of all relict geomorphic features having potential for associated prehistoric sites.

   When relict fluvial systems are recorded, make sure that the map:

   a. differentiates between generations of channeling when more than one generation is present;

   b. shows any internal channel features such as point bar deposits and terraces;

   c. delineates any channel margin features such as natural levee ridges;

   d. indicates all depths of channel banks and channel axes (thalwegs); and

   e. delineates all areas recommended by your archaeologist for avoidance for potential archaeological resources.

   Note: An isopach map of channel fill sediments is often the most efficient means of conveying the above information, but this method alone will not allow differentiation between more than one generation of channeling.

2. All magnetic anomalies and acoustic survey (sidescan sonar) contacts of unknown source (for magnetic anomalies use map symbol: ▲; for acoustic survey contacts use map symbol: ☒).

   Identify these magnetic anomalies and acoustic survey contacts using only the aforementioned symbols and a unique number keyed to the listings in the unidentified magnetic anomaly and acoustic survey tables in the text (see paragraph F below).

   In congested areas with numerous unidentified magnetic anomalies, you may use a map(s) at a scale of 1:6,000 to depict the anomalies. If you do, tie this congested area map(s) into the 1:12,000 survey area map. ***Plot all recommended potential archaeological avoidance areas on the survey area map.***

3. Sites of oil and gas operations (e.g., well locations, platform sites, and/or pipelines), when available at the time of report preparation.

4. Sites of former oil and gas operations (e.g., abandoned well locations, platform sites, and/or pipelines).

E. An analysis of the potential for prehistoric sites within the survey area that includes:

1. A discussion of relict geomorphic features and their archaeological potential that includes the type, age, and association of the mapped features; the acoustic characteristics of channels and their fill material; evidence for preservation or erosion of channel margins; evidence for more than one generation of fluvial downcutting; and the sea level curves you used in the assessment.

2. A discussion, based on the capabilities of current technology in relation to the thickness and composition of sediments overlying the area of a potential site, of the potential for identification and evaluation of buried prehistoric sites.

F. A current review of existing records for reported shipwreck locations in the survey area and adjacent areas, and the following, as appropriate:

1. A table of the unidentified magnetic anomalies with the OCS block, shot point, and survey line location (corrected for sensor offset); gamma intensity; lateral extent (duration); whether the anomaly is characterized by a dipolar, monopolar, or complex signature; the magnetometer sensor tow height off seafloor; the NAD 27 decimal degree coordinates of the center of each unidentified anomaly; and the recommended avoidance zone. Below is an example of a suggested format for this unidentified magnetic anomaly table;

Anomaly Number	Line No.	Shot Pt.	Tow Height (feet)	Signature	Intensity (gammas)	Duration (feet)	NAD 27 Coordinates (in decimal degrees)	Minimum Avoidance Dist. (feet)
1	0020	11.4	20	Dipole	15	75		100

2. A table of sidescan sonar contacts with the lease block, shot point, and survey line location (corrected for sensor offset); size; shape; height of protrusion above the seafloor; the NAD 27 decimal degree coordinates; and recommended avoidance distance of each. A suggested format for this unidentified sidescan sonar contact table is included below;

Anomaly	Magnetometer	Dimensions	Shape	NAD 27	Minimum

Number	Association	LxWxH (ft)		Coordinates (in decimal degrees)	Avoidance Dist. (feet)
1	Mag. Anomaly 1, Line 0020, Shot Point 11.4	100 x 50 x 5	Linear		100

3. A discussion of any magnetic anomalies and acoustic survey contacts of unknown source in terms of their potential as historic shipwrecks (include an analysis of reported nearby wrecks and their potential association with these contacts/anomalies on the basis of vessel size and anomaly characterization);

4. A discussion of any correlation between magnetic anomalies or acoustic survey contacts and known or probable sources;

5. For any archaeological resources that can be positively identified from remote-sensing records, an analysis of their possible significance and recommendations for any further research or special precautions that may be necessary.

6. A discussion of the potential for shipwreck preservation in terms of bottom sediment type and thickness, and the effects of past and present marine processes in the survey area; and

7. A discussion of the potential for identification and evaluation of potential shipwrecks considering the capabilities of current technology in relation to the water depth, probable thickness and composition of sediments overlying the potential shipwreck location, and the preservation potential.

G. Representative data samples from each survey instrument to demonstrate the quality of the records. If appropriate, include the following data samples, which you may use in lieu of the representative data samples:

1. A sample of subbottom profiler data for each type of relict landform that is identified. When more than one generation of fluvial channeling is evident, include a sample that depicts each generation. Each sample should be readable and include horizontal and vertical scales. Provide any interpretive highlighting or annotation of the sample data on a separate overlay or a copy of the sample data. Do not highlight original survey data.

2. Copies of all acoustic survey data where contacts representing unidentified objects are recorded. Make sure that the copies are readable and include the scale. If you want to provide any interpretive highlighting or annotation of the sample acoustic

survey data, provide either a separate overlay or a copy of the sample data. Do not highlight original acoustic survey data. Include a digital copy of the computer-generated mosaics as a geo-referenced Tagged Image Format (TIF) file.

H. A summary of conclusions and recommendations supported by the field survey data including:

   1. A discussion of all known or potential physical, biological and archaeological resources; and

   2. Recommendations for avoidance or for further investigations.

I. A discussion of the data and results from any additional investigations that are required by NOAA Fisheries and the EPA.

J. Hydrological Measurements: Reporting of the hydrological measurements (waves and currents) should contain a thorough description of the methods employed including the instrumentation used, location and depth of deployment, deployment periods and field procedures involved in the deployment, maintenance and retrieval of equipment. Descriptions should also include the number of cells (bins) measured, and data averaging protocols for the instruments used and how the data were processed and analyzed. Any problems or issues should also be discussed in the methods section.

   The results should provide a description of maximum, minimum and average currents and tidal excursions and include a current rose plot of depth averaged currents and a rose plot for near surface, mid-water and near bottom currents. A plot of the tidal ellipse (magnitude and inclination of the major axis and magnitude of minor axis) should also be included.

   The processed wave and current data used in the analysis should be submitted to NOAA and the EPA on CD_ROM or DVD.