Deepwater Horizon Oil Spill (DWHOS)
Water Column Technical Working Group

Addendum to:
NRDA Summer 2011 Epipelagic Plankton Bongo & Neuston Sampling Cruise Plan

Sampling Vessel: M/V *Bunny Bordelon*

September 6, 2011

Prepared by:
Deborah French-McCay and Eileen Graham (ASA) on behalf of the Trustees
Reviewed by:
NOAA: Dan Hahn, John Quinlan (NOAA)
Louisiana: Amanda Vincent (LA)
BP : William Graeber, Amy Piko, Jeffrey Simms (Cardno ENTRIX) and Joyce Miley (BP).

Planned Cruise Dates
July 18 – September 30, 2011 (Labor Day Break: September 2-5)
Leg 1: July 18 – July 31 (14 DAS)
Leg 2: August 3 – August 16 (14 DAS)
Leg 3: August 19 – September 1 (14 DAS)
Leg 4: September 7 – September 18 (11 DAS)
Leg 5: September 21 – September 30 (9 DAS)

Revised Cruise Dates
July 18 – September 2, 2011
Leg 1: July 18 – July 31 (14 DAS)
Leg 2: August 3 – August 16 (14 DAS)
Leg 3: August 19 – September 2 (15 DAS)

Except as amended herein, all provisions of the NRDA Summer 2011 Epipelagic Plankton Bongo & Neuston Sampling Cruise Plan remain in effect.

Background

This addendum modifies the NRDA Summer Epipelagic Plankton Cruise Plan, revising the dates and making minor changes to the sampling protocols for the group of stations sampled after 30 August 2011.

The NRDA Summer Epipelagic Plankton Cruise Plan, dated 19 July 2011, describes the NRDA survey for summer 2011 where a subset of the SEAMAP stations were selected for sampling ichthyo- and other plankton in the upper water column (i.e., epipelagic). The primary objective of the NRDA survey is to assess the occurrence, abundance, and distribution of the early life stages of fishes in the north central Gulf of Mexico, commercially important invertebrates (lobsters, decapods) and other zooplankton found in the surface waters <200m. Ichthyo- and other zooplankton in the upper water column were sampled

using paired bongo nets, and at the water surface with a rectangular neuston net (SEAMAP standard) and a manta neuston net (CalCOFI standard). The deployment protocols of deep bongo tows (in the upper 200m) and surface neuston tows are those used in the SEAMAP program. In addition to the standard SEAMAP sampling regime, shallow bongo tows and manta neuston net tows were conducted.

Natural tracers may be used to evaluate food web structure and examine any potential changes in organic source contributions and trophic relationships following the Deepwater Horizon spill. A sub-sample of collections from the spring and summer cruises were taken to potentially investigate pelagic food webs using natural tracers, $\delta^{13}C$ and $\delta^{15}N$ stable isotopes, of organism processes. Baseline data exists in previous research by Wells and Rooker (2009) for offshore areas of the northern Gulf during 2007 and 2008; in addition, unpublished data for 2009 exists (D. Wells, personal communication). Once collected, these samples can be frozen and archived for future processing and analysis. BP has not had the opportunity to understand this effort but since the collection of samples during this cruise is a minor objective and will not slow down the approved data gathering, the collection of these samples will be supported and BP will work with the trustees to understand the historical data and proposed future data processing and analysis. BP will look forward to further opportunities to discuss both the rationale and designs for both the sampling and analysis of stable isotopes as part of the injury assessment.

Methodology

Sampling Stations

The cruise track and selected station array for the NRDA M/V *Bunny Bordelon* summer survey was designed to attain data at offshore and inshore stations, to perform more sampling in the deep water areas, and to ensure complete coverage of the area sampled during the winter and spring 2011 surveys (Figure 1).

The cruise schedule allowed for 62 days at sea (DAS), considering the breaks between legs. There are 125 proposed sampling locations for summer 2011. Based on the sampling schedule of the spring 2011 survey, we had assumed approximately 3 – 4 stations could be sampled each 24-hour cycle.

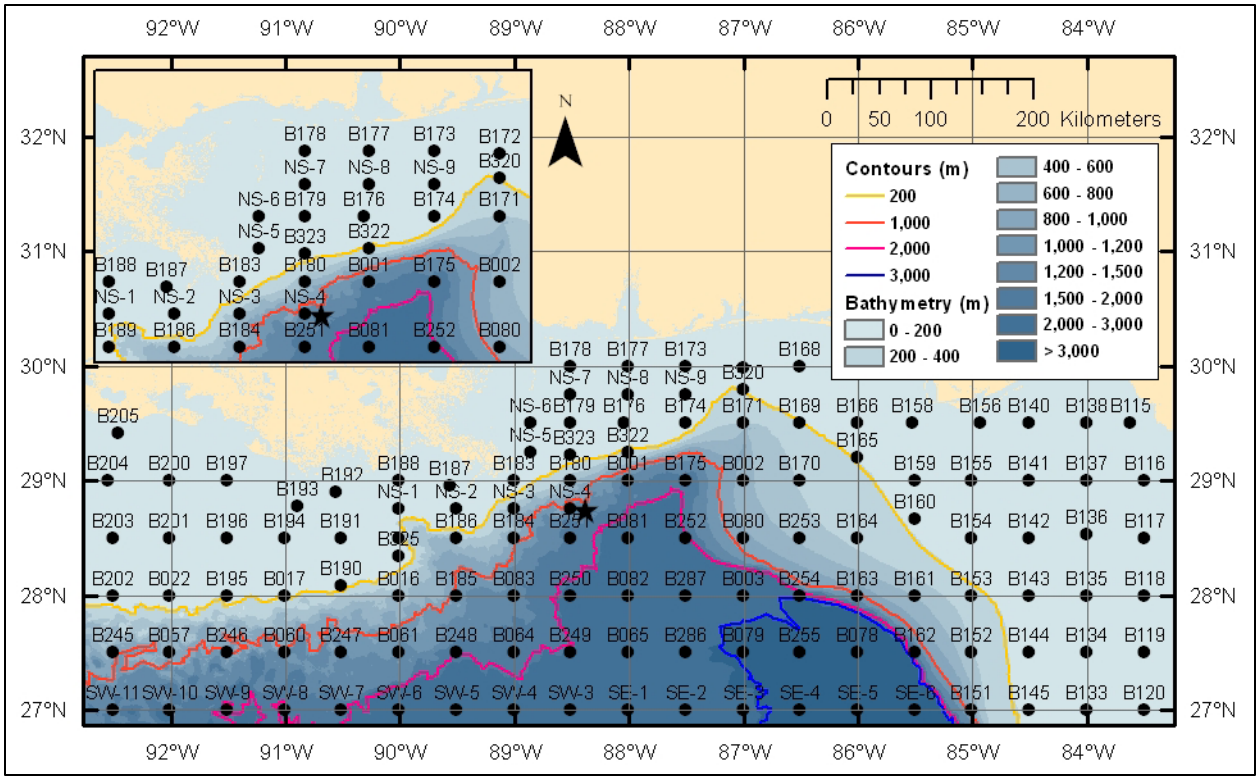

Figure 1. NRDA summer 2011 epipelagic plankton stations; star denotes Deepwater Horizon wellhead position.

Sampling Procedures

For the summer cruise, all 125 stations were sampled sequentially. Until 29 August 2011, sampling occurred around the clock, each station sampled once, either day or night, maintaining the exclusion +/- 30 minutes (preferably +/- 60 minutes) around sun rise/set, EXCEPT at locations where the last day sample was conducted. At these locations the boat held on that station while the sun set and repeated sampling at night (thereby attaining a day/night pair) at those stations. The boat then continued along the station path sampling once per station until the following afternoon, where it held station at the last location sampled before dusk and then repeat after sunset. Thus the boat repeated sampling in day/night paired stations only at the last day/first night station. This allowed 3-4 stations to be sampled each 24-hour cycle. This protocol was designed to capture changes in densities due to the diel cycle of zooplankton vertical migration.

At 0000 hours on 30 August 2011, 13 stations (the W-E line from B154-B117, the E-W line from B118-B003, and SW-7, see Figure 1) remained to be sampled. Leg 3 was scheduled to end on 1 September 2011. By extending the cruise an additional day to 2 September 2011, it was expected that 12 of the 13 stations could be completed. This would only leave station SW-7 un-sampled of the 125 stations in the plan. Thus, Legs 4 and 5 were cancelled.

To complete the 12 eastern stations (B154-B117 and B118-B003) by the end of Leg 3, the night sampling of the paired day/night stations on the shelf will be eliminated. Also, the food web component of the station sampling to occur Aug 30 and 31 will be eliminated. The food web component is described in the main plan and repeated below.

> **Food Web and Isotope Analyses:** At every third station, additional ~5-min surface tow collections was performed using the bongos and the rectangular neuston net. Consumers (i.e. fishes, invertebrates) were

individually selected out of these surface bongo and neuston net tows and frozen. The rest of the net collections were frozen in bulk. In addition at these stations, surface particulate organic matter (POM) will be obtained by collecting 7 liters of surface seawater and filtering over 47 mm GF/F filters (which have been pre-combusted for 1 hr at 450^{o}C) in the wet lab on board. All samples will be frozen for possible future food web analysis (stable isotope analysis of $\delta^{13}C$ and $\delta^{15}N$) using a stable isotope mass spectrometer. Any agreement regarding analysis of the collected samples will be determined in subsequently developed, reviewed and approved cooperative work plan(s).

Budget

The NOAA budget for the NRDA Summer Epipelagic Plankton Cruise Plan is revised to reflect the reduced number of days at sea. There will be no increase to the vessel budget for the NRDA Summer Epipelagic Plankton Cruise Plan.

The Parties acknowledge that this budget is an estimate, and that actual costs may prove to be higher due to a number of potential factors. As soon as factors are identified that may increase the estimated cost, BP will be notified and a change order describing the nature and cause for the increase cost in addition to a revised budget for BP's consideration and review.

Budget Chart #1 Showing a reduction from the original work plan cost estimate of $980,000.

Field Survey Costs	Hrs/Days/Trips	Day/Hr Rate	Total
NOAA Labor (days):			
NOAA Chief Scientist	43	$2,500	$107,500
NOAA Alternate Watch Lead	43	$2,000	$86,000
4 Plankton/Net handlers	43 x 4	$1,500	$258,000
2 Data Manager	43 x 2	$1,500	$129,000
Misc Costs Sample Handling	1	$10,000	$10,000
Travel	1	$25,000	$25,000
TOTAL			**$615,500**

Days/Trips based on 43 cruising days. Labor is estimated cost and hours.

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Approvals

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

BP Approval — Printed Name: Joyce McKay for Larry Mahan — Signature: Joyce McKay — Date: 9/8/2011

Federal Trustee Approval — Printed Name: Jessica White for Lisa DiPinto — Signature: Jessica White — Date: 9/7/2011

Louisiana Approval — Printed Name: DOBUSSCHON KRAOLION — Signature: FOR NAAMD GUIDRY — Date: 9/12/2011