

Cruise Instructions

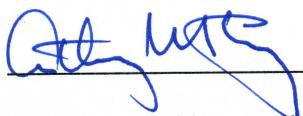
Date Submitted: April 16, 2010

Platform: NOAA Ship *Gordon Gunter*

Cruise Number: GU-10-02 (58)

Project Title: Atlantic Marine Mammal Assessment Survey

Cruise Dates: June 10-August 5, 2010

Prepared by: 

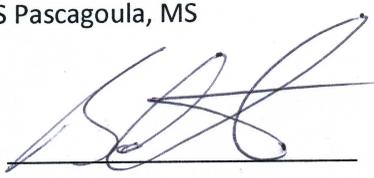
Date: 4. May. 2010

Anthony Martinez, Field Party Chief
NOAA Fisheries, Miami Laboratory

Approved by: 

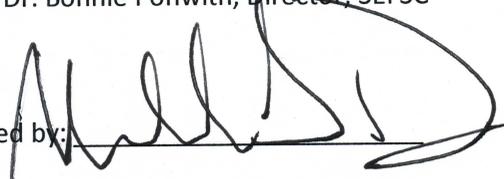
Date: 5/21/10

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Date: 5-25-10

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Approved by: 

Date: 6-11/10

Captain Michael S. Devany, NOAA
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Amendment to Cruise Instructions
NOAA Ship *Gordon Gunter* Cruise GU-10-03 (59)
Atlantic Marine Mammal Assessment Survey
14 June – 5 August 2010

Background and Purpose of Amendment

The Deepwater Horizon incident at the Mississippi Canyon 252 site resulted in the discharge of an extensive oil spill within a region of high density and diversity of protected marine mammals. Since April 28th, aerial surveys have been conducted in this area documenting the presence of sperm whales that are listed as endangered under the ESA. In addition numerous species of marine mammals protected under the MMPA occur in the region. Aerial surveys have verified the presence of pantropical spotted dolphins, striped dolphins, spinner dolphins, bottlenose dolphins, and Risso's dolphins within or near the oil spill. A small, isolated population of Bryde's whales resides along the continental shelf break just east of the spill area, and this population is likely to be impacted by oil in the coming weeks.

The effects of oil on marine mammals are not well understood. However, it is probable that sperm whales and other protected marine mammals encountering oiled environments experience potential detrimental effects due to skin contact, inhalation of hydrocarbon vapors, and ingestion of oil (Geraci 1990). It is unknown whether or not prolonged exposure would result in direct mortality of individual animals. It seems most probable that the most direct effect of severe habitat degradation related to the spill will be a shift in spatial distribution by these highly mobile predators. The area near the spill is a high-use habitat for these species, and this is likely associated with concentration of prey resources. Thus, a distribution shift will likely result in the movement of animals out of a primary feeding habitat to areas with lower prey densities, and this may have impacts on survival and productivity of the populations. In the longer term, it is likely that the marine mammal populations of the northern Gulf of Mexico will be exposed to chronic impacts of the spill due to increased concentrations of contaminants or toxins in the food web.

In addition to the oil released at the well site, several hundred thousand gallons of oil dispersant chemicals have been deployed within the spill region. The composition and toxic effects of the dispersants are unknown, and their impacts on marine mammals within the spill area are uncertain. As with the oil impacts, the probable impacts of chemical dispersants on marine mammals include acute exposure due to contact or inhalation, shift in distribution away from a primary feeding habitat, and longer-term exposure through accumulation in the food web.

Under both the ESA and the MMPA, the NMFS is required to assess the magnitude of human impacts on protected species and their habitats. In particular, under the ESA NMFS is required to determine the number of takes of endangered sperm whales and assess the impact of these takes on the recovery of this population. Under the MMPA, incidental takes of marine mammals are prohibited except where small numbers of takes are permitted or in the case of incidental serious injury or mortality during commercial fishing operations. Thus, NMFS is obligated under these two acts to 1) assess the level of takes of endangered sperm whales and other protected marine mammals, and 2) evaluate the potential impact of these takes on the recovery of these protected species.

To meet the obligations of the Acts, NMFS must determine 1) the incidence and extent of exposure to oil and chemicals for protected marine mammals and 2) the potential harm to these species through mortality, distribution shifts, habitat degradation, and chronic accumulation of pollutants. Direct quantification of mortality is unlikely to be possible in this offshore marine environment since most dead animals will not be observed. Longer term chronic effects can only be fully evaluated if there is a sufficient amount of baseline information to compare to future results.

In response to this event and to help meet NOAA's mandate to assess impacts on protected species, we will conduct a study of sperm whales and other protected marine mammals in the deep-water habitats of the north-central Gulf of Mexico impacted by the oil spill during GU-10-02. The study will provide critical information on the acute effects of the spill and develop a baseline of information with which to evaluate longer-term chronic effects. The scientific objectives of the study are to:

- 1) Evaluate the incidence of exposure to oil and other chemicals
- 2) Assess changes in animal distribution correlated to oil exposure
- 3) Develop baseline information on population demographics and tissue contaminants in endangered sperm whales
- 4) Assess the spatial distribution of prey resources and habitat features in the region of the spill

Participating Institutions

The Southeast Fisheries Science Center (SEFSC) Marine Mammal Program is the primary institution conducting this survey. Scientists from collaborating institutions including the University of California at San Diego, Oregon State University, and Cornell University will also participate in the cruise.

Personnel (Science Party):

<u>Name</u>	<u>Title</u>	<u>Sex</u>	<u>Organization</u>	<u>Citizenship</u>
<i>Leg 1 (14 June – 26 June)</i>				
Anthony Martinez	FPC	M	NMFS, Miami, FL	US
Carrie Sinclair	Scientist	F	NMFS, Pascagoula, MS	US
Jesse Wicker	Scientist	M	CIMAS, Miami, FL	US
Melody Baran	Scientist	F	IAP	US
Desray Reeb	Scientist	F	IAP	US
Bridget Watts	Scientist	F	IAP	US
Tom Ninke	Scientist	M	IAP	US
Cheryl Cross	Scientist	F	IAP	US
Erin Lebreque	Scientist	F	IAP	US
Adam U	Scientist	M	NMFS, SWFSC	US
Emma Jugovich	Scientist	F	IAP	US
Josh Jones	Scientist	M	Univ. of California, San Diego	US
<i>Leg 2 (30 June – 16 July)</i>				
Anthony Martinez	FPC	M	NMFS, Miami, FL	US
Carrie Sinclair	Scientist	F	NMFS, Pascagoula, MS	US
Jesse Wicker	Scientist	M	CIMAS, Miami, FL	US
Melody Baran	Scientist	F	IAP	US
Desray Reeb	Scientist	F	IAP	US
Bridget Watts	Scientist	F	IAP	US
Tom Ninke	Scientist	M	IAP	US
Cheryl Cross	Scientist	F	IAP	US
Erin Lebreque	Scientist	F	IAP	US
Adam U	Scientist	M	NMFS, SWFSC	US
Emma Jugovich	Scientist	F	IAP	US
Kelly Cunningham	Scientist	F	IAP	US
Bruce Mate	Scientist	M	Oregon State University	US
TBD	Scientist	M	Oregon State University	US
TBD	Scientist	M	Oregon State University	US

Leg 3 (20 July – 5 August)

Anthony Martinez	FPC	M	NMFS, Miami, FL	US
Carrie Sinclair	Scientist	F	NMFS, Pascagoula, MS	US
Jesse Wicker	Scientist	M	CIMAS, Miami, FL	US
Melody Baran	Scientist	F	IAP	US
Barbie Byrd	Scientist	F	JHT	US
Bridget Watts	Scientist	F	IAP	US
Tom Ninke	Scientist	M	IAP	US
Cheryl Cross	Scientist	F	IAP	US
Erin Lebreque	Scientist	F	IAP	US
Adam U	Scientist	M	NMFS, SWFSC	US
Emma Jugovich	Scientist	F	IAP	US
Kelly Cunningham	Scientist	F	IAP	US

Operations

Science Operations and Cruise Plan

During GU-10-03, we will work in the deep waters of the north-central Gulf of Mexico focusing on the high-use areas for sperm whales, Bryde's whales, and other protected marine mammals currently impacted by the spill and anticipated to be impacted over the next several months.

The survey will focus on four primary operational areas (Figure 1). These areas include regions where sperm whale and other oceanic marine mammal densities are high during summer months based upon historical survey data. The areas include: (A) The shelf break region south of Louisiana, (B) The De Soto/Mississippi Canyon Area, (C) The Dry Tortugas, and (D) a region encompassing the Bryde's whale habitat. The home ranges of sperm whales within the northern Gulf of Mexico are likely to include primarily areas A and B. The Dry Tortugas region is also an area of known concentration of sperm whales, and it is unknown if these animals also occupy the other regions of the Northern Gulf. The Dry Tortugas region is selected as a control site given that it has not experienced significant impacts from the MS252 incident as of yet. The vessel will transit to each operational area on an adaptive basis dependent upon weather and other conditions and conduct major science operation within the area. The survey will be adaptive in nature and will respond to changing conditions related to the distribution of oil from the MC252 incident.

The cruise will maintain the original schedule to the extent possible with in-ports in Pascagoula, MS. The current cruise itinerary is:

- Leg 1: 14 June – 26 June
- Leg 2: 30 June – 16 July
- Leg 3: 20 July – 5 August

However, we understand that the cruise is not likely to depart prior to 14 June. **We are expecting scientists to arrive on 9 June to accommodate HAZWOPPR training required before the cruise. Therefore, we will require berthing for 11 scientists beginning on 9 June.**

The major science operations during the cruise will include:

- 1) Collect tissue biopsy samples of marine mammals, with a particular focus on sperm whales and Bryde's whales

- 2) Collect photographic data from close approaches to sperm whales and Bryde's whales to document skin condition or other external evidence of oiling/injury
- 3) Deploy long-term passive acoustic monitoring systems to collect data on the occurrences of acoustically active marine mammals along the 1000m isopleth from western Louisiana to the West Florida shelf, including areas near the incident site, adjacent to the immediate impact zone and at a range of distances from the impact zone.
- 4) Support the deployment of satellite tags on sperm whales to evaluate long-term movements and exposure to oil
- 5) Conduct visual and passive acoustic surveys of sperm whales and other marine mammals within target areas
- 6) Collect habitat information including surface hydrographic data, vertical profiles of temperature, salinity, and dissolved oxygen, and collect acoustic backscatter information to characterize water column productivity and prey resources.

The survey plan will be adaptive in response to changing conditions. Daily activities will be planned through close consultation between the FPC and the command. Typically, during daylight hours, the vessel will transit at approximately 10 kt along pre-determined tracklines to conduct visual surveys for cetaceans. The passive acoustic array will be deployed simultaneously during these surveys. During night hours, the passive acoustic array may be towed at slower speed over the tracklines covered during the daylight period or may be used to track sperm whales throughout the night for re-acquisition in the morning. XBT casts will be made while underway at pre-determined stations. In addition, CTD casts will be made 2-3 times per day at pre-determined stations to a maximum depth of 500m. The small boat (R3) will be deployed for collection of biopsy samples, photographic data, or to conduct tagging operations as conditions allow as determined by the Command and the FPC.

Operations to be Conducted

Visual Survey

The visual team will operate on the flying bridge and will consist of 2 observers using the 25x150 "bigeye" binoculars and a central observer/data recorder. Data will be collected by the data recorder stationed on the flying bridge, and communications will be by radio on NOAA channels F1 or F2. Data will be recorded using the VisSurvey data acquisition program which will operate on a laptop. The data collection computer stationed on the flying bridge will be connected to the ship's network via ethernet cable. The computer should be given appropriate permissions on the network to allow it to receive Scientific Computing System (SCS) messages and send messages over the network. Both 120 volt and 12 volt (10 amp minimum) are required on the flying bridge in addition to the network connection.

Typically, if a sighting is within a 3.0 nm strip on either side of the ship, the ship will be diverted from the trackline to approach the group to identify species and estimate group-size. The flying bridge data recorder will be responsible for communicating course and speed changes to the vessel operators to facilitate approach to cetacean groups. The flying bridge may also request charted water depths, information on weather, or information on radar contacts.

Survey speed will typically be 10 kt, but may vary with sea conditions. Visual survey effort will likely be suspended during high sea states, poor visibility conditions (e.g., fog, haze, rain), or when there is lightning in the area.

A day/night capable closed circuit television (CCTV) system will be installed on the bow to monitor dolphins that ride the ship's bow pressure wave. This system will have the capability to be monitored

and recorded on both the flying bridge and acoustics lab. Additionally, request this CCTV system should be broadcast over the *Gordon Gunter's* internal TV network for easy monitoring anywhere there is a TV located.

Acoustic Survey

Passive acoustic monitoring will be conducted simultaneously with the visual observations. Acoustic monitoring will be conducted using a hydrophone array towed behind the ship. The acoustic array will extend behind the ship 200 to 600 m and will be 10 to 50+ m below the surface depending on the speed through water. The arrays will be interfaced with a suite of electronics inside the ship and scientists will monitor the array when it is in tow. An acoustic array may be in use 24 h/day. Signal processing equipment, recording equipment and data collection computers will be stationed in the dry lab. A team of operators will rotate through watches to support acoustic monitoring around the clock. Data collection will be accomplished by a computer connected to the ship's network to allow it to both receive SCS signals and send messages over the network.

Request a log of the use of any active transducers on the ship be maintained throughout the cruise and provided as a data product at the end of the cruise. Please note, operating astern propulsion while an array is in the water, should only occur in cases of extreme emergency as there would be a great likelihood of destroying the array or having it tangle in the ship's screws.

Environmental Sampling

Environmental data will be collected from the suite of instruments integrated into the SCS, which will be in operation 24 h/day. The SCS system will be managed by the ship's Electronics Technician (ET) and a complete copy of these data be provided to the FPC at the conclusion of each leg. The observer stations on the flying bridge and in the acoustics lab will require both standard and customized SCS sentences over the ship's computer network. These customized sentences have already been set up by SEFSC scientists on a previous cruise and should be sent over the network continuously throughout the survey. The ADCP, Simrad EK60, and continuous-flow thermosalinograph/fluorometer systems will operate 24 h/day. Scientific echosounder settings will be determined by the FPC. The data from these systems will be recorded directly to the individual systems hard drive and backed up to the ship's network servers throughout the survey. The science party will then copy this data to portable hard disks at the conclusion of each leg.

CTD casts up to 1000 m will be made at pre-determined environmental sampling sites and at stations of opportunity identified during the survey (for example near sperm whale feeding aggregations) on an adaptive basis. XBT casts will be made while underway during transit periods along the trackline at approximately 1 h (~ 10 mile) intervals. Following completion of an XBT cast, the collected data will be inspected for initial quality control and to identify significant features in the profile such as surface temperature (5 m depth), mixed layer depth, thermocline depth, and thermocline temperature according to prescribed methods. These data, along with station location and time information, will be logged in a spreadsheet. The Operations Officer will be provided with updated physical oceanography sampling plans daily.

At least once during the survey, the SimRad EK60 may need to be calibrated. This operation involves suspending a metal sphere beneath the transducers. The sphere is attached to spectra line suspended from down-rigger reels attached at 3 predetermined points on the vessel frame. The calibration operation will take place when there are both calm seas and limited current. The vessel will be required to sit dead in the water (engines all-stop) for a period of 8-10 hours during the calibration period. This operation will likely be conducted early in the cruise, and the FPC will communicate the intent to do the calibration to the Operations Officer.

Biopsy Sampling

A variety of biopsy rifles, crossbows, and various dart heads will be used for collecting tissue samples from the *R3* or from the ship's bow. A fiberglass (or similar non-corrosive material) storage box of adequate size will be mounted on the foredeck in order to provide a weather resistant storage space on the bow for the darting rifles and attendant biopsy equipment. This will allow safe yet rapid access by "shooters" that have the appropriate training and experience and have been designated as such by the FPC. During biopsy collection from the ship's bow, the vessel may be asked to turn multiple times to maintain contact with a targeted group of cetaceans. These communications will be directed by the flying bridge or biopsy personnel on the bow.

Biopsy tissue samples will be used for genetic analysis, stable isotope analysis, and contaminant analysis. Genetic samples will be stored in small vials of 20% DMSO at room temperature or in a refrigerator. Samples for stable isotopes must be stored at -20° C and those for contaminants must be stored at -80°C both shortly after collection and during the duration of the cruise. A liquid nitrogen storage tank will be carried on board *Gordon Gunter* to recharge a portable container for use aboard the *R3* to store samples while away from the ship. The small -80° C freezer stationed in the ship's lab and the -20° C chest freezer in the wet lab will be used for sample storage.

Small-boat Operations

At least one week before the cruise the FPC shall provide *Gordon Gunter* a list of qualified Small Boat Operators (SBO) along with their small boat credentials. Request the Command then issue a certification letter to those SBO's who are found qualified to operate a small boat at sea from the GUNTER. No SBO will be allowed to operate a small boat from the ship without the approval and certification from the Commanding Officer. Before the *R3* is launched each day, a safety brief will be conducted with at least the following personnel present: the CO and/or his designee, the Chief Bosun, the *R3*'s Operator In Charge (OIC), and the FPC to discuss the operations of the day. A debrief will be held with the same personnel at the end of the day to discuss the day's operations. Fueling of the *R3* with gasoline will be the ship's responsibility and will be carried out as requested or needed for the following day's operations.

The timing and location of *R3* deployment will be variable and will depend upon weather conditions, the presence of cetaceans in the area, and other operational constraints. The FPC will inform the Command when a *R3* launch is planned with at least 30 min notice and will coordinate the timing of the launch. Generally, the *R3* will operate in the vicinity of cetaceans for several hours and may remain deployed for up to 12 h. *Gordon Gunter* may continue to survey while the *R3* is deployed, and the small boat may work away from the ship by as much as 20 n mi. Radio communications between *Gordon Gunter* and the *R3* will be maintained on a regular basis via either VHF or satellite phone or satellite messenger service.

Deployment of Acoustic Monitoring Buoys

Two types of acoustic monitoring buoys will be deployed at selected locations throughout the cruise (Figure 1): four to five High frequency Acoustic Recording Packages (HARPs) and 22 Marine Autonomous Recording Units (MARUs). These are autonomous packages that sit on the sea floor and record marine mammal vocalizations for up to 4 months. Both types of recorders are relatively small and can be accommodated on the fantail of the *Gordon Gunter* along with the required anchoring material (generally chain or railroad wheels). Assistance from the deck crew during deployments will be required and planned in advance in consultation with the Command. This may include night-time deployments to accommodate changes in the cruise track and other operations. All mooring materials and the packages themselves will be provided by the scientists.

Satellite tagging of Sperm Whales and Bryde's Whales

During the second leg of the cruise, satellite tagging operations of Sperm whales and Bryde's whales will be conducted with the assistance of Dr. Bruce Mate and other staff from Oregon State University. The tagging efforts will take place primarily in the DeSoto Canyon/Mississippi Canyon area. Tagging efforts will take place aboard the *R3*, and the decision to deploy the small boat for tagging will be dependent upon weather conditions and the presence of sperm whales. Typically, during the tagging efforts, a visual watch will be conducted and the ship will remain in close contact with the small boat to facilitate tracking of whales and documentation of the effort. The Command will be briefed on the specifics of the tagging efforts at the start of leg 2 to facilitate safe and effective operations and coordination. All required supplies and materials for the tagging study will be provided by the scientists. Oregon State University holds all required permits for these operations under the MMPA.

Appendix I

Figure 1. Operating areas for GU-10-03 (59) showing the locations for deployment of autonomous recording packages.

