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CRUISE RESULTS

**NOAA Ship *Gordon Gunter* Cruise GU-04-02 (027)
13 April – 11 June 2004**

A Study of Sperm Whales and other Oceanic Cetaceans in the Northern Gulf of Mexico

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Pascagoula, Mississippi

February 2023

This cruise report is used for documentation and timely communication of preliminary results immediately following the conclusion of the survey. Data, as presented here, are subject to change as further auditing and analysis occur.

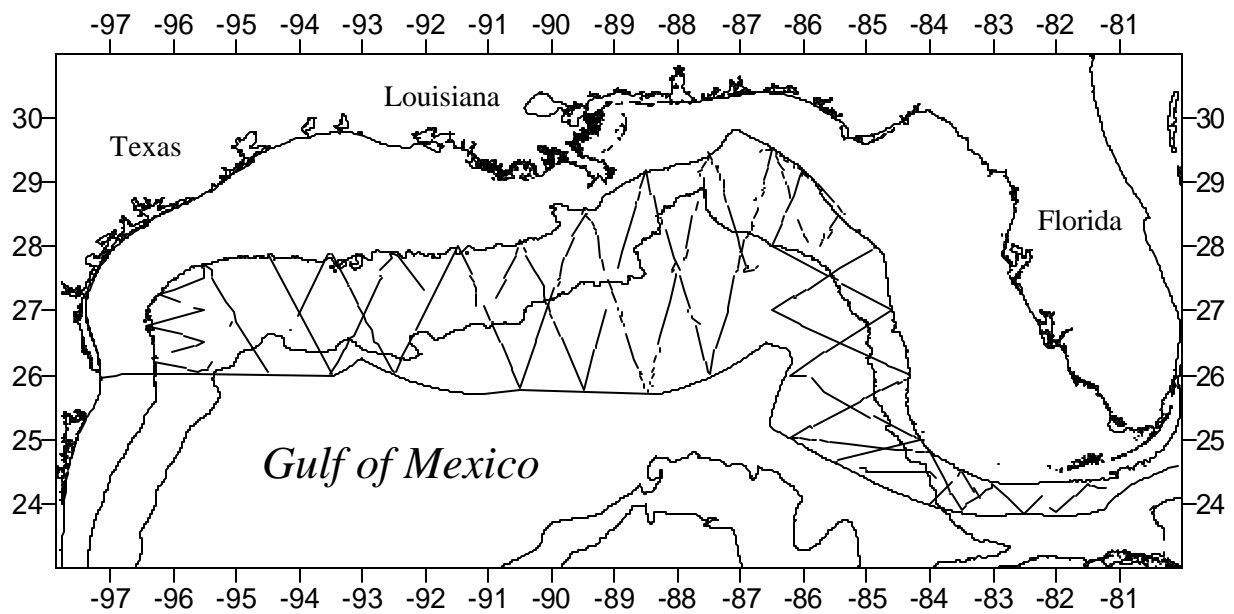
The Southeast Fisheries Science Center was authorized to conduct marine mammal research activities during the cruise under Marine Mammal Protection Act (MMPA) Permit No. 779-1633.

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U.S. Department of Commerce
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INTRODUCTION

NOAA Ship *Gordon Gunter* departed Pascagoula, Mississippi on 14 April 2004 to conduct a marine mammal survey in the northern Gulf of Mexico (GMx). Operations occurred in the waters from 200 m deep seaward to the Exclusive Economic Zone (EEZ) from Brownsville, Texas east into the Straights of Florida to 81.0° W.

The U.S. Marine Mammal Protection Act (MMPA) requires that stocks of marine mammal species in U.S. waters be maintained at or above their optimum sustainable population level (OSP), defined as the number of animals which results in the maximum net productivity. To meet this requirement for each stock, the U.S. National Marine Fisheries Service (NMFS) estimates annual human-caused mortality and potential biological removal (PBR), the maximum number of animals that may be removed from a stock due to human activities (e.g., fisheries bycatch) while allowing the stock to reach or maintain its OSP. PBR is calculated following specific criteria using the estimated abundance of the stock, its maximum net productivity rate (theoretical or estimated), and a recovery factor (Barlow et al., 1995; Wade and Angliss, 1997). The NMFS is required to prepare an annual Stock Assessment Report (SAR) for each stock to update abundance, stock structure, maximum net productivity, human-caused mortality, PBR, and status (e.g., Waring et al., 2001).

During the second leg of the cruise, in addition to the marine mammal operations, data were collected at 12 ichthyoplankton stations in the extreme eastern GMx that were near the marine mammal trackline. These stations were to be sampled during NOAA Ship *Oregon II* Cruise OT-04-02 (258). Due to delays during the drydock repair period for the *Oregon II*, that cruise was shorter than expected. Details of the ichthyoplankton methods and results can be found in the report for that cruise.

OBJECTIVES

1. Conduct visual line-transect surveys for abundance estimation, and distribution of cetaceans in the northern GMx.
2. Obtain unbiased estimates of sperm whale group size in the northern GMx.
3. Conduct acoustic line-transect surveys for abundance estimation, and distribution of cetaceans in the northern GMx.
4. Collect photographic identification of individual cetaceans, including sperm whales.
5. Collection of tissue samples (biopsies) of select cetaceans using a variety of devices including rifles and crossbows.
6. Conduct limited physical oceanographic sampling.

METHODS

Visual Survey

Visual and acoustics surveys were conducted from the 68-m NOAA Ship *Gordon Gunter* from April-June 2004. Standard ship-based, line-transect survey methods for cetaceans, similar to those used in the Pacific Ocean, Atlantic Ocean and GMx were used (e.g., Barlow 1995, Mullin and Fulling 2003, Fulling *et al.* 2003). Surveys were conducted during daylight hours along a predetermined trackline which uniformly covered the oceanic waters ≥ 200 m deep to the EEZ (Fig. 1).

Data were collected by 6-8 observers which rotated through three positions every 30 minutes on the ship's flying bridge during daylight hours. At least one observer experienced in ship-based, line-transect methods and identification of tropical cetaceans was present on the flying bridge at all times. The left and right side observers searched to the horizon in the arc from 10° right and left of the ship's bow to the left and right beams (90°), respectively, using 25x binoculars. The third observer searched using unaided eye or 7x hand-held binoculars and recorded data. Survey speed was usually $18 \text{ km}\cdot\text{hr}^{-1}$ (~10 knots) but varied with sea conditions.

Data were recorded on a computer interfaced with a global positioning system (GPS) via a custom BASIC data acquisition program. For each cetacean sighting, time, position, bearing and reticle (a measure of radial distance) of the sighting, species, group-size, behavior, bottom depth, sea surface temperature, and associated animals (e.g., seabirds, fish) were recorded. The bearing and radial distance for groups sighted without 25x binoculars and close to the ship were estimated. Survey effort data were automatically recorded every 2 min and included the ship's position and heading, effort status, observer positions, and environmental conditions which could affect the observers' ability to sight animals (e.g., Beaufort sea state, sun position). Typically, if a sighting was within a 5.5 km strip on either side of the ship, the ship was diverted from the trackline to approach the group to identify species and estimate group-size by a consensus of the observer team.

Cetaceans were identified to the lowest taxonomic level possible. Observers' ability to make identifications were limited depending upon distance to the animals and weather conditions, and surveys were therefore limited to times of no rain and Beaufort sea states < 6 .

Additionally, when sperm whales were encountered, a 90 minute observation period ("90-minute Count") was done on selected groups in which the ship slowly maneuvered while all cetacean observers scanned a predetermined portion of the horizon to obtain group size counts and provide an estimate of dive intervals of the sperm whales in the area.

Acoustic Survey

Acoustic line-transect surveys were also conducted aboard the *Gunter* during visual surveys and separately at night. A team of three acoustics watch-standers rotated every 4 hours. A five-element acoustic array was towed behind the ship and extended about 600 m. Nighttime acoustics followed a predetermined closed “W-track” which began at the location of the end of the survey day and terminated at that same position to begin the next survey day.

Biopsy Sampling

A variety of biopsy rifles, crossbows and dart heads were used for collecting skin and blubber samples from a small boat or from the ship’s bow. Skin samples are used to provide individual identification, sex, stock identification and social organization. Blubber samples can be analyzed for a variety of contaminants. Data on each sampling attempt were recorded and included, GPS location, time, date, sampler and recorder name, species, body location struck, behavioral reaction, and whether or not a sample was obtained. A complete log of the biopsy data is maintained at the Pascagoula laboratory.

Photographic Documentation

An attempt was made to obtain photographs of each cetacean sighting to verify identification and establish a photographic record of biopsy attempts.

Photo-identification

Sperm whales, killer whales, pilot whales and Bryde’s whales were photographed from the small boat and from the *Gunter*. In many cases, flukes or dorsal fins of these whales serve to uniquely identify individual animals.

Small-Boat

A small boat was launched for photo-identification and biopsy collection for species such as sperm whales that do not ride the ship’s bow.

Environmental Data

Environmental data were collected using CTDs and XBTs. A CTD cast was made up to 1000 m deep at the end of most visual survey days and XBTs were launched at the discretion of the acoustic team. Several other environmental parameters were collected *in situ* via the ship Scientific Computer System (SCS). The SCS continuously displayed and recorded the ship’s position, heading and speed, wind speed and direction, barometric pressure, sea surface and air temperatures, and water depth. A continuous flow thermosalinograph and acoustic Doppler current profiler (ADCP) recorded data 24 hr/day.

Permit

The Southeast Fisheries Science Center was authorized to conduct marine mammal research activities during the cruise under Permit No. 779-1633-00 issued to the SEFSC by the NMFS Office of Protected Resources.

RESULTS

Visual Survey

During the 56 day survey, 6845 km of effort were surveyed visually (Leg 1, 2341 km; Leg2, 2365 km and Leg 3, 2140 km; Table 1, Fig. 1). Daily effort ranged from a maximum of 224 km in 12.3 hrs, to a minimum of zero. Number of sightings per day were highly variable ranging from a maximum of 18 on 26 May to zero on three separate days. Overall, there were 216 cetacean sightings (Leg 1, 40; Leg 2, 43; and Leg 3, 133). During the study we observed at least 15 cetacean species (Table 2). Pantropical spotted dolphins (*Stenella attenuata*) were sighted with greatest frequency (n = 55), followed by sperm whales (*Physeter macrocephalus*; n = 38), and bottlenose dolphins (*Tursiops truncatus*; n = 25). Cetaceans were encountered throughout the survey area (Fig. 2). However, cetacean sightings were less frequent in the western and southeastern GMx, potentially because of very poor weather on Legs 1 and 2, respectively.

Acoustic Survey

Acoustic operations were maintained as planned throughout the cruise. Results from the acoustic survey will be presented upon completion of the data analysis.

Cetacean Biopsy

Seventy biopsy samples were collected and represented nine different species (Table 3). Bottlenose, spinner, and pantropical spotted dolphins were the most frequently sampled species.

Photo-identification

Photographs of sperm whale flukes and dorsal fins of Bryde's whales, killer whales, and short-finned pilot whale dorsal fins were collected and are archived at the Pascagoula Laboratory.

Environmental Data

All data from the CTDs, XBTs and the SCS are maintained at the Pascagoula Laboratory for analysis, editing and archiving. The CTD and SCS data are available upon request from Chuck.Schroeder@noaa.gov.

LITERATURE CITED

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GU-04-02 (027) - Cruise Participants

<u>Name</u>	<u>Title</u>	<u>Sex</u>	<u>Organization</u>	<u>Citizenship</u>
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Leg 1 (13 April - 1 May)

Tony Martinez	Field Party Chief	M	NMFS, Miami, FL	US
Keith Mullin	ID Specialist	M	NMFS, Pascagoula, MS	US
Grisel Rodriguez	ID Specialist	F	JCWS, Pascagoula, MS	US
Carrie Barry	Visual Observer	F	JCWS, Pascagoula, MS	US
Carol Fairfield	Visual Observer	F	NMFS, Miami, FL	US
Brandi Trigg	Visual Observer	F	JCWS, Pascagoula, MS	US
Carrie Horton	Visual Observer	F	JCWS, Pascagoula, MS	US
Kevin Barry	Visual Observer	M	JCWS, Pascagoula, MS	US
Lanora Lang	Visual Observer	F	JCWS, Pascagoula, MS	US
Laura Oremland	Acoustics	F	NMFS, Washington, DC	US
Greg Walsh	Acoustics	M	Cooperator, NH	US
David Palmer	Acoustics	M	AOML, Miami, FL	US

Leg 2 (4 May - 22 May)

Tony Martinez	Field Party Chief	M	NMFS, Miami, FL	US
Keith Mullin	ID Specialist	M	NMFS, Pascagoula, MS	US
Grisel Rodriguez	ID Specialist	F	JCWS, Pascagoula, MS	US
Carol Fairfield	Visual Observer	F	NMFS, Miami, FL	US
Megan Mattson	Visual Observer	F	JCWS, Pascagoula, MS	US
Andre Debose	Visual Observer	F	NMFS, Pascagoula, MS	US
John Moser	Visual Observer	M	JCWS, Pascagoula, MS	US
Michael Hendon	Visual Observer	M	JCWS, Pascagoula, MS	US
Glenn Zaphe	Visual Observer	F	JCWS, Pascagoula, MS	US
Jesse Wicker	Acoustics, Lead	M	NMFS, Miami, FL	US
Gina Fisher	Acoustics	F	Cooperator, Brooklyn, NY	US
Raquel Saez	Acoustics	F	Cooperator, Madrid	Spain

Leg 3 (25 May - 11 June)

Keith Mullin	Field Party Chief	M	NMFS, Pascagoula, MS	US
Grisel Rodriguez	ID Specialist	F	JCWS, Pascagoula, MS	US
Carrie Barry	ID Specialist	F	JCWS, Pascagoula, MS	US
John Moser	Visual Observer	M	JCWS, Pascagoula, MS	US
Jenny Litz	Visual Observer	M	Contractor, Miami, FL	US
Michael Hendon	Visual Observer	M	JCWS, Pascagoula, MS	US
Sarah Gomez	Visual Observer	F	Contractor, Miami, FL	US
Carrie Horton	Visual Observer	F	JCWS, Pascagoula, MS	US
Jesse Wicker	Acoustics, Lead	M	NMFS, Miami, FL	US

Carrie Hubard	Acoustics	F	NMFS, Washington, DC	US
Raquel Saez	Acoustics	F	Cooperator, Madrid	Spain

Submitted by:

Approved by:

Anthony Martinez
Field Party Chief (Legs 1 & 2)

Scott Nichols, Director
Mississippi Laboratories

Keith Mullin
Field Party Chief (Leg 3)

Nancy Thompson, Director
Southeast Fisheries Science Center

Table 1. Effort, Beaufort sea state, and number of sightings for each day of NOAA Ship *Gordon Gunter* Cruise 04-02 (027), April-June 2004.

Leg Date	Transect Kilometers	Effort Hours	Average Sea State	Number of Sightings
Leg 1				
13 April	Weather delay			
14 April	Depart Pascagoula, Mississippi			
15 April	120	6.6	2.9	7
16 April	224	12.3	3.0	4
17 April	143	7.6	3.3	5
18 April	217	12.0	4.2	1
19 April	193	10.7	4.2	5
20 April	207	11.5	4.8	3
21 April	0	0	6.0	1
22 April	203	11.0	4.9	3
23 April	132	7.9	5.0	1
24 April	172	11.6	4.3	2
25 April	147	8.6	3.3	3
26 April	44	2.4	1.3	1
27 April	219	12.1	4.7	0
28 April	178	10.1	4.4	1
29 April	141	8.2	4.4	3
30 April	Transit (Beaufort 5/6 & rain)			
1 May	Arrive Pascagoula, Mississippi			
Leg 1 Total	2341	132.5	3.9	40

Continued

Table 1. Continued

Leg Date	Transect Kilometers	Effort Hours	Average Sea State	Number of Sightings
Leg 2				
4 May	Depart Pascagoula, Mississippi			
5 May	51	2.7	1.6	4
6 May	196	12.1	3.7	4
7 May	218	12.3	3.9	1
8 May	73	3.9	2.8	6
9 May	194	11.6	4.5	5
10 May	193	11.3	4.5	3
11 May	120	7.2	4.3	3
12 May	73	4.4	3.9	1
13 May	104	7.9	4.9	1
14 May	111	6.3	4.5	0
15 May	124	8.6	4.0	0
16 May	216	12.0	3.8	4
17 May	212	11.8	3.9	1
18 May	222	12.0	4.2	1
19 May	208	11.4	2.8	2
20 May	51	2.7	2.8	7
21 May	Arrive Pascagoula, Mississippi (a day early due to a Lab request)			
22 May	Scheduled arrival day			
Leg 2 Total	2365	138.2	3.7	43

Continued

Table 1. Continued

Leg Date	Transect Kilometers	Effort Hours	Average Sea State	Number of Sightings
Leg 3				
25 May	Depart Pascagoula, Mississippi			
26 May	143	7.5	1.7	18
27 May	196	12.2	3.0	4
28 May	135	7.3	2.8	5
29 May	185	10.0	3.5	7
30 May	126	9.5	5.0	4
31 May	61	4.5	4.5	2
1 June	217	12.5	4.2	2
2 June	198	11.1	3.5	6
3 June	80	4.3	2.7	8
4 June	117	6.4	2.7	9
5 June	36	2.0	1.0	15
6 June	175	9.5	1.0	8
7 June	149	8.0	1.7	14
8 June	180	10.1	3.4	12
9 June	79	4.3	1.7	9
10 June	72	3.9	1.7	10
11 June	Arrive Pascagoula, Mississippi			
Leg 3 Total	2140	122.6	2.8	133
CRUISE TOTAL	6845	393.3	3.5	217

Table 2. Number of cetacean group sightings for each leg of NOAA Ship *Gordon Gunter* Cruise 04-02 (27) conducted in the U.S. Gulf of Mexico, April-June 2004.

Species	Leg 1	Leg 2	Leg 3	Total
Unidentified balaenopterid whale (<i>Balaenoptera</i> sp.)	0	1	0	1
Bryde's whale (<i>Balaenoptera edeni</i>)	0	4	0	4
Sperm whale (<i>Physeter macrocephalus</i>)	6	9	23	38
Dwarf/Pygmy sperm whale (<i>Kogia</i> spp.)	0	0	5	5
Cuvier's beaked whale (<i>Ziphius cavirostris</i>)	1	0	0	1
Mesoplodont beaked whale (<i>Mesoplodon</i> spp.)	0	0	0	0
Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	0	0	1	1
Killer whale (<i>Orcinus orca</i>)	1	0	2	3
Pygmy killer whale (<i>Feresa attenuata</i>)	0	0	3	3
False killer whale (<i>Pseudorca crassidens</i>)	0	0	0	0
Melon-headed whale (<i>Peponocephala electra</i>)	1	0	1	2
Risso's dolphin (<i>Grampus griseus</i>)	2	2	8	12
Bottlenose dolphin (<i>Tursiops truncatus</i>)	2	8	15	25
Rough-toothed dolphin (<i>Steno bredanensis</i>)	0	0	0	0

Continued

Table 2. Continued

Fraser's dolphin (<i>Lagneodelphis hosei</i>)	0	0	0	0
Pantropical spotted dolphin (<i>Stenella attenuata</i>)	12	6	37	55
Striped dolphin (<i>Stenella coeruleoalba</i>)	1	3	5	9
Clymene dolphin (<i>Stenella clymene</i>)	5	1	0	6
Atlantic spotted dolphin (<i>Stenella frontalis</i>)	2	3	0	5
Spinner dolphin (<i>Stenella longirostris</i>)	0	0	7	7
<i>Stenella</i> sp.	1	0	0	1
Unidentified dolphin	2	2	17	21
Unidentified odontocete	4	3	3	10
Unidentified small whale	0	1	2	3
Unidentified large whale	0	0	2	2

Table 3. Number of cetacean biopsies for each leg of NOAA Ship *Gordon Gunter* Cruise 04-02 (27) conducted in the U.S. Gulf of Mexico, April-June 2004.

Species	Leg 1	Leg 2	Leg 3	Total
Bryde's whale (<i>Balaenoptera edeni</i>)	0	2	0	2
Sperm whale (<i>Physeter macrocephalus</i>)	0	1	1	2
Short-finned pilot whale (<i>Globicephala macrorhyncus</i>)	0	0	5	5
Killer whale (<i>Orcinus orca</i>)	1	0	1	2
Bottlenose dolphin (<i>Tursiops truncatus</i>)	0	9	18	27
Atlantic spotted dolphin (<i>Stenella frontalis</i>)	0	1	0	1
Pantropical spotted dolphin (<i>Stenella attenuata</i>)	0	0	15	15
Clymene dolphin (<i>Stenella clymene</i>)	1	0	0	1
Spinner dolphin (<i>Stenella longirostris</i>)	0	0	15	15
TOTAL	2	13	55	70

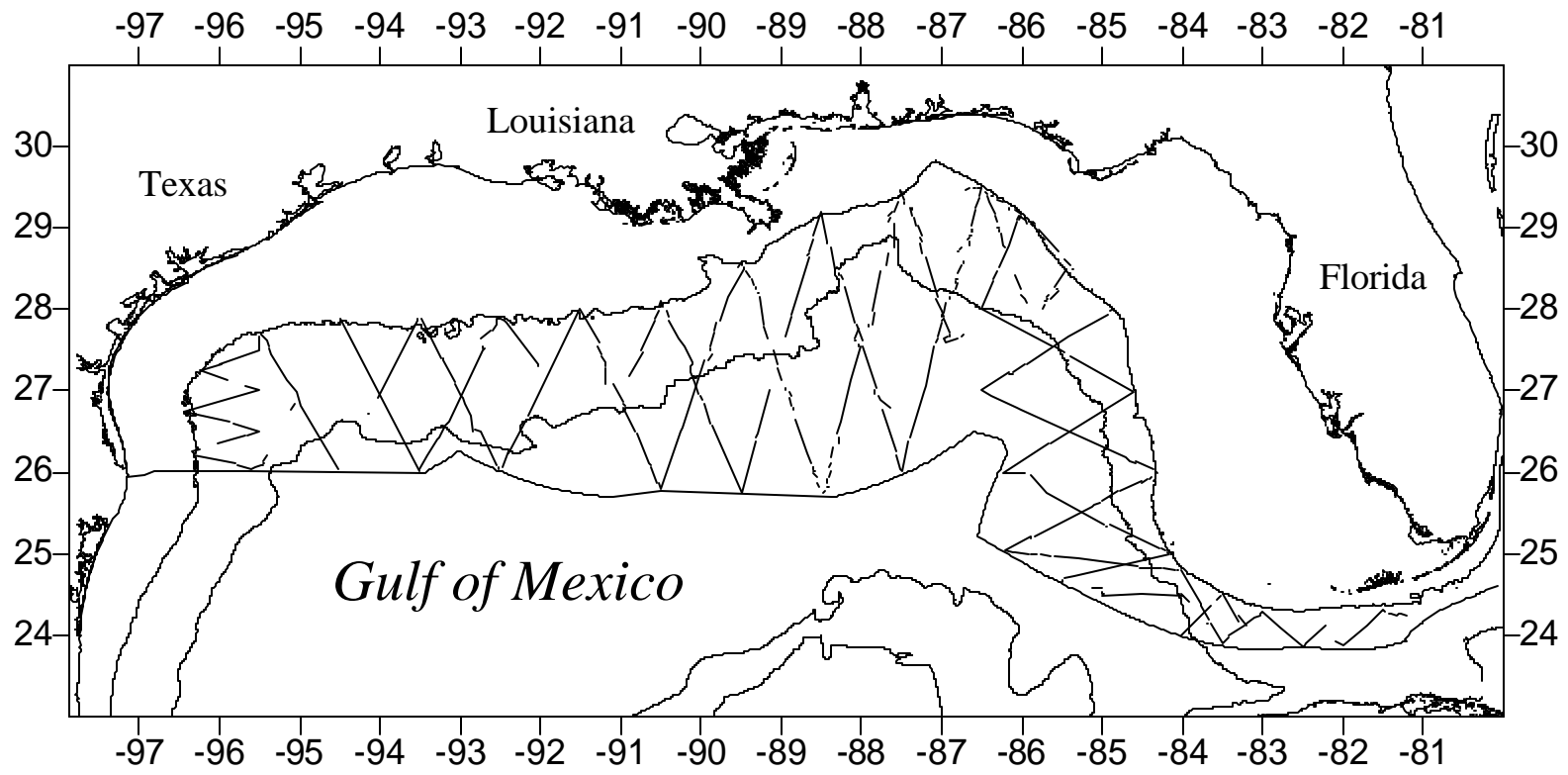


Figure 1. Location of visual survey effort during *Gordon Gunter* Cruise GU-04-02, April-June 2004. The 200 and 2000 m isobaths and the US EEZ are shown.

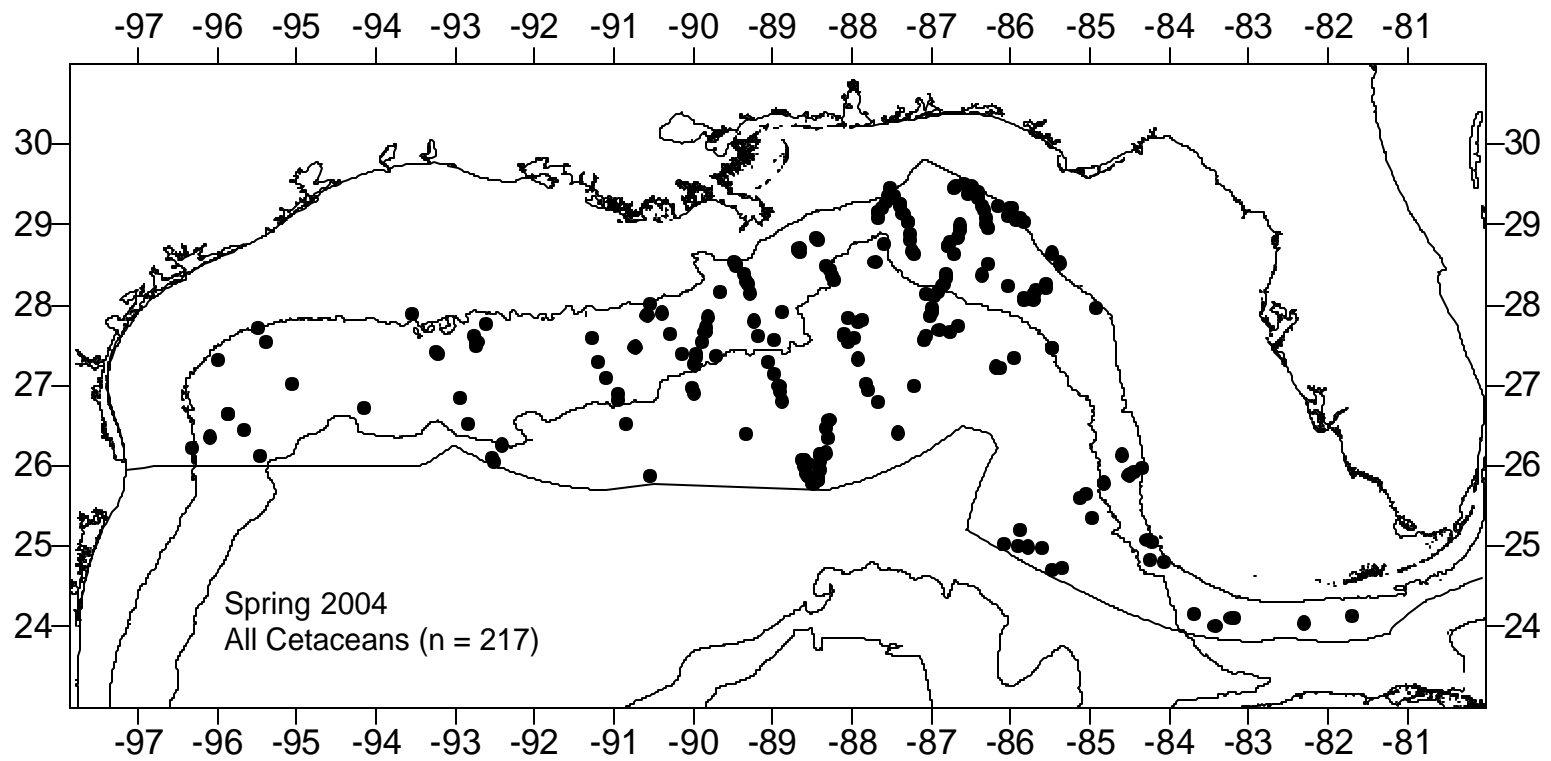


Figure 2. Location of all cetacean sightings during *Gordon Gunter* Cruise GU-04-02, April-June 2004. The 200 and 2000 m isobaths and the US EEZ are shown.