



Southeast Fisheries Science Center Reference Document MMTD-2023-02

CRUISE RESULTS

**NOAA Ship *Gordon Gunter* Cruise GU-03-02 (23)
12 June – 18 August 2003**

A Study of 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.

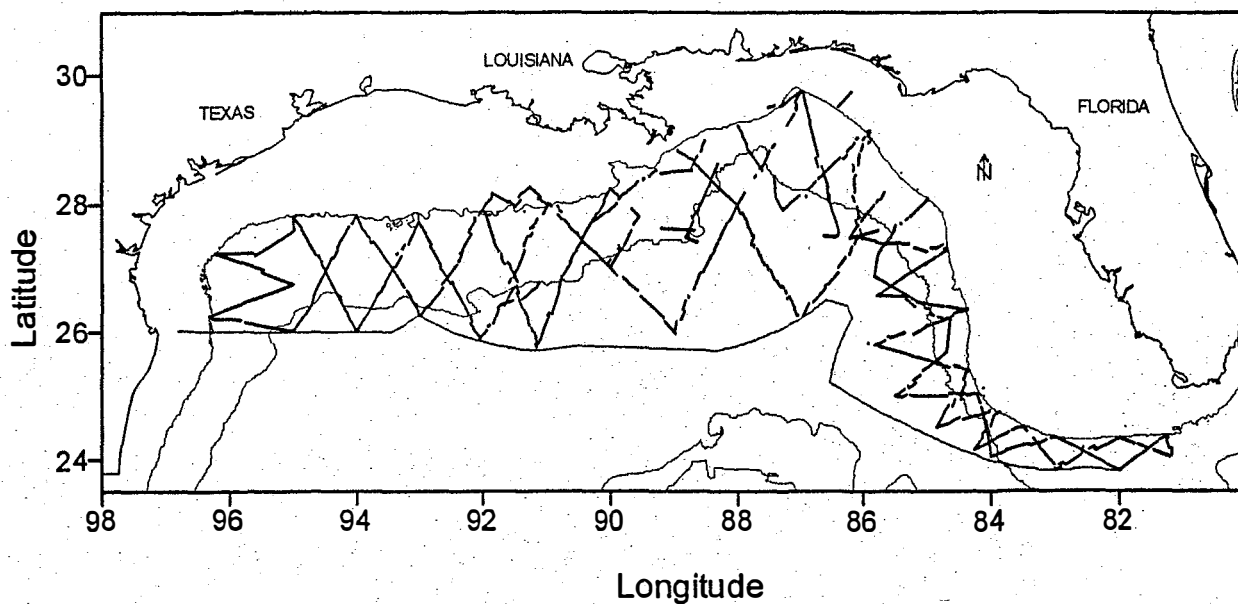
The Southeast Fisheries Science Center was authorized to conduct marine mammal research activities during the cruise under Marine Mammal Protection Act (MMPA) Permit No. 779-1633.

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U.S. Department of Commerce
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INTRODUCTION

NOAA Ship *Gordan Gunter* departed Pascagoula, Mississippi on 12 June 2003 to conduct a marine mammal survey in the northern Gulf of Mexico (GOM). Operations occurred in the oceanic waters (>200m) from Brownsville, Texas to Key West, Florida seaward to the Exclusive Economic Zone (EEZ). Leg 1 (12 June- 1 July) was shortened by two days due to Tropical Storm Bill which was active in the survey area. All other legs departed and returned on time.

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).

Previous surveys of the oceanic northern GOM were done in conjunction with ichthyoplankton surveys which have predetermined tracklines. Difficulties with these previous cruises have dealt with non-random survey effort and lack of complete coverage of the study area due to night time transits. The current study is the first dedicated to surveying cetaceans in these waters and will be instrumental in improving our estimates of the distribution and abundance of several species.

OBJECTIVES

1. Conduct visual line-transect surveys for abundance estimation, and distribution of cetaceans in the northern GOM
2. Conduct acoustic line-transect surveys for abundance estimation, and distribution of cetaceans in the northern GOM
3. Collect photographic identification of individual cetaceans, including sperm whales
4. Collection of tissue samples (biopsies) of select cetaceans using a variety of devices including rifles and crossbows
5. Collection of sloughed skin and fecal samples of select cetaceans

6. Collect data on distribution and abundance of sea turtles

7. Conduct limited physical oceanographic sampling

METHODS

Visual Survey

Visual and acoustics surveys were conducted from the 68-m NOAA Ship *Gordon Gunter* from June-August 2003. Standard ship-based, line-transect survey methods for cetaceans, similar to those used in the Pacific Ocean and U.S. GOM, were used (e.g., Barlow, 1995; Hansen et al., 1996). Surveys were conducted during daylight hours along a predetermined trackline which uniformly covered the oceanic waters ≥ 200 m in depth, to the EEZ (Fig. 1).

Data were collected by a team of eight observers which rotated through four positions every half hour on the ship's flying bridge. Each team had at least two members experienced in ship-based, line-transect methods and identification of tropical cetaceans. 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 the fourth recorded data. Observers changed position every 30-40 minutes, and each person filled 2-hr watches throughout daylight hours. 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 we encountered sperm whales we invoked a ~ 90 minute observation period in which the ship slowly maneuvered while all cetacean observers were called to the flying bridge. All observers then scanned a predetermined portion of the horizon to obtain good 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 four acoustics watch-standers rotated every 3-4 hours. For this survey, a five-element acoustic array was towed from a winch placed onboard the vessel and extended behind the ship ~600 m. Nighttime acoustics followed a predetermined "race-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 tissue samples from the small boat or from the ship's bow. Blubber samples can be analyzed for a variety of contaminants. Biopsies of several species of cetaceans were taken (Permit No. 779-1633-00). These samples are used to provide individual identification, sex, stock identification and social organization. Data on each sampling attempt (ship's bow or small boat) 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

We attempted to obtain photographs of each cetacean sighting to verify identification and establish a photographic record of biopsy attempts.

Photo-identification

Several sperm whales were photographed from the small boat and from the *Gunter*. Flukes of these whales are currently being analyzed for identification of individual animals. In addition several short-finned pilot whales were photographed and will serve as a starting point for a new photo-id catalog.

Small-Boat

The small boat was launched on several occasions to actively pursue sperm whales for the purposes of photo-identification and collection of biopsies.

Environmental Data

Environmental data were collected using CTDs and XBTs. A CTD cast was made at the end of each visual survey day 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 fluorometer recorded data 24 hr/day. Sea surface temperature and salinity were download every 60 seconds and were accessed and displayed via the SCS. The CTD and SCS data are available, please send requests for data to Chuck.Schroeder@noaa.gov.

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 49 survey days, 6910 km of effort were surveyed visually (Leg 1, 2201 km; Leg2, 2304 km and Leg 3, 2405 km; Table 1, Fig. 1). Daily effort ranged from a maximum of 238 km in 13hrs, to a minimum of 25 km in 1.5 hrs (Table 1). Number of sightings per day were highly variable ranging from a maximum of 37 on 11 July to no sightings on three separate days in August. Overall, there were 411 cetacean sightings (Leg 1, 113; Leg 2, 215; and Leg 3, 83). During the study we observed 14 distinct cetacean species, four individual genera (i.e, not identified to species) and five groups of unidentified cetaceans (Table 2). Pantropical spotted dolphins (*Stenella attenuata*) were sighted with greatest frequency ($n = 97$), followed by sperm whales (*Physeter macrocephalus*; $n = 68$), bottlenose dolphins (*Tursiops truncatus*; $n = 34$) and Risso's dolphin (*Grampus griseus*; $n = 31$). Cetaceans were encountered throughout the survey area and were quite frequent in waters >2000m deep (Fig. 2). However, cetacean sightings were less frequent in the western GOM, potentially because of poor weather.

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. Results are expected by spring 2004.

Cetacean Biopsy

Fifty-eight biopsy samples were collected. These samples included biopsies taken from the bow of the *Gunter* ($n = 55$) and 3 sperm whale biopsies taken from the small boat ($n = 3$; Table 3). Biopsies from the *Gunter* represented nine different species including Risso's dolphin ($n = 1$) and short-finned pilot whale ($n = 13$). Bottlenose and pantropical spotted dolphins were the two most sampled species with 16 and 14 biopsies, respectively (Table 3).

Photo-identification

Photographs of sperm whale flukes and short-finned pilot whale dorsal fins were collected and are archived at the Pascagoula Laboratory.

Environmental Data

Forty-four CTD casts were made during the cruise (15, leg 1; 17, leg 2 and; 12 leg 3). All data from the CTDs, XBTs and the SCS are maintained at the Pascagoula Laboratory for analysis, editing and archiving.

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GU-03-02 (23) - Cruise Participants

Leg 1 (June 12 - June 28)

Greg Fulling	Field Party Chief	NMFS, Pascagoula, MS
Jenny Litz	Visual Observer	NMFS, Miami, FL
Maria Cardona	Visual Observer	NMFS, Pascagoula, MS
Brandi Trigg	Visual Observer	JCWS, Pascagoula, MS
Grisel Rodriguez	Visual Observer	JCWS, Pascagoula, MS
Megan Mattson	Visual Observer	JCWS, Pascagoula, MS
Kevin Rademacher	Visual Observer	NMFS, Pascagoula, MS
Carrie Horton	Visual Observer	JCWS, Pascagoula, MS
Kevin Barry	Oceanographer	JCWS, Pascagoula, MS
Tony Martinez	Lead Acoustics	NMFS, Miami, FL
Kathy Foley	Acoustics	JCWS, Pascagoula, MS
Lindsay Hall	Acoustics	JCWS, Pascagoula, MS
Jesse Wicker	Acoustics	NMFS, Miami, FL
Jack Stamates	Acoustics	NMFS, Miami, FL

Leg 2 (July 8 - July 28)

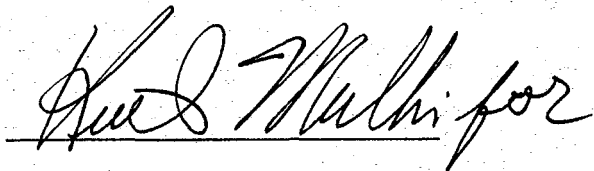
Tony Martinez	Field Party Chief	NMFS, Miami, FL
Amy Engelhaupt	Visual Observer	JCWS, Pascagoula, MS
Maria Cardona	Visual Observer	NMFS, Pascagoula, MS
Carrie Horton	Visual Observer	JCWS, Pascagoula, MS
Grisel Rodriguez	Visual Observer	JCWS, Pascagoula, MS
Megan Mattson	Visual Observer	JCWS, Pascagoula, MS
Keith Mullin	Visual Observer	NMFS, Pascagoula, MS
Michael Hendon	Visual Observer	NMFS, Charleston, SC
Paul Felts	Oceanographer	JCWS, Pascagoula, MS
Kathy Foley	Acoustics	JCWS, Pascagoula, MS
Lindsay Hall	Acoustics	NMFS, Miami, FL
Susan Zaretsky	Acoustics	NMFS, Miami, FL
Penny Cohen	Acoustics	NMFS, Miami, FL
Sara Heimlich	Acoustics	NMFS, Miami, FL

Cruise Participants (Continued)

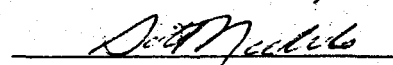
Leg 3 (July 31- August 18)

Tony Martinez	Field Party Chief
Amy Engelhaupt	Visual Observer
Brandi Trigg	Visual Observer
Carrie Barry	Visual Observer
Grisel Rodriguez	Visual Observer
Megan Mattson	Visual Observer
Kristine Hiltunen	Visual Observer
Michael Hendon	Visual Observer
Paul Felts	Oceanographer
Kathy Foley	Acoustics
Jesse Wicker	Acoustics
Susan Zaretsky	Acoustics
Lance Garrison	Acoustics
Jesse Wicker	Acoustics
Submitted by:	

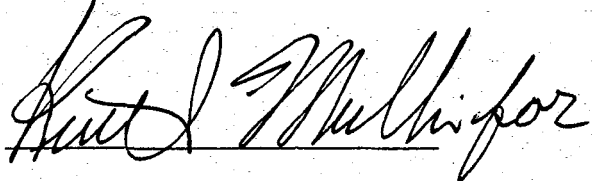
NMFS, Miami, FL
 JCWS, Pascagoula, MS
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 NMFS, Miami, FL
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 Approved by:



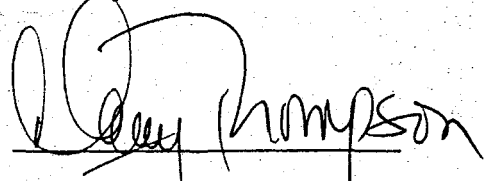
Gregory L. Fulling
Field Party Chief



Scott Nichols, Director
Mississippi Laboratories



Anthony Martinez
Field Party Chief (Legs 2 & 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 03-02 (23), June- August 2003.

Leg Date	Transect Kilometers	Effort Hours	Average Sea State	Number of Sightings
Leg 1				
12 June	Depart Pascagoula, MS			
13 June	Transit/Training			
14 June	147.1	8.1	2.8	11
15 June	197.6	11.4	2.7	10
16 June	174.3	9.6	3.2	13
17 June	188.0	10.2	3.4	7
18 June	229.9	12.6	3.8	3
19 June	176.7	10.3	2.7	7
20 June	157.2	9.9	3.1	8
21 June	24.9	1.4	2.2	8
22 June	141.2	8.0	2.4	13
23 June	144.3	7.9	2.6	9
24 June	65.1	3.7	2.4	4
25 June	161.7	8.9	2.8	5
26 June	170.8	9.7	3.1	3
27 June	108.0	5.9	2.3	8
28 June	114.5	6.3	3.8	3
29 June	Early arrival Pascagoula, MS due to tropical storm			
30 June	Tropical storm			
1 July	Tropical storm			
SUBTOTAL	2201.3	123.9	2.9	113

Continued

Table 1. Continued

Leg Date	Transect Kilometers	Effort Hours	Average Sea State	Number of Sightings
Leg 2				
8 July	Depart Pascagoula, MS			
9 July	Transit			
10 July	128.4	7.0	1.3	13
11 July	160.3	8.3	0.4	37
12 July	136.4	7.7	2.3	5
13 July	122.8	6.7	3.3	2
14 July	102.8	5.6	4.0	4
15 July	180.6	9.8	2.9	4
16 July	93.0	5.1	1.1	16
17 July	120.7	6.4	1.0	19
18 July	71.4	3.9	0.1	13
19 July	84.8	4.6	1.1	13
20 July	193.7	10.7	2.3	9
21 July	133.1	7.1	0.9	16
22 July	151.5	8.3	2.8	10
23 July	91.7	5.0	2.9	9
24 July	149.5	8.2	1.0	20
25 July	202.4	11.2	1.0	11
26 July	69.4	3.8	1.7	8
27 July	111.8	6.0	2.2	5
28 July	Arrive Pascagoula, MS			
SUBTOTAL	2304.3	125.4	1.9	215

Continued

Table 1. Continued

Leg Date	Transect Kilometers	Effort Hours	Average Sea State	Number of Sightings
Leg 3				
31 July	Depart Pascagoula, MS			
1 August	Transit			
2 August	152.1	8.2	1.8	14
3 August	147.9	8.0	2.8	6
4 August	206.3	11.3	2.9	5
5 August	192.0	10.5	4.1	4
6 August	170.3	9.4	3.2	2
7 August	238.1	13.0	3.4	0
8 August	198.2	10.8	4.0	3
9 August	175.9	9.7	1.9	11
10 August	198.9	10.8	3.3	6
11 August	144.6	8.1	2.7	7
12 August	10.9	0.6	5.0	0
13 August	147.1	7.8	4.6	2
14 August	90.8	5.0	6.4	0
15 August	32.8	1.8	4.0	1
16 August	169.0	9.3	2.3	10
17 August	129.9	7.2	2.3	9
18 August	Arrive Pascagoula, MS			
SUBTOTAL	2404.8	131.5	3.4	83
TOTAL	6910.4	380.8	2.7	411

Table 2. Number of cetacean group sightings for each leg of NOAA Ship *Gordon Gunter* Cruise 03-02 (23) conducted in the U.S. Gulf of Mexico, June-August 2003.

Species	Leg 1	Leg 2	Leg 3	Total
Sperm whale (<i>Physeter macrocephalus</i>)	18	30	20	68
Dwarf/Pygmy sperm whale (<i>Kogia</i> spp.)	0	23	3	26
Cuvier's beaked whale (<i>Ziphius cavirostris</i>)	0	1	0	1
Beaked whale (<i>Mesoplodon</i> spp.)	0	2	2	4
Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	1	7	3	11
False killer whale (<i>Pseudorca crassidens</i>)	1	6	1	8
Pygmy killer whale (<i>Feresa attenuata</i>)	1	1	1	3
Melon-headed whale (<i>Peponocephala electra</i>)	0	1	2	3
Bottlenose dolphin (<i>Tursiops truncatus</i>)	13	17	4	34
Bottlenose /Atlantic spotted dolphin (<i>T. truncatus/S. frontalis</i>)	0	1	0	1
Risso's dolphin (<i>Grampus griseus</i>)	17	13	1	31
Rough-toothed dolphin (<i>Steno bredanensis</i>)	2	8	3	13
Pantropical spotted dolphin (<i>Stenella attenuata</i>)	27	51	19	97
Striped dolphin (<i>Stenella coeruleoalba</i>)	9	1	0	10
Clymene dolphin (<i>Stenella clymene</i>)	0	8	3	11
Continued				

Table 2. Continued

Atlantic spotted dolphin (<i>Stenella frontalis</i>)	1	1	0	2
Spinner dolphin (<i>Stenella longirostris</i>)	5	1	0	6
<i>Stenella</i> sp.	2	9	1	12
Unidentified dolphin	13	11	3	27
Unidentified ziphiidae	1	8	8	17
Unidentified odontocete	4	8	2	14
Unidentified small whale	1	2	6	9
Unidentified large whale	1	2	0	3
TOTAL				411

Table 3. Number of cetacean biopsies for each leg of NOAA Ship *Gordon Gunter* Cruise 03-02 (23) conducted in the U.S. Gulf of Mexico, June-August 2003.

Species	Leg 1	Leg 2	Leg 3	Total
Sperm whale (<i>Physeter macrocephalus</i>)	1	2	0	3
Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	0	13	0	13
False killer whale (<i>Pseudorca crassidens</i>)	1	5	0	6
Melon-headed whale (<i>Peponocephala electra</i>)	0	0	1	1
Bottlenose dolphin (<i>Tursiops truncatus</i>)	11	5	0	16
Risso's dolphin (<i>Grampus griseus</i>)	1	0	0	1
Rough-toothed dolphin (<i>Steno bredanensis</i>)	0	1	0	1
Pantropical spotted dolphin (<i>Stenella attenuata</i>)	5	8	1	14
Clymene dolphin (<i>Stenella clymene</i>)	0	0	1	1
Spinner dolphin (<i>Stenella longirostris</i>)	2	0	0	2
TOTAL				58

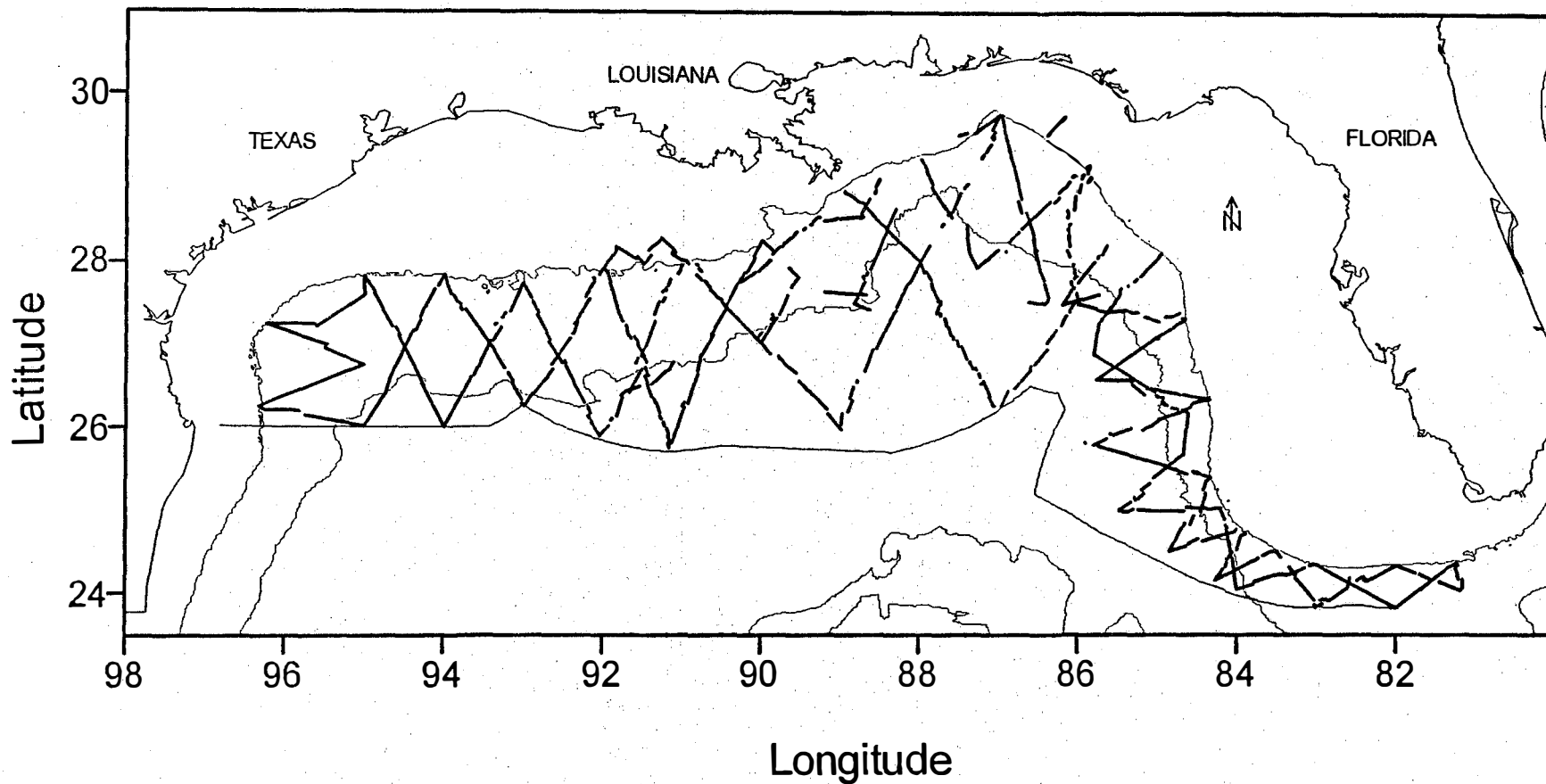


Figure 1. Location of visual survey effort during *Gordon Gunter* Cruise GU-03-02, June-August 2003. The 200 and 2000 m isobaths and the US EEZ are shown.

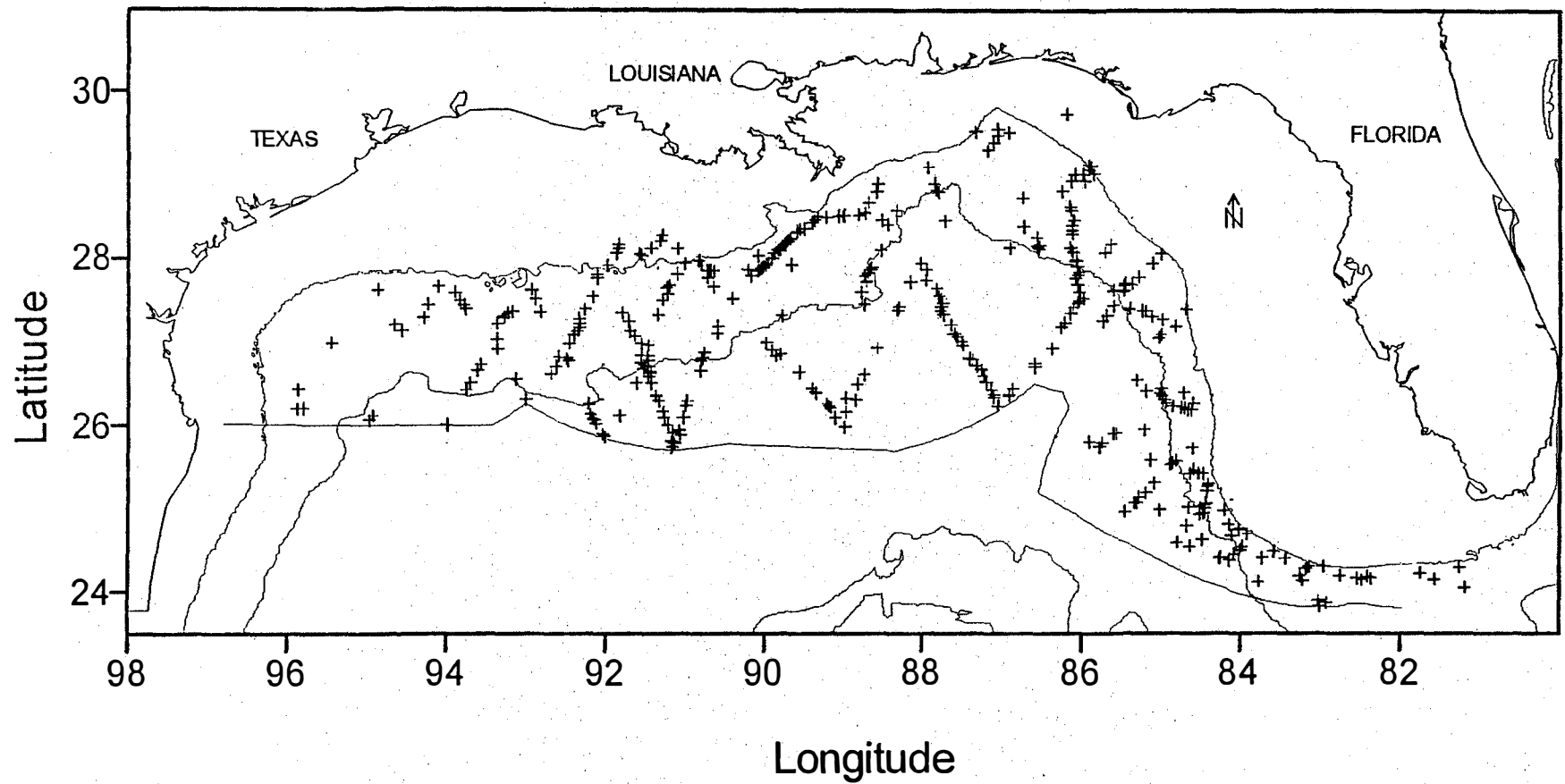


Figure 2. Location of all cetacean sightings during *Gordon Gunter* Cruise GU-03-02, June-August 2003. The 200 and 2000 m isobaths and the US EEZ are shown.