

## CRUISE RESULTS

Fall Southeast Area Monitoring and Assessment Program (SEAMAP)

Ichthyoplankton Survey

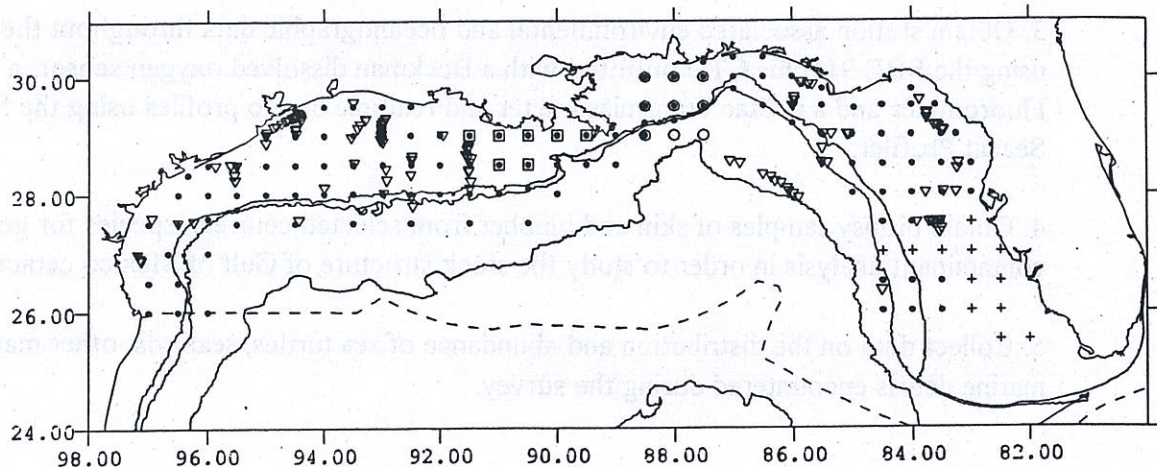
and

Cetacean Survey

NOAA Ship *Gordon Gunter* Cruise 99-02(3)

31 August - 30 September 1999

GULF STATES MARINE  
FEB 09 2000  
FISHERIES COMMISSION



U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Southeast Fisheries Science Center  
Mississippi Laboratories  
Pascagoula Facility  
P.O. Drawer 1207  
Pascagoula, MS 39568-1207

## **NOAA Ship *Gordon Gunter* Cruise 99-02 (03)**

August 31, 1999 to September 30, 1999

### **INTRODUCTION**

The NOAA Ship *Gordon Gunter* departed Pascagoula, MS on August 31, 1999 to initiate the Southeast Area Monitoring and Assessment Program (SEAMAP) fall ichthyoplankton and marine mammal survey in the northern Gulf of Mexico. A total of 27 successful sea days were worked over two legs during the cruise: Leg 1, August 31-September 16 and Leg 2, September 21-30.

### **OBJECTIVES**

1. Collect ichthyoplankton samples with bongo and neuston gear for abundance and distribution of eggs, larvae, and small juveniles of king and Spanish mackerel, clupeids, lutjanids and sciaenids.
2. Collect line-transect data to estimate abundance and define distribution of cetacean species in continental shelf waters of the northern Gulf of Mexico.
3. Obtain station associated environmental and oceanographic data throughout the survey area using the SBE 911plus CTD outfitted with a Beckman dissolved oxygen sensor, a Sea Tech Fluorometer and a C Star Transmissometer and realtime bongo profiles using the SBE 19 Seacat Profiler.
4. Obtain biopsy samples of skin and blubber from selected cetacean species for genetic and contaminant analysis in order to study the stock structure of Gulf of Mexico cetaceans.
5. Collect data on the distribution and abundance of sea turtles, seabirds, other marine life and marine debris encountered during the survey.



## METHODS

### Ichthyoplankton

All cruise objectives, environmental and ichthyoplankton, were implemented in accordance with procedures outlined in the SEAMAP data collections manual.

A predefined cruise track of 112 SEAMAP stations approximately 30 nautical miles apart were targeted for the survey. Leg 1 targeted 66 stations and Leg 2 targeted 46 stations. Primary station operations were to consist of a Seabird SBE 911plus CTD profile, a bongo tow with a Seabird SBE 19 Seacat Profiler and a neuston tow. Larval fish samples were taken with the standard SEAMAP 61 cm bongo outfitted with two 0.335 mm mesh nets towed in an oblique path from near bottom or 200 m maximum depth to the surface. Vessel speed of 1.5 kts was adjusted during the bongo tow to maintain a 45-degree wire angle in order to uniformly sample the water column. Associated sea temperature profiles were recorded using the SBE 19 Seacat Profiler mounted above the bongo frame. Neuston tows were done with a 1 x 2 m frame with a 1 x 2 m 0.947 mm mesh net and were conducted for 10 minutes at a vessel speed of 2 kts to keep half of the frame submerged in the water.

### Cetacean Visual Survey

The survey was scheduled to complete the cruise track in two legs from the 68.3 m NOAA Ship *Gordon Gunter*. Leg 1 was scheduled for August 31- September 18 and Leg 2, September 19-30 (Table 1). This survey was conducted in conjunction with SEFSC ichthyoplankton sampling along a predetermined track line at stations uniformly spaced throughout continental shelf waters of the U.S. Gulf of Mexico (Figures 1 and 2). The track line was transited 24-hours a day. Line-transect sampling (Buckland et al., 1993) was conducted at a ship's speed of 10 kts while traveling between stations during daylight hours.

Line-transect data were collected by two teams of three observers during daylight hours, weather permitting (i.e., no rain, Beaufort sea state <6). Each team consisted of skilled observers experienced in shipboard cetacean observation and identification techniques. Two observers searched for cetaceans using 25X "bigeye" binoculars mounted on the ship's flying bridge. The third observer recorded data and maintained a search of the area near the ship using unaided eye or 7X hand-held binoculars. Data were recorded on a laptop computer using a BASIC data acquisition program interfaced with a global positioning system (GPS). Environmental data included measures of sea state, weather, wind, and glare. Cetacean sighting data included species, group-size, presence of calves, bearing from the bow, linear distance from the ship, surface temperature, depth, and behavioral observations.

As required by Research Permit No. 779-1339 issued to the SEFSC by the National Marine Fisheries Service Office of Protected Resources, data on behavioral responses of cetaceans to the survey vessel were recorded. A complete set of these responses can be obtained from the Pascagoula Laboratory.



## **Cetacean Biopsy**

In order to study cetacean stock structure, biopsy samples of skin and blubber were collected from selected species (designated by Permit No. 779-1339) for genetic and contaminant analysis. A modified .22 caliber dart rifle was used for obtaining samples, and each dart was fitted with specially designed heads that extract a small plug of tissue from animals at close range. Samples were collected from animals riding at the bow of the *Gordon Gunter*. As required by Permit No. 779-1339, data on each sampling attempt were recorded, including date, time, platform, sampler and recorder name, field number, device, species, location (GPS), number of hits and misses, body location struck, and whether a sample was taken. A complete log can be obtained from the Pascagoula Laboratory.

## **Environmental Data**

Environmental data was collected at each designated ichthyoplankton station. Each SEAMAP station included a CTD cast to near bottom or 200 m maximum depth. A continuous-flow thermosalinograph/fluorometer was in use 24 hours/day. A host of information from shipboard sensors was accessed via the Scientific Computer System (SCS). The SCS continuously displayed and recorded to disk the ship's position, heading and speed, wind direction and speed, barometric pressure, sea surface temperature, air temperature and water depth.

## **RESULTS**

Over the course of this survey, ichthyoplankton was collected from 118 stations (Figure 1), 72 stations were sampled during Leg 1 and 46 stations were sampled during Leg 2. This resulted in the collection of 235 bongo samples (118 left, 117 right) and 116 neuston samples. A total of 116 SBE 19 Seacat profiles were taken during the cruise (Leg 1, 70; Leg 2, 46). On the first leg, the right cod end and sample were lost during bongo retrieval on 1 station, then at a different station a neuston tow was not done after a winch problem occurred during the bongo tow and on the second leg, a neuston sample was lost.

After the assignment of SEAMAP numbers to all SEAMAP samples, the right bongos and neustons were shipped to ZSIOP Szczecin, Poland for sorting. The left bongo samples were deposited at Gulf Coast Research Laboratory (GCRL; Ocean Springs, MS) for processing, analysis and storage.

## **Cetacean Visual Survey**

During the 19 survey days, 2109 transect km were surveyed (Leg 1, 1265 km; Leg 2, 844 km) (Table 1 and Figure 2). Daily effort ranged up to 8.4 hours/day and 158 km/day and averaged 5.3 hours/day and 115 km/day. In total, 130 cetacean groups were sighted (Leg 1, 81 groups; Leg 2, 49



groups) (Tables 2, 3 and 4, Figure 3). Sixteen of these groups were off-effort. At least seven species were sighted (Table 3, Figures 4 and 5). The highest number of cetacean groups sighted on one day was 28 (Tables 1 and 4). The most commonly sighted species were bottlenose dolphins (75 sightings) and Atlantic spotted dolphins (27 sightings; there were also 14 sightings identified as bottlenose or Atlantic spotted dolphins). During one day of transiting to Pascagoula through deeper water, 2 groups of striped dolphins, 4 groups of pantropical spotted dolphins, and 3 sperm whales were sighted (Tables 2 and 4).

The largest groups recorded on this cruise were a group of 175 melon-headed whales and a group of 90 pantropical spotted dolphins. A summary of group size, water depth, and sea surface temperature for each species is presented in Table 3.

Cetaceans were encountered in all areas surveyed (Figure 3). Bottlenose dolphins and Atlantic spotted dolphins were the only species sighted in continental shelf waters (<100 m) except for one sighting of an unidentified dolphin. The dominance of these two species along the continental shelf was not surprising and has been well documented by other surveys in the Gulf of Mexico (i.e., GulfCet I and II).

Observations were recorded on the prevalence of bite wounds from cookie-cutter sharks (*Isistius* sp.) on Gulf of Mexico cetaceans. Of the 113 groups observed at close enough range to see the crater wounds or healed scars caused by cookie-cutter sharks, 8 groups representing 4 species showed evidence of an *Isistius* attack. The four groups of pantropical spotted dolphins, the 2 groups of striped dolphins and the group of melon-headed whales included at least one individual with an *Isistius* bite. Of the 75 groups of bottlenose dolphin groups assessed, only 1 showed evidence of a cookie-cutter bite. No Atlantic spotted dolphins observed at close range displayed any cookie-cutter shark wounds.

Results from behavioral responses of cetaceans to the survey vessel were typical of those from previous surveys. Of 130 groups for which responses were recorded, 57 groups demonstrated no response to the vessel. Of the 73 groups for which a response was observed, 66 groups responded by either bow-riding or approaching the ship, 5 groups dove and 2 groups were observed fleeing the ship.

### Cetacean Biopsy

Sixteen biopsy samples were obtained during the cruise (Figure 6). All samples were collected from animals riding at the bow of the *Gordon Gunter*. The biopsies represent three species: bottlenose dolphin (5), Atlantic spotted dolphin (9) and pantropical spotted dolphin (2). Biopsies were collected throughout the waters of the U.S. Gulf of Mexico (Figure 6). Several samples were taken from different individuals of the same group. The skin and blubber samples were sent to the NOS Charleston (South Carolina) Laboratory for analysis and storage. All other cetacean data were returned to the NMFS Mississippi Laboratories, Pascagoula for analysis, editing, comparison, and archiving.



## Environmental Data

Profiles from the SBE 19 Seacat Profiler and the SBE 911plus CTD, other environmental data and data from the ship's SCS were returned to the NMFS Pascagoula Laboratory for analysis, editing, comparison and archiving.

## LITERATURE CITED

Buckland, S.T., D.R. Anderson, K.P. Burnham, and J.L. Laake. 1993. Distance Sampling: Estimating abundance of biological populations. Chapman and Hall, London. 446 pp.

## CRUISE PARTICIPANTS

<u>Name</u>	<u>Title</u>	<u>Organization</u>
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Leg 1 (31 August - 16 September 1999)

### Mammal/Plankton

Keith Mullin	Fishery Biologist	NMFS; Pascagoula, MS
Charlotte Cates	Fishery Biologist I	JCWS <sup>1</sup> ; Pascagoula, MS
Carolyn Burks	Fish/Wildlife Biologist II	JCWS; Pascagoula, MS
Jim Tobias	Fishery Biologist	NMFS; Miami, FL
Cheryl Brown	Fishery Biologist	NMFS; Miami, FL
Kathy Hough	Fishery Biologist	NMFS; San Diego, CA

### Plankton

Denice Drass	Field Party Chief	NMFS; Pascagoula, MS
Alonzo Hamilton	Fishery Biologist	NMFS; Pascagoula, MS
Jennifer Miller	Fishery Biologist I	JCWS; Pascagoula, MS
Kim Williams	Fishery Biologist	FDEP <sup>2</sup> ; St. Petersburg, FL
Frank Thompson	Fishery Biologist	JCWS; Pascagoula, MS

<sup>1</sup> - Johnson Controls World Services

<sup>2</sup> - Florida Department of Environmental Protection



<u>Name</u>	<u>Title</u>	<u>Organization</u>
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Leg 2 (21 September-30 September 1999)

Mammal/Plankton

Keith Mullin	Fishery Biologist	NMFS; Pascagoula, MS
Charlotte Cates	Fishery Biologist I	JCWS <sup>1</sup> ; Pascagoula, MS
Carolyn Burks	Fish/Wildlife Biologist II	JCWS; Pascagoula, MS
John Brusher	Fishery Biologist	NMFS; Panama City, FL
Chris Palmer	Fishery Biologist	NMFS; Panama City, FL
Joe Contillo	Fishery Biologist	NMFS; Miami, FL
Lisa Csuzdi	Fishery Biologist	NMFS; Miami, FL

Plankton

Denice Drass	Field Party Chief	NMFS; Pascagoula, MS
Alonzo Hamilton	Fishery Biologist	NMFS; Pascagoula, MS
Andre Debose	Fishery Biologist	NMFS; Pascagoula, MS
Dave Hanisko	Fishery Biologist	NMFS; Pascagoula, MS
Frank Thompson	Fishery Biologist	JCWS; Pascagoula, MS

Submitted by:

Denice M. Drass  
Denice M. Drass  
Field Party Chief

Approved by:

Scott Nichols  
Scott Nichols, Director  
Mississippi Laboratories

Bradford E. Brown  
Bradford E. Brown, Director  
Southeast Science and Research Center

Table 1. Effort, Beaufort sea state, and number of sightings for each day of NOAA Ship *Gordon Gunter* Cruise 99-02 (3), August-September 1999.

Leg Date	Effort hours	Transect kilometers	Average Sea State	Number of Sightings
<u>Leg 1</u>				
31 August	Depart Pascagoula, MS			
1 September	Transit			
2 September	Transit			
3 September	2.4	45	4.0	0
4 September	7.9	153	3.6	3
5 September	5.5	103	3.6	3
6 September	7.3	130	2.4	5
7 September	6.5	122	2.5	28
8 September	6.2	118	2.5	2
9 September	8.4	157	4.0	8
10 September	6.1	117	3.1	15
11 September	7.3	144	1.5	5
12 September	6.8	124	3.4	12
13 September	2.7	52	3.6	0
14 September	0.0	0	>4	0
15 September	0.0	0	>4	0
16 September	Arrive Pascagoula, MS			
Total	67.1	1265		81
<u>Leg 2</u>				
21 September	Depart Pascagoula, MS			
22 September	2.8	52	4.0	0
23 September	5.4	100	3.1	8
24 September	5.7	106	2.6	9
25 September	6.4	124	3.6	7
26 September	2.7	50	4.1	6
27 September	5.5	104	3.3	7
28 September	7.4	150	4.1	1
29 September	8.4	158	1.3	11
30 September	Arrive Pascagoula, MS			
Total	44.3	844		49
TOTAL	111.4	2109		130



Table 2. Number of cetacean group sightings for each leg of NOAA Ship *Gordon Gunter* Cruise 99-02 (3) conducted in the U.S. Gulf of Mexico, August-September 1999.

Species	Leg 1	Leg 2	Total
Atlantic Spotted dolphin ( <i>Stenella frontalis</i> )	8	19	27
Bottlenose dolphin ( <i>Tursiops truncatus</i> )	64	11	75
Bottlenose/Atlantic spotted dolphin ( <i>T. truncatus</i> / <i>S. frontalis</i> )	7	7	14
False killer whale ( <i>Pseudorca crassidens</i> )	1	0	1
Melon-headed whale ( <i>Peponocephala electra</i> )	1	0	1
Pantropical Spotted dolphin ( <i>Stenella attenuata</i> )	0	4	4
Sperm whale ( <i>Physeter macrocephalus</i> )	0	3	3
Striped dolphin ( <i>Stenella coeruleoalba</i> )	0	2	2
Unidentified dolphin	0	2	2
Unidentified odontocete	0	1	1
<b>TOTAL</b>	<b>81</b>	<b>49</b>	<b>130</b>



Table 3. Number of groups (n), mean group-size, water depth, and sea surface temperature for cetacean sightings in the U.S. Gulf of Mexico during NOAA Ship *Gordon Gunter* Cruise 99-02(3), August-September 1999.

Species	n	Group Size (animals)		Water Depth (meters)		Sea Surface Temperature (°C)	
		Mean (SE)	Range	Mean (SE)	Range	Mean (SE)	Range
<i>Stenella frontalis</i>	27	11.9 (1.78)	1 - 41	52 (8)	11 - 196	28.9 (0.20)	27.7 - 30.9
<i>Tursiops truncatus</i>	75	8.9 (0.98)	1 - 47	33 (4)	9 - 205	29.8 (0.40)	27.6 - 33.3
<i>T. truncatus/S. frontalis</i>	14	2.5 (0.43)	1 - 6	22 (4)	9 - 57	29.4 (0.37)	27.8 - 31.3
<i>Pseudorca crassidens</i>	1	14.0		545		31.1	
<i>Peponocephala electra</i>	1	175.0		768		29.9	
<i>Stenella attenuata</i>	4	48.8 (15.99)	12 - 90	887 (85)	680 - 1097	29.0 (0.49)	28.4 - 30.5
<i>Physeter macrocephalus</i>	3	1.0 (0)	1 - 1	975 (47)	889 - 1052	28.6 (0.03)	28.5 - 28.6
<i>Stenella coeruleoalba</i>	2	52.5 (2.50)	50 - 55	719 (7)	711 - 726	28.7 (0.20)	28.5 - 28.9
Unidentified dolphin	2	2.5 (0.50)	2 - 3	374 (361)	13 - 735	28.5 (0.55)	27.9 - 29.0
Unidentified odontocete	1	3.0		759		30.0	



Table 4. Summary of cetacean sightings during NOAA Ship *Gordon Gunter* Cruise 99-02(3) in the U.S. Gulf of Mexico August-September 1999 (S = effort status of sighting, SST = Sea surface temperature).

surface temperature).							
Date	Species	Group	Position		SST (°C)	Depth (m)	S
Leg 1							
1999 Sep 04	<i>Tursiops truncatus</i>	18	26°51'	97°07'	28.4	29	on
1999 Sep 04	<i>Tursiops truncatus</i>	21	26°53'	97°08'	28.6	27	on
1999 Sep 04	<i>Tursiops truncatus</i>	12	26°57'	97°10'	28.8	27	on
1999 Sep 05	<i>Stenella frontalis</i>	41	27°31'	96°12'	29.4	106	on
1999 Sep 05	<i>Tursiops truncatus</i>	3	27°29'	96°29'	29.3	70	off
1999 Sep 05	<i>Tursiops truncatus</i>	5	27°33'	96°56'	29.7	26	on
1999 Sep 06	<i>T. truncatus/S. frontalis</i>	4	28°27'	95°52'	30.1	18	on
1999 Sep 06	<i>Tursiops truncatus</i>	12	28°29'	95°36'	33.3	22	on
1999 Sep 06	<i>Tursiops truncatus</i>	1	28°28'	95°29'	30.4	26	off
1999 Sep 06	<i>Tursiops truncatus</i>	47	28°20'	95°32'	29.8	27	on
1999 Sep 06	<i>Tursiops truncatus</i>	5	28°14'	95°31'	30.1	35	on
1999 Sep 07	<i>Tursiops truncatus</i>	13	28°51'	95°00'	30.6	18	on
1999 Sep 07	<i>Tursiops truncatus</i>	5	28°59'	95°00'	30.4	16	on
1999 Sep 07	<i>Tursiops truncatus</i>	6	28°59'	95°00'	30.4	16	on
1999 Sep 07	<i>Tursiops truncatus</i>	3	29°00'	94°59'	30.4	16	off
1999 Sep 07	<i>Tursiops truncatus</i>	5	29°02'	94°59'	30.6	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	15	29°07'	94°52'	30.8	13	off
1999 Sep 07	<i>Tursiops truncatus</i>	9	29°07'	94°53'	30.8	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	8	29°06'	94°54'	30.8	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	4	29°09'	94°50'	30.6	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	37	29°11'	94°45'	30.8	15	on
1999 Sep 07	<i>Tursiops truncatus</i>	18	29°13'	94°42'	30.9	13	on
1999 Sep 07	<i>T. truncatus/S. frontalis</i>	2	29°14'	94°39'	30.7	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	12	29°16'	94°35'	30.8	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	22	29°18'	94°31'	30.7	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	33	29°18'	94°30'	31.3	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	22	29°19'	94°28'	31.3	13	off
1999 Sep 07	<i>T. truncatus/S. frontalis</i>	6	29°22'	94°27'	31.3	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	4	29°23'	94°27'	31.3	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	5	29°22'	94°26'	31.4	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	6	29°22'	94°26'	31.4	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	11	29°22'	94°26'	31.4	13	on
1999 Sep 07	<i>Tursiops truncatus</i>	10	29°20'	94°24'	31.4	15	on
1999 Sep 07	<i>T. truncatus/S. frontalis</i>	2	29°17'	94°23'	31.0	15	on

continued



Table 4. continued

Date	Species	Group	Position		SST (°C)	Depth (m)	S
1999 Sep 07	<i>Tursiops truncatus</i>	8	29°15'	94°24'	30.8	15	on
1999 Sep 07	<i>T. truncatus/S. frontalis</i>	3	29°16'	94°23'	30.8	15	on
1999 Sep 07	<i>Tursiops truncatus</i>	5	29°06'	94°29'	31.3	15	on
1999 Sep 07	<i>Tursiops truncatus</i>	1	29°06'	94°29'	31.2	15	on
1999 Sep 07	<i>Tursiops truncatus</i>	1	29°01'	94°29'	31.2	16	on
1999 Sep 08	<i>Peponocephala electra</i>	175	27°32'	94°29'	29.9	769	on
1999 Sep 08	<i>Tursiops truncatus</i>	2	28°04'	93°59'	30.7	66	on
1999 Sep 09	<i>Tursiops truncatus</i>	2	29°33'	93°30'	30.4	11	on
1999 Sep 09	<i>Tursiops truncatus</i>	5	29°33'	93°29'	30.4	16	off
1999 Sep 09	<i>Tursiops truncatus</i>	1	29°17'	93°17'	30.6	16	on
1999 Sep 09	<i>Tursiops truncatus</i>	8	29°15'	93°17'	30.6	18	on
1999 Sep 09	<i>Tursiops truncatus</i>	10	29°10'	93°22'	30.6	55	on
1999 Sep 09	<i>Tursiops truncatus</i>	2	29°07'	93°25'	30.6	66	on
1999 Sep 09	<i>Tursiops truncatus</i>	4	28°58'	93°31'	30.7	22	on
1999 Sep 09	<i>Tursiops truncatus</i>	4	28°30'	93°28'	30.0	44	off
1999 Sep 10	<i>Stenella frontalis</i>	5	27°59'	92°58'	30.0	102	off
1999 Sep 10	<i>Tursiops truncatus</i>	4	28°12'	92°55'	30.1	66	on
1999 Sep 10	<i>Stenella frontalis</i>	17	28°21'	92°55'	30.1	51	on
1999 Sep 10	<i>Tursiops truncatus</i>	14	28°52'	93°00'	30.6	26	on
1999 Sep 10	<i>Stenella frontalis</i>	11	28°53'	93°00'	30.8	22	on
1999 Sep 10	<i>Stenella frontalis</i>	11	28°55'	93°01'	30.9	22	on
1999 Sep 10	<i>Tursiops truncatus</i>	9	28°58'	93°00'	31.0	24	on
1999 Sep 10	<i>Tursiops truncatus</i>	9	28°59'	92°59'	31.0	24	on
1999 Sep 10	<i>Tursiops truncatus</i>	5	29°02'	93°00'	31.0	22	on
1999 Sep 10	<i>Tursiops truncatus</i>	2	29°04'	93°01'	30.9	20	on
1999 Sep 10	<i>Tursiops truncatus</i>	1	29°07'	93°00'	31.1	18	on
1999 Sep 10	<i>Tursiops truncatus</i>	3	29°08'	93°00'	30.3	18	on
1999 Sep 10	<i>Tursiops truncatus</i>	13	29°12'	93°00'	30.7	16	on
1999 Sep 10	<i>Tursiops truncatus</i>	2	29°16'	92°57'	30.6	16	off
1999 Sep 10	<i>Tursiops truncatus</i>	9	29°14'	92°59'	30.6	16	on
1999 Sep 11	<i>T. truncatus/S. frontalis</i>	1	28°37'	92°28'	29.9	37	on
1999 Sep 11	<i>Tursiops truncatus</i>	3	28°34'	92°29'	29.9	38	on
1999 Sep 11	<i>Stenella frontalis</i>	4	28°18'	92°30'	30.2	60	on
1999 Sep 11	<i>Tursiops truncatus</i>	4	27°58'	92°29'	30.6	152	on
1999 Sep 11	<i>Pseudorca crassidens</i>	14	27°48'	92°28'	31.1	545	on
1999 Sep 12	<i>Tursiops truncatus</i>	4	28°59'	91°56'	29.9	15	off
1999 Sep 12	<i>T. truncatus/S. frontalis</i>	5	28°48'	91°30'	30.1	18	on

continued



Table 4. continued.

Date	Species	Group	Position		SST (°C)	Depth (m)	S
1999 Sep 12	<i>Tursiops truncatus</i>	18	28°46'	91°31'	30.0	22	on
1999 Sep 12	<i>Tursiops truncatus</i>	9	28°44'	91°31'	30.1	24	on
1999 Sep 12	<i>Tursiops truncatus</i>	12	28°39'	91°34'	30.3	31	on
1999 Sep 12	<i>Tursiops truncatus</i>	10	28°37'	91°32'	30.2	33	on
1999 Sep 12	<i>Tursiops truncatus</i>	6	28°35'	91°30'	30.3	33	on
1999 Sep 12	<i>Tursiops truncatus</i>	15	28°31'	91°28'	30.2	44	on
1999 Sep 12	<i>Tursiops truncatus</i>	8	28°24'	91°29'	30.2	59	on
1999 Sep 12	<i>Tursiops truncatus</i>	12	28°21'	91°31'	30.2	108	on
1999 Sep 12	<i>Stenella frontalis</i>	25	28°12'	91°29'	30.4	86	on
1999 Sep 12	<i>Stenella frontalis</i>	1	28°03'	91°29'	30.3	117	on

## Leg 2

1999 Sep 23	<i>T. truncatus</i> / <i>S. frontalis</i>	2	29°27'	85°59'	28.1	57	on
1999 Sep 23	<i>Stenella frontalis</i>	2	29°34'	85°59'	27.7	38	on
1999 Sep 23	<i>Stenella frontalis</i>	14	29°36'	85°57'	27.9	40	on
1999 Sep 23	<i>Stenella frontalis</i>	27	29°54'	85°55'	27.7	31	on
1999 Sep 23	<i>T. truncatus</i> / <i>S. frontalis</i>	1	29°52'	85°50'	27.8	29	on
1999 Sep 23	<i>Tursiops truncatus</i>	3	29°52'	85°45'	27.9	9	on
1999 Sep 23	<i>T. truncatus</i> / <i>S. frontalis</i>	1	29°51'	85°44'	27.8	9	on
1999 Sep 23	<i>Tursiops truncatus</i>	3	29°51'	85°43'	27.8	22	on
1999 Sep 24	<i>Tursiops truncatus</i>	2	29°34'	83°51'	27.6	13	on
1999 Sep 24	<i>Tursiops truncatus</i>	1	29°21'	83°44'	28.0	13	on
1999 Sep 24	Unidentified dolphin	3	29°20'	83°44'	27.9	13	on
1999 Sep 24	<i>Stenella frontalis</i>	7	29°18'	83°44'	28.3	16	on
1999 Sep 24	<i>Tursiops truncatus</i>	2	29°09'	83°38'	28.4	13	on
1999 Sep 24	<i>Stenella frontalis</i>	9	29°07'	83°35'	28.2	13	on
1999 Sep 24	<i>Tursiops truncatus</i>	15	29°08'	83°34'	28.2	11	on
1999 Sep 24	<i>Stenella frontalis</i>	6	29°05'	83°31'	28.1	11	on
1999 Sep 24	<i>Stenella frontalis</i>	7	29°03'	83°27'	28.1	11	on
1999 Sep 25	<i>Stenella frontalis</i>	8	28°59'	85°03'	27.9	42	off
1999 Sep 25	<i>Stenella frontalis</i>	15	28°59'	85°02'	28.0	44	on
1999 Sep 25	<i>Stenella frontalis</i>	12	28°59'	85°19'	28.0	42	off
1999 Sep 25	<i>Stenella frontalis</i>	22	29°00'	85°27'	28.1	70	off
1999 Sep 25	<i>Tursiops truncatus</i>	12	28°46'	85°30'	28.2	161	on
1999 Sep 25	<i>Stenella frontalis</i>	26	28°32'	85°30'	28.1	196	on

continued



Table 4. continued.

Date	Species	Group	Position		SST (°C)	Depth (m)	S
1999 Sep 25	<i>Tursiops truncatus</i>	7	28°29'	85°26'	28.3	181	on
1999 Sep 26	<i>T. truncatus</i> / <i>S. frontalis</i>	3	28°30'	83°14'	27.9	15	on
1999 Sep 26	<i>T. truncatus</i> / <i>S. frontalis</i>	1	28°29'	83°12'	27.8	15	off
1999 Sep 26	<i>T. truncatus</i> / <i>S. frontalis</i>	3	28°24'	83°10'	28.2	15	on
1999 Sep 26	<i>Tursiops truncatus</i>	3	27°59'	83°14'	28.4	20	on
1999 Sep 26	<i>Stenella frontalis</i>	8	28°00'	83°27'	28.4	26	off
1999 Sep 26	<i>Stenella frontalis</i>	4	27°59'	83°45'	28.4	37	off
1999 Sep 27	<i>Stenella frontalis</i>	7	27°28'	83°55'	28.7	55	on
1999 Sep 27	<i>Stenella frontalis</i>	7	27°29'	83°44'	29.0	46	on
1999 Sep 27	<i>Tursiops truncatus</i>	2	27°29'	83°40'	29.1	44	on
1999 Sep 27	<i>T. truncatus</i> / <i>S. frontalis</i>	1	27°29'	83°39'	30.0	42	on
1999 Sep 27	<i>Stenella frontalis</i>	10	27°29'	83°31'	29.0	38	on
1999 Sep 27	<i>Stenella frontalis</i>	4	27°22'	83°29'	29.1	40	on
1999 Sep 27	<i>Stenella frontalis</i>	11	27°19'	83°30'	28.6	42	on
1999 Sep 28	<i>Tursiops truncatus</i>	23	26°19'	84°29'	28.9	205	on
1999 Sep 29	<i>Stenella attenuata</i>	12	27°54'	85°53'	28.4	1098	on
1999 Sep 29	<i>Physeter macrocephalus</i>	1	27°56'	85°57'	28.5	1052	on
1999 Sep 29	<i>Physeter macrocephalus</i>	1	28°00'	86°03'	28.6	985	on
1999 Sep 29	<i>Physeter macrocephalus</i>	1	28°03'	86°07'	28.6	889	off
1999 Sep 29	<i>Stenella attenuata</i>	45	28°02'	86°06'	28.6	891	on
1999 Sep 29	<i>Stenella coeruleoalba</i>	55	28°05'	86°08'	28.5	727	on
1999 Sep 29	<i>Stenella attenuata</i>	48	28°12'	86°16'	28.6	681	on
1999 Sep 29	<i>Stenella coeruleoalba</i>	50	28°13'	86°22'	28.9	712	on
1999 Sep 29	Unidentified dolphin	2	28°18'	86°28'	29.0	736	on
1999 Sep 29	Unidentified odontocete	3	28°30'	86°53'	30.0	759	on
1999 Sep 29	<i>Stenella attenuata</i>	90	28°32'	86°58'	30.5	878	on



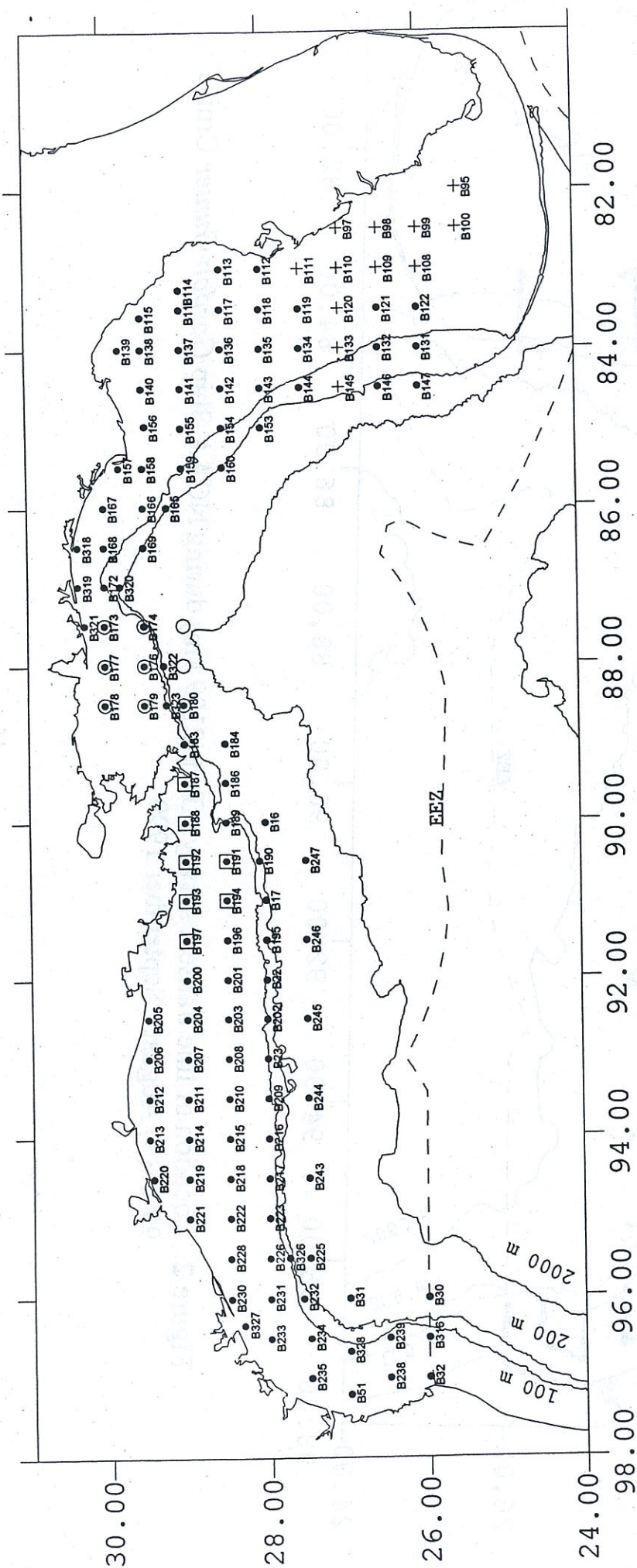


Figure 1. Cruise track with SEAMAP Ichthyoplankton stations for NOAA Ship *Gordon Gunter* Cruise 99-02 (3) August - September 1999 including stations collected by Florida, Mississippi and Louisiana. filled circle = NMFS; plus = FL; circle = MS; square = LA



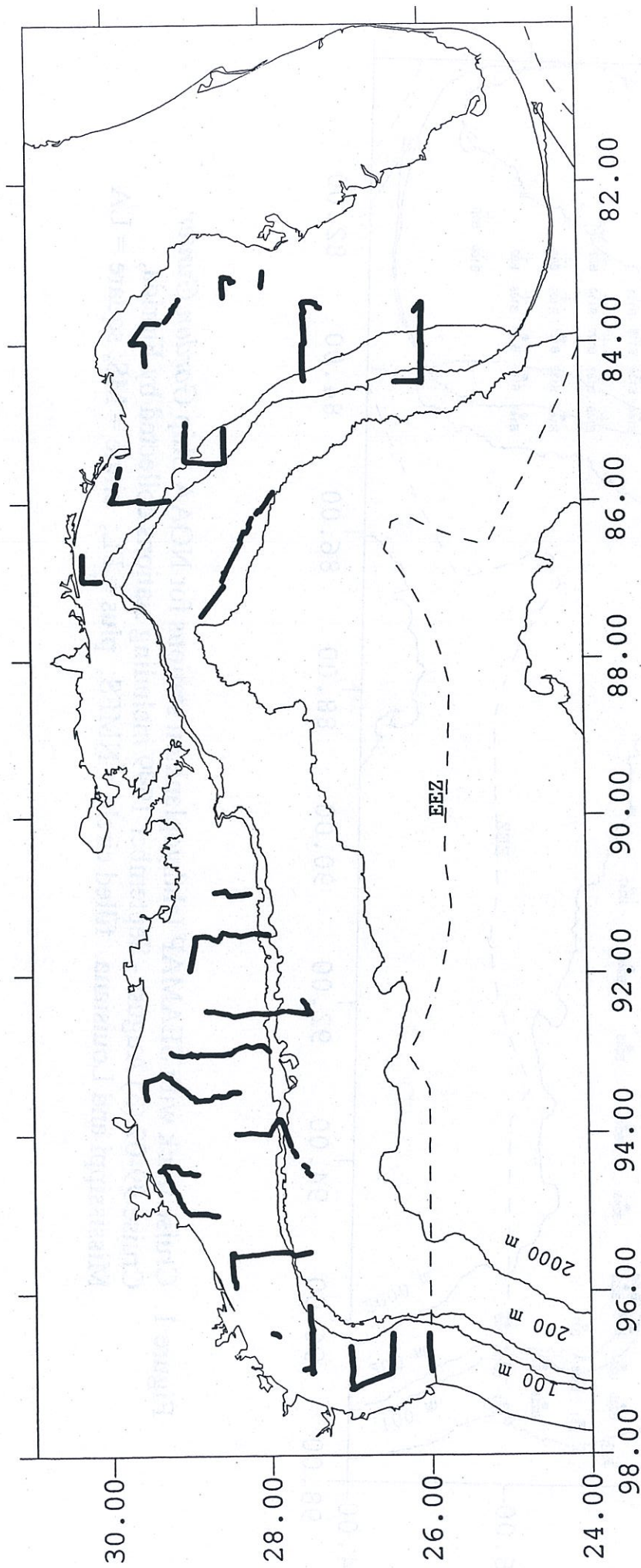


Figure 2. Location of line transect survey effort (2109 km) during NOAA Ship *Gordon Gunter* Cruise 99-02(3) August - September 1999 .



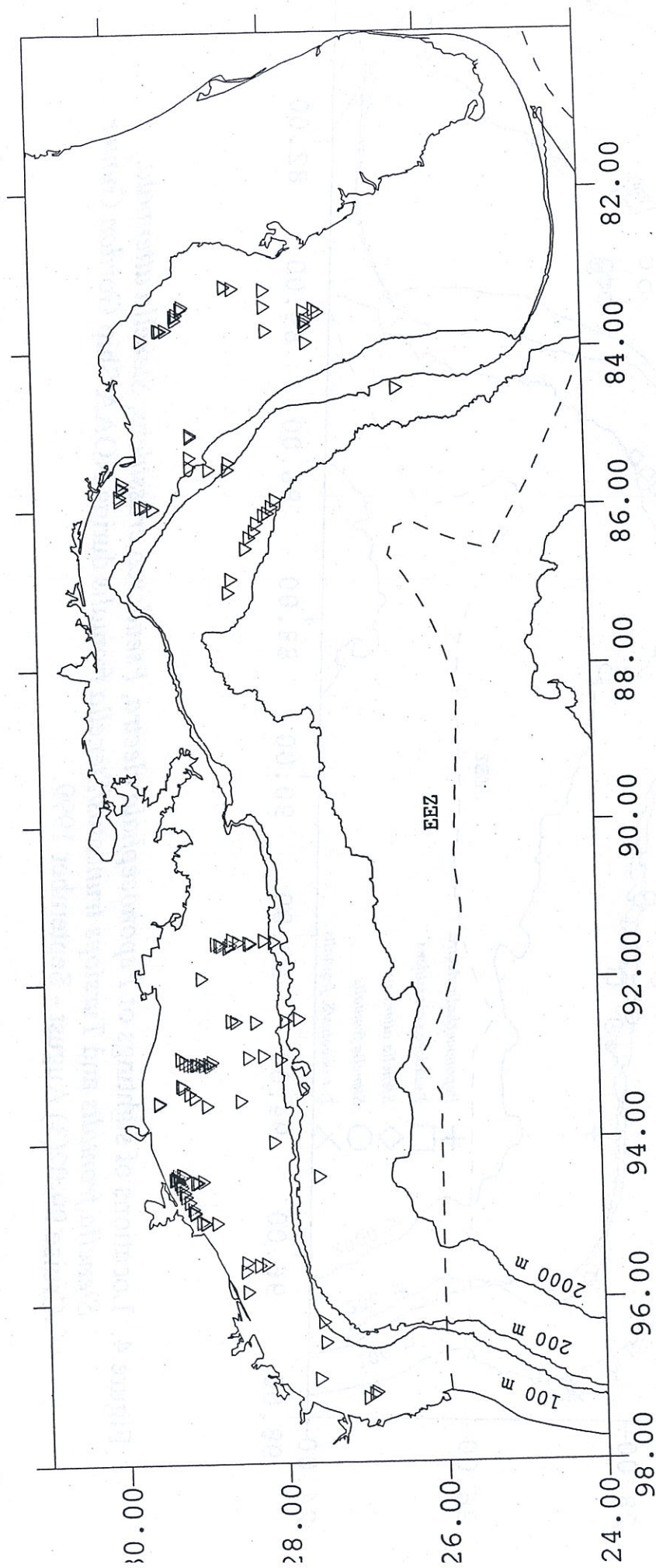


Figure 3. Locations of all cetacean group sightings during NOAA Ship Gordon Gunter Cruise 99-02(3) August - September 1999.



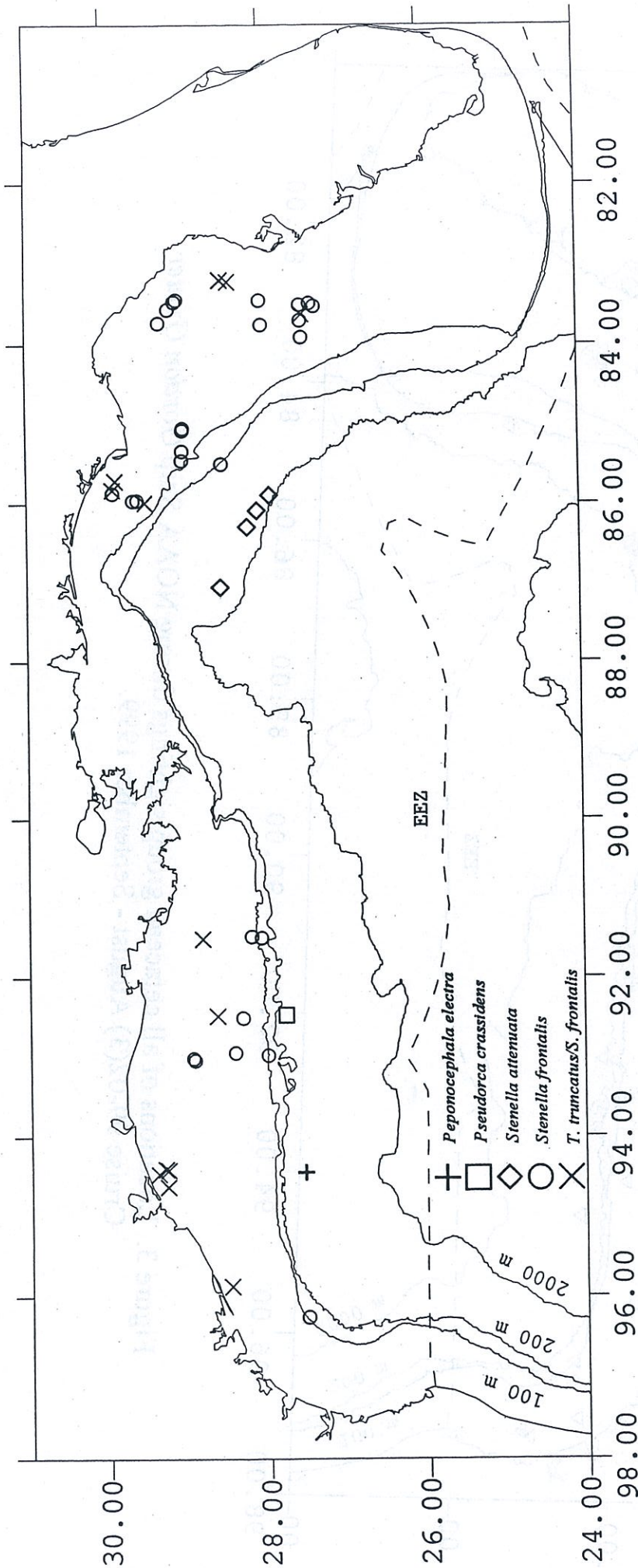


Figure 4. Locations of sightings of *Peponocephala electra*, *Pseudorca crassidens*, *Stenella attenuata*, *Stenella frontalis* and *Tursiops truncatus/Stenella frontalis* during NOAA Ship Gordon Gunter Cruise 99-02(3) August - September 1999.



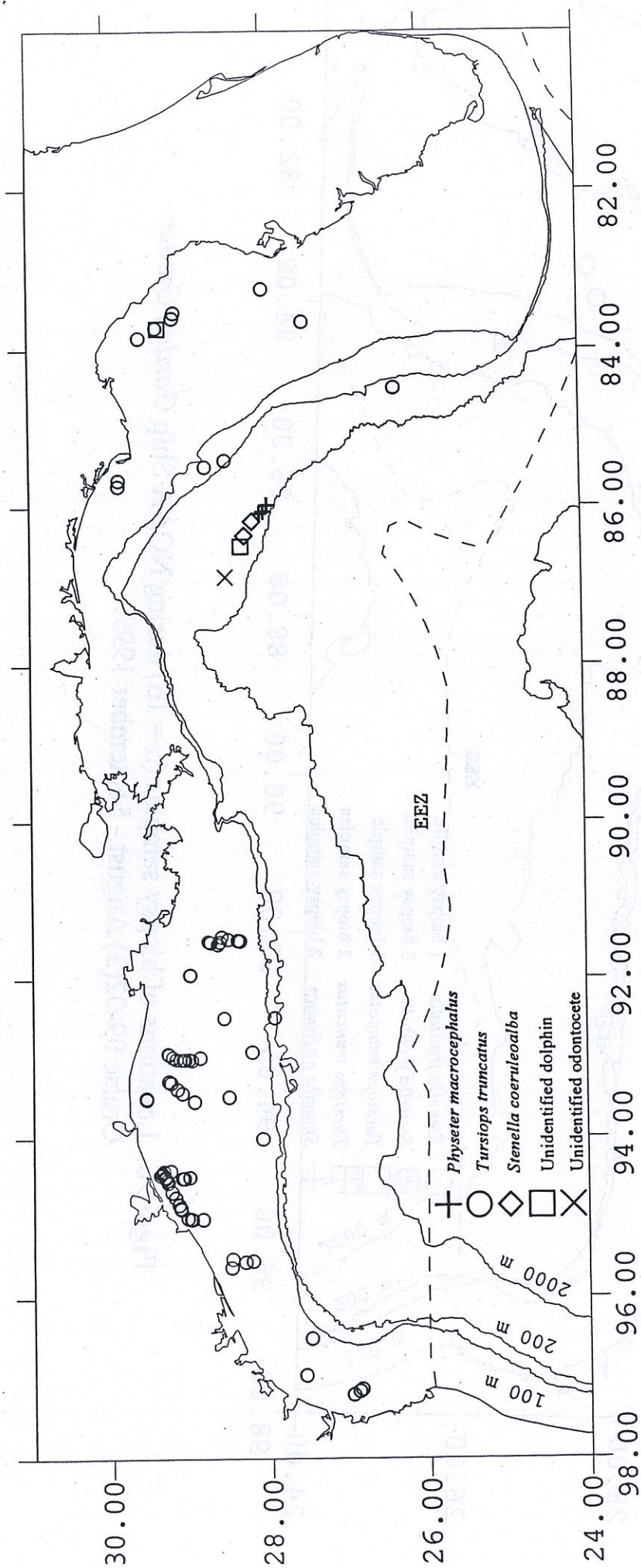


Figure 5. Locations of sightings of *Physeter macrocephalus*, *Tursiops truncatus*, *Stenella coeruleoalba*, unidentified dolphin and unidentified odontocete during NOAA Ship Gordon Gunter Cruise 99-02(3) August - September 1999.



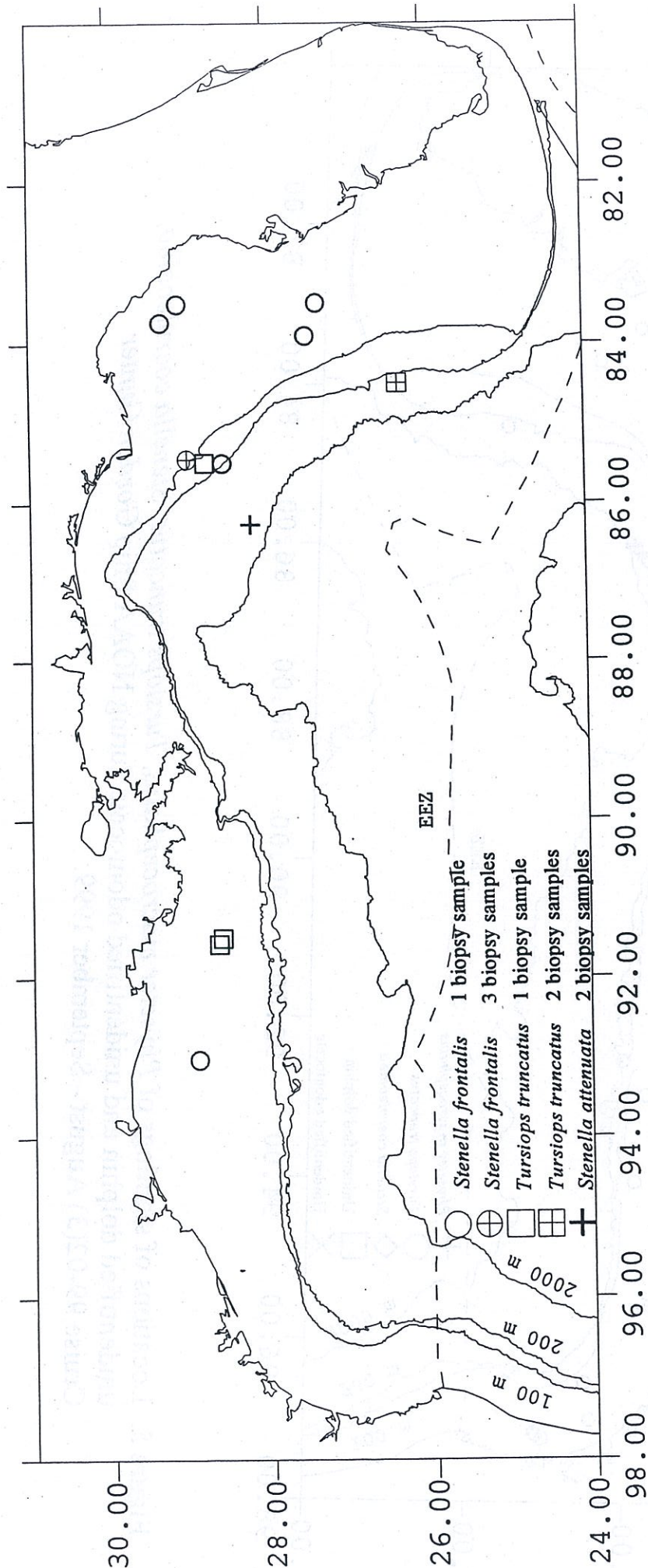


Figure 6. Locations of biopsych samples (n = 16) during NOAA Ship Gordon Gunter Cruise 99-02(3) August - September 1999.