

CRUISE RESULTS

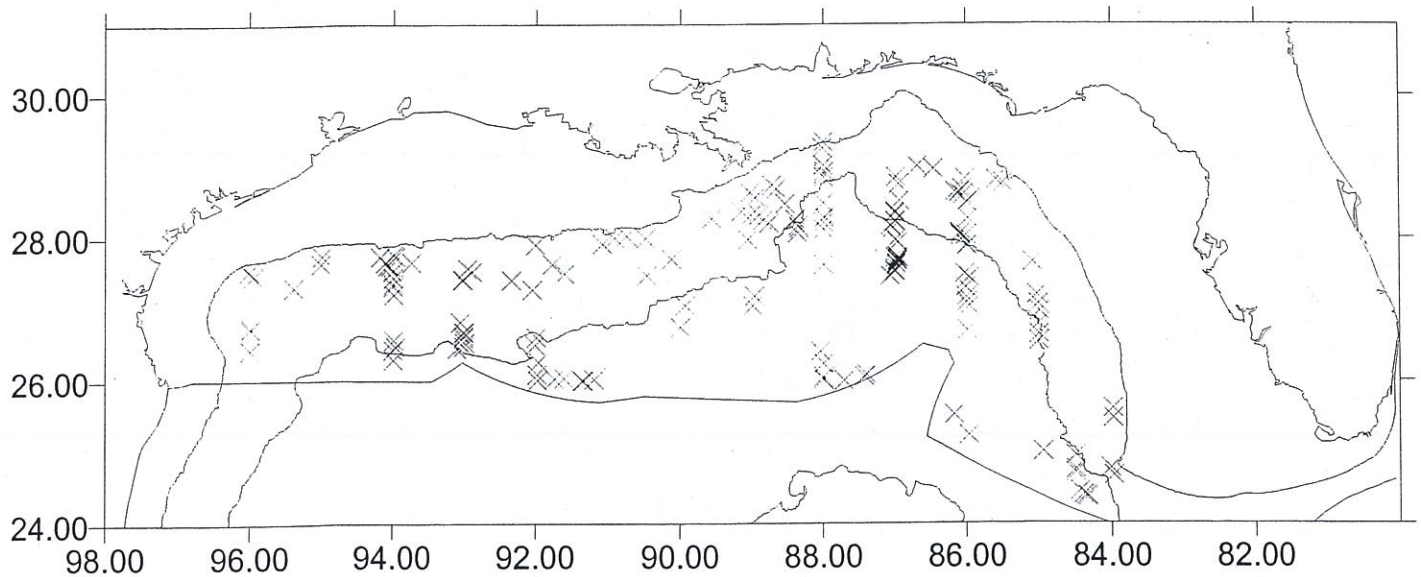
Spring Southeast Area Monitoring and Assessment Program
(SEAMAP) Ichthyoplankton Survey

and

Cetacean Survey

NOAA Ship *Gordon Gunter* Cruise GU-01-02
17 April – 31 May 2001

GULF STATES MARINE
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NOAA Ship Charles Young
 Cruise 07-01-02
 17 April - 21 May 2007

NOAA Ship Charles Young
 Cruise 07-01-02
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and

Continued

NOAA Ship Charles Young Cruise 07-01-02
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U.S. Department of Commerce
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INTRODUCTION

The NOAA Ship *Gordon Gunter* departed Pascagoula, Mississippi on 17 April 2001 to conduct the spring cetacean and Southeast Area Monitoring and Assessment Program (SEAMAP) ichthyoplankton survey in the northern U.S. Gulf of Mexico.

The SEAMAP Program is a cooperative State/Federal/University program designed to collect biological and environmental data from southeastern U.S. waters. The spring ichthyoplankton survey samples the planktonic early life stages of a variety of species of fishes and invertebrates, but specifically targets bluefin tuna larvae, to estimate the distribution and abundance of this commercially and recreationally important species.

Marine mammals in U.S. waters are protected under the provisions of the Marine Mammal Protection Act and the Endangered Species Act. The National Marine Fisheries Service (NMFS) has jurisdiction over and is responsible for monitoring cetacean species. For this reason, the NMFS Southeast Fisheries Science Center (SEFSC) has conducted numerous surveys of cetacean diversity, abundance, and distribution in the U.S. Gulf of Mexico. Most of the data collected to estimate overall abundance of cetacean species in the entire oceanic northern Gulf of Mexico (e.g., GulfCet I & II) were collected in coordination with the spring SEAMAP ichthyoplankton survey. Previous research has shown that the oceanic (>200 m) cetacean community primarily consists of 21 species (Balaenopteridae, 1 species; Physeteridae, 1; Kogiidae, 2; Ziphiidae, 3; and Delphinidae, 14). The outer continental shelf and shelf-edge (20-200 m) community ordinarily consists of two species, the bottlenose dolphin (*Tursiops truncatus*) and the Atlantic spotted dolphin (*Stenella frontalis*) (Scott et al. 1989, Blaylock and Hoggard 1994, Mullin et al. 1994, Hansen et al. 1995, Hansen et al. 1996, Mills and Rademacher 1996, Mullin and Hansen 1999).

This survey is the sixth cooperative research survey between the SEFSC and the Minerals Management Service (MMS) that will examine cetacean abundances in both oceanic and continental shelf waters.

OBJECTIVES

1. Collect ichthyoplankton samples for estimates of the abundance and distribution of Atlantic bluefin tuna larvae.
2. Collect data to estimate the abundance and distribution of cetaceans in the oceanic northern Gulf of Mexico.
3. Collect associated environmental data at all designated ichthyoplankton stations and marine mammal sightings.

4. Collect data on the distribution of sea turtles, seabirds, and other marine life.
5. Collect data on distribution and type of marine debris encountered during the survey.
6. Obtain biopsy samples of skin and blubber from selected cetacean species for genetic stock structure and contaminant analyses.
7. Obtain photographs of selected cetacean species for photo-identification studies.

METHODS

The survey was scheduled to complete the cruise track twice in two “legs” from the 68.3-m NOAA Ship *Gordon Gunter*. Leg 1 was scheduled for 17 April - 8 May and Leg 2, 10 - 31 May 2001.

Ichthyoplankton

The survey was conducted along a predefined standard trackline which included 98 SEAMAP ichthyoplankton stations located approximately 30 nautical miles apart (Figure 1). The sampling protocol for each bongo station included a bongo with an attached SBE 19 SeaCat profiler, a double neuston tow, and a SBE 9/11 conductivity-temperature-depth (CTD) profile. Designated neuston stations consisted of the CTD cast and neuston tow only. The SEAMAP bongo is 61 cm in diameter and has two, 0.335 mm mesh nets. It was towed in an oblique path from near bottom or 200 m maximum depth to the surface. Vessel speed was adjusted during the bongo tow to maintain a 45-degree wire angle in order to uniformly sample throughout the water column. The neuston net is a 1 x 4 m frame outfitted with two, 1 x 2 m, 0.947 mm mesh nets. Each neuston tow was conducted for 10 minutes at a vessel speed of approximately 2 knots to keep half of the frame submerged in the water. Forty-nine bongo/neuston stations and 49 neuston stations were targeted on each leg of the cruise.

The collection, handling, and preservation of all ichthyoplankton samples on Legs 1 and 2 were performed in accordance with standard SEAMAP protocol.

Cetacean Visual Survey

This survey was conducted in conjunction with ichthyoplankton sampling along the trackline uniformly spaced throughout oceanic and continental slope waters of the U.S. Gulf of Mexico (Figure 1). The trackline was transited 24-hours a day. Line-transect sampling (Buckland et al. 1993) was conducted at a ship's speed of 10 kts during daylight transits between ichthyoplankton stations, as well as in transit to and from the ichthyoplankton track.

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. 779-1339-03 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 (see cover for address).

Cetacean Biopsy

Biopsy samples of skin and blubber were collected from selected cetacean species (designated by Permit No. 779-1339-03) for genetic and contaminant analyses. A modified .22 caliber dart gun, fitted with specially designed heads that extract a small plug of tissue from animals, was used for obtaining samples. Sampling was attempted from the bow of the *Gordon Gunter* and from small boats. As required by Permit No. 779-1339-03, data on each sampling attempt were recorded in a log book, including date, time, platform, sampler and recorder name, field number, device, species, location (GPS), number of hits and misses, body location struck, behavioral reaction, and whether a sample was taken. A complete log can be obtained from the Pascagoula Laboratory.

Ancillary Collections

Flyingfish and marine insects, *Halobates* sp., were collected opportunistically throughout the cruise. Some specimens were removed from neuston nets when captured during routine plankton operations. Other specimens were collected via dipnetting during nighttime plankton stations. While the ship was stopped during the CTD cast, high wattage deck lights attracted sea life towards the ship and long-handled nets were used to capture fish and insects.

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. Bongo stations also included a SeaCat (SBE-19) cast. During Leg 2, water samples were collected from surface, mid, and max depths in an effort to determine the amount of chlorophyll *a* in the water as an estimate of phytoplankton biomass. The water was filtered and the chlorophyll *a* extracted and measured using an onboard fluorometer following the Welschmeyer method. 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 speed and direction, barometric pressure, sea surface and air temperature, and water depth.

RESULTS

Leg 1 was conducted from 17 April – 8 May 2001. Strong easterly winds were the dominant weather pattern for the entire first leg, affecting both plankton and mammal operations. As a result of high winds and seas, nine plankton stations were completely skipped (Figure 1). At other stations the neuston tow was cancelled. Poor weather also reduced marine mammal observational effort. Because stations were skipped and there were less diversions for marine mammals than normal, the planned trackline was prematurely completed on 4 May. The extra time and the improved weather conditions allowed for added plankton and marine mammal effort. Nine additional plankton stations (CTD and neuston tow) were sampled on 5 – 6 May (Figure 1). The locations of these stations were selected to sample across oceanographic features in the area and to try and maximize the possibility of catching bluefin tuna larvae. When weather permitted, marine mammal observations were conducted between these plankton stations. On 7 May surveying for marine mammals was carried out along a zigzag trackline off the Mississippi River delta.

Leg 2 was conducted from 11 – 31 May 2001. The weather was much more cooperative during the second half of the cruise. All 98 plankton stations were sampled as scheduled. Marine mammal effort doubled and the number of groups sighted almost quadrupled compared to that of Leg 1.

Ichthyoplankton

A total of 196 ichthyoplankton stations were attempted during the cruise (Leg 1, 98; Leg 2, 98). This sampling resulted in the collection of 368 neuston samples (183 left, 185 right). One hundred ninety-one bongo samples were also collected (95 left, 96 right). Left neuston and left bongo samples were preserved in 95% ethanol while right neuston and right bongo samples were initially fixed in formalin and were later transferred to 95% ethanol. Nine stations on the original trackline were skipped during Leg 1 due to inclement weather; however, nine neuston stations were added to the end of Leg 1. Also during Leg 1, nine neuston tows were cancelled due to high winds and seas, one neuston tow was cancelled due to lightning and one bongo tow was cancelled due to winch problems (Figure 1). A total of 96 SBE 19 SeaCat profiles were taken during the cruise (Leg 1, 47; Leg 2, 49).

After the assignment of SEAMAP numbers to samples from SEAMAP stations, the right bongo, right neuston, and selected left neuston samples will be shipped to ZSIOP, Szczecin, Poland for sorting and identification. The left bongo samples will be deposited at GCRL (Ocean Springs, Mississippi) for processing, analysis, and storage.

Cetacean Visual Survey

During the 40 survey days, 4094 transect km were surveyed (Leg 1, 1390 km; Leg 2, 2704 km) (Figures 2 & 3). Daily effort ranged up to 11.5 hours/day and 219 km/day and averaged 5.5 hours/day and 102 km/day (Table 1). In total, 181 cetacean groups were sighted

(Leg 1, 40 groups; Leg 2, 141 groups) (Table 2, Figure 4). At least 17 cetacean species were observed. Twenty groups comprising 7 species were sighted while off-effort. The highest number of cetacean groups sighted on one day was 24 (Tables 1 & 4). The most commonly sighted species were pantropical spotted dolphins (43 sightings), sperm whales (27 sightings), dwarf/pygmy sperm whale (20 sightings), and Risso's dolphin (14 sightings) (Table 2). On six occasions, two different species of cetaceans were observed associating with each other. Four of these sightings involved rough-toothed dolphins with the following: Atlantic spotted dolphins, an undetermined stenellid species of dolphin, bottlenose dolphins, and melon-headed whales. The two remaining associated sightings were both comprised of Atlantic spotted dolphins with bottlenose dolphins.

Twelve groups observed were estimated to be larger than 100 animals: pantropical spotted dolphins (10), bottlenose dolphins (1), and melon-headed whales (1). The largest estimated group was a group of 220 bottlenose dolphins west of the Dry Tortugas in 318m of water. Melon-headed whales had the largest mean group size with 103 animals per group, followed by false killer whales (70) and pantropical spotted dolphins (60). Pygmy killer whales, pygmy/dwarf sperm whales, and Cuvier's beaked whales were consistently found in deeper waters than most other cetacean species. 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 (Figures 5 - 10). The one baleen whale sighted, identified as either a Bryde's whale or a Sei whale, was observed off the Florida Panhandle at a depth of 149m (Figure 5). All three groups of melon-headed whales were observed off the Mississippi River delta (Figure 6). Bottlenose dolphins and Atlantic spotted dolphins were predominantly sighted in shelf-edge and upper continental slope waters (Figure 10). The distribution of these two species along the continental shelf/slope was not surprising and has been well documented by other surveys in the Gulf of Mexico (i.e., GulfCet I & II).

Observations were recorded on the prevalence of bite wounds from cookie-cutter sharks (*Isistius* spp.) on Gulf of Mexico cetaceans. Of the 55 groups observed at close enough range to see the crater wounds or healed scars caused by cookie-cutter sharks, 32 groups, representing ten species, showed evidence of an *Isistius* attack. Twenty-eight groups of pantropical spotted dolphins were assessed for cookie-cutter bites and 19 (67.9%) of those included at least one individual with an *Isistius* bite. Of the eight bottlenose dolphin groups assessed, four (50.0%) showed evidence of a cookie-cutter bite. The presence of remoras attached to marine mammals was also recorded. Remoras were observed in only five of the 52 cetacean groups assessed. The species to which remoras were attached were pantropical spotted dolphins, Atlantic spotted dolphins, and bottlenose dolphins.

Results from behavioral responses of cetaceans to the survey vessel were typical of those from previous surveys. Behavioral responses were recorded for 174 groups, of which 61 groups demonstrated no response to the vessel. Of the 113 groups for which a response was observed, 61 (54.0%) responded by either bow-riding or approaching the ship, 30 groups (26.5%) dove, 6 (5.3%) were observed fleeing the ship, and the other 16 groups (14.2%) exhibited various behaviors. Some species showed a consistent behavioral reaction towards the ship. Thirty-six

pantropical spotted dolphin groups exhibited a behavioral change: 30 rode the bow, five approached the ship, and one exhibited other behavior. Of the eight bottlenose dolphin groups that changed behavior, seven rode the bow and one showed other behavior. On the other hand, 17 sperm whale groups exhibited a behavior change, 14 (82.4%) by diving. All 14 of the dwarf/pygmy sperm whale groups that changed behaviors did so by diving.

Cetacean Biopsy

Fifteen biopsy samples were obtained during the cruise (Leg 1, 14; Leg 2, 1) (Table 5, Figure 11). Samples were collected from animals riding at the bow of the *Gordon Gunter*. The biopsies represent six cetacean species: melon-headed whale (3), pantropical spotted dolphin (1), Atlantic spotted dolphin (2), striped dolphin (3), rough-toothed dolphin (2), and bottlenose dolphin (4). Biopsies were collected throughout the waters of the U.S. Gulf of Mexico (Figure 11). 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.

Ancillary Collections

Dipnetting took place during 18 stations, totaling 8.5 hours of effort. Flyingfish were collected at 13 dipnet stations and *Halobates* sp. were captured at eight stations. A total of 49 flyingfish were collected (36 in dipnet, 13 in neuston tows) (Figure 12). Two other fish were caught in dipnets: a mahi mahi (*Coryphaena* sp.) and a unidentified hemiramphid, or half beak. Flyingfish were sent to Bob Pitman at the SWFSC in La Jolla, CA for identification and cataloging. Four-wing flyingfish collected included *Cheilopogon exsiliens*, *Cheilopogon melanurus*, *Cypselurus comatus*, *Hirundichthys rondeletii*, *Parexocoetus brachypterus*, *Prognichthys gibbifrons*, and one possible hybrid, *Cheilopogon exsiliens/furcatus*. One species of two-wing flyingfish, *Exocoetus obtusirostris*, was caught.

Halobates, presumably all *H. micans* (Cheng and Wormuth 1992), were encountered across the survey area (Figure 13). Forty-four *Halobates* were caught at 8 dipnet stations, and 267 *Halobates* were caught in 37 neuston tows. The insects were sent to Dr. Lanna Cheng at Scripps for further study and preservation.

Environmental Data

The 96 SBE 19 SeaCat profiles and the 196 SBE 9/11 CTD profiles along with other environmental data, and data from the ship's SCS were returned to the NMFS Pascagoula Laboratory for analysis, editing, comparison, and archiving. Chlorophyll *a* readings from the onboard fluorometer were recorded on station sheets and entered with other environmental data into the SEAMAP database.

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CRUISE PARTICIPANTS

<u>Name</u>	<u>Title</u>	<u>Organization</u>
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Leg 1 (17 April – 8 May 2001)

Mammal

Carrie Hubard	Field Party Chief	NMFS, Pascagoula, MS
Lisa Csuzdi	Fisheries Research Assistant	NMFS, Miami, FL
Greg Fulling	Fishery Biologist	JCWS ¹ , Pascagoula, MS
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Wayne Hoggard	Fishery Biologist	NMFS, Pascagoula, MS
Kathy Hough	Fishery Biologist	NMFS, La Jolla, CA
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Lanora Lang	Fishery Biologist	JCWS, Pascagoula, MS

Leg 2 (10 – 31 May 2001)

Mammal

Carrie Hubard	Field Party Chief	NMFS, Pascagoula, MS
Carolyn Burks	Fishery Biologist	NMFS, Pascagoula, MS
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Submitted by:

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Approved by:

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Table 1. Effort, Beaufort sea state, and number of sightings for each day of NOAA Ship Gordon Gunter Cruise GU-01-02, April-May 2001.

Leg Date	Effort Hours	Transect Kilometers	Average Sea State	Number of Sightings
<u>Leg 1</u>				
17 April	Departed Pascagoula, MS			
18 April	1.5	29	4.0	2
19 April	8.5	153	4.7	2
20 April	0.0	0	>5.0	0
21 April	0.0	0	>5.0	2
22 April	2.3	40	5.3	0
23 April	7.2	139	3.7	6
24 April	3.2	53	4.0	3
25 April	3.4	63	5.0	1
26 April	1.5	28	4.9	1
27 April	0.3	5	5.0	2
28 April	1.0	18	4.0	0
29 April	0.0	0	>5.0	0
30 April	5.7	108	4.4	2
01 May	4.1	79	3.7	5
02 May	6.7	128	4.1	1
03 May	4.0	72	4.2	1
04 May	6.3	119	4.2	2
05 May	2.2	38	5.0	1
06 May	6.9	129	4.6	1
07 May	10.2	189	4.6	4
08 May	Arrived Pascagoula, MS			
Total	75.0	1390	-	36
<u>Leg 2</u>				
10 May	Departed Pascagoula, MS			
11 May	7.8	138	3.4	4
12 May	7.4	138	3.4	5
13 May	8.0	152	3.3	4
14 May	7.9	141	4.4	6
15 May	8.8	161	2.7	2
16 May	6.5	123	1.2	14
17 May	6.6	125	1.4	24
18 May	7.5	144	3.2	8
19 May	7.4	139	3.1	11
20 May	9.0	169	4.0	2
21 May	8.1	137	5.0	2

continued

Table 1. continued.

Leg Date	Effort hours	Transect kilometers	Average Sea State	Number of Sightings
22 May	6.0	104	4.0	3
23 May	8.1	137	5.0	11
24 May	7.0	132	3.5	7
25 May	7.6	145	2.2	13
26 May	9.1	171	4.1	1
27 May	3.0	57	3.9	3
28 May	1.5	29	4.4	3
29 May	11.5	219	3.1	5
30 May	7.7	143	3.1	11
31 May	Arrived Pascagoula, MS			
Total	146.5	2704	-	139
TOTAL	221.5	4094	-	175

Table 2. Number of cetacean group sightings for each leg of NOAA Ship *Gordon Gunter* Cruise GU-01-02 conducted in the U.S. Gulf of Mexico, April-May 2001.

Species	Leg 1	Leg 2	Total
Sei/Bryde's whale (<i>B. borealis/edeni</i>)	0	1	1
Sperm whale (<i>Physeter macrocephalus</i>)	3	24	27
Dwarf/pygmy sperm whale (<i>Kogia</i> spp.)	0	20	20
Cuvier's beaked whale (<i>Ziphius cavirostris</i>)	0	4	4
Unidentified mesoplodon (<i>Mesoplodon</i> spp.)	0	1	1
Striped dolphin (<i>Stenella coeruleoalba</i>)	1	4	5
Spinner dolphin (<i>Stenella longirostris</i>)	0	1	1
Clymene dolphin (<i>Stenella clymene</i>)	0	1	1
Pantropical spotted dolphin (<i>Stenella attenuata</i>)	12	31	43
Atlantic spotted dolphin (<i>Stenella frontalis</i>)	3	3	6
Unidentified <i>Stenella</i> (<i>Stenella</i> spp.)	1	4	5
Bottlenose dolphin (<i>Tursiops truncatus</i>)	4	9	13
Rough-toothed dolphin (<i>Steno bredanensis</i>)	3	1	4

continued

Table 2. continued.

Species	Leg 1	Leg 2	Total
Risso's dolphin (<i>Grampus griseus</i>)	4	10	14
False killer whale (<i>Pseudorca crassidens</i>)	1	0	1
Killer whale (<i>Orcinus orca</i>)	1	0	1
Pilot whale (<i>Globicephala</i> spp.)	0	4	4
Pygmy killer whale (<i>Feresa attenuata</i>)	0	1	1
Melon-headed whale (<i>Peponocephala electra</i>)	1	2	3
Unidentified dolphin	3	17	20
Unidentified large whale	0	2	2
Unidentified ziphiid	0	1	1
Unidentified odontocete	3	0	3
TOTAL	40	141	181

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 GU-01-02, April-May 2001 (SE = standard error).

Species	n	Group Size (animals)			Water Depth (meters)			Sea Surface Temperature (°C)	
		Mean	(SE)	Range	Mean	(SE)	Range	Mean (SE)	Range
<i>B. borealis/edeni</i>	1	1.0			149			25.1	
<i>Physeter macrocephalus</i>	27	2.5	(0.40)	1 – 11	930	(100)	345 – 1892	26.5 (0.23)	24.3 – 29.7
<i>Kogia</i> spp.	20	1.7	(0.20)	1 – 4	1345	(109)	449 – 1652	27.2 (0.11)	26.0 – 28.4
<i>Ziphius cavirostris</i>	4	1.0	(0.00)	1 – 1	1345	(197)	824 – 1760	26.1 (0.64)	25.2 – 27.9
<i>Mesoplodon</i> spp.	1	2.0			1150			26.6	
<i>Stenella coeruleoalba</i>	5	35.0	(9.19)	12 – 65	1010	(242)	243 – 1752	26.1 (0.90)	22.7 – 27.7
<i>Stenella longirostris</i>	1	8.0			756			26.2	
<i>Stenella clymene</i>	1	42.0			1175			26.7	
<i>Stenella attenuata</i>	43	59.6	(8.40)	1 – 200	1117	(84)	192 – 1882	26.0 (0.16)	23.6 – 28.0
<i>Stenella frontalis</i>	6	32.3	(7.42)	8 – 58	88	(4)	69 – 101	24.5 (0.71)	22.4 – 26.3
<i>Stenella</i> spp.	5	13.8	(6.94)	1 – 40	1027	(185)	388 – 1464	26.1 (0.42)	25.2 – 27.6
<i>Tursiops truncatus</i>	13	39.9	(16.67)	2 – 220	151	(25)	62 – 396	25.4 (0.42)	22.4 – 27.8
<i>Steno bredanensis</i>	4	18.8	(3.50)	12 – 28	546	(327)	70 – 1464	24.1 (0.62)	22.4 – 25.4
<i>Grampus griseus</i>	14	9.9	(1.94)	2 – 23	878	(164)	166 – 1770	25.7 (0.42)	23.2 – 28.2
<i>Pseudorca crassidens</i>	1	70.0			171			25.1	
<i>Orcinus orca</i>	1	2.0			889			27.5	
<i>Globicephala</i> spp.	4	21.5	(5.55)	8 – 35	389	(31)	338 – 475	26.7 (0.43)	25.9 – 27.8
<i>Feresa attenuata</i>	1	2.0			1892			24.4	
<i>Peponocephala electra</i>	3	103.3	(24.03)	70 – 150	811	(249)	560 – 1310	25.7 (0.79)	24.2 – 26.9
Unidentified dolphin	20	6.4	(1.27)	1 – 20	776	(110)	167 – 1760	25.9 (0.34)	22.7 – 28.3
Unidentified large whale	2	2.0	(0.00)	0 – 0	1362	(163)	1200 – 1525	26.2 (0.05)	26.1 – 26.2
Unidentified ziphiid	1	1.0			1760			25.7	
Unidentified odontocete	3	1.7	(0.33)	1 – 2	479	(121)	275 – 694	24.9 (0.38)	24.3 – 25.6

Table 4. Summary of cetacean sightings during NOAA Ship Gordon Gunter Cruise GU-01-02 in the U.S. Gulf of Mexico April-May 2001 (S = effort status, SST = sea surface temperature).

Date	Species	Group	Position	SST (°C)	Depth (m)	S
Leg 1						
2001 Apr 18	<i>Stenella frontalis</i>	38	28°49' 85°38'	22.4	165	on
	<i>Tursiops truncatus</i>	11				
2001 Apr 18	<i>Stenella frontalis</i>	58	28°46' 85°31'	22.4	154	on
	<i>Steno bredanensis</i>	12				
2001 Apr 19	Unidentified dolphin	2	27°12' 85°00'	22.7	575	on
2001 Apr 19	<i>Stenella attenuata</i>	68	27°05' 85°00'	23.6	686	on
2001 Apr 21	<i>Stenella attenuata</i>	60	24°42' 84°29'	24.2	3402	off
2001 Apr 21	<i>Stenella attenuata</i>	6	25°00' 84°56'	25.7	3386	off
2001 Apr 23	Unidentified odontocete	2	28°13' 86°00'	24.9	503	on
2001 Apr 23	Unidentified dolphin	12	28°28' 86°00'	22.9	329	on
2001 Apr 23	<i>Grampus griseus</i>	3	28°34' 86°03'	23.2	318	on
2001 Apr 23	<i>Tursiops truncatus</i>	87	28°38' 86°06'	23.4	335	on
2001 Apr 23	<i>Grampus griseus</i>	5	28°56' 86°27'	23.5	366	on
2001 Apr 23	<i>Stenella coeruleoalba</i>	65	29°00' 86°40'	22.7	445	on
2001 Apr 24	<i>Stenella attenuata</i>	20	27°58' 86°59'	25.4	2862	off
2001 Apr 24	<i>Stenella attenuata</i>	5	27°42' 86°59'	26.0	3005	on
2001 Apr 24	<i>Stenella attenuata</i>	16	27°31' 86°59'	26.2	3032	on
2001 Apr 25	<i>Stenella attenuata</i>	75	27°36' 87°59'	24.3	2562	off
2001 Apr 26	<i>Stenella attenuata</i>	40	28°34' 88°55'	24.3	750	on
2001 Apr 27	Unidentified dolphin	10	27°14' 88°59'	25.7	2150	on
2001 Apr 27	<i>Stenella attenuata</i>	5	27°02' 88°59'	25.7	2269	off
2001 Apr 30	<i>Physeter macrocephalus</i>	3	27°14' 92°00'	24.6	1254	on
2001 Apr 30	<i>Tursiops truncatus</i>	2	27°53' 92°00'	25.3	150	off
2001 May 01	<i>Physeter macrocephalus</i>	3	27°28' 93°00'	24.3	732	on
2001 May 01	<i>Stenella attenuata</i>	30	26°40' 93°00'	25.4	1627	on
2001 May 01	<i>Orcinus orca</i>	2	26°38' 93°00'	27.5	1627	on
2001 May 01	<i>Stenella attenuata</i>	25	26°38' 92°59'	25.5	1627	off
2001 May 01	<i>Steno bredanensis</i>	15	26°29' 92°59'	25.4	2679	on
	<i>Stenella</i> sp.	15				
2001 May-02	<i>Tursiops truncatus</i>	55	27°40' 94°00'	24.9	234	on
2001 May 03	<i>Grampus griseus</i>	10	27°47' 95°00'	24.5	368	on
2001 May 04	<i>Pseudorca crassidens</i>	70	27°24' 95°59'	25.1	313	on
2001 May 04	<i>Stenella frontalis</i>	15	27°30' 96°00'	24.9	161	off
2001 May 05	Unidentified odontocete	1	27°17' 95°25'	25.6	856	on
2001 May 06	<i>Physeter macrocephalus</i>	2	27°26' 92°23'	25.0	915	on
2001 May 07	<i>Stenella attenuata</i>	1	28°16' 89°33'	.	884	off
2001 May 07	Unidentified odontocete	2	28°19' 88°55'	24.3	1270	on
2001 May 07	<i>Grampus griseus</i>	15	28°36' 89°00'	24.3	540	on

continued

Table 4. continued.

Date	Species	Group	Position	SST (°C)	Depth (m)	S
2001 May 07	<i>Peponocephala electra</i>	70	28°43' 88°46'	24.2	1032	on
	<i>Steno bredanensis</i>	20				
Leg 2						
2001 May 11	<i>B. borealis/edeni</i>	1	28°50' 86°00'	25.1	273	on
2001 May 11	<i>Grampus griseus</i>	4	28°40' 86°03'	24.8	304	on
2001 May 11	<i>Tursiops truncatus</i>	10	28°36' 86°05'	24.2	324	off
2001 May 11	Unidentified dolphin	6	28°31' 85°56'	24.6	306	on
2001 May 12	Unidentified dolphin	15	27°43' 84°59'	23.7	426	on
2001 May 12	<i>Stenella attenuata</i>	135	26°57' 85°00'	24.1	886	on
2001 May 12	<i>Grampus griseus</i>	5	26°48' 84°59'	24.6	1440	on
2001 May 12	<i>Ziphius cavirostris</i>	1	26°37' 84°59'	25.2	2718	on
2001 May 12	<i>Stenella</i> sp.	5	26°34' 84°59'	25.2	1620	on
2001 May 13	<i>Steno bredanensis</i>	28	25°37' 83°59'	24.4	128	on
	<i>Tursiops truncatus</i>	2				
2001 May 13	<i>Stenella frontalis</i>	8	25°28' 83°58'	24.5	126	on
2001 May 13	<i>Tursiops truncatus</i>	220	24°47' 83°59'	25.4	318	on
2001 May 13	<i>Grampus griseus</i>	8	24°42' 83°59'	25.2	1039	on
2001 May 14	<i>Physeter macrocephalus</i>	3	24°20' 84°18'	26.5	3462	on
2001 May 14	<i>Feresa attenuata</i>	2	24°22' 84°19'	24.4	3462	off
2001 May 14	<i>Physeter macrocephalus</i>	1	24°23' 84°23'	24.6	3462	on
2001 May 14	<i>Stenella attenuata</i>	115	24°24' 84°24'	24.6	3444	on
2001 May 14	<i>Stenella attenuata</i>	9	24°44' 84°29'	25.2	3386	on
2001 May 14	<i>Physeter macrocephalus</i>	2	24°56' 84°29'	25.2	2050	on
2001 May 15	<i>Stenella attenuata</i>	15	25°13' 85°59'	27.7	3267	on
2001 May 15	<i>Stenella coeruleoalba</i>	38	25°30' 86°08'	27.4	3206	on
2001 May 16	Unidentified dolphin	1	26°41' 85°59'	24.9	3221	on
2001 May 16	<i>Stenella attenuata</i>	20	26°57' 86°00'	24.9	3203	on
2001 May 16	<i>Ziphius cavirostris</i>	1	27°04' 85°59'	25.2	3221	on
2001 May 16	Unidentified ziphiidae	1	27°09' 86°00'	25.7	3221	on
2001 May 16	<i>Stenella attenuata</i>	38	27°14' 86°00'	25.8	3239	on
2001 May 16	<i>Grampus griseus</i>	20	27°23' 86°00'	28.2	3239	on
2001 May 16	<i>Stenella attenuata</i>	33	27°27' 85°58'	27.8	3230	on
2001 May 16	<i>Stenella attenuata</i>	200	27°46' 86°00'	26.3	2745	on
2001 May 16	Unidentified dolphin	20	27°53' 85°59'	26.1	2745	on
2001 May 16	<i>Stenella attenuata</i>	110	27°57' 85°59'	26.1	915	on
2001 May 16	<i>Stenella attenuata</i>	160	28°01' 86°00'	26.2	1409	on
2001 May 16	<i>Kogia</i> sp.	3	28°01' 86°05'	26.0	968	on
2001 May 16	<i>Stenella attenuata</i>	7	28°02' 86°05'	25.7	904	on
2001 May 16	Unidentified dolphin	10	28°02' 86°05'	25.7	904	off

continued

Table 4. continued.

Date	Species	Group	Position	SST (°C)	Depth (m)	S
2001 May 17	<i>Stenella attenuata</i>	68	28°52' 86°59'	25.6	673	on
2001 May 17	<i>Stenella</i> sp.	8	28°46' 86°59'	26.1	710	on
2001 May 17	<i>Stenella attenuata</i>	200	28°35' 86°58'	26.0	864	on
2001 May 17	<i>Kogia</i> sp.	1	28°22' 86°59'	28.4	1003	on
2001 May 17	<i>Kogia</i> sp.	2	28°21' 86°59'	26.4	1003	on
2001 May 17	<i>Kogia</i> sp.	1	28°20' 86°59'	26.6	1003	on
2001 May 17	<i>Kogia</i> sp.	1	28°14' 8°659'	26.9	2745	on
2001 May 17	<i>Kogia</i> sp.	2	28°13' 8°659'	26.9	2745	on
2001 May 17	<i>Stenella attenuata</i>	140	28°13' 86°59'	27.1	2818	on
2001 May 17	<i>Kogia</i> sp.	1	28°07' 87°02'	27.3	2818	on
2001 May 17	<i>Kogia</i> sp.	1	27°55' 86°57'	27.3	2944	on
2001 May 17	<i>Grampus griseus</i>	23	27°47' 86°58'	27.4	3005	on
2001 May 17	<i>Kogia</i> sp.	2	27°42' 86°57'	27.3	3005	on
2001 May 17	<i>Kogia</i> sp.	1	27°42' 86°57'	27.3	3005	on
2001 May 17	<i>Kogia</i> sp.	3	27°41' 86°57'	27.3	3005	on
2001 May 17	<i>Kogia</i> sp.	1	27°40' 86°57'	27.4	3005	on
2001 May 17	<i>Kogia</i> sp.	4	27°39' 86°58'	27.4	3005	on
2001 May 17	<i>Kogia</i> sp.	1	27°38' 86°58'	27.4	3023	on
2001 May 17	<i>Kogia</i> sp.	1	27°37' 86°58'	27.4	3023	on
2001 May 17	<i>Kogia</i> sp.	1	27°36' 86°58'	27.4	3023	on
2001 May 17	<i>Kogia</i> sp.	1	27°34' 86°59'	27.4	3023	on
2001 May 17	<i>Kogia</i> sp.	2	27°33' 86°59'	27.4	3023	on
2001 May 17	<i>Kogia</i> sp.	2	27°31' 86°59'	27.3	3023	on
2001 May 17	<i>Grampus griseus</i>	5	27°27' 87°00'	26.9	3047	on
2001 May 18	<i>Stenella attenuata</i>	70	26°05' 87°20'	26.0	3138	on
2001 May 18	<i>Physeter macrocephalus</i>	3	26°03' 87°25'	25.9	3148	on
2001 May 18	<i>Stenella attenuata</i>	45	25°59' 87°41'	26.0	3111	on
2001 May 18	<i>Physeter macrocephalus</i>	1	26°00' 87°59'	26.0	2935	on
2001 May 18	<i>Physeter macrocephalus</i>	2	26°00' 87°59'	26.2	3010	on
2001 May 18	<i>Physeter macrocephalus</i>	1	26°02' 87°59'	26.2	3010	on
2001 May 18	<i>Stenella attenuata</i>	18	26°13' 87°59'	26.1	2912	on
2001 May 18	Unidentified large whale	2	26°22' 87°59'	26.1	2791	on
2001 May 19	Unidentified dolphin	5	28°04' 87°59'	26.5	2562	on
2001 May 19	<i>Physeter macrocephalus</i>	4	28°11' 87°59'	26.4	2333	on
2001 May 19	<i>Physeter macrocephalus</i>	2	28°16' 87°59'	26.1	2324	off
2001 May 19	<i>Stenella attenuata</i>	65	28°12' 87°59'	26.6	2288	on
2001 May 19	<i>Stenella</i> sp.	40	28°28' 87°59'	26.1	2306	on
2001 May 19	<i>Stenella attenuata</i>	150	28°49' 88°00'	26.1	1556	on
2001 May 19	<i>Stenella attenuata</i>	15	28°52' 87°59'	26.0	1482	on
2001 May 19	Unidentified dolphin	5	28°55' 87°59'	26.1	1482	on

continued

Table 4. continued.

Date	Species	Group	Position	SST (°C)	Depth (m)	S
2001 May 19	<i>Stenella longirostris</i>	8	28°59' 88°00'	26.2	1383	on
2001 May 19	<i>Tursiops truncatus</i>	16	29°13' 88°00'	26.3	225	on
2001 May 19	<i>Tursiops truncatus</i>	8	29°18' 88°00'	26.3	113	on
2001 May 20	<i>Peponocephala electra</i>	90	28°00' 88°59'	26.0	2397	on
2001 May 20	<i>Ziphius cavirostris</i>	1	27°59' 89°00'	26.0	2397	off
2001 May 21	<i>Grampus griseus</i>	4	26°44' 89°59'	26.4	2663	on
2001 May 21	<i>Stenella attenuata</i>	150	27°02' 89°58'	26.4	2288	on
2001 May 22	Unidentified dolphin	3	27°59' 90°29'	26.3	373	off
2001 May 22	<i>Stenella frontalis</i>	35	27°59' 90°46'	26.2	185	on
2001 May 22	<i>Stenella frontalis</i>	40	28°00' 90°52'	26.3	170	on
	<i>Tursiops truncatus</i>	60				
2001 May 23	<i>Stenella attenuata</i>	6	26°01' 91°11'	26.2	2659	on
2001 May 23	Unidentified large whale	2	26°00' 91°18'	26.2	2196	on
2001 May 23	<i>Physeter macrocephalus</i>	3	26°00' 91°20'	26.3	2196	on
2001 May 23	Unidentified dolphin	15	26°00' 91°20'	26.3	2196	off
2001 May 23	<i>Stenella coeruleoalba</i>	40	26°01' 91°33'	27.7	2105	on
2001 May 23	Mesoplodon sp.	2	26°01' 91°43'	26.6	2105	on
2001 May 23	<i>Stenella clymene</i>	42	26°00' 91°56'	26.7	2150	off
2001 May 23	<i>Stenella attenuata</i>	70	26°05' 91°58'	26.7	2141	on
2001 May 23	<i>Physeter macrocephalus</i>	5	26°13' 91°59'	26.6	2105	on
2001 May 23	<i>Stenella coeruleoalba</i>	20	26°28' 92°00'	26.3	1879	on
2001 May 23	Unidentified dolphin	1	26°35' 91°59'	26.3	1739	on
2001 May 24	<i>Globicephala</i> sp.	23	27°29' 92°50'	25.9	869	on
2001 May 24	<i>Globicephala</i> sp.	8	27°30' 92°57'	26.1	619	on
2001 May 24	<i>Physeter macrocephalus</i>	1	27°24' 93°00'	26.1	860	on
2001 May 24	<i>Stenella coeruleoalba</i>	12	26°51' 93°01'	26.6	1610	on
2001 May 24	Unidentified dolphin	8	26°52' 93°01'	26.6	1610	on
2001 May 24	<i>Stenella attenuata</i>	12	26°32' 93°00'	26.7	1647	on
2001 May 24	<i>Grampus griseus</i>	15	26°27' 93°01'	26.6	1885	on
2001 May 25	<i>Grampus griseus</i>	2	26°15' 94°00'	26.6	2288	on
2001 May 25	Unidentified dolphin	1	26°24' 93°59'	26.4	1565	off
2001 May 25	<i>Stenella attenuata</i>	17	26°27' 93°59'	26.7	1565	on
2001 May 25	<i>Stenella attenuata</i>	22	26°32' 93°59'	26.8	1008	on
2001 May 25	<i>Physeter macrocephalus</i>	3	27°10' 93°59'	27.5	922	on
2001 May 25	<i>Physeter macrocephalus</i>	1	27°19' 93°59'	27.6	880	on
2001 May 25	<i>Physeter macrocephalus</i>	1	27°20' 93°59'	27.6	880	on
2001 May 25	<i>Physeter macrocephalus</i>	2	27°26' 93°59'	27.2	1168	on
2001 May 25	<i>Kogia</i> sp.	2	27°31' 94°00'	27.7	822	on
2001 May 25	<i>Tursiops truncatus</i>	18	27°36' 94°02'	27.8	725	off

continued

Table 4. continued.

Date	Species	Group	Position	SST (°C)	Depth (m)	S
2001 May 25	<i>Globicephala</i> sp.	35	27°32' 94°00'	27.8	725	on
2001 May 25	<i>Physeter macrocephalus</i>	1	27°37' 94°04'	27.8	631	on
2001 May 25	<i>Tursiops truncatus</i>	25	27°41' 94°00'	26.9	264	on
2001 May 26	<i>Stenella attenuata</i>	65	27°40' 95°00'	26.9	714	on
2001 May 27	<i>Physeter macrocephalus</i>	1	26°25' 95°59'	27.4	1010	on
2001 May 27	<i>Physeter macrocephalus</i>	3	26°42' 95°58'	27.5	979	on
2001 May 27	<i>Physeter macrocephalus</i>	2	26°44' 95°58'	27.5	979	on
2001 May 28	<i>Stenella attenuata</i>	45	27°43' 94°12'	26.8	351	on
2001 May 28	<i>Physeter macrocephalus</i>	1	27°39' 94°06'	27.3	688	on
2001 May 28	<i>Tursiops truncatus</i>	5	27°39' 93°44'	26.8	448	off
2001 May 29	<i>Globicephala</i> sp.	20	27°38' 91°45'	26.8	633	on
2001 May 29	<i>Stenella attenuata</i>	63	27°30' 91°39'	26.9	1098	on
2001 May 29	Unidentified dolphin	2	27°51' 91°08'	27.2	318	on
2001 May 29	Unidentified dolphin	2	27°28' 90°28'	27.4	1263	on
2001 May 29	<i>Stenella attenuata</i>	45	27°39' 90°11'	27.4	882	on
2001 May 30	Unidentified dolphin	8	28°21' 89°09'	26.8	769	on
2001 May 30	<i>Peponocephala electra</i>	150	28°18' 89°00'	26.9	1025	on
2001 May 30	<i>Physeter macrocephalus</i>	5	28°14' 88°52'	27.6	1343	on
2001 May 30	<i>Physeter macrocephalus</i>	2	28°12' 88°46'	27.3	1700	on
2001 May 30	<i>Grampus griseus</i>	20	28°01' 88°24'	27.6	2000	on
2001 May 30	<i>Stenella</i> sp.	1	28°04' 88°21'	27.6	2084	on
2001 May 30	<i>Stenella attenuata</i>	105	28°08' 88°20'	28.0	2013	on
2001 May 30	Unidentified dolphin	1	28°10' 88°21'	28.1	2013	on
2001 May 30	Unidentified dolphin	1	28°15' 88°23'	28.3	1839	on
2001 May 30	<i>Ziphius cavirostris</i>	1	28°27' 88°32'	27.9	1508	on
2001 May 30	<i>Physeter macrocephalus</i>	11	28°40' 88°39'	29.7	964	on

Table 5. Number of cetacean biopsies for each leg of NOAA Ship *Gordon Gunter* Cruise GU-01-02 conducted in the U.S. Gulf of Mexico, April-May 2001.

Species	Leg 1	Leg 2	Total
Pantropical spotted dolphin (<i>Stenella attenuata</i>)	0	1	1
Striped dolphin (<i>Stenella coeruleoalba</i>)	3	0	3
Atlantic spotted dolphin (<i>Stenella frontalis</i>)	2	0	2
Bottlenose dolphin (<i>Tursiops truncatus</i>)	4	0	4
Rough-toothed dolphin (<i>Steno bredanensis</i>)	2	0	2
Melon-headed whale (<i>Peponocephala electra</i>)	3	0	3
TOTAL	14	1	15

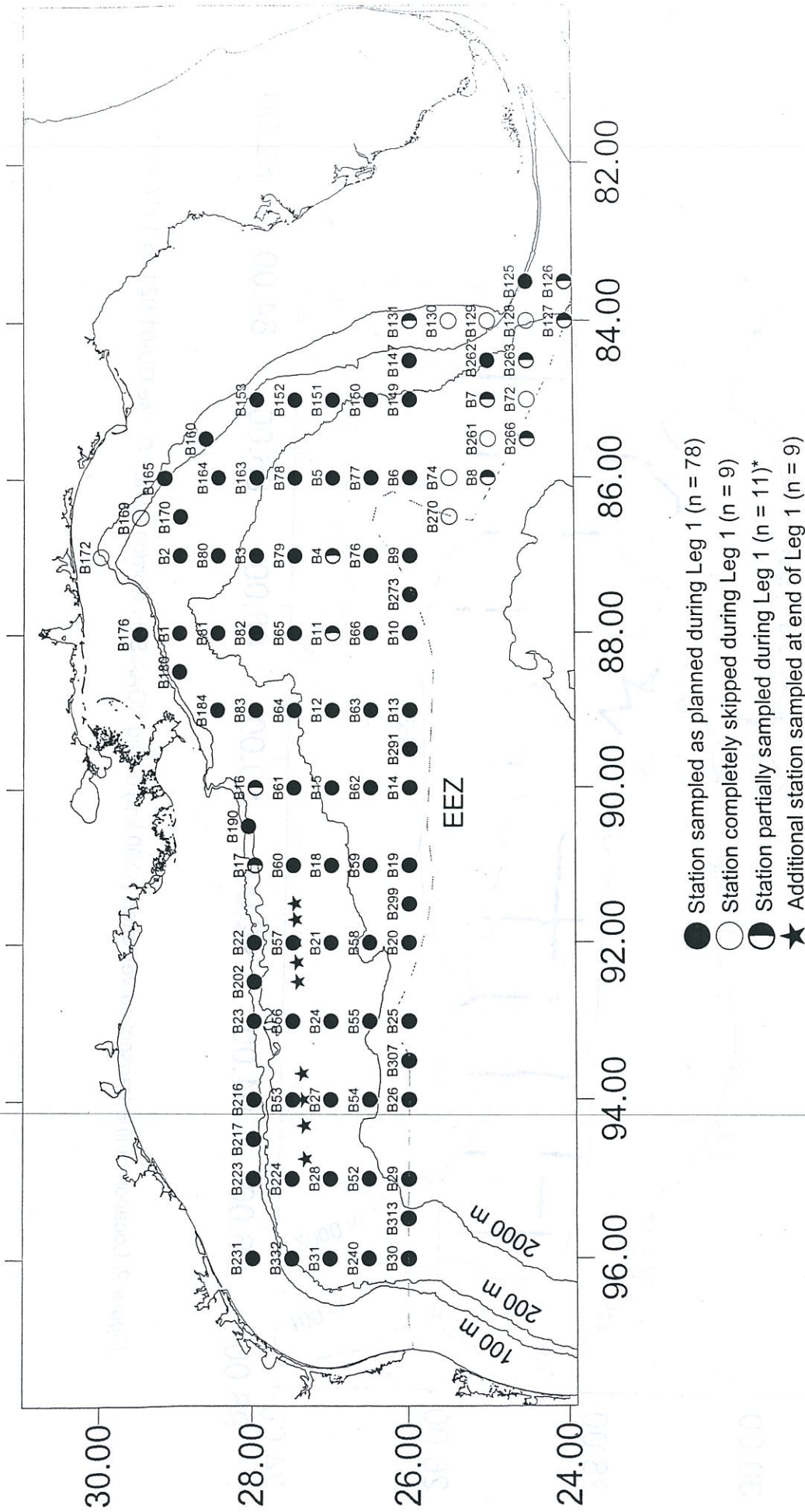


Figure 1. Cruise track with SEAMAP ichthyoplankton stations for NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001). Each station was scheduled to be sampled a total of two times. Symbols indicate whether or not stations were sampled during Leg 1. During Leg 2, all 98 SEAMAP stations were sampled as planned.

* In most cases, partially completed stations consisted of a CTD cast and a bongo tow; neuston tows were cancelled due to high winds and seas.

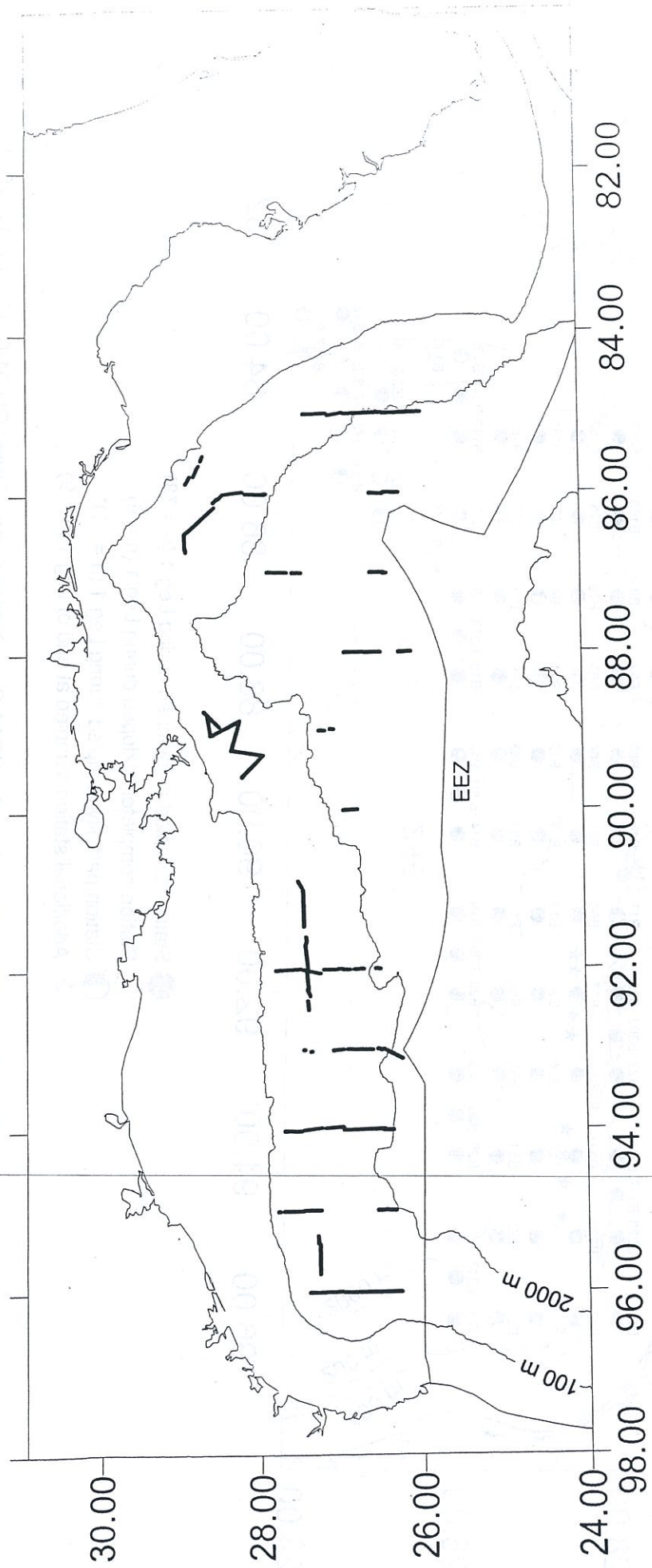


Figure 2. Location of line transect survey effort (1390 km) during NOAA Ship Gordon Gunter Cruise GU-01-02 Leg 1 (17 April - 8 May 2001).

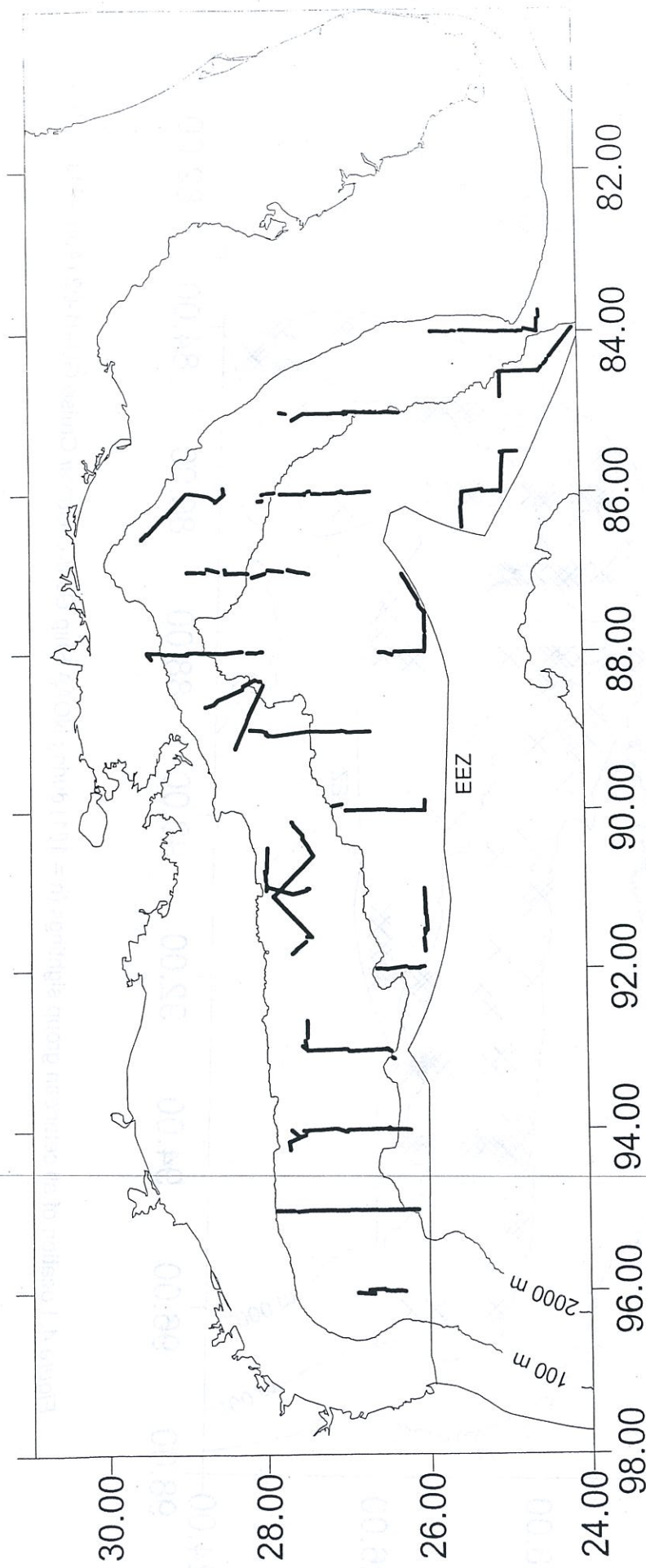


Figure 3. Location of line transect survey effort (2704 km) during NOAA Ship Gordon Gunter Cruise Gu-01-02 Leg 2 (10 - 31 May 2001).

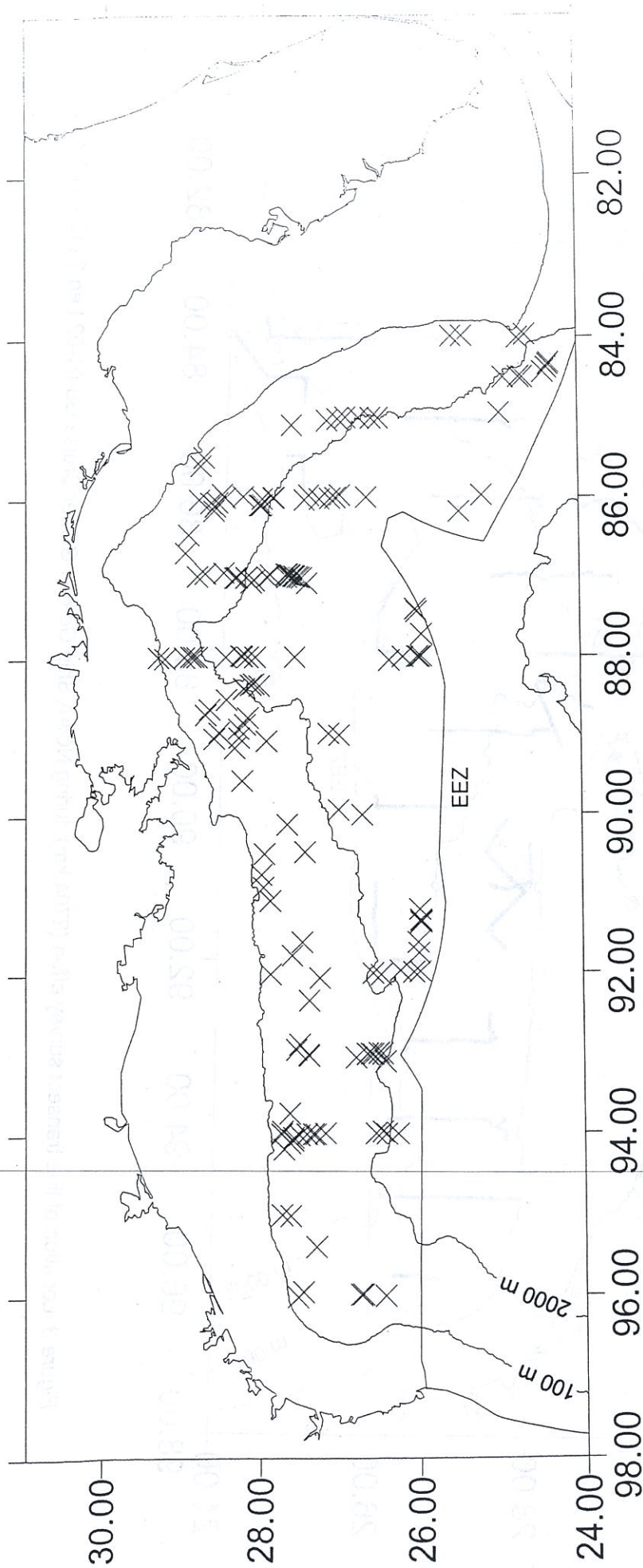


Figure 4. Location of all cetacean group sightings (n = 181) during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

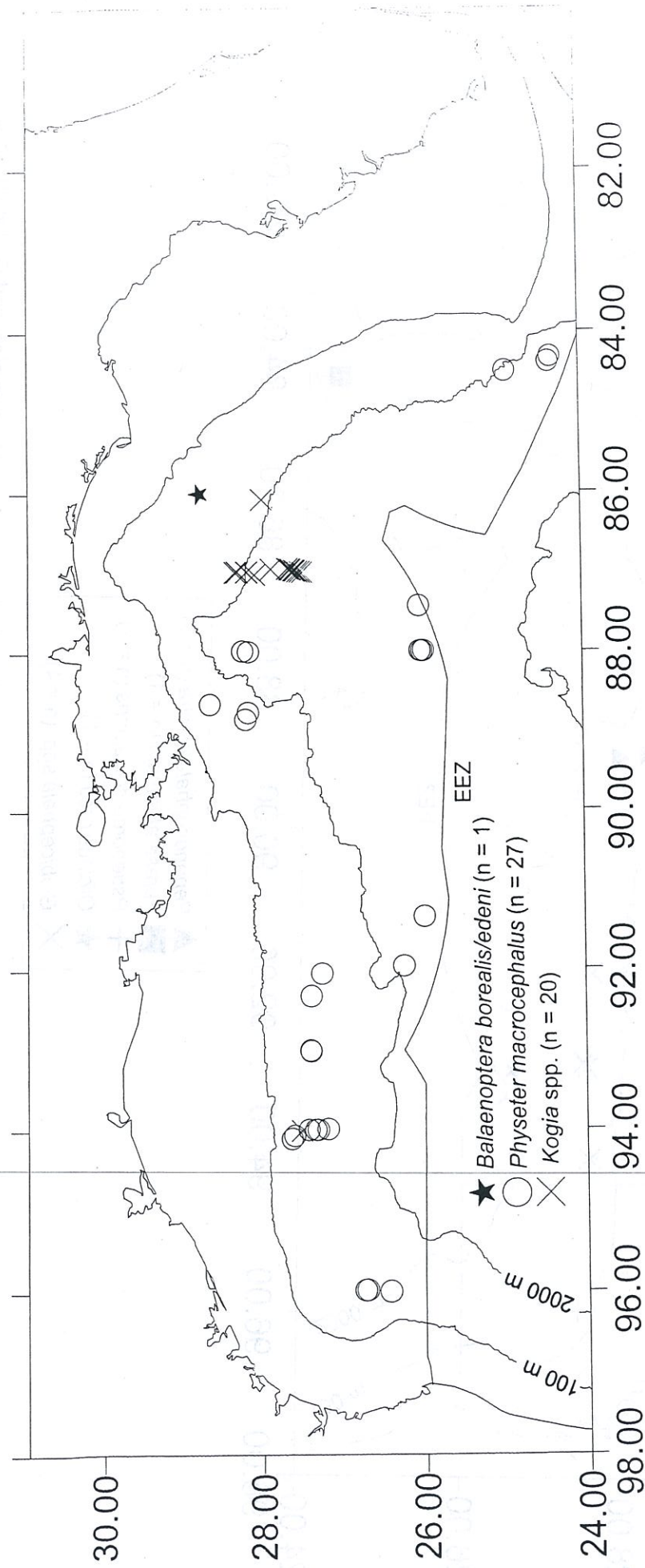


Figure 5. Locations of sightings of *Balaenoptera borealis/edeni*, *Physeter macrocephalus*, and *Kogia* spp., during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

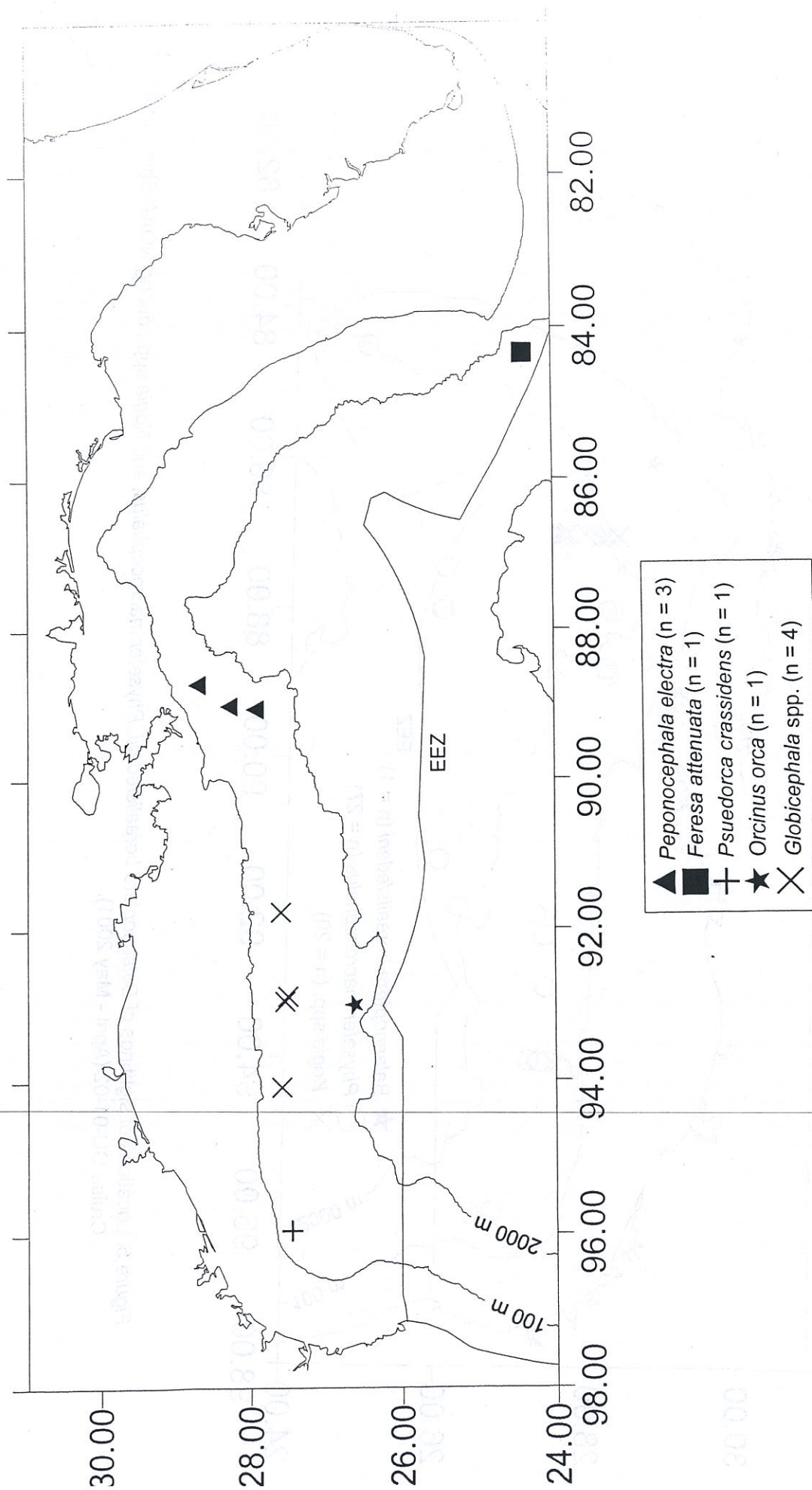


Figure 6. Locations of sightings of *Peponocephala electra*, *Feresa attenuata*, *Pseudorca crassidens*, *Orcinus orca*, and *Globicephala* spp., during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

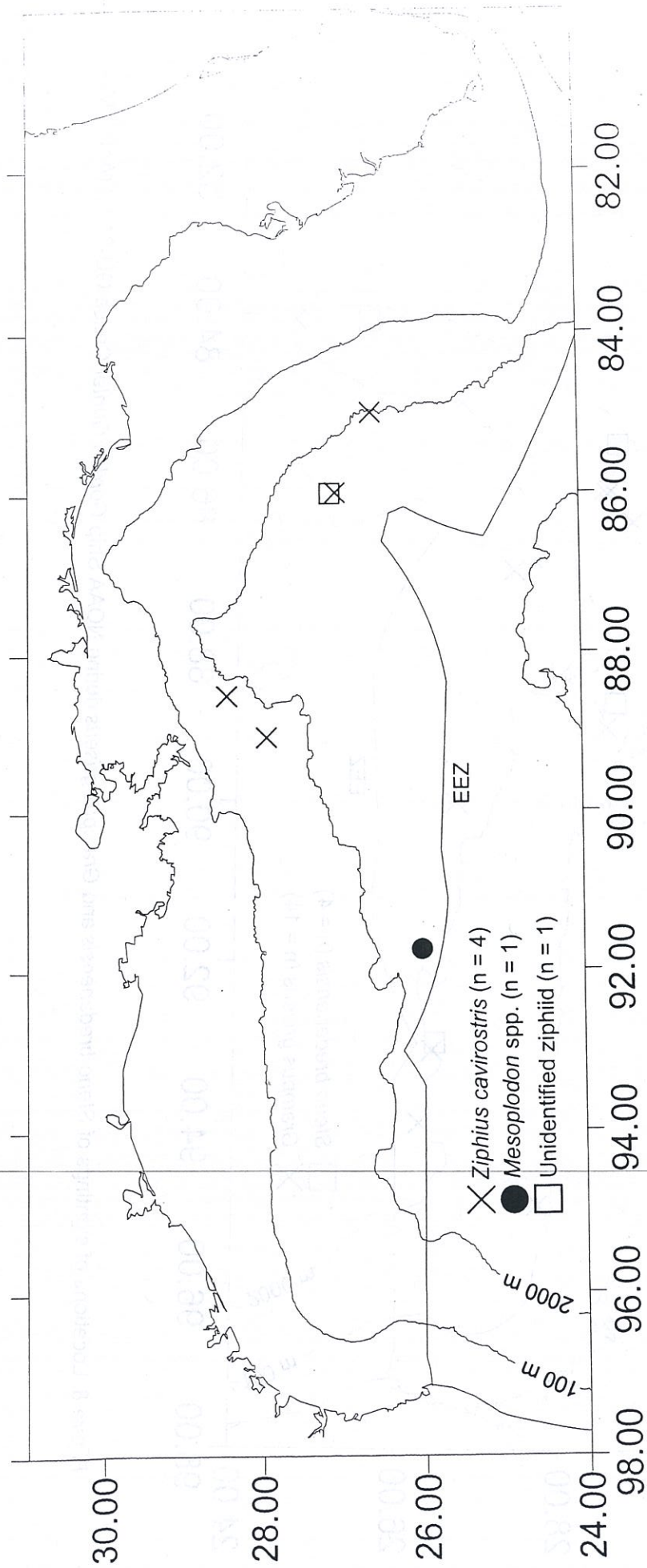


Figure 7. Locations of sightings of *Ziphius cavirostris*, *Mesoplodon* spp. and unidentified ziphiidae during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

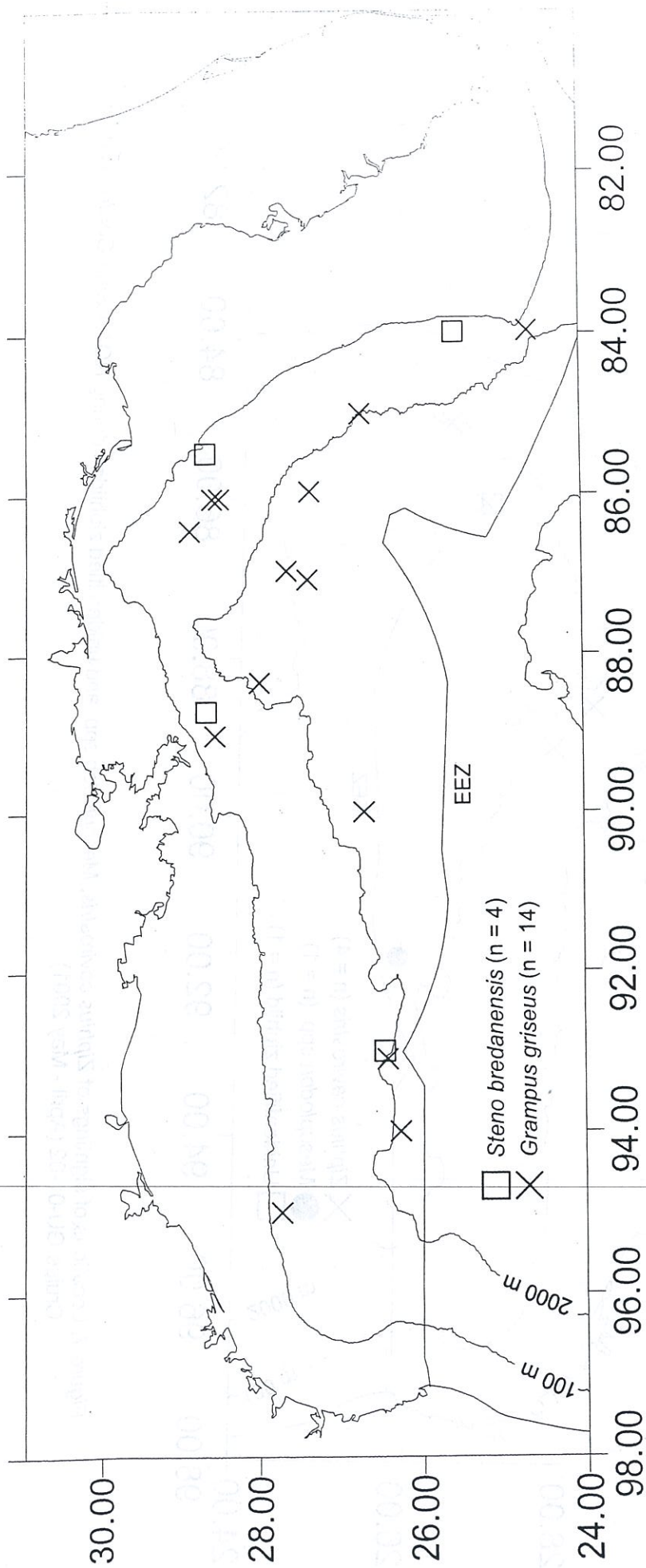


Figure 8. Locations of sightings of *Steno bredanensis* and *Grampus griseus* during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

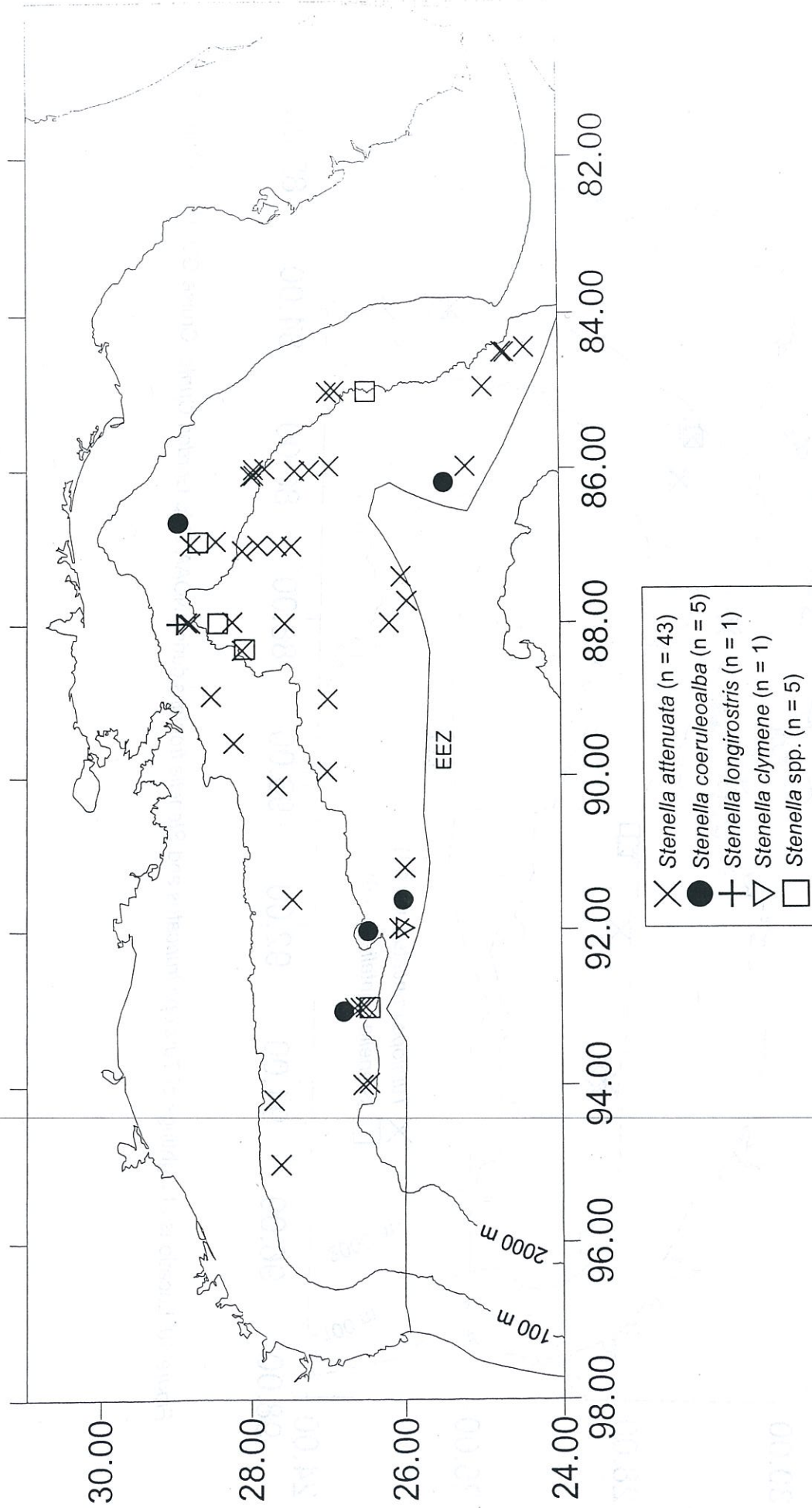


Figure 9. Locations of sightings of *Stenella attenuata*, *Stenella coeruleoalba*, *Stenella longirostris*, *Stenella clymene*, and *Stenella* spp. during Gordon Gunter Cruise GU-01-02 (April - May 2001).

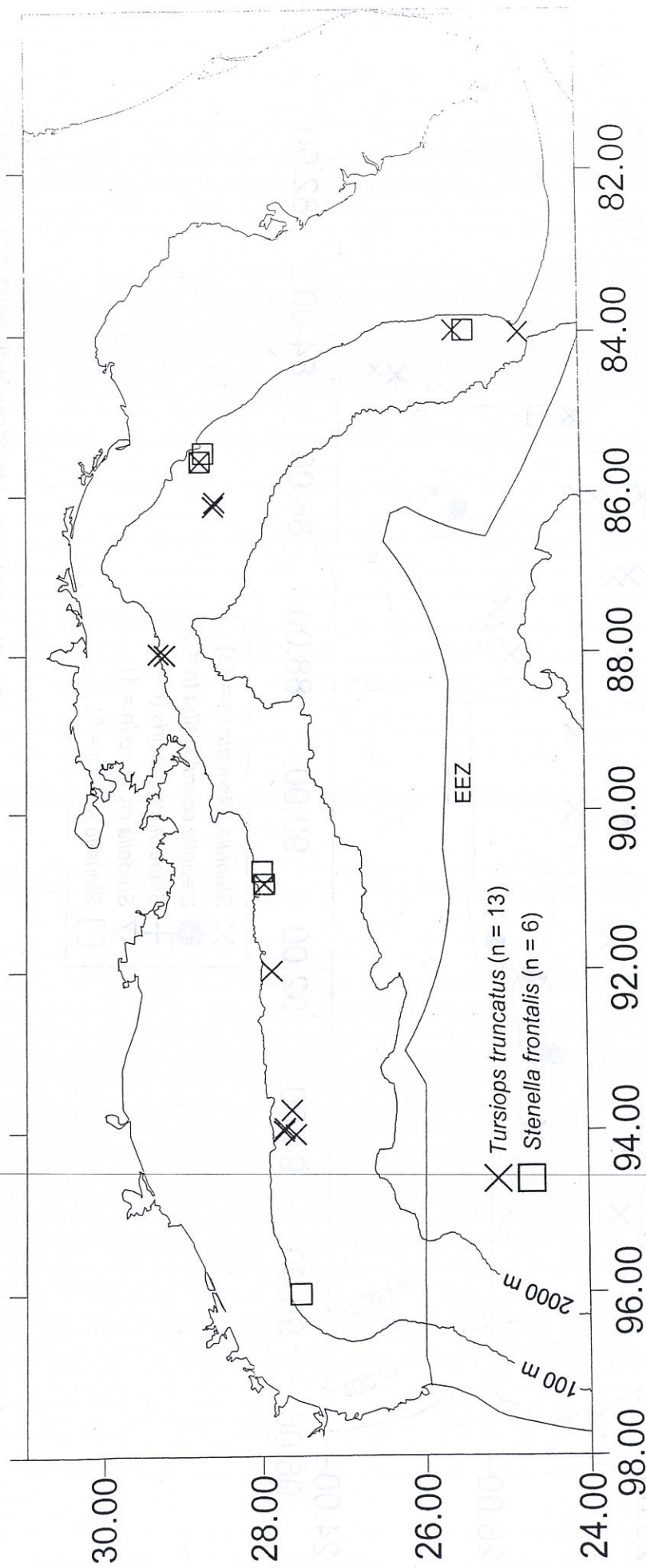


Figure 10. Locations of sightings of *Tursiops truncatus* and *Stenella frontalis* during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

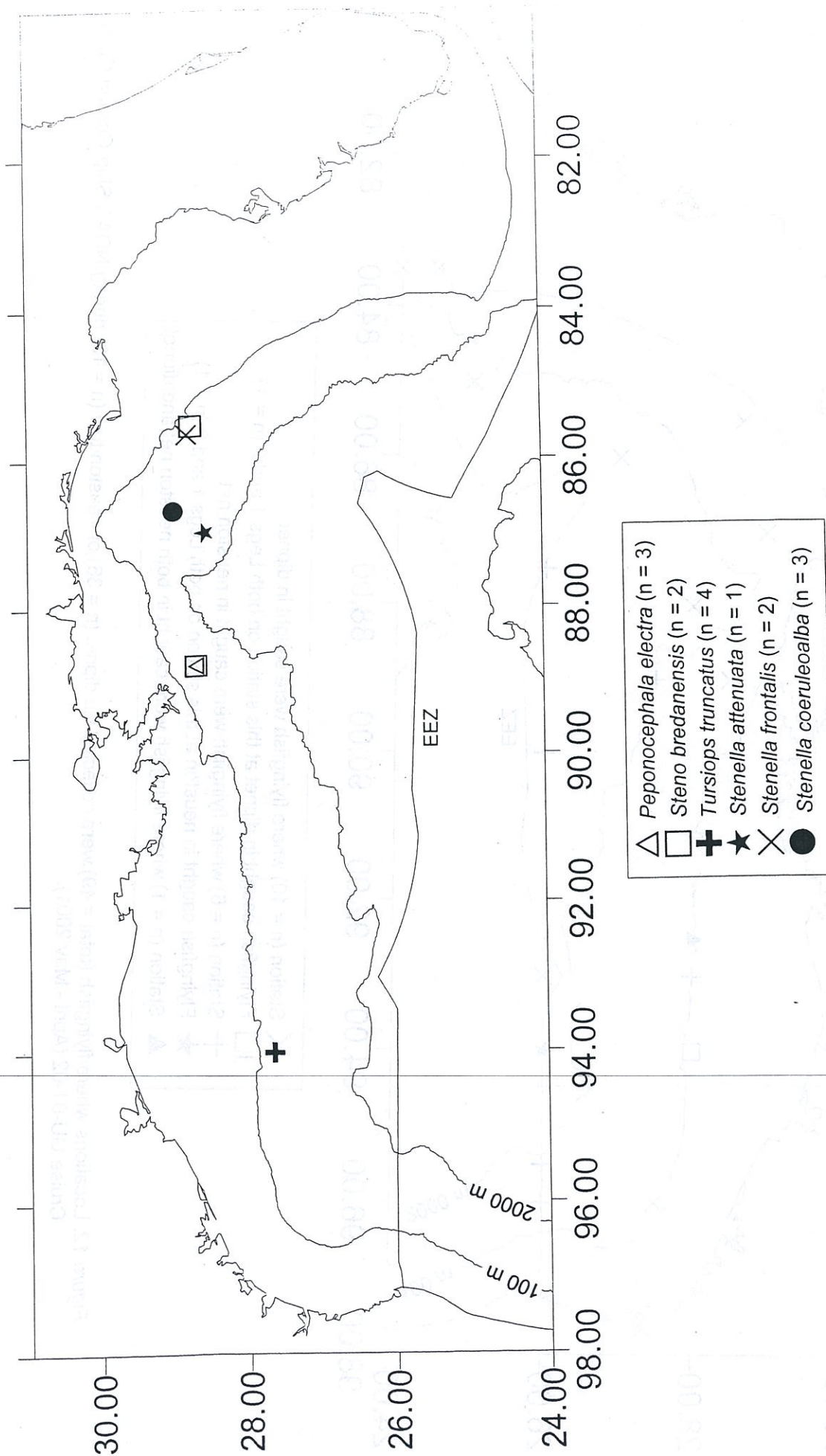


Figure 11. Location of biopsy samples obtained (n = 15) during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

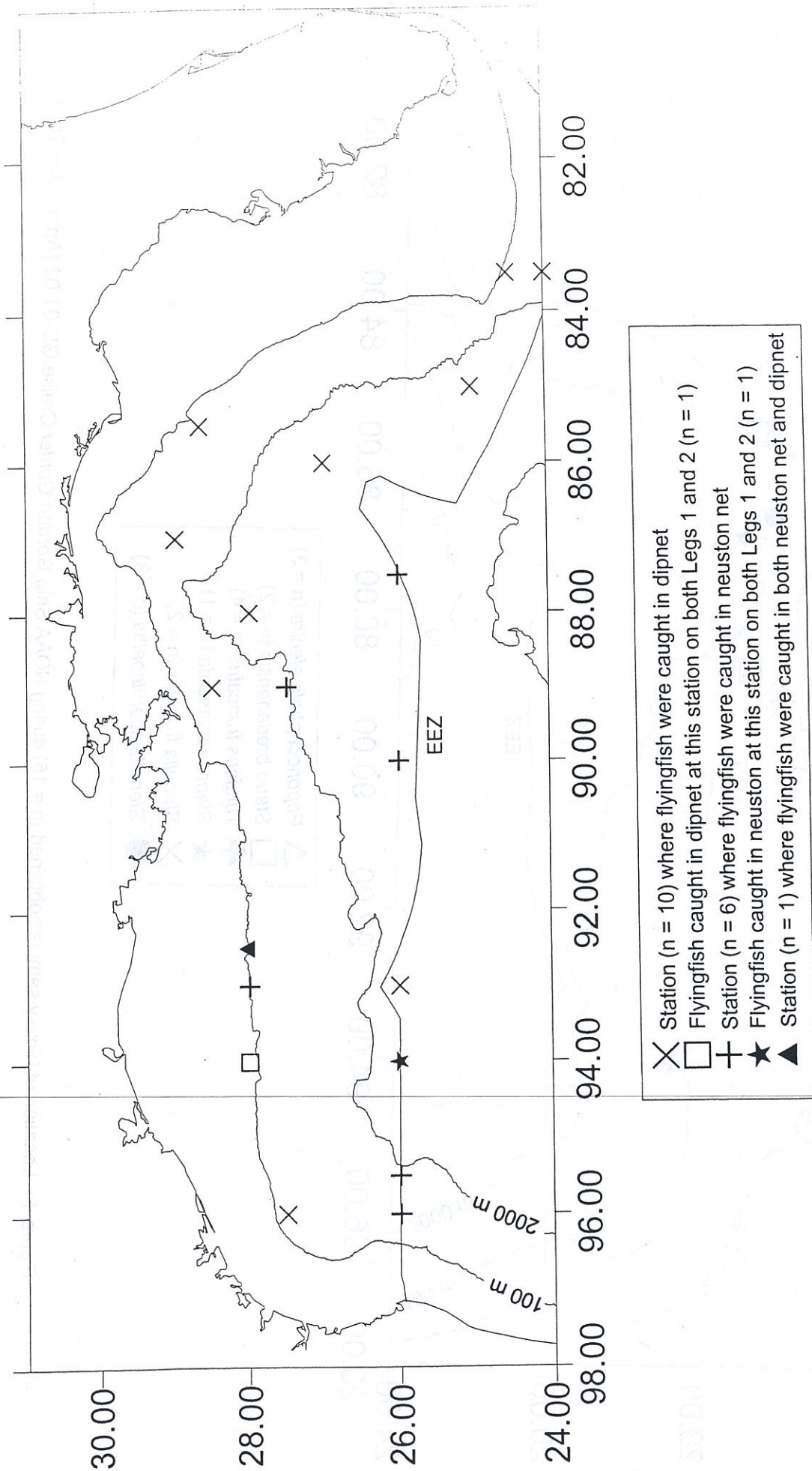


Figure 12. Locations where flyingfish (total = 49) were collected via dipnet (n = 36) or neuston tow (n = 13) during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

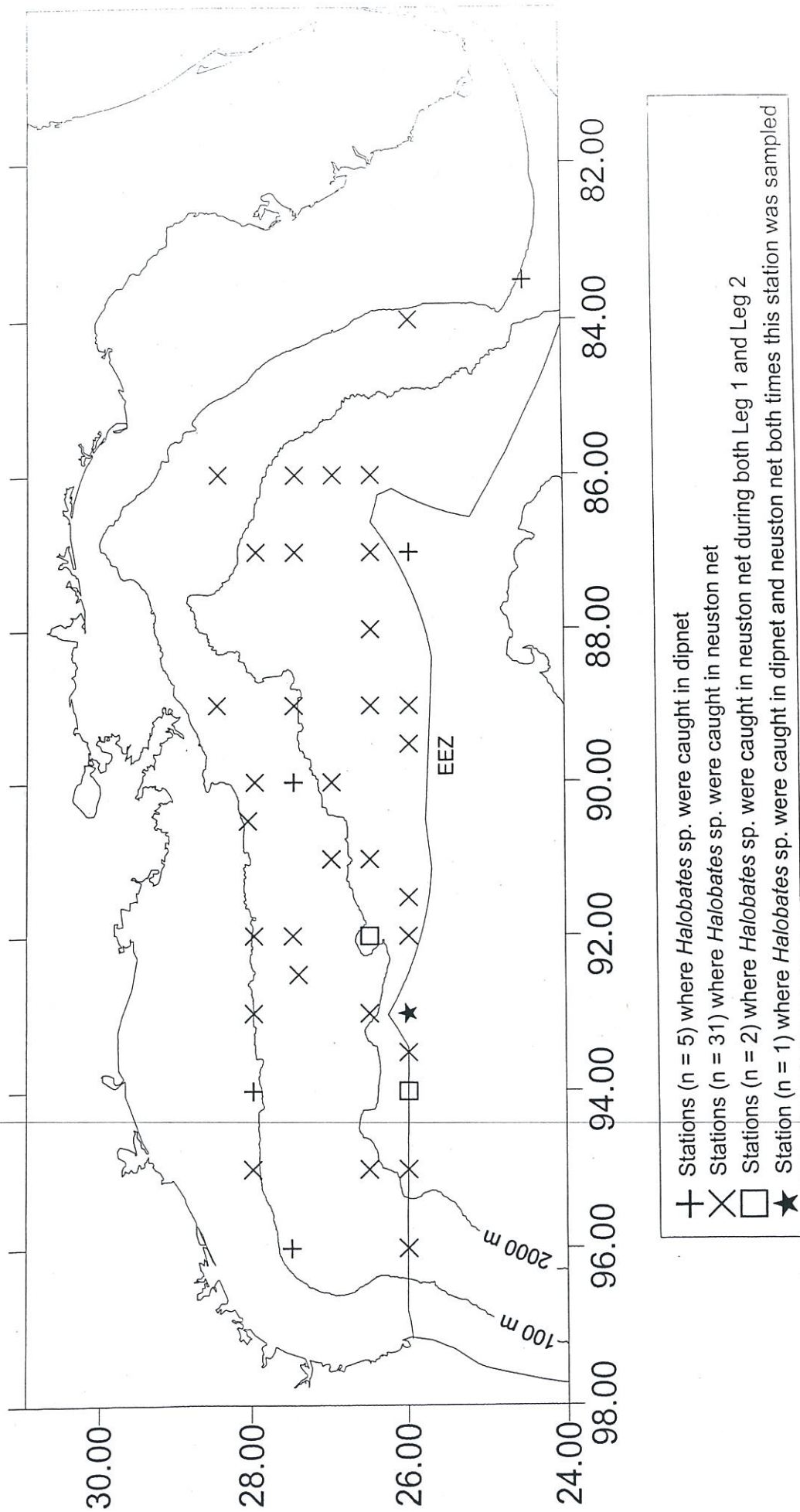


Figure 13. Locations where *Halobates* sp. (total = 311) were collected via dipnet (n = 44) or neuston tow (n = 267) during NOAA Ship Gordon Gunter Cruise GU-01-02 (April - May 2001).

