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REPORT OF A MARINE MAMMAL SURVEY OF THE CALIFORNIA COAST ABOARD THE RESEARCH VESSEL *McARTHUR* JULY 28 - NOVEMBER 5, 1991

P. Scott Hill
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NOAA-TM-NMFS-SWFSC-169

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Center

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P. Scott Hill
Jay Barlow

National Marine Fisheries Service, NOAA
Southwest Fisheries Science Center
P.O. Box 271
La Jolla, California 92038

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U.S. DEPARTMENT OF COMMERCE
Barbara H. Franklin, Secretary
National Oceanic and Atmospheric Administration
John A. Knauss, Under Secretary for Oceans and Atmosphere
National Marine Fisheries Service
William W. Fox, Jr., Assistant Administrator for Fisheries

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P. Scott Hill
and
Jay Barlow

INTRODUCTION

This paper presents the preliminary results of a three month ship survey of cetaceans in waters off the coast of California. The study was motivated by the need to estimate the size of those populations that are being impacted by gillnet fisheries in this region.

In California, gillnets are used in two quite separate fisheries. In the shark and swordfish fishery, drift gillnets are used in offshore waters from the Mexican border to the Oregon border, typically between 20 and 200 nautical miles from the coast. In the set gillnet fishery, bottom gillnets and trammel nets are used to catch halibut and angel sharks from the Mexican border to approximately Bodega Bay, California. Set gillnets are typically fished only in shallow water (less than 50 fathoms deep). Both types of gillnets take marine mammal species.

The mortality of marine mammals in gillnets came to public attention in the early 1980s. At this time and during the late 1970s, the use of monofilament gillnets increased dramatically with the development of set-netting for halibut and drift-netting for sharks. Swordfish were initially caught incidentally to shark fishing, but soon became a major source of income in the drift-net fishery. Similarly, halibut fishermen found that they could catch angel sharks in the vicinity of the Channel Islands in southern California. Along with these developing fisheries came evidence of marine mammal entanglement. Evidence came in the form of increasing numbers of harbor porpoise washing ashore in the San Francisco area and increasing numbers of sea lions seen with net fragments around their necks at rookeries and haulout areas throughout the state.

Responding to this evidence, the California Department of Fish and Game (CDFG), under a cooperative agreement with the National Marine Fisheries Service (NMFS), began monitoring gillnets by putting observers on gillnet vessels. This on-vessel program depended on voluntary cooperation of the skippers, but CDFG also observed vessels, either from shore with telescopes or from an auxiliary vessel. Beginning with the 1983/84 fishing season, CDFG made yearly estimates of marine mammal mortality in gillnets (until their program ended in 1987). Results from that program indicated that annual fishery by-catch included 2000-4000 California sea lions, 1000-2000 harbor seals, and 200-300 harbor porpoise (Barlow et al. in press). Other marine mammals were also observed to be taken, but in numbers that were too small for accurate mortality rates to calculated. Other species seen in gillnets or stranding with gillnet marks included common dolphins, minke whales, northern right whale dolphins, short-finned pilot whales, Pacific white-sided dolphins, bottlenose dolphins, Risso's dolphins, killer whales, Hubb's beaked whales, Cuvier's beaked whales, and gray whales.

Beginning in 1990, NMFS began a mandatory observer program on both drift and set gillnet vessels. Preliminary mortality estimates were made for the last half of 1990 based on these data (Lennert et al. 1991). Estimated mortality for this half-year period was 44 harbor porpoise, 33 sea otters, 234 elephant seals, 415 harbor seals, 937 California sea lions, 203 common dolphins, 68 Pacific white-sided dolphins, 23 short-finned pilot whales, 23 beaked whales, and 23 Dalls porpoise.

The impact of this fishery mortality is easier to measure for pinnipeds than it is for cetaceans. Pinnipeds are counted each year when they haul-out for molting or pupping. The three major species (California sea lions, harbor seals, and elephant seals) are all increasing in abundance despite the fishery mortality (they had all been previously depleted by humans, elephant seals to near extinction). We also know that gray whale populations are growing. Studies of population trends have begun for harbor porpoise using aerial surveys, but insufficient data have been gathered to date to show a definitive trend. For the other species, abundance estimates (if available) are woefully inadequate to estimate trends in abundance and are out of date.

The California coastal marine mammal survey was designed to obtain solid estimates of abundance for the majority of cetacean species which would enable us to judge the significance of incidental fishing mortality. In this report, we describe the design used during the 1991 survey and we present summaries of the distance searched and marine mammals encountered from aboard the NOAA Ship McArthur (Cruise AR-91-02; SWFSC Observer Cruise 1426).

SURVEY OBJECTIVES

The primary objectives of the cruise were to estimate the abundance and understand the distribution of dolphin and whale species which are commonly in California waters and which are killed in U.S. commercial gillnetting operations. The specific objectives were to:

1. collect data for estimating the density, size, and species composition of dolphin and whale aggregations in order to make mean and minimum estimates of their population sizes;

2. collect physical, biological, and oceanographic data regarding the habitat of marine mammals in order to better understand why they are distributed as they are;

3. take individual identification photographs of blue, humpback, right, and sperm whales in order to estimate their population sizes using mark-recapture methods;

4. take biopsy samples from whales and dolphins for future genetic analyses of population structure.

A briefing document for the subsequent Cruise Leaders was compiled by the Chief Scientist during the first leg of the cruise. This document has been included as Appendix A of this report.

MATERIALS AND METHODS

Study Area and Itinerary

The survey called for the McArthur to complete a grid of predetermined tracklines to uniformly cover the California coastal waters out to a distance of approximately 300 nmi (555km) (Figure 1). The grid was chosen arbitrarily without considering known concentrations of cetaceans. A secondary strata was included in the survey design and consisted of circumnavigating each of the Channel Islands at a distance of one nautical mile (1.85 km) from shore. This region was expected *a priori* to have a higher density of cetaceans. The cruise was conducted from July 28 through November 5, 1991, and included port calls in Eureka, San Diego, and San Francisco. The itinerary of the vessel included four segments or effort legs:

Leg 1.		
Departed	San Diego	July 28
Arrived	Eureka	August 20
Leg 2.		
Departed	Eureka	August 24
Arrived	San Diego	September 15
Leg 3.		
Departed	San Diego	September 18
Arrived	San Francisco	October 7
Leg 4.		
Departed	San Francisco	October 13
Arrived	San Francisco	November 5

Scientific Personnel

Cruise Leaders	Legs
Jay Barlow, SWFSC	1
Scott Hill, SWFSC	2
Mark Lowry, SWFSC	3
Paul Wade, SWFSC	4
Identification Specialists	
Scott Benson, SWFSC	1-4
Jim Cotton, SWFSC	1-4
Marine Mammal Observers	
Wes Armstrong, SWFSC	1-4
Darlene Everhart, SWFSC	1-4
Mary Lycan, SWFSC	1-4
Robyn Mellon, SWFSC	1-4
Independent Observers	
Barb Taylor, NRC	1
Eric Archer, SIO	2
Karin Forney, SWFSC	3
Susan Kruse, SWFSC	4
Additional Scientific Personnel	
David Demer, Acoustic Technician, SIO	1
Valerie Philbrick, Oceanographer, SWFSC	3

Abbreviations: SWFSC - Southwest Fisheries Science Center
NRC - National Research Council
SIO - Scripps Institution of Oceanography

Oceanographic data were collected by the *McArthur* survey department personnel.

Marine Mammal Species Surveyed

During the survey, the observers recorded information on all species of whales and dolphins sighted throughout the cruise. All sightings of pinnipeds encountered more than ten nautical miles (18.5 km) from the nearest point of land were also recorded.

Equipment

The *McArthur*, commissioned in 1966, is 53.3 m in length, has a beam of 11.6 m, and has a 3.7 m draft. During the surveys, the vessel maintained a cruising speed of approximately 18.5 km/hr (10 knots).

Several pieces of equipment were used to gather data. The geographic position of the vessel was recorded periodically and at the time of a marine mammal sighting using the vessel's Global Positioning System (GPS). Marine mammals were detected with port and starboard pedestal-mounted 25x150 Fujinon[1] binoculars and hand-held 7x50 binoculars. The larger binoculars were mounted on the upper deck approximately 10.7 m above the sea surface. Sea surface temperature and salinity, and temperature versus depth profiles were obtained using a thermosalinograph and expendable bathythermographs (XBTs), respectively. Salinity and temperature profiles were obtained using a conductivity-temperature-depth (CTD) probe. Water samples collected during these casts were analyzed for chlorophyll, salinity, and primary productivity (using a C-14 uptake method).

The bearing and radial distance from the vessel to each sighted marine mammal group was recorded. The bearing from the vessel to the group was recorded by the observers using a 360° graduated ring attached to the base of the 25X binoculars. Distance was determined by utilizing graduated reticles enclosed in the right eyepiece of the 25X binoculars.

A 35 mm F-1 Canon[1] camera with motor drive was used to photograph animals to aid in stock and species identification. The system included 400mm, 70-210mm zoom, 50mm, and 28mm lenses. The photographic identification study of large whales was conducted using a Nikon[1] F-3 camera equipped with a 80-210mm zoom lens and a Canon[1] 630 camera equipped with a 100-300mm autofocus zoom lens. Animals were also recorded on 1.27 cm video tape using a Panasonic[1] VHS camcorder with a telephoto lens.

Duty Stations

The marine mammal observers occupied three duty stations during the survey, with the observers rotating through each station.

1. Left Binocular - The port-side observer used a 25X binocular, mounted on the port side of the vessel, to scan the ocean for marine mammal sighting cues. The major area of responsibility for this observer was from the midpoint of the trackline to abeam the port side of the vessel and outward to the horizon or to the extent possible with prevailing environmental conditions.

2. Right Binocular - The starboard observer used a 25X binocular, mounted on the starboard side of the vessel, to search from the midpoint of the trackline to abeam the starboard side of the vessel, and outward to the horizon or to the extent possible with prevailing environmental conditions. Observers in the left and right positions frequently searched up to 10° on the opposite side of the trackline.

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[1]Reference to trade name does not imply endorsement by the NMFS.

3. Recorder - The recorder's duties were to enter data on search effort, environmental conditions and sightings using the on-line data acquisition computer system, and to search the trackline adjacent to the vessel by naked eye and with hand held binoculars for groups not detected by the observers on the 25X glasses.

In addition to the regular watch teams, a fourth independent observer, maintained watch in order to detect groups or individual animals missed by the regular observer teams. The independent observer was stationed near the centerline of the vessel on the flying bridge and maintained watch with the naked eye and 7x50 binoculars.

Observer Teams and Rotation

Two teams of three observers each alternately occupied the three duty stations. Each team was on duty for a two-hour shift. During each shift, observers spent approximately equal time occupying each duty station.

Two of the six observers, one on each team, were experts in identifying marine mammals. A rotating watch schedule was developed so the team composition did not remain constant during the entire survey. However, one identification expert was always on watch. Team members rotated between the duty stations and teams rotated on and off duty without interrupting searching effort. Teams alternated standing the first watch of the day.

The independent observer stood watch for no more than two consecutive hours. The cruise leader also occupied the independent observer station as time permitted.

Data Collection Procedures

A typical day's searching activity began at sunrise, approximately 0630 hours local time, and ended at sunset. The searching procedure was initiated when observers were occupying the duty stations and a recorder was in place to record information with the on-line data acquisition computer system. After securing marine mammal sighting effort for the night, the vessel would slow to a minimal speed and stay in the area. An oceanographic station was conducted each morning where the sighting effort was terminated on the previous night. In this manner, the searching effort typically began in the same geographic position as effort was terminated on the previous day.

When a sighting cue (marine mammals, birds, splashes, etc.) was detected, it was determined whether marine mammals were present and if the sighting was appropriate to approach. Generally, all cetacean groups (dolphins and whales) encountered within 5.6 km (3.0 nmi) lateral to the vessel were approached. For these groups, the searching effort was terminated, and the vessel was directed to intersect the group in order for the observers to obtain estimates of group size and species composition. The searching mode was resumed after the vessel returned to its original course and speed, and the observers resumed searching for other sighting cues.

During each marine mammal sighting, the recorder transcribed all the necessary data on the automated data entry system (refer to Appendix B for details concerning this system). Criteria for assigning sun position and sea state conditions are given in Figure 2 and Table 1, respectively. Observers recorded bearing and range to the mammals using the 360° calibrated ring and reticles etched into the right eyepieces of the 25 power binoculars. The reticle measurements were converted to nmi using

$$a = 0.003942 \tan(\arctan(1420.28) - 0.001088\ r),$$

where a equals radial distance in nmi and r denotes the number of reticles below the topmost reticle. Values in this equation were calculated by Barlow using an equation presented by Smith (1982) and data collected during previous research vessel cruises.

Each observer who had a good view of the group independently recorded in his or her logbook the high, low, and best estimates of group size and a determination of species composition. At no time were the observers allowed to discuss their estimates of group size and species composition. This procedure assured independence and consistency of each observer's data. Each night the Cruise Leader collected the individual logbooks and transcribed observer estimates of group size and species composition to complete the daily sighting and effort file compiled by the automated data entry system.

All available observers were, however, allowed to discuss species identification and animal behavior, and a consensus was entered on the Research Vessel Sighting Continuation Form (Figure 3) shortly after the time of a sighting. Species identifications were validated when possible by photographing the group at close range using 35 mm and video cameras.

Data Analyses

Sea state conditions were grouped into "calm" conditions, without whitecaps (Beaufort numbers 0-2), or "rough" conditions, with whitecaps (Beaufort numbers 3-5). The presence of whitecaps was important in searching for sighting cues. Animal splashes could not effectively be used as a sighting cue during rough seas because whitecaps were easily confused with the animal splashes.

Visibility conditions were classified into "good" and "poor" categories. Poor visibility conditions were recorded when horizontal sun position was 12 and vertical position was 1, 2, or 3, or when there were clouds together with fog or rain (Holt 1987) or haze. All other conditions were considered good conditions.

The study area was divided into two strata, with the sum of the two strata comprising the total study area. Encounter rate data are presented separately for each stratum and pooled over strata.

The rate of encountering marine mammal groups was determined as the simple ratio of sightings detected per 1000 km searched. Encounter rates were calculated for all marine mammals detected during Beaufort states 0 through 5. Rates were calculated for all groups detected in the study area and for calm and rough sea conditions, good and poor sun conditions, and individual observers.

Distributions of perpendicular sighting distance for each species were calculated using even intervals of 0.2 nmi out to a total distance of 3.0 nmi from the trackline.

RESULTS

The tracklines surveyed during the entire cruise are depicted in Figure 4. Figures 5 through 11 display those tracklines covered during each leg of the cruise and during the various Beaufort states.

Perpendicular distance groups for on-effort sightings made by the primary observer teams (excluding sightings made by the independent observers) are presented in Table 2.

Information summarized for each marine mammal sighting encountered during the survey is presented in Table 3. Included in this table are off-effort sightings and sightings made by the independent observer. The geographic positions of all groups detected during the survey are presented for each species category (code) in Figures 12 through 46.

Searching effort was conducted during Beaufort 0 through 5 conditions. Effort was terminated once the seas and wind attained a force of Beaufort 6 or when the team leader and the cruise leader determined that conditions were unworkable.

During the entire survey, observers searched 10.353 km and made 822 on-effort marine mammal sightings (plus 7 sightings of unidentified objects, possibly marine mammals). An additional 119 sightings were made off-effort. Dolphins or porpoises were detected in 401 on-effort schools and whales were detected in 185 on-effort pods (of these, 17 groups contained both dolphins and whales). Pinnipeds were detected in 251 groups; in which, they were associated with whales and dolphins on 2 and 9 occasions, respectively. During the survey 7 species of delphiniids, 2 species of porpoise, 5 species of other odontocete whales, and 6 species of baleen whales were identified (Table 4). The overall rate of detecting groups in the study area was 74.96 groups/1000 km searched (Table 5).

Sea conditions in the study area were extremely rough. Over 311 hours of searching effort were lost to poor weather, including high winds and seas, rain, and fog. The amount of time lost during each leg varied from 22.0 to 127.5 hours (Table 6). Only 23% of the searching effort was completed in calm seas (Table 5). However, 52% of all groups were detected during calm seas and the rate of detecting groups during calm seas was approximately 3.6 times the detection rate during rough seas.

Poor visibility conditions occurred during 42% of the surveying effort, during which time 59% of the groups were detected (Table 5). It seems that visibility conditions had little effect on sighting marine mammal groups as the rate of detecting groups during poor conditions was actually higher than the rate of detection during good conditions.

The percentage of groups detected by each of the primary mammal observer ranged from 12 to 24% (Table 5). The rates of detecting marine mammal groups also varied considerably among observers (range of 26.0 to 52.8 groups/1000 km).

SUMMARY

In this report, we have presented data on marine mammal encounter rates, group size, and species composition which meet the primary objectives of the California marine mammal cruise aboard the McArthur. Data on all marine mammal sightings have been summarized. We found that the rate of encountering marine mammal groups was higher during calm seas than during rough seas, and the rate during good visibility conditions was lower than the encounter rate during poor visibility conditions. Encounter rates among observers were variable.

ACKNOWLEDGMENTS

The cruise aboard the NOAA Ship McArthur was successfully executed due to the work of many dedicated professionals. Among those contributing to the success of the cruise were the marine mammal observers who spent many long hours collecting the data and especially the officers and crew of the McArthur who gave their continuous support. Special recognition should be given to the survey department personnel of the McArthur who exceeded our data gathering expectations. Special efforts were provided in procurement by B. Engstrand and B. Watkins. A. Jackson edited the sighting data. We are grateful to I. Barrett, R. Neal, D. DeMaster, T. Gerrodette, and B. Remington for their support during the entire cruise preparation and execution. This manuscript was improved by the careful reviews of DeMaster and T. Gerrodette. Editorial assistance was provided by J. Gilmore.

LITERATURE CITED

Barlow, J., R. W. Baird, J. E. Heyning, K. Wynne, A. M. Manville, II, L. F. Lowry, D. Hanan, J. Sease, and V. N. Burkanov. (in press). A review of cetacean and pinniped mortality in coastal fisheries along the west coast of the U.S. and Canada and the east coast of the Russian Federation. Rep. Int. Whal. Commn, Special Issue.

Bowditch, N. 1966. American practical navigator, an epitome of navigation. U. S. Naval Oceanographic Office. H. O. Pub. No. 9. Washington, DC. 1524 pp.

Holt, R. S. 1987. Estimating density of dolphin schools in the eastern tropical Pacific ocean by line transect methods. Fish. Bull. U.S. 85(3):419-434.

Lennert, C., S. Kruse, and M. Beeson. 1991. Preliminary report on incidental marine mammal bycatch in California gillnet fisheries. Int. Whal. Commn working paper SC/43/O3.

Smith, T. D. 1982. Testing methods of estimating range and bearing to cetaceans aboard the R/V David Starr Jordan. NOAA-TM-NMFS-SWFC-20, 20 pp.

Table 1. Sea state conditions measured by the Beaufort scale (from Bowditch, 1966).

Wind force (Beaufort)	Knots	Descriptive	Sea Conditions	Probable wave height in feet
0	0- 1	Calm	Sea smooth and mirror-like	-
1	1- 3	Light air	Scale-like ripple without foam crests	1/4
2	4- 6	Light breeze	Small short wavelets; crests have a glassy appearance and do not break	1/2
3	7-10	Gentle breeze	Large wavelets; some crests begin to break; foam of glassy appearance. Occasional white foam crests	2
4	11-16	Moderate breeze	Small waves, becoming longer; fairly frequent white foam crests	4
5	17-21	Fresh breeze	Moderate waves, taking a more pronounced long form; many white foam crests; there may be some spray	6
6	22-27	Strong breeze	Large waves begin to form; white foam crests are more extensive everywhere; there may be some spray	10

Table 2. Perpendicular distance groups for on-effort sightings made by the primary observer team (excluding the independent observer). Distances are estimated as the sine of the sighting angle times the radial sighting distance. Sightings of mixed species are counted in each applicable species category; therefore, the totals will be less than the sum of the columns.

Spp. Code		Total Number of Sightings	Perpendicular Distance Groups in Nautical Miles															
			0.0 - 0.2	- 0.4	- 0.6	- 0.8	- 1.0	- 1.2	- 1.4	- 1.6	- 1.8	- 2.0	- 2.2	- 2.4	- 2.6	- 2.8	- 3.0	>3.0
	TOTAL	775	253	131	94	49	47	32	36	25	26	18	11	7	11	7	6	22
05	Unid. D. delphis	9	5	0	1	0	0	0	0	2	1	0	0	0	0	0	0	0
13	S. coeruleoalba	24	5	6	2	4	0	2	0	1	0	1	0	0	2	0	1	0
16	D. delphis bairdii	13	2	2	0	2	0	2	1	2	1	0	1	0	0	0	0	0
17	D. delphis delphis	132	34	21	17	10	7	10	7	4	9	5	1	0	3	0	1	3
18	T. truncatus	18	1	2	3	2	3	0	1	4	0	0	0	1	1	0	0	0
21	G. griseus	31	3	5	7	4	6	0	2	3	0	0	0	0	0	0	0	1
22	L. obliquidens	12	2	4	0	2	1	1	2	0	0	0	0	0	0	0	0	0
27	L. borealis	16	2	3	2	2	4	0	2	0	0	0	0	0	0	0	1	0
37	Orcinus orca	5	1	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0
40	Phocoena phocoena	32	13	10	3	2	3	1	0	0	0	0	0	0	0	0	0	0
44	Phocoenoides dalli	97	43	21	10	1	3	2	4	2	4	3	0	0	1	1	1	1
46	P. macrocephaus	13	3	0	1	1	2	2	1	1	0	0	0	1	1	0	0	0
47	Kogia spp.	3	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
49	ziphiid spp.	7	0	2	0	1	0	0	1	0	1	0	1	0	1	0	0	0
51	Mesoplodon spp.	5	0	1	0	0	0	1	1	1	0	0	0	0	0	0	1	0
61	Ziphius cavirostris	14	9	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0
63	Berardius bairdii	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
69	E. robustus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	Unid. baleen whale	9	3	0	1	0	1	0	0	0	0	0	0	0	0	1	0	3
71	B. acutorostrata	5	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
72	B. edeni	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
74	B. physalus	23	6	4	2	1	4	0	1	1	0	1	1	1	0	0	0	1
75	B. musculus	50	13	5	6	2	6	1	1	3	4	3	2	1	1	0	2	0
76	M. novaeangliae	14	0	2	0	0	0	1	1	2	0	1	3	1	0	0	0	3
77	Unid. delphinid	24	4	2	2	3	0	1	3	0	2	1	0	1	0	2	0	3
78	Unid. small whale	13	2	3	0	1	1	0	0	1	1	1	1	0	1	0	0	1
79	Unid. large whale	22	2	2	2	1	1	1	2	0	2	0	0	1	0	1	0	7
96	Unid. cetacean	8	2	2	1	1	1	0	0	0	1	0	0	0	0	0	0	0
97	Unid. object	7	2	2	0	0	1	0	0	0	0	0	0	0	2	0	0	0
98	Unid. whale	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
99	B. edeni/borealis	2	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
ZC	Z. californianus	72	34	15	12	2	2	3	1	2	1	0	0	0	0	0	0	0
PV	P. vitulina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MA	M. angustirostris	59	24	9	11	4	4	1	2	1	1	1	0	0	0	1	0	0
AT	A. townsendii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CU	C. ursinus	49	19	9	8	5	1	4	1	1	0	1	0	0	0	0	0	0
UO	Unid. otariid	25	10	3	5	1	1	1	2	0	0	2	0	0	0	0	0	0
EJ	E. jubatus	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PU	Unid. pinniped	33	12	7	2	3	2	1	2	2	0	2	0	0	0	0	0	0

Table 3. All marine mammal sightings (including off effort and independent observer sightings) from the 1991 CAMMS cruise ordered by species and sighting number. Mean school sizes are the unadjusted averages of best estimates of all animals taken from all observers. To obtain the number of the primary species, it is necessary to multiply by the fraction of the school represented by that species. This fraction is also a simple average from all observers.

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Fraction Primary Species	Mean Group Size
Unid. D. delphis	5	0	0	21	72991	909	4	76	0.00	33	00.21	118	30.47	1.000	15.0
	5	0	0	24	72991	1053	3	88	0.50	32	53.69	118	34.89	1.000	1.0
	5	0	0	94	80191	1208	5	55	0.18	33	33.91	123	59.50	1.000	1.0
	5	0	0	446	90191	808	5	76	0.04	37	35.39	124	47.80	1.000	9.3
	5	0	0	458	90491	1443	3	88	0.57	35	21.64	123	14.11	1.000	6.0
	5	0	0	460	90491	1550	4	77	0.05	35	20.39	123	01.82	1.000	5.0
	5	0	0	508	90591	1737	1	77	0.14	35	00.55	120	53.90	1.000	5.0
	5	0	0	530	90691	1337	0	88	0.76	34	53.95	121	04.31	1.000	33.5
	5	0	0	544	90691	1725	2	88	0.03	34	45.79	121	24.41	1.000	5.5
	5	0	0	605	91291	827	3	85	0.20	32	21.94	122	24.45	1.000	1.0
	5	0	0	613	91291	1548	4	87	1.00	32	08.39	121	06.49	1.000	10.0
	5	17	0	637	91991	701	1	7	1.70	31	34.16	119	36.03	0.167	65.0
	5	0	0	707	92291	1625	2	88	1.53	32	09.74	124	18.32	1.000	4.0
	5	21	18	768	92791	1154	4	87	1.54	34	03.58	119	39.14	0.078	23.5
S. coeruleoalba	13	17	0	57	73091	1712	3	88	0.29	33	05.72	121	11.74	0.373	78.0
	13	17	0	104	80291	1303	5	76	1.12	33	57.81	126	41.39	0.220	238.3
	13	0	0	105	80291	1451	5	88	1.06	34	00.68	127	03.66	1.000	75.0
	13	17	0	444	90191	738	5	55	0.20	37	32.71	124	53.58	0.283	16.7
	13	17	0	448	90391	1739	4	76	2.57	35	38.70	124	59.32	0.300	83.8
	13	17	0	449	90391	1909	4	55	0.13	35	32.52	124	50.44	0.038	45.0
	13	0	0	600	91191	843	4	7	0.67	32	38.70	124	44.33	1.000	250.0
	13	0	0	601	91191	1008	4	55	0.50	32	38.81	124	27.17	1.000	91.7
	13	17	0	604	91191	1304	4	7	0.79	32	33.33	123	50.85	0.497	263.3
	13	17	0	677	91991	1534	2	7	0.20	31	02.51	120	39.99	0.267	286.7
	13	17	0	695	92191	827	3	88	2.48	31	24.33	123	47.13	0.367	52.3
	13	18	21	699	92191	1201	3	55	0.42	31	34.14	124	13.74	0.795	55.0
	13	0	0	700	92191	1314	3	55	0.79	31	27.79	124	24.75	1.000	47.5
	13	0	0	701	92191	1709	4	88	0.11	31	39.47	125	05.89	1.000	13.8
	13	17	0	823	100191	932	4	87	0.24	31	25.26	122	45.91	0.045	127.0
	13	17	0	826	100491	1707	4	77	0.22	35	27.56	126	46.76	0.198	162.5
	13	17	0	828	100591	912	3	76	0.35	35	46.60	126	13.24	0.158	157.5
	13	17	0	836	100591	1700	3	76	2.90	36	18.40	124	46.05	0.005	215.0
	13	17	0	839	100591	1823	3	7	0.31	36	22.16	124	37.16	0.010	16.0
	13	17	0	873	101591	1823	4	87	1.54	37	49.35	127	11.40	0.140	133.3
	13	17	0	880	101691	1004	2	76	0.20	37	46.72	127	36.41	0.080	80.0
	13	75	17	905	102291	904	2	87	1.92	34	18.29	122	40.55	0.103	240.3
	13	17	0	924	110191	1541	4	88	0.25	39	05.80	129	56.83	0.037	1253.3
	13	17	0	938	110391	900	2	76	0.61	36	15.24	127	58.13	0.013	186.7
	13	17	0	949	110491	841	4	88	0.02	36	59.40	126	6.85	0.053	400.0

Table 3. (continued).

Primary Species		Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude	Longitude	Fraction Primary Species	Mean Group Size
D. delphis bairdii	16	17	0	505	90591	1633	2	7	1.11	35 3.87	120 58.89	0.140	626.7
	16	ZC	17	754	92591	1626	4	87	1.70	33 52.76	120 6.90	0.980	250.0
	16	0	0	756	92691	657	4	76	0.04	33 59.45	120 20.02	1.000	197.5
	16	0	0	760	92691	1538	4	55	1.54	34 15.34	119 42.93	1.000	350.0
	16	0	0	761	92691	1636	5	7	2.02	34 7.91	119 47.06	1.000	343.8
	16	0	0	763	92791	824	4	55	0.32	34 0.10	119 58.26	1.000	275.0
	16	0	0	764	92791	851	4	55	0.05	33 58.60	119 55.37	1.000	9.0
	16	0	0	765	92791	901	4	76	0.63	33 58.71	119 54.83	1.000	141.3
	16	0	0	767	92791	1123	4	87	1.48	34 4.66	119 39.40	1.000	492.5
	16	0	0	769	92791	1259	5	55	0.73	34 3.23	119 31.15	1.000	230.0
	16	0	0	771	92791	1548	3	87	0.09	33 59.54	119 30.83	1.000	12.5
	16	17	0	775	92791	1706	1	88	1.17	33 56.80	119 41.20	0.060	93.8
	16	ZC	0	782	92891	930	1	88	0.35	33 52.86	119 17.87	0.670	17.3
	16	0	0	795	92891	1823	4	55	1.24	33 30.42	118 1.57	1.000	185.0
D. delphis delphis	17	0	0	5	72891	1501	4	7	2.46	32 39.20	117 45.86	1.000	268.3
	17	75	0	6	72891	1530	4	76	1.61	32 39.09	117 49.55	0.983	218.0
	17	0	0	7	72891	1634	4	76	0.67	32 40.15	117 50.27	1.000	17.5
	17	0	0	9	72891	1708	4	88	0.09	32 43.79	117 55.70	1.000	9.3
	17	0	0	17	72991	727	2	88	4.28	32 48.26	118 19.52	1.000	1.0
	17	0	0	18	72991	809	3	76	0.05	32 52.87	118 23.09	1.000	53.3
	17	0	0	19	72991	826	3	87	0.68	32 54.99	118 25.25	1.000	23.3
	17	0	0	20	72991	850	4	76	0.44	32 57.24	118 28.19	1.000	93.3
	17	0	0	23	72991	1026	4	55	1.00	32 56.80	118 36.03	1.000	15.0
	17	0	0	25	72991	1101	3	55	0.50	32 52.87	118 35.12	1.000	290.0
	17	0	0	27	72991	1148	3	55	0.96	32 47.62	118 28.43	1.000	135.0
	17	0	0	28	72991	1207	3	7	0.06	32 45.18	118 27.01	1.000	75.0
	17	0	0	31	72991	1323	4	76	0.60	32 45.11	118 28.62	1.000	80.0
	17	ZC	0	32	72991	1357	4	76	0.63	32 45.57	118 31.98	0.987	27.0
	17	0	0	34	72991	1426	4	88	0.26	32 46.83	118 37.79	1.000	7.0
	17	0	0	39	72991	1833	5	88	0.21	32 51.46	119 20.53	1.000	11.5
	17	0	0	43	73091	908	4	55	0.41	32 59.11	120 1.94	1.000	43.3
	17	0	0	49	73091	1303	3	55	1.51			1.000	43.3
	17	0	0	51	73091	1405	3	34	0.10	33 5.66	120 49.78	1.000	4.0
	17	0	0	53	73091	1430	3	76	0.07	33 7.33	120 52.16	1.000	47.5
	17	75	0	54	73091	1505	3	87	1.45	33 7.02	120 59.16	0.940	32.0
	17	0	0	55	73091	1622	3	55	0.50	33 5.20	121 4.51	1.000	13.3
	17	0	0	56	73091	1653	3	77	0.57	33 5.69	121 9.52	1.000	30.3
	17	13	0	57	73091	1712	3	88	0.29	33 5.72	121 11.74	0.627	78.0
	17	0	0	58	73091	1801	3	76	0.00	33 4.20	121 15.79	1.000	33.0
	17	0	0	59	73091	1807	3	76	0.24	33 4.32	121 16.81	1.000	28.3
	17	0	0	60	73091	1831	3	87	0.97	33 7.33	121 19.98	1.000	26.0
	17	75	0	62	73091	1858	3	7	2.01	33 11.02	121 21.60	0.787	9.3
	17	0	0	64	73191	701	2	88	0.12	33 14.74	121 33.50	1.000	80.0

Table 3. (continued).

Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Fraction Primary Species	Mean Group Size
17	0	0	66	73191	806	2	76	0.00	33	12.17	121	41.49	1.000	8.3
17	75	0	68	73191	901	2	87	1.00	33	14.04	121	45.74	0.950	23.0
17	0	0	72	73191	953	2	76	0.79	33	15.09	121	48.92	1.000	10.0
17	0	0	73	73191	1004	2	55	0.79	33	15.23	121	50.94	1.000	23.3
17	0	0	74	73191	1016	2	55	0.38	33	15.19	121	53.04	1.000	121.7
17	0	0	78	73191	1429	3	7	0.00	33	24.34	122	37.80	1.000	10.0
17	0	0	86	73191	1947	4	76	1.19	33	30.54	123	6.95	1.000	19.0
17	0	0	93	80191	1152	5	7	0.58	33	34.08	123	56.92	1.000	223.3
17	0	0	95	80191	1257	5	88	0.01	33	35.11	124	8.98	1.000	50.0
17	0	0	96	80191	1315	5	77	0.05	33	35.59	124	12.64	1.000	68.3
17	0	0	103	80291	814	5	76	0.07	33	49.51	125	38.16	1.000	27.0
17	13	0	104	80291	1303	5	76	1.12	33	57.81	126	41.39	0.780	238.3
17	0	0	107	80291	1936	4	87	0.50	34	15.09	126	38.10	1.000	12.7
17	0	0	108	80391	1506	5	7	1.54	34	57.49	124	52.38	1.000	116.7
17	0	0	109	80391	1624	4	88	0.34	35	2.51	124	39.60	1.000	42.0
17	0	0	110	80391	1741	4	76	1.03	35	7.48	124	25.43	1.000	21.0
17	0	0	141	80591	1338	3	55	0.00	36	16.91	122	32.33	1.000	13.0
17	0	0	146	80691	751	2	88	0.34	36	35.37	124	12.18	1.000	20.0
17	0	0	147	80691	755	1	88	2.00	36	35.67	124	12.37	1.000	12.0
17	0	0	148	80691	759	1	88	0.41	36	36.32	124	12.59	1.000	32.5
17	0	0	158	80691	1945	3	7	0.97	36	54.26	126	41.76	1.000	21.0
17	0	0	160	80791	1629	5	77	0.10	37	13.44	128	48.17	1.000	30.0
17	0	0	162	80891	1214	4	87	0.31	37	41.55	127	54.43	1.000	24.0
17	0	0	163	80891	1254	4	76	1.22	37	43.72	127	45.89	1.000	35.0
17	0	0	164	80891	1351	4	76	1.77	37	43.03	127	37.70	1.000	38.8
17	0	0	165	80891	1421	4	88	0.56	37	46.07	127	36.09	1.000	40.0
17	27	0	430	83191	850	2	76	0.67	39	14.14	124	11.56	0.650	36.3
17	0	0	443	90191	734	5	72	0.03	37	32.40	124	54.25	1.000	14.0
17	13	0	444	90191	738	5	55	0.20	37	32.71	124	53.58	0.717	16.7
17	0	0	445	90191	800	5	77	0.00	37	35.50	124	55.08	1.000	8.0
17	13	0	448	90391	1739	4	76	2.57	35	38.70	124	59.32	0.700	83.8
17	13	0	449	90391	1909	4	55	0.13	35	32.52	124	50.44	0.962	45.0
17	0	0	450	90491	710	4	7	0.05	35	35.61	124	41.00	1.000	6.8
17	0	0	451	90491	832	4	55	1.77	35	33.32	124	22.06	1.000	43.0
17	0	0	453	90491	1052	3	88	0.89	35	28.09	123	54.24	1.000	46.7
17	0	0	456	90491	1333	3	87	0.37	35	23.50	123	30.19	1.000	16.0
17	0	0	459	90491	1508	4	77	0.08	35	21.63	123	8.61	1.000	33.8
17	0	0	462	90491	1713	4	55	0.51	35	18.30	122	43.10	1.000	45.0
17	0	0	463	90491	1756	4	77	0.21	35	18.12	122	34.48	1.000	18.8
17	0	0	465	90591	703	3	55	0.57	35	14.02	122	17.74	1.000	8.0
17	0	0	466	90591	718	3	55	0.27	35	14.44	122	15.00	1.000	35.8
17	0	0	467	90591	751	3	77	0.30	35	13.74	122	8.76	1.000	32.8
17	16	0	505	90591	1633	2	7	1.11	35	3.87	120	58.89	0.860	626.7
17	0	0	536	90691	1602	2	55	1.20	34	48.13	121	12.56	1.000	86.3

Table 3. (continued).

Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Fraction Primary Species	Mean Group Size
17	0	0	565	90791	814	0	77	0.75	34	29.57	121	56.84	1.000	148.8
17	0	0	568	90791	916	0	7	0.78	34	26.91	122	6.76	1.000	136.0
17	0	0	574	90791	1215	0	7	0.33	34	18.36	122	37.63	1.000	172.5
17	0	0	579	90791	1325	0	88	1.88	34	13.43	122	49.65	1.000	160.0
17	0	0	580	90791	1413	1	55	0.21	34	11.80	122	57.08	1.000	38.0
17	0	0	581	90791	1414	1	87	0.00	34	11.75	122	57.23	1.000	9.8
17	0	0	582	90791	1445	1	87	0.56	34	11.50	122	59.12	1.000	186.3
17	0	0	583	90791	1530	1	55	0.65	34	8.35	123	3.71	1.000	46.8
17	0	0	589	90991	747	5	77	0.01	33	54.71	123	44.03	1.000	23.8
17	0	0	590	90991	811	5	72	0.10	33	51.51	123	47.35	1.000	15.5
17	0	0	594	90991	1021	5	77	0.21	33	39.58	124	1.86	1.000	27.5
17	0	0	599	91091	1354	4	77	1.39	32	48.85	126	6.93	1.000	13.8
17	0	0	602	91191	1048	4	72	0.00	32	38.88	124	20.42	1.000	22.3
17	13	0	604	91191	1304	4	7	0.79	32	33.33	123	50.85	0.503	263.3
17	0	0	606	91291	1039	3	7	1.24	32	18.80	121	57.51	1.000	6.3
17	0	0	611	91291	1509	4	77	0.00	32	9.22	121	6.16	1.000	4.0
17	0	0	614	91291	1627	4	77	0.02	32	8.20	121	5.64	1.000	45.0
17	0	0	617	91391	910	4	76	1.37	32	5.38	120	9.41	1.000	151.3
17	0	0	619	91391	1217	4	88	0.15	31	56.08	119	36.85	1.000	28.3
17	0	0	622	91391	1713	4	88	1.93	31	53.35	118	42.14	1.000	93.8
17	0	0	624	91491	656	3	87	1.79	32	14.67	118	1.87	1.000	348.8
17	0	0	629	91491	1205	4	88	0.07	32	4.27	118	28.23	1.000	23.3
17	0	0	633	91491	1510	4	87	3.76	31	49.64	118	59.92	1.000	1.0
17	0	0	634	91591	727	3	55	2.09	31	53.02	118	32.69	1.000	60.0
17	5	0	637	91991	701	1	7	1.70	31	34.16	119	36.03	0.833	65.0
17	0	0	656	91991	1025	1	88	0.11	31	24.23	119	55.43	1.000	7.5
17	0	0	658	91991	1052	1	77	1.05	31	22.17	120	0.68	1.000	73.3
17	0	0	673	91991	1352	1	76	0.61	31	6.77	120	25.61	1.000	8.5
17	0	0	674	91991	1410	1	7	1.77	31	5.47	120	27.62	1.000	145.0
17	0	0	675	91991	1453	2	88	0.03	31	4.06	120	32.92	1.000	7.7
17	13	0	677	91991	1534	2	7	0.20	31	2.51	120	39.99	0.733	286.7
17	0	0	681	92091	709	1	88	1.73	30	53.29	121	10.85	1.000	147.5
17	0	0	682	92091	900	2	76	0.26	30	58.47	121	32.08	1.000	11.5
17	13	0	695	92191	827	3	88	2.48	31	24.33	123	47.13	0.633	52.3
17	0	0	708	92391	1328	4	55	0.33	32	42.41	122	53.73	1.000	136.3
17	0	0	709	92391	1420	4	77	0.50	32	39.78	122	48.57	1.000	20.0
17	0	0	710	92391	1453	4	87	0.07	32	42.89	122	41.80	1.000	12.5
17	0	0	711	92391	1506	4	77	0.11	32	43.36	122	39.40	1.000	24.3
17	0	0	712	92391	1526	4	77	0.00	32	45.31	122	35.40	1.000	28.3
17	0	0	713	92391	1545	4	7	0.27	32	46.48	122	31.92	1.000	13.0
17	0	0	715	92391	1601	4	76	0.17	32	46.91	122	31.66	1.000	7.3
17	75	ZC	719	92491	806	4	87	1.48	33	5.40	121	58.70	0.665	12.8
17	0	0	723	92491	1042	4	55	0.45	33	11.69	121	45.51	1.000	8.3
17	0	0	724	92491	1042	4	86	0.16	33	11.69	121	45.48	1.000	4.0

Table 3. (continued).

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Fraction Primary Species	Mean Group Size
	17	0	0	729	92491	1410	4	88	0.48	33	19.75	121	17.46	1.000	34.3
	17	0	0	732	92491	1608	4	89	0.43	33	15.37	121	12.91	1.000	9.5
	17	16	ZC	754	92591	1626	4	87	1.70	33	52.76	120	6.90	0.015	250.0
	17	16	0	775	92791	1706	1	88	1.17	33	56.80	119	41.20	0.940	93.8
	17	0	0	777	92891	704	2	77	1.30	33	53.32	119	30.43	1.000	120.0
	17	0	0	794	92891	1711	4	7	1.26	33	31.24	118	15.52	1.000	225.0
	17	0	0	796	92991	710	0	76	0.17	33	30.87	118	0.00	1.000	291.3
	17	0	0	798	92991	752	0	7	0.11	33	31.87	117	56.91	1.000	31.3
	17	0	0	800	92991	852	1	55	0.86	33	27.47	117	48.62	1.000	66.3
	17	0	0	801	92991	934	1	77	1.79	33	28.61	117	46.92	1.000	61.3
	17	0	0	804	92991	1217	3	77	0.15	33	16.96	118	14.92	1.000	418.8
	17	ZC	0	807	92991	1310	2	55	0.08	33	11.92	118	23.12	0.998	176.3
	17	ZC	0	810	92991	1508	2	7	0.45	33	2.90	118	45.17	0.998	296.8
	17	ZC	0	812	92991	1552	2	7	1.11	33	1.50	118	51.62	0.920	51.0
	17	13	0	823	100191	932	4	87	0.24	31	25.26	122	45.91	0.955	127.0
	17	13	0	826	100491	1707	4	77	0.22	35	27.56	126	46.76	0.803	162.5
	17	13	0	828	100591	912	3	76	0.35	35	46.60	126	13.24	0.843	157.5
	17	13	0	836	100591	1700	3	76	2.90	36	18.40	124	46.05	0.995	215.0
	17	13	0	839	100591	1823	3	7	0.31	36	22.16	124	37.16	0.990	16.0
	17	13	0	873	101591	1823	4	87	1.54	37	49.35	127	11.40	0.860	133.3
	17	0	0	874	101691	743	3	55	1.90	37	50.65	127	21.53	1.000	145.0
	17	13	0	880	101691	1004	2	76	0.20	37	46.72	127	36.41	0.920	80.0
	17	22	0	888	102191	720	5	76	0.07	33	56.69	120	40.30	0.800	350.0
	17	0	0	890	102191	950	4	77	0.04	33	57.85	120	50.84	1.000	146.7
	17	0	0	891	102191	1027	4	7	0.37	34	0.12	120	57.96	1.000	18.3
	17	0	0	896	102191	1200	4	76	1.35	34	1.41	121	11.17	1.000	63.3
	17	0	0	897	102191	1231	4	77	0.52	34	1.49	121	14.57	1.000	47.7
	17	0	0	901	102191	1607	4	88	0.91	34	8.23	121	59.24	1.000	120.0
	17	0	0	903	102291	740	2	76	0.83	34	13.98	122	24.83	1.000	261.7
	17	75	13	905	102291	904	2	87	1.92	34	18.29	122	40.55	0.887	240.3
	17	0	0	906	102291	1113	2	55	0.12	34	22.95	122	47.58	1.000	45.0
	17	0	0	908	102291	1356	2	77	1.20	34	21.65	123	12.53	1.000	396.7
	17	0	0	914	103191	950	3	77	0.05	38	49.94	126	19.29	1.000	22.7
	17	0	0	918	103191	1138	3	83	0.00	38	46.77	126	42.84	1.000	4.0
	17	13	0	924	110191	1541	4	88	0.25	39	5.80	129	56.83	0.963	1253.3
	17	21	0	935	110291	1644	0	76	3.39	38	26.08	129	0.56	1.000	2.0
	17	13	0	938	110391	900	2	76	0.61	36	15.24	127	58.13	0.987	186.7
	17	13	0	949	110491	841	4	88	0.02	36	59.40	126	6.85	0.947	400.0
	17	0	0	953	110491	1124	4	76	1.88	37	7.97	125	43.49	1.000	381.7
<u>T.</u> <u>truncatus</u>	18	21	0	403	82891	853	4	76	0.66	40	24.59	128	7.25	0.113	24.7
	18	21	0	685	92091	1059	1	77	1.56	31	0.55	121	55.13	0.460	19.0
	18	46	0	696	92191	921	3	55	1.47	31	23.98	123	55.02	0.613	34.3
	18	46	0	698	92191	1041	3	76	2.32	31	30.39	124	3.01	0.707	30.8

Table 3. (continued).

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Fraction Primary Species	Mean Group Size
	18	13	21	699	92191	1201	3	55	0.42	31	34.14	124	13.74	0.155	55.0
	18	46	0	704	92291	1013	2	76	2.43	31	47.41	125	21.83	0.832	21.3
	18	21	0	744	92591	1100	4	88	0.75	33	46.13	120	9.36	0.117	33.0
	18	21	0	746	92591	1127	4	88	0.84	33	47.07	120	6.95	0.105	9.0
	18	21	0	749	92591	1239	2	87	1.29	33	52.50	119	54.33	0.370	24.8
	18	21	0	750	92591	1306	4	55	0.03	33	51.98	119	49.77	0.500	7.3
	18	21	5	768	92791	1154	4	87	1.54	34	3.58	119	39.14	0.262	23.5
	18	21	0	774	92791	1631	0	55	0.28	33	57.64	119	36.74	0.313	29.0
	18	21	0	783	92891	1032	1	77	0.35	33	46.68	119	8.15	0.835	2.5
	18	21	0	790	92891	1352	3	76	1.00	33	39.67	118	53.09	0.345	18.3
	18	21	0	791	92891	1420	4	87	0.94	33	35.42	118	48.95	0.240	17.0
	18	21	0	808	92991	1345	2	88	1.48	33	8.34	118	28.50	0.275	31.0
	18	21	0	869	101591	1600	4	87	0.42	37	45.72	126	44.42	0.108	35.3
	18	21	0	871	101591	1709	3	55	0.46	37	47.37	126	58.02	0.050	21.3
<u>*G. griseus*</u>	21	0	0	82	73191	1841	4	55	0.85	33	28.77	122	55.32	1.000	20.7
	21	0	0	135	80591	908	2	77	1.27	36	12.11	121	59.89	1.000	19.8
	21	0	0	166	80891	1501	3	88	0.59	37	49.79	127	29.60	1.000	20.0
	21	0	0	226	81591	1845	3	7	0.21	42	2.83	127	21.36	1.000	12.3
	21	18	0	403	82891	853	4	76	0.66	40	24.59	128	7.25	0.888	24.7
	21	0	0	405	82891	1250	5	7	0.40	40	0.15	128	44.56	1.000	11.5
	21	27	0	407	83091	717	3	55	0.89	38	38.89	125	35.25	0.740	28.0
	21	0	0	447	90391	1713	4	87	0.39	35	39.02	125	4.04	1.000	4.8
	21	18	0	685	92091	1059	1	77	1.56	31	0.55	121	55.13	0.540	19.0
	21	13	18	699	92191	1201	3	55	0.42	31	34.14	124	13.74	0.050	55.0
	21	0	0	705	92291	1322	2	77	0.45	31	58.26	124	48.28	1.000	2.7
	21	0	0	706	92291	1442	1	87	0.95	31	57.31	124	31.06	1.000	13.0
	21	18	0	744	92591	1100	4	88	0.75	33	46.13	120	9.36	0.883	33.0
	21	18	0	746	92591	1127	4	88	0.84	33	47.07	120	6.95	0.895	9.0
	21	18	0	749	92591	1239	2	87	1.29	33	52.50	119	54.33	0.630	24.8
	21	18	0	750	92591	1306	4	55	0.03	33	51.98	119	49.77	0.500	7.3
	21	18	5	768	92791	1154	4	87	1.54	34	3.58	119	39.14	0.660	23.5
	21	18	0	774	92791	1631	0	55	0.28	33	57.64	119	36.74	0.687	29.0
	21	18	0	783	92891	1032	1	77	0.35	33	46.68	119	8.15	0.165	2.5
	21	18	0	790	92891	1352	3	76	1.00	33	39.67	118	53.09	0.655	18.3
	21	18	0	791	92891	1420	4	87	0.94	33	35.42	118	48.95	0.760	17.0
	21	0	0	792	92891	1440	4	89	0.15	33	36.32	118	48.27	1.000	3.7
	21	18	0	808	92991	1345	2	88	1.48	33	8.34	118	28.50	0.725	31.0
	21	0	0	867	101591	1126	4	76	0.38	37	38.41	125	47.43	1.000	44.5
	21	0	0	868	101591	1432	4	87	0.48	37	43.62	126	27.23	1.000	28.3
	21	18	0	869	101591	1600	4	87	0.42	37	45.72	126	44.42	0.893	35.3
	21	18	0	871	101591	1709	3	55	0.46	37	47.37	126	58.02	0.950	21.3
	21	0	0	887	101691	1512	1	76	0.04	37	59.69	128	41.96	1.000	3.0
	21	0	0	894	102191	1137	4	7	0.16	34	0.83	121	7.91	1.000	6.0

Table 3. (continued).

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Fraction Primary Species	Mean Group Size
	21	0	0	921	110191	1128	4	76	0.61	39	0.12	128	59.07	1.000	23.3
	21	17	0	935	110291	1644	0	76	3.39	38	26.08	129	0.56	0.000	2.0
	21	0	0	943	110391	1401	2	77	0.66	36	40.62	127	3.10	1.000	13.3
L. obliquidens	22	0	0	111	80491	646	4	77	0.25	35	18.98	124	0.74	1.000	12.0
	22	0	0	134	80591	841	2	88	0.77	36	14.75	121	58.28	1.000	14.3
	22	0	0	136	80591	953	2	88	1.06	36	12.19	121	58.52	1.000	42.5
	22	0	0	139	80591	1238	2	88	0.31	36	15.55	122	21.77	1.000	12.0
	22	0	0	178	81191	826	4	88	0.13	39	15.21	124	1.42	1.000	4.0
	22	27	0	198	81291	1355	2	76	1.32	39	32.89	125	29.25	0.260	142.5
	22	0	0	380	81991	1720	2	88	0.25	40	19.04	125	7.76	1.000	41.0
	22	0	0	391	82091	929	1	7	0.62	40	28.16	124	41.88	1.000	17.0
	22	0	0	401	82491	1550	6	77	0.00	40	40.83	124	46.36	1.000	3.0
	22	27	0	440	83191	1253	1	76	0.07	38	57.25	124	55.86	0.657	70.0
	22	0	0	441	83191	1619	2	76	0.05	38	55.02	125	1.51	1.000	14.3
	22	CU	0	470	90591	953	3	76	0.31	35	8.03	121	41.80	0.710	3.5
	22	ZC	0	850	100691	1554	5	55	0.17	37	6.55	122	49.05	0.707	10.3
	22	0	0	851	100691	1559	5	55	0.07	37	6.93	122	48.20	1.000	3.0
	22	27	0	857	101391	1535	2	7	1.00	37	22.36	123	19.80	0.840	98.3
	22	27	0	863	101391	1803	1	7	1.38	37	25.37	123	45.14	0.850	28.0
	22	17	0	888	102191	720	5	76	0.07	33	56.69	120	40.30	0.200	350.0
	22	0	0	957	110591	649	4	76	0.00	37	7.60	122	44.07	1.000	125.0
L. borealis	27	22	0	198	81291	1355	2	76	1.32	39	32.89	125	29.25	0.740	142.5
	27	21	0	407	83091	717	3	55	0.89	38	38.89	125	35.25	0.260	28.0
	27	17	0	430	83191	850	2	76	0.67	39	14.14	124	11.56	0.350	36.3
	27	22	0	440	83191	1253	1	76	0.07	38	57.25	124	55.86	0.343	70.0
	27	61	78	560	90691	1859	1	87	0.34	34	37.06	121	40.04	0.810	10.5
	27	0	0	570	90791	1006	0	55	0.47	34	27.58	122	16.10	1.000	12.8
	27	0	0	610	91291	1446	4	87	0.17	32	9.88	121	7.38	1.000	8.0
	27	0	0	615	91291	1831	4	87	0.61	32	6.31	120	42.54	1.000	6.0
	27	0	0	643	91991	815	1	55	2.84	31	31.21	119	44.79	1.000	13.7
	27	0	0	645	91991	843	1	87	0.89	31	31.16	119	45.44	1.000	9.0
	27	0	0	646	91991	903	1	87	0.23	31	28.81	119	47.24	1.000	14.5
	27	0	0	648	91991	924	1	76	0.99	31	28.36	119	50.01	1.000	8.5
	27	0	0	650	91991	941	1	86	0.20	31	27.57	119	52.55	1.000	2.5
	27	0	0	652	91991	952	1	76	0.86	31	27.23	119	51.93	1.000	5.3
	27	0	0	655	91991	1017	1	77	0.01	31	25.01	119	54.05	1.000	7.7
	27	0	0	657	91991	1033	1	88	0.00	31	23.46	119	56.82	1.000	9.5
	27	0	0	665	91991	1230	1	55	0.31	31	15.27	120	14.05	1.000	8.5
	27	0	0	671	91991	1328	2	55	0.44	31	9.65	120	23.85	1.000	11.8
	27	22	0	857	101391	1535	2	7	1.00	37	22.36	123	19.80	0.160	98.3
	27	22	0	863	101391	1803	1	7	1.38	37	25.37	123	45.14	0.150	28
														Fraction	Mean

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
<u>Orcinus</u> <u>orca</u>	37	0	0	115	80491	1435	3	77	1.06	35	56.04	122	32.95	1.000	2.5
	37	0	0	137	80591	1021	2	76	0.00	36	14.69	121	59.65	1.000	4.0
	37	0	0	209	81291	1842	3	77	2.27	39	40.89	126	22.24	1.000	5.0
	37	0	0	343	81791	1800	3	76	2.44	41	43.06	124	56.33	1.000	6.5
	37	0	0	902	102191	1655	4	55	0.34	34	11.28	122	4.56	1.000	2.3
	37	0	0	956	110491	1544	4	76	0.10	37	24.53	125	8.40	1.000	6.0
<u>Phocoena</u> <u>phocoena</u>	40	0	0	127	80591	650	3	76	0.04	36	9.81	121	53.38	1.000	1.0
	40	0	0	300	81791	1029	1	7	0.12	41	31.80	124	25.21	1.000	9.5
	40	0	0	302	81791	1045	1	7	0.34	41	31.68	124	22.66	1.000	1.0
	40	0	0	303	81791	1047	1	34	0.10	41	31.66	124	22.39	1.000	2.0
	40	0	0	304	81791	1047	1	34	0.01	41	31.66	124	22.39	1.000	4.3
	40	0	0	305	81791	1050	1	7	0.42	41	31.60	124	21.65	1.000	3.0
	40	0	0	306	81791	1051	1	76	0.15	41	31.58	124	21.43	1.000	3.0
	40	0	0	307	81791	1051	1	34	0.00	41	31.56	124	21.25	1.000	2.0
	40	0	0	308	81791	1055	1	76	0.25	41	31.47	124	20.34	1.000	2.0
	40	0	0	309	81791	1105	1	87	0.45	41	31.29	124	18.28	1.000	2.0
	40	0	0	310	81791	1107	1	7	0.28	41	31.24	124	17.70	1.000	1.0
	40	0	0	311	81791	1108	1	87	1.00	41	31.22	124	17.56	1.000	1.0
	40	0	0	312	81791	1111	1	76	0.03	41	31.15	124	16.76	1.000	2.0
	40	0	0	313	81791	1113	1	87	0.24	41	31.12	124	16.31	1.000	2.0
	40	0	0	314	81791	1114	1	34	0.10	41	31.09	124	16.01	1.000	1.5
	40	0	0	315	81791	1117	1	7	0.80	41	31.04	124	15.41	1.000	1.0
	40	0	0	316	81791	1118	1	76	0.07	41	31.02	124	15.14	1.000	3.0
	40	0	0	317	81791	1118	1	7	0.02	41	31.00	124	14.92	1.000	3.0
	40	0	0	318	81791	1121	1	7	0.20	41	30.96	124	14.43	1.000	3.0
	40	0	0	319	81791	1122	1	76	0.05	41	30.94	124	14.13	1.000	1.5
	40	0	0	320	81791	1124	1	87	0.02	41	30.89	124	13.51	1.000	2.0
	40	0	0	321	81791	1130	1	34	0.05	41	30.78	124	11.96	1.000	1.0
	40	0	0	322	81791	1135	1	34	0.45	41	30.69	124	10.83	1.000	2.0
	40	0	0	323	81791	1140	1	87	0.39	41	30.59	124	9.48	1.000	3.0
	40	0	0	324	81791	1141	1	76	0.75	41	30.58	124	9.29	1.000	3.0
	40	0	0	325	81791	1143	1	76	0.24	41	30.53	124	8.59	1.000	5.0
	40	0	0	327	81791	1508	1	7	0.42	41	59.70	124	18.72	1.000	1.0
	40	0	0	328	81791	1510	1	87	1.00	41	59.49	124	19.21	1.000	2.0
	40	0	0	329	81791	1511	1	7	0.10	41	59.42	124	19.39	1.000	1.0
	40	0	0	330	81791	1512	1	87	0.30	41	59.30	124	19.68	1.000	1.0
	40	0	0	331	81791	1520	1	76	0.01	41	58.61	124	21.24	1.000	1.0
	40	0	0	397	82091	1122	1	55	0.08	40	35.33	124	29.51	1.000	66.7
	40	0	0	398	82491	1309	1	87	0.80	40	42.55	124	18.64	1.000	2.0
	40	0	0	399	82491	1318	1	76	0.04	40	40.78	124	19.55	1.000	3.0
	40	0	0	400	82491	1321	1	87	0.22	40	40.24	124	19.84	1.000	3.0
	40	0	0	522	90591	1854	1	77	0.38	34	58.60	120	42.69	1.000	1.0
	40	0	0	523	90591	1857	1	72	0.40	34	58.73	120	41.97	1.000	1.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	40	0	0	524	90591	1900	1	72	3.04	34	58.87	120	41.23	1.000	1.0
	40	0	0	525	90591	1901	1	88	0.04	34	58.90	120	41.07	1.000	3.0
	40	0	0	526	90591	1906	1	72	0.22	34	59.08	120	40.09	1.000	7.0
	40	ZC	0	528	90691	1147	0	87	1.14	34	56.25	120	44.93	0.875	3.5
<u>Phocoenoides</u> <u>dalli</u>	44	0	0	113	80491	919	5	34	2.80	35	30.18	123	32.39	1.000	4.0
	44	0	0	122	80491	1745	3	88	0.00	36	9.21	122	17.70	1.000	2.0
	44	0	0	130	80591	748	3	15	0.10	36	12.85	121	52.83	1.000	3.5
	44	0	0	131	80591	800	2	88	5.60	36	13.07	121	53.42	1.000	3.5
	44	0	0	144	80591	1601	3	34	0.13	36	22.59	122	58.95	1.000	7.5
	44	0	0	153	80691	1215	2	76	0.00	36	42.63	125	0.58	1.000	2.0
	44	0	0	173	81091	1617	4	34	1.45	38	9.33	123	16.36	1.000	2.0
	44	0	0	176	81091	1945	3	76	0.00	38	20.99	123	27.48	1.000	3.0
	44	0	0	177	81091	1949	3	34	0.00	38	20.96	123	28.28	1.000	4.0
	44	0	0	179	81191	837	5	55	0.13	39	16.06	123	58.96	1.000	8.7
	44	0	0	181	81191	856	5	55	0.07	39	17.53	123	54.61	1.000	4.7
	44	0	0	185	81291	748	1	15	0.09	39	22.89	124	10.04	1.000	3.0
	44	0	0	186	81291	851	2	87	1.92	39	24.58	124	21.63	1.000	6.7
	44	0	0	197	81291	1249	2	7	0.01	39	31.29	125	13.26	1.000	4.3
	44	0	0	199	81291	1520	1	88	0.08	39	35.84	125	39.28	1.000	2.0
	44	0	0	200	81291	1544	2	77	0.58	39	36.44	125	43.34	1.000	6.3
	44	0	0	202	81291	1635	3	34	5.08	39	37.31	125	54.11	1.000	1.0
	44	0	0	203	81291	1646	2	87	0.48	39	37.72	125	56.46	1.000	4.0
	44	0	0	204	81291	1704	2	87	0.09	39	37.80	126	0.71	1.000	2.7
	44	0	0	212	81391	753	3	76	0.26	39	45.15	126	49.68	1.000	1.0
	44	0	0	214	81391	818	3	77	0.46	39	45.87	126	56.22	1.000	27.0
	44	0	0	215	81391	821	3	77	0.06	39	45.83	126	56.79	1.000	1.0
	44	0	0	218	81391	959	3	77	0.13	39	45.25	127	19.24	1.000	1.0
	44	0	0	219	81391	1016	3	76	0.07	39	43.73	127	20.59	1.000	2.0
	44	0	0	223	81591	1613	2	88	0.23	41	51.52	127	40.91	1.000	6.3
	44	0	0	224	81591	1732	3	7	0.00	41	59.85	127	26.56	1.000	6.3
	44	0	0	228	81591	1924	1	87	0.13	42	0.13	127	14.43	1.000	3.7
	44	0	0	232	81691	709	2	55	0.28	41	58.75	127	6.88	1.000	5.5
	44	0	0	234	81691	737	1	88	0.20	41	57.44	127	1.78	1.000	2.3
	44	0	0	235	81691	832	1	87	0.01	41	54.56	126	49.96	1.000	3.7
	44	0	0	236	81691	843	1	76	0.11	41	54.19	126	47.40	1.000	3.0
	44	0	0	237	81691	852	1	87	0.45	41	54.29	126	46.73	1.000	3.0
	44	0	0	238	81691	853	1	34	0.14	41	54.29	126	46.73	1.000	4.0
	44	0	0	239	81691	908	0	7	1.78	41	52.97	126	42.84	1.000	2.0
	44	0	0	240	81691	912	0	76	0.09	41	53.36	126	42.35	1.000	2.0
	44	0	0	242	81691	921	0	76	0.09	41	53.56	126	40.62	1.000	2.0
	44	0	0	243	81691	933	0	87	0.19	41	53.02	126	38.97	1.000	2.0
	44	0	0	244	81691	934	0	76	0.70	41	52.97	126	38.67	1.000	2.0
	44	0	0	245	81691	949	1	76	0.10	41	52.40	126	35.20	1.000	3.0

Table 3. (Continued)

Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
44	0	0	246	81691	955	1	7	0.02	41	52.20	126	33.69	1.000	3.0
44	0	0	247	81691	1013	1	55	0.10	41	52.06	126	30.57	1.000	2.7
44	0	0	248	81691	1025	1	34	0.23	41	52.42	126	28.63	1.000	2.0
44	0	0	250	81691	1038	1	77	1.08	41	51.93	126	25.25	1.000	3.7
44	0	0	256	81691	1153	1	77	0.50	41	47.51	126	9.47	1.000	4.0
44	0	0	257	81691	1211	2	7	1.69	41	46.20	126	5.54	1.000	3.0
44	0	0	261	81691	1300	2	7	3.16	41	46.95	125	56.57	1.000	1.0
44	0	0	263	81691	1311	2	87	0.40	41	47.70	125	55.07	1.000	3.0
44	0	0	265	81691	1359	2	7	2.65	41	43.37	125	44.85	1.000	2.0
44	0	0	267	81691	1453	1	55	2.90	41	41.40	125	31.50	1.000	3.0
44	0	0	270	81691	1458	1	34	0.95	41	40.98	125	30.61	1.000	5.3
44	0	0	271	81691	1535	1	77	1.20	41	39.51	125	32.29	1.000	2.0
44	0	0	272	81691	1559	1	34	0.18	41	37.64	125	27.96	1.000	2.0
44	0	0	273	81691	1722	1	7	1.18	41	36.71	125	20.27	1.000	2.8
44	0	0	274	81691	1737	1	55	0.29	41	36.05	125	17.34	1.000	5.7
44	0	0	275	81691	1749	1	77	0.22	41	36.89	125	14.71	1.000	3.0
44	0	0	277	81691	1836	1	88	0.84	41	37.49	125	6.96	1.000	2.0
44	0	0	278	81691	1856	1	77	0.41	41	35.15	125	5.74	1.000	2.0
44	0	0	280	81691	1921	1	77	0.00	41	34.13	125	2.15	1.000	4.5
44	0	0	281	81691	1929	1	34	0.20	41	33.99	125	0.09	1.000	3.0
44	0	0	283	81791	656	2	76	0.13	41	33.95	124	50.48	1.000	3.0
44	0	0	284	81791	713	3	76	0.46	41	33.91	124	46.23	1.000	3.3
44	0	0	289	81791	807	2	77	0.04	41	32.96	124	33.19	1.000	2.0
44	0	0	293	81791	829	1	15	0.00	41	31.83	124	28.99	0.000	1.0
44	0	0	335	81791	1631	2	55	0.07	41	51.27	124	36.97	1.000	3.7
44	0	0	336	81791	1637	2	15	0.17	41	50.59	124	37.97	1.000	2.0
44	0	0	337	81791	1640	2	88	0.04	41	50.32	124	38.58	1.000	2.0
44	0	0	338	81791	1650	2	88	0.10	41	49.46	124	40.68	1.000	3.0
44	0	0	339	81791	1701	2	77	0.00	41	48.40	124	43.30	1.000	1.0
44	0	0	341	81791	1740	2	7	0.01	41	44.95	124	51.87	1.000	2.0
44	0	0	344	81791	1806	3	76	0.01	41	43.58	124	57.36	1.000	1.0
44	0	0	345	81791	1839	3	76	0.80	41	44.06	125	2.07	1.000	9.3
44	0	0	346	81791	1920	3	76	0.02	41	39.67	125	10.28	1.000	1.0
44	0	0	347	81791	1925	3	87	0.24	41	39.29	125	11.26	1.000	3.0
44	0	0	349	81791	1944	3	77	0.19	41	38.10	125	15.45	1.000	1.0
44	0	0	350	81891	658	4	77	0.10	41	37.67	125	14.76	1.000	5.3
44	0	0	351	81891	734	3	55	0.21	41	34.21	125	22.18	1.000	3.0
44	0	0	352	81891	823	3	7	0.02	41	29.18	125	31.02	1.000	1.0
44	0	0	353	81891	941	4	76	0.40	41	21.39	125	48.90	1.000	2.0
44	0	0	362	81991	656	4	7	0.05	39	19.82	127	13.48	1.000	3.0
44	0	0	363	81991	722	4	7	0.22	39	21.97	127	8.70	1.000	4.0
44	0	0	364	81991	851	3	88	0.38	39	28.43	126	51.06	1.000	5.5
44	0	0	366	81991	938	3	77	0.21	39	33.50	126	41.63	1.000	3.0
44	0	0	367	81991	1001	3	34	0.19	39	36.28	126	36.88	1.000	6.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	44	0	0	368	81991	1012	3	7	0.40	39	37.53	126	34.75	1.000	2.0
	44	0	0	371	81991	1154	2	7	0.08	39	47.49	126	14.07	1.000	6.7
	44	0	0	372	81991	1205	2	88	0.10	39	48.25	126	11.67	1.000	3.0
	44	0	0	376	81991	1520	2	76	0.01	40	8.12	125	30.77	1.000	2.0
	44	0	0	377	81991	1536	2	87	0.16	40	9.87	125	27.52	1.000	4.7
	44	0	0	378	81991	1646	2	55	0.09	40	15.97	125	14.95	1.000	2.7
	44	0	0	379	81991	1701	2	77	0.31	40	17.21	125	11.80	1.000	3.7
	44	0	0	381	81991	1758	2	76	0.50	40	20.06	125	6.18	1.000	1.0
	44	0	0	382	81991	1808	2	76	1.50	40	20.84	125	3.90	1.000	4.0
	44	0	0	383	81991	1822	2	87	1.27	40	19.46	125	2.17	1.000	2.0
	44	0	0	384	81991	1854	1	76	0.26	40	22.63	124	58.90	1.000	2.0
	44	0	0	385	81991	1902	1	76	0.29	40	23.64	124	57.27	1.000	6.7
	44	0	0	388	82091	909	1	7	0.39	40	26.27	124	46.24	1.000	2.0
	44	0	0	392	82091	949	1	76	1.51	40	29.62	124	40.26	1.000	1.0
	44	0	0	394	82091	1012	1	55	0.14	40	28.92	124	36.02	1.000	5.0
	44	0	0	412	83091	1002	2	76	1.93	38	33.28	125	5.59	1.000	2.3
	44	0	0	413	83091	1039	2	88	0.05	38	31.44	124	58.35	1.000	2.0
	44	0	0	415	83091	1136	2	88	0.50	38	31.25	124	46.70	1.000	3.8
	44	0	0	417	83091	1211	1	87	0.30	38	31.37	124	40.56	1.000	1.5
	44	0	0	419	83091	1232	1	87	0.07	38	31.46	124	36.45	1.000	4.3
	44	0	0	424	83091	1510	3	76	0.10	38	27.60	124	2.43	1.000	1.5
	44	0	0	425	83091	1640	4	77	0.01	38	24.25	123	41.33	1.000	2.5
	44	75	76	427	83091	1858	4	55	1.95	38	19.44	123	31.25	0.920	25.0
	44	0	0	431	83191	1100	3	7	0.03	39	5.28	124	32.88	1.000	1.0
	44	0	0	435	83191	1207	2	76	2.44	38	59.42	124	46.71	1.000	3.0
	44	0	0	437	83191	1213	2	76	0.04	38	59.73	124	47.79	1.000	1.0
	44	0	0	438	83191	1229	1	76	1.26	38	59.52	124	50.92	1.000	1.0
	44	0	0	503	90591	1626	2	87	0.38	35	4.49	121	0.22	1.000	7.8
	44	0	0	510	90591	1752	1	55	0.14	35	0.56	120	53.22	1.000	3.0
	44	0	0	512	90591	1755	1	55	0.60	35	0.67	120	52.46	1.000	2.0
	44	0	0	514	90591	1807	2	77	0.33	35	0.90	120	49.92	1.000	1.0
	44	0	0	518	90591	1827	1	85	0.03	34	59.04	120	47.46	1.000	1.0
	44	0	0	519	90591	1829	1	77	0.05	34	59.00	120	46.99	1.000	3.5
	44	0	0	520	90591	1833	1	77	0.84	34	59.01	120	46.29	1.000	2.0
	44	0	0	521	90591	1842	1	77	0.29	34	58.17	120	45.28	1.000	1.0
	44	0	0	859	101391	1636	2	55	0.19	37	23.55	123	25.44	1.000	3.0
	44	0	0	925	110291	1140	2	77	0.03	38	53.98	128	14.46	1.000	5.0
	44	0	0	927	110291	1226	2	55	1.34	38	49.95	128	22.78	1.000	6.3
	44	0	0	929	110291	1356	1	76	0.33	38	42.75	128	36.99	1.000	3.0
	44	0	0	931	110291	1432	2	77	1.62	38	38.62	128	42.61	1.000	7.0
	44	0	0	932	110291	1530	2	7	1.76	38	31.93	128	51.93	1.000	1.0
	44	0	0	952	110491	952	4	77	0.18	37	2.88	125	54.99	1.000	4.0
P. macrocephalus	46	0	0	101	80191	1720	4	77	0.52	33	38.60	124	43.94	1.000	1.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	46	0	0	102	80191	1757	4	76	1.13	33	39.77	124	49.55	1.000	1.7
	46	0	0	149	80691	858	2	76	0.03	36	37.95	124	24.87	1.000	1.8
	46	0	0	151	80691	1121	2	55	0.75	36	40.59	124	52.81	1.000	9.7
	46	0	0	571	90791	1046	0	76	0.94	34	26.40	122	20.85	1.000	3.7
	46	0	0	585	90791	1557	1	55	0.15	34	7.42	123	6.78	1.000	1.0
	46	0	0	636	91591	815	3	77	1.00	31	52.94	118	22.35	1.000	1.0
	46	0	0	692	92091	1738	2	55	1.11	31	12.55	123	13.49	1.000	3.3
	46	0	0	694	92091	1846	2	55	0.08	31	15.50	123	25.84	1.000	5.3
	46	18	0	696	92191	921	3	55	1.47	31	23.98	123	55.02	0.388	34.3
	46	0	0	697	92191	1034	3	76	0.19	31	29.56	124	1.74	1.000	4.0
	46	18	0	698	92191	1041	3	76	2.32	31	30.39	124	3.01	0.293	30.8
	46	18	0	704	92291	1013	2	76	2.43	31	47.41	125	21.83	0.168	21.3
	46	0	0	827	100491	1803	4	55	1.40	35	26.82	126	36.44	1.000	3.5
<u>Kogia</u> spp.	47	0	0	885	101691	1306	0	7	0.56	37	56.79	128	14.26	1.000	1.0
	47	0	0	936	110391	749	1	77	2.63	36	12.19	128	9.30	1.000	1.8
	47	0	0	946	110391	1502	2	77	0.12	36	45.73	126	50.90	1.000	1.5
<u>Ziphius</u> spp.	49	0	0	603	91191	1133	4	55	0.26	32	37.05	124	10.70	1.000	2.0
	49	0	0	683	92091	939	1	76	2.04	30	59.45	121	39.47	1.000	2.0
	49	0	0	702	92191	1820	4	76	0.26	31	31.47	125	17.49	1.000	1.0
	49	0	0	872	101591	1814	3	7	2.49	37	49.04	127	9.30	1.000	1.0
	49	0	0	881	101691	1111	2	76	1.36	37	53.95	127	48.46	1.000	3.0
	49	0	0	883	101691	1141	1	55	1.66	37	54.57	127	54.38	1.000	4.0
	49	0	0	947	110391	1514	2	55	0.60	36	46.00	126	49.57	1.000	3.5
<u>Mesoplodon</u> spp.	51	0	0	46	73091	1145	3	76	1.01	33	4.25	120	24.36	1.000	2.0
	51	0	0	152	80691	1203	2	76	1.37	36	42.01	124	58.41	1.000	1.0
	51	0	0	161	80891	1124	4	55	0.39	37	37.41	128	5.25	1.000	2.0
	51	0	0	210	81291	1945	2	76	1.49	39	40.08	126	27.30	1.000	1.0
	51	0	0	531	90691	1342	0	85	0.07	34	53.46	121	5.20	1.000	1.0
	51	0	0	689	92091	1316	2	76	2.81	31	3.72	122	18.41	1.000	2.0
<u>Ziphius</u> <u>cavirostris</u>	61	0	0	118	80491	1546	3	77	0.05	36	1.28	122	26.05	1.000	1.0
	61	0	0	258	81691	1235	1	87	0.17	41	46.58	126	1.02	1.000	3.7
	61	27	78	560	90691	1859	1	87	0.34	34	37.06	121	40.04	0.095	10.5
	61	0	0	690	92091	1500	2	55	1.16	31	7.21	122	40.02	1.000	2.0
	61	0	0	703	92291	839	2	88	0.31	31	34.70	125	30.27	1.000	2.0
	61	0	0	736	92591	721	3	88	0.57	33	27.60	120	53.60	1.000	2.5
	61	0	0	737	92591	752	3	7	0.15	33	30.25	120	47.50	1.000	2.5
	61	0	0	889	102191	922	4	77	0.03	33	57.05	120	45.98	1.000	1.0
	61	0	0	900	102191	1432	4	76	0.02	34	4.44	121	38.70	1.000	2.0
	61	0	0	937	110391	846	2	88	0.15	36	13.93	128	1.03	1.000	1.3
	61	0	0	939	110391	934	2	88	0.34	36	18.48	127	54.76	1.000	2.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	61	0	0	941	110391	1249	2	88	0.01	36	36.39	127	18.26	1.000	1.0
	61	0	0	945	110391	1430	3	77	0.19	36	43.93	126	58.22	1.000	2.3
	61	0	0	948	110491	814	3	55	0.04	36	57.06	126	12.52	1.000	2.0
Berardius bairdii	63	0	0	119	80491	1558	3	15	0.00	36	4.10	122	23.18	1.000	1.0
	63	0	0	120	80491	1605	3	7	0.12	36	6.64	122	22.95	1.000	6.8
	63	0	0	230	81591	1947	1	88	1.35	41	58.40	127	9.83	1.000	3.5
E. robustus	69	0	0	326	81791	1317	0	88	0.78	41	43.94	124	14.58	1.000	1.0
Unid. baleen whale	70	0	0	11	72891	1751	4	76	2.80	32	46.65	118	1.29	1.000	1.0
	70	0	0	37	72991	1750	5	77	0.93	32	49.67	119	13.27	1.000	2.0
	70	75	0	44	73091	914	4	55	0.75	32	59.30	120	3.18	0.083	4.0
	70	0	0	45	73091	1042	4	76	0.07	33	4.29	120	10.50	1.000	1.0
	70	0	0	50	73091	1306	3	77	0.33	1	1.00			1.000	1.0
	70	0	0	75	73191	1056	2	55	3.20	33	15.81	121	57.76	1.000	121.7
	70	0	0	81	73191	1838	4	55	3.69	33	28.60	122	54.96	1.000	3.0
	70	0	0	89	80191	812	4	88	0.91	33	31.85	123	22.33	1.000	1.0
	70	75	0	722	92491	949	4	7	0.59	33	9.47	121	52.86	0.400	5.0
	70	0	0	726	92491	1133	4	77	0.09	33	11.22	121	40.81	1.000	1.0
	70	0	0	815	93091	940	4	77	4.28	32	44.75	119	35.58	1.000	1.0
	70	75	0	833	100591	1512	3	87	0.18	36	15.44	125	1.57	0.500	2.0
B. acutorostrata	71	0	0	268	81691	1455	1	88	1.80	41	41.32	125	30.94	1.000	1.3
	71	0	0	374	81991	1447	2	76	0.02	40	5.03	125	35.46	1.000	1.0
	71	0	0	487	90591	1422	1	85	0.10	35	8.43	121	15.02	1.000	1.0
	71	0	0	527	90691	1130	0	76	0.19	34	57.80	120	43.16	1.000	1.0
	71	74	0	561	90691	1910	1	76	0.17	34	35.63	121	41.49	0.330	3.0
	71	0	0	766	92791	948	4	55	0.10	34	5.08	119	56.80	1.000	1.0
	71	0	0	773	92791	1632	0	86	0.67	33	57.63	119	37.00	1.000	1.0
B. edenii	72	0	0	832	100591	1345	3	55	2.01	36	8.75	125	17.45	1.000	2.0
B. physalus	74	0	0	36	72991	1611	5	7	0.21	32	49.08	118	59.91	1.000	2.0
	74	75	0	42	73091	732	4	76	1.97	32	57.76	119	52.90	0.250	4.0
	74	75	0	79	73191	1644	3	88	0.39	33	27.70	122	41.60	0.233	4.3
	74	0	0	169	80991	1213	5	88	1.00	38	32.00	125	52.43	1.000	2.0
	74	0	0	225	81591	1738	3	76	4.16	41	59.72	127	25.40	1.000	6.3
	74	0	0	474	90591	1122	2	55	0.10	35	3.69	121	25.89	1.000	2.0
	74	0	0	477	90591	1212	2	76	0.49	35	4.51	121	21.58	1.000	2.0
	74	0	0	478	90591	1233	1	7	1.30	35	5.81	121	21.60	1.000	1.0
	74	0	0	479	90591	1241	1	76	0.18	35	6.37	121	19.70	1.000	2.0
	74	0	0	496	90591	1508	1	76	0.48	35	7.50	121	8.95	1.000	1.0
	74	75	76	529	90691	1314	0	88	0.30	34	53.96	120	58.72	0.530	15.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	74	0	0	539	90691	1701	2	77	0.84	34	47.23	121	20.53	1.000	1.0
	74	0	0	543	90691	1721	2	55	0.35	34	45.77	121	24.29	1.000	2.0
	74	75	0	547	90691	1734	2	76	0.99	34	45.34	121	24.97	0.330	3.0
	74	0	0	548	90691	1749	2	76	2.39	34	43.68	121	27.05	1.000	1.0
	74	0	0	550	90691	1800	2	76	0.06	34	42.29	121	28.85	1.000	1.0
	74	0	0	551	90691	1801	2	7	0.89	34	42.16	121	29.02	1.000	1.0
	74	0	0	552	90691	1803	2	7	0.72	34	42.01	121	29.22	1.000	1.0
	74	0	0	553	90691	1810	2	7	0.21	34	41.38	121	30.64	1.000	1.0
	74	0	0	554	90691	1813	2	76	0.07	34	41.16	121	31.17	1.000	2.0
	74	71	0	561	90691	1910	1	76	0.17	34	35.63	121	41.49	0.670	3.0
	74	0	0	586	90791	1743	4	87	1.94	33	59.64	123	26.13	1.000	1.0
	74	ZC	0	727	92491	1304	4	7	0.56	33	15.67	121	27.39	0.773	3.3
	74	0	0	831	100591	1259	3	55	0.17	36	6.04	125	27.19	1.000	1.0
	74	0	0	834	100591	1557	3	7	0.06	36	16.39	124	55.40	1.000	3.0
	74	0	0	835	100591	1633	4	55	1.48	36	17.31	124	49.81	1.000	1.0
	74	0	0	837	100591	1740	3	87	2.13	36	18.27	124	42.00	1.000	2.8
	74	0	0	878	101691	916	3	87	0.64	37	44.79	127	29.69	1.000	3.0
	74	0	0	919	103191	1217	3	55	0.20	38	45.15	126	52.38	1.000	1.0
	74	0	0	933	110291	1536	2	77	0.14	38	30.90	128	52.24	1.000	2.0
<u>B. musculus</u>	75	0	0	1	72891	1127	4	76	1.10	32	35.97	117	26.26	1.000	3.6
	75	17	0	6	72891	1530	4	76	1.61	32	39.09	117	49.55	0.017	218.0
	75	0	0	14	72991	615	4	55	0.61	32	43.75	118	18.10	1.000	3.5
	75	0	0	35	72991	1600	5	34	0.35	32	49.08	118	59.91	1.000	3.0
	75	74	0	42	73091	732	4	76	1.97	32	57.76	119	52.90	0.750	4.0
	75	70	0	44	73091	914	4	55	0.75	32	59.30	120	3.18	0.917	4.0
	75	17	0	54	73091	1505	3	87	1.45	33	7.02	120	59.16	0.060	32.0
	75	17	0	62	73091	1858	3	7	2.01	33	11.02	121	21.60	0.213	9.3
	75	0	0	65	73191	721	2	88	0.54	33	13.59	121	36.84	1.000	2.0
	75	0	0	67	73191	818	2	76	0.03	33	12.79	121	43.72	1.000	2.5
	75	17	0	68	73191	901	2	87	1.00	33	14.04	121	45.74	0.050	23.0
	75	0	0	77	73191	1428	3	77	0.82	33	24.34	122	37.80	1.000	2.3
	75	74	0	79	73191	1644	3	88	0.39	33	27.70	122	41.60	0.767	4.3
	75	0	0	87	80191	711	4	7	2.00	33	28.63	123	14.13	1.000	2.0
	75	0	0	88	80191	809	4	55	0.03	33	31.94	123	21.73	1.000	1.0
	75	0	0	92	80191	925	4	55	1.76	33	32.17	123	33.06	1.000	1.0
	75	0	0	99	80191	1530	5	76	0.07	33	36.69	124	27.24	1.000	1.0
	75	0	0	174	81091	1833	3	55	0.97	38	19.25	123	19.14	1.000	1.0
	75	44	76	427	83091	1858	4	55	1.95	38	19.44	123	31.25	0.027	25.0
	75	0	0	486	90591	1316	1	76	0.06	35	7.54	121	14.40	1.000	3.0
	75	0	0	495	90591	1502	1	55	0.00	35	7.00	121	10.15	1.000	2.0
	75	74	76	529	90691	1314	0	88	0.30	34	53.96	120	58.72	0.270	15.0
	75	0	0	533	90691	1555	1	76	1.40	34	48.73	121	11.12	1.000	1.0
	75	74	0	547	90691	1734	2	76	0.99	34	45.34	121	24.97	0.670	3.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	75	0	0	558	90691	1842	1	87	0.86	34	38.70	121	36.65	1.000	2.0
	75	0	0	559	90691	1846	1	7	0.19	34	38.27	121	37.52	1.000	1.0
	75	0	0	563	90791	725	0	55	0.60	34	33.02	121	50.14	1.000	1.0
	75	0	0	584	90791	1533	1	72	0.34	34	8.19	123	4.21	1.000	1.0
	75	0	0	587	90791	1802	4	87	2.07	33	57.17	123	25.80	1.000	3.5
	75	0	0	591	90991	849	5	76	0.41	33	46.28	123	52.48	1.000	1.8
	75	0	0	593	90991	949	5	7	0.02	33	39.57	123	59.23	1.000	2.0
	75	0	0	595	90991	1027	5	55	0.35	33	39.94	124	3.02	1.000	1.8
	75	0	0	597	90991	1154	5	55	0.57	33	42.53	124	8.69	1.000	1.3
	75	0	0	609	91291	1433	4	77	0.55	32	10.70	121	9.99	1.000	3.0
	75	0	0	612	91291	1530	4	85	0.00	32	8.59	121	5.38	1.000	1.8
	75	0	0	621	91391	1431	4	77	0.14	31	55.31	119	9.13	1.000	1.0
	75	0	0	623	91391	1810	4	77	0.08	31	53.93	118	33.63	1.000	2.7
	75	0	0	625	91491	759	4	76	0.38	32	11.47	118	8.33	1.000	1.0
	75	0	0	626	91491	838	3	55	0.11	32	9.29	118	10.22	1.000	1.0
	75	0	0	627	91491	927	3	55	1.42	32	9.12	118	15.08	1.000	5.0
	75	0	0	641	91991	741	1	7	0.17	31	33.31	119	41.24	1.000	1.0
	75	0	0	718	92491	704	4	88	1.61	33	1.23	122	1.60	1.000	2.3
	75	17	ZC	719	92491	806	4	87	1.48	33	5.40	121	58.70	0.250	12.8
	75	70	0	722	92491	949	4	7	0.59	33	9.47	121	52.86	0.600	5.0
	75	0	0	725	92491	1059	4	55	1.75	33	11.85	121	41.96	1.000	2.0
	75	0	0	731	92491	1505	4	89	0.43	33	18.85	121	9.53	1.000	2.0
	75	0	0	735	92491	1725	4	76	2.45	33	23.20	121	5.36	1.000	2.0
	75	0	0	814	93091	743	4	55	2.99	32	48.04	119	20.95	1.000	1.0
	75	0	0	816	93091	1010	4	55	0.04	32	41.06	119	40.45	1.000	1.0
	75	0	0	818	93091	1034	4	76	0.02	32	40.69	119	43.60	1.000	1.0
	75	0	0	821	93091	1424	4	76	0.99	32	20.74	120	26.15	1.000	3.8
	75	0	0	824	100391	858	5	77	0.73	34	38.93	125	18.05	1.000	2.5
	75	0	0	825	100391	1059	4	76	1.04	34	39.25	125	41.70	1.000	2.0
	75	70	0	833	100591	1512	3	87	0.18	36	15.44	125	1.57	0.500	2.0
	75	0	0	840	100591	1839	3	87	0.90	36	24.01	124	35.52	1.000	1.0
	75	0	0	841	100691	1006	4	77	2.01	36	39.45	123	58.56	1.000	1.0
	75	0	0	866	101591	1026	4	76	1.97	37	37.93	125	42.24	1.000	2.0
	75	79	0	875	101691	756	3	55	0.17	37	49.38	127	24.04	0.550	2.3
	75	0	0	877	101691	901	3	55	0.50	37	45.56	127	29.13	1.000	2.0
	75	17	13	905	102291	904	2	87	1.92	34	18.29	122	40.55	0.010	240.3
	75	0	0	907	102291	1125	2	88	2.90	34	22.82	122	49.77	1.000	2.0
	75	0	0	909	102591	953	3	87	0.22	38	6.41	123	19.60	1.000	2.0
	75	0	0	951	110491	943	4	55	0.50	37	1.87	125	56.56	1.000	2.3
	75	0	0	955	110491	1309	4	77	2.35	37	16.71	125	32.02	1.000	2.0
<u>M. novaeangliae</u>	76	0	0	125	80491	1815	3	77	0.33	36	9.64	122	11.01	1.000	1.0
	76	0	0	170	81091	1532	6	76	0.00	38	5.20	123	21.44	1.000	1.0
	76	0	0	292	81791	824	1	77	2.17	41	32.63	124	29.01	1.000	3.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	76	0	0	396	82091	1042	1	88	1.03	40	32.61	124	31.02	1.000	2.0
	76	0	0	426	83091	1659	4	87	2.25	38	23.41	123	38.29	1.000	14.0
	76	44	75	427	83091	1858	4	55	1.95	38	19.44	123	31.25	0.053	25.0
	76	0	0	490	90591	1444	1	88	3.39	35	7.68	121	13.52	1.000	1.0
	76	0	0	491	90591	1448	1	55	3.39	35	7.28	121	12.89	1.000	1.0
	76	0	0	515	90591	1810	2	55	3.42	35	0.81	120	49.23	1.000	1.0
	76	74	75	529	90691	1314	0	88	0.30	34	53.96	120	58.72	0.200	15.0
	76	0	0	730	92491	1436	4	88	2.05	33	18.47	121	15.52	1.000	1.0
	76	0	0	733	92491	1623	4	76	2.17	33	17.11	121	10.68	1.000	2.0
	76	0	0	757	92691	832	5	77	1.41	34	2.57	120	29.76	1.000	1.3
	76	0	0	892	102191	1056	4	7	1.28	34	0.59	121	2.12	1.000	2.0
	76	0	0	898	102191	1319	4	77	1.54	34	3.82	121	23.67	1.000	2.0
	76	0	0	910	102591	1023	3	88	0.51	38	6.43	123	23.60	1.000	2.0
Unid. delphinid	77	0	0	33	72991	1413	4	77	0.69	32	46.40	118	35.01	1.000	1.0
	77	0	0	61	73091	1857	3	7	2.65	33	10.89	121	21.47	0.000	1.0
	77	0	0	140	80591	1312	2	88	0.19	36	16.34	122	29.11	1.000	2.0
	77	0	0	156	80691	1417	2	55	0.80	36	46.18	125	26.20	1.000	1.0
	77	0	0	188	81291	952	3	87	0.32	39	26.72	124	36.05	1.000	2.0
	77	0	0	207	81291	1802	2	55	1.04	39	39.89	126	14.36	1.000	3.5
	77	0	0	231	81691	644	2	77	3.74	41	59.46	127	12.31	1.000	3.5
	77	0	0	333	81791	1625	2	88	0.41	41	51.92	124	35.53	1.000	1.0
	77	0	0	361	81891	1853	4	55	0.53	40	31.03	127	36.48	1.000	3.0
	77	0	0	408	83091	741	2	76	1.37	38	40.17	125	33.69	1.000	10.0
	77	0	0	410	83091	758	2	88	0.22	38	41.00	125	29.63	1.000	1.0
	77	0	0	411	83091	816	2	72	0.01	38	40.68	125	27.72	1.000	2.0
	77	0	0	452	90491	1013	3	7	0.00	35	29.35	124	2.77	1.000	1.0
	77	0	0	455	90491	1246	3	76	2.22	35	23.25	123	38.73	1.000	4.0
	77	0	0	464	90491	1842	3	88	1.32	35	16.18	122	24.42	1.000	2.0
	77	0	0	516	90591	1812	2	77	1.20	35	0.76	120	48.85	1.000	1.0
	77	0	0	517	90591	1810	2	85	0.30	35	0.81	120	49.23	1.000	1.0
	77	0	0	644	91991	820	1	86	0.18	31	31.42	119	45.52	1.000	10.0
	77	0	0	661	91991	1147	1	77	3.25	31	19.10	120	5.90	1.000	1.0
	77	0	0	678	91991	1540	2	7	1.64	31	2.40	120	41.09	1.000	7.0
	77	0	0	753	92591	1541	3	76	0.11	33	53.53	120	0.74	1.000	1.0
	77	0	0	755	92591	1809	4	76	2.70	34	0.65	120	16.13	1.000	10.0
	77	0	0	758	92691	1000	4	87	1.87	34	4.15	120	19.32	1.000	30.0
	77	0	0	772	92791	1628	1	55	3.20	33	57.64	119	35.97	1.000	12.5
	77	0	0	858	101391	1621	2	88	0.06	37	23.21	123	23.61	1.000	3.0
	77	0	0	876	101691	858	3	7	0.61	37	45.55	127	28.69	1.000	8.0
	77	0	0	882	101691	1119	2	45	0.39	37	54.08	127	50.42	1.000	1.0
	77	0	0	920	103191	1619	4	55	0.10	39	1.46	127	40.12	1.000	2.0
	77	0	0	940	110391	1227	1	76	3.13	36	33.20	127	17.76	1.000	2.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	77	0	0	959	110591	754	4	55	1.61	37	12.84	122	30.85	1.000	5.0
Unid. small whale	78	0	0	12	72891	1754	4	76	1.87	32	46.90	118	1.47	1.000	1.0
	78	0	0	142	80591	1348	3	88	1.92	36	16.82	122	32.96	1.000	1.0
	78	0	0	222	81391	1930	3	34	0.17	40	5.41	129	30.84	1.000	1.0
	78	0	0	406	82891	1751	5	55	0.75	39	32.25	129	38.04	1.000	1.0
	78	0	0	422	83091	1331	1	85	0.35	38	30.13	124	22.35	1.000	1.0
	78	27	61	560	90691	1859	1	87	0.34	34	37.06	121	40.04	0.095	10.5
	78	0	0	660	91991	1133	1	77	1.99	31	21.28	120	6.40	1.000	1.0
	78	0	0	686	92091	1155	1	88	0.84	31	0.59	122	2.67	1.000	1.0
	78	0	0	693	92091	1823	3	77	4.17	31	14.75	123	20.72	1.000	3.3
	78	0	0	751	92591	1501	5	88	0.20	33	56.58	119	56.85	1.000	1.0
	78	0	0	752	92591	1537	3	76	1.74	33	54.19	120	0.85	1.000	1.0
	78	0	0	776	92791	1816	2	87	0.00	33	54.95	119	33.02	1.000	1.0
	78	0	0	799	92991	825	1	88	1.48	33	28.05	117	53.03	1.000	1.0
	78	0	0	864	101591	851	4	55	0.07	37	36.34	125	23.86	1.000	1.0
	78	0	0	870	101591	1638	3	77	0.30	37	46.96	126	51.76	1.000	1.0
	78	0	0	879	101691	942	3	77	2.48	37	44.96	127	33.35	1.000	1.0
	78	0	0	934	110291	1609	1	55	2.01	38	30.54	128	55.46	1.000	2.0
Unid. large whale	79	0	0	8	72891	1639	4	76	0.52	32	40.87	117	50.64	1.000	1.0
	79	0	0	10	72891	1724	4	55	4.04	32	43.45	117	57.20	1.000	9.3
	79	0	0	13	72891	1828	4	76	3.65	32	50.33	118	4.42	1.000	1.0
	79	0	0	63	73191	635	2	88	0.51	33	13.11	121	30.86	1.000	2.0
	79	0	0	76	73191	1112	3	88	2.27	33	16.44	122	1.17	1.000	1.0
	79	0	0	80	73191	1834	4	88	0.42	33	28.52	122	54.18	1.000	3.0
	79	0	0	83	73191	1912	4	88	3.40	33	29.68	122	59.73	1.000	20.7
	79	0	0	90	80191	848	4	55	1.64	33	32.09	123	26.38	1.000	1.0
	79	0	0	91	80191	858	4	88	0.28	33	32.25	123	28.47	1.000	1.0
	79	0	0	100	80191	1634	5	55	0.45	33	37.62	124	34.27	1.000	1.0
	79	0	0	117	80491	1545	3	88	1.19	36	1.28	122	26.05	1.000	3.0
	79	0	0	121	80491	1652	3	76	0.35	36	7.53	122	18.38	1.000	1.0
	79	0	0	217	81391	950	3	88	1.79	39	46.54	127	18.22	1.000	1.0
	79	0	0	457	90491	1351	3	87	3.90	35	23.21	123	25.85	1.000	16.0
	79	0	0	476	90591	1129	2	77	0.17	35	4.06	121	24.33	1.000	1.0
	79	0	0	482	90591	1311	1	76	4.80	35	8.13	121	15.31	1.000	2.0
	79	0	0	483	90591	1313	1	87	3.96	35	7.96	121	15.06	1.000	2.0
	79	0	0	537	90691	1603	2	88	1.27	34	48.04	121	12.77	1.000	1.0
	79	0	0	540	90691	1710	1	77	0.75	34	46.35	121	22.09	1.000	2.0
	79	0	0	588	90791	1914	4	55	1.33	33	53.64	123	27.46	1.000	1.0
	79	0	0	596	90991	1135	5	72	0.19	33	43.78	124	7.03	1.000	1.5
	79	0	0	598	90991	1819	4	88	2.61	33	18.88	125	4.17	1.000	1.0
	79	0	0	630	91491	1215	4	88	3.09	32	3.43	118	30.02	1.000	23.3
	79	0	0	631	91491	1241	4	88	1.99	32	4.95	118	32.73	1.000	1.0

Table 3. (Continued)

Primary Species		Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	79	0	0	716	92391	1620	4	88	0.94	32	48.72	122	28.53	1.000	1.0
	79	0	0	720	92491	807	4	19	1.31	33	5.45	121	58.58	1.000	1.0
	79	0	0	811	92991	1513	2	76	0.45	33	2.45	118	46.04	1.000	1.0
	79	0	0	848	100691	1541	5	77	0.10	37	4.92	122	52.61	1.000	1.0
	79	75	0	875	101691	756	3	55	0.17	37	49.38	127	24.04	0.450	2.3
	79	0	0	923	110191	1512	4	88	0.13	39	5.51	129	52.94	1.000	1.0
Unid. cetacean	96	0	0	52	73091	1408	3	87	0.94	33	5.74	120	50.35	0.000	1.0
	96	0	0	116	80491	1521	3	88	0.00	36	0.59	122	27.81	1.000	1.0
	96	0	0	260	81691	1252	2	87	1.70	41	45.87	125	57.04	1.000	1.0
	96	0	0	423	83091	1342	1	7	0.52	38	29.98	124	22.79	1.000	1.0
	96	0	0	577	90791	1318	0	88	0.72	34	13.97	122	48.28	1.000	3.0
	96	0	0	608	91291	1416	4	87	0.31	32	10.65	121	12.41	1.000	1.0
	96	0	0	616	91391	830	4	7	0.01	32	5.09	120	16.83	1.000	1.0
	96	0	0	620	91391	1338	4	88	0.32	31	56.74	119	19.59	1.000	3.0
Unid. object	97	0	0	22	72991	954	4	7	2.49	33	2.47	118	38.47	1.000	1.0
	97	0	0	127	80491	1929	2	55	0.00	36	8.84	121	57.82	1.000	1.0
	97	0	0	138	80591	1224	2	88	0.88	36	16.20	122	19.89	1.000	1.0
	97	0	0	221	81391	1759	3	76	0.20	40	2.28	129	8.27	1.000	1.0
	97	0	0	359	81891	1420	3	88	0.21	40	53.69	126	42.64	1.000	1.0
	97	0	0	404	82891	1201	4	88	0.28	40	4.33	128	35.72	1.000	1.0
	97	0	0	670	91991	1308	1	86	0.23	31	11.58	120	20.16	1.000	1.0
	97	0	0	691	92091	1555	3	88	2.47	31	8.84	122	51.43	1.000	1.0
	97	0	0	759	92691	1011	4	86	0.03	34	2.81	120	17.49	1.000	1.0
Unid. whale	98	0	0	684	92091	1040	1	88	1.52	31	1.52	121	51.96	1.000	1.0
B. edeni/borealis	99	0	0	97	80191	1335	5	77	1.64	33	36.07	124	16.63	1.000	1.0
	99	0	0	98	80191	1426	5	7	0.43	33	35.19	124	18.89	1.000	1.0
	99	0	0	454	90491	1103	3	72	0.27	35	27.39	123	51.78	1.000	2.5
Z. californianus	ZC	0	0	2	72891	1236	4	88	0.10	32	40.13	117	27.64	1.000	2.0
	ZC	0	0	3	72891	1255	4	76	0.98	32	39.81	117	26.96	1.000	1.0
	ZC	0	0	15	72991	624	4	55	0.06	32	43.92	118	19.78	1.000	1.0
	ZC	0	0	30	72991	1300	5	7	0.82	32	44.91	118	24.23	1.000	5.0
	ZC	17	0	32	72991	1357	4	76	0.63	32	45.57	118	31.98	0.013	27.0
	ZC	0	0	38	72991	1804	5	88	0.00	32	50.31	119	15.81	1.000	2.0
	ZC	0	0	41	72991	1850	5	88	0.02	32	52.29	119	23.79	0.000	1.0
	ZC	0	0	129	80591	706	3	7	0.06	36	10.89	121	50.24	1.000	1.0
	ZC	0	0	132	80591	818	2	55	0.08	36	13.21	121	53.70	1.000	1.0
	ZC	0	0	133	80591	820	2	77	1.26	36	13.38	121	54.31	0.000	1.0
	ZC	0	0	172	81091	1614	4	7	0.14	38	8.94	123	16.99	1.000	1.0
	ZC	0	0	183	81291	701	2	77	0.07	39	20.88	123	59.86	1.000	1.0

Table 3. (Continued)

Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
ZC	0	0	184	81291	720	1	77	0.11	39	21.70	124	4.26	1.000	1.0
ZC	0	0	213	81391	809	3	55	0.26	39	45.70	126	53.95	1.000	1.0
ZC	0	0	285	81791	742	1	76	0.10	41	33.65	124	39.09	1.000	1.0
ZC	0	0	294	81791	1009	1	7	0.00	41	32.10	124	30.38	1.000	1.0
ZC	0	0	296	81791	1012	1	7	0.20	41	32.05	124	29.50	1.000	1.0
ZC	0	0	297	81791	1025	1	7	0.06	41	31.87	124	26.36	1.000	1.0
ZC	0	0	298	81791	1026	1	76	0.18	41	31.85	124	26.01	1.000	1.0
ZC	0	0	299	81791	1028	1	76	1.19	41	31.82	124	25.50	1.000	1.0
ZC	0	0	301	81791	1030	1	76	0.24	41	31.79	124	25.01	1.000	1.0
ZC	0	0	332	81791	1524	1	76	0.02	41	58.17	124	22.20	1.000	1.0
ZC	0	0	354	81891	1023	4	88	0.02	41	17.63	125	55.83	1.000	1.0
ZC	0	0	355	81891	1046	3	77	0.35	41	15.08	126	0.86	1.000	1.0
ZC	0	0	387	82091	904	1	76	0.48	40	25.74	124	47.17	1.000	2.0
ZC	0	0	395	82091	1020	1	55	0.01	40	29.83	124	34.77	1.000	1.0
ZC	0	0	428	83191	707	2	7	0.12	39	20.27	123	56.68	1.000	1.0
ZC	0	0	429	83191	833	2	55	0.00	39	15.47	124	8.26	1.000	1.0
ZC	0	0	432	83191	1105	3	72	0.00	39	4.85	124	33.83	1.000	1.0
ZC	0	0	492	90591	1452	1	77	0.00	35	6.87	121	12.21	1.000	1.0
ZC	0	0	501	90591	1620	2	76	1.55	35	5.07	121	1.53	1.000	1.0
ZC	0	0	509	90591	1741	1	55	0.03	35	0.40	120	53.60	1.000	1.0
ZC	40	0	528	90691	1147	0	87	1.14	34	56.25	120	44.93	0.125	3.5
ZC	0	0	532	90691	1553	1	7	0.06	34	48.90	121	10.72	1.000	1.0
ZC	0	0	535	90691	1601	2	88	0.29	34	48.27	121	12.23	1.000	1.0
ZC	0	0	555	90691	1817	2	7	0.75	34	40.78	121	32.02	1.000	1.0
ZC	0	0	566	90791	853	0	77	0.49	34	28.58	122	1.78	1.000	19.0
ZC	0	0	618	91391	1130	4	87	0.12	31	56.86	119	46.64	1.000	1.0
ZC	0	0	632	91491	1344	4	88	0.01	31	57.77	118	43.31	1.000	1.0
ZC	0	0	653	91991	1001	1	7	0.02	31	26.40	119	51.13	1.000	1.0
ZC	0	0	667	91991	1250	1	87	0.43	31	13.38	120	16.59	1.000	1.0
ZC	0	0	668	91991	1305	1	87	0.25	31	11.96	120	19.42	1.000	1.0
ZC	0	0	669	91991	1306	1	76	0.33	31	11.80	120	19.73	1.000	1.0
ZC	0	0	717	92391	1845	4	77	0.01	33	1.15	122	2.69	1.000	1.0
ZC	75	17	719	92491	806	4	87	1.48	33	5.40	121	58.70	0.085	12.8
ZC	0	0	721	92491	946	4	87	0.05	33	9.37	121	53.65	1.000	1.0
ZC	74	0	727	92491	1304	4	7	0.56	33	15.67	121	27.39	0.227	3.3
ZC	0	0	741	92591	1030	4	76	0.14	33	43.55	120	14.89	1.000	2.0
ZC	0	0	742	92591	1036	4	76	0.01	33	44.04	120	13.78	1.000	1.0
ZC	0	0	743	92591	1051	4	19	0.00	33	45.40	120	10.85	1.000	1.0
ZC	0	0	745	92591	1122	4	76	0.43	33	46.61	120	7.81	1.000	1.0
ZC	0	0	747	92591	1138	4	76	0.08	33	48.03	120	6.39	1.000	1.0
ZC	0	0	748	92591	1139	4	88	0.35	33	48.15	120	6.14	1.000	2.0
ZC	16	17	754	92591	1626	4	87	1.70	33	52.76	120	6.90	0.005	250.0
ZC	0	0	778	92891	753	2	55	0.50	33	53.36	119	22.96	1.000	1.0
ZC	0	0	779	92891	759	2	55	0.10	33	53.79	119	21.64	1.000	1.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	ZC	0	0	780	92891	800	2	87	0.00	33	53.83	119	21.52	1.000	1.0
	ZC	0	0	781	92891	804	2	76	0.85	33	54.17	119	20.49	1.000	1.0
	ZC	16	0	782	92891	930	1	88	0.35	33	52.86	119	17.87	0.330	17.3
	ZC	0	0	784	92891	1044	1	55	0.03	33	46.84	119	5.74	1.000	1.0
	ZC	0	0	785	92891	1228	1	76	0.41	33	47.58	119	5.17	1.000	1.0
	ZC	0	0	786	92891	1230	1	76	0.04	33	47.46	119	4.71	1.000	1.0
	ZC	0	0	787	92891	1245	1	76	0.49	33	45.72	119	2.04	1.000	1.0
	ZC	0	0	788	92891	1306	3	88	0.29	33	43.33	118	58.67	1.000	1.0
	ZC	0	0	789	92891	1311	3	76	0.00	33	42.77	118	57.92	1.000	1.0
	ZC	0	0	797	92991	743	0	76	0.38	33	32.37	117	58.82	1.000	2.0
	ZC	0	0	803	92991	1058	1	76	0.50	33	23.85	117	59.87	1.000	8.0
	ZC	0	0	805	92991	1256	2	55	0.21	33	13.03	118	20.64	1.000	1.0
	ZC	17	0	807	92991	1310	2	55	0.08	33	11.92	118	23.12	0.002	176.3
	ZC	0	0	809	92991	1458	2	87	0.21	33	3.72	118	43.11	1.000	4.0
	ZC	17	0	810	92991	1508	2	7	0.45	33	2.90	118	45.17	0.002	296.8
	ZC	17	0	812	92991	1552	2	7	1.11	33	1.50	118	51.62	0.080	51.0
	ZC	0	0	817	93091	1023	4	76	0.09	32	41.05	119	42.09	1.000	1.0
	ZC	0	0	819	93091	1125	4	86	0.20	32	36.85	119	50.62	1.000	1.0
	ZC	0	0	830	100591	1141	2	77	0.05	36	0.97	125	44.68	1.000	1.0
	ZC	0	0	844	100691	1233	4	87	0.04	36	49.18	123	29.32	1.000	1.0
	ZC	22	0	850	100691	1554	5	55	0.17	37	6.55	122	49.05	0.293	10.3
	ZC	0	0	854	101391	1447	2	7	0.11	37	21.03	123	8.94	1.000	2.0
	ZC	0	0	860	101391	1721	1	76	0.29	37	24.39	123	35.63	1.000	1.0
	ZC	0	0	862	101391	1756	1	7	0.39	37	25.20	123	43.68	1.000	1.0
	ZC	0	0	895	102191	1148	4	76	0.40	34	1.11	121	8.57	1.000	1.0
	ZC	0	0	911	102591	1121	3	7	0.44	38	4.92	123	36.14	1.000	1.0
	ZC	0	0	958	110591	729	4	76	0.03	37	10.20	122	35.63	1.000	1.0
M. angustirostis	MA	0	0	4	72891	1439	4	76	1.40	32	38.45	117	41.17	1.000	1.0
	MA	0	0	126	80491	1902	2	55	0.22	36	9.20	122	3.84	1.000	1.0
	MA	0	0	168	80991	725	4	76	0.60	38	7.11	126	47.55	1.000	1.0
	MA	0	0	191	81291	1122	2	34	0.08	39	29.74	124	54.56	1.000	1.0
	MA	0	0	211	81291	1949	2	76	0.39	39	40.23	126	28.20	1.000	1.0
	MA	0	0	227	81591	1908	3	76	0.07	42	1.25	127	17.93	1.000	1.0
	MA	0	0	241	81691	918	0	87	0.98	41	53.67	126	41.23	1.000	1.0
	MA	0	0	259	81691	1248	2	76	1.94	41	46.03	125	58.08	1.000	1.0
	MA	0	0	262	81691	1310	2	76	1.76	41	47.79	125	55.34	1.000	1.0
	MA	0	0	264	81691	1316	2	76	0.66	41	46.98	125	54.12	1.000	1.0
	MA	0	0	276	81691	1807	1	88	0.16	41	37.75	125	10.53	1.000	1.0
	MA	0	0	282	81691	1937	2	87	0.59	41	33.84	124	58.08	1.000	1.0
	MA	0	0	356	81891	1123	4	77	0.06	41	11.35	126	8.72	1.000	1.0
	MA	0	0	357	81891	1134	4	55	0.28	41	10.27	126	11.03	1.000	1.0
	MA	0	0	365	81991	923	3	34	0.09	39	31.78	126	44.59	1.000	1.0
	MA	0	0	369	81991	1146	2	76	0.06	39	46.66	126	15.87	1.000	1.0

Table 3. (Continued)

Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
MA	0	0	370	81991	1151	2	76	0.50	39	47.16	126	14.78	1.000	1.0
MA	0	0	375	81991	1509	2	76	0.29	40	6.67	125	32.46	1.000	1.0
MA	0	0	386	81991	1914	1	34	0.06	40	24.93	124	54.77	1.000	1.0
MA	0	0	393	82091	959	1	76	0.45	40	29.14	124	38.32	1.000	1.0
MA	0	0	402	82891	722	3	55	0.42	40	30.51	127	47.46	1.000	1.0
MA	0	0	409	83091	753	2	55	0.34	38	40.73	125	30.84	1.000	1.0
MA	0	0	414	83091	1135	2	76	0.04	38	31.25	124	46.98	1.000	1.0
MA	0	0	416	83091	1148	1	55	1.23	38	31.52	124	45.92	1.000	1.0
MA	0	0	418	83091	1231	1	7	0.15	38	31.48	124	36.66	1.000	1.0
MA	0	0	421	83091	1318	1	7	0.20	38	30.43	124	25.63	1.000	1.0
MA	0	0	433	83191	1153	2	87	0.49	39	0.57	124	43.81	1.000	1.0
MA	0	0	436	83191	1212	2	88	0.16	38	59.66	124	47.68	1.000	1.0
MA	0	0	461	90491	1606	4	76	0.02	35	20.12	122	58.37	1.000	1.0
MA	0	0	480	90591	1244	1	7	0.77	35	6.55	121	19.16	1.000	1.0
MA	0	0	485	90591	1315	1	76	0.59	35	7.73	121	14.70	1.000	1.0
MA	0	0	498	90591	1557	2	55	0.50	35	6.88	121	5.98	1.000	1.0
MA	0	0	502	90591	1624	2	76	0.10	35	4.67	121	0.63	1.000	1.0
MA	0	0	507	90591	1730	2	7	0.10	35	0.46	120	55.47	1.000	1.0
MA	0	0	545	90691	1732	2	7	0.01	34	45.57	121	24.68	1.000	1.0
MA	0	0	556	90691	1819	2	87	0.80	34	40.66	121	32.31	1.000	1.0
MA	0	0	564	90791	811	0	88	0.05	34	29.71	121	56.05	1.000	1.0
MA	0	0	569	90791	954	1	88	0.67	34	27.96	122	13.70	1.000	1.0
MA	0	0	578	90791	1320	0	88	0.49	34	13.83	122	48.64	1.000	1.0
MA	0	0	607	91291	1407	4	77	0.11	32	10.86	121	14.11	1.000	1.0
MA	0	0	628	91491	1203	4	55	0.22	32	4.45	118	27.70	1.000	1.0
MA	0	0	688	92091	1315	2	76	2.65	31	3.68	122	18.17	1.000	1.0
MA	0	0	728	92491	1340	3	76	0.04	33	17.61	121	23.46	1.000	1.0
MA	0	0	739	92591	1005	4	76	0.04	33	41.30	120	20.16	1.000	1.0
MA	0	0	740	92591	1026	3	76	0.45	33	43.11	120	15.83	1.000	1.0
MA	0	0	740	92591	1011	4	7	0.00	33	41.82	120	18.96	1.000	1.0
MA	0	0	806	92991	1257	2	77	0.05	33	12.96	118	20.79	1.000	1.0
MA	0	0	813	92991	1739	2	7	0.81	32	57.92	119	7.27	1.000	1.0
MA	0	0	820	93091	1136	4	76	1.58	32	35.77	119	52.76	1.000	1.0
MA	0	0	829	100591	1104	2	87	1.12	35	57.32	125	52.03	1.000	1.0
MA	0	0	842	100691	1104	4	55	0.08	36	43.67	123	48.58	1.000	1.0
MA	0	0	845	100691	1311	4	76	0.48	36	52.46	123	21.32	1.000	1.0
MA	0	0	861	101391	1726	1	76	0.41	37	24.50	123	36.85	1.000	1.0
MA	0	0	865	101591	917	4	55	0.00	37	36.57	125	26.69	1.000	1.0
MA	0	0	886	101691	1438	0	88	0.31	37	58.94	128	34.33	1.000	1.0
MA	0	0	899	102191	1414	4	76	0.23	34	3.95	121	34.83	1.000	1.0
MA	0	0	904	102291	856	2	87	0.05	34	17.27	122	39.27	1.000	1.0
MA	0	0	913	103191	744	3	88	0.02	38	39.86	125	52.59	1.000	1.0
MA	0	0	915	103191	1046	3	88	0.16	38	47.61	126	30.17	1.000	1.0
MA	0	0	916	103191	1101	3	76	0.28	38	47.87	126	33.72	1.000	1.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	MA	0	0	917	103191	1128	3	76	0.13	38	47.21	126	40.38	1.000	1.0
	MA	0	0	922	110191	1223	4	77	0.02	38	59.95	129	11.46	1.000	1.0
	MA	0	0	928	110291	1333	3	87	0.88	38	45.57	128	32.83	1.000	1.0
	MA	0	0	930	110291	1427	2	7	0.67	38	39.24	128	41.65	1.000	1.0
	MA	0	0	942	110391	1357	2	76	0.78	36	40.37	127	4.11	1.000	1.0
	MA	0	0	950	110491	914	4	55	0.19	36	59.85	126	0.96	1.000	1.0
	MA	0	0	954	110491	1258	4	55	0.13	37	15.78	125	34.38	1.000	1.0
<u>A.</u> <u>townsendii</u>	AT	0	0	150	80691	932	2	76	0.20	36	38.22	124	28.97	1.000	1.0
<u>C.</u> <u>ursinus</u>	CU	0	0	112	80491	907	5	76	1.16	35	29.26	123	34.64	1.000	1.0
	CU	0	0	143	80591	1450	4	76	0.19	36	20.33	122	43.17	1.000	1.0
	CU	0	0	145	80591	1640	3	77	0.27	36	23.56	123	6.46	1.000	1.0
	CU	0	0	171	81091	1612	4	76	0.19	38	8.68	123	17.39	1.000	1.0
	CU	0	0	182	81291	653	2	88	0.48	39	20.54	123	57.92	1.000	1.0
	CU	0	0	187	81291	930	2	7	0.02	39	25.98	124	30.86	1.000	1.0
	CU	0	0	189	81291	1049	2	88	0.26	39	28.70	124	46.97	1.000	1.0
	CU	0	0	192	81291	1130	2	77	0.06	39	29.91	124	56.40	1.000	1.5
	CU	0	0	193	81291	1136	2	77	1.19	39	30.03	124	57.86	1.000	2.8
	CU	0	0	194	81291	1148	2	55	0.12	39	28.79	124	59.55	1.000	1.0
	CU	0	0	195	81291	1152	2	55	0.16	39	28.86	125	0.29	1.000	1.0
	CU	0	0	196	81291	1238	2	76	1.17	39	31.08	125	10.58	1.000	1.0
	CU	0	0	201	81291	1605	2	76	0.06	39	36.21	125	46.99	1.000	1.0
	CU	0	0	206	81291	1734	2	88	0.78	39	38.95	126	7.81	1.000	1.0
	CU	0	0	208	81291	1803	2	88	1.38	39	39.93	126	14.61	1.000	1.0
	CU	0	0	229	81591	1934	1	55	0.36	41	59.21	127	12.51	1.000	1.0
	CU	0	0	233	81691	732	2	55	0.30	41	57.67	127	2.94	1.000	1.0
	CU	0	0	251	81691	1111	1	88	0.50	41	50.37	126	18.52	1.000	1.0
	CU	0	0	253	81691	1123	1	88	0.23	41	48.54	126	16.70	1.000	1.0
	CU	0	0	254	81691	1128	1	88	0.08	41	48.17	126	15.82	1.000	1.0
	CU	0	0	255	81691	1130	1	77	0.15	41	48.10	126	15.22	1.000	1.0
	CU	0	0	269	81691	1457	1	55	0.24	41	41.20	125	30.66	1.000	1.0
	CU	0	0	286	81791	745	1	87	0.08	41	33.59	124	38.48	1.000	1.0
	CU	0	0	288	81791	805	2	77	0.02	41	32.98	124	33.52	1.000	1.0
	CU	0	0	295	81791	1010	1	76	0.77	41	32.09	124	30.13	1.000	2.0
	CU	0	0	348	81791	1934	2	55	0.00	41	39.05	125	13.23	1.000	1.0
	CU	0	0	389	82091	913	1	15	0.09	40	26.59	124	45.47	1.000	1.0
	CU	0	0	468	90591	918	3	7	0.01	35	10.67	121	48.75	1.000	2.0
	CU	0	0	469	90591	933	3	76	1.56	35	9.89	121	45.30	1.000	1.0
	CU	22	0	470	90591	953	3	76	0.31	35	8.03	121	41.80	0.290	3.5
	CU	0	0	473	90591	1112	2	55	0.93	35	3.19	121	28.00	1.000	1.0
	CU	0	0	475	90591	1127	2	55	0.26	35	3.95	121	24.79	1.000	1.0
	CU	0	0	481	90591	1308	1	87	0.64	35	8.09	121	15.98	1.000	2.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	CU	0	0	484	90591	1313	1	87	0.27	35	7.92	121	14.98	1.000	1.0
	CU	0	0	488	90591	1434	1	88	0.00	35	8.77	121	15.33	1.000	1.0
	CU	0	0	489	90591	1443	1	88	0.41	35	7.86	121	13.82	1.000	1.0
	CU	0	0	493	90591	1453	1	72	0.41	35	6.67	121	11.88	1.000	1.0
	CU	0	0	494	90591	1456	1	88	0.00	35	6.45	121	11.36	1.000	1.0
	CU	0	0	499	90591	1607	2	7	0.01	35	6.10	121	4.06	1.000	1.0
	CU	0	0	500	90591	1609	2	87	0.59	35	5.88	121	3.54	1.000	1.0
	CU	0	0	504	90591	1631	2	76	1.20	35	4.06	120	59.29	1.000	1.0
	CU	0	0	506	90591	1728	2	87	0.09	35	0.44	120	55.81	1.000	1.0
	CU	0	0	511	90591	1752	1	85	0.06	35	0.56	120	53.22	1.000	1.0
	CU	0	0	513	90591	1758	1	85	0.03	35	0.76	120	51.73	1.000	1.0
	CU	0	0	534	90691	1557	1	76	0.58	34	48.61	121	11.41	1.000	1.0
	CU	0	0	546	90691	1733	2	87	0.51	34	45.42	121	24.87	1.000	1.0
	CU	0	0	549	90691	1755	2	76	1.88	34	42.93	121	28.01	1.000	1.0
	CU	0	0	557	90691	1831	0	7	0.33	34	39.67	121	34.58	1.000	1.0
	CU	0	0	562	90791	714	1	55	0.77	34	33.93	121	48.01	1.000	1.0
	CU	0	0	575	90791	1225	0	7	0.66	34	18.08	122	39.78	1.000	1.0
	CU	0	0	635	91591	751	3	76	0.50	31	54.00	118	28.20	1.000	1.0
	CU	0	0	638	91991	734	1	7	0.22	31	33.84	119	39.92	1.000	1.0
	CU	0	0	639	91991	739	1	7	0.77	31	33.46	119	40.85	1.000	1.0
	CU	0	0	640	91991	740	1	88	0.03	31	33.39	119	41.04	1.000	1.0
	CU	0	0	649	91991	935	1	87	0.04	31	28.14	119	51.38	1.000	1.0
	CU	0	0	651	91991	949	1	86	0.15	31	27.52	119	51.46	1.000	1.5
	CU	0	0	662	91991	1153	1	7	0.13	31	18.58	120	6.98	1.000	1.0
	CU	0	0	680	91991	1647	2	76	0.16	31	5.02	120	46.76	1.000	1.0
	CU	0	0	687	92091	1310	2	7	0.56	31	3.53	122	17.25	1.000	1.0
Unid. otariid	UO	0	0	114	80491	1001	5	55	0.43	35	32.19	123	24.73	1.000	1.0
	UO	0	0	123	80491	1748	3	55	0.23	36	9.33	122	17.01	1.000	1.0
	UO	0	0	128	80591	659	3	76	1.32	36	10.41	121	51.62	1.000	1.0
	UO	0	0	159	80791	908	4	55	1.15	37	0.73	127	23.23	1.000	1.0
	UO	0	0	167	80891	1542	3	34	0.39	37	51.79	127	23.91	1.000	1.0
	UO	0	0	180	81191	846	5	55	0.03	39	16.77	123	56.93	1.000	1.0
	UO	0	0	205	81291	1725	2	7	0.10	39	38.59	126	5.58	1.000	1.0
	UO	0	0	216	81391	823	3	55	0.06	39	45.68	126	57.47	1.000	1.0
	UO	0	0	220	81391	1136	4	7	0.55	39	47.67	127	39.82	1.000	1.0
	UO	0	0	249	81691	1025	1	77	1.87	41	52.40	126	28.51	1.000	1.0
	UO	0	0	266	81691	1402	1	77	0.05	41	43.21	125	43.91	1.000	1.0
	UO	0	0	287	81791	757	2	7	1.91	41	33.25	124	35.62	1.000	1.0
	UO	0	0	290	81791	816	1	88	0.29	41	32.75	124	30.97	1.000	2.0
	UO	0	0	291	81791	817	1	77	0.17	41	32.74	124	30.71	1.000	1.0
	UO	0	0	334	81791	1631	2	55	0.19	41	51.33	124	36.85	1.000	1.0
	UO	0	0	340	81791	1703	2	88	0.00	41	48.24	124	43.69	1.000	1.0
	UO	0	0	342	81791	1754	3	76	0.02	41	43.69	124	54.84	1.000	1.0

Table 3. (Continued)

	Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
	UO	0	0	358	81891	1155	3	77	0.47	41	7.98	126	15.42	1.000	1.0
	UO	0	0	390	82091	920	1	7	0.43	40	27.18	124	43.72	1.000	1.0
	UO	0	0	442	90191	712	5	55	0.08	37	30.45	124	58.54	1.000	1.0
	UO	0	0	471	90591	1032	3	88	0.97	35	2.70	121	36.63	1.000	1.0
	UO	0	0	472	90591	1053	3	55	0.44	35	2.86	121	32.13	1.000	1.0
	UO	0	0	538	90691	1700	2	77	0.71	34	47.36	121	20.40	1.000	1.0
	UO	0	0	573	90791	1135	0	76	0.39	34	21.12	122	29.43	1.000	1.0
	UO	0	0	846	100691	1343	5	7	1.40	36	55.05	123	14.71	1.000	1.0
	UO	0	0	849	100691	1542	5	55	0.04	37	5.58	122	51.22	1.000	1.0
	UO	0	0	852	101391	1404	2	55	0.10	37	20.00	122	58.84	1.000	1.0
E. jubatus	EJ	0	0	157	80691	1537	3	77	0.15	36	46.69	125	45.01	1.000	1.0
Unid. pinniped	PU	0	0	175	81091	1930	3	55	0.20	38	21.05	123	23.93	1.000	1.0
	PU	0	0	190	81291	1118	2	88	1.48	39	29.63	124	53.60	1.000	1.0
	PU	0	0	252	81691	1121	1	77	0.38	41	48.95	126	17.11	1.000	1.0
	PU	0	0	279	81691	1917	1	77	0.77	41	34.21	125	3.34	1.000	1.0
	PU	0	0	360	81891	1504	4	77	0.19	40	48.82	126	51.34	1.000	1.0
	PU	0	0	420	83091	1235	1	87	0.00	38	31.39	124	35.83	1.000	1.0
	PU	0	0	434	83191	1202	2	88	0.40	38	59.81	124	45.65	1.000	1.0
	PU	0	0	439	83191	1231	1	88	0.76	38	59.28	124	51.42	1.000	1.0
	PU	0	0	497	90591	1555	2	55	0.23	35	7.04	121	6.35	1.000	1.0
	PU	0	0	541	90691	1713	1	77	0.09	34	46.01	121	22.81	1.000	1.0
	PU	0	0	542	90691	1714	1	77	0.29	34	45.95	121	23.00	1.000	1.0
	PU	0	0	567	90791	914	0	7	1.48	34	26.99	122	6.48	1.000	5.0
	PU	0	0	572	90791	1113	0	55	0.07	34	23.21	122	24.96	1.000	1.0
	PU	0	0	576	90791	1317	0	88	0.25	34	14.11	122	47.93	1.000	1.0
	PU	0	0	592	90991	947	5	87	0.34	33	39.45	123	58.77	1.000	1.0
	PU	0	0	642	91991	809	1	76	0.01	31	31.78	119	43.59	1.000	2.0
	PU	0	0	647	91991	917	1	86	0.28	31	29.07	119	48.69	1.000	1.0
	PU	0	0	654	91991	1007	1	77	0.00	31	25.87	119	52.22	1.000	1.0
	PU	0	0	659	91991	1103	1	77	0.33	31	21.93	120	3.18	1.000	1.0
	PU	0	0	663	91991	1207	0	86	0.20	31	17.30	120	9.66	1.000	1.0
	PU	0	0	664	91991	1221	1	55	1.35	31	16.02	120	12.38	1.000	1.0
	PU	0	0	666	91991	1232	1	76	1.71	31	15.14	120	14.34	1.000	1.0
	PU	0	0	672	91991	1347	2	55	1.14	31	7.12	120	24.71	1.000	1.0
	PU	0	0	676	91991	1507	2	7	0.03	31	2.94	120	34.54	1.000	1.0
	PU	0	0	679	91991	1542	2	88	1.24	31	2.37	120	41.46	1.000	1.0
	PU	0	0	738	92591	940	4	77	0.40	33	38.98	120	25.31	1.000	1.0
	PU	0	0	793	92891	1448	4	89	0.64	33	36.32	118	48.27	1.000	1.0
	PU	0	0	802	92991	1038	1	87	0.10	33	25.53	117	56.14	1.000	1.0
	PU	0	0	822	93091	1628	4	77	0.76	32	17.12	120	45.21	1.000	1.0
	PU	0	0	838	100591	1808	3	77	0.92	36	20.76	124	40.23	1.000	1.0
	PU	0	0	843	100691	1114	4	55	0.17	36	44.07	123	46.21	1.000	1.0
	PU	0	0	847	100691	1431	5	88	0.23	36	59.00	123	5.03	1.000	1.0

Table 3. (Continued)

Primary Species	Other Species		Sighting Number	Date MoDaYr	Time	Beaufort State	Observer Number	Perpdic. Distance	Latitude		Longitude		Primary Species	Group Size
PU	0	0	853	101391	1439	2	77	0.28	37	20.80	123	7.22	1.000	1.0
PU	0	0	855	101391	1451	2	87	0.38	37	21.14	123	9.84	1.000	1.0
PU	0	0	856	101391	1503	2	77	0.80	37	21.48	123	12.60	1.000	1.0
PU	0	0	884	101691	1231	1	77	1.81	37	55.88	128	6.08	1.000	1.0
PU	0	0	893	102191	1133	4	87	0.05	34	0.69	121	6.98	1.000	1.0
PU	0	0	912	102591	1411	4	7	0.19	37	51.74	124	10.24	1.000	1.0
PU	0	0	926	110291	1148	2	7	1.99	38	53.82	128	14.76	1.000	1.0
PU	0	0	944	110391	1429	3	77	0.05	36	43.85	126	58.55	1.000	1.0

Table 4. Summary of marine mammal sightings encountered during the 1991 CAMMS cruise. Included are on-effort sightings made by the primary observations team (excluding independent observer sightings). Group sizes are based on simple averages of the product of estimated group size multiplied by the proportion of the given species in the group for each observer.

Species Name (Scientific name)	Species Code	# of Sightings Total	Pure	Mixed	Average No. per Group
(005) Common dolphins (unid.) (*Delphinus delphis*)	05	10	8	2	75.8
(016) Common dolphins (longbeak) (*Delphinus delphis bairdii*)	16	13	9	4	183.8
(017) Common dolphins (shortbeak) (*Delphinus delphis delphis*)	17	129	100	29	97.9
(013) Striped dolphins (*Stenella coeruleoalba*)	13	24	5	19	43.3
(018) Bottlenose dolphins (*Tursiops truncatus*)	18	18	0	18	7.7
(021) Risso's dolphins (*Grampus griseus*)	21	30	14	16	15.7
(022) Pacific white-sided dolphins (*Lagenorhynchus obliquidens*)	22	12	7	5	24.6
(027) Northern right whale dolphin (*Lissodelphis borealis*)	27	16	10	6	15.7
(037) Killer whales (*Orcinus orca*)	37	5	5	0	4.4
Harbor porpoise (*Phocoena phocoena*)	40	32	31	0	4.4
Dall's porpoise (*Phocoenoides dalli*)	44	96	96	0	3.7
Sperm whales (*Physeter macrocephalus*)	46	13	10	3	4.6
Pygmy sperm whales (*Kogia breviceps*)	47	3	3	0	1.3

overall 47.46

Table 4. (continued).

Species Name (Scientific name)	Species Code	# of Sightings Total	Pure	Mixed	Average No. per Group
Unidentified ziphiid	49	7	7	0	2.4
Unidentified mesoplodont (*Mesoplodon* spp.)	51	5	5	0	1.6
Cuvier's beaked whales (*Ziphius cavirostris*)	61	14	14	0	1.9
Baird's beaked whales (*Berardius bairdii*)	63	1	1	0	4.0
Gray whales (*Eschrichtius robustus*)	69	0	0	0	-
Unidentified baleen whale (*Balaenoptera* spp.)	70	6	6	0	1.3
Minke whales (*Balaenoptera acutorostrata*)	71	5	4	1	1.0
Bryde's whales (*Balaenoptera edeni*)	72	1	1	0	2.0
Fin whales (*Balaenoptera physalus*)	74	22	18	4	1.8
Blue whales (*Balaenoptera musculus*)	75	50	39	11	2.0
Humpback whales (*Megaptera novaeangliae*)	76	11	11	0	3.0
Unidentified dolphins	77	21	21	0	4.7
Unidentified small whales	78	12	12	0	1.1
Unidentified large whales	79	15	15	0	1.3
Unidentified cetaceans	96	8	8	0	1.4
Unidentified whales	98	1	1	0	1.0
Unid. sei or Bryde's whales (*Balaenoptera edeni* or *borealis*)	99	2	2	0	1.0

Table 4. (continued).

Species Name (Scientific name)	Species Code	# of Sightings Total	Pure	Mixed	Average No. per Group
California sea lion (*Zalophus californianus*)	ZC	72	62	10	1.6
Harbor seal (*Phoca vitulina*)	PV	0	0	0	-
Northern elephant seal (*Mirounga angustirostris*)	MA	59	59	0	1.0
Guadalupe fur seal (*Arctocephalus townsendii*)	AT	0	0	0	-
Northern fur seal (*Callorhinus ursinus*)	CU	49	49	0	1.1
Unidentified otariid	UO	25	25	0	1.0
Northern sea lions (*Eumetopias jubatus*)	EJ	1	1	0	1.0
Unidentified pinniped	PU	33	33	0	1.1

Table 5. Summary of distance searched, marine mammal groups detected, and encounter rates by observers during the CAMMS cruise. All categories include only on-effort sightings and all, except the last (independent observers), include only sightings made by the primary observation team.

	Distance Searched (km)	Percent Distance Searched	Number Groups Detected	Percent Groups Detected	Detection Rate per 1000 km
All Data	10353	100	776	100	74.96
Island Strata	281	3	26	3	92.46
Non-Island	10071	97	750	97	74.47
Sea State Conditions					
Calm	2401	23	404	52	168.24
Rough	7957	77	372	48	46.75
Visibility Conditions					
Good	5966	58	321	41	53.80
Poor	4396	42	455	59	103.51
Regular Observers					
7	3465	17	113	15	32.61
55	3332	16	145	19	43.51
76	3504	17	185	24	52.80
77	3556	17	119	15	33.47
87	3539	17	92	12	25.99
88	3324	16	121	16	36.40
Independent Observers					
15	888	9	3	6	3.38
19	1178	11	1	2	0.85
34	2444	24	21	40	8.59
45	744	7	1	2	1.35
72	1310	13	9	17	6.87
83	897	9	1	2	1.11
85	1053	10	6	11	5.70
86	1030	10	8	15	7.77
89	490	5	3	6	6.12
99	302	3	0	0	0.00

Table 6. Effect of Weather on Searching Effort.

	Leg 1	Leg 2	Leg 3	Leg 4
Days in Leg	24	23	20	24
Hours Lost to Weather	55.8	106.5	22.0	127.5
Trackline Searched (km)	3707.9	2366.9	2560.6	1621.2

Figure 1. Proposed tracklines for the 1991 CAMMS cruise.

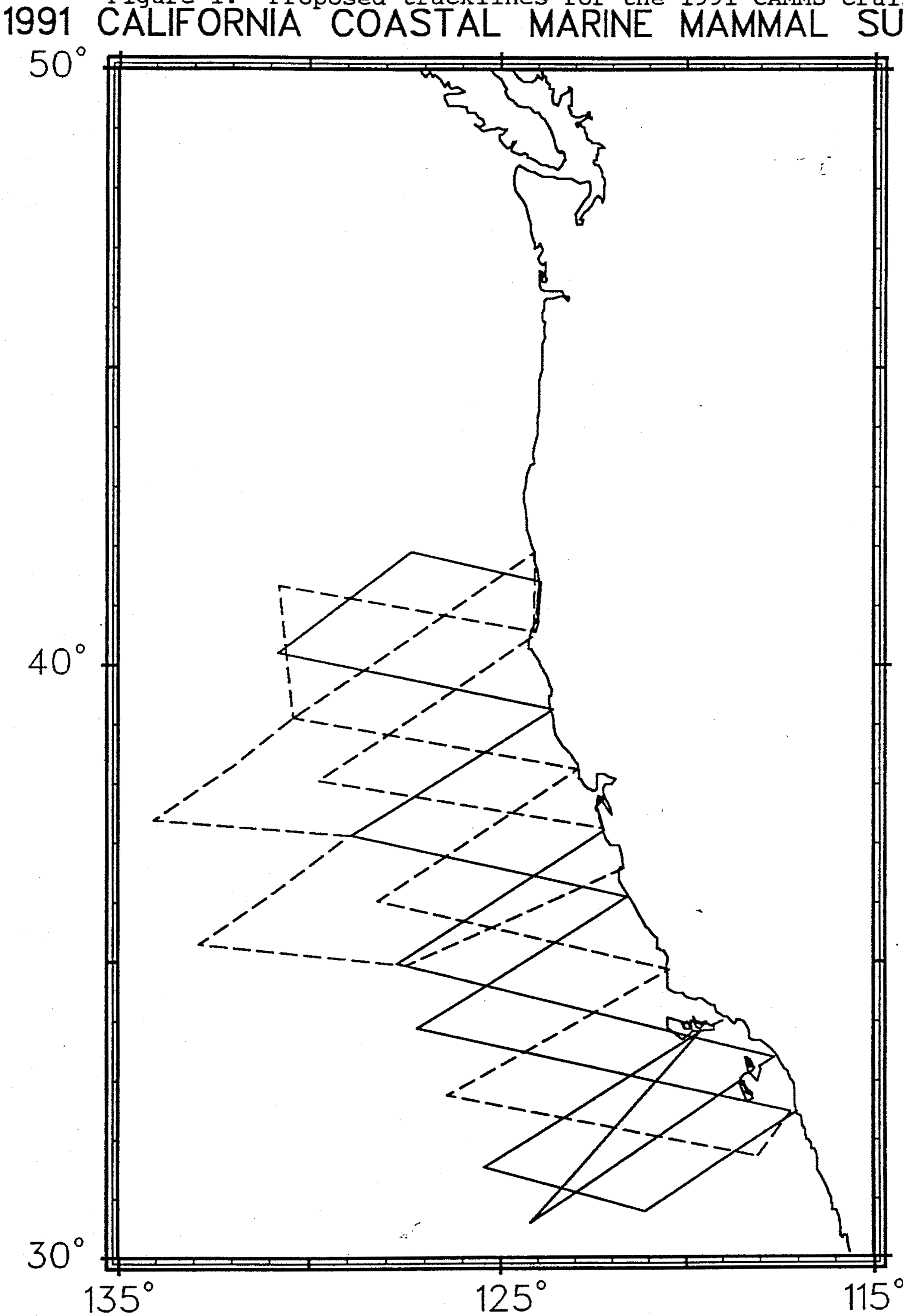
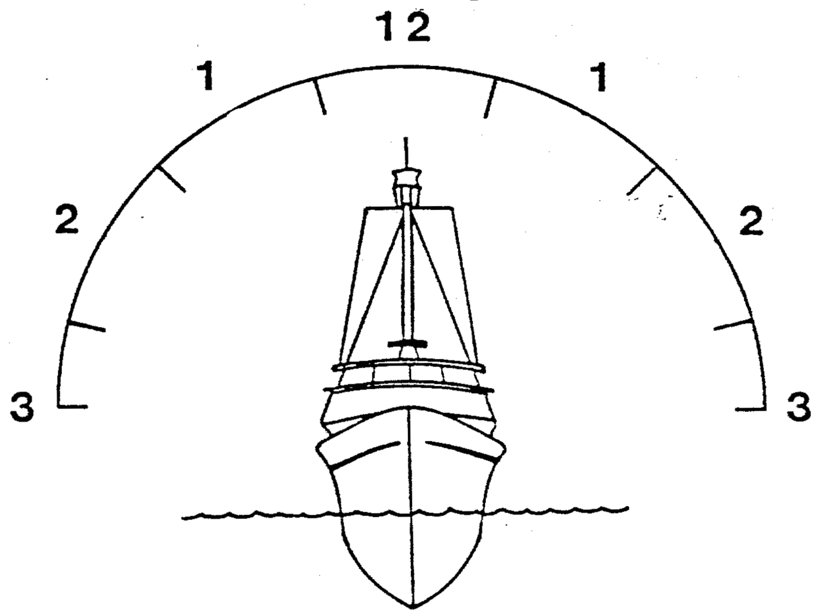
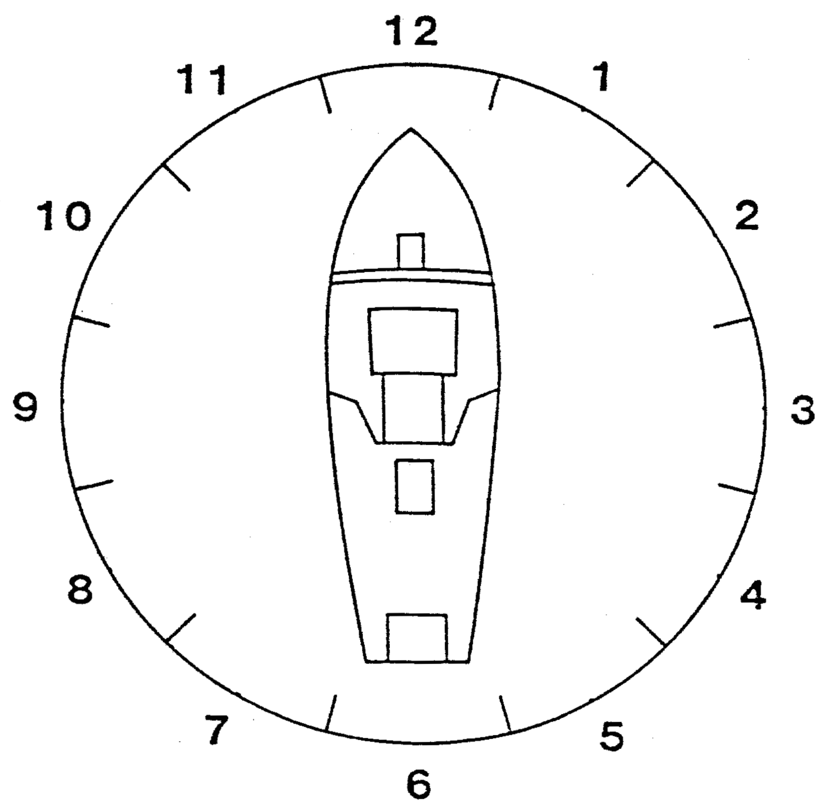


Figure 2. Vertical and horizontal sun position categories.



VERTICAL SUN POSITION



HORIZONTAL SUN POSITION

Figure 3. Research Ship Sighting Continuation Form

CRUISE #	DATE YEAR	MONTH	DAY	SIGHT #	SERIES #	LEG #	OBS. CODE
1	5	7	9	11	13	15	17

SKETCH FEATURES OF ANIMALS SIGHTED

SIGHTING SUMMARY

LIST ALL DIAGNOSTIC FEATURES OBSERVED
(INCLUDING ESTIMATED BODY LENGTH)

BEHAVIOR – (DESCRIBE AGGREGATION, MOVEMENT, BOW AND STERN RIDING, BLOWS, ETC.)

MOVEMENT OF SCHOOL : SPEED (KTS) ______ DIRECTION (RELATIVE TO BOW) ______

ASSOCIATED ANIMALS – (INCLUDE NUMBER AND SPECIES OF BIRDS)

PHOTOS. ROLL # ______

FRAME (S): # ______

TOTAL TIME OF OBSERVATION ______

ENVIR. COND. (RAIN, OVERCAST, FOG, CHOPPY) ______

CLOSEST DISTANCE OF OBSERVATION ______

AMT. OF TIME AT CLOSEST DISTANCE ______

TAGS ASSOCIATED WITH SIGHTING ______

METHOD OF OBSERVATION (EYE, 7x, 10x, 25x) ______

NOAA Form 88-208

Figure 4. Tracklines surveyed during the 1991 CAMMS cruise.

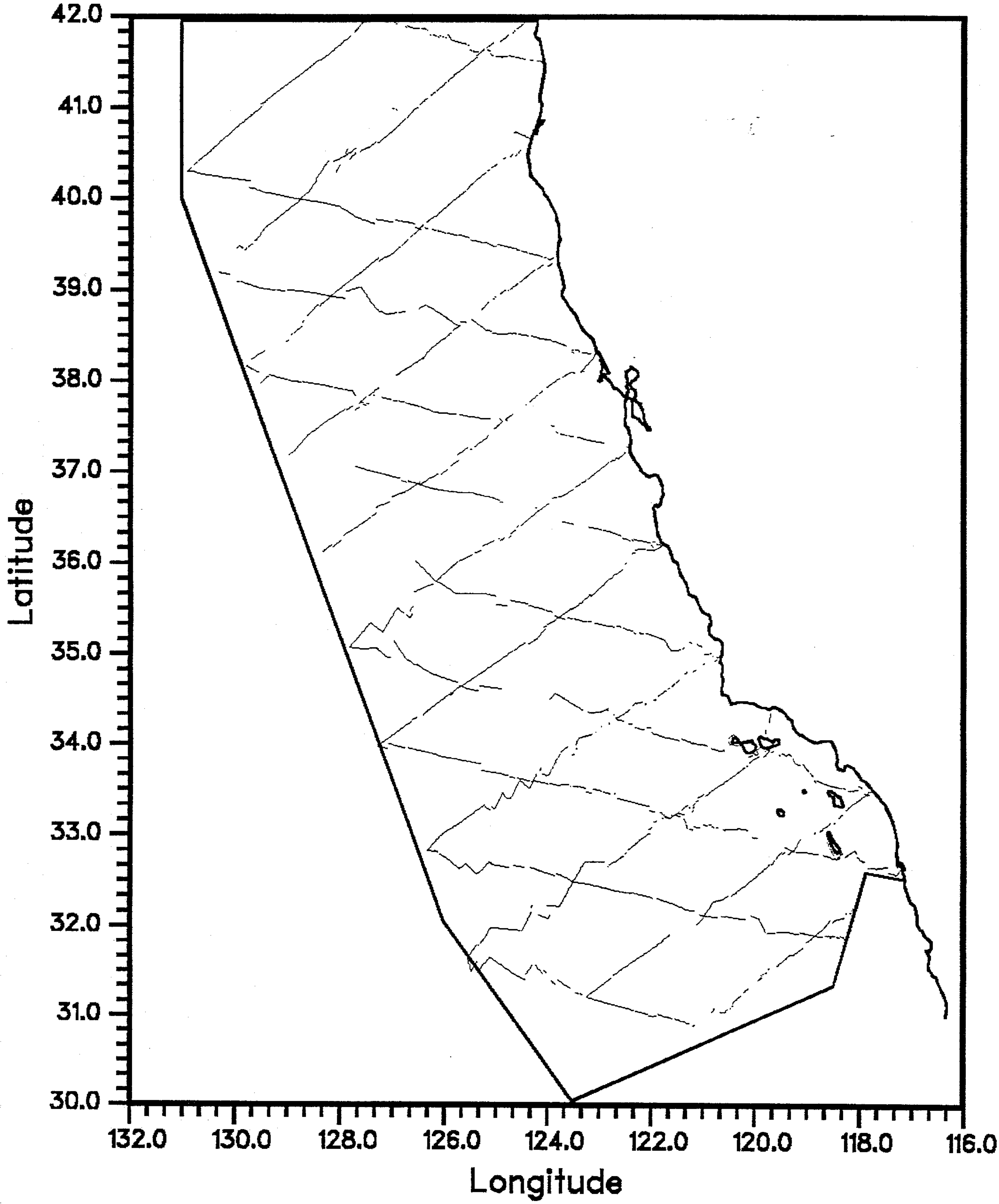


Figure 5. Tracklines surveyed during leg 1 of the 1991 CAMMS cruise.

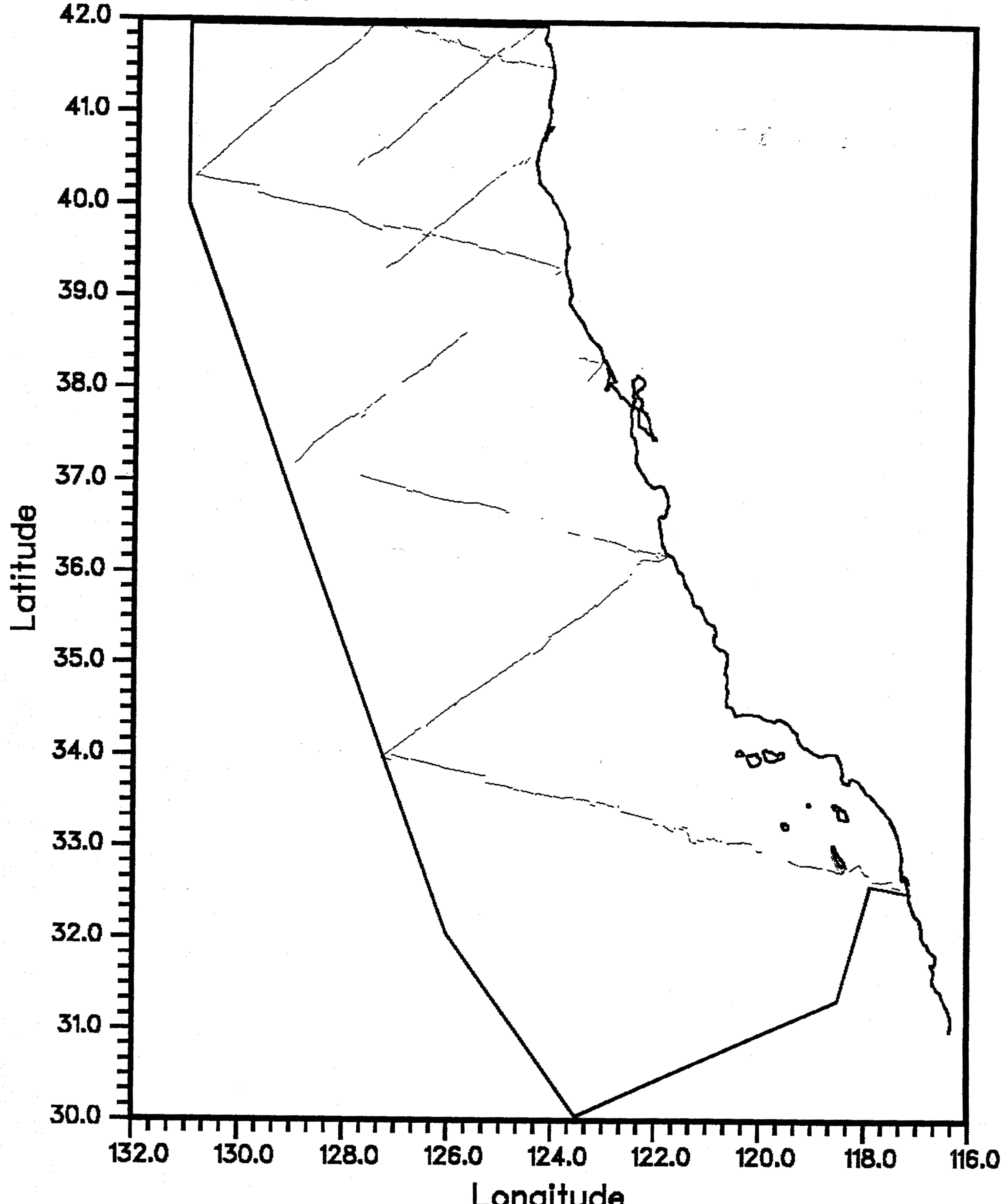


Figure 6. Tracklines surveyed during leg 2 of the 1991 CAMMS cruise.

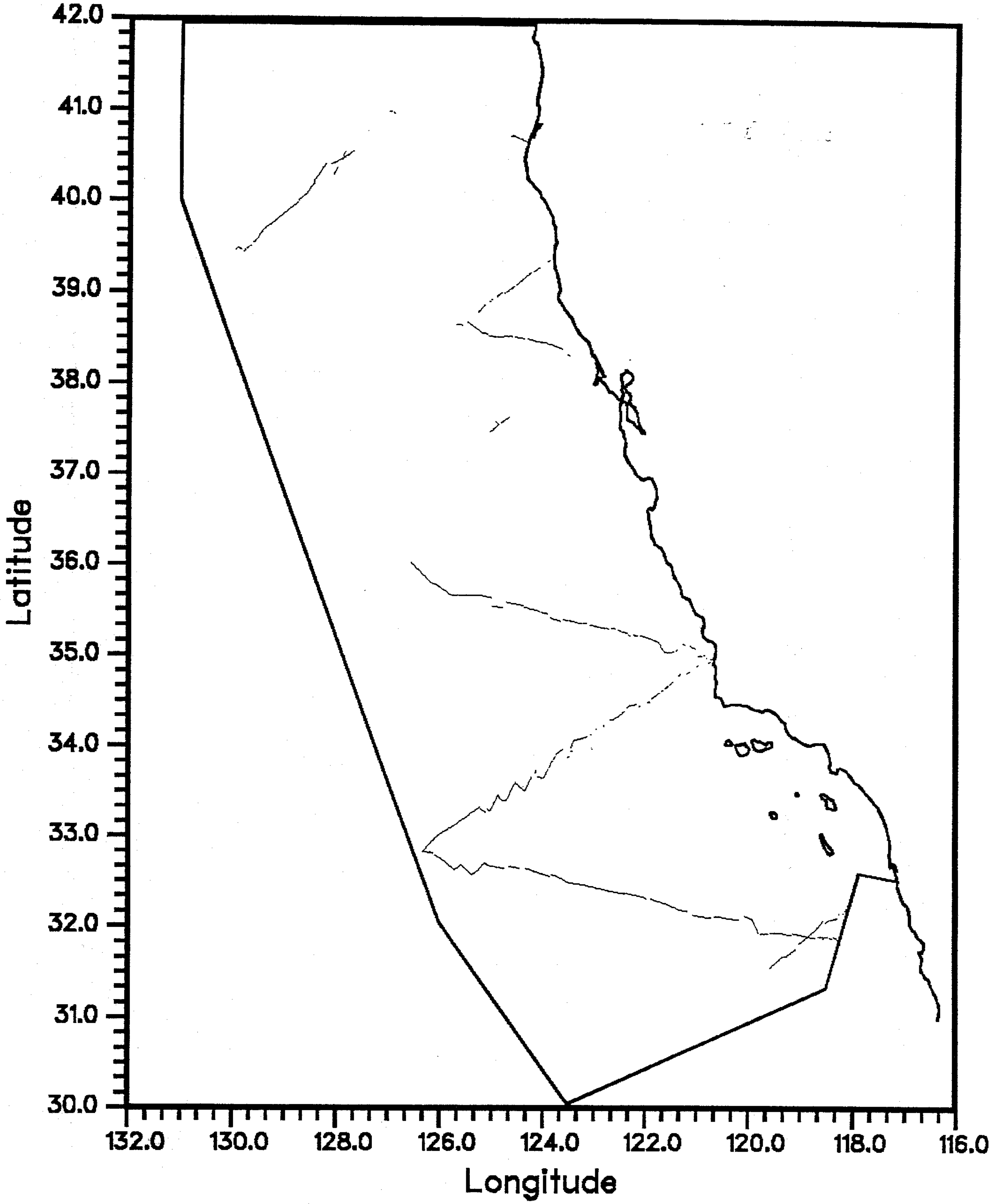


Figure 7. Tracklines surveyed during leg 3 of the 1991 CAMMS cruise.

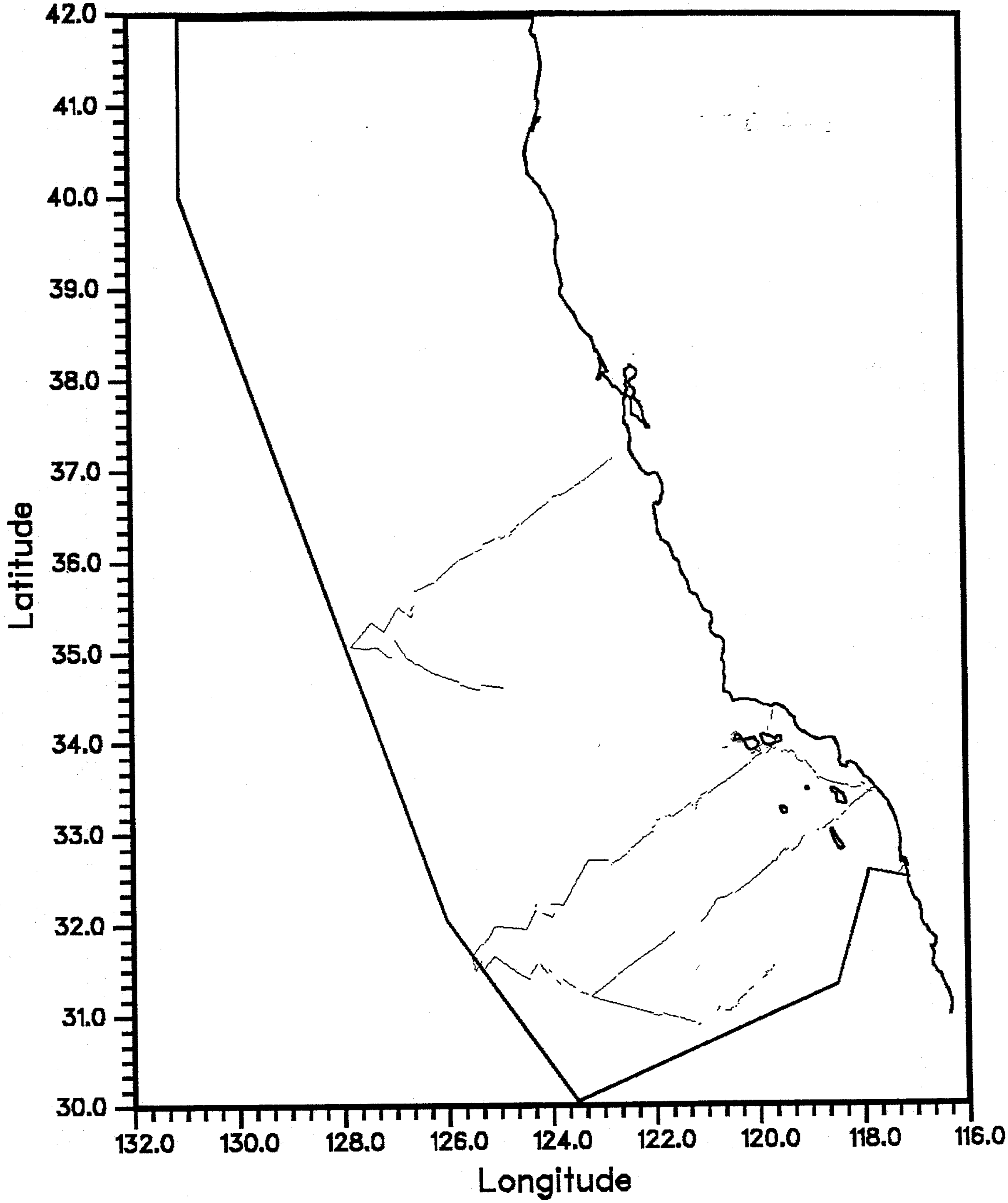


Figure 8. Tracklines surveyed during leg 4 of the 1991 CAMMS cruise.

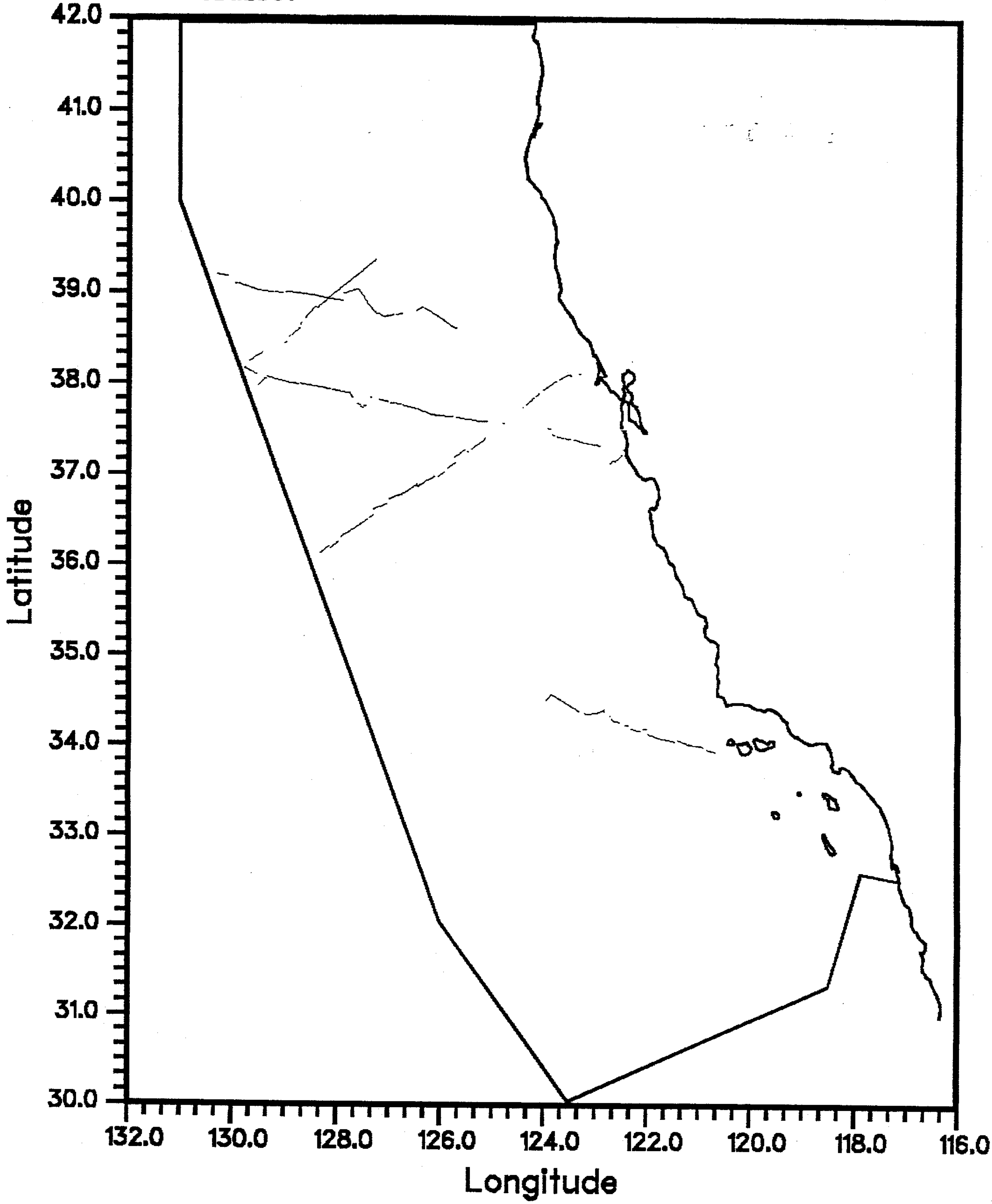


Figure 9. Tracklines surveyed in Beaufort sea states 0 through 2 during the 1991 CAMMS cruise.

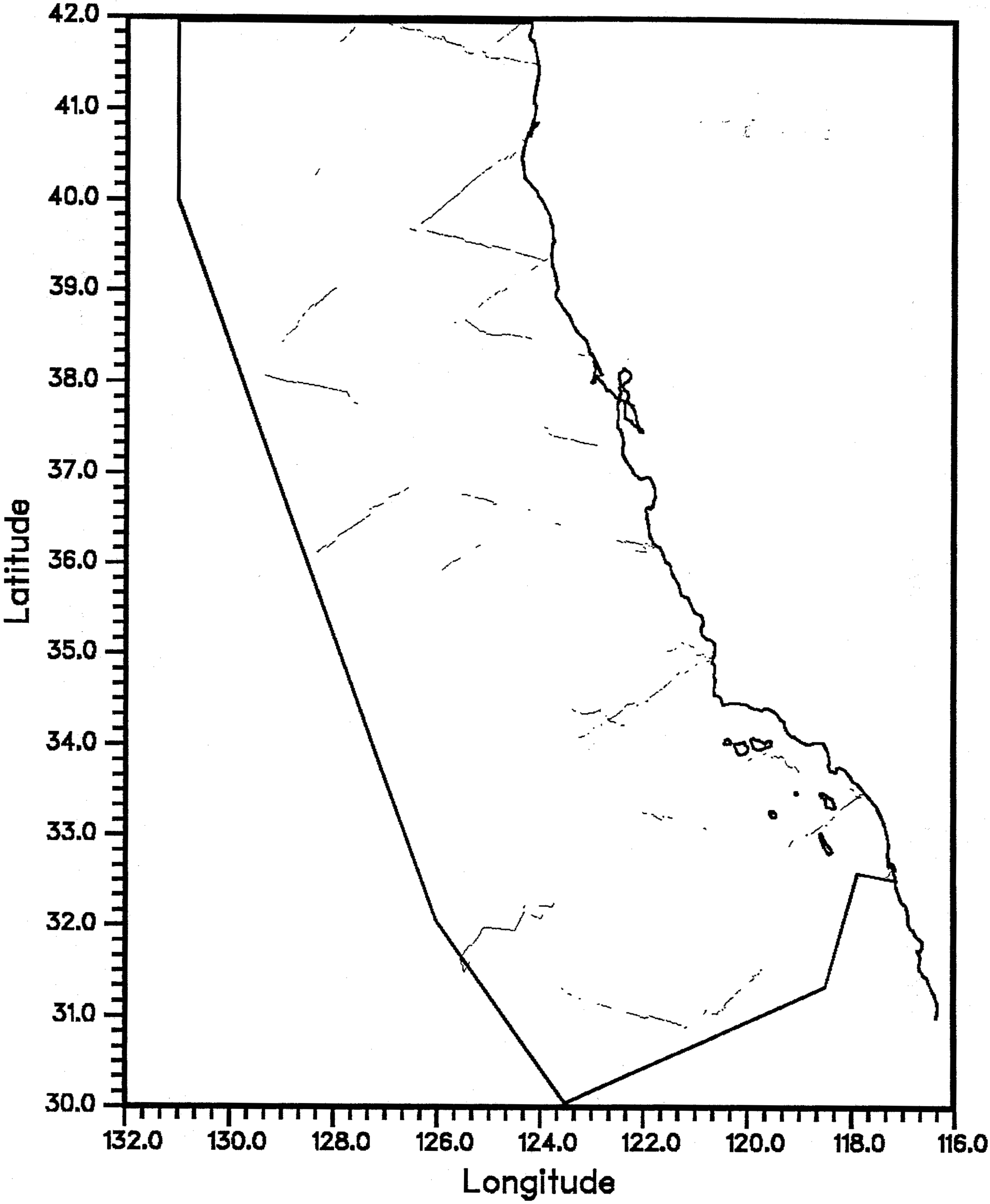


Figure 10. Tracklines surveyed in a sea state of Beaufort 3 during the 1991 CAMMS cruise.

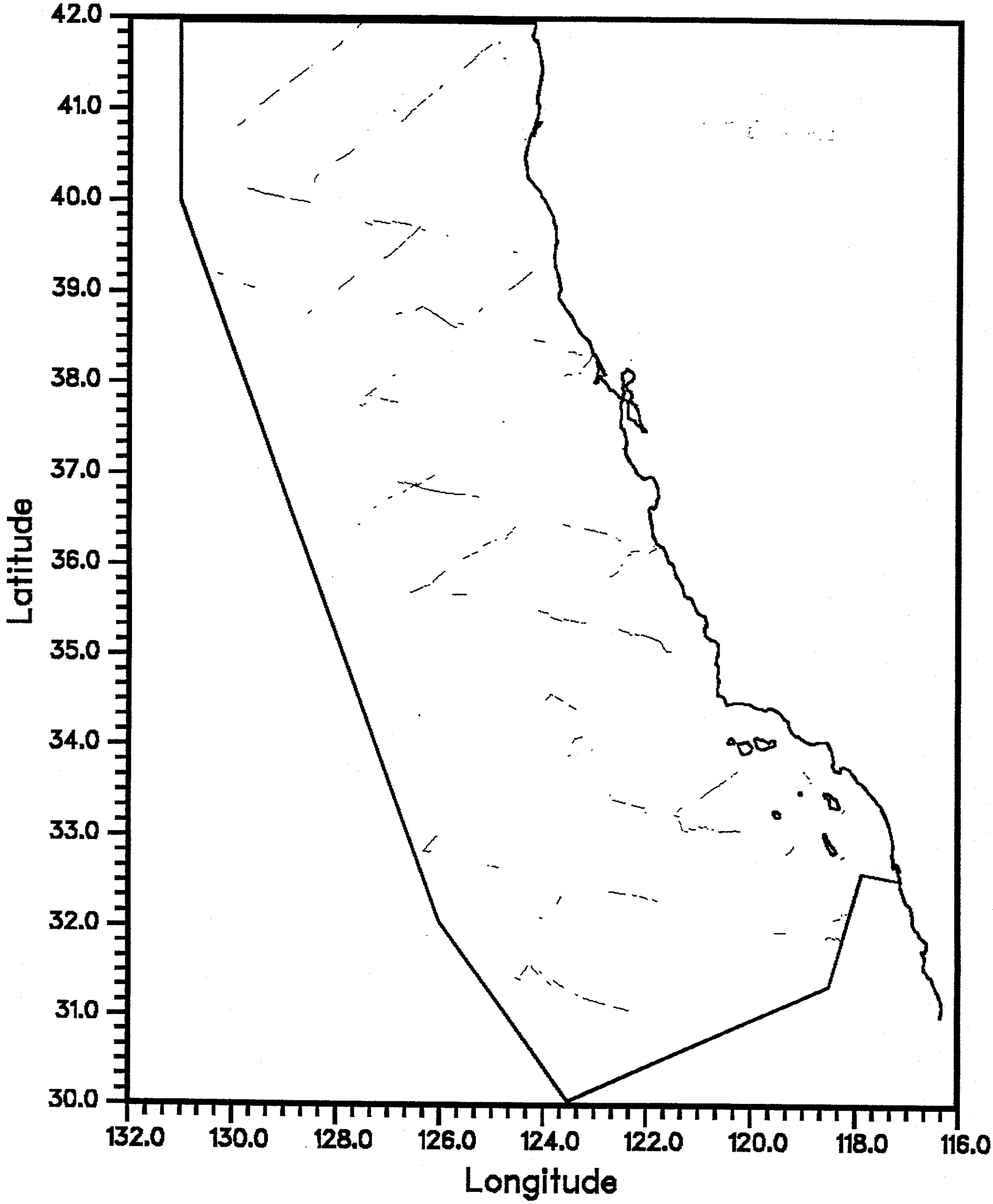


Figure 11. Tracklines surveyed in Beaufort sea states 4 and 5 during the 1991 CAMMS cruise.

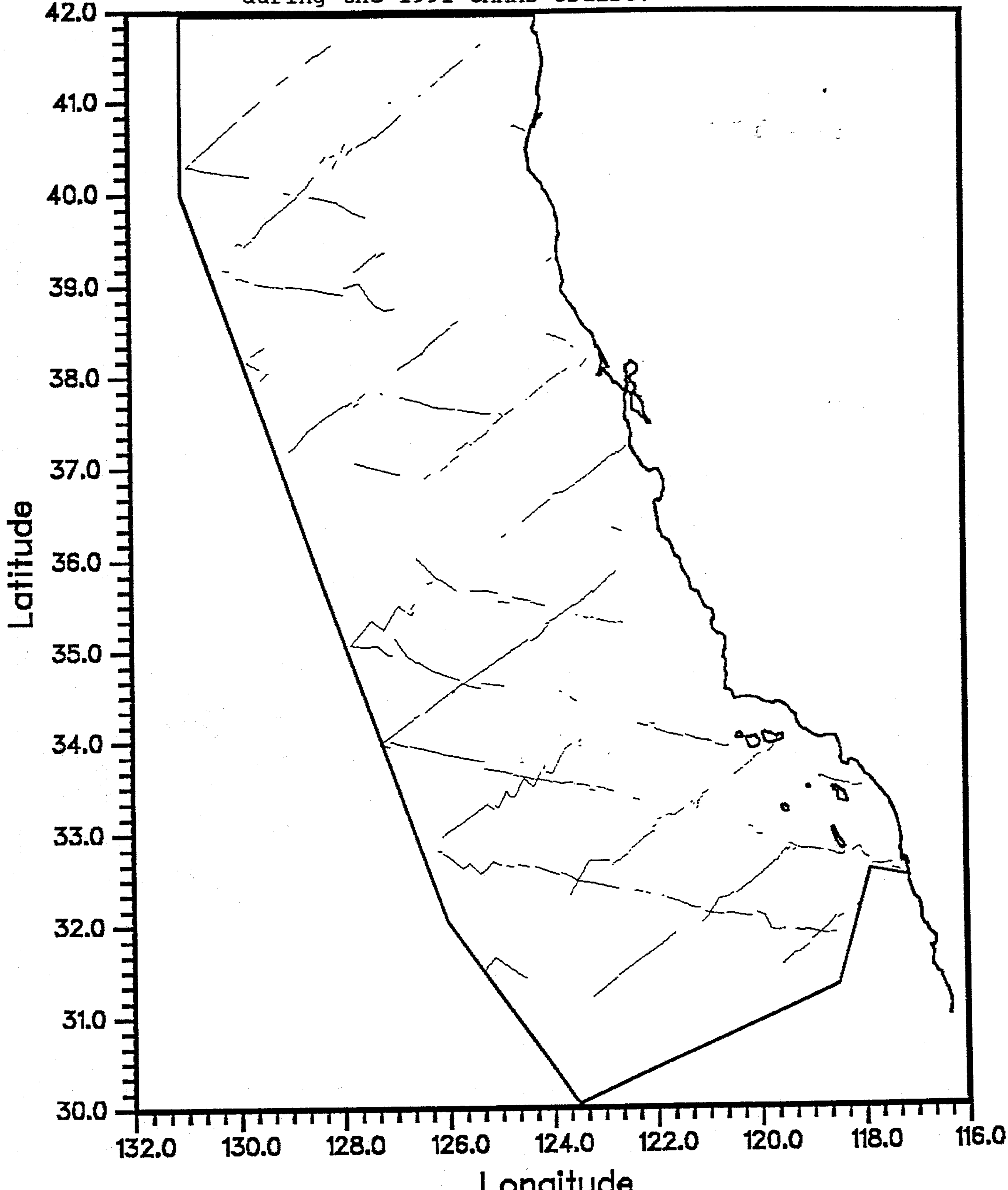


Figure 12. Marine mammal schools encountered during the 1991 CAMMS cruise.

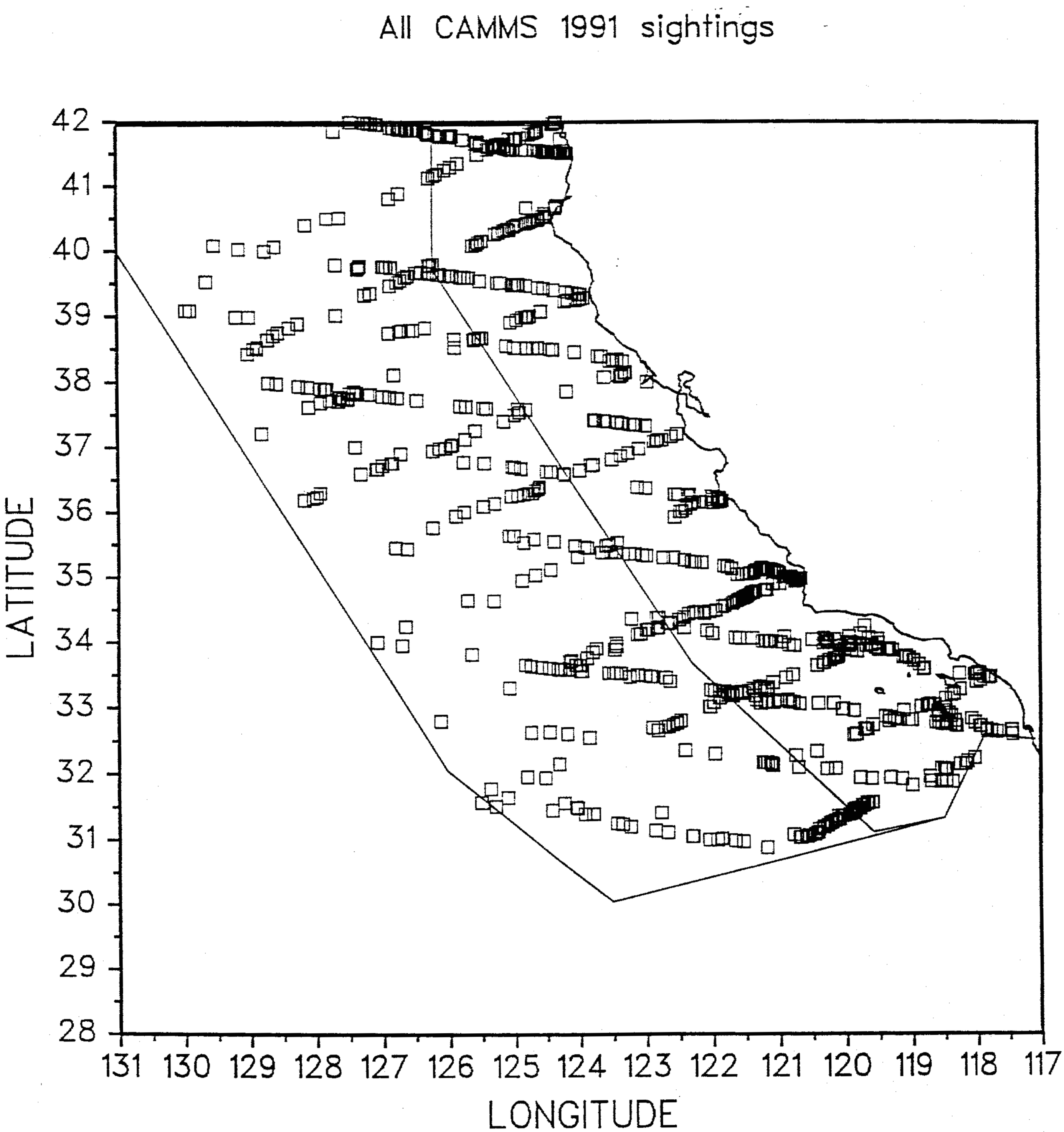


Figure 13. Common dolphin (unknown stock) sightings during the 1991 CAMMS cruise.

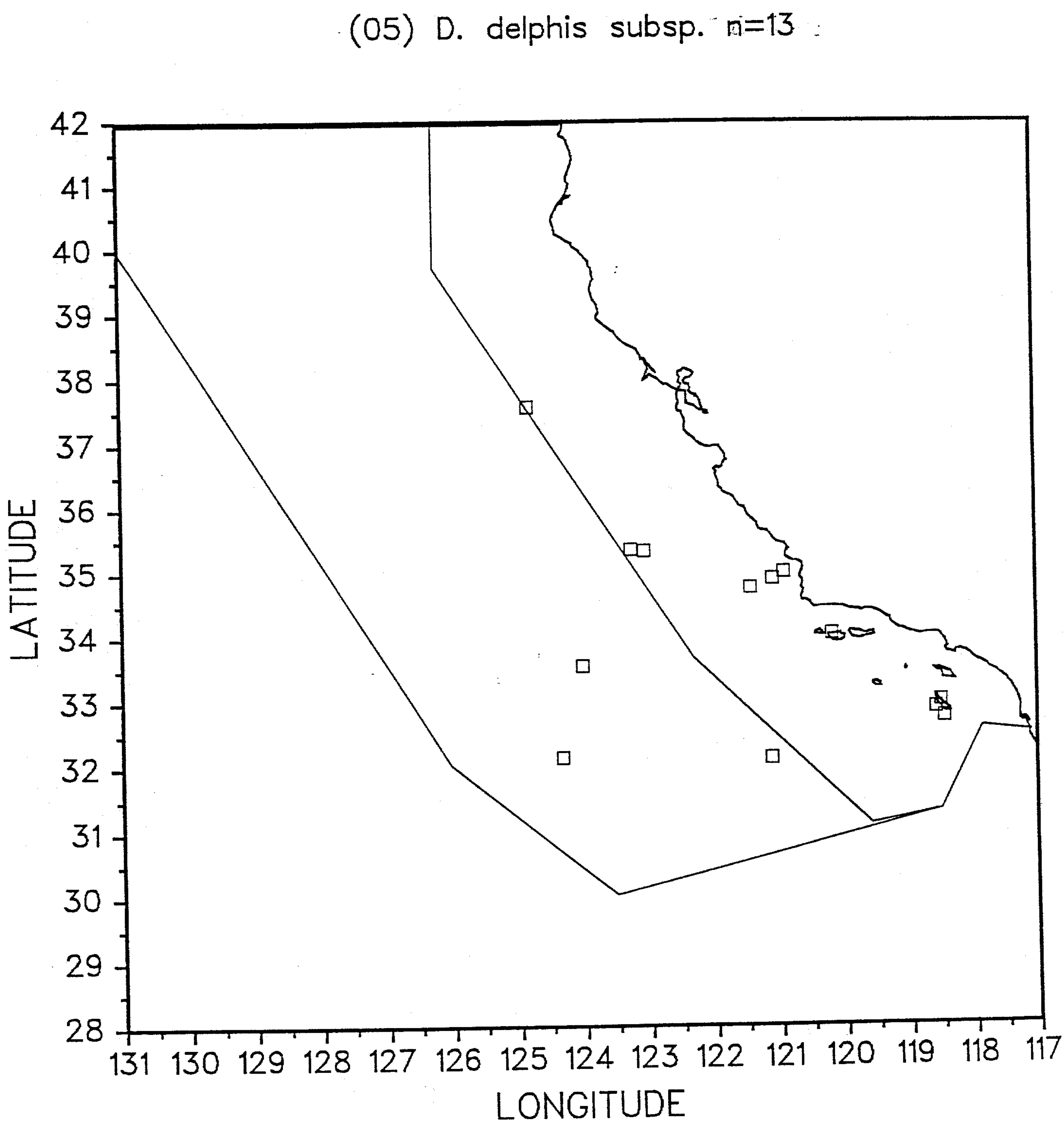


Figure 14. Striped dolphin sightings during the 1991 CAMMS cruise.

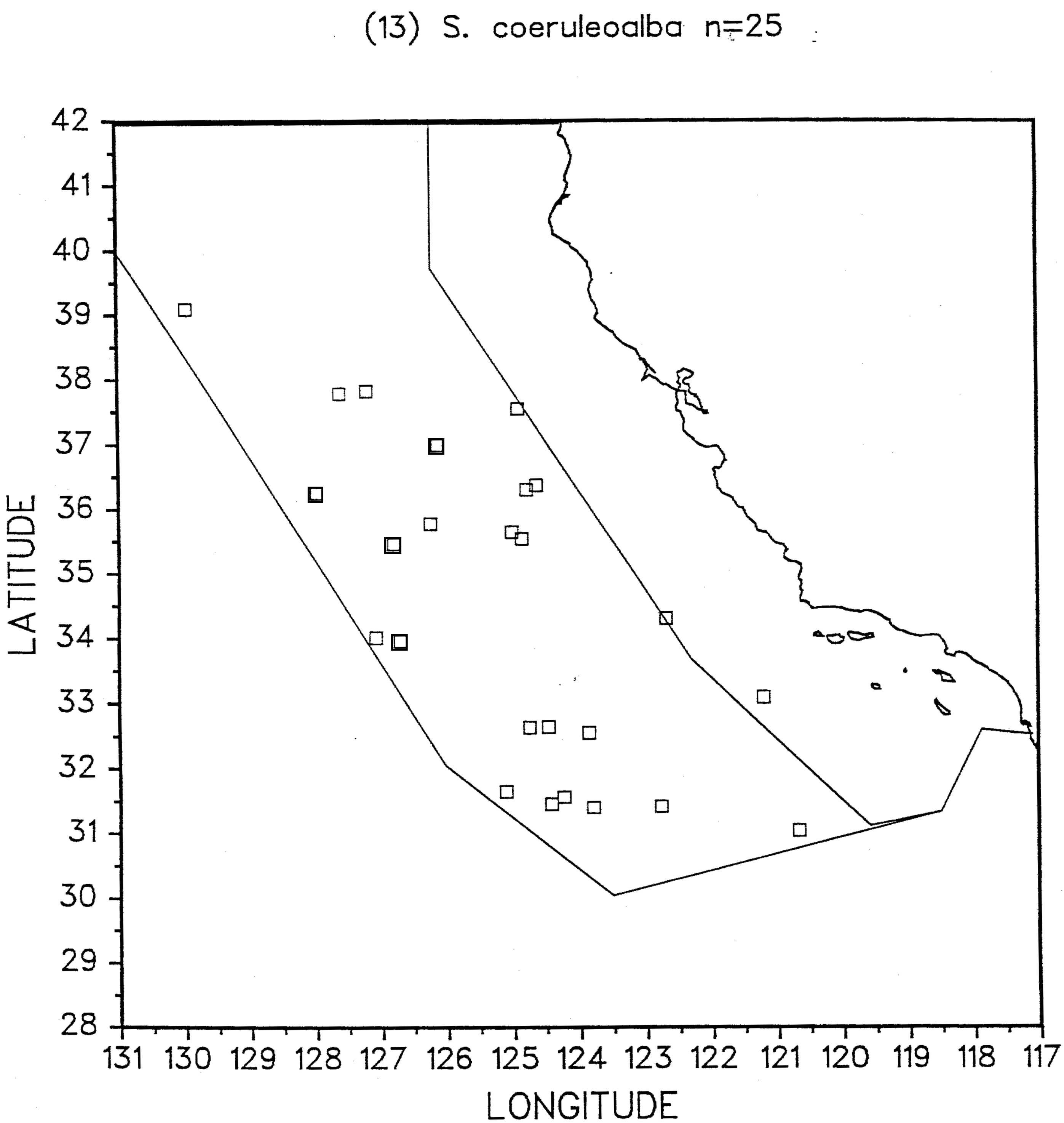


Figure 15. Longbeaked common dolphin sightings during the 1991 CAMMS cruise.

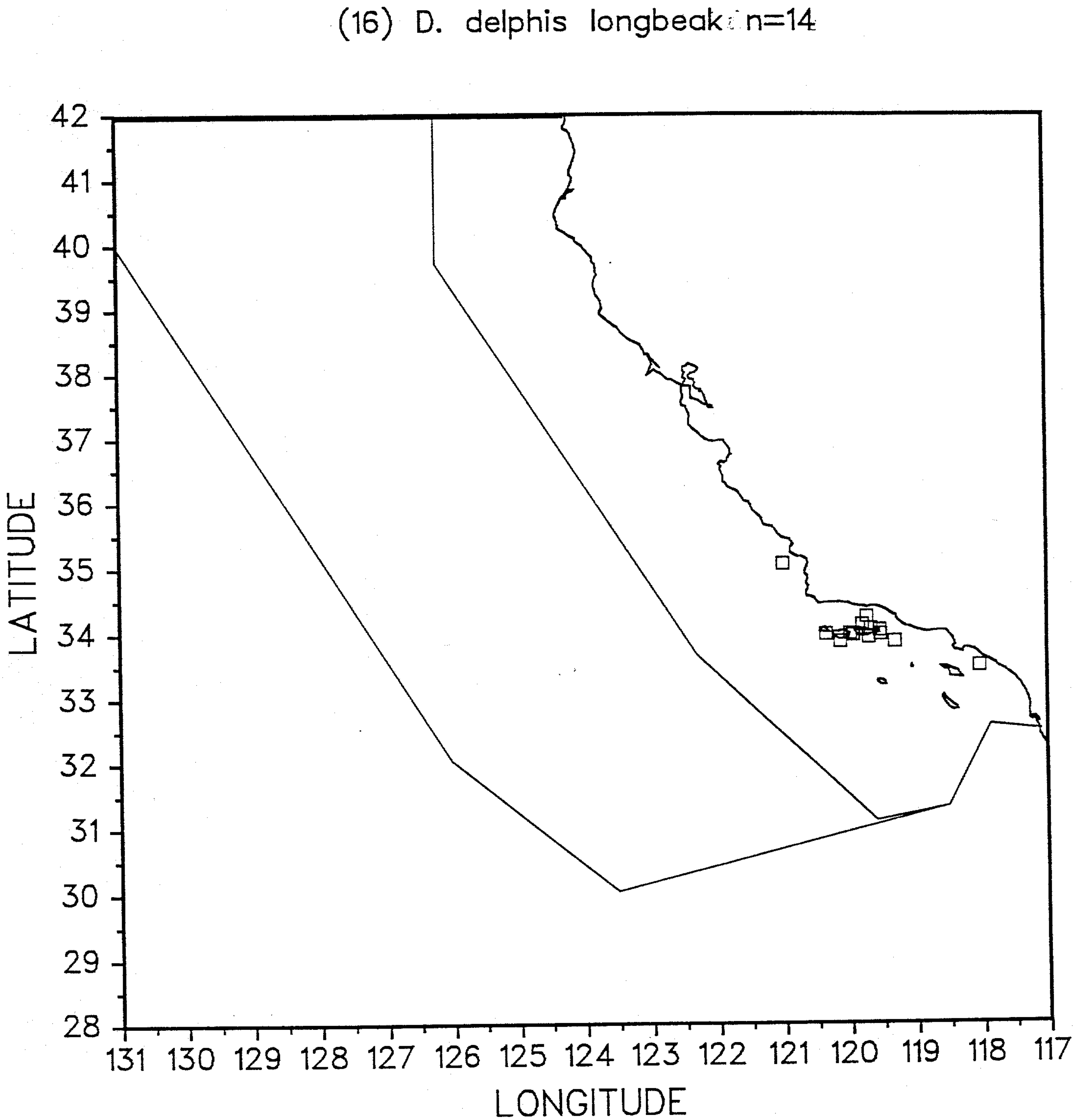


Figure 16. Shortbeaked common dolphin sightings during the 1991 CAMMS cruise.

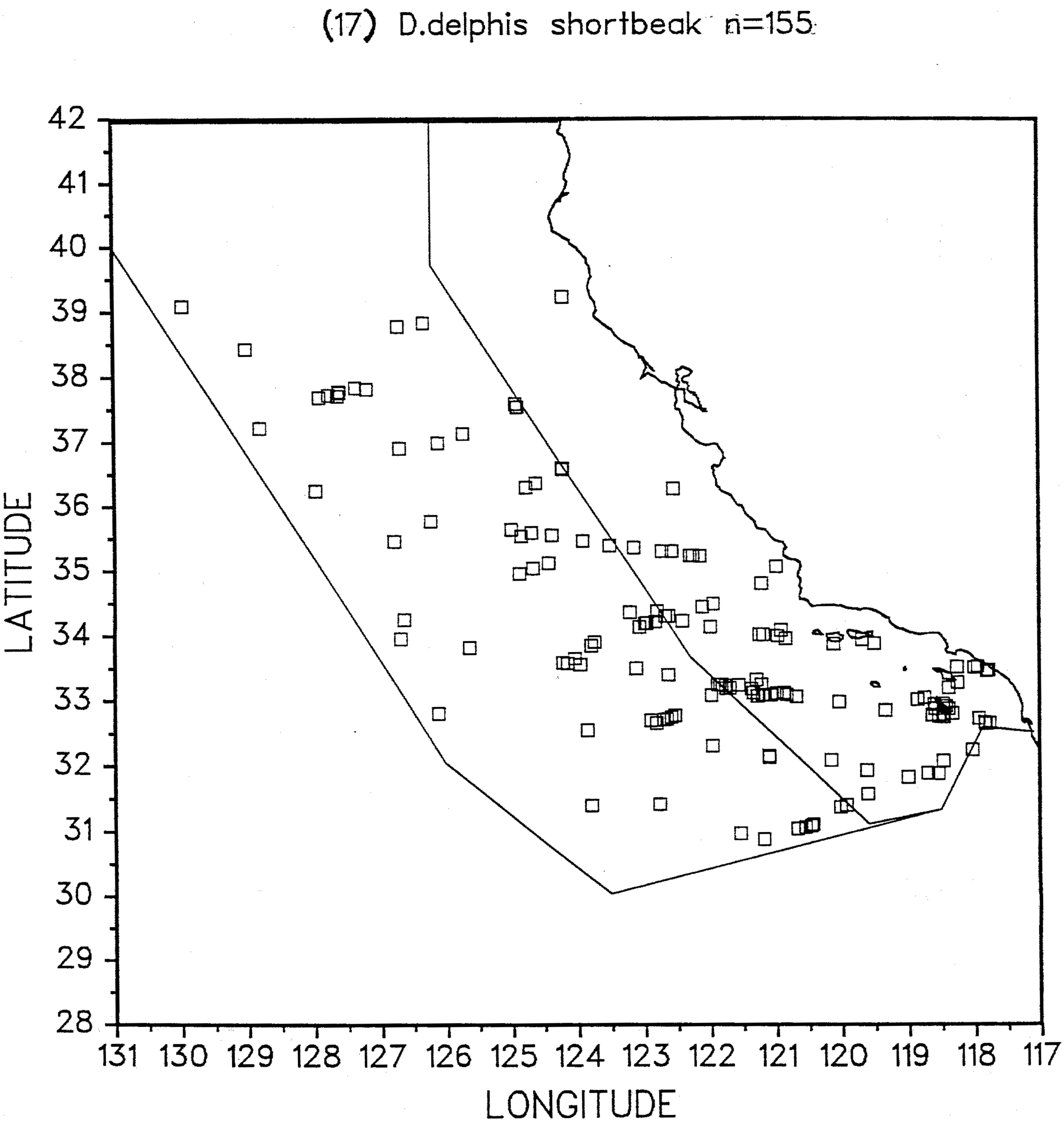


Figure 17. Bottlenose dolphin sightings during the 1991 CAMMS cruise.

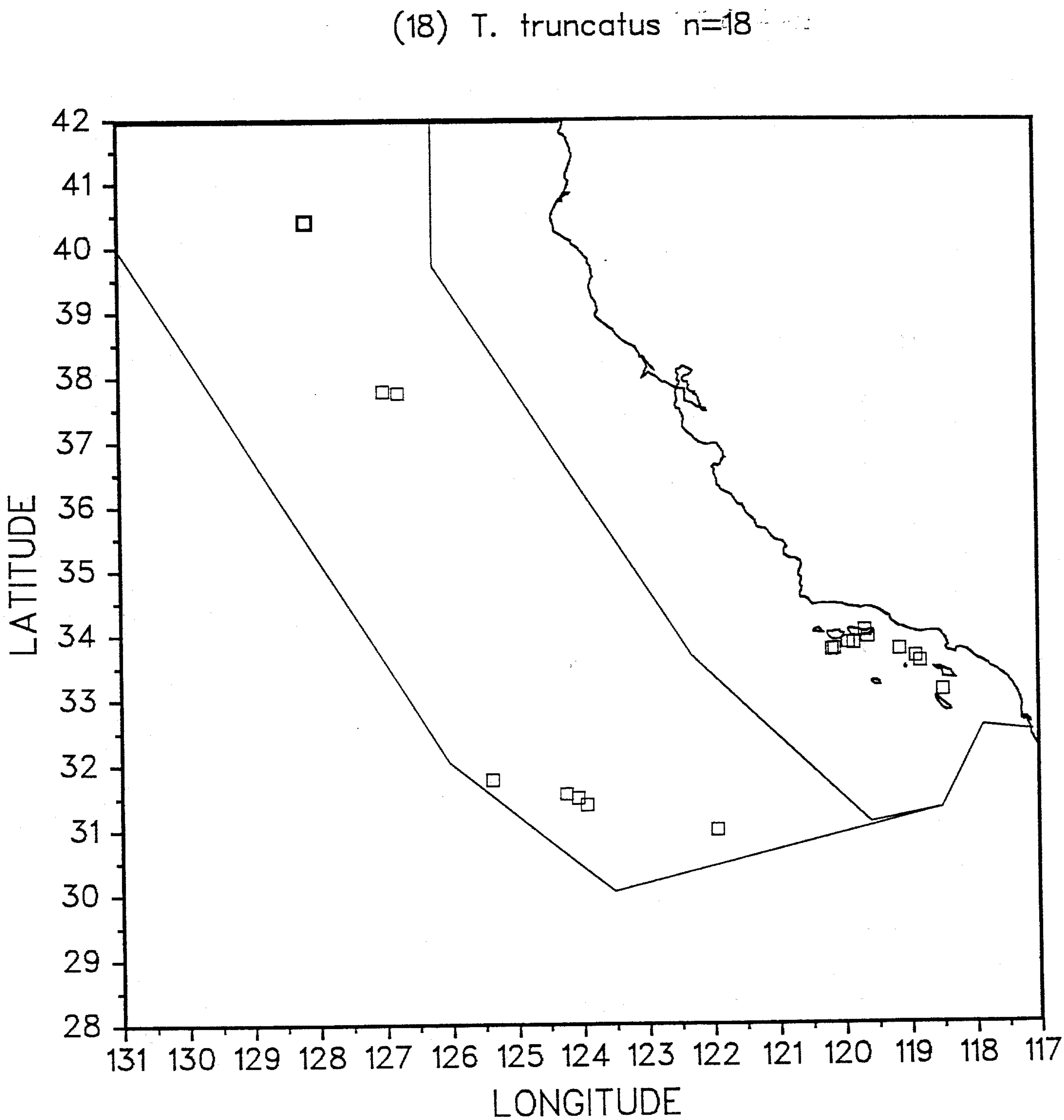


Figure 18. Risso's dolphin sightings during the 1991 CAMMS cruise.

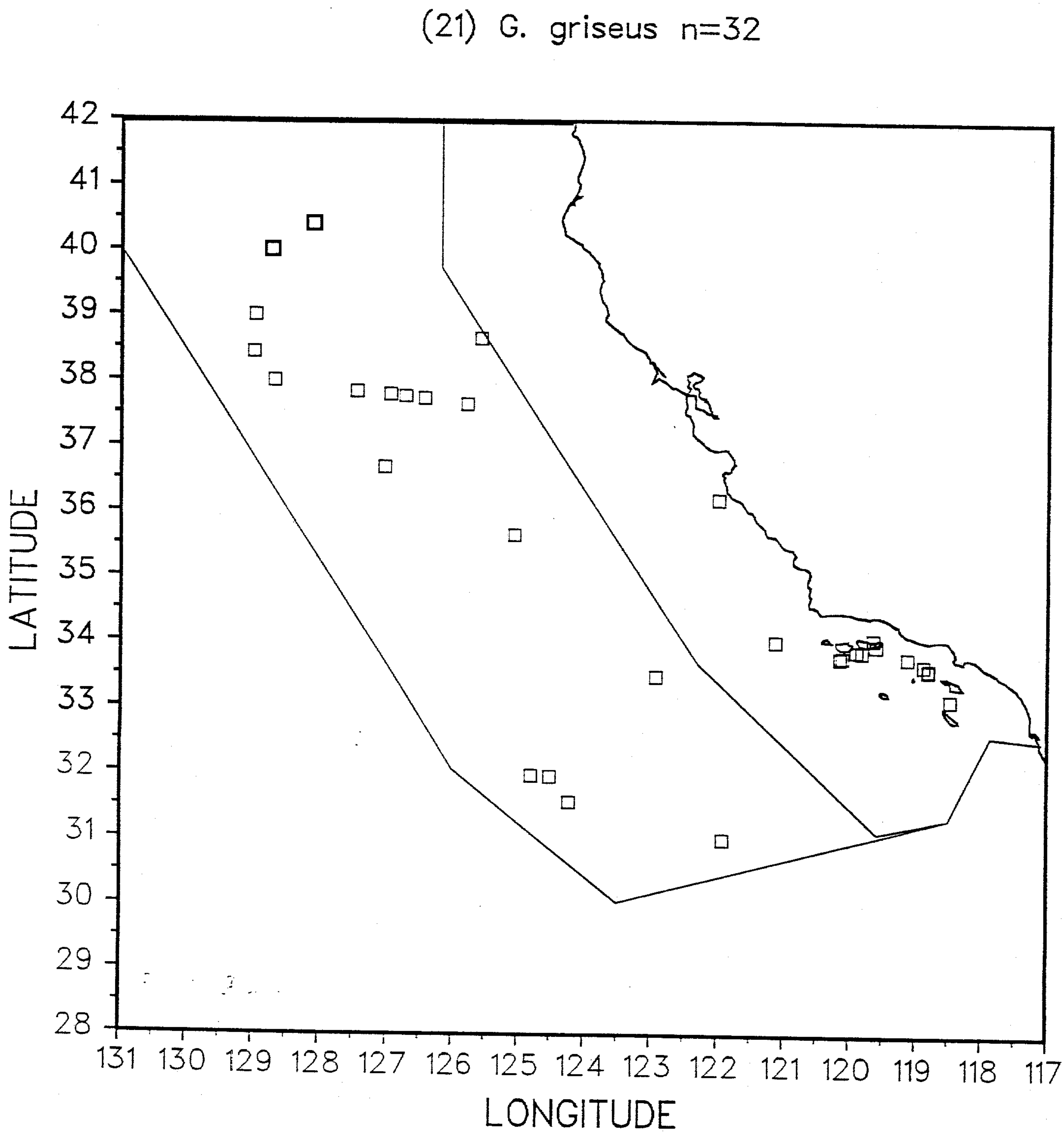


Figure 19. Pacific white-sided dolphin sightings during the 1991 CAMMS cruise.

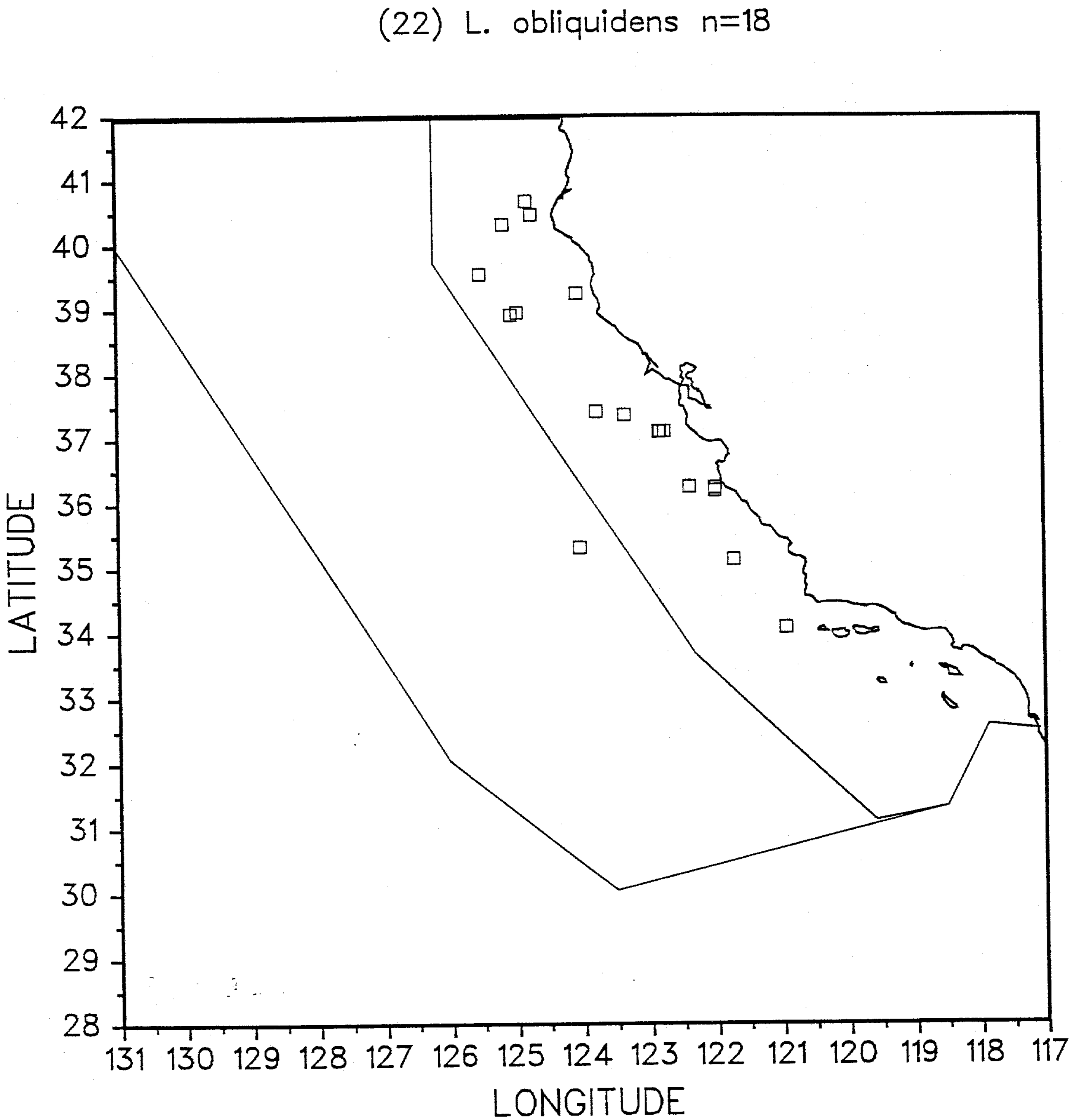


Figure 20. Northern right whale dolphin sightings during the 1991 CAMMS cruise.

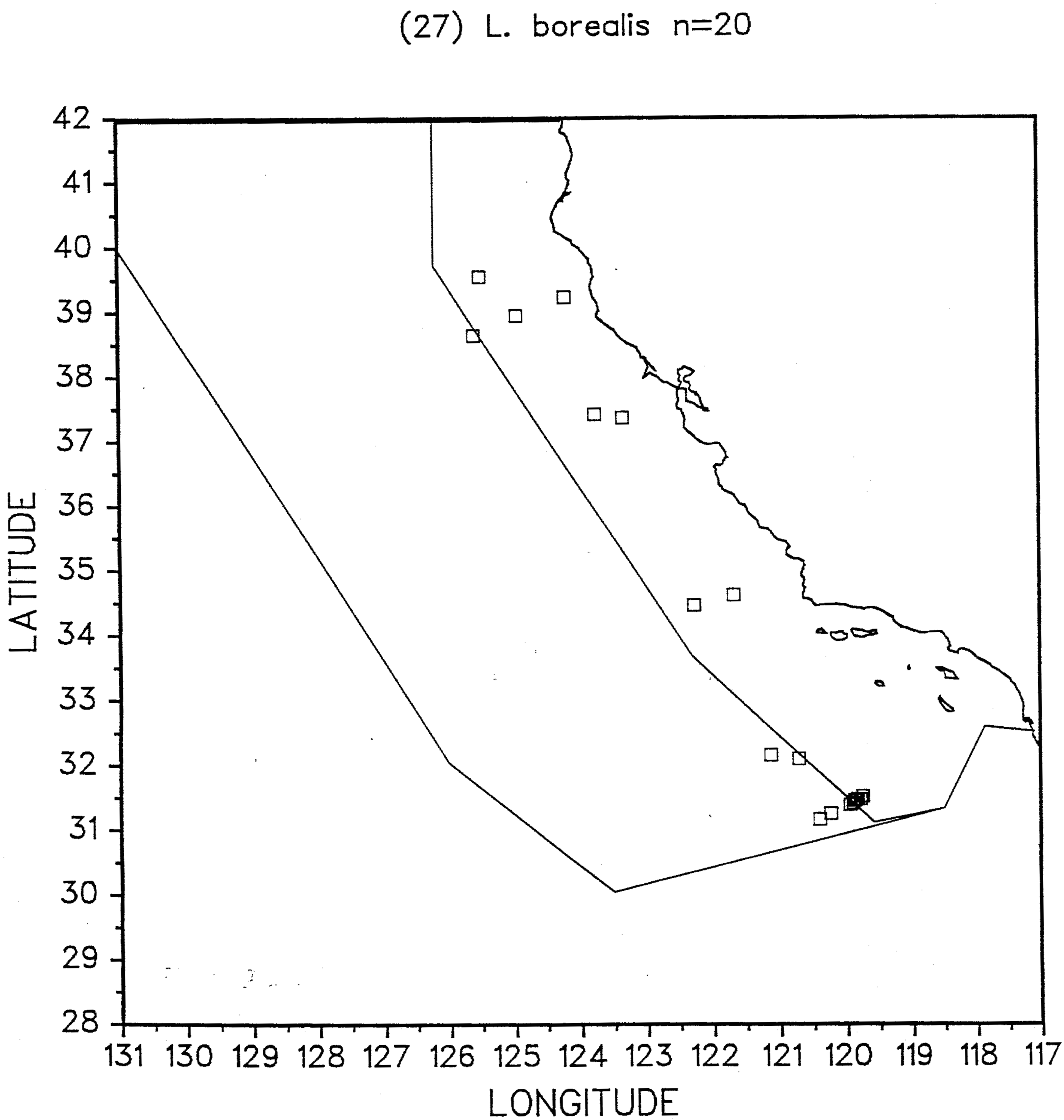


Figure 21. Killer whale sightings during the 1991 CAMMS cruise.

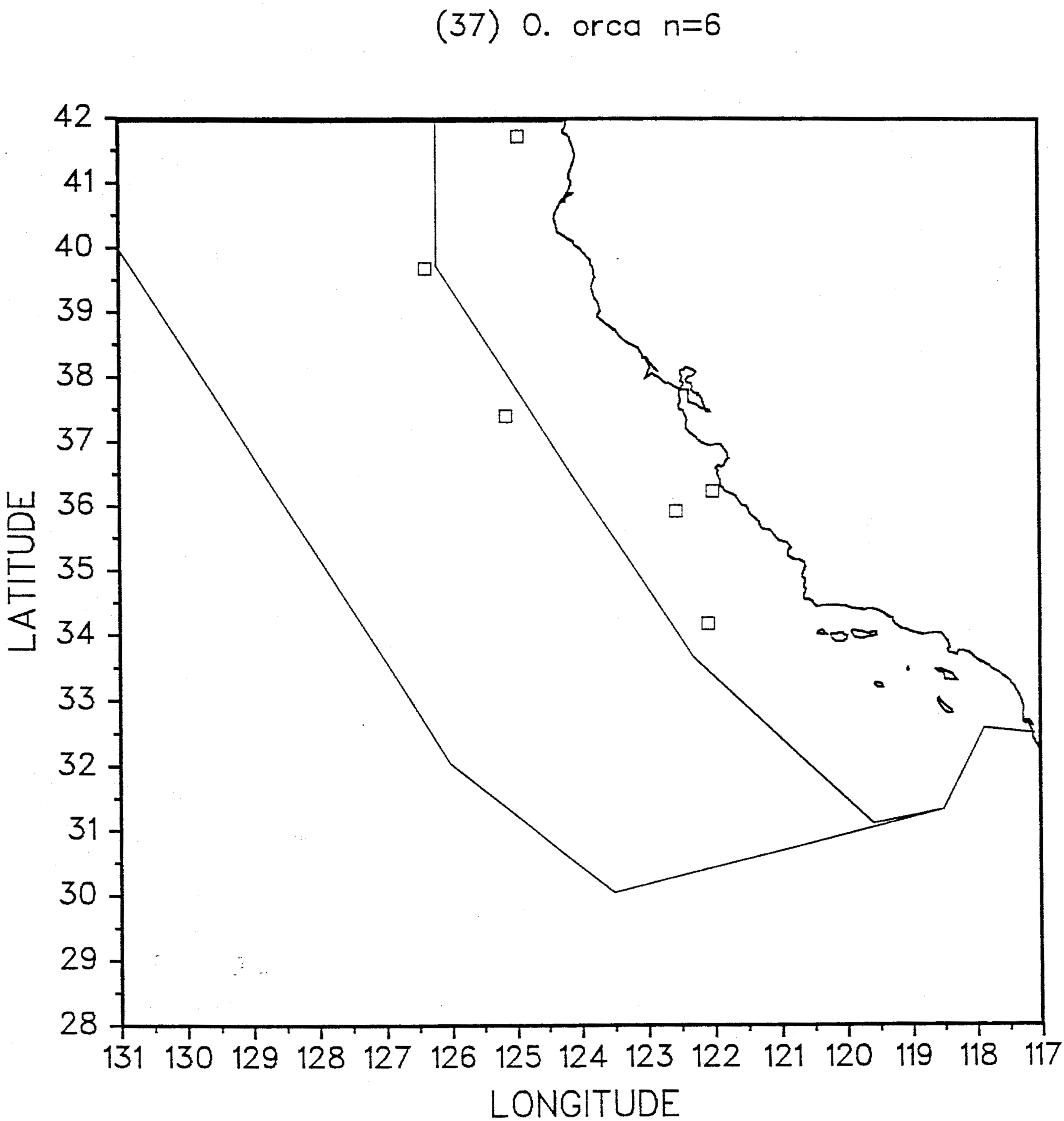


Figure 22. Harbor porpoise sightings during the 1991 CAMMS cruise.

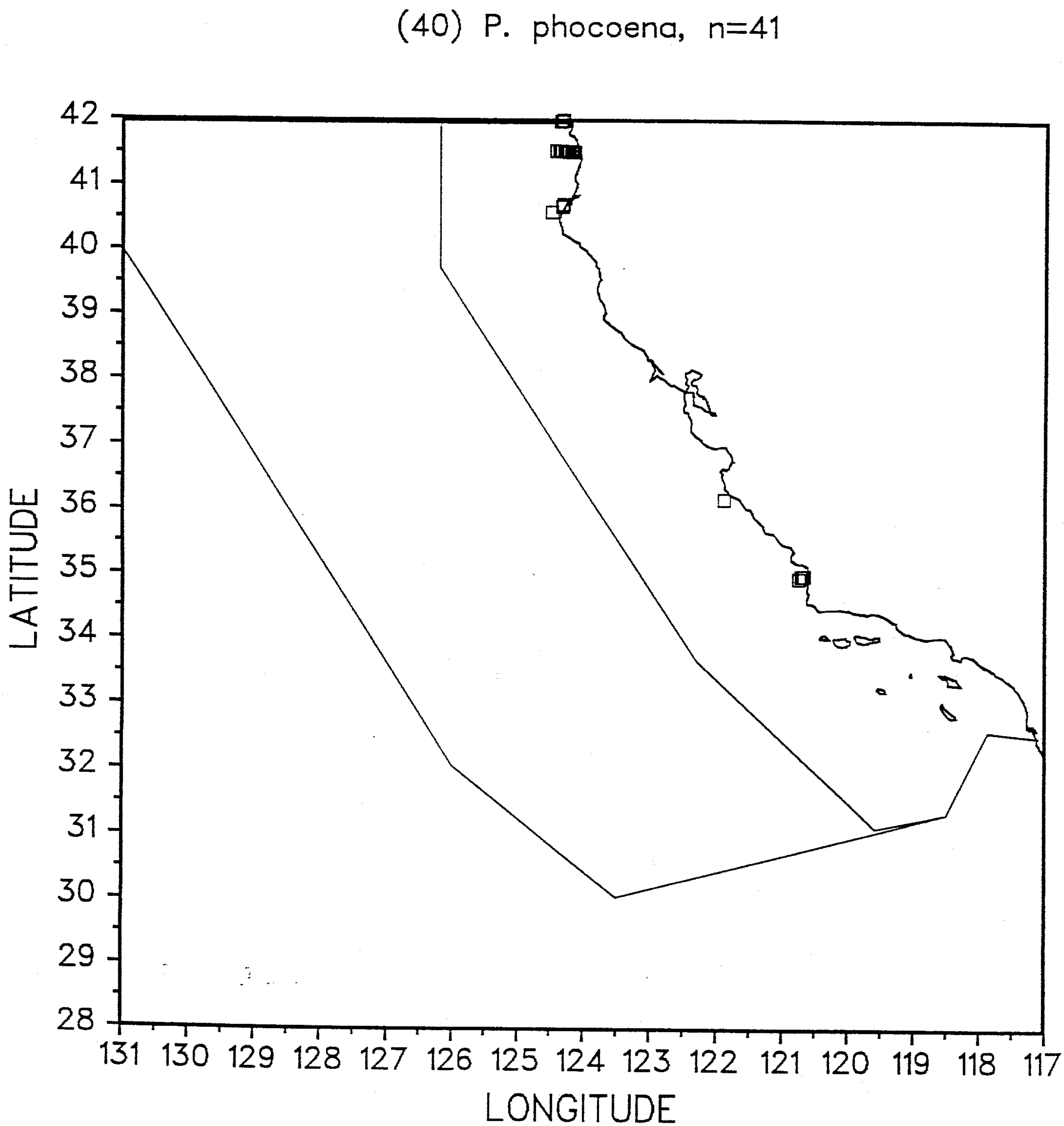


Figure 23. Dall's porpoise sightings during the 1991 CAMMS cruise.

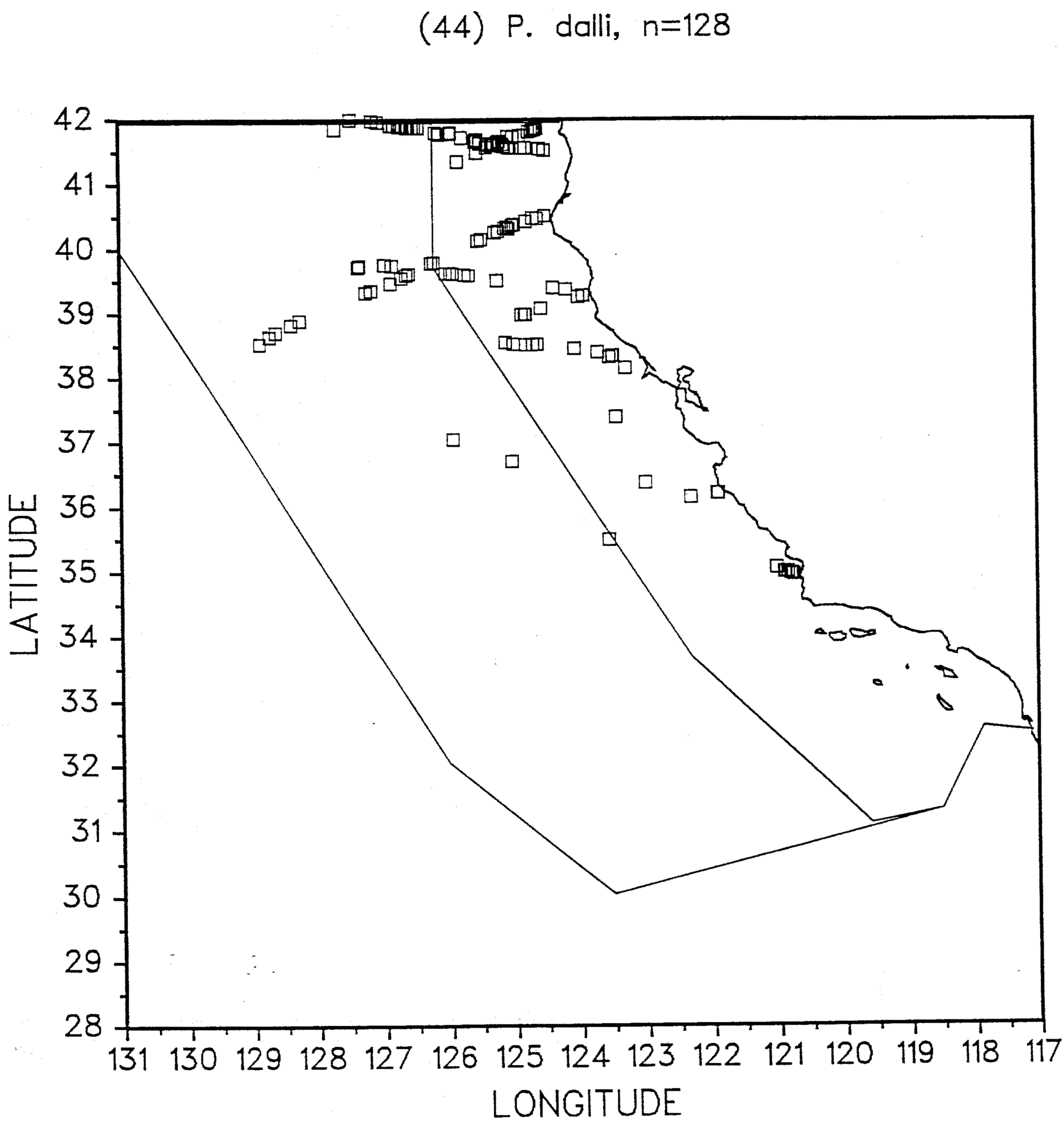


Figure 24. Sperm whale sightings during the 1991 CAMMS cruise.

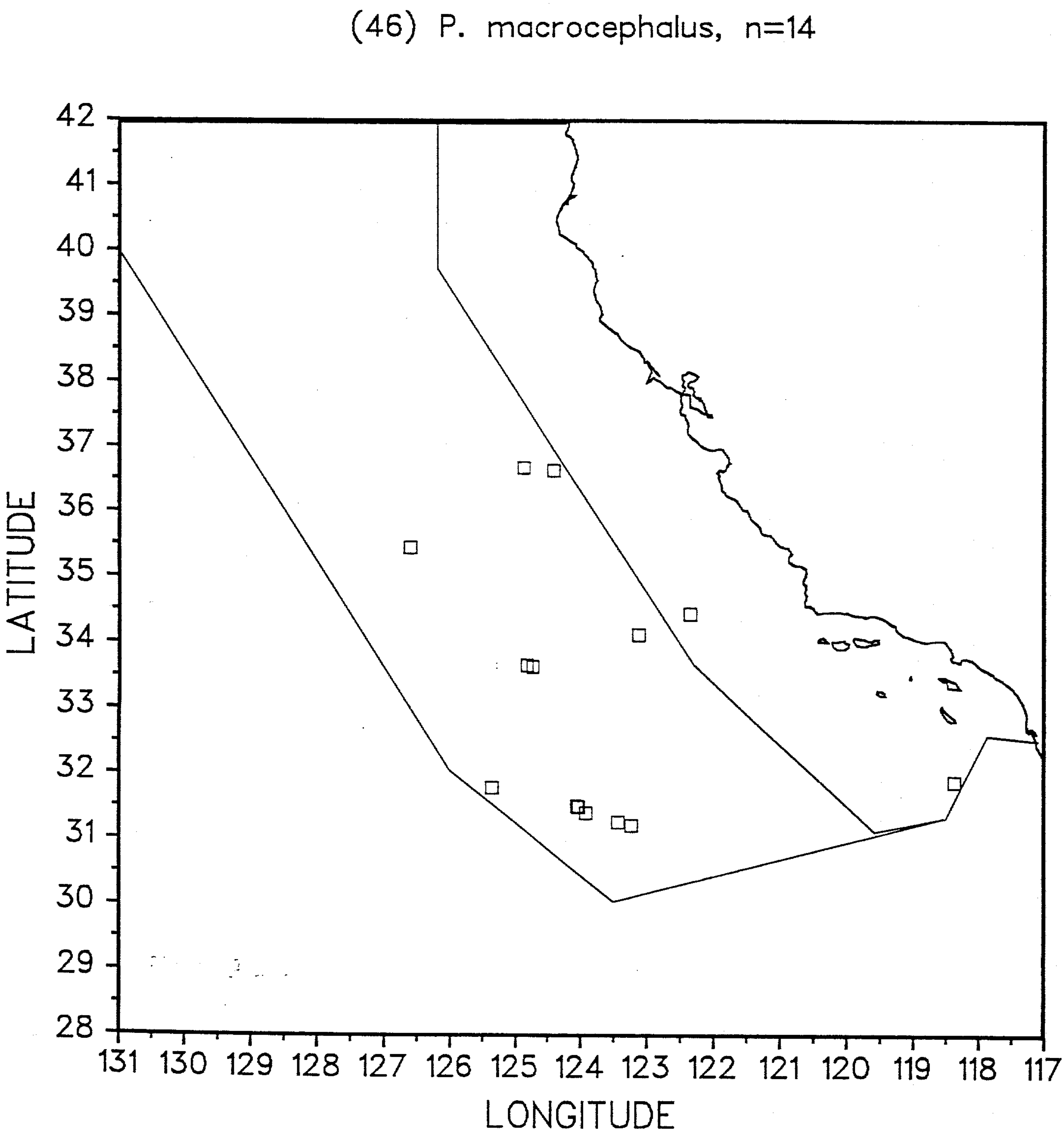


Figure 25. Pygmy sperm whale sightings during the 1991 CAMMS cruise.

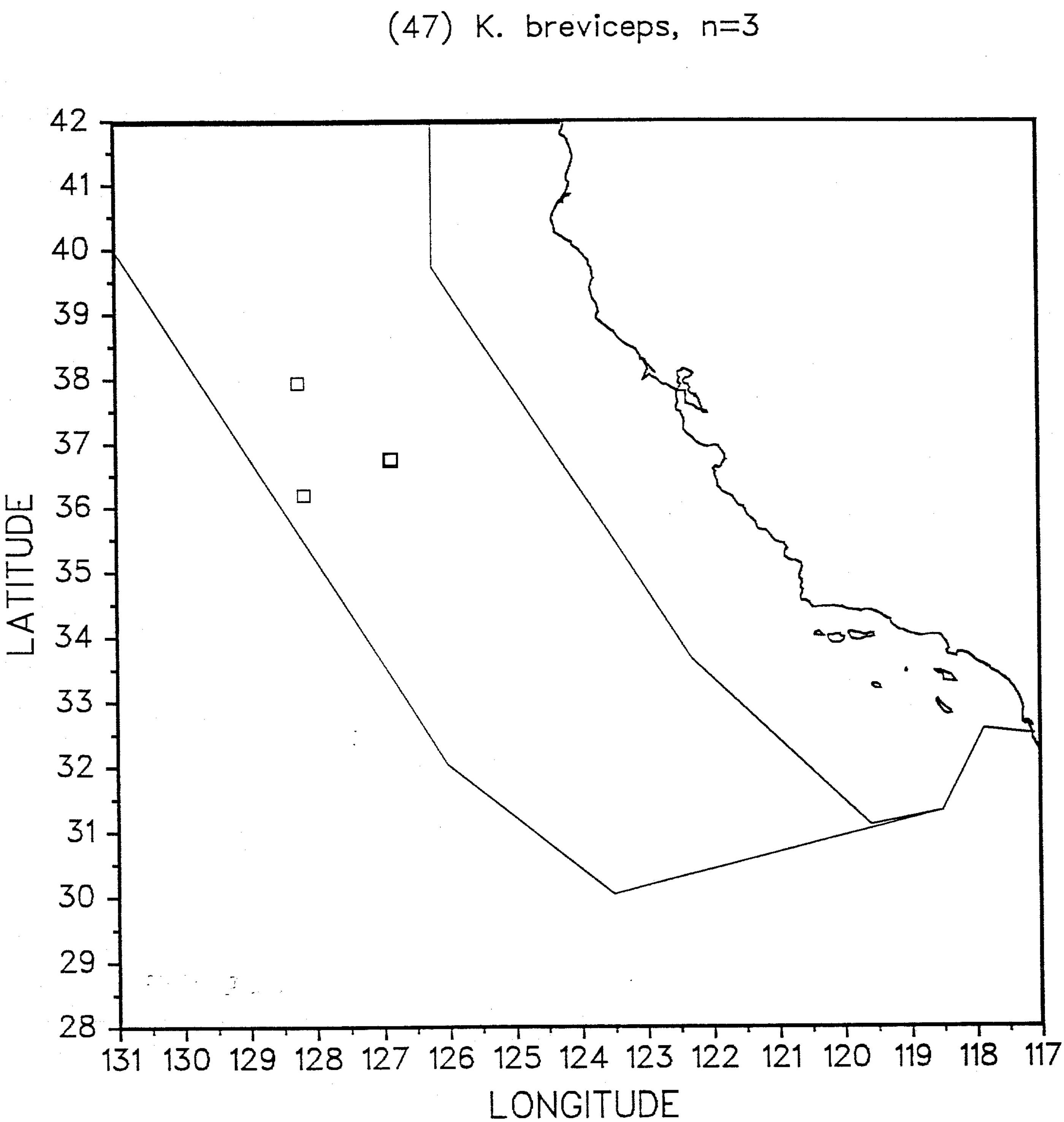


Figure 26. Unidentified beaked whale sightings during the 1991 CAMMS cruise.

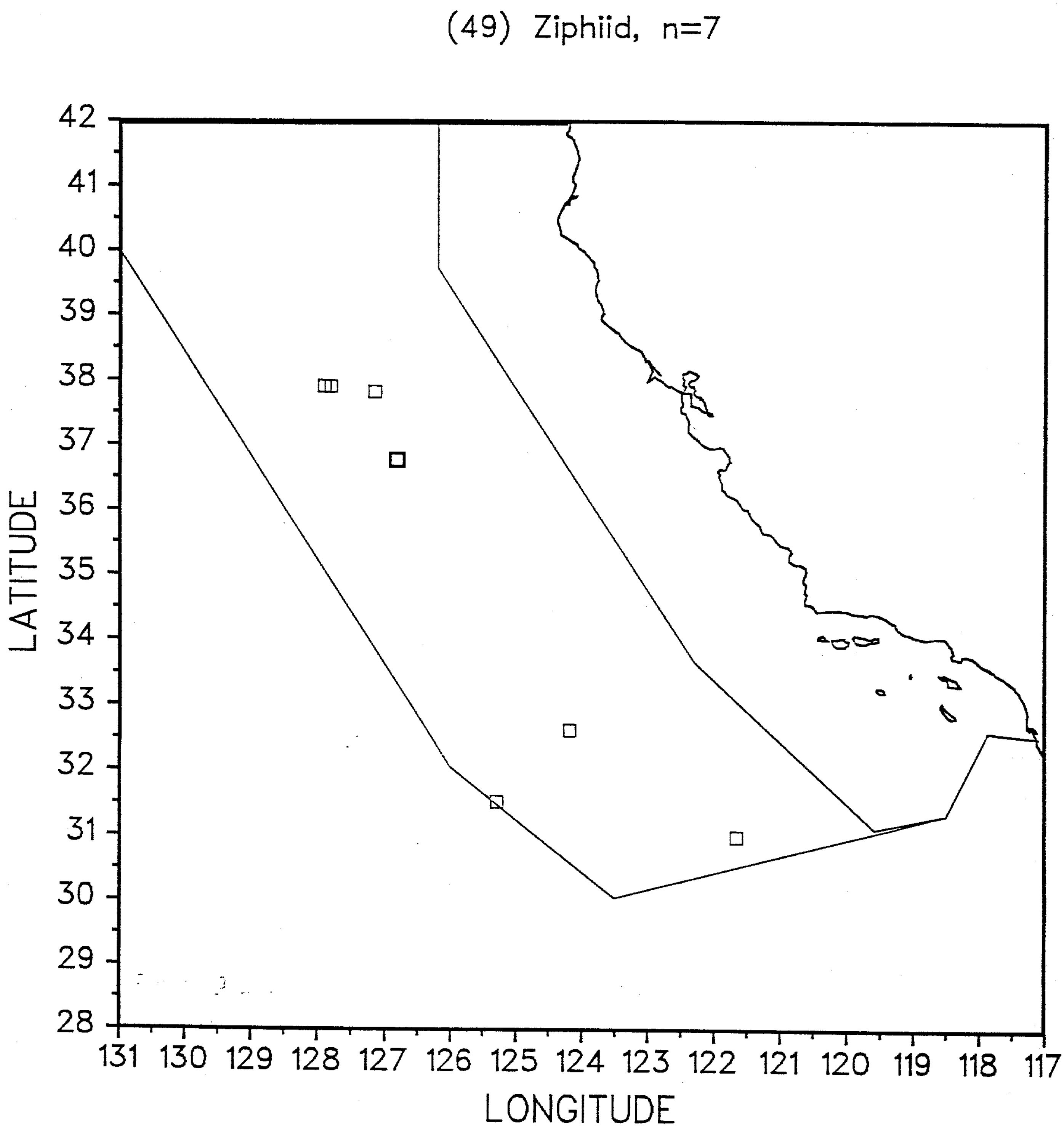


Figure 27. Unidentified Mesoplodon sightings during the 1991 CAMMS cruise.

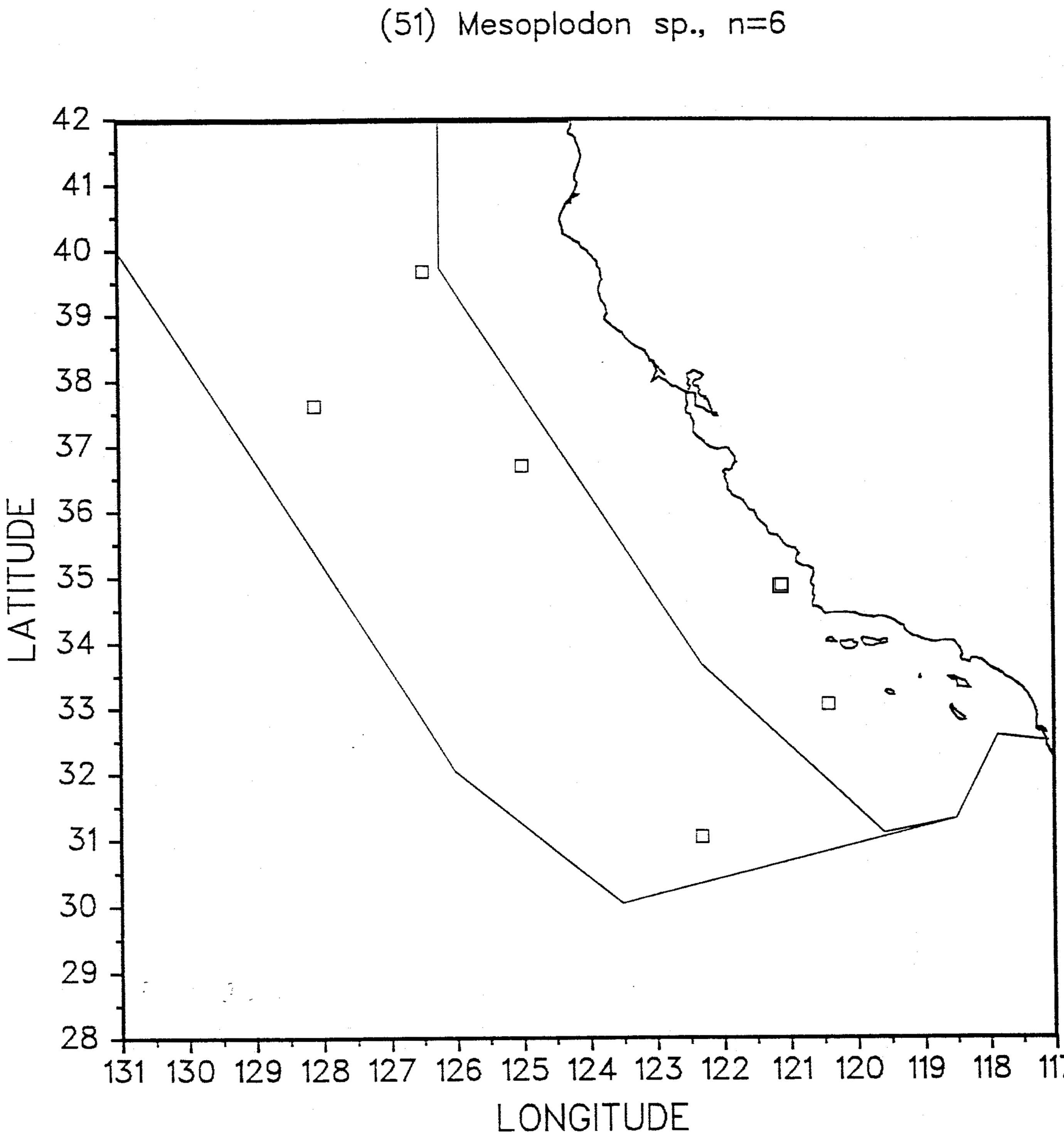


Figure 28. Cuvier's beaked whale sightings during the 1991 CAMMS cruise.

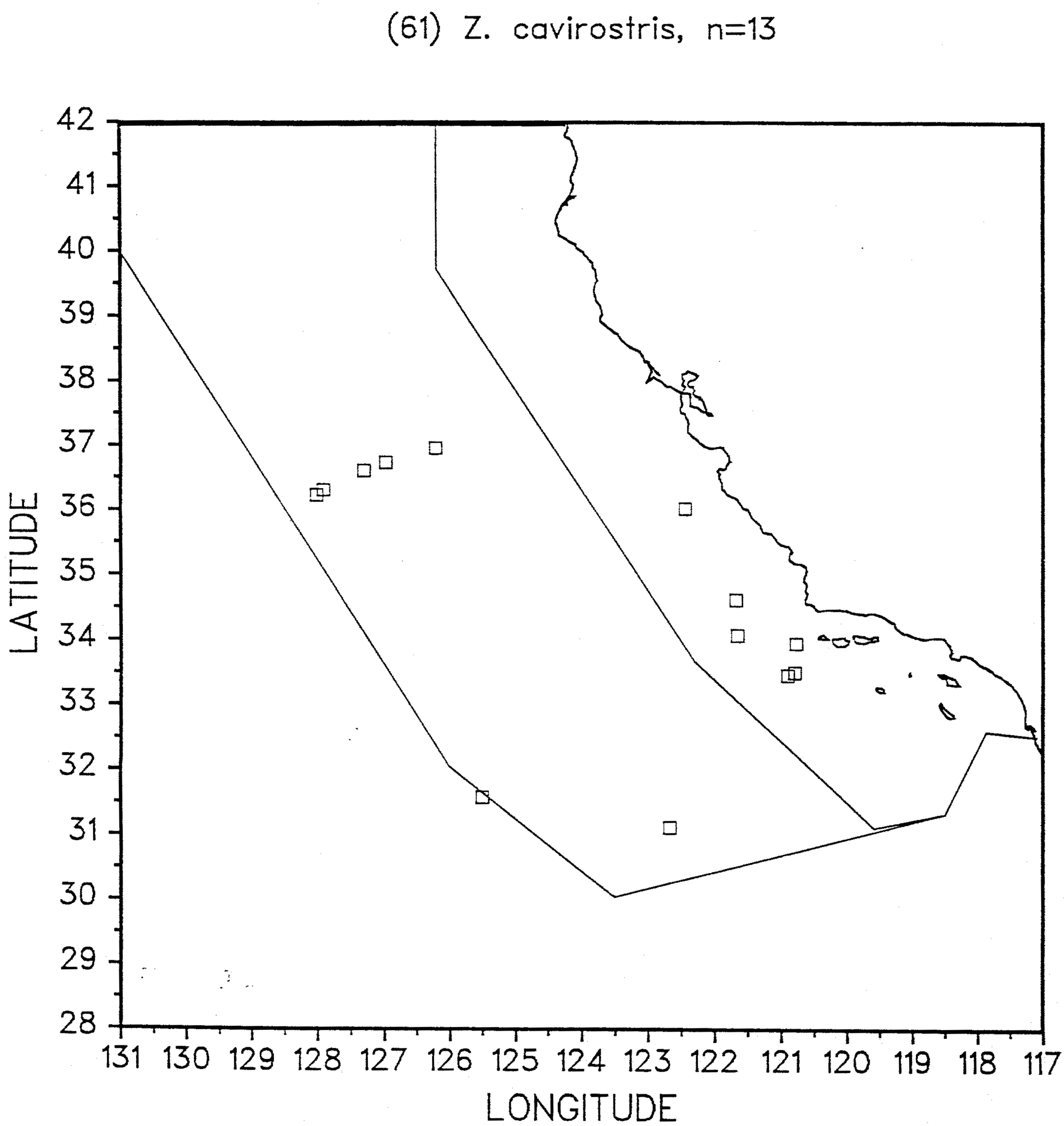


Figure 29. Baird's beaked whale sightings during the 1991 CAMMS cruise.

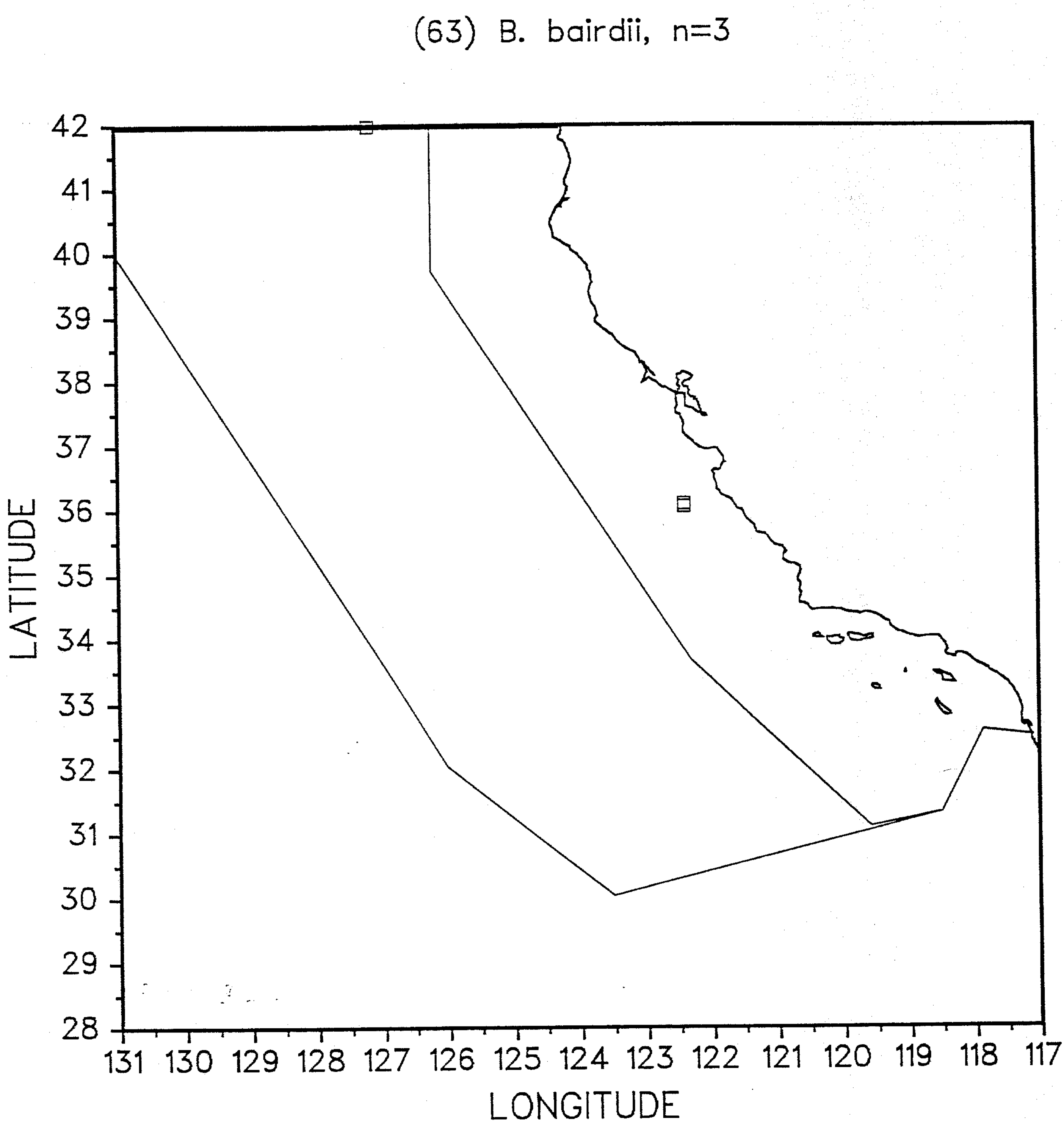


Figure 30. Gray whale sightings during the 1991 CAMMS cruise.

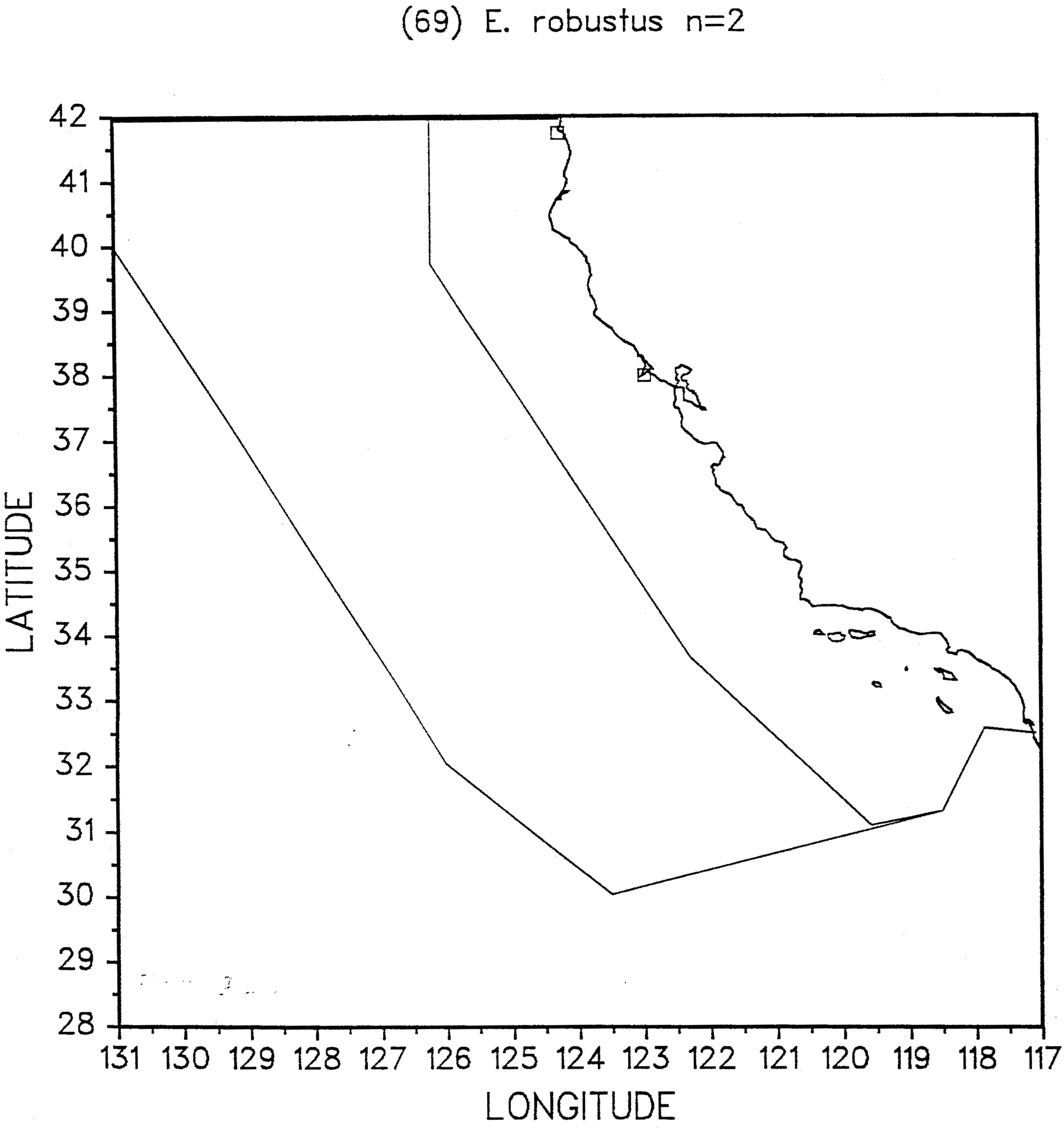


Figure 31. Unidentified Rorqual sightings during the 1991 CAMMS cruise.

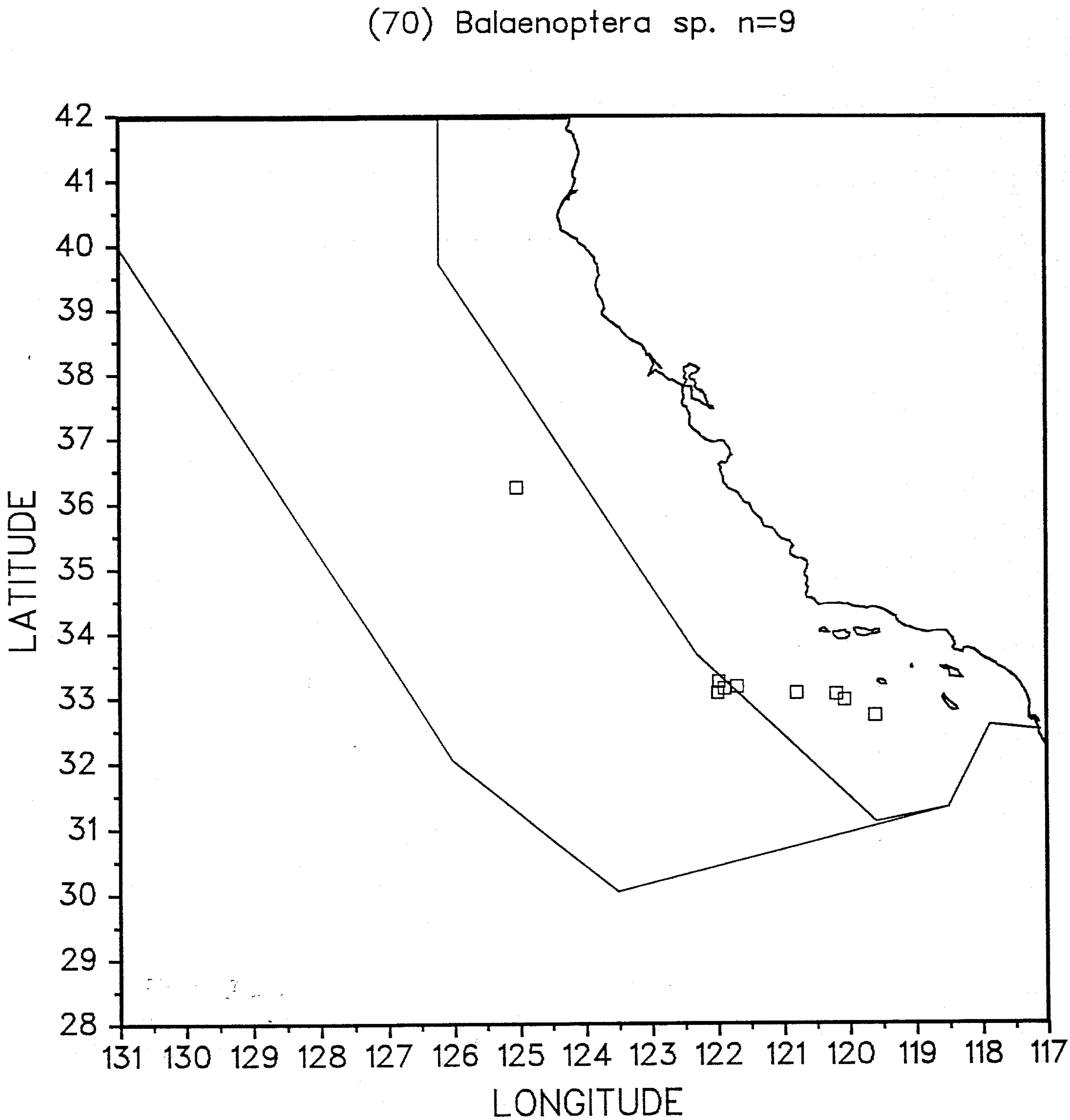


Figure 32. Minke whale sightings during the 1991 CAMMS cruise.

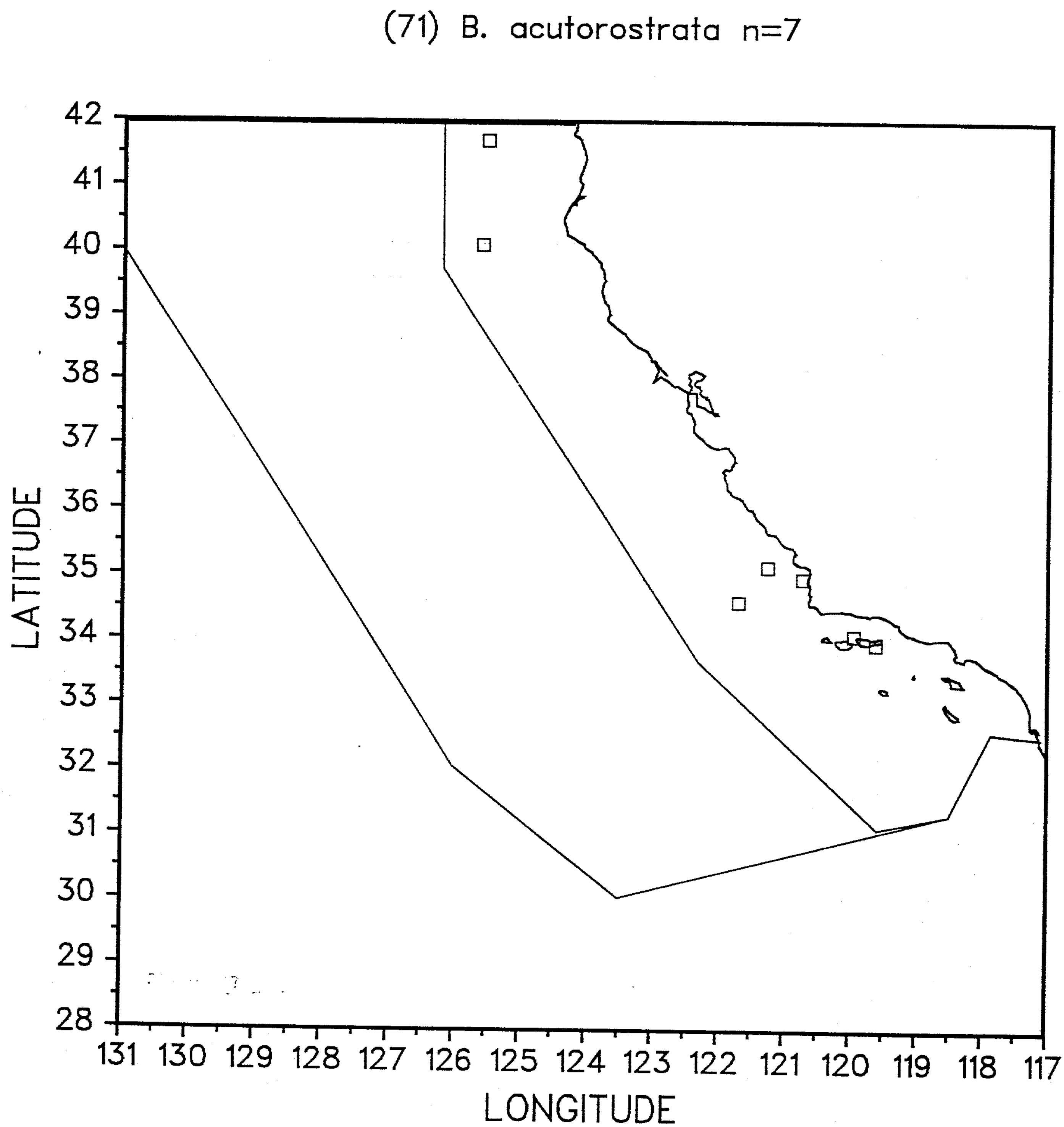


Figure 33. Bryde's whale sightings during the 1991 CAMMS cruise.

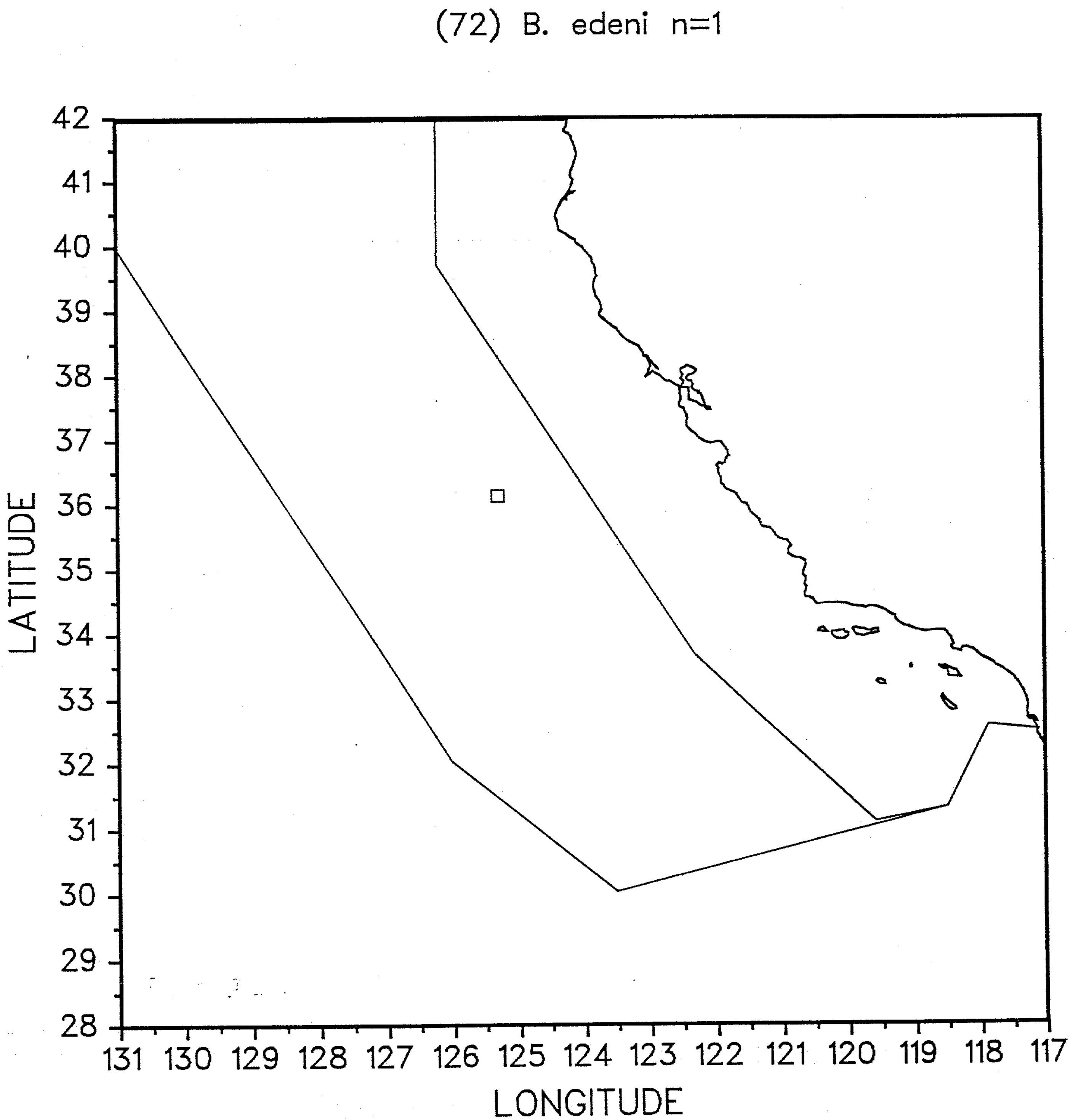


Figure 34. Fin whale sightings during the 1991 CAMMS cruise.

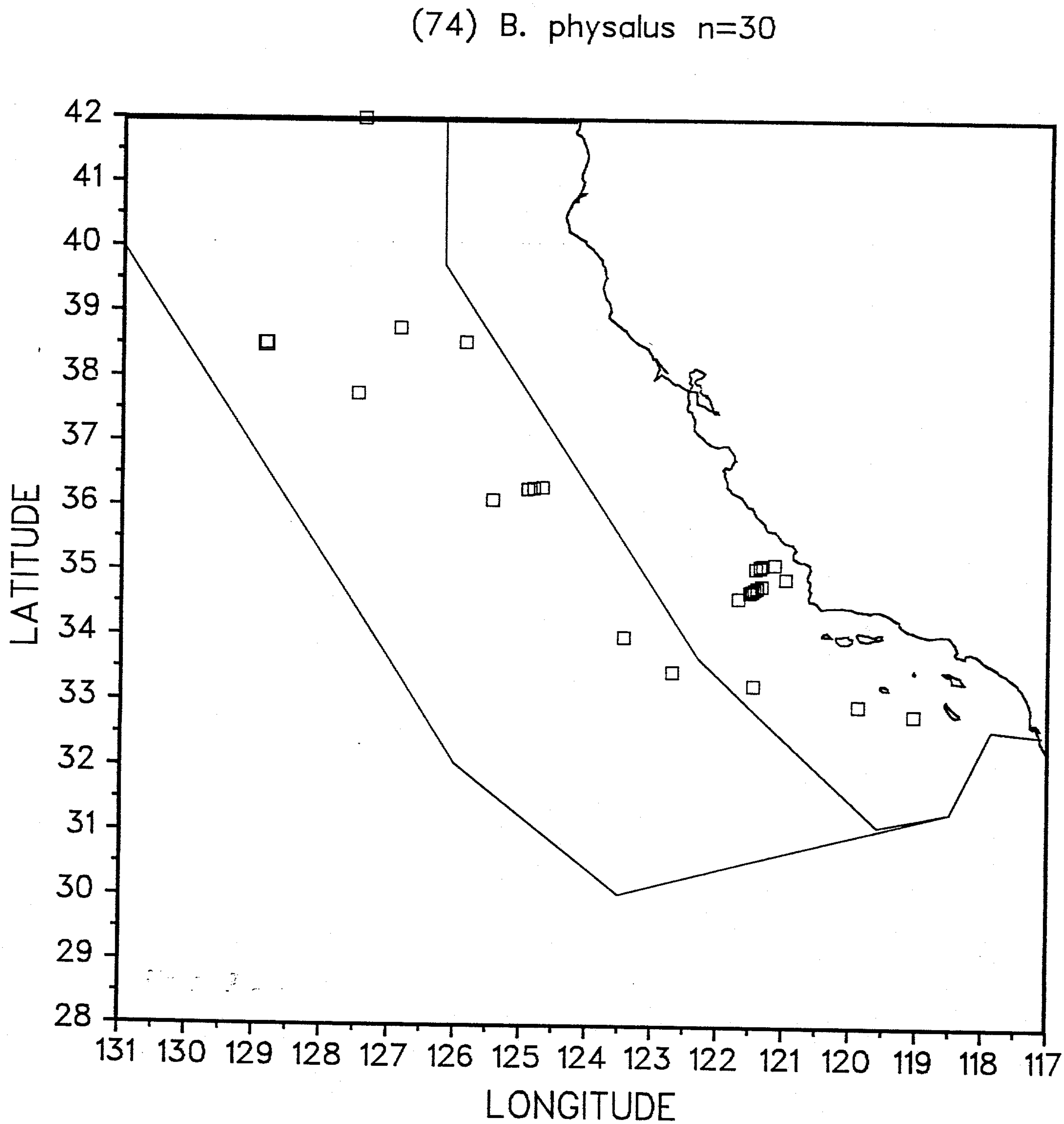


Figure 35. Blue whale sightings during the 1991 CAMMS cruise.

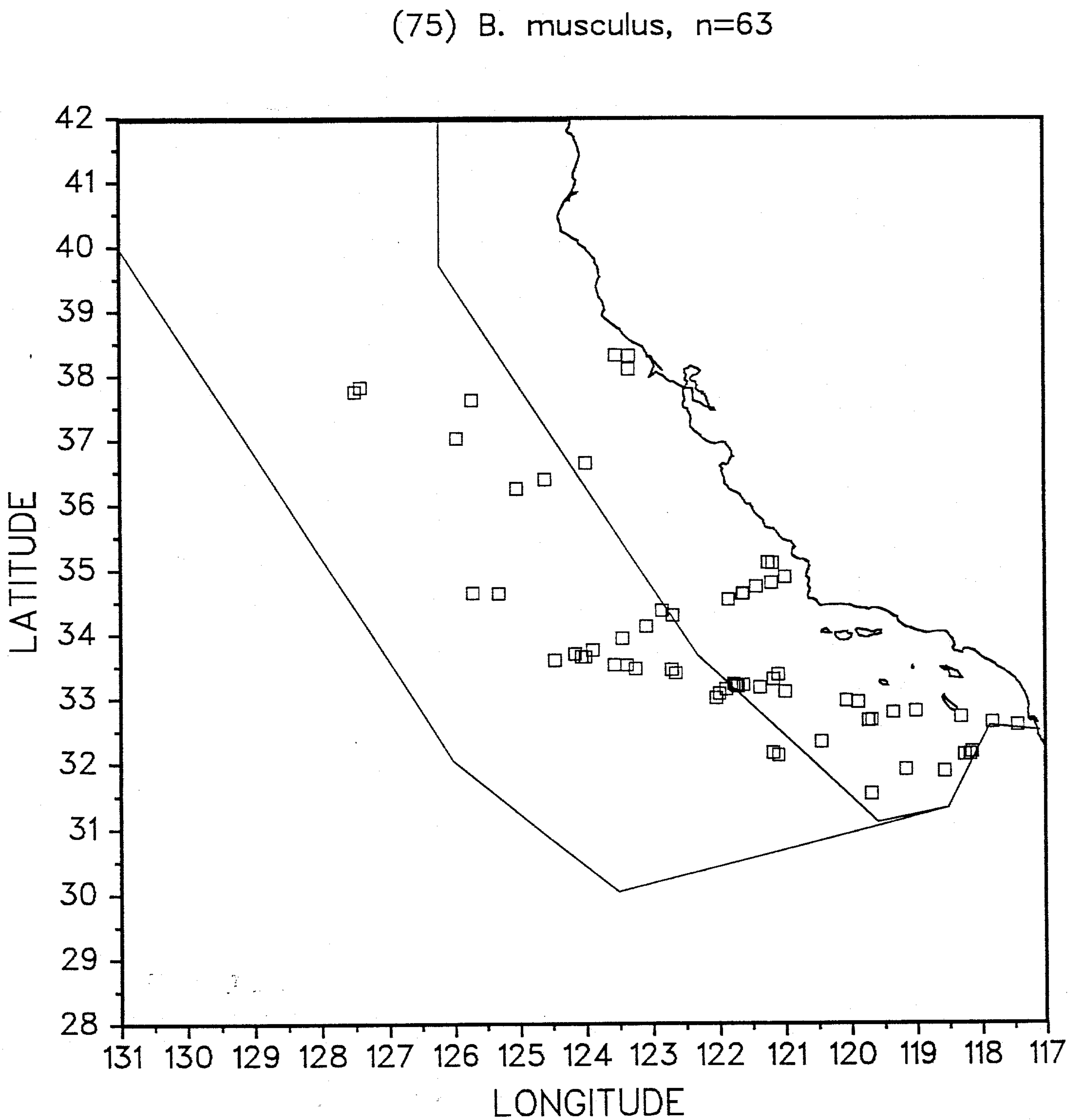


Figure 36. Humpback whale sightings during the 1991 CAMMS cruise.

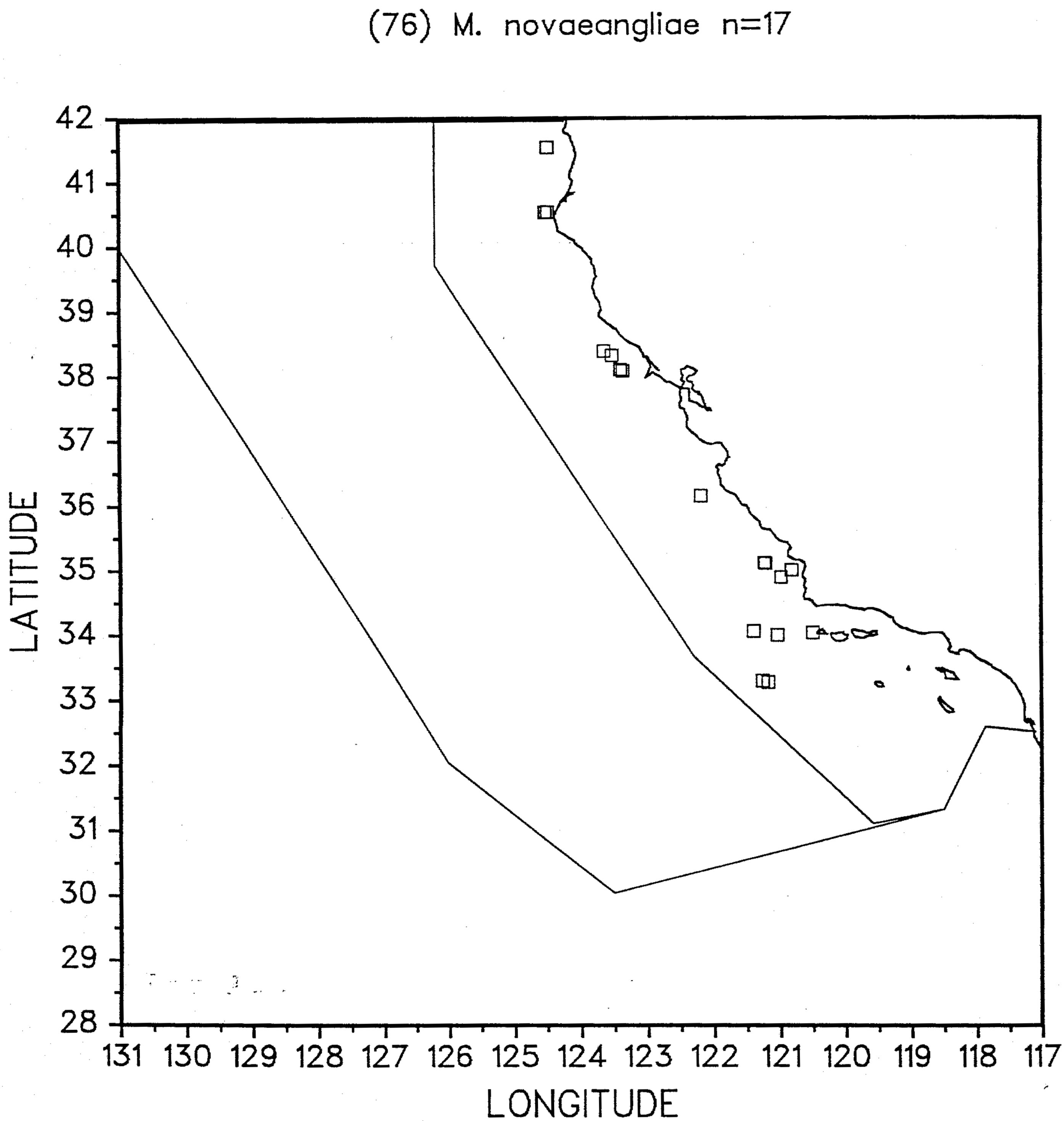


Figure 37. Unidentified dolphin/porpoise sightings during the 1991 CAMMS cruise.

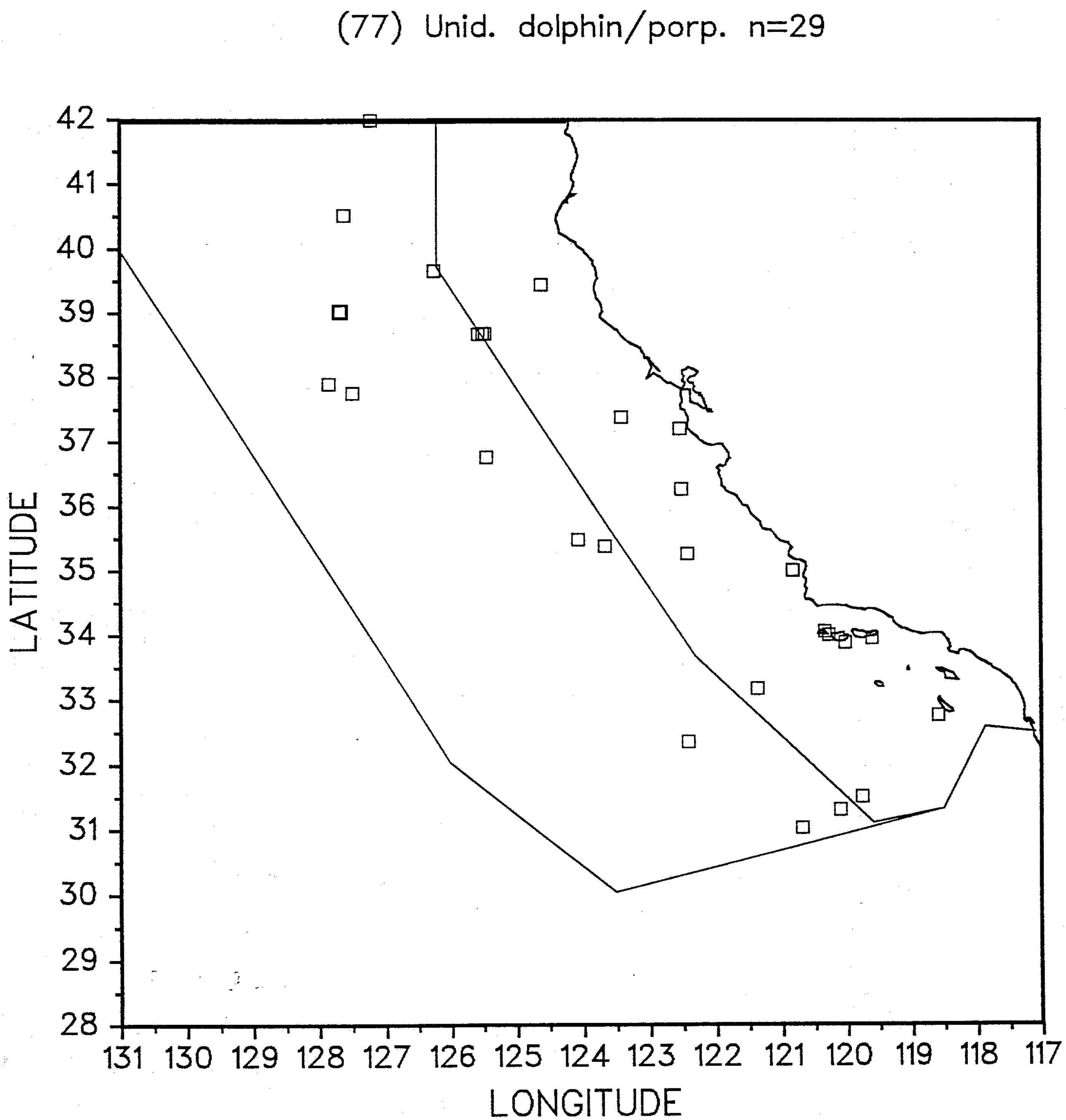


Figure 38. Unidentified small whale sightings during the 1991 CAMMS cruise.

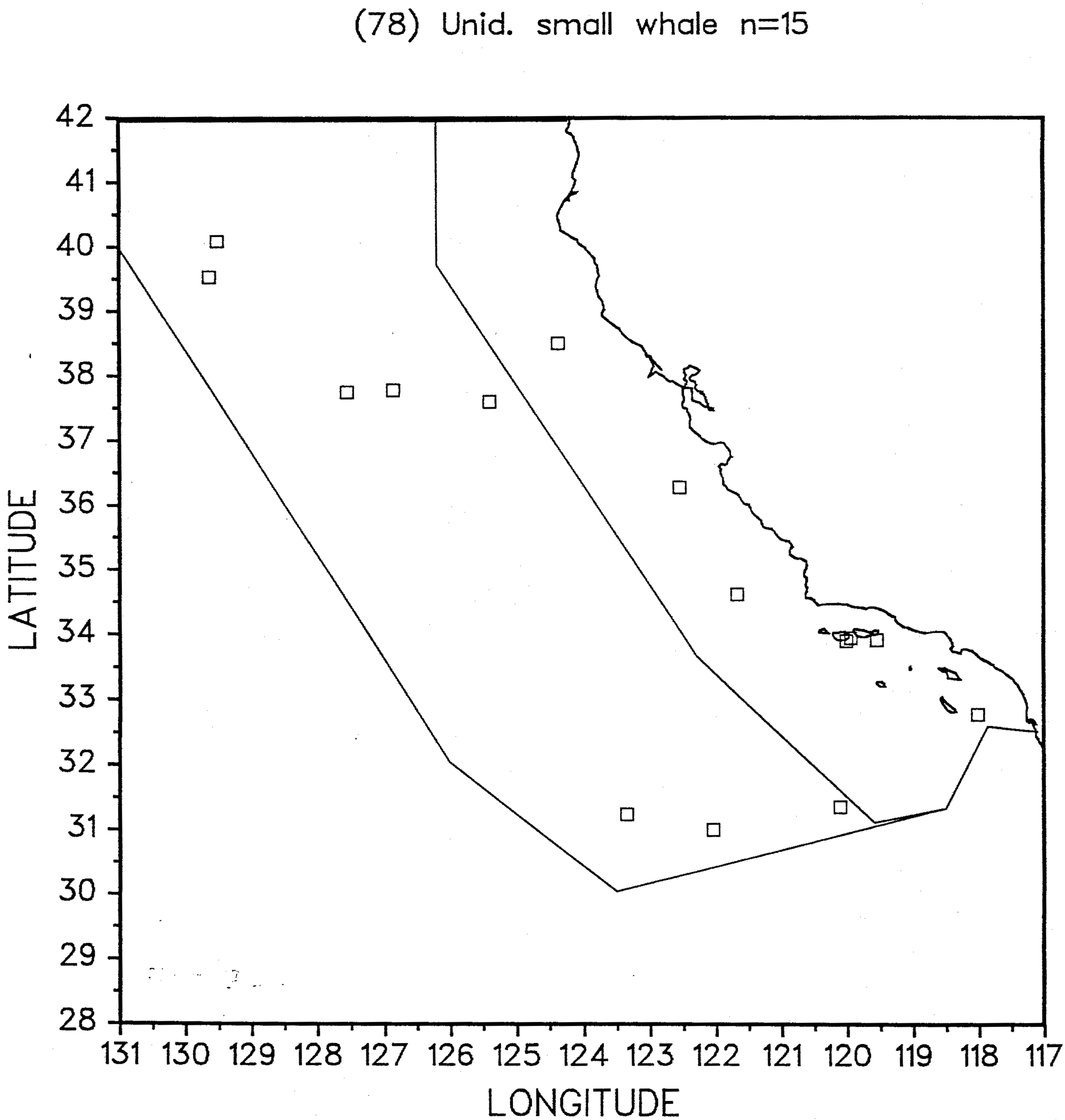


Figure 39. Unidentified large whale sightings during the 1991 CAMMS cruise.

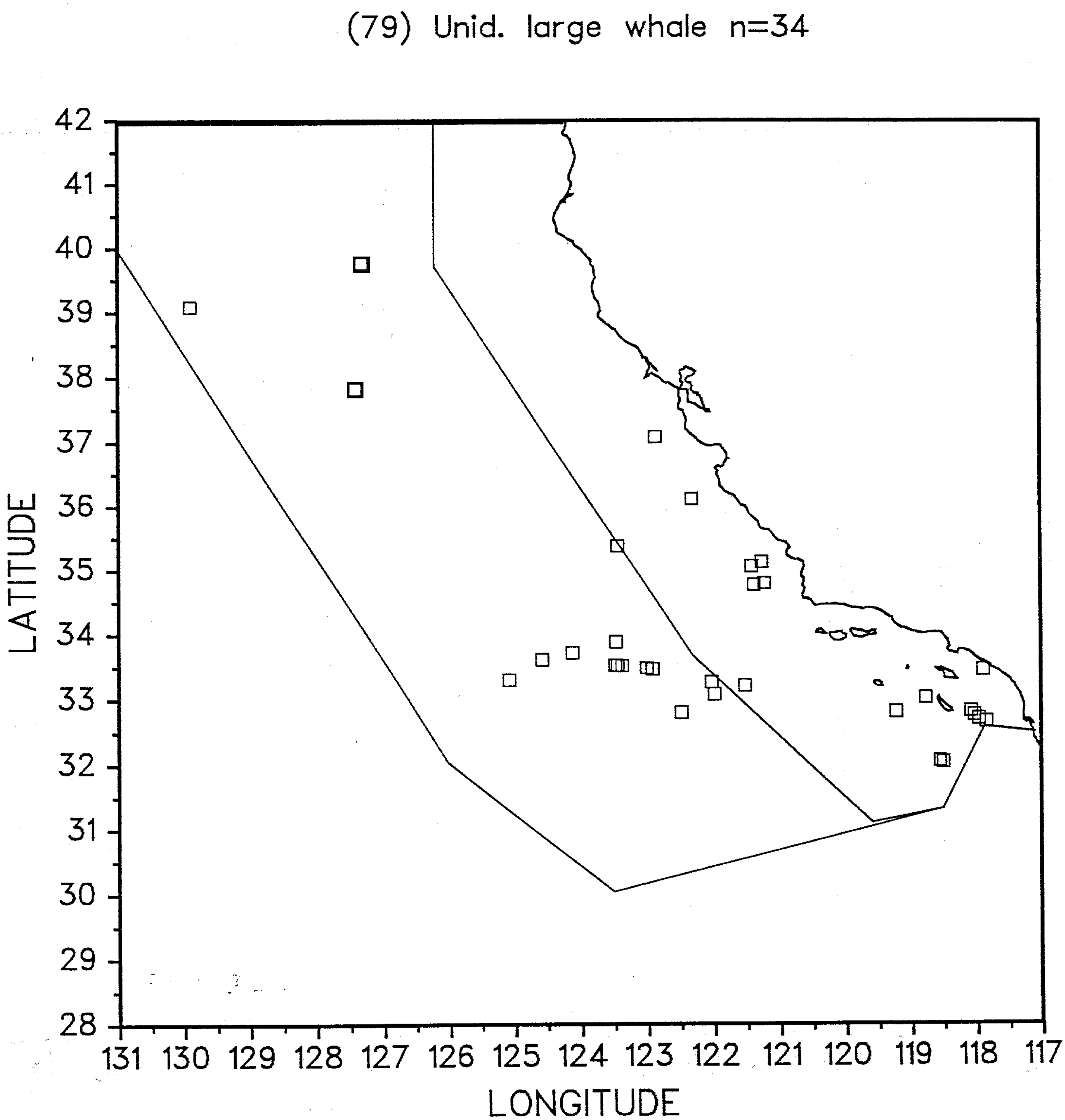


Figure 40. Unidentified cetacean sightings during the 1991 CAMMS cruise.

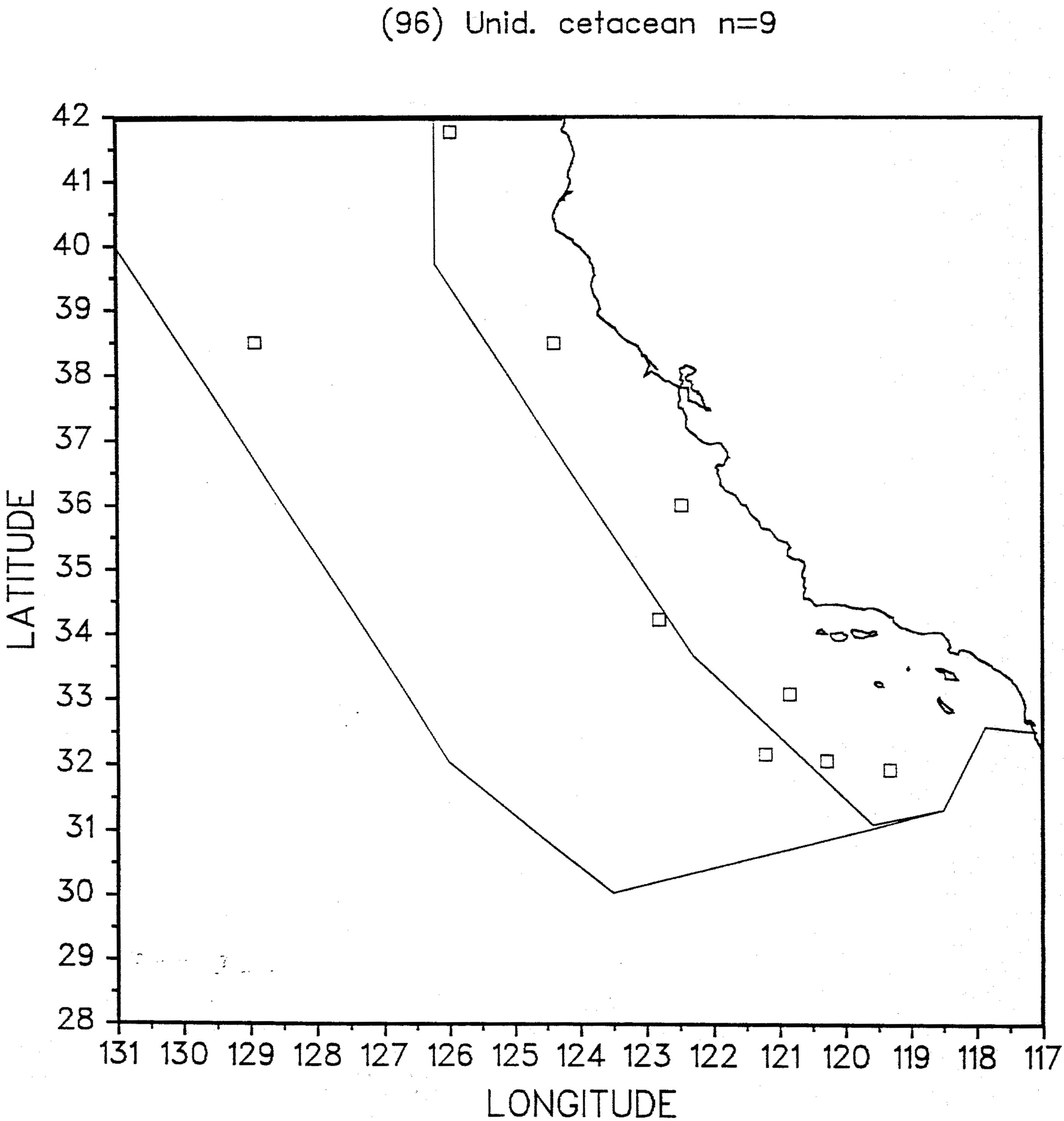


Figure 41. Unidentified object sightings during the 1991 CAMMS cruise.

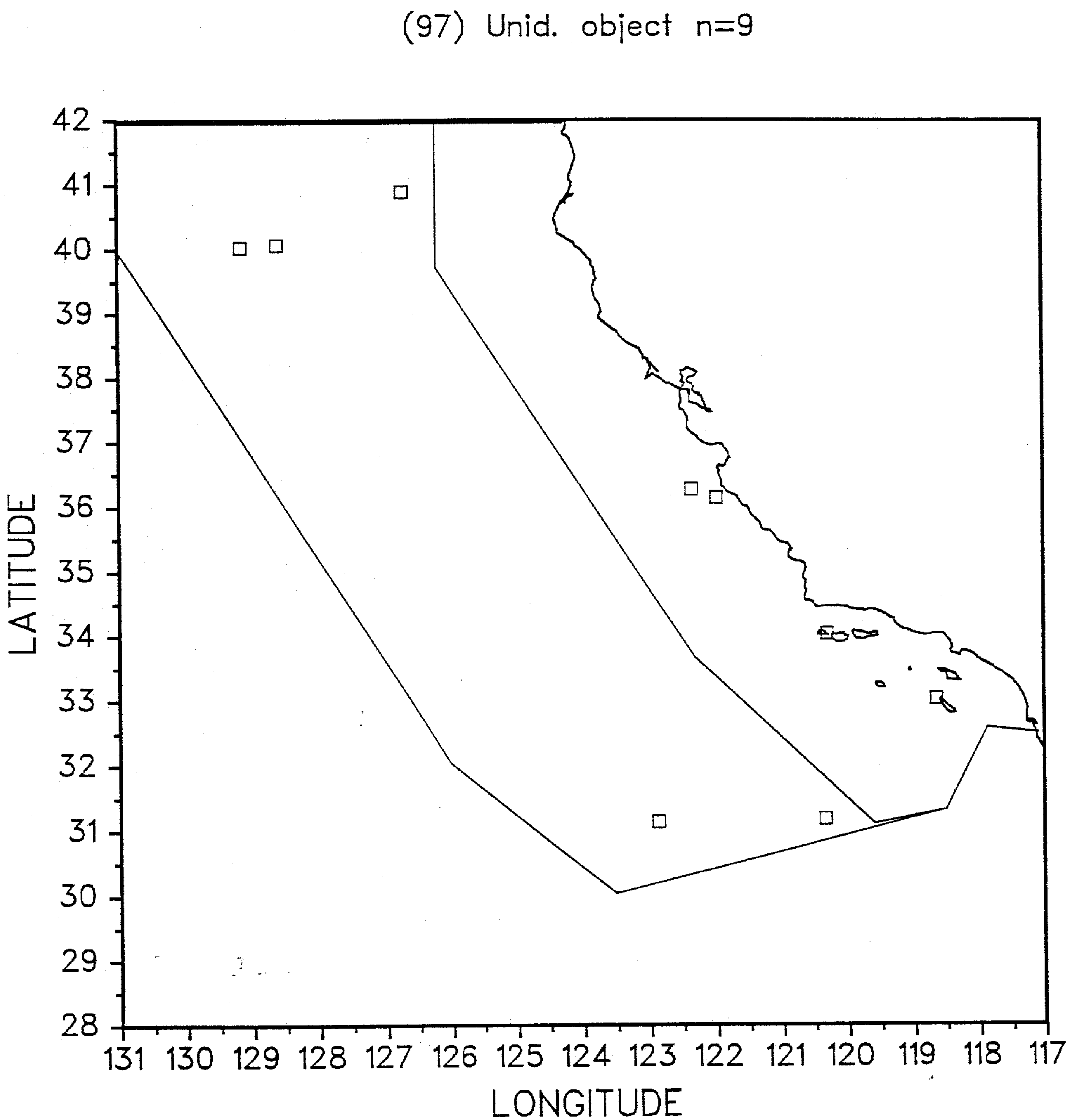


Figure 42. Unidentified whale sightings during the 1991 CAMMS cruise.

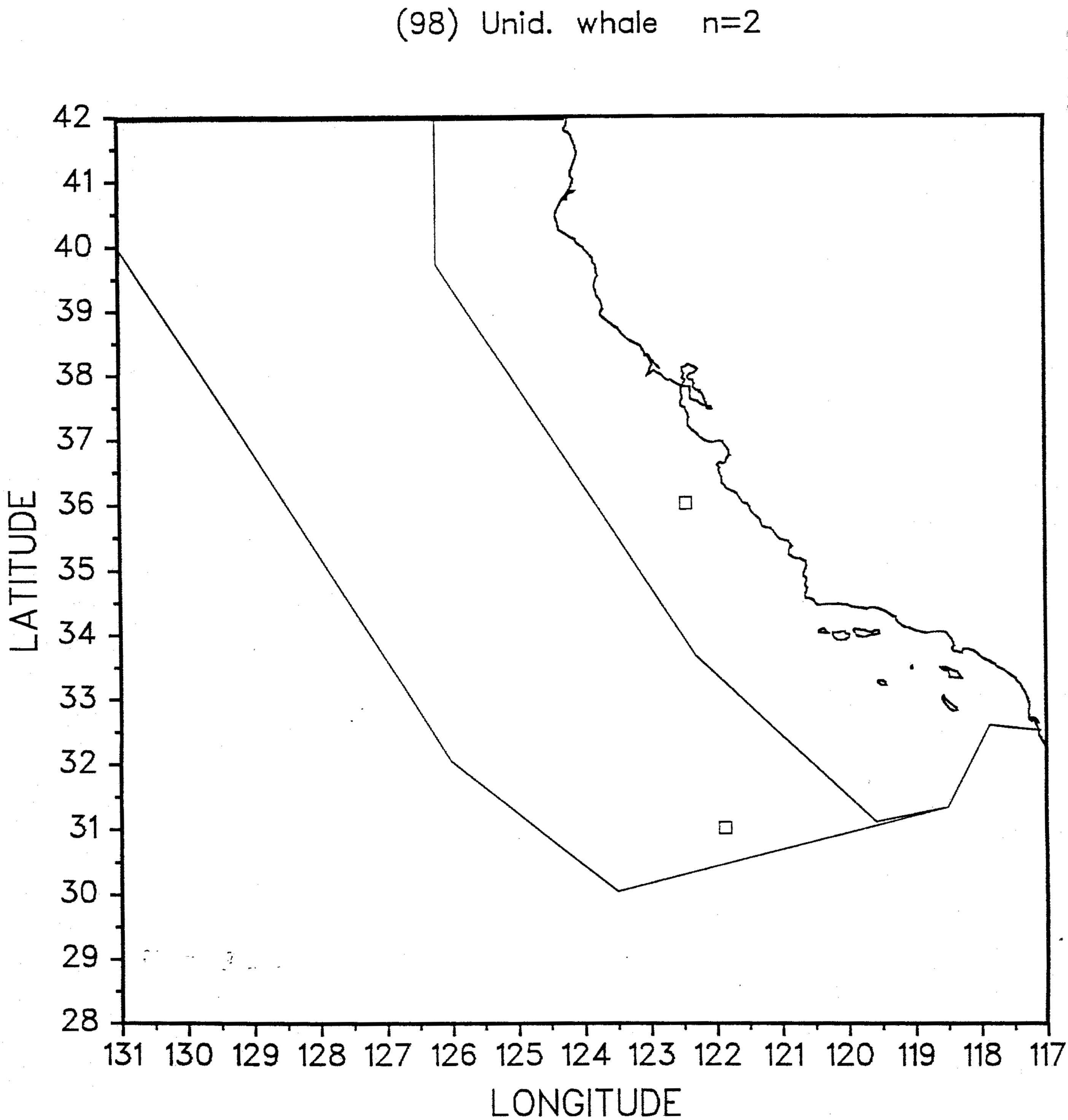


Figure 43. Unidentified sei or Bryde's whale sightings during the 1991 CAMMS cruise.

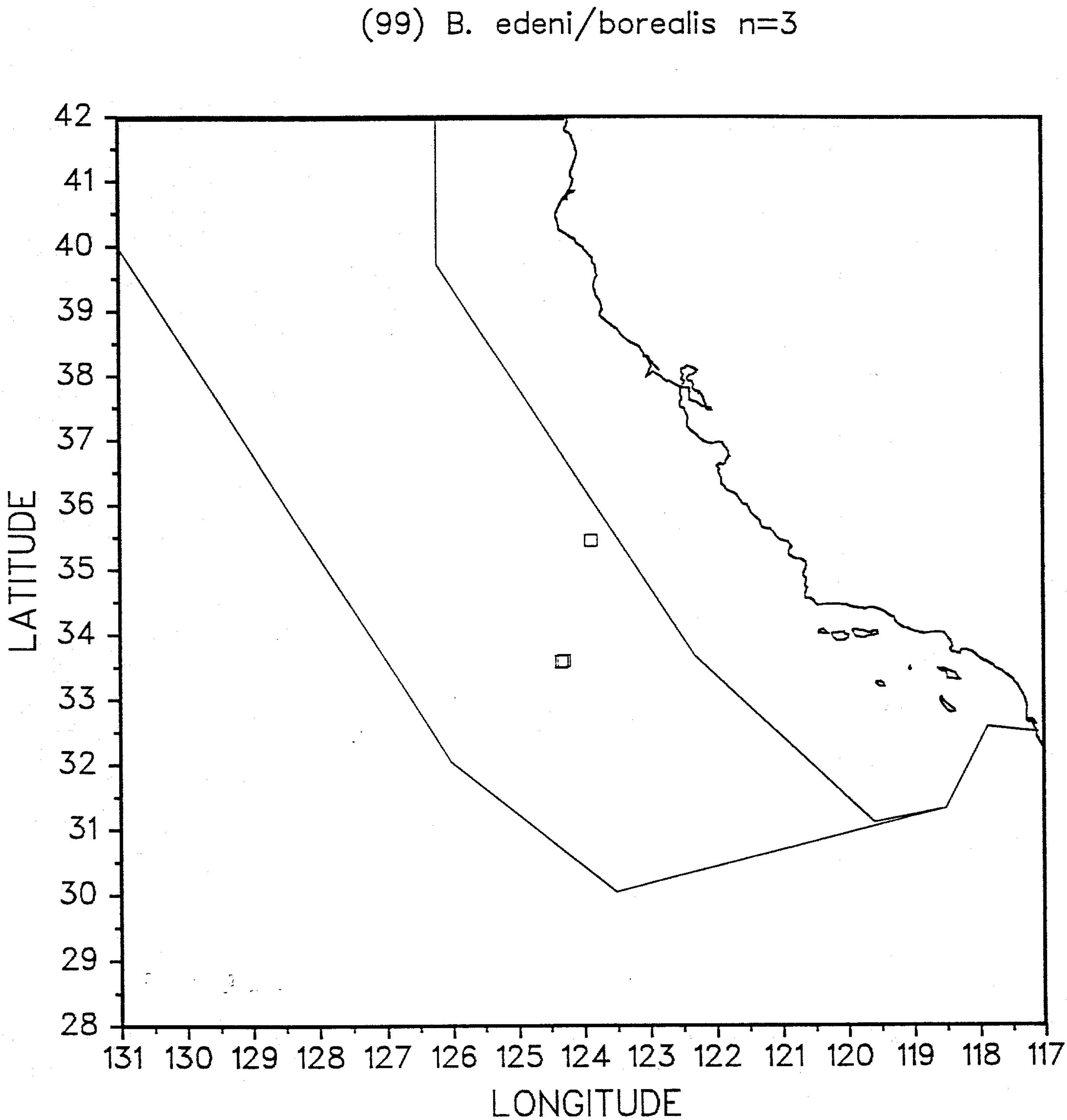


Figure 44. California sea lion sightings during the 1991 CAMMS cruise.

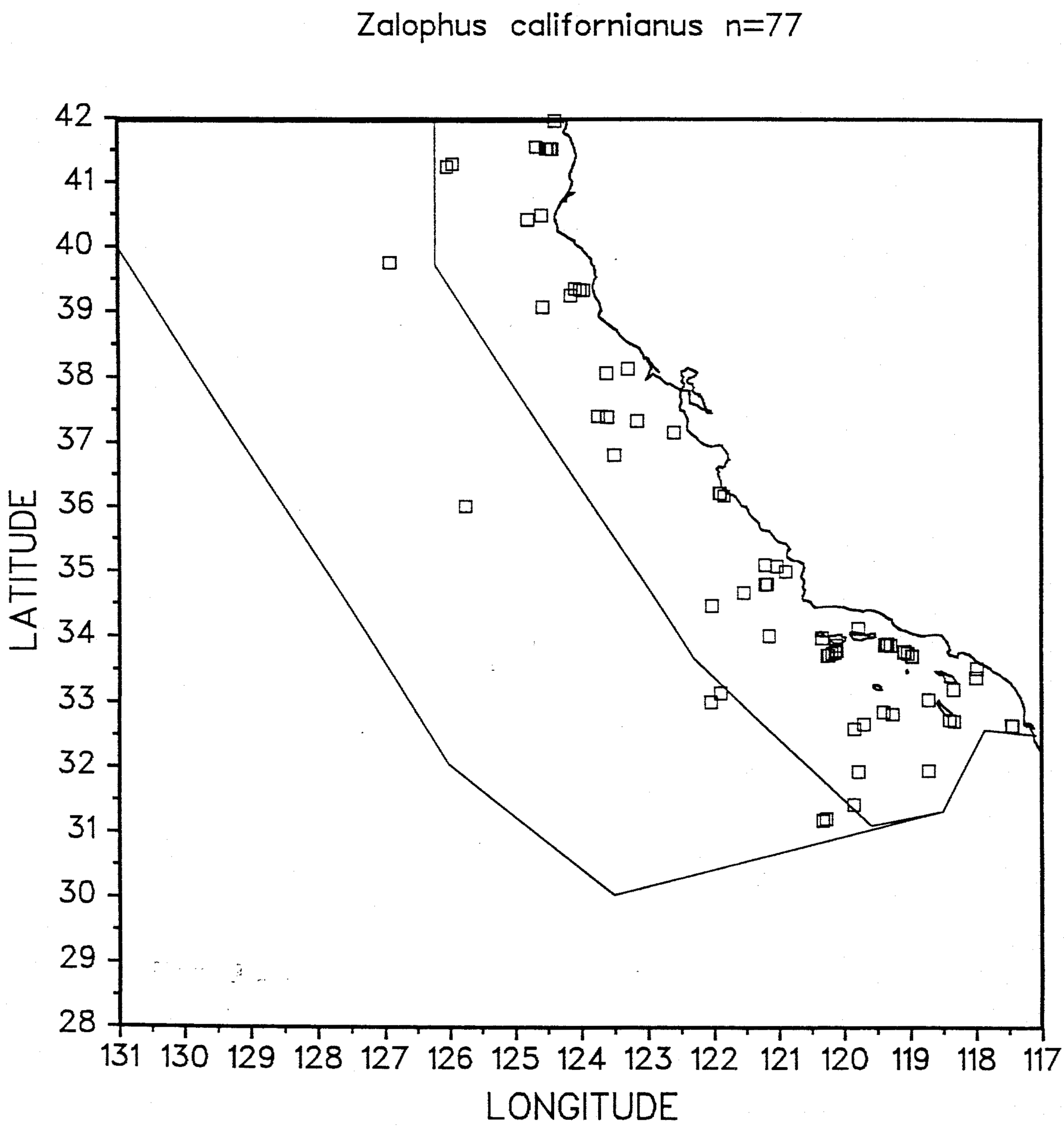


Figure 45. Northern elephant seal sightings during the 1991 CAMMS cruise.

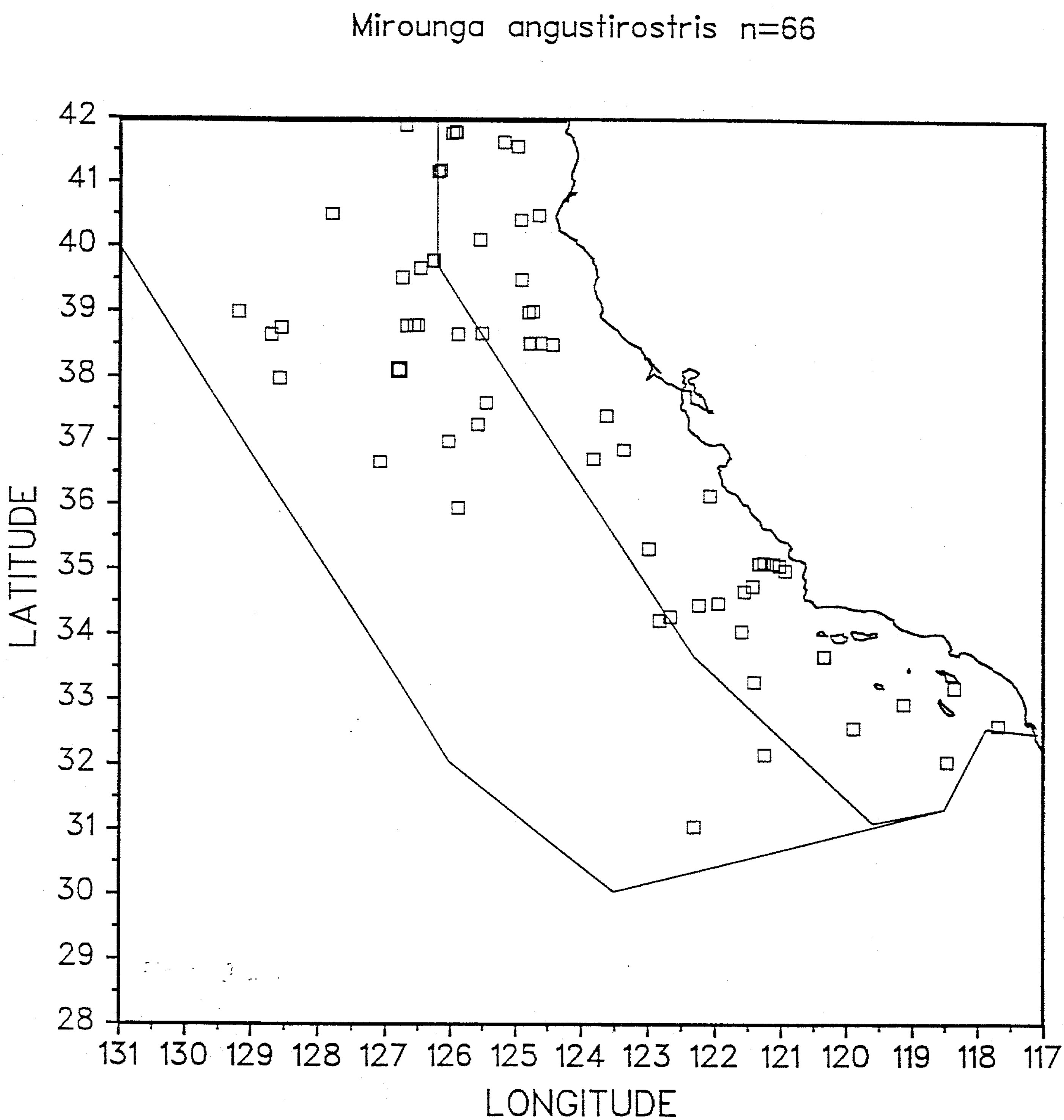
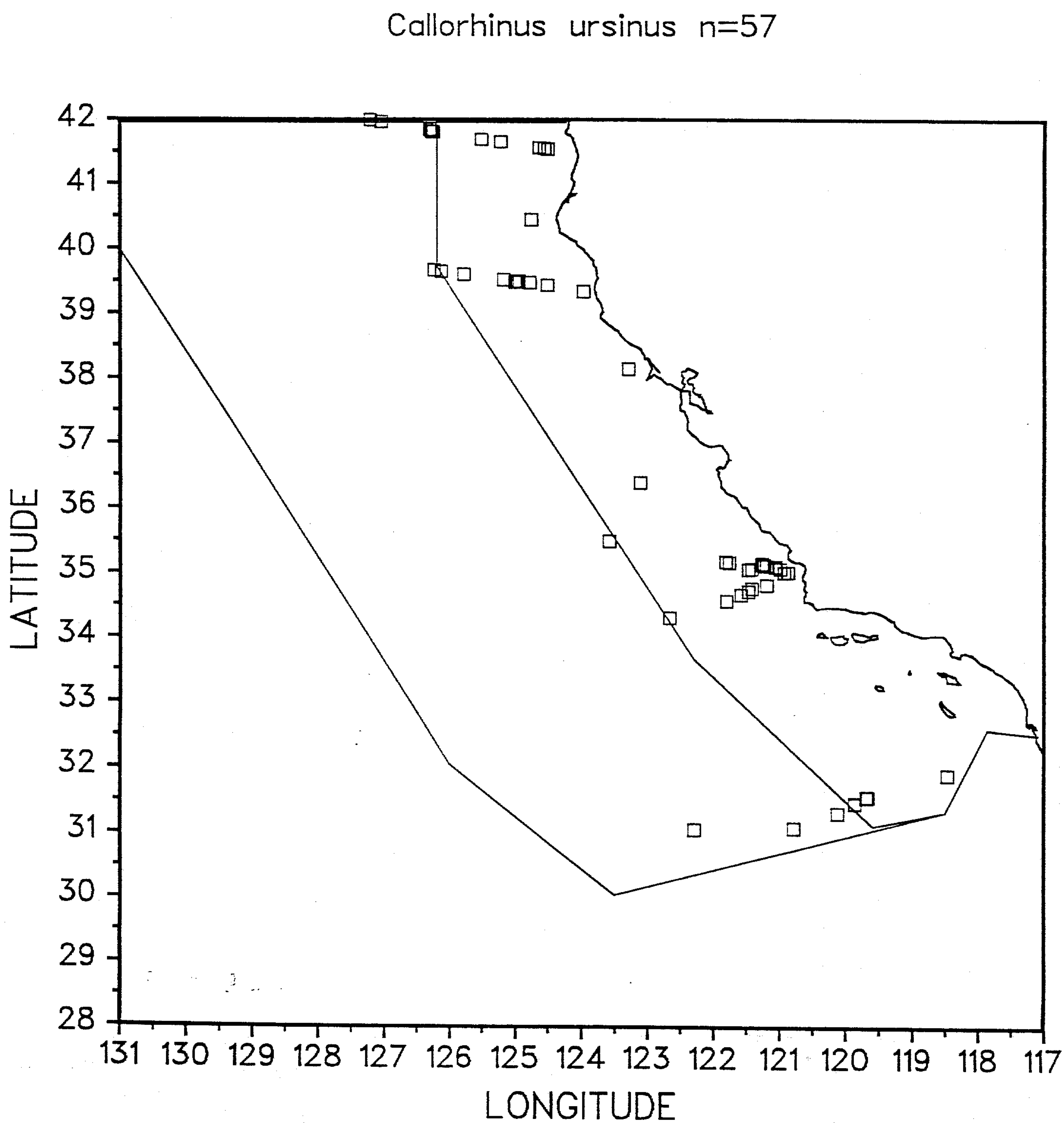


Figure 46. Northern fur seal sightings during the 1991 CAMMS cruise.



APPENDIX A

CRUISE LEADER INSTRUCTIONS FOR THE 1991 CAMMS CRUISE

As cruise leader, your primary responsibilities are to maintain the integrity of the scientific data collected on your leg and to act as supervisor and coordinator of all scientific research on the vessel. The intent of this document is to give you guidelines for the performance of these duties. If activities are required outside these guidelines, you should make every effort to contact the chief scientist as soon as possible.

The primary mission of this cruise is to estimate the population size of all cetacean species in California coastal waters (out to approximately 300nmi offshore). Methods include 1) line-transect surveys of a uniform grid pattern (see attached figures), 2) a line-transect survey of a separate strata which consists of the region within 2nmi of each of the Channel Islands, 3) mark-recapture estimation of abundance for those whale species for which photographic catalogs are already well developed, and 4) studies of genetic population structure through collection of biopsy tissue samples from those species which are included in our permit. Sufficient time has been allocated to accomplish each of the primary missions. If, due to extraordinarily bad weather, some activities have to be curtailed, the priorities are in the order given above. Each of these facets of the primary mission are covered below in more detail.

A secondary mission is the collection of oceanographic data to help understand the patterns of cetacean distribution. These samples include continuous measurement of sea surface salinity, temperature, and chlorophyll; twice daily expendable bathythermograph XBT probes; and a daily hydrographic station each morning with CTD and water samples for primary productivity. All oceanographic data collection will be run by the ship's survey technical department (with help of Valerie Philbrick on leg 3). As cruise leader, you do not directly supervise the oceanography, but you should be aware of what is going on. Check with chief survey tech Julie every couple of days to see if everything is going smoothly. Another secondary mission is the collection of at-sea pinniped sightings to better establish where the various species are feeding. When pinniped sightings are so frequent that they are interfering with cetacean search, the recording of pinniped sightings should curtailed or limited to short comments. A guideline that worked on the first leg is that pinnipeds are not considered sightings and are not given sighting numbers when within 10 miles from shore or nearest island. When they are given sighting numbers, pinniped group sizes should be recorded in green books just as with cetaceans. A third secondary mission is the collection of turtle sighting data. This is so rare as to not affect cetacean searching. If a turtle is small enough to be brought aboard, we should try to capture it for life-history data and measurements, and we should tag and release the turtle. A final secondary mission is the dip-netting of surface fish at the end of the day (usually 2100 to 2200). This is lead by Jim Cotton out of his own personal research interest. This work should be permitted, but is not a NMFS mission and is not covered by overtime for Jim.

Several previously scheduled scientific mission have been cancelled, including hydro-acoustic surveys and associated mid-water trawling, bird observations, and manta net tows.

PRIMARY MISSIONS

1) LINE TRANSECT ON UNIFORM GRID

The established cruise tracks cover a uniform grid from the Mexican border to the Oregon border and out 300nmi. Try to stick to these cruise tracks as much as possible. The cruise tracks include several "dead head" transects which are necessary to simply get from the end of one transect to the beginning of the next. I have indicated these on the enclosed figures. Try to cover the "dead head" line by running at night as much as possible. When on a dead line, conduct search during daylight hours as usual, but I want to keep these data separate from the regular uniform grid. Start a new data file whenever you start or end a "dead-head" transect (you close an existing data file using the control-D to escape the program CRUISE and start a new file by restarting the program). In getting from the end of one transect line to the beginning of the next, try to make efficient use of ship time. If you can replicate previous tracklines, do so. If you can search for whales to photo-ID, do so. On leg one, I conducted a survey for harbor porpoise along the 10-20 fathom depth contour (using 5 observers and a recorder, all searching with hand-held binoculars). Additional data of this sort would be useful north of Point Conception (in Beaufort 0-2 only).

On the first leg, I found that given good weather, the time was more than sufficient to complete the scheduled transects. At one point we were weathered-out in one area and headed for shelter near the coast. There we were able to complete about 40nmi of LEG 2 transects in the vicinity of Bodega Head. Also, we were able to complete a sizeable segment of LEG 4 transects in the far northeastern corner of the grid. These added regions are noted in the back of the Cruise Leader Logbook. If you have extra time on your leg, try to cover areas assigned to other legs. Always try to take advantage of good weather when it occurs. There is no need to re-do that which was completed in good weather on a previous leg (even if that area was scheduled originally to be completed on your leg).

On the first leg, we missed a segment of LEG 1 transect (approximately a 1-day run) just southwest of Fort Bragg. Please try to fill in missed segments of previous surveys as time permits. Missed segment of effort should be listed in the back of the cruise leader log-book.

In good weather, you can expect to cover about 80 miles per day in the Southern California Bight, 120 miles per day on the outside (more than 100nmi from land), and an intermediate distance in the northern inshore areas. Originally I planned for 100nmi per day, but on the first leg we averaged more than this. Because I was generous with time, the option exists of sitting-out rough weather or fog rather than just trucking down the trackline and leaving a big hole that has to be filled later. Consider this option if the weather forecast is encouraging. (Note, a phone number of the marine forecaster for the National Weather Service is listed in the front of the Cruise Leader Logbook. You can consult that person directly if you identify yourself as being on a NOAA dolphin survey.)

LEG-Specific Comments

LEG 2. Leg 2 has a long segment of dead-head on the outside in the far north. Try to cover as much of this at night as possible (even if it means shaving 20 miles off one of the other legs). After this excursion offshore, you will come to shore near Bodega Head. The 20nmi inshore segment of this transect and the 20nmi offshore segment of the next transect were already covered in suitable weather conditions. This area is, however, a hot-bed of whale abundance and has surface swarms of krill. I do not want to bias the survey by double-counting this area, but you might want to conduct a whale hunt for photo-ID in this area. A good option for finding whales might be to travel south approximately 10 miles from shore. The home stretch going into San Diego crosses Mexican waters and is thus a dead-head run. If you have time after completing scheduled lines, try to pick-up another transect line and avoid wasting time transitting Mexican waters.

LEG 3. Leg 3 circumnavigates most of the Channel Islands. See the explicit instructions below for these surveys. We were able to do San Clemente Island on the LEG 1, so skip it. See if you can pick-up San Nicolas or Santa Barbara Islands in its place. You should probably call the Navy long before you try San Nicolas. Once you complete the northern Channel Islands, you have a long "dead-head" line. If weather is good, try to complete the LEG 3 transect that was planned to go from offshore towards Los Angeles in the reverse direction (or replicate adjacent tracklines which head in the same general direction). Take advantage of good weather when you get it. Leave some time for whale photo-ID in the vicinity of Half Moon Bay, on you final run into San Francisco.

LEG 4. Leg 4 is a mop-up leg. In addition to the scheduled tracklines, try to fill-in the holes created by bad weather during the previous Legs. A large section of the LEG 4 transects in the far northeast were completed under good weather on LEG 1 and do not have to be replicated. As time permits, complete one or two of the forays into the far offshore waters to see what cetacean fauna is there. Confer with the chief scientist frequently regarding cruise tracks.

2) LINE-TRANSECT SURVEYS W/IN 2 MILES OF CHANNEL ISLANDS.

During these survey, end the regular transect grid-line at approximately the 10-fathom curve before you begin the special "island stratum". Close the data file and open a new one so that I can keep these data separate in the analyses. You will conduct the surveys at 1 nmi offshore and will not chase sightings that are more than 1 nmi perpendicular to the offshore side of the ship). This will form a strata that consists of waters within 2nmi of the Channel Islands. As with other surveys, you can break effort to conduct whale photo-ID, but if the AR-2 is running well and waters are calm, you may be able to send-out a photo-ID team and continue effort. I especially would like to get picture of the island population of Tursiops.

3) **PHOTO-IDENTIFICATION OF WHALES FOR MARK/RECAPTURE POPULATION ESTIMATION.**

If whales are cooperative or if weather if rough, this work can be conducted from the McArthur. In general, better photographs can be taken from the launch, AR-2, because of its faster speed (to get in position) and its greater maneuverability. The crew is very fast and efficient at launching and retrieving AR-2. The photo-ID crew usually consists of the team leader who is not on-duty as the primary photographer, the cruise leader (or Sue Kruse who has extensive experience) as data recorder and back-up photographer, and Wes Armstrong for biopsy sampling (see below). Try to rotate in other people if possible, without packing the boat (a practical maximum is 3 scientists and a driver). I am willing to spend up to 3-4 hours at this with a good bunch of whales under good conditions. Read the conditions of the permit and make sure that those conditions are not violated. Species of primary interest are blue whales, humpback whales, killer whales, pilot whales, bottlenose dolphins (inshore or near islands), and right whales. Do not waste time on gray whales.

4) **BIOPSY SAMPLES FOR POPULATION IDENTIFICATION**

We have an ETP biopsy permit to take samples from some of the species that are found in California coastal waters. A second permit is pending that would include the remaining species. Do not take samples from unauthorized species (including Dalls porpoise and northern right whale dolphins) until the second permit is in-hand. In general, we would like to get samples from a wide variety of authorized species. Of particular interest are common dolphins and humpback whales because existing studies of DNA stock structure are already underway for those species. Wes Armstrong is taking the lead in this project.

INDEPENDENT OBSERVER EXPERIMENT

During the regular survey grid and the island surveys, an independent observer will collect data on the groups of cetaceans and (when more than 10 miles from shore) pinnipeds that are missed by the primary observer team. The independent observer searches primarily with naked eyes but should have a binocular in their hands at all times to verify more distant objects. The stick binoculars are good to hold because they are always raised and the independent observer does not draw inadvertent attention by raising or searching for binoculars. To qualify as missed, the entire group must be past 90 degrees right or left or be at the bow. To know whether a group will be missed, the independent observer must wait without saying anything or cueing the other observers until the school is past. If the independent observer is cueing the other observers, they should be sternly warned by the cruise leader not to do so. If this happens more than twice, you should consider relieving them of duty. The independent observer can call to turn the vessel if they need to verify species or school size, but only after the group has passed abeam. I expect the independent observer to work 4 to 5 hours a day at this job, with watches of not more than 2 consecutive hours. Watches should cover all periods of the day on a rotational basis (animals may be especially likely to be missed near dawn or dusk). The cruise leader should participate as independent observer whenever time permits (subject to the same constraints as the regular independent observer). You will have to coordinate watch schedules with the independent observer.

APPENDIX B

AUTOMATED DATA ENTRY INSTRUCTIONS FOR CAMMS CRUISE

INTRODUCTION

For the first time on our marine mammal ship surveys, a computerized data entry system will be used to record sighting and effort data. The reasons for using a computer are primarily to increase the accuracy of data recording and to reduce the time between collecting the data and being able to analyze it. An added benefit is a reduced work load for the data recorder. Of course, the Sighting Continuation Form (which is the most time consuming form to fill out) cannot be replaced by computer entry since it requires drawing pictures. The Sighting Form and the Effort Record will not be used on this cruise.

The data entry program (called CRUISE) is a modification of one used extensively on SWFSC aerial surveys. It was designed for very rapid data gathering situations and has been tested under the most trying of circumstances. It may not be bullet-proof, but it is very close.

The basic feature of the program is that it is event-driven. You press a function key to indicate an event. Each function key has a specific assignment (eg. F2 for a sighting, F5 to toggle effort on-or-off, etc.). When you press a function key, the computer notes the time and latitude/longitude of the ship at the moment you pressed the key. You will not have to write down time or position (for the latter, the computer is plugged into a GPS satellite navigation unit). The first event you enter will be noted in the event buffer in the upper left part of the computer screen. You can continue to press other event buttons while the computer is waiting for you to respond with information on the first event. These subsequent events will just stack-up in the buffer and wait for your response. <u>There is never any rush.</u> The time and position of the buffered events has already been recorded.

Most errors that are made in entering data can be easily fixed. If you make an error that cannot be fixed, or if you are unsure you fixed it correctly, it is best to document the problem using a comment statement (F10). If, when you are entering information, that information will not be saved until you press the escape button (ESC). You can continue to make changes, going from one data element to the next, until you get it perfect. If you make a mistake and pressed the wrong event button, you can cancel it by pressing the UNDO button (F1). If you entered a wrong value and already pressed the ESC to save it, you can even go backwards and re-edit these data using the left and right arrow keys on the keyboard. Each of the event buttons and error-recovery functions are documented in more detail below.

As always, it is the recorder's responsibility to see that all data are entered properly. That person should be constantly reviewing weather and sighting conditions and updating them on the computer whenever conditions change. All conditions must be reviewed at the beginning of each recorder's shift.

At the end of each day, it is the responsibility of the team leaders and the cruise leader to edit the newly created data files to ensure that data are complete and that any missing data have been inserted. Never edit the original copy of the data file. Transfer the data file to hard disk and edit it there. Document any problems with the data in a new comment line.

DATA EVENT FUNCTION KEYS

Information requested by the computer when you press an event button is exactly the same information that would go on the paper forms. There is, however, some differences in format. On paper, yes/no answers are coded as 1/2; on the computer you will answer with the letters "y" or "n". On paper you do not enter the decimal point; on the computer you do. On paper you must supply leading zeros for all data fields; on the computer you do not. Detailed instructions on each data element follow a general summary of the event options. The information you enter will be edited to ensure that it falls within specified ranges. A beep will indicate an invalid entry. You must then enter a correct value before proceding.

ESC The ESC or escape button is used to save the changes you have made for a specific event button.

F2 Sighting This event indicates that you have seen something (a cue) that may be a marine mammal. The computer will prompt you for initial sighting information (the observer ID number, the type of cue, the method of sighting, the bearing to the cue, the distance to the cue). If you enter reticle distance, the computer will convert this to nautical miles. If the cue pans out to be a marine mammal sighting, then you will also enter a sighting number. The last assigned sighting number is shown in the upper line on the screen. When you are certain that the sighting is a cetacean and have already entered all of the above data, you press ESC to record these data. At this point, the computer will request auxiliary sighting information (the water temperature, whether documented photos were taken or birds were present with the cetacean, and species codes for up to 3 species). Species codes are available from a separate table. If you are unsure of the species, please enter the lowest taxonomic group that you are sure of. These species codes may be edited later based on your continuation sheets. [If more than 3 species are present in a school, hit the sighting button, F2, a second time and enter the additional species. Document what you have done using a comment, F10.]

If a cue does not turn out to be a cetacean, you can cancel both the first and second page of input by pressing UNDO (F1) and responding yes to the subsequent querry.

F3	**Begin**	This event begins a day's effort. It sets up a series of events in the event buffer to ensure that when you start effort, all the pertinent information has been recorded. In addition to using this to start effort in the morning, it is good to use it whenever you are starting effort after a long (>30 minute) gap in sighting effort. The only specific information for this event is the cruise number. Pressing this button will, however, stack-up the buffer with events that correspond with F6, F7, F8, and F9.
F4	**Turtle**	This event indicates a turtle sighting. Information requested includes the observer ID number, the turtle species, the bearing and distance at first sighting, the number of turtles, and associated objects (jellyfish, floating debris, or red tide). [NOTE that you are also requested to fill out the turtle life history form for each turtle sighting.]
F5	**Effort**	Both beginning and ending effort are considered separate events. This one button acts as a toggle switch for both. If you are on-effort, pressing F5 will end it. If you are off-effort, pressing F5 will start it. Always check to see that the screen properly displays "ON" or "OFF". If you have an on-effort sighting, always press the sighting button before logging off-effort.
F6	**ObsvPos**	This event indicates a change in observer positions. Use this whenever you rotate positions or begin a new shift. Pressing this button will stack-up the buffer with events that correspond with F7, F8, and F9 so that you can review this information and certify that it is correct.
F7	**ViewCondit'n**	This event indicates a change in sea state variables. These include Beaufort code, swell height, swell direction, and water temperature.
F8	**Navigation**	This event indicates a change in navigational variables. These include course and speed.
F9	**Weather**	This event indicates a change in weather conditions. These include rain/fog/haze code, horizontal sun, vertical sun, wind direction, and visibility code.
F10	**Comment**	This event is used to record ancillary information. You are encouraged to insert <u>relevant</u> comments liberally. Whenever you make an error in data entry, it is a good idea to document it. This is absolutely necessary if you are unable to go back and fix the error directly. Each

comment is associated with a time and position, so feel free to record any unusual sightings or observations as comments.

NON-EVENT FUNCTION KEYS

There are several function keys which do not indicate an event. Some of these are activated by pressing the SHIFT key while simultaneously pressing a function key. These non-event keys are documented below.

ctrl-d

Exit the program by simultaneously pressing the control key (Ctrl) and the letter 'd'.

F1 Undo

Undo is used to correct errors on the event you are currently editing. It has two levels. First, if you are typing information on a specific data element and you make a mistake and want to go back to the previous, original information you can press F1. If instead you are not adding information but have discovered that you have pressed the wrong event button by mistake, you can press F1 to cancel the event you are currently editing. Similarly you can go back into the data record using the arrow keys (below) and delete a previously entered event. In either case, the computer will prompt you to make sure you want to cancel this event.

left-arrow

The left-arrow key is used to go back to make corrections on previous events which were recorded incorrectly. Each time you press "left-arrow", you will step one event back through the data file. You will be limited to editing only the most recent data. Undo can be used to delete a previous event. ESC is used to save a corrected event or to return to the most recently event that has not yet been entered. Similarly, the left or right arrow keys will save the corrected event, but these will move you within the buffer and will not return you to the end of the buffer.

When you back-up to a sighting or a sighting position update, the bearing (rel. true north) and distance to that sighting are displayed. This is <u>not</u> continuously updated (as is the "last sighting position" window), but rather represents the bearing and distance at the time it appeared. If you want to update this, press right-arrow followed by left-arrow.

right-arrow

The right-arrow will move you around in the event buffer, but cannot be used to by-pass events for which no information has been added. This is to prevent you from accidentally skipping an event.

up-arrow The up-arrow is used to move from one data element in the currently displayed event to the element above it.

down-arrow The down-arrow is used to move from one data element in the currently displayed event to the element below it.

shift F2 SightPos To update school position, press Shift-F2 and enter the sighting number and the current course, angle, and distance. There is a window on the screen which indicates the approximate position of the initial sighting cue and the angle and heading to that position. This is based on the position and course at the time of the cue, and the angle and distance entered by the recorder. This information is presented in the hope that it will help find lost schools and to document school movement. Schools do move, and you should update the school's position frequently, at least 2-3 times for distant sightings. As with sightings, if you enter reticle distance, the computer will convert this to nautical miles.

shift F3 Map A map of the entire study area or the immediate region (+/- 12 NMI) can be displayed using shift-F3. For the entire area, all on-effort tracklines will also be shown. For the immediate area, all tracklines will be shown. Sighting positions will also be displayed in the latter mode. NOTE: this feature can only be called when there are no events waiting in the buffer. It will be canceled by pressing any key.

shift F5 Sighting# A new sighting number can be specified using F5. This is only used if sequential numbering of schools get off track.

SPECIFIC INSTRUCTIONS FOR DATA ELEMENTS

F2 Sighting

Sight#	xxxx	4-digit sequential sighting number.
Observer	xx	2-digit code assigned to observer who saw the initial cue. See Code Table 15.
1st Cue	x	1-digit code: 1=bird, 2=splash, 3=mammals, 4=ships, 5=other or unknown,6=blow,7=helo.

SiteCode	x	1-digit code: 3=crew, 4=obs 25x, 5=obs not 25x, 6=other or ?, 7=helo, 8=ind.observer.
Bearing	xxx	3-digit angle to cue.
Reticle	x.x	Reticle distance to cue in tenths.
Distance	x.x	Nautical miles to cue, in tenths.
Temp	xx.x	Temperature in degrees centigrade to tenths.
PhotoY/N	y/n	Were photographs taken of the animals and documented on the sighting continuation sheet? Answer "y" or "n".
BirdsY/N	y/n	Were birds present with sighting? Answer "y" or "n".
Spp1Code	xx	2-digit code for 1st mm spp. present.
Spp2Code	xx	2-digit code for 2nd mm spp. present.
Spp3Code	xx	2-digit code for 3rd mm spp. present.

F3 Begin

Cruise #	xxxx	4-digit cruise number.

F4 Turtle

Observer	xx	2-digit code assigned to observer who saw the initial cue. See Code Table 15.
Species	xx	2-digit code for species of turtle.
Bearing	xxx	3-digit initial angle to turtle sighting.
Distance	x.x	Initial nautical miles to turtle in tenths.
#Turtles	x	Number of turtles present in the given sighting.
AssocJFR	x	Up to 3 1-digit codes for associated objects: J=jellyfish, F=floating object, R=redtide

F5 Effort Turn effort on or off.

F6 ObsvPos

Left	xx	2-digit code assigned to left 25x observer. See Code Table 15.
Recorder	xx	2-digit code assigned to data recorder. See Code Table 15.
Right	xx	2-digit code assigned to right 25x observer. See Code Table 15.

Ind.Obs.	xx	2-digit code assigned to independent observer (if any). See Code Table 15.

F7 SeaState

Beaufort	x	1-digit code for Beaufort sea state. See Code Table 5.
Swell Ht	xx	Swell height in feet.
SwellDir	xxx	Swell direction relative to North.
W. Temp	xx.x	Water temperature in degrees centigrade.

F8 Navigation

Course	xxx	Ship heading relative to true north.
Speed	xx.x	Ship's speed in knots and tenths.

F9 Weather

Rain/Fog	x	1-digit code, 1=no rain or fog, 2=fog, 3=rain, 4=rain and fog, 5=haze but not fog or rain.
Horz Sun	xx	2-digit code for horizontal sun position.
Vert Sun	xx	2-digit code for vertical sun position.
Wind Dir	xxx	Wind direction relative to true North.
Visbilty	xx	Distance in nautical miles of visibility.

F10 Comment Enter written comment up to 142 characters long.

DATA FILES CREATED

The program creates or uses a number of data files; these are described below.

DAShhmm.mdd This is the day's main data file created on the computer's battery-backed RAM-Disk drive D. The name includes a time and day stamp so as to avoid overwriting this file when you restart the computer. In the name, **hhmm** refers to the hour and minute the program was started and **mdd** refers to the month and day (months 10, 11 and 12 are coded A, B, and C, respectively). Data include any edited changes made to the original data during the data gathering. See below for data format.

BAKhhmm.mdd This is the day's backup data file created on the computer's internal battery-backed RAM-Disk drive D. The name includes the same time and date stamp as the above DAS file. It also includes all the same information in the same format as the DAS file. In the backup, however, edited changes have <u>not</u> been made to the original line of data. Instead, a new data line has been created with the same sequence number as the original data line but with the edited data in place of the original data. Using this file, it is posible to find out what was originally entered before any changes have been made or it is possible to reconstruct the DAS file.

POSITION.DAT This file contains information of the ship's position recorded at the beginning and end of each segment of effort. This file is used in MAP function #1 to plot cruise tracks. New information is appended to the end of this file.

COAST.DAT This file contains the California coastline data. The file is used to plot the coast in MAP functions.

SIGHTNUM.DAT This file contains the last sighting number of the previous day.

DESCRIPTION OF DATA OUTPUT FORMAT FOR FILES DAS* AND BAK*

COLUMNS

1-3	3-digit sequence number for the given event. Sequence starts anew each day.
4	1-digit code to indicate the type of event.

S	marine mammal sighting
B	begin effort for the day
t	turtle sighting
R	resume effort
E	end effort
V	sea state viewing conditions
N	navigation information
W	weather information
C	comment
P	observer positions
A	auxiliary sighting information
s	sighting position update
*	automatic position record (every 10 minutes)
1,2,3,4,5,or 6	school size and species proportions

5	period . to indicate on-effort event, otherwise blank
6-11	time (HHMMSS)
12	blank
13-18	date (MMDDYY)
19	blank
20-39	position, latitude and longitude
40	blank
41-44	data field 1
45	blank
46-49	data field 2
50	blank
51-54	data field 3
55	blank
56-59	data field 4
60	blank
61-64	data field 5
65	blank
66-69	data field 6
70	blank
71-74	data field 7

contents of data fields 1-7 depends on type of event (see column 4)

Data Field Number

Event	1	2	3	4	5	6	7
B	Cruise#						
t	ObsID	Spp	Bearing	DistNMI	#turtles	AssocJFR	
R							
E							
V	Beauf	SwHght	SwDir	W.Temp.			
N	Course	Speed					
W	Rain/Fog	HorzSun	VertSun	WindDir	Visibility		
P	LtObsID	RecordID	RtObsID	IndObsID			
s	Sight#	Bearing	Reticle	DistNMI	Course		
*							
S	Sight#	ObsID	Cue	SCode	Bearing	Reticle	DistNMI
A	Sight#	W.Temp	PhotoY/N	BirdsY/N	Spp1Code	Spp2Code	Spp3Code
1,2,3,4, 5, or 6	ObsID	BestSS	HighSS	LowSS	%Spp1	%Spp2	%Spp3
C	Comments are continuous lines across all the data fields and may						
C	wrap around to subsequent comment lines.						

Event	Description
B	begin effort for the day
t	turtle sighting
R	resume effort
E	end effort
V	sea state viewing conditions
N	navigation information
W	weather information
C	comment
P	observer positions
S	marine mammal sighting
A	auxilary sighting information
s	sighting position update
*	automatic position record (every 10 minutes)
1,2,3,4,5,or 6	school size and species proportions for up to 6 observers

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V.A. PHILBRICK, P.C. FIEDLER, S.B. REILLY, R.L. PITMAN, L.T. BALLANCE, G.G. THOMAS and D.W. BEHRINGER
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