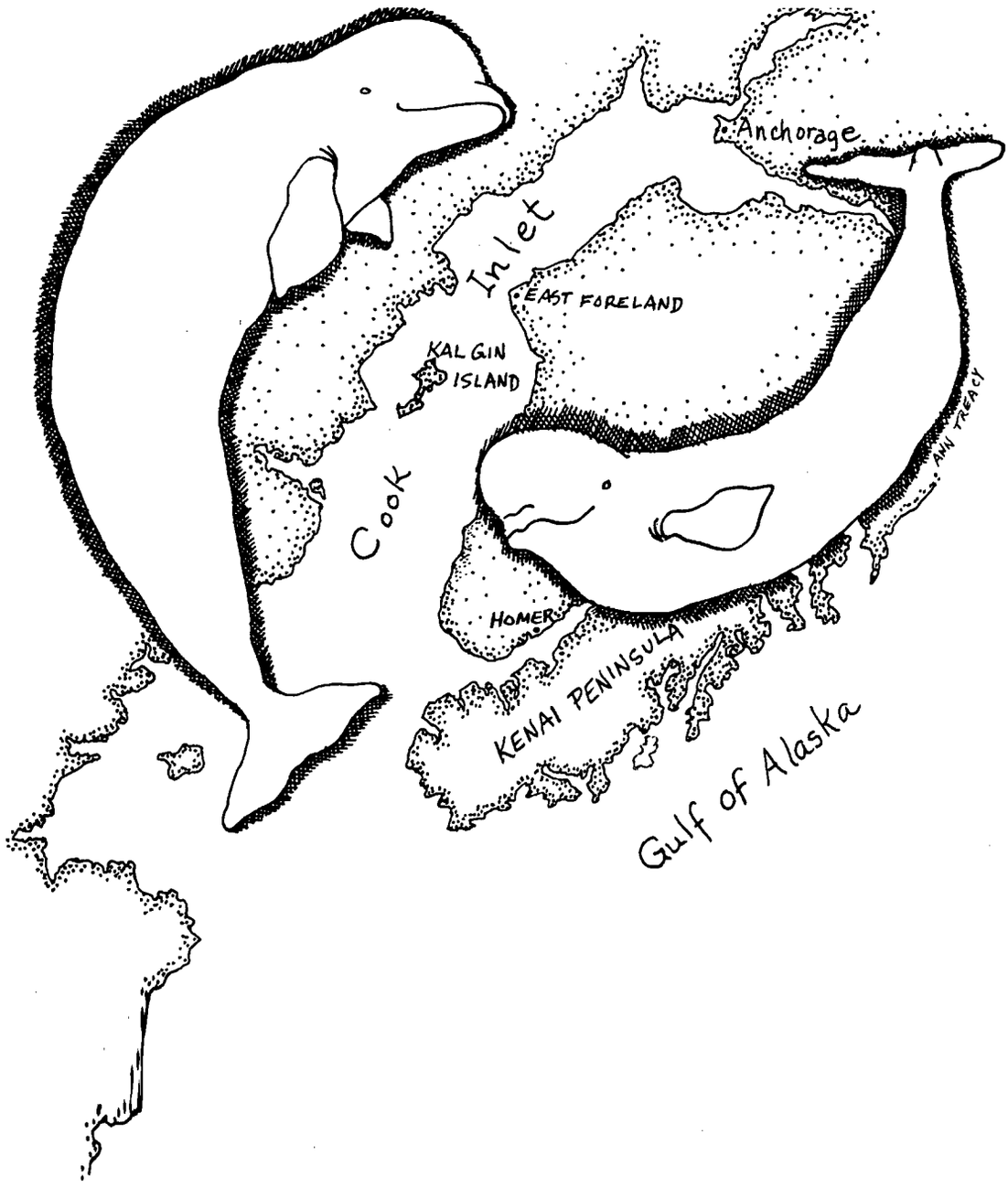
Final Report

OCS Study
MMS 99-0024

Distribution of Cook Inlet Beluga Whales (*Delphinapterus leucas*) in Winter



MMS U.S. Department of the Interior
Minerals Management Service
Alaska Outer Continental Shelf Region

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Distribution of Cook Inlet Beluga Whales (*Delphinapterus leucas*) in Winter

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U.S. Department of the Interior
Minerals Management Service
Alaska OCS Region

Anchorage, AK
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Abstract

Beluga whales *(Delphinapterus leucas)* commonly occur in Cook Inlet during summer and autumn (May through October). However, little information is available on their distribution during the winter. Ten aerial surveys were conducted in Cook Inlet from 12 February through 14 March 1997. Some surveys were extended to include the lower Kenai Peninsula, Shelikof Strait, Kodiak Island, and Yakutat Bay areas. Most of the survey effort was devoted to search surveys along and within about 3 km of coastlines; however, sets of parallel transects were flown in Cook Inlet, Kamishak Bay, and Yakutat Bay. A total of 160 individual beluga whale sightings were recorded during 9,406 km of survey effort. Of these sightings, 150 were recorded in the middle portion of Cook Inlet, from the west side of Kalgin Island to just north of the East Foreland, and 10 were recorded near the Hubbard Glacier in Yakutat Bay (60°01' N, 139°35' W). The surveys also recorded four other species of cetacea (harbor porpoise, *Phocoena phocoena*, 35 individuals; Dall's porpoise, *Phocoenoides dalli*, 11 individuals; killer whale, *Orcinus orca*, 3 individuals; and fin whale, *Balaenoptera physalus*, 3 individuals), two species of pinnipedia (Steller's sea-lion, *Eumetopias jubatus*, 594 individuals; harbor seal, *Phoca vitulina*, 440 individuals), and sea otter *(Enhydra lutris*, 784 individuals).

Project Organization

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Project members are from the Minerals Management Service and the National Marine Fisheries Service (NMFS).

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Contents

Figures

Tables

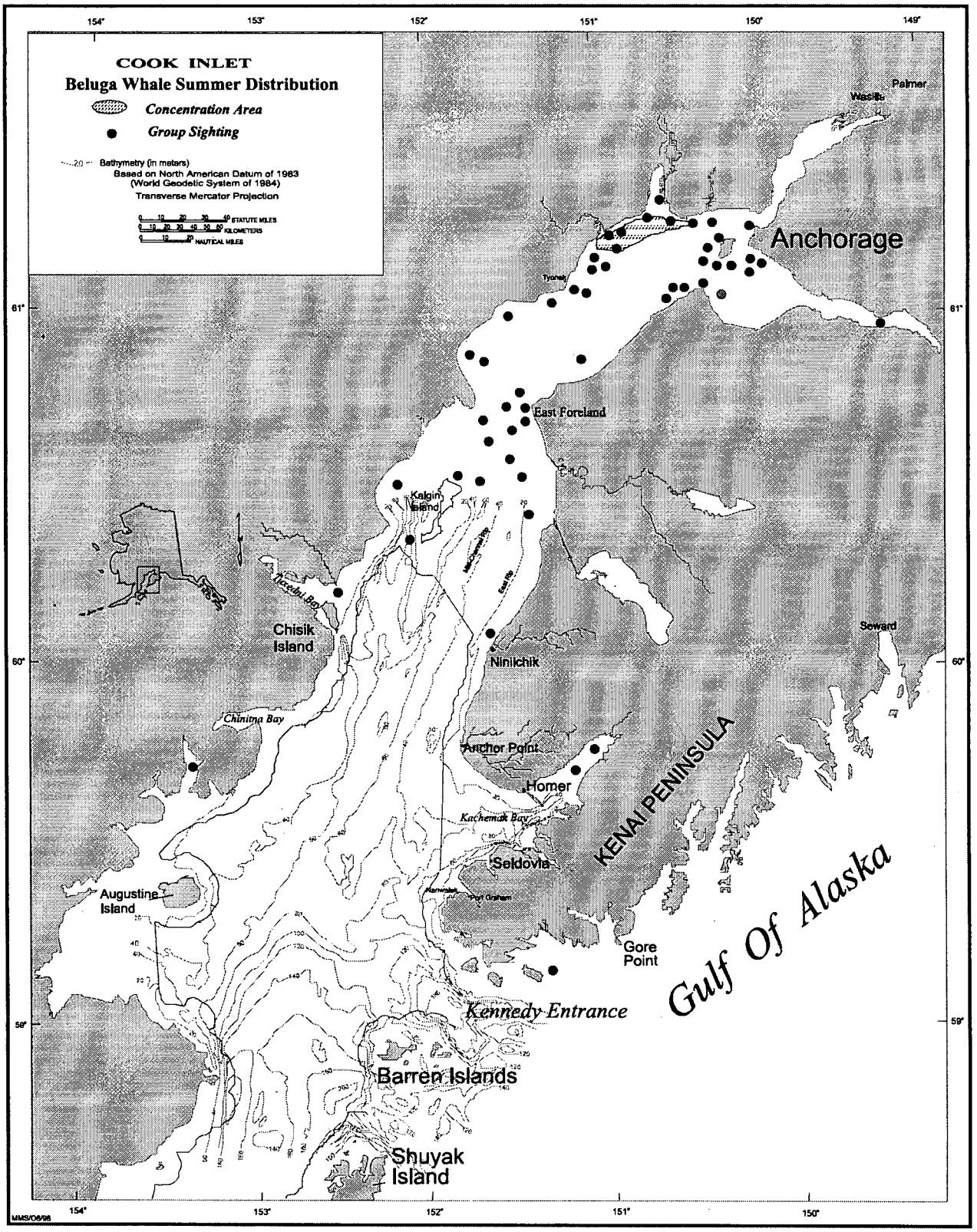

Figure 1. Historic Summer Distribution of Beluga Whale Sightings and Concentration area in Cook Inlet (Sources: Calkins, 1984; Rugh et al., 1995; NMFS, Marine Mammal Platforms of Opportunity Sightings Data, 1996.)

I. INTRODUCTION

The Cook Inlet population of belugas is believed to be geographically isolated from other Alaskan populations of this species that occur in the Bering, Chukchi, and Beaufort Seas (Calkins, 1989; Hill, DeMaster, and Small, 1996; Small and DeMaster, 1995).

The population currently is estimated at a mean of 505 animals (Hobbs, Rugh, and DeMaster, 1998), apparently having declined from an estimated 653 to 347 between 1994 and 1998 (Hobbs et al., 1998). Summer aerial surveys conducted by the National Marine Fisheries Service to determine whale population size found that seasonal concentrations of whales in the summer occur along the north coast of the upper inlet from the Beluga River east to and including the Susitna and Little Susitna Rivers, Knik Arm, and Chickaloon Bay (Rugh et al., 1995; Figure 1). Sightings of belugas formerly were common throughout the inlet during summer and fall (Calkins, 1989), but current indications are that the distribution has contracted (Rugh, 1998). The whales are believed to use the lower inlet more heavily during winter (Calkins, 1989); however, the distribution and abundance of beluga whales during winter (November through March) essentially is unknown (Calkins, 1989). The only previously documented presence of belugas in the study area during winter, four sightings on the west side of Cook Inlet, is shown in Figure 2 (Harrison and Hall, 1978; Agler et al., 1995). The National Marine Fisheries Service has commenced a status review of the Cook Inlet population to determine if there is a basis for listing this stock in a protected status (NMFS, 1999a), and to obtain data essential for its management and conservation (NMFS, 1999b).

Information on the occurrence of Cook Inlet beluga whales in all seasons is needed to address concerns about the potential effect of oil and gas development and other activities on this declining population. The paucity of Cook Inlet beluga sightings in winter prompted us to conduct aerial surveys of the Cook Inlet region in February and March during the period of maximum ice coverage in the inlet to determine their distribution and relative abundance in several areas where they had been previously reported or observed (Hansen and Hubbard, 1998).

II. STUDY AREA

The study area included Cook Inlet south to the latitude of Cape Douglas (58° 51' N.) and east to the longitude of Gore Point (152° 57' 30" W.) and adjacent waters (Figure 2). Areas farther south to Kodiak Island and Shelikof Strait and east to Yakutat Bay were surveyed after interviews with subsistence whalers, fishermen, and government field personnel indicated belugas could occur in these areas, or had been reported (Appendix A).

Winter weather patterns in southcentral Alaska and the northern Gulf of Alaska are dominated by a low-pressure center over the western Aleutian Islands, with storm systems moving from west to east an average of every 4 to 5 days (Hartmann, 1974). Prevailing winter winds flow from the north-northeast in the Cook Inlet area, channeled parallel to the major inlet axis by surrounding mountain ranges, and from either direction at the level of Kamishak Bay and Kennedy–Stevenson Entrances (Brower et al., 1988). This regime is influenced by westerly mountain-gap

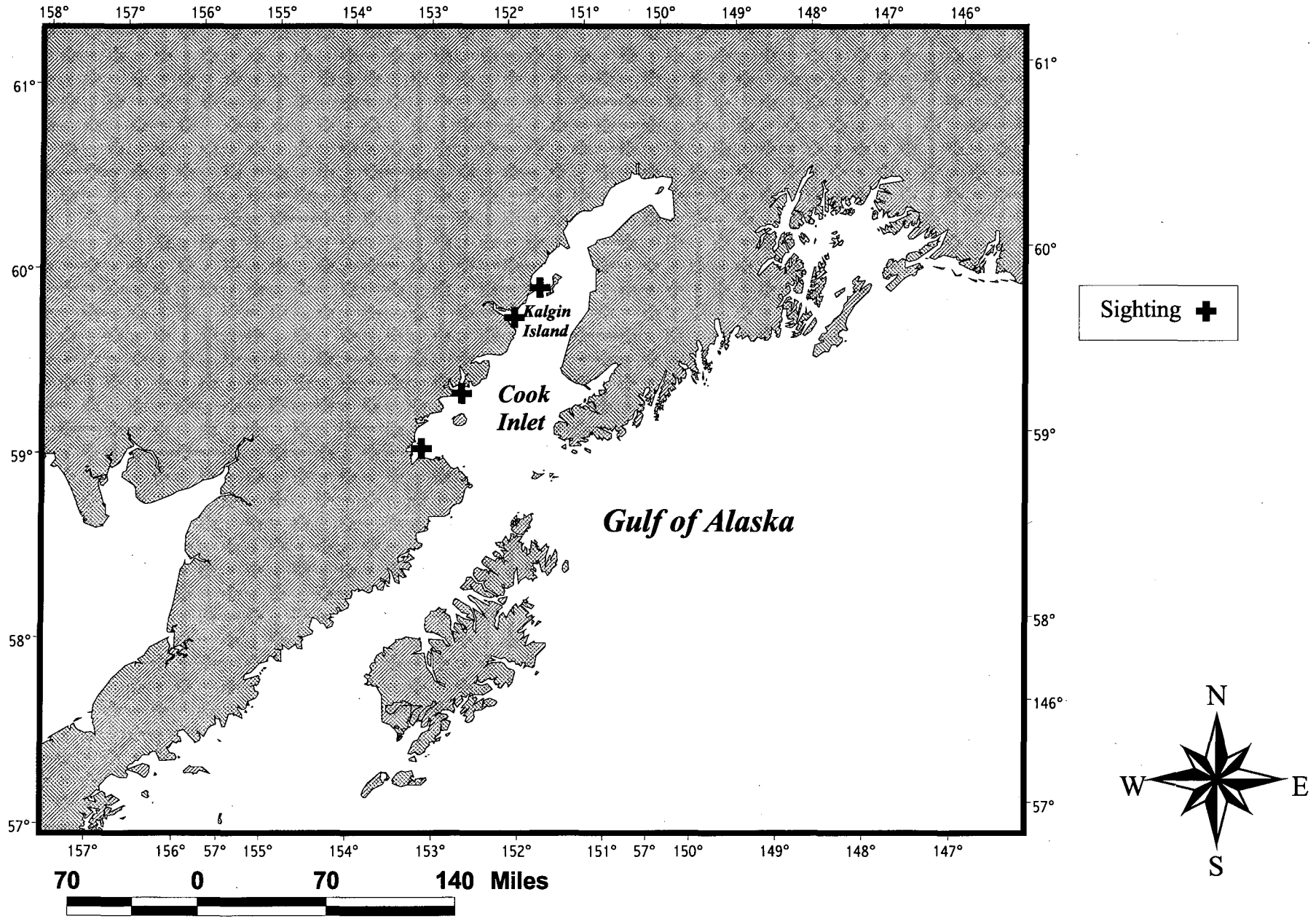

Figure 2. Map of Primary Study Area for Winter Surveys in Cook Inlet Area 12 February to 14 March 1997 and Historic Winter (November-March) Sightings of Belugas in Cook Inlet (Sources: Harrison and Hall, 1978; Agler et al., 1995).

winds through ranges on the Alaska Peninsula, and cold-air drainage from any of the surrounding mountains.

Circulation in Cook Inlet is produced by a complex interaction of the Alaska Coastal Current entering from the gulf, freshwater discharge from major rivers, and tidal oscillations, modified by upwelling and convergence of water masses (Muench, Mofjeld, and Charnell, 1978). Primary outflow is to Shelikof Strait. Tidal range in Cook Inlet is extreme—lows ranged from -4.6 to -7.6 feet and highs from 12.2 to 22.1 feet (Seldovia) during the project period. Sea ice in Cook Inlet generally reaches a maximum in late February (Brower et al., 1988).

III. MATERIALS AND METHODS

A. Objectives:

The objectives of the surveys were to:

1. Summarize from existing sources the known winter distribution and abundance of beluga whales in Cook Inlet.
2. Determine the distribution of beluga whales in Cook Inlet during winter, mapping the locations of whales sighted and identifying any concentration areas.
3. Record behaviors of beluga whales wintering in Cook Inlet, and prevailing environmental conditions where whales are found.
4. Record incidental sightings of other marine mammal species during the surveys.

B. Equipment:

The project aircraft was a de Havilland Twin Otter Series 300 equipped with bubble windows for complete trackline viewing. Onboard equipment and procedures replicated those developed and used in past years (1979-1997) for the Bowhead Whale Aerial Survey Program, described in Treacy (1996). Observers, data recorder, and pilot were linked to a common communication system with recording capability. Aircraft avionics included a Flight Management System (FMS) by ARNAV Systems, Inc., part of which is a Global Positioning System (GPS). The FMS 5000, Model GPS-505, is a worldwide satellite-based system that provides continuous position updating (15-m precision) and survey navigation through preprogramming of transect start and end points. GPS data are polled every 5 minutes for automatic input of time, latitude, longitude, and altitude.

A laptop computer (Compaq LTE 386) was used aboard the aircraft to store and analyze flight and observation data. A portable printer (Kodak Diconix 150 Plus Inkjet) was used to print a backup hard copy of all logged data.

Onboard safety equipment included an impact-triggered emergency locator transmitter (ELT) installed in the aircraft, a portable ELT in a 6-person Switlik Search and Rescue Life Raft, a portable aircraft-band transceiver, flotation suits, Nomex flight suits, and emergency crash helmets.

Table 1. Data-Entry Sequence on the Portable Flight Computer.

Sequence	Position Update	Beluga Whale Sightings	Other Cetacean Sightings	Other Species
1. Entry number	X	X	X	X
2. Time	X	X	X	X
3. Latitude	X	X	X	X
4. Longitude	X	X	X	X
5. Altitude	X	X	X	X
6. Reason for entry	X	X	X	X
7. Search type	X	X	X	X
8. Species		X	X	X
9. Sighting cue		X		
10. Habitat		X	X	X
11. Behavior		X	X	X
12. Size		X		
13. Total number		X	X	X
14. Calf number		X	X	X
15. Clinometer angle		X		
16. Side of plane		X		
17. Swim direction		X	X	
18. Swim speed		X		
19. Aircraft response		X	X	X
20. Repeat sighting		X		
21. Observer		X	X	
22. Weather	X	X	X	X
23. Visibility right	X	X	X	X
24. Visibility left	X	X	X	X
25. Ice coverage	X	X	X	X
26. Ice type	X	X	X	X
27. Sea state	X	X	X	X
28. Water color	X	X	X	X

Table 2. Operational Definitions of Observed Whale Behaviors.

Behavior	Definition
Swimming	Whale(s) proceeding forward through the water propelled by tail pushes.
Milling	Whale(s) swimming slowly at the surface in close proximity (within 100 m) to other whales, often with varying headings.
Diving	Whale(s) changing swim direction or body orientation relative to the water surface, resulting in submergence; may or may not be accompanied by lifting the tail out of the water.
Resting	Whale(s) floating at the surface with head, or head and back, exposed, showing no movement.
Feeding	Whale(s) diving repeatedly in a fixed general area.
Playing	Whale(s) milling or thrashing about.
Mating	Ventral-ventral orienting of two whales; other individuals may participate.
Cow-Calf	Calf nursing; calf swimming within 20 m of an adult.
Rolling	Whale(s) rotating on longitudinal axis, sometimes associated with mating.
Tail-slapping	Whale(s) floating horizontally or head-downward in the water, waving tail back and forth above the water and striking the water surface.
Underwater Blowing	Whale(s) exhaling while submerged, thus creating a visible bubble.

Survey observers used hand-held clinometers to determine the angle of inclination to the sighting location of observed whales. Written field notes complemented observations verbally relayed to the data recorder for entry into the computer.

C. Survey Design:

The aerial surveys were based in Anchorage, Alaska. The Minerals Management Service Principal Investigators and survey team conducted 8 days of aerial surveys in the Cook Inlet area and 2 days in the Yakutat Bay area during the period mid-February to mid-March 1997. The surveys were flown during daylight hours when sea states were favorable (< Beaufort 5) and ceilings were ≥ 1,000 ft (304.8 m). The basic survey team included 4 observers: a team leader, who made decisions on daily survey protocol, a data recorder/observer, and 2 primary observers.

Survey locations and routes depended on the following factors:

1. Weather conditions—ceilings (VFR) and wind speed (<15 knots).
2. Locations of previous and current winter beluga sightings, which were used to plan surveys and routes to and from each day's survey area.
3. Patterns of ice coverage observed in transit to and from survey areas.
4. Presence of ice-free coastlines which were surveyed 1–2 km offshore.
5. Occurrence of favorable weather conditions allowing predetermined transects to be completed.

The primary objective of this study was to determine winter distribution of beluga whales in Cook Inlet. Beluga behaviors and basic information concerning other species incidentally sighted (e.g., other cetaceans, pinnipeds, sea otters) also were recorded.

D. Survey Protocol:

The basic personnel configuration on surveys consisted of a pilot, a team leader in the copilot seat, a starboard data recorder/observer, and a primary observer on each side of the aircraft.

The target altitude was a minimum of 1,000 ft (304.8 m) in order to avoid having to get an incidental-take permit from the National Marine Fisheries Service under the Marine Mammal Protection Act. Surveys over open water followed shorelines or predetermined routes or transects. Surveys over ice-covered areas (upper Cook Inlet) generally followed the ice edge, and also overflew any substantial openings in the ice.

When we encountered whales, the aircraft was sometimes diverted from a predetermined path for brief periods (≤ 10 min.) to circle the whales for better estimates of their numbers, to determine if sub-adults were present, and to record behaviors.

Coordination and consultation with the State of Alaska, Federal agencies, Native subsistence groups, commercial fishermen, and private companies for information on beluga whales in Cook Inlet and in the Gulf of Alaska consisted primarily of telephone conversations and personal interviews. Appendix A provides a list of contacts.

Table 3. Beluga Whale Aerial Survey Effort and Sighting Rates.

Flight #	Date	Total Hours	Total Km	Belugas Observed	Belugas /hour	Belugas /100 Km
1	12 Feb	3.95	828	12	3.04	1.45
2	15 Feb	3.1	605	0	0	0
3	19 Feb	3.38	759	10	2.95	1.32
4	20 Feb	1.3	474	0	0	0
5	28 Feb	6.42	1320	50	7.79	3.79
6	1 March	3.52	827	34	9.66	4.11
7	3 March	6.06	1254	0	0	0
8	12 March	5.53	1022	24	4.34	2.35
9	13 March	5.95	1169	11	1.85	0.94
10	14 March	5.63	1148	19	3.37	1.66
Totals		**44.84**	**9406**	**160**	$\bar{x}$ **= 3.57**	$\bar{x}$ **= 1.70**

Table 4. Selected Aerial Survey Data Recorded for Each Beluga Whale Sighting.

Flight No.	Latitude	Longitude	Adults	Heading (◦)	Behavior	Speed
1	60.21.3	152.09.5	12	360	swim	medium
3	60.01.9	139.33.1	5		mill	
	60.01.9	139.32.2	5	90	swim	medium
5	60.30.2	152.01.5	36		mill	
	60.50.2	151.08.0	13	300	dive	medium
	60.31.5	151.53.3	1		rest	slow
6	60.30.0	152.00.2	12	10	swim	medium
	60.29.7	151.47.0	22	30	swim	medium
8	60.38.1	151.39.8	24	210	swim	slow
9	60.31.8	152.05.4	11	120	swim	medium
10	60.47.9	151.18.0	10	30	swim	slow
	60.31.4	151.59.0	9	20	swim	medium

Table 5. Proportion of Belugas Engaged in Specified Behaviors When First Sighted.

Behavior	Proportion (%)
Swimming, medium speed	44
Swimming, slow speed	21
Milling	27
Diving	8
Resting	1

E. Data-Entry Protocol:

Where appropriate, data-entry protocol followed procedures established for the Minerals Management Service Bowhead Whale Aerial Survey Project (Treacy, 1996). Basic data recorded for each whale or group of whales observed included time, location (latitude, longitude), number of individuals, clinometer angle (for calculation of distance of individual from trackline), visibility (distance), ice coverage (percentage), sea state (Beaufort scale), and behavior. Data-entry sequence on the flight computer for each observation is given on Table 1. Clinometer angle measurements were made when the initial sighting location was abeam the aircraft. Typical behaviors include swimming (with estimate of direction and speed), milling, resting, diving, and feeding. Operational definitions for whale behaviors are given on Table 2.

F. Data Analysis:

The distribution and relative abundance of beluga whales in Cook Inlet during the winter was determined from the project surveys. Whale distribution was compared to seasonal ice coverage.

Preliminary data analysis included editing flight data files and confirming summary values for sightings. Sighting rates for each flight were derived as number of belugas counted per unit of effort (per hour of survey and per kilometer) (Table 3).

Excel spreadsheets were prepared for flight data associated with sightings of beluga whales and other marine mammals. These spreadsheets list the latitude, longitude, and number of animals observed for each sighting. These data were converted into dbf files and imported into ArcView as tables. The tables were converted into event themes to allow portrayal of sightings on ArcView maps.

ArcView graphics software was used to plot daily flight maps of the track lines and positions of belugas recorded during each flight. These flight maps and narratives are given in Appendix B.

IV. RESULTS

A. Survey Effort:

A total of 9,406 km (44.84 hours) of aerial surveys were conducted between 12 February 1997 and 14 March 1997 in Cook Inlet and in the Gulf of Alaska searching for beluga whales (Table 3; Figures 3a and 3b). Eight surveys were conducted in Cook Inlet, with some of these surveys extending into Shelikof Strait and the bays of Kodiak Island, Afognak Island, and the lower Kenai Peninsula. Yakutat Bay was surveyed, as were limited portions of Prince William Sound and the Gulf of Alaska coast between Anchorage and Yakutat. Most flight effort was devoted to search surveys within about 3 km of shorelines. Sets of transects were flown across Cook Inlet and Yakutat Bay (Figures 3a and 3b).

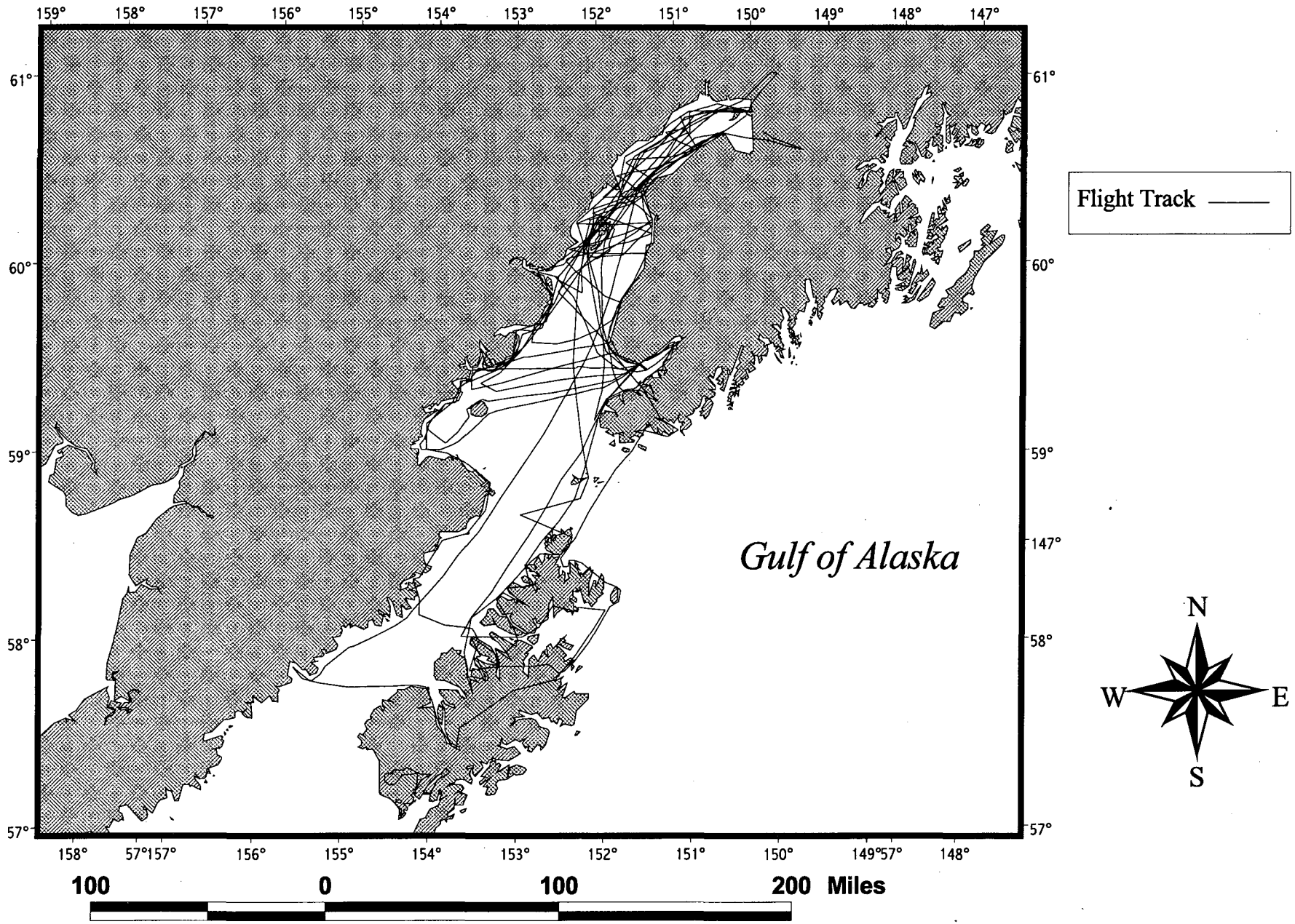

Figure 3a. Map of Beluga Whale Aerial Survey Flight Tracks in the Cook Inlet Area.

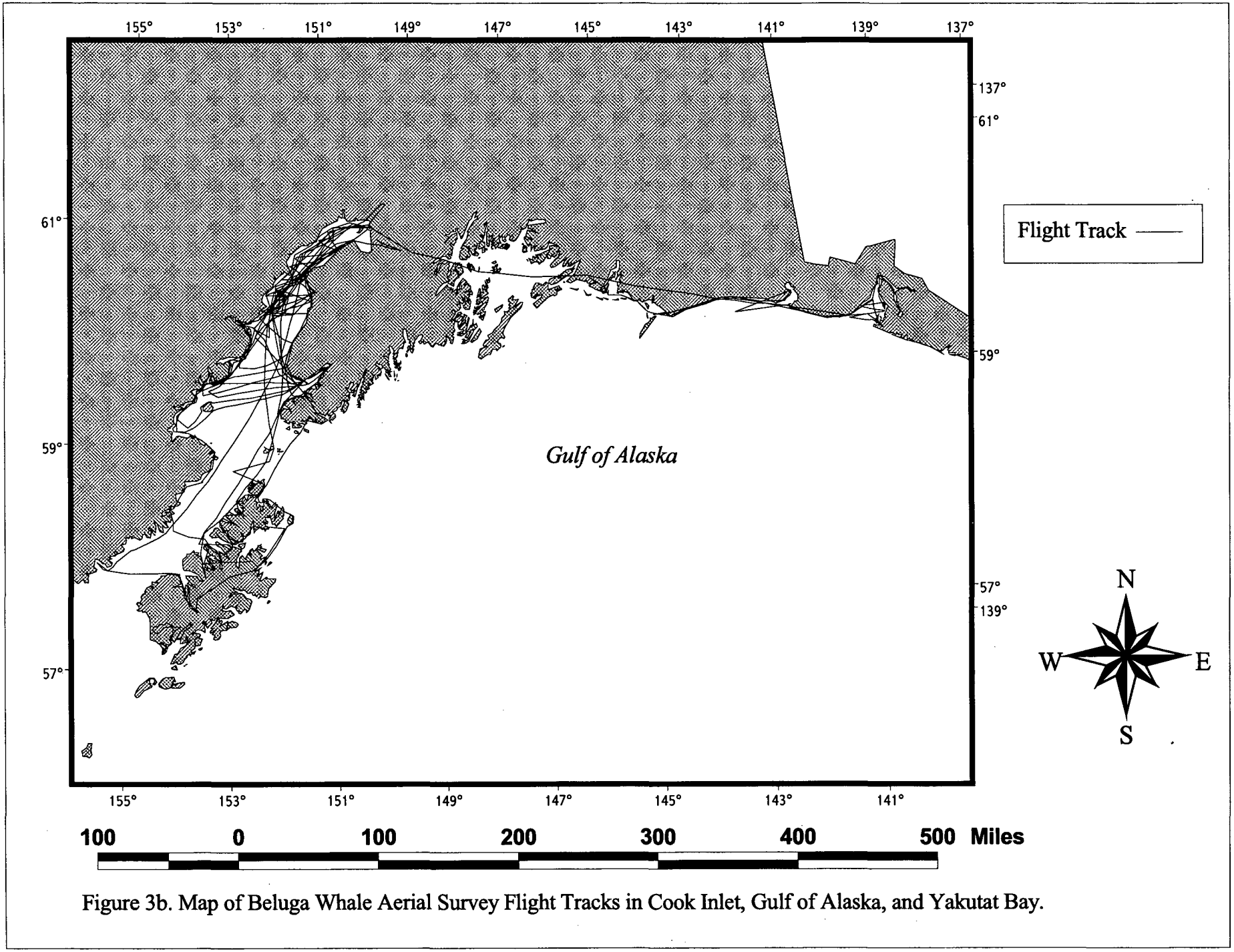

Figure 3b. Map of Beluga Whale Aerial Survey Flight Tracks in Cook Inlet, Gulf of Alaska, and Yakutat Bay.

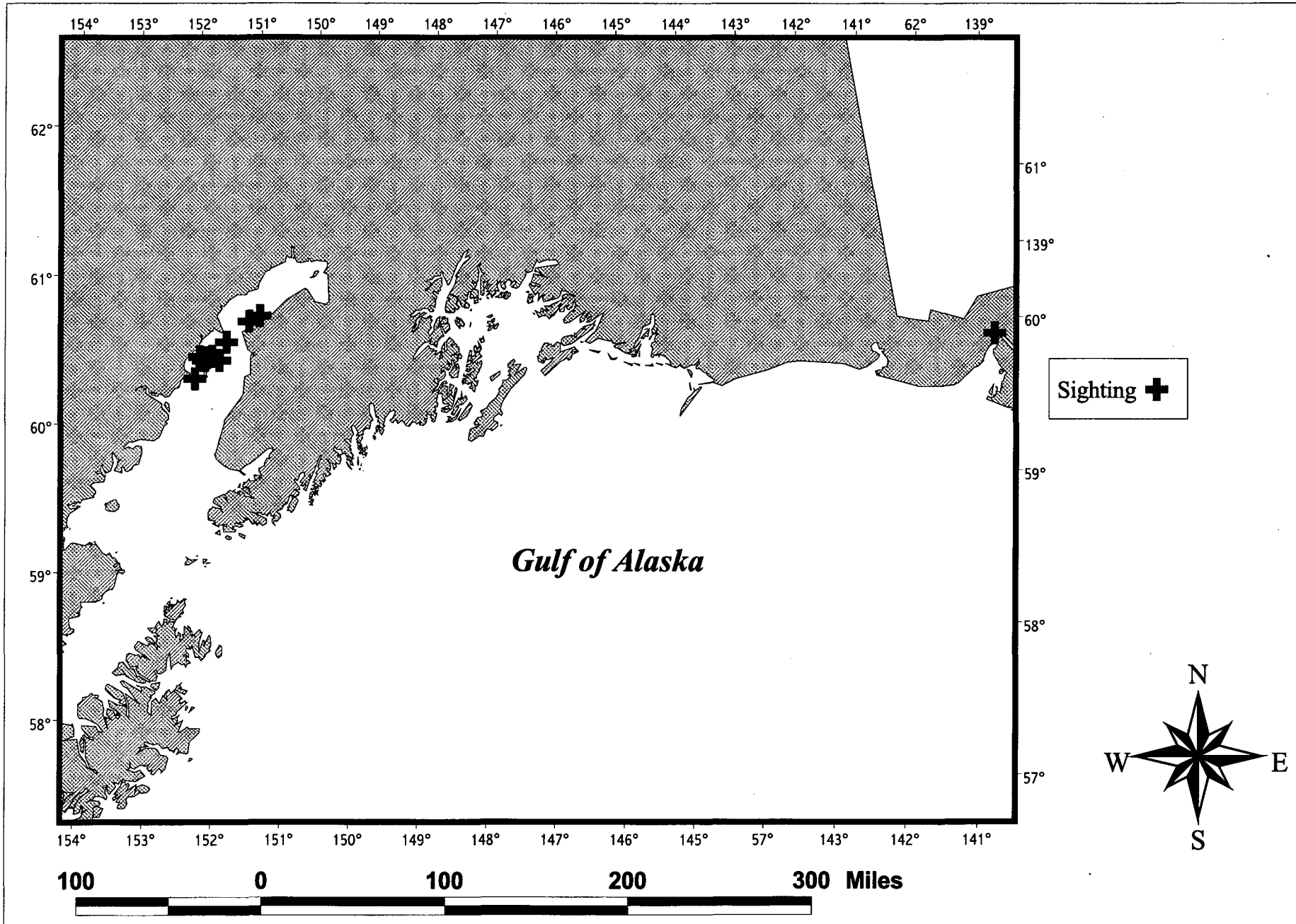

Figure 4. Map of Beluga Whale Sightings on 12, 19, and 28 February and 1, 12, 13, and 14 March 1997.

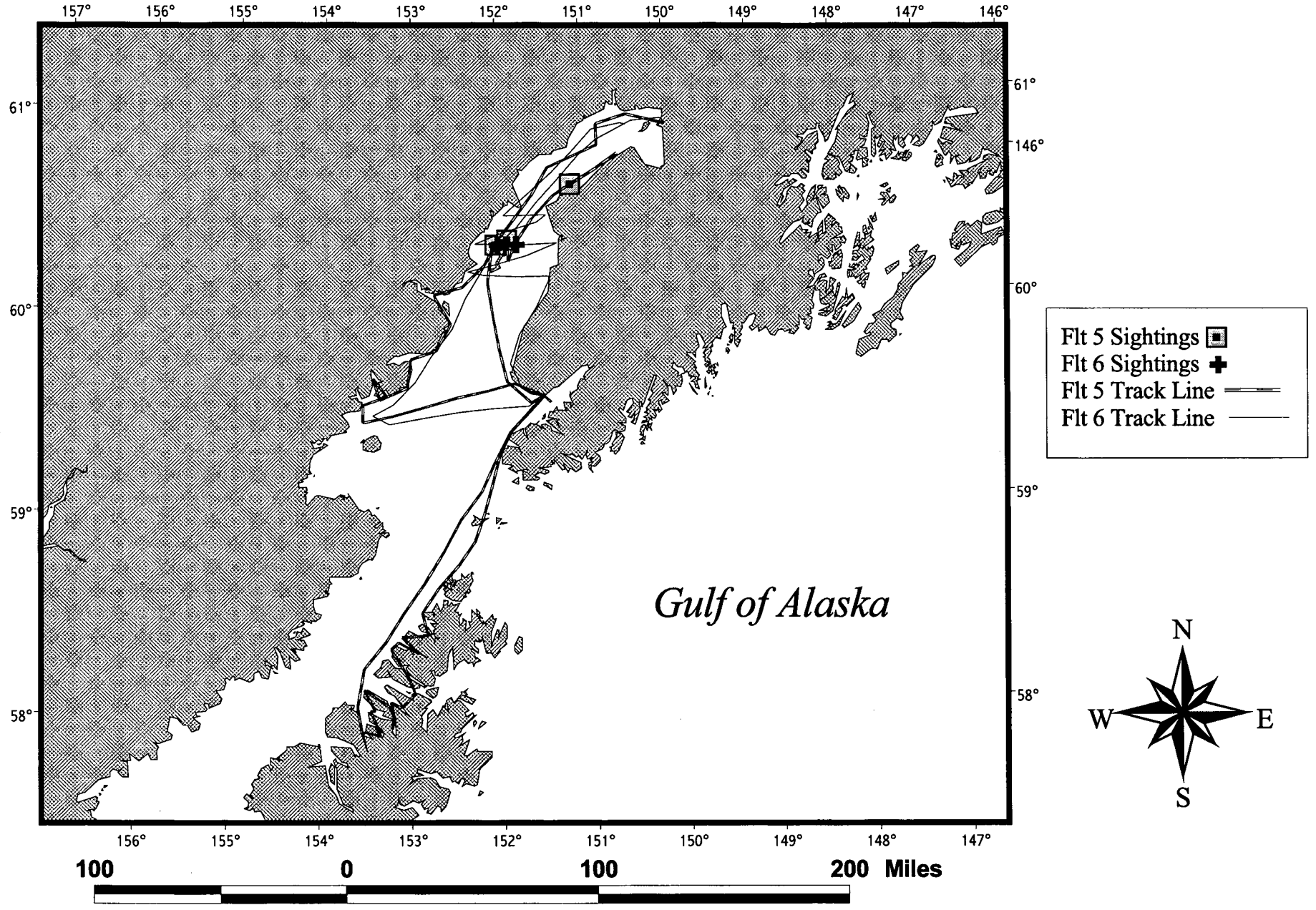

Figure 5. Map of Flights 5 & 6 Survey Tracks and Beluga Sightings, 28 February and 1 March 1997, respectively.

Table 6. Summary of Cetacean Sightings by Survey Flight and Date.

Day	Flight #	Beluga Whale	Harbor Porpoise	Killer Whale	Fin Whale	Dall's Porpoise	Unidentified Cetacean
12 Feb	1	12	0	0	0	0	0
15 Feb	2	0	0	0	0	0	0
19 Feb	3	10	8	0	0	0	0
20 Feb	4	0	3	0	0	0	0
28 Feb	5	50	0	0	0	0	0
01 Mar	6	34	0	0	0	0	0
03 Mar	7	0	0	0	3	0	0
12 Mar	8	24	6	0	0	0	0
13 Mar	9	11	2	0	0	0	5
14 Mar	10	19	16	3	0	11	0
Total		160	35	3	3	11	5

Table 7. Summary of Pinniped and Sea Otter Sightings by Survey Flight and Date.

Day	Flight #	Harbor Seal	Steller's Sea-Lion	Unidentified Pinniped	Sea Otter
12 Feb	1	0	0	0	1
15 Feb	2	0	0	0	0
19 Feb	3	13	0	3	66
20 Feb	4	0	5	0	8
28 Feb	5	20	422	11	40
01 Mar	6	0	0	31	0
03 Mar	7	18	50	1	307
12 Mar	8	22	0	16	209
13 Mar	9	13	0	0	142
14 Mar	10	354	117	0	11
Total		440	594	62	784

B. Beluga Whale Observations:

We observed a total of 160 belugas during the 10 aerial surveys (Table 3). This results in a sighting rate for individual flights ranging from 0 to 9.66 belugas/hour. Belugas in Cook Inlet were distributed in the middle portion of the inlet from the west side of Kalgin Island to just north of the East Foreland (Figure 4). Also, 10 belugas were observed near the Hubbard Glacier in Yakutat Bay. These represent the first documented occurrence of beluga whales in Yakutat Bay during winter (Hubbard, Hansen, and Mahoney, in press).

Maximum numbers of belugas and belugas/hour were observed in Cook Inlet on flights 5 and 6 on 28 February and 1 March, when surveys were conducted near Kalgin Island (Figure 5).

The location and behavior of each group of belugas sighted are given in Table 4. The most common behaviors observed were swimming (65% of individuals) and milling (27%); diving and resting behaviors were recorded much less often (Table 5). No beluga calves were recorded during any of the surveys. The gray-colored calves are difficult to see in the gray glacial-silt–laden waters of northern Cook Inlet and in the turbid waters near the Hubbard Glacier of Yakutat Bay. Alternatively, females with calves may not typically occur at this time of year in the areas where we observed whales.

In Cook Inlet, 73% of the whales for which headings were obtained were moving in a north to northeasterly (360 to 030 degrees) direction (Table 4). The remainder were heading northwest or southeast. A small group observed in Yakutat Bay (Flight #3) was heading east.

C. Beluga Distribution Relative to Ice Cover in Cook Inlet:

Beluga whales were observed in the Kalgin Island area in mid February when ice coverage was four- to six-tenths, and again in the same area from late February to mid March when there was no ice cover (Appendix C). The presence of extensive shorefast ice at the mouth of the Susitna River and other major streams made it difficult to see if whales were in these areas. Ice cover in the inlet reached its maximum advance south of Kalgin Island during late January (Appendix C, map for 31 January 1997), prior to these surveys. At its maximum, usually in January or February, sea ice can reach south to about Anchor Point on the east side of Cook Inlet and to southern Kamishak Bay on the west side (Brower et al., 1977). The winter of 1996–97 apparently was a light ice year for the inlet.

D. Other Marine Mammal Observations:

Other species observed during the surveys were harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), killer whale (*Orcinus orca),* fin whale (*Balaenoptera physalus*), harbor seal (*Phoca vitulina),* Steller's sea-lion (*Eumetopias jubatus),* and sea otter (*Enhydra lutris)* (Tables 6–7, Figures 6–14, p. 17–25). Distribution of these sightings are as follows:

1. Harbor Porpoise: Harbor porpoises were the most widely distributed cetacean species sighted during the surveys (Figure 6). We observed porpoises in small pods scattered

from mid Cook Inlet south through Shelikof Strait, in Yakutat Bay, and along the Gulf of Alaska coast west of Icy Bay.

2. Fin Whale, Killer Whale, and Dall's Porpoise: A group of 3 fin whales was observed in the Shuyak Island area (Figure 7), and one group of 3 killer whales and 11 Dall's porpoises were observed in the Shelikof Strait area (Figures 8 and 9).

3. Harbor Seal: Most harbor seals observed were in Uyak Bay on the west side of Kodiak Island and in northern Kamishak Bay. Scattered sightings were made in Kachemak, Tuxedni, and Yakutat Bays (Figure 10). These sightings generally reflect the summer haul-out distribution of harbor seals along the Gulf of Alaska coast, although Prince William Sound, which we overflew once in transit to Yakutat Bay, has a substantial population. The concentration of sightings in Uyak Bay, where no major haul-outs have been identified (Hoover, 1988), may represent an unrecorded wintering area for harbor seals, a recent shift in their winter distribution, or an occasional winter use of this area.

4. Steller's Sea-Lion: Steller's sea-lion (Rice, 1998) sightings were scattered from the south side of the Alaska Peninsula to the Kodiak Island archipelago, the Barren Islands, and the Kayak Island area in the northeastern Gulf of Alaska (Figure 11). Some of these sightings are located near or on summer rookery locations, as in the Barren Islands (Hoover, 1988), while others may represent winter haul-out areas.

5. Sea Otter: The majority of otter sightings were in Kamishak and Kachemak Bays of lower Cook Inlet (Figure 12). Other sightings were scattered in northern Kodiak Island, Afognak Island, and Yakutat Bay. A few sightings were made in eastern Prince William Sound and the west side of Shelikof Strait. This distribution generally reflects the known distribution and abundance pattern of otters in the northern Gulf of Alaska (Calkins, 1987), but also represents survey effort in these areas. Sea otters were observed in Prince William Sound only near Cordova during the single flight between Anchorage and Yakutat.

6. Unidentified Cetaceans and Pinnipeds: Two sightings of 5 unidentified cetaceans, probably harbor porpoises, were made in Cook Inlet near Anchor Point (Figure 13). The distribution of unknown pinniped sightings (Figure 14) is very similar to that of harbor seals, so we assume that these animals probably are harbor seals.

V. DISCUSSION

During aerial surveys of the Cook Inlet–Kodiak Island–Shelikof Strait area in late winter (12 Feb to 14 March), groups of 12 to at least 50 beluga whales occurred consistently in the Kalgin Island area to just north of the East Foreland. It is probable that many of the 150 sightings of individuals in the Kalgin Island area were resightings of some of the same whales on successive surveys (Figure 5). National Oceanic and Atmospheric Administration images of sea-surface temperatures in Cook Inlet indicate a temperature gradient in the Kalgin Island area south of the forelands. The temperature gradient may be related to changes in ocean and tidal currents associated with coastal topography. The narrowing of the inlet in this area and the presence of

Kalgin Island just south of the forelands may cause upwelling and eddies that concentrate nutrients or act as a "still-water shelter area" for migrating anadromous fishes such as salmon, eulachon, and smelt, which are known beluga prey species (Calkins, 1983; 1989). The Kalgin Island area may be rich in biological productivity; crustaceans are known to occur south of the island (Calkins, 1983). The Kalgin Island area may serve as a late-winter staging area for eulachon prior to migration to their natal streams in upper Cook Inlet. If these fish and crustaceans generally are present in this area during late winter, they may be an important food source for any belugas overwintering in the inlet.

It generally is believed that Bering Sea populations of beluga whales disperse offshore during winter (Hazard, 1988). Likewise, the Cook Inlet stock also may disperse throughout the northern Gulf of Alaska, including lower Cook Inlet, Shelikof Strait, Kodiak Island, and northeastern gulf localities such as Yakutat Bay, where we observed a small number. Local residents and fishermen have observed belugas during the winter in bays along the coast of Kodiak and along the southern coast of the Alaska Peninsula (Appendix A: K.Wynne, National Marine Fisheries Service, Kodiak, and B. Priewe, Priewe Air). The Kalgin Island beluga whales may remain in Cook Inlet throughout the winter, or these whales may be a vanguard of animals arriving early in the inlet following the early migration of anadromous fishes. The Kalgin Island area may serve as a later winter staging area for eulachon and other prey of belugas.

Bob Priewe of Priewe Air has observed belugas in northern Cook Inlet throughout the winter in ice leads and open water on charter flights between Anchorage and Trading Bay on the west side of the inlet (Appendix A). Robert Gill, with the Biological Resource Division of the U.S. Geological Survey, has observed beluga whales in upper Cook Inlet during shorebird surveys conducted on the west side of the inlet. Most of his sightings occurred in the northwestern corner of the inlet, from the west channel of the Susitna River westward to the Ivan and Lewis Rivers (Gill, pers. comm., 1999). Gill (1999) sighted a large group of 75 belugas to the south in Tuxedni Bay in late October 1998, and observed groups of 5 and 2 individuals in Trading Bay 2 April 1999. Alan Bennett, formerly with the Lake Clark National Park and Preserve staff, observed substantial numbers of beluga whales in Tuxedni and Chinitna Bays in early to mid-April 1994–1996 (Bennett, 1996). These observations, together with those made during this study, suggest that at least some portion of the Cook Inlet population remains in the northern half of the inlet for at least part of some winters. However, no winter sightings of beluga were mentioned in an interview with village of Tyonek beluga hunter P. Merryman or in contacts with rig foremen on Unocal oil production platforms in northern Cook Inlet (Appendix A). The lack of sightings by hunters in Tyonek and oil industry personnel may simply indicate that belugas are more easily seen from the air than from onshore or from stationary platforms which provide a limited view of Cook Inlet. Also, it is not likely these observers spend significant periods looking for belugas during winter months.

Ross Schaeffer of the Alaska Beluga Whaling Committee mentioned that Cook Inlet belugas leave the inlet in winter and go to the Yakutat area. He referenced Walter Porter, a subsistence hunter and fisherman living in Yakutat. Mr. Porter said that belugas commonly occur along the west side of Yakutat Bay from Point Manby north to the Hubbard Glacier. John Vale, a commercial fisherman in Yakutat, and Robert Johnson, Alaska Department of Fish and Game, frequently see belugas on the west side of the bay during August and September near the mouths

of rivers. They believe that the whales are feeding on coho salmon. Interviews with these persons and other residents of the Yakutat area revealed that there was no documented information on beluga whale occurrence in the Yakutat area during winter months (November–March). Our observations of 10 belugas on 19 February 1997 is the first documented record of winter occurrence in the bay.

VI. SUMMARY

Ten aerial surveys for beluga whales were conducted in Cook Inlet during February and March 1997, and included parts of lower Kenai Peninsula, Shelikof Strait, and Kodiak Island. Yakutat Bay also was surveyed. Most of the survey effort was devoted to search surveys within about 3 km of coastlines; however, sets of parallel transects were flown within Cook Inlet and Yakutat Bay.

A total of 160 individual beluga whales were recorded during 9,406 km of survey effort; 72 sightings were made in February and 88 in March. Ten whales were observed near the Hubbard Glacier in Yakutat Bay (60°01' N, 139°33' W). This is the first documented record of beluga whales in Yakutat Bay during winter. The remainder were observed in the middle portion of Cook Inlet from the west side of Kalgin Island to just north of the East Foreland. The overall sighting rate of belugas was 3.57 whales/hour or 0.017 whales/km.

The Cook Inlet beluga whale stock may disperse throughout the northern Gulf of Alaska, including lower Cook Inlet, Shelikof Strait, Kodiak Island, and northeastern gulf localities such as Yakutat Bay. Belugas have been observed during winter in Kodiak Island bays and along the southern coast of the Alaska Peninsula. The beluga whales we observed near Kalgin Island may have remained in Cook Inlet throughout the winter, or may have been individuals following the early migration of anadromous fishes into the inlet. Observations by charter pilots and research personnel working in upper Cook Inlet during the winter indicate that some portion of the population remains in Cook Inlet for at least part of some winter seasons.

Incidental sightings of other marine mammals included 784 sea otters, 594 Steller's sea-lions, 440 harbor seals, 62 unidentified pinnipeds, 35 harbor porpoises, 3 fin whales, 11 Dall's porpoises, 3 killer whales, and 5 unidentified cetaceans.

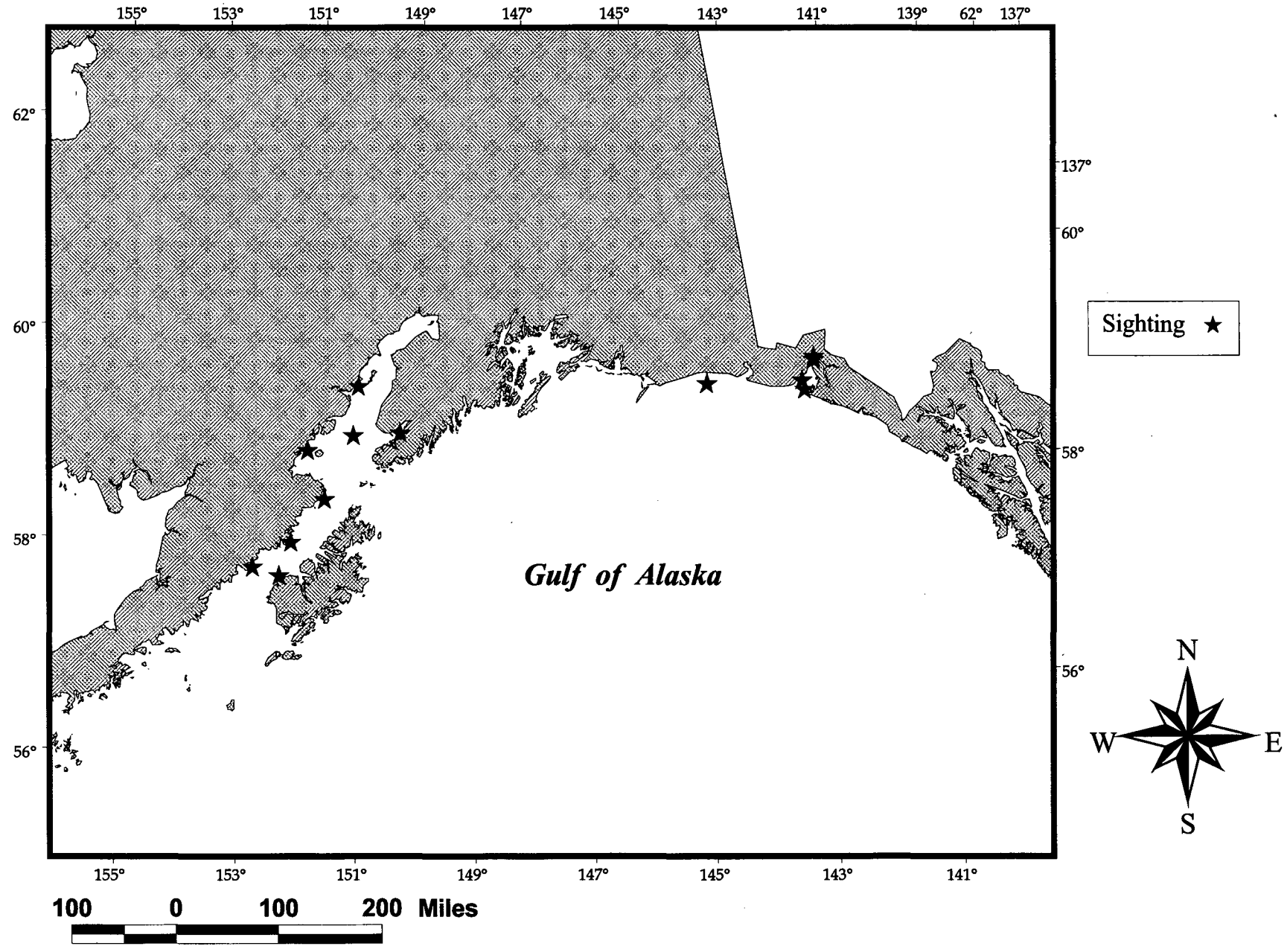

Figure 6. Map of Harbor Porpoise Sightings on 19, and 20 February and 12, 13, and 14 March 1997.

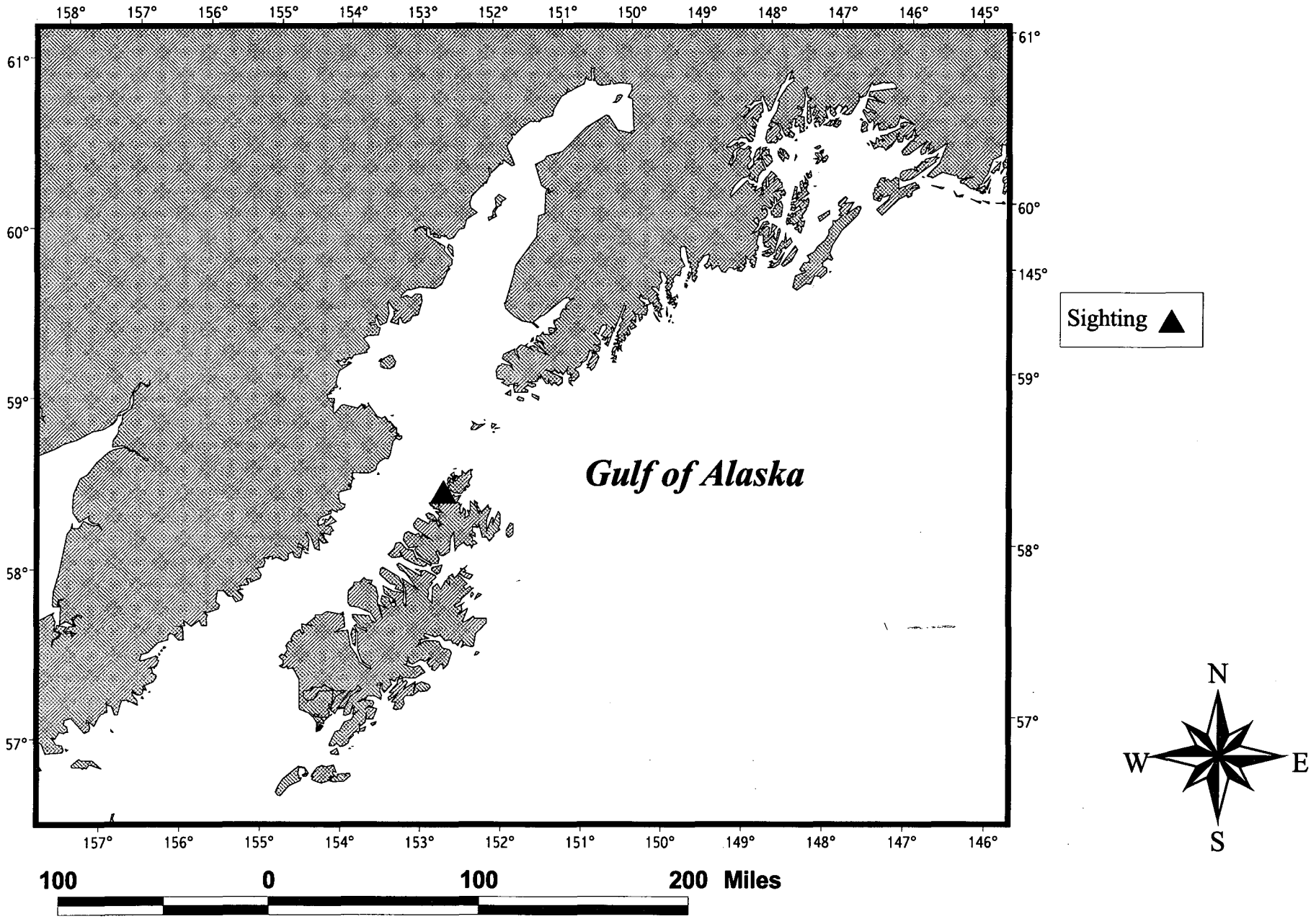

Figure 7. Map of Fin Whale Sighting on 3 March 1997.

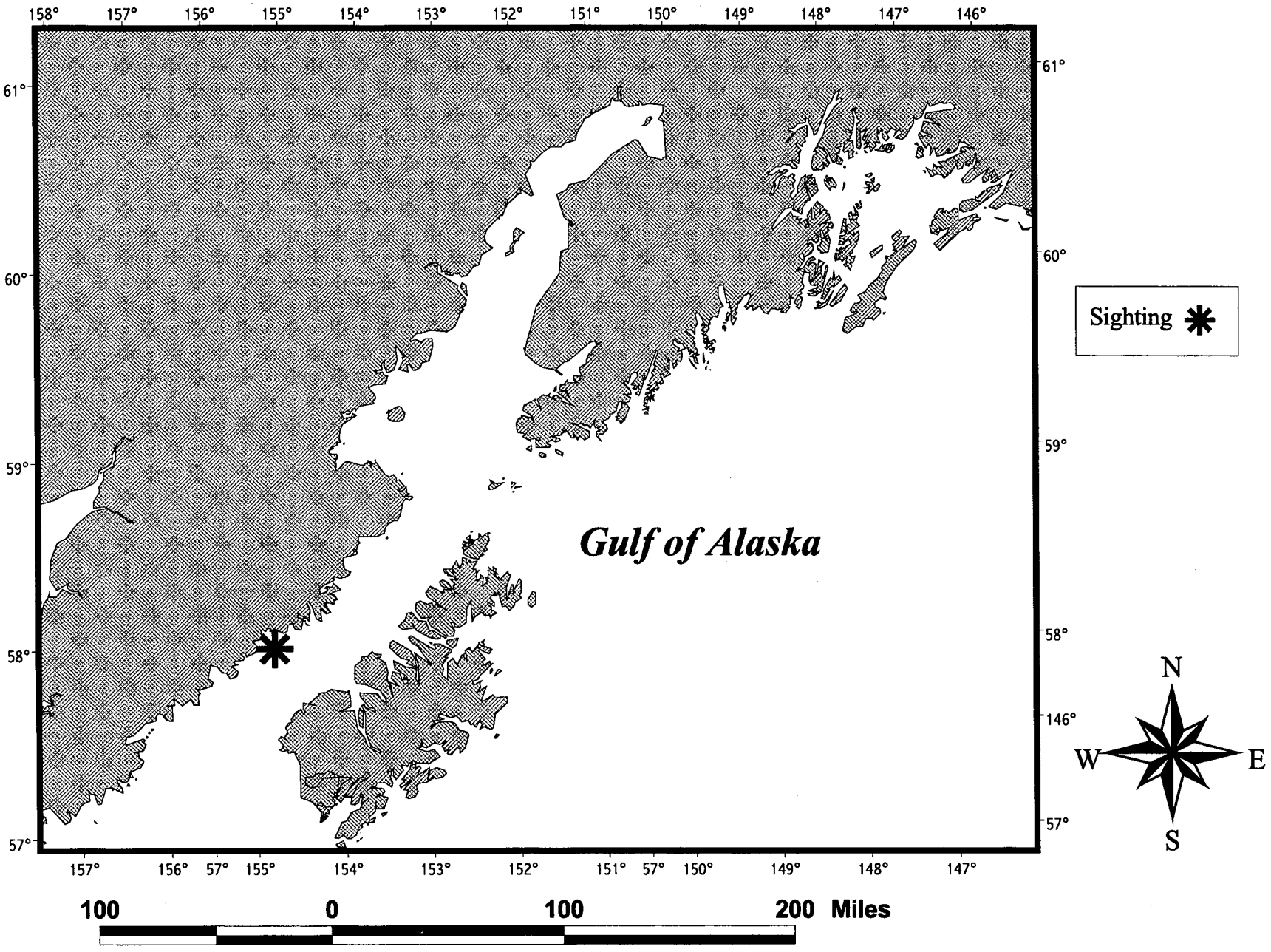

Figure 8. Map of Killer Whale Sighting on 14 March 1997.

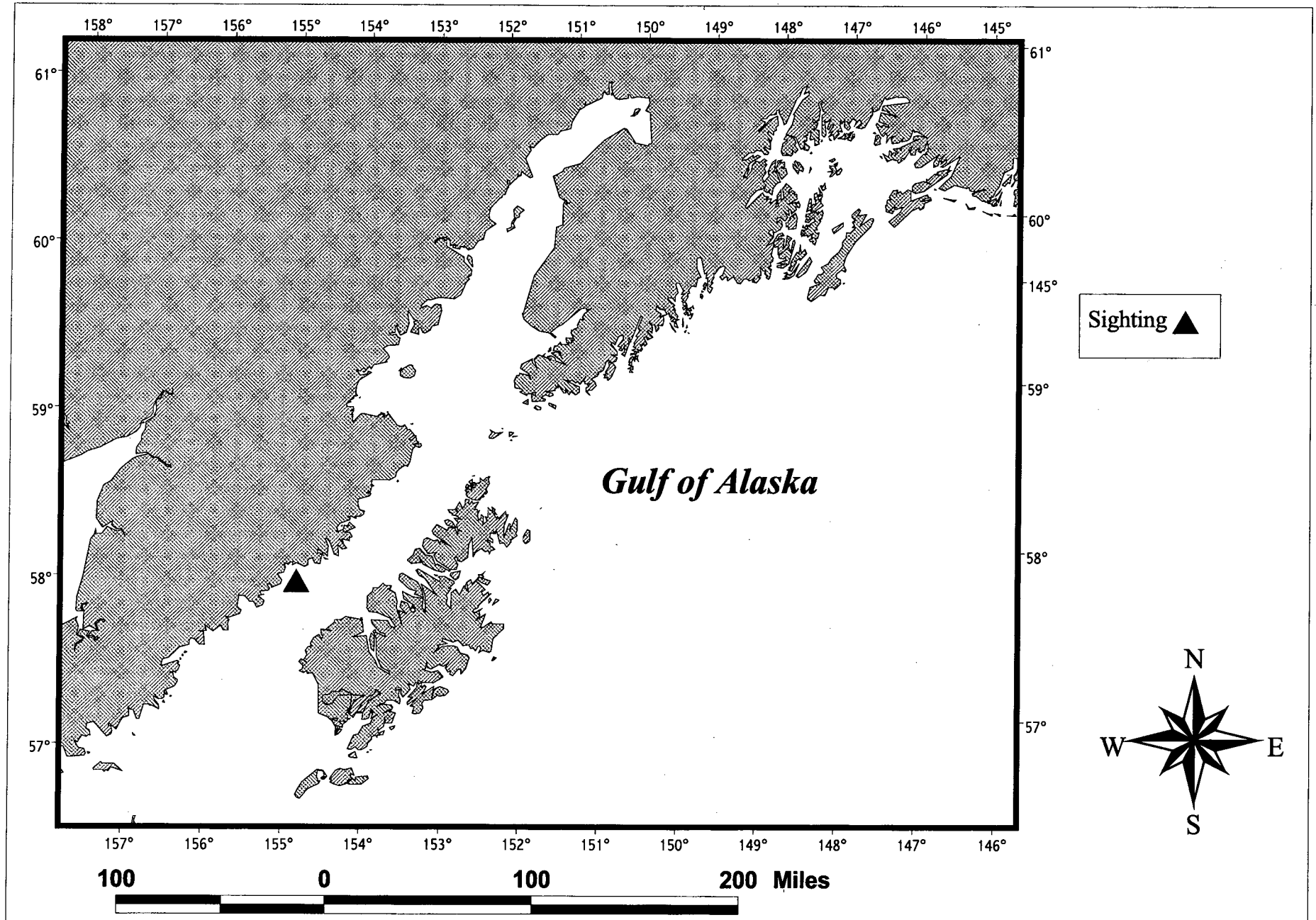

Figure 9. Map of Dall's Porpoise Sighting on 14 March 1997.

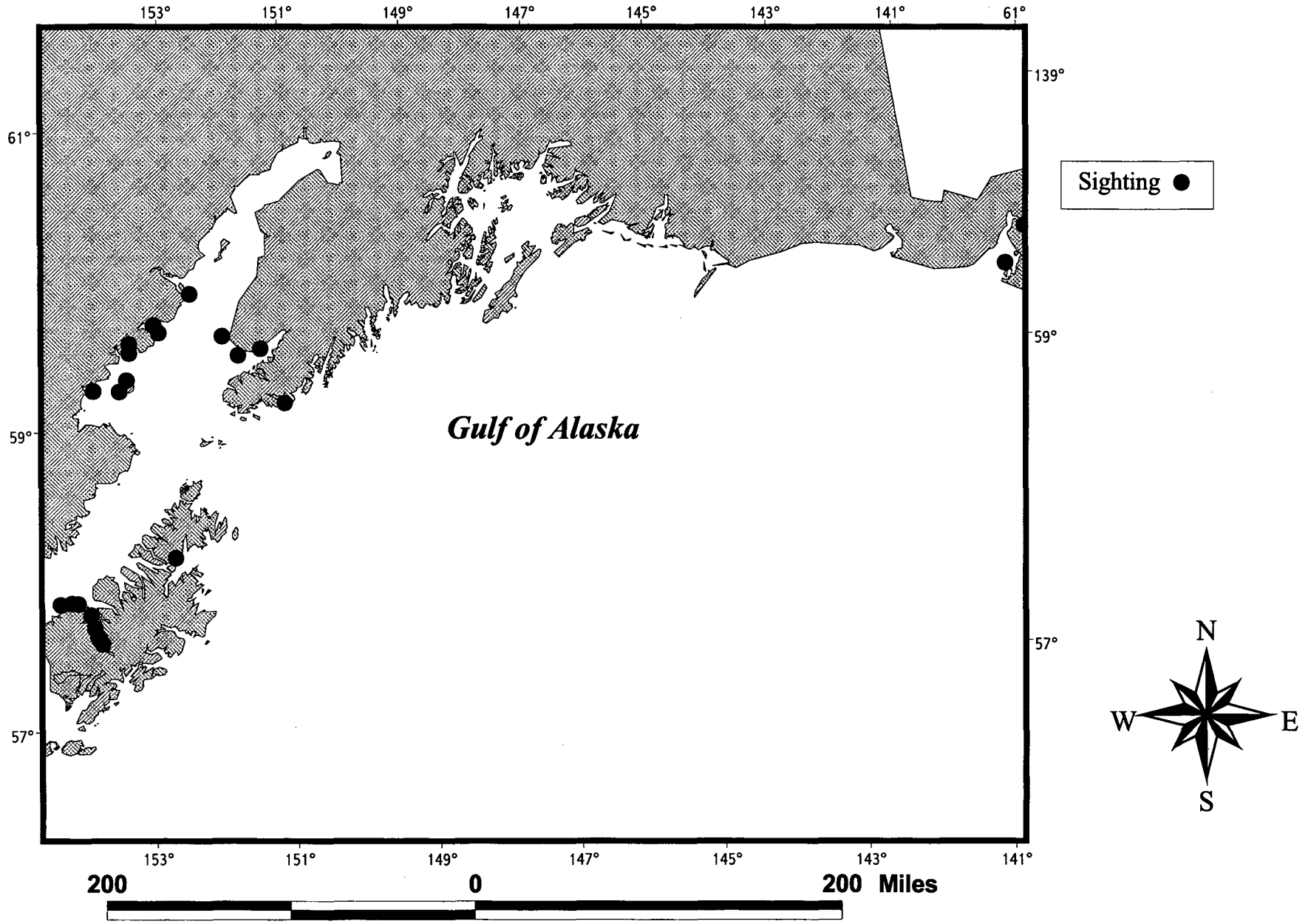

Figure 10. Map of Harbor Seal Sightings on 19, and 28 February and 3, 12, 13, and 14 March 1997.

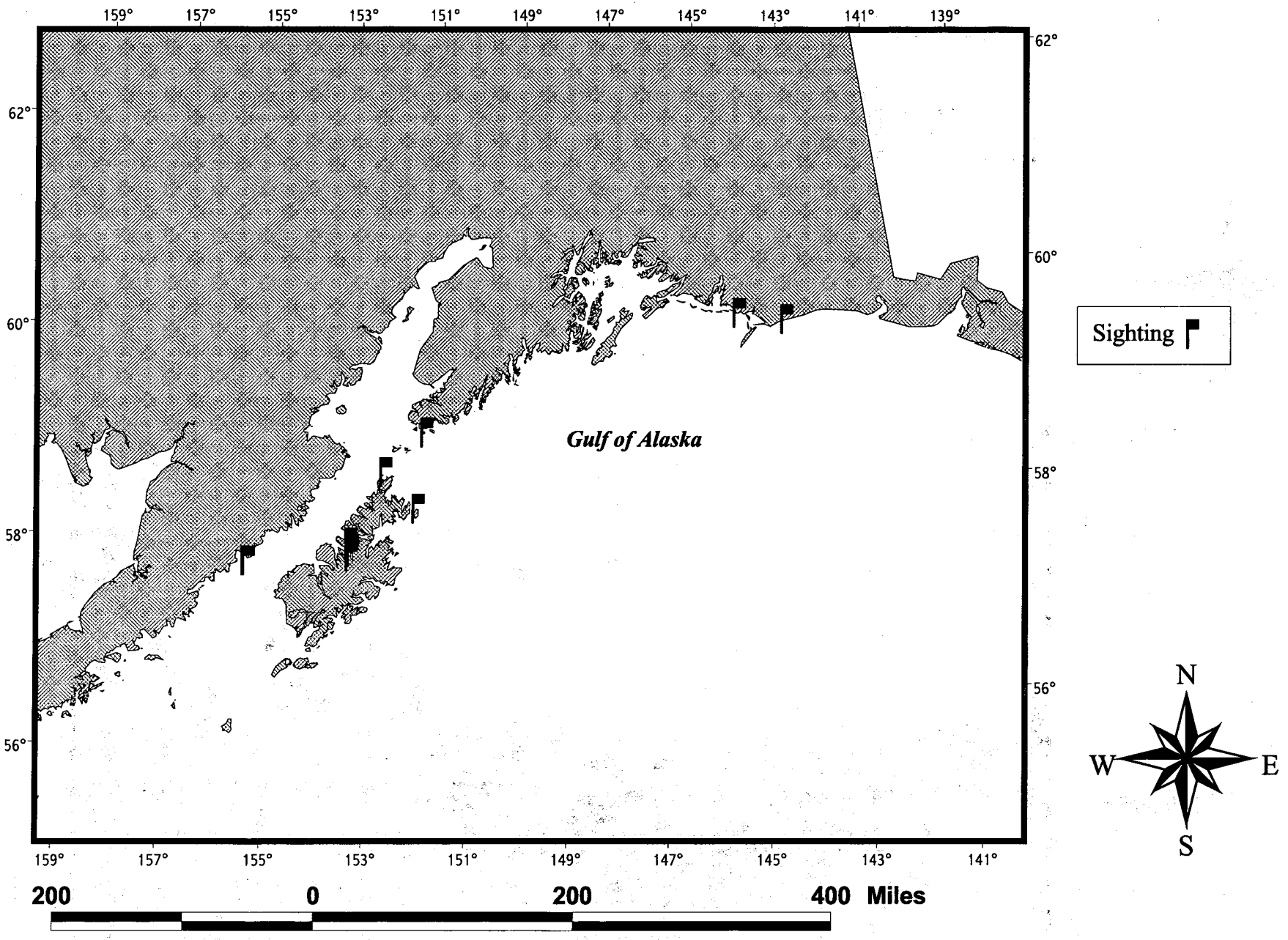

Figure 11. Map of Steller's Sea Lion Sightings on 20, and 28 February and 3, and 14 March 1997.

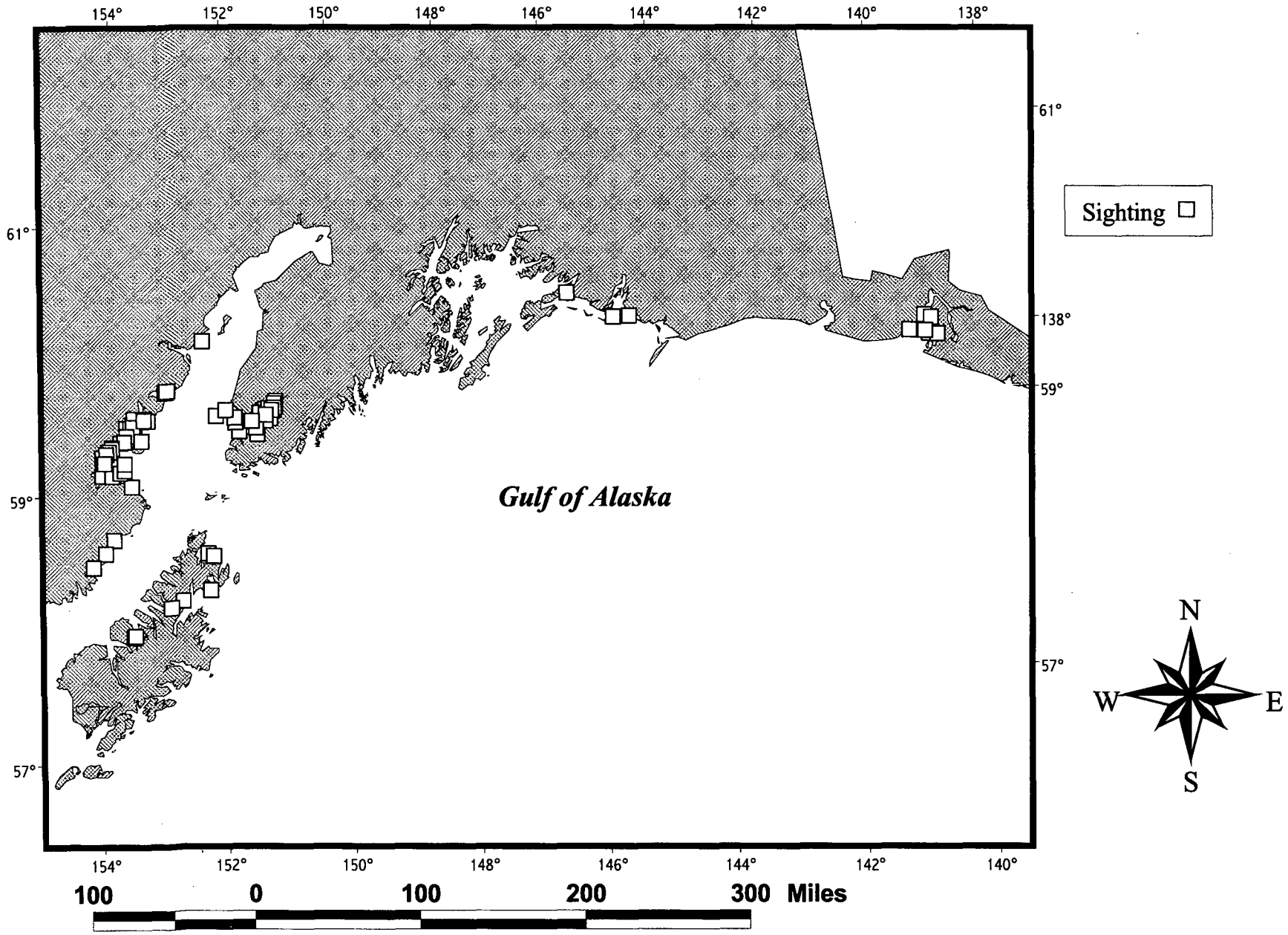

Figure 12. Map of Sea Otter Sightings on 12, 19, 20, and 28 February and 3, 12, 13, and 14 March 1997.

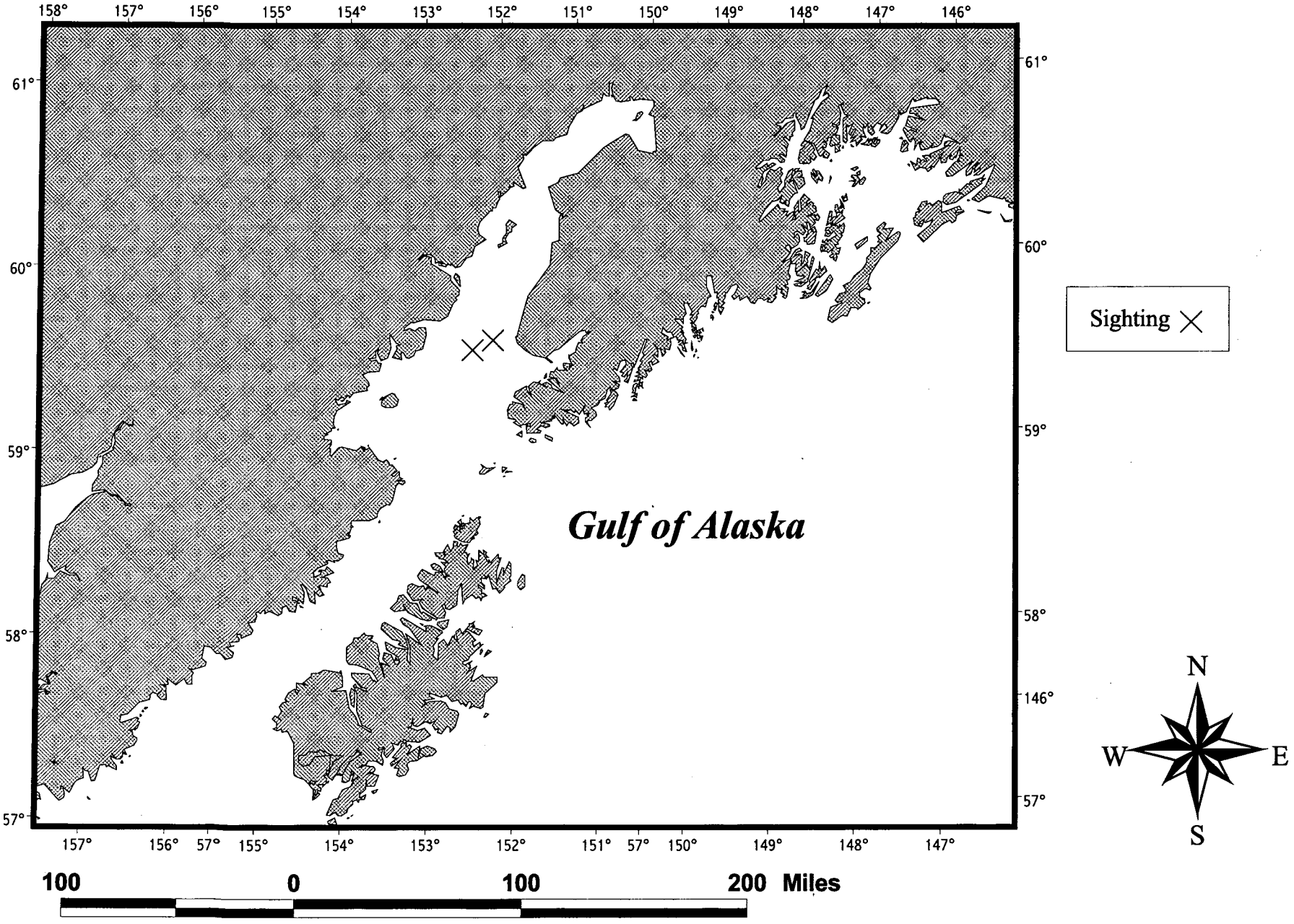

Figure 13. Map of Unidentified Cetacean Sightings on 13 March 1997.

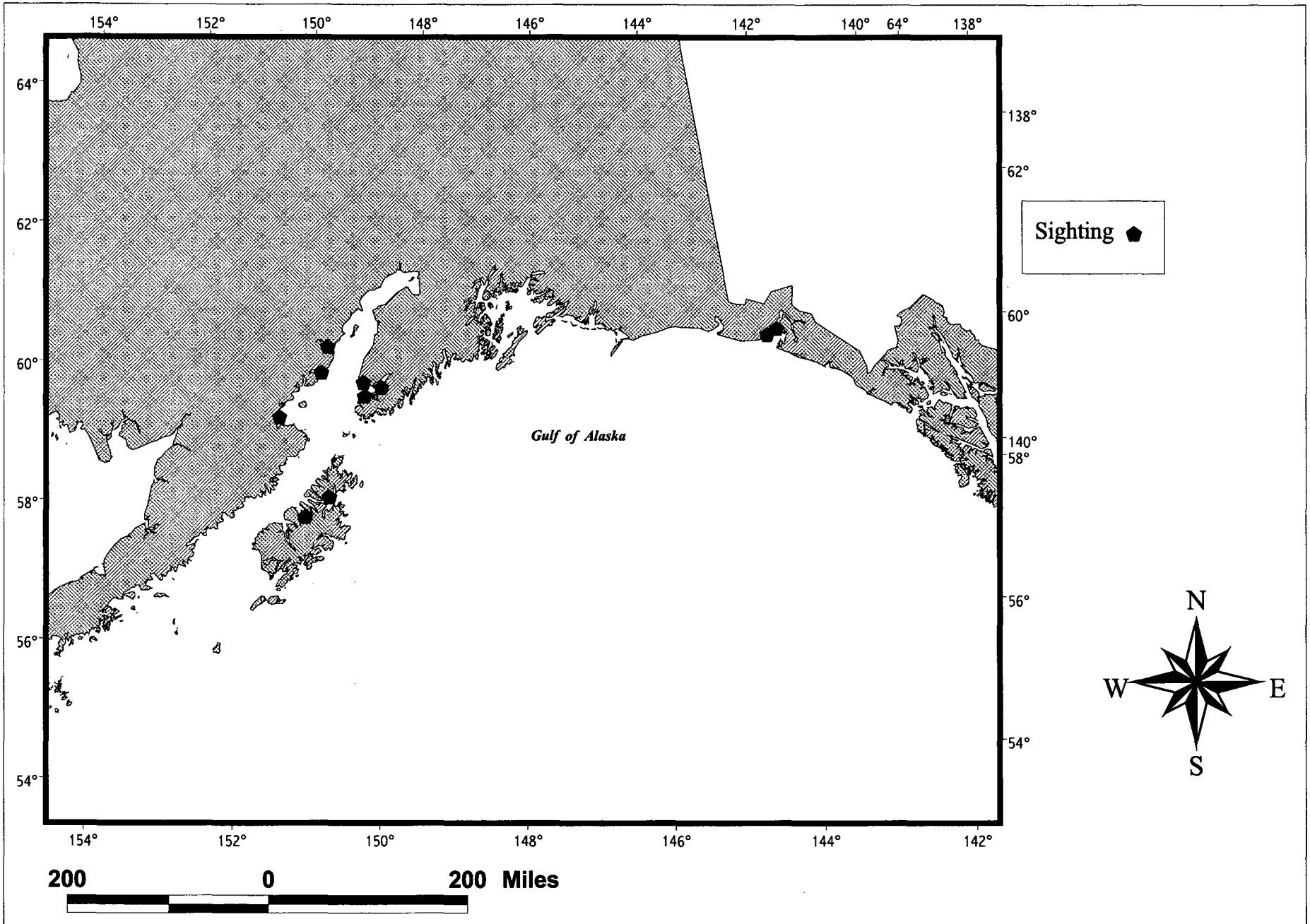

Figure 14. Map of Unidentified Pinniped Sightings on 19, and 28 February and 1, 3, and 12 March 1997.

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